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Introducing the New Materialisms

As human beings we inhabit an ineluctably material world. We live our everyday lives surrounded by, immersed in, matter. We are ourselves composed of matter. We experience its restlessness and intransigence even as we reconfigure and consume it. At every turn we encounter physical objects fashioned by human design and endure natural forces whose imperatives structure our daily routines for survival. Our existence depends from one moment to the next on myriad micro-organisms and diverse higher species, on our own hazily understood bodily and cellular reactions and on pitiless cosmic motions, on the material artifacts and natural stuff that populate our environment, as well as on socioeconomic structures that produce and reproduce the conditions of our everyday lives. In light of this massive materiality, how could we be anything other than materialist? How could we ignore the power of matter and the ways it materializes in our ordinary experiences or fail to acknowledge the primacy of matter in our theories?

Yet for the most part we take such materiality for granted, or we assume that there is little of interest to say about it. Even (or perhaps, especially) in the history of philosophy, materialism has remained a sporadic and often marginal approach. For there is an apparent paradox in thinking about matter: as soon as we do so, we seem to

distance ourselves from it, and within the space that opens up, a host of immaterial things seems to emerge: language, consciousness, subjectivity, agency, mind, soul; also imagination, emotions, values, meaning, and so on. These have typically been presented as idealities fundamentally different from matter and valorized as superior to the baser desires of biological material or the inertia of physical stuff. It is such idealist assumptions and the values that flow from them that materialists have traditionally contested. It is true that over the past three decades or so theorists have radicalized the way they understand subjectivity, discovering its efficacy in constructing even the most apparently natural phenomena while insisting upon its embeddedness in dense networks of power that outrun its control and constitute its willfulness. Yet it is on subjectivity that their gaze has focused. Our motivation in editing this book has been a conviction that it is now time to subject objectivity and material reality to a similarly radical reappraisal. Our respective researches have prompted our own interests in changing conceptions of material causality and the significance of corporeality, both of which we see as crucial for a materialist theory of politics or agency. We now advance the bolder claim that foregrounding material factors and reconfiguring our very understanding of matter are prerequisites for any plausible account of coexistence and its conditions in the twenty-first century.

Our commitment to editing a book on the new materialisms at this time springs from our conviction that materialism is once more on the move after several decades in abeyance and from our eagerness to help define and promote its new directions. Everywhere we look, it seems to us, we are witnessing scattered but insistent demands for more materialist modes of analysis and for new ways of thinking about matter and processes of materialization. We are also aware of the emergence of novel if still diffuse ways of conceptualizing and investigating material reality. This is especially evident in disciplines across the social sciences, such as political science, economics, anthropology, geography, and sociology, where it is exemplified in recent interest in material culture, geopolitical space, critical realism, critical international political economy, globalization, and environmentalism, and in calls for a renewed materialist feminism, or a more materialist queer theory or postcolonial studies. We interpret such developments as signs that the more textual approaches associated with

the so-called cultural turn are increasingly being deemed inadequate for understanding contemporary society, particularly in light of some of its most urgent challenges regarding environmental, demographic, geopolitical, and economic change.

The eclipse of materialism in recent theory can be negatively associated with the exhaustion of once popular materialist approaches, such as existential phenomenology or structural Marxism, and with important challenges by poststructuralists to the ontological and epistemological presumptions that have supported modern approaches to the material world. More positively, materialism's demise since the 1970s has been an effect of the dominance of analytical and normative political theory on the one hand and of radical constructivism on the other. These respective Anglophone and continental approaches have both been associated with a cultural turn that privileges language, discourse, culture, and values. While this turn has encouraged a de facto neglect of more obviously material phenomena and processes, it has also problematized any straightforward overture toward matter or material experience as naively representational or naturalistic. Notwithstanding the capacity of these currently dominant theories to clarify arguments and to alert us to the way power is present in any attempt to represent material reality, however, we believe it is now timely to reopen the issue of matter and once again to give material factors their due in shaping society and circumscribing human prospects. The essays we have commissioned for the current volume are exemplary of some of the new and innovative ways of conceptualizing and responding to this reorientation.

The essays that follow are at the forefront of current thinking about matter; about how to approach it, and about its significance for and within the political. They resonate with our own belief that to succeed, a reprisal of materialism must be truly radical. This means returning to the most fundamental questions about the nature of matter and the place of embodied humans within a material world; it means taking heed of developments in the natural sciences as well as attending to transformations in the ways we currently produce, reproduce, and consume our material environment. It entails sensitivity to contemporary shifts in the bio- and eco-spheres, as well as to changes in global economic structures and technologies. It also demands detailed analyses of our daily interactions with

material objects and the natural environment. What is at stake here is nothing less than a challenge to some of the most basic assumptions that have underpinned the modern world, including its normative sense of the human and its beliefs about human agency, but also regarding its material practices such as the ways we labor on, exploit, and interact with nature.

In labeling these essays collectively as *new* materialisms, we do not wish to deny their rich materialist heritage. Many of our contributors indeed draw inspiration from materialist traditions developed prior to modernity or from philosophies that have until recently remained neglected or marginalized currents within modern thinking. From this perspective their interventions might be categorized as *renewed* materialisms. If we nevertheless persist in our call for and observation of a *new* materialism, it is because we are aware that unprecedented things are currently being done with and to matter, nature, life, production, and reproduction. It is in this contemporary context that theorists are compelled to rediscover older materialist traditions while pushing them in novel, and sometimes experimental, directions or toward fresh applications.

If we pluralize these new materialisms, this is indicative of our appreciation that despite some important linkages between different strands of contemporary work and a more general materialist turn, there are currently a number of distinctive initiatives that resist any simple conflation, not least because they reflect on various levels of materialization. What has been exciting for us as editors has indeed been our sense of encountering the emergence of new paradigms for which no overall orthodoxy has yet been established. Our aim in presenting the twelve essays collected here is accordingly to initiate a debate about the new materialism while on the one hand, leaving its future possibilities relatively open and on the other, eliciting key themes and orientations that we judge to be bringing structure and velocity to current arguments. It has been our ambition here to contribute to a broad-ranging discussion that is emerging about the nature of our materially and discursively fast-changing world by bringing together a number of leading scholars who are engaging critically with it. In introducing their work our more specific aims are to explain the reasons for a widespread sense that rejuvenating materialism is necessary, to outline and contextualize some of the principal questions and modes of thinking that are emerging in response, and to make clear our own commitment to a renewed materialism in social and political analysis.

The Context of the New Materialism

In advocating a new materialism we are inspired by a number of developments that call for a novel understanding of and a renewed emphasis on materiality. Of great significance here are, firstly, twentieth-century advances in the natural sciences. The great materialist philosophies of the nineteenth century, notably those of Marx, Nietzsche, and Freud, were themselves hugely influenced by developments in the natural sciences, yet the new physics and biology make it impossible to understand matter any longer in ways that were inspired by classical science. While Newtonian mechanics was especially important for these older materialisms, for post-classical physics matter has become considerably more elusive (one might even say more immaterial) and complex, suggesting that the ways we understand and interact with nature are in need of a commensurate updating. While we recognize that there can be no simple passage from natural to social science theories or from science to ethics, developments in the former do become disseminated among educated publics; they inform expert witnesses who contribute to relevant policy making, and they gradually transform the popular imaginary about our material world and its possibilities. As Stephen White points out, ontology involves not simply the abstract study of the nature of being but also the underlying beliefs about existence that shape our everyday relationships to ourselves, to others, and to the world: "Ontological commitments in this sense are thus entangled with questions of identity and history, with how we articulate the meaning of our lives, both individually and collectively."[1] From this point of view, thinking anew about the fundamental structure of matter has far-reaching normative and existential implications.

A second and urgent reason for turning to materialism is the emergence of pressing ethical and political concerns that accompany the scientific and technological advances predicated on new scientific models of matter and, in particular, of living matter. As critically engaged theorists, we find ourselves compelled to explore the significance of complex issues such as climate change or global capital and population flows, the biotechnological engineering of genetically modified organisms, or the saturation of our intimate and physical lives by digital, wireless, and virtual technologies. From our understanding of the boundary between life and death and our everyday work practices to the way we feed ourselves and

recreate or procreate, we are finding our environment materially and conceptually reconstituted in ways that pose profound and unprecedented normative questions. In addressing them, we unavoidably find ourselves having to think in new ways about the nature of matter and the matter of nature; about the elements of life, the resilience of the planet, and the distinctiveness of the human. These questions are immensely important not only because they cast doubt on some of modernity's most cherished beliefs about the fundamental nature of existence and social justice but also because presumptions about agency and causation implicit in prevailing paradigms have structured our modern sense of the domains and dimensions of the ethical and the political as such. Recent developments thus call upon us to reorient ourselves profoundly in relation to the world, to one another, and to ourselves.

In terms of theory itself, finally, we are summoning a new materialism in response to a sense that the radicalism of the dominant discourses which have flourished under the cultural turn is now more or less exhausted. We share the feeling current among many researchers that the dominant constructivist orientation to social analysis is inadequate for thinking about matter, materiality, and politics in ways that do justice to the contemporary context of biopolitics and global political economy. While we recognize that radical constructivism has contributed considerable insight into the workings of power over recent years, we are also aware that an allergy to "the real" that is characteristic of its more linguistic or discursive forms—whereby overtures to material reality are dismissed as an insidious foundationalism—has had the consequence of dissuading critical inquirers from the more empirical kinds of investigation that material processes and structures require. While by no means are all the essays in this volume hostile to constructivism, and new materialists countenance no simple return to empiricism or positivism, we share the view current among many critics that our contemporary context demands a theoretical rapprochement with material realism.

Congruent with these imperatives for readdressing materiality, we discern three interrelated but distinctive themes or directions in new materialist scholarship, and we use these to organize the rest of our discussion here. We do so in the hope of setting a framework for ensuing debate, although we are aware that our three themes are somewhat unevenly represented in the essays that follow. First among them is an ontological

reorientation that is resonant with, and to some extent informed by, developments in natural science: an orientation that is posthumanist in the sense that it conceives of matter itself as lively or as exhibiting agency. The second theme entails consideration of a raft of biopolitical and bioethical issues concerning the status of life and of the human. Third, new materialist scholarship testifies to a critical and nondogmatic reengagement with political economy, where the nature of, and relationship between, the material details of everyday life and broader geopolitical and socioeconomic structures is being explored afresh. An important characteristic shared by all three components is their emphasis on materialization as a complex, pluralistic, relatively open process and their insistence that humans, including theorists themselves, be recognized as thoroughly immersed within materiality's productive contingencies. In distinction from some recent examples of constructivism, new materialists emphasize the productivity and resilience of matter. Their wager is to give materiality its due, alert to the myriad ways in which matter is both self-constituting and invested with—and reconfigured by—intersubjective interventions that have their own quotient of materiality.

Towards a New Ontology: Matter, Agency, and Posthumanism

At first glance it seems hard to imagine how we might think about matter differently since its brute "thereness" seems so self-evident and unassailable. It seems literally to provide the solid foundation of existence and to offer itself to an unambiguous ontology. Yet exposing such commonsense and philosophical beliefs as contingent assumptions is a precondition for thinking materiality in new ways. Many of our ideas about materiality in fact remain indebted to Descartes, who defined matter in the seventeenth century as corporeal substance constituted of length, breadth, and thickness; as extended, uniform, and inert. This provided the basis for modern ideas of nature as quantifiable and measurable and hence for Euclidian geometry and Newtonian physics. According to this model, material objects are identifiably discrete; they move only upon an encounter with an external force or agent, and they do so according to a linear logic of cause and effect. It seems intuitively congruent with what common sense tells us is the "real" material world of solid, bounded objects that occupy space

and whose movements or behaviors are predictable, controllable, and replicable because they obey fundamental and invariable laws of motion.

The corollary of this calculable natural world was not, as one might have expected, a determinism that renders human agency an illusion but a sense of mastery bequeathed to the thinking subject: the *cogito* (I think) that Descartes identified as ontologically other than matter. In distinction from the passivity of matter, modern philosophy has variously portrayed humans as rational, self-aware, free, and self-moving agents. Such subjects are not only deemed capable of making sense of nature by measuring and classifying it from a distance but are also aided in such a quest by theories whose application enables them to manipulate and reconfigure matter on an unprecedented scale. The Cartesian-Newtonian understanding of matter thereby yields a conceptual and practical domination of nature as well as a specifically modern attitude or ethos of subjectivist potency.

It has been important briefly to sketch this modern account of matter because in many ways new materialists define their materialism as an alternative to it. As mentioned already, we discern as an overriding characteristic of the new materialists their insistence on describing active processes of materialization of which embodied humans are an integral part, rather than the monotonous repetitions of dead matter from which human subjects are apart. It is important for us to make this difference clear because a further trait of much of the new materialism is its antipathy toward oppositional ways of thinking. As such, its exponents generally decline to locate themselves explicitly through critiques of ontological dualism such as one finds in Cartesianism: they prefer a creative affirmation of a new ontology, a project that is in turn consistent with the productive, inventive capacities they ascribe to materiality itself. The prevailing ethos of new materialist ontology is consequently more positive and constructive than critical or negative: it sees its task as creating new concepts and images of nature that affirm matter's immanent vitality. Such thinking is accordingly post- rather than anti-Cartesian. It avoids dualism or dialectical reconciliation by espousing a monological account of emergent, generative material being. It draws inspiration from exploring alternative ontologies, such as that of Spinoza, whose work emerged more or less contemporaneously with Cartesianism in early modernity yet which until recently enjoyed a far more subterranean or subjugated existence.[2] This new materialist ontology is evident in a number of the essays that follow.

Given the lively immanence of matter associated with new materialisms, it is unsurprising that they should be emerging contemporaneously with a new vitalism.[3] Gilles Deleuze, whose work has been influential in much of the new ontology, did not count himself a materialist despite his radical empiricism and some evocative descriptions of materialization. But he was emphatic that everything he wrote "is vitalist, at least I hope it is."[4] Hostilities between these respective approaches have traditionally been staged as an opposition between mechanistic and vitalist understandings of (dead versus lively) matter. Typically, they were resolved by distinguishing between the sort of mechanical, inorganic matter described by physicists and the evolving organic systems described by biologists. But new materialists are attracted to forms of vitalism that refuse this latter distinction. They often discern emergent, generative powers (or agentic capacities) even within inorganic matter, and they generally eschew the distinction between organic and inorganic, or animate and inanimate, at the ontological level. Jane Bennett has provocatively labeled this an "enchanted materialism," ascribing agency to inorganic phenomena such as the electricity grid, food, and trash, all of which enjoy a certain efficacy that defies human will.[5]

Even natural science, whose influence on some of these new accounts of matter is far from nugatory, now envisages a considerably more indeterminate and complex choreography of matter than early modern technology and practice allowed, thus reinforcing new materialist views that the whole edifice of modern ontology regarding notions of change, causality, agency, time, and space needs rethinking. Perhaps most significant here is the way new materialist ontologies are abandoning the terminology of matter as an inert substance subject to predictable causal forces. According to the new materialisms, if everything is material inasmuch as it is composed of physicochemical processes, nothing is reducible to such processes, at least as conventionally understood. For materiality is always something more than "mere" matter: an excess, force, vitality, relationality, or difference that renders matter active, self-creative, productive, unpredictable. In sum, new materialists are rediscovering a materiality that materializes, evincing immanent modes of self-transformation that compel us to think of causation in far more complex terms; to recognize that phenomena are caught in a multitude of interlocking systems and forces and to consider anew the location and nature of capacities for agency.

Conceiving matter as possessing its own modes of self-transformation, self-organization, and directedness, and thus no longer as simply passive or inert, disturbs the conventional sense that agents are exclusively humans who possess the cognitive abilities, intentionality, and freedom to make autonomous decisions and the corollary presumption that humans have the right or ability to master nature. Instead, the human species is being relocated within a natural environment whose material forces themselves manifest certain agentic capacities and in which the domain of unintended or unanticipated effects is considerably broadened. Matter is no longer imagined here as a massive, opaque plenitude but is recognized instead as indeterminate, constantly forming and reforming in unexpected ways. One could conclude, accordingly, that "matter becomes" rather than that "matter is." It is in these choreographies of becoming that we find cosmic forces assembling and disintegrating to forge more or less enduring patterns that may provisionally exhibit internally coherent, efficacious organization: objects forming and emerging within relational fields, bodies composing their natural environment in ways that are corporeally meaningful for them, and subjectivities being constituted as open series of capacities or potencies that emerge hazardously and ambiguously within a multitude of organic and social processes. In this monolithic but multiply tiered ontology, there is no definitive break between sentient and nonsentient entities or between material and spiritual phenomena.

So far we have emphasized the extent to which new materialist ontologies are rejecting the presuppositions that underpin modern philosophy and the classical sciences that have been its ontological conjugate. But we also want to draw attention to ways in which the natural sciences have themselves been problematizing the notion of matter and thus undermining classical ontologies while inspiring the sort of radical reconceptions of matter we associate with new materialisms. In order to explain such developments, we need to undertake a brief excursus through modern physics. What we want to emphasize here is the way matter as such has become both less conceptually important and more ontologically negligible, while at the same time its very possibility of being has become more elusive.

When Newton laid the foundations of modern physics in the seventeenth century, he realized that one of the most important properties of a material object is its mass. While for laypersons mass is generally en-

visaged as equivalent to size or weight, for Newton it was the property of an object or body that makes it difficult to accelerate (its inertia). What sets an object in motion, he concluded, are forces of attraction and repulsion that act upon it. Broadly speaking, it would be the task of classical (mechanical) physics to examine the interactive relationships between bodies and the forces that act upon them. Although physics began with ordinary objects, it developed as a science of forces and movements that are less obviously material yet from which matter is inseparable. According to this mechanical model, when a force moves something, it performs work, and the ability of a system to perform work is measured as energy. Einstein's theory of relativity would show that mass and energy can be converted into one another and are in this sense equivalent: a theory that further subverted the idea that solid matter persists as such.

In 1905 Einstein also produced the first persuasive argument for the existence of atoms (although there were atomists even among the pre-Socratics); gross matter itself now became a more negligible component of the cosmos. For the microscopic atom consists of a positively charged nucleus surrounded by a cloudlike, three-dimensional wave of spinning electrons.[6] And if most of the atom's mass resides in its nucleus, this is itself but a tiny percentage of the atom's volume. The atom is a smeared field of distributed charge whose subatomic particles are less like planets in solar orbit than they are like flashes of charge that emerge from and dissipate in the empty space from which they are composed. Even when vast numbers of atoms are assembled in the kind of macrostructures we experience in the "condensed matter" of the perceptible world, their subatomic behavior consists in the constant emergence, attraction, repulsion, fluctuation, and shifting of nodes of charge: which is to say that they demonstrate none of the comforting stability or solidity we take for granted. While this does not of course mean that the objective world we inhabit is mere illusion, it does suggest that even—or especially—the most ardent realist must concede that the empirical realm we stumble around in does not capture the truth or essence of matter in any ultimate sense and that matter is thus amenable to some new conceptions that differ from those upon which we habitually rely.

On entering the realm of subatomic particles one finds an even more quixotic and elusive sense of matter. In little more than a century, well over one hundred subatomic particles have been discovered (or, as radical

constructivists might argue, invented), yet this quantum realm seems scarcely less strange than that of medieval theology. For instance, here matter is described as being composed of two kinds of particle, quarks and leptons, which together compose fermions. In the Standard Model, quarks are the building blocks of the universe, although they are not really distinct or discrete quantifiable "units" because the states that constitute them as "particles" are variable, a variability that produces the electrical charge of which they are composed.[7] When quarks interact inside a proton, it is the massless "gluon" that is credited with holding them together. But while there is no accepted theory about why particles exist in the way that they do or how their characteristics might be rendered more predictable for the purposes of instrumentalization, there is agreement that any account of matter also requires an inference of short-lived virtual particles that flash in and out of existence, clustering around the more enduring particles whose properties they alter. Interestingly, what causes mass remains something of a mystery: a type of particle called a Higgs boson is hypothesized as having the capacity to make space "sticky" in a manner that we experience as mass. A popular science book lyrically declares that the "material world is fashioned from frozen matter."[8] However, the "freezing" mechanism remains an enigma. In sum, "particles" are more like vibrating strands of energy, strings that oscillate in eleven dimensions, than like small versions of the sand grains suggested by their name. In any case, physicists infer that most of the universe is composed of the so-called "dark matter" that is needed to explain the gravitational pull manifest in the galaxy, and they claim that only some 10 to 15 percent of the theoretically required material is visible. Indeed, recent astronomical research suggests that as little as 3 or 4 percent of the universe may be composed of ordinary matter, while something called "dark energy" or "quintessence" is invoked to explain an expanding universe.[9]

The point of this synopsis for new materialisms is to show that theoretical physics' understanding of matter is now a long way from the material world we inhabit in our everyday lives and that it is no longer tenable to rely on the obsolete certainties of classical physics as earlier materialists did. Granted, one can still discern in physics' terminology of fundamental forces and elementary particles the holy grail of discovering the fundamental constituents of matter. But forces, charges, waves, virtual particles, and empty space suggest an ontology that is very different from the sub-

stantialist Cartesian or mechanistic Newtonian accounts of matter. And while scientific theories cannot simply be imported into philosophy, the tropes and rhythms they suggest can transform theoretical discourses. In fact, it is evident from new materialist writing that forces, energies, and intensities (rather than substances) and complex, even random, processes (rather than simple, predictable states) have become the new currency. Given the influence of classical science on the foundations of modern political thought, it is germane for new materialists to ask how these new conceptions of matter might reconfigure our models of society and the political. Furthermore, the practical applications of the new physics, such as the ones scientists anticipate in nanotechnology or quantum computing, may soon have significant material effects upon our bodies and our working or recreational environments.

While particle physics has radically changed our sense of the composition of matter, other currents within physics, notably chaos and complexity theory, are also transforming our sense of the patterns or characteristics of matter's movements.[10] They, too, are undermining the idea of stable and predictable material substance, hastening a realization that our natural environment is far more complex, unstable, fragile, and interactive than earlier models allowed. Complexity theory is playing an increasingly significant role in understanding sociomaterial processes, too, because it appreciates their inextricability from a wider natural environment.

During the 1970s scientists turned their attention to nonlinear dynamic systems that seem structured yet unpredictable and which mainstream physics had tended to ignore because they are inexplicable in mechanistic terms. As James Gleick remarks of chaos theory, "fractals and bifurcations, intermittencies and periodicities . . . are the new elements of motion, just as, in traditional physics, quarks and gluons are the new elements of matter. To some physicists chaos is a science of process rather than state; of becoming rather than being."[11] While for chaos theory apparently random effects have an extremely complex, nonlinear provenance, for complexity theory the emphasis is on unpredictable events that can catapult systems into novel configurations. For both, the physical world is a mercurial stabilization of dynamic processes. Rather than tending toward inertia or a state of equilibrium, matter is recognized here as exhibiting immanently self-organizing properties subtended by an intricate filigree of relationships.[12] Tumbleweeds, animal species, the planetary ecosystem, global

weather patterns, but also new social movements, health and crime, and economics are all amenable to the kind of explanation developed by complexity theorists.[13] Such phenomena are now understood as emergent systems that move with a superficially chaotic randomness that is underlain by patterns of complex organization, which in turn function as foci for further organization and development. Such systems are marked by considerable instability and volatility since their repetition is never perfect; there is a continuous redefining and reassembling of key elements that results in systems' capacities to evolve into new and unexpected forms. Their logic of proliferation is again resonant with new materialist senses of contingent, immanent self-transformation.

If such patterns of organization are not predictable or determinable, this is in part because there is no longer a quantitative relationship between cause and effect. For any emergent material configuration, infinitesimally small causes can transform successive conditions for interaction among elements such that they end up having massive but unanticipated effects.[14] What is famously known as "the butterfly effect" in weather patterns, for example, refers to the possibility that a slight disturbance of air precipitated by a flapping of diaphanous wings could set off a succession of complex meteorological and atmospheric changes that trigger a hurricane in another hemisphere. In such cases it is not, as John Urry explains, that "the sum is greater than the parts — but that there are system effects that are different from their parts. [The] components of a system through their interaction 'spontaneously' develop collective properties or patterns. . . . These are non-linear consequences that are non-reducible to the very many individual components that comprise such activities."[15] Because innumerable interactions between manifold elements that produce patterns of organization successively *transform* those elements, it is impossible either to predict outcomes in advance or to repeat an event.[16] Since, moreover, determination within dynamic systems is nonlinear, terminal effects cannot be construed as possibilities that were already latent in some initial moment.[17] Again, one can discern in such material productivity a posthumanist sense of material agency and a limitation of humans' agentic efficacy.

In outlining elements of a new materialist ontology in this section we have drawn attention to the vibrant, constitutive, aleatory, and even immaterial indices that characterize the new senses of materiality and mate-

rialization evident in current scientific and philosophical thinking. At this level we have alluded to indirect implications that we believe such dynamic ways of conceptualizing matter have for our most basic ideas about humanity and agency and thus for politics and society. We believe there is much work for politically minded materialists to do here. In considering a second direction of the new materialism in the next section, we examine more directly some of the already urgent political and ethical challenges presented by recent developments in the natural sciences and their application. Our attention shifts here from the physical to the biological sciences of matter.

Bioethics and Biopolitics

There is something unprecedented about our contemporary situation in which the prefix "bio-" proliferates. Molecular biology and its cognates are achieving the sort of privileged status previously reserved for theoretical physics, fuelled by a revolution in biomedicine and biotechnology. This is in turn propelling an unprecedented range of issues concerning the nature and status of living matter onto the agenda of critical thinkers and defining what we see as a second major strand of a *new* materialism. While there are many relevant initiatives developing here, we draw attention to four in particular. These are the spillover effects and applications of complexity theory, a new focus on the body and its role in politics, a number of bioethical controversies that again touch on some fundamental questions about the distinctiveness of the human and of moral agency, and biopolitical concerns regarding new possibilities for and configurations of biopower that are also shifting perspectives on and definitions of politics.

In the previous section we considered the importance of complexity theory for new ways of understanding dynamic physical systems. We now draw attention to some of the broader ways this approach is affecting the treatment of biological organisms and their relationship to other aspects of their material environment. In the life sciences as well as in physics, material phenomena are increasingly being conceptualized not as discrete entities or closed systems but rather as open, complex systems with porous boundaries.[18] Such theories challenge earlier distinctions between physical and biological systems, drawing attention to their interaction and transforming the way scientists think of biological matter and its imbrica-

tion in the social. Whether we are talking about unforeseen mutations, trajectories of illness or distress, patterns of global climate change, or the vagaries of the international economy, the open systems or ecological perspective provokes us to consider (and find better ways to think about) the interactions between socioeconomic and environmental conditions and biological and physiological or physical processes.[19] As with postclassical physics, the new biology facilitates new ways of thinking about matter and its effects on our visceral-social economy; these in turn pose significant challenges for our modern conceptions of moral and political agency.

Approaches to global warming offer one example of such thinking as well as exemplifying a new emphasis on the material dimensions of social existence. As instances of the deleterious effects of rapid climate change mount, there is increasing attention to the way seemingly insignificant daily activities work synergistically to produce effects that devastate the global environment. The enormous macroscopic impact of myriad mundane individual actions provokes critical, political, and legal reflection not only upon the nature of causation but also upon the nature of the responsibilities that individuals and governments have for the health of the planet. The unequal effects of occurrences such as rising sea levels and drought associated with climate change also pose serious questions for advocates of social justice, especially in light of the mismatch between actions, intentions, and consequences. Questions regarding the definition, the ethical value, and the moral and political culpability of the human, the nonhuman, and the virtually human become especially vexed as concerns about environmental degradation and dwindling natural resources acquire an urgency unimaginable just a generation ago. Such questions not only prompt reflection upon who or what should be taken as the subjects and objects of ethical, legal, or political action; they also suggest a need for new ways of theorizing risk and accountability as humans meddle more vigorously in natural processes and thus become more materially, if not yet ethically, responsible for outcomes.[20]

A rather different example of the blurring of clear boundaries or distinctions between bodies, objects, and contexts is evident in the myriad biotechnological and digital technological developments that are changing the landscape of the living. Genetically modified organisms now feed much of the world and fuel its vehicles; they seem destined to change forms of agricultural production and energy use irrevocably. Wondrous

medical and digital prostheses, too, now enable, enhance, and enrich our physical and social lives in many ways. Whether it is pacing the heartbeat, dispensing medication, catching the news on a podcast, elaborating an internet-based community, finding directions via the web or GPS, or sending family love via wireless communications, digital technologies have become a part of our lives and of who we are. It is not merely the case that more people are becoming something akin to Donna Haraway's cyborg (a fusion of human and technology).[21] More radically, as N. Katherine Hayles argues, our saturation with networked and programmable media shunts us out of the realm of the human and into the realm of the posthuman: "an informational pattern that happens to be instantiated in a biological substrate."[22] Such changes have significant implications for our understanding of the human as a distinctive biological or moral entity.[23]

A further example of the way new materialists are being obliged to recognize the interactions of different orders of matter is evident in genetics. For some geneticists, insight into the porosity of organisms' boundaries has been prompted by the discovery that there is a considerably smaller number of genes in the human genome than was initially anticipated. Before mapping the genome, many had imagined that each gene produces a corresponding protein that is responsible for a specific trait: a distinctly mechanistic conception of the work of genes.[24] The assumption that followed was that once all the genes were known and mapped, humans might be able precisely to predict and control their organic life process. The unexpectedly small number of genes that geneticists actually found compelled them to abandon the explanatory framework of simple genetic determinism and to acknowledge that an organism's particular properties and susceptibilities are produced through complex interactions between genes and a host of other factors such as hormones, neurochemical stimuli, dietary intake, and environmental conditions. This has in turn prompted a reappraisal of organisms as discrete, autonomous units with relatively tidy, bounded causal patterns. It has also provided an incentive to study gene behavior using more complex ideas of "systems-biology," epigenomics, and gene-ecology.[25]

While such conclusions reinforce some of the new physics' challenges to older Cartesian-Newtonian conceptions of matter and to correspondingly Promethean ideas of human mastery over nature, they also suggest that previously separate fields such as those of medical and political science

must work together more closely since in such models the body is also understood as an open system and one whose interactions with its environment significantly shape its neurochemical functioning and the trajectory of disease and health. Indicative of such cooperation is the way exponents have used an "open developmental systems approach" to examine the effects of successive social contexts on differential health outcomes over time[26] or to reconsider patterns of social behavior, for example, by pointing to suggestive correlations between the demographics of criminal behavior and the geographic distribution of industrial pollutants. Inasmuch as the aggregated effects of environmental toxins can be shown to have deleterious effects upon judgment and behavior, the implication is that cleaning up the environment or changing diet may be more efficacious than incarcerating disaffected urban youth.[27] Such examples show the important policy-making implications of new ways of understanding the internal dynamics of material processes as well as suggest how social stratifications such as class affect and cycle through apparently natural processes.

Biotechnological developments may also have more indirect political repercussions whose complex unfolding it is difficult to predict or control. At issue here is the complex interrelationships between open systems that enable events in one "ecodomain" to precipitate events in another. For instance, petroleum is not only a pillar of the global economy but also, and consequently, a central feature of current foreign policy and international relations. Accordingly, recent efforts to create synthetic bacteria that might produce biofuel could generate considerable macrolevel effects: to end dependence on fossil fuels might not only catapult a different configuration of economies to international prominence, but such a shift in the balance of economic powers might also transform the imperatives that guide international diplomacy and foreign relations, shift the direction of capital flows, and reconfigure the topography of economic migration.

Insofar as politics is understood as an ongoing process of negotiating power relations (a perspective, we suggest, that is particularly congruent with materialism) rather than as a merely formal constitutional, institutional, or normative edifice, political analysts cannot afford to ignore the way biotechnological developments and their corporate owners are implicated in the entire geopolitical system. Clearly, too, developments in biomedicine and biotechnology prompt renewed reflection on the rela-

tionship between science and politics. If, for example, biotechnological developments have potentially far-reaching political, economic, and ethical implications, is there not a need for more public, political dialogue about the goals, uses, and ownership of research? Yet if science is brought explicitly into a public forum, what kinds of arguments are to be accorded merit: those informed by secular science, or economic interest, or religious faith?[28]

We have noted that complexity theories and developing technologies are rendering bodies less discrete qua organic entities distinct from physical, environmental, or technologically refabricated matter. As a consequence, when researchers use complexity theories in their consideration of biomatter, they are very quickly led to incorporate into their analyses a host of ethical and political issues. However, a second aspect of the new biomaterialism that we wish to draw attention to is an increasing acknowledgment within theories of politics—and especially in theories of democracy and citizenship—of the role played by the body as a visceral protagonist within political encounters. We suggest not only that this emphasis on bodily processes and corporeal capacities is a notable element within some of the new materialisms but also that it is indispensable to any adequate appreciation of democratic processes.

For new materialists, no adequate political theory can ignore the importance of bodies in situating empirical actors within a material environment of nature, other bodies, and the socioeconomic structures that dictate where and how they find sustenance, satisfy their desires, or obtain the resources necessary for participating in political life. This is in fact something that feminists and class theorists have often insisted upon, and we would add in this context only our concern that such material dimensions have recently been marginalized by fashionable constructivist approaches and identity politics. Of course, the latter have had a good deal to say about the body and its imbrication in relationships of power, but we are not convinced that they pay sufficient attention to the material efficacy of bodies or have the theoretical resources to do so. From this perspective we draw attention to a new materialist predilection for a more phenomenological approach to embodiment. In addition to focusing on the way power constitutes and is reproduced by bodies, phenomenological studies emphasize the active, self-transformative, practical aspects of corporeality as it participates in relationships of power. They find bodies exhibiting

agentic capacities in the way they structure or stylize their perceptual milieu, where they discover, organize, and respond to patterns that are corporeally significant. Such theories thus introduce elements of creative contingency, meaning, difference, efficacy, and a limited freedom for improvisation or resistance into nature before cognition begins. In other words, they complement ontologies of immanently productive matter by describing how living matter structures natural and social worlds before (and while) they are encountered by rational actors. Again, they give materiality its due.

This emphasis on corporeality further dislocates agency as the property of a discrete, self-knowing subject inasmuch as the corpus is now recognized as exhibiting capacities that have significant effects on social and political situations. Thus bodies communicate with other bodies through their gestures and conduct to arouse visceral responses and prompt forms of judgment that do not necessarily pass through conscious awareness. They are significant players in games of power whenever face-to-face encounters are involved, such as in deliberative models of democracy. Paying attention to corporeality as a practical and efficacious series of emergent capacities thus reveals both the materiality of agency and agentic properties inherent in nature itself.[29] Both have important implications for the way we understand political processes.

In this emphasis on corporeality, we also glimpse one of the most distinctive characteristics of the new materialist ontologies: their avowed posthumanism. They displace what Giorgio Agamben calls "the anthropological machine of humanism."[30] While new materialists' conceptualization of materialization is not anthropocentric, it does not even privilege human bodies. There is increasing agreement here that all bodies, including those of animals (and perhaps certain machines, too), evince certain capacities for agency. As a consequence, the human species, and the qualities of self-reflection, self-awareness, and rationality traditionally used to distinguish it from the rest of nature, may now seem little more than contingent and provisional forms or processes within a broader evolutionary or cosmic productivity. If human perfection or redemption is no longer understood as the destiny of history, neither is it the goal of evolution. While it does not follow that cognitive capacities for symbolism or reflexivity are no longer valued, the new materialism does prompt a way of reconsidering them as diffuse, chance products of a self-generative nature

from which they never entirely emerge. It further invites acknowledgment that these capacities are manifest in varying degrees across different species of being, that they are indelibly material in their provenance, that human intelligence emerges within a spectrum of vital materializations, and that rights—for example in the case of animals—can no longer automatically be understood solely as human rights.[31] From this perspective, the difference between humans and animals, or even between sentient and nonsentient matter, is a question of degree more than of kind. Recalling the earlier quote by Stephen White, it is clear both that thinking in these new ways will have a significant impact on our normative assumptions and that normative theory itself needs to become more engaged with the changing material context in which it considers concepts such as social justice.

The third biodimension we recognize as a vital element of the new materialism concerns a range of specifically bioethical challenges that arise from the way living matter and its definitions are being materially and discursively transformed. At a practical level, biosciences and biotechnologies yield gene therapies, microsurgeries, assisted reproductive technologies, life-saving prosthetic devices, and pharmaceutical mood and behavioral adjusters, as well as cloning, genetically modified crops, and gene hybridization. All such biotechnological developments purport to enhance, extend, or give us control over the hidden depths and minutiae of life, and in this sense they contribute only to a modern will to dominate nature. Yet their negative externalities and their inability to control the forces they unleash are also apparent, opening up a minefield of ambiguous ethical and political possibilities (such as biodisasters and bioterrorism). As both promises and threats, such developments summon new materialists to confront pressing bioethical and biopolitical questions about the nature of responsibility and property ownership, the relationship of humans to the world, the very definition of the human in relation to the nonhuman, and the way shifting definitions of nature and life affect subjective experiences of selfhood or the forms and domains of politico-juridical regulation. For as Nikolas Rose points out, while biotechnologies bring new tools and procedures for classifying, measuring, monitoring, and modifying biological stuff—genes, carbohydrates, amino acids, cholesterols, cell structure, facial profiles, heart rates, and so forth—within our daily routines, so individuals' experiences of themselves as subjects and agents of their own lives are also transformed.[32] This, too, raises significant

questions regarding the distribution of material resources and of access to new biotechnologies that literally promise more life, in terms of longer, healthier life spans, to the privileged.[33]

At the same time, it is becoming evident that changes in living matter are rendering obsolete many of the conventional ethical categories used to evaluate them. As scientists succeed in bridging species, artificially creating and extending human and animal life, and manipulating and synthesizing genes to create new life forms, they muddle the concepts and boundaries that are the ground for much ethical and political thinking. Smart synthetic life forms, for example, challenge our very conception of ourselves as persons since distinctions between intelligent and unintelligent life have been crucial in efforts to distinguish humans from other animals and to justify humans' instrumental appropriation of material resources.[34] If scientists have the capacity to create life from matter, and if such life forms can take the form of intelligent agents able to carry out specific tasks, then previously essential distinctions are rendered less viable, and the norms that depend upon them become less intelligible. This raises questions pertaining to life forms themselves. What kind of ethical value should we attribute to synthetic life forms and according to what criteria? If synthetic life forms act in unexpected and unacceptable ways, we need to consider who is, should, and can be held responsible. In this domain, science fiction may well be ahead of mainstream ethics.[35]

The final aspect of new biomaterialist inquiry that we see as important concerns the emergent modes of biopower afforded by biotechnological developments. To be sure, some of these questions center on the ownership of the new patents and the considerable power accumulated by global corporations which have no accountability to the world's population beyond their own shareholders but which are acquiring extensive control over the food, water, and energy that are the very condition of human survival. This is one reason why in the next section, we advocate renewed attention to international political economy. But our particular interest here is to identify the importance for new materialists of the unprecedented micropowers that biotechnology is engendering. As Rose warns, theorists need to be alert to the ways in which the culture and norms of the contemporary biopolitical context provide opportunities for controlling groups and individuals in new ways. Readers of Foucault, such as Rose, are well aware of the biopolitical interest the modern state has taken in

managing the life, health, and death of its populations since the eighteenth century. The state's management of fertility rates, marriage and funeral rites, epidemics, food hygiene, and the nation's health is not new or even necessarily malign. But there has until recently been a dearth of attention paid to this material aspect of power that justifies incursions into the most intimate habits of daily existence and thus warrants critical investigation. Similarly, while the bevy of new biotechnological capacities, as well as movements to ameliorate environmental degradation, are to be welcomed in many ways, the tools, practices, policies, and regulations they occasion must also be considered critically in terms of their capacity to facilitate and encourage more intensive interventions in the everyday minutiae of our material lives. For even as we might welcome a broad transformation in lifestyle according to an ecoethos, the norms, incentives, and identities people adopt inevitably become part of new disciplinary formations whose contours need to be specified and traced.

Biotechnological developments also raise specifically political questions about what life is and how far it can or must fall under state control. According to Agamben, contemporary history has witnessed the "growing inclusion of man's natural life in the mechanisms and calculations of power."[36] As we see in debates about fetal rights, abortion, stem cell research, and euthanasia: medical, scientific, or religious accounts of the boundary between life and death are currently becoming further enmeshed with issues surrounding sovereignty because increasingly the state must legislate on matters that were formerly left to God or nature. Seemingly technical questions about biological life processes enter the political order because the state must frequently make decisions about the worthiness of different lives. Assisted suicide, for example, demonstrates how the very definitions of life and death are thrown into the political arena once decisions about survival rely on medical expertise.[37] Agamben himself explains how the condition called *coma dépassé* (a state in which vital functions cease but life-support machines maintain the comatose, artificially surviving body in a limbo between life and death) has obliged legislators to redefine death by shifting the final border of life. In the face of this "bare life" that is sustained and controlled by human technologies, nature is no longer a reliable guide to the difference between life and death. Instead, the distinction becomes a scientific, medical, and ethicopolitical question.[38]

The current interest among social scientists and policymakers in demography similarly demonstrates how scientific innovations and their widespread social uptake in areas of formerly unregulated natural processes—notably reproductive technologies facilitating the reliable management of fertility and medical advances extending life expectancy—may have unexpected but extensive macrolevel consequences to which political actors are increasingly obliged to respond. Aging and even declining populations pose significant political and economic challenges for the welfare state, as well as potentially engendering widespread structural shifts in the balance of global power as developed and developing regions exhibit differential demographic momentums that affect the relative sizes of workforces and armies, ethnic groups and electoral age profiles, and ecological footprints.[39] The sheer materiality and mass of bodies—their numbers, their needs, their fecundity, their productivity, their sustainability and so on—is becoming a key dimension of political analysis and intervention.

In this section we have sketched a number of directions that we discern within new biomaterialist thinking and whose importance for ethicopolitical inquiry we are especially eager to foreground. Our main argument here has been that new ways of thinking about living matter are radically and rapidly reconfiguring our material world—both empirically and conceptually—not only transforming our most basic conceptions of life and the human but also intervening in the very building blocks of life and altering the environment in which the human species—among others—persists. While these reconfigurations pose huge ethical and political questions with which many new materialists are engaging, we are also aware that from a materialist perspective normative questions cannot be treated adequately in isolation from a well-informed understanding of new scientific and technological developments or from their material implications and context. In turning now to the third main direction we see a new materialism taking, we emphasize this renewed attention to material context in terms of its economic and political power relations.

Practicing Critical Materialism

The final major trend we identify as a component of renewed materialism is the most explicitly political as well as, sometimes, the most theoretically polemical. It encompasses approaches for which materialism means prac-

tical, politically engaged social theory, devoted to the critical analysis of actual conditions of existence and their inherent inequality. This focus orients it toward a methodological realism that is at odds with some more radical, and especially linguistic, forms of constructivism as well as with dominant trends in abstract normative political theory. What we see as new in this aspect of materialism is twofold. First is its practitioners' reinvention of materialism in response to criticisms that radical constructivists and deconstructionists rightly made of earlier critical materialisms and realisms, Marxism in particular; second is this cohort's ongoing invention of new concepts and theoretical frameworks in order to understand the complexities of global capitalism (in its broadest sense) and its diverse, localized effects on everyday lives. Through this creative and sometimes experimental form of materialism, critical social theorists are analyzing current events and developments in a way that is congruent with the pluralist, contingent rhythms of materialization noted within new materialism's other main strands.

There are a number of indications that critical social theory is reorienting toward more realist approaches to political analysis. For example, Axel Honneth complains of "a growing tendency today for social criticism to be practiced as a form that is without a component of sociological explanation."[40] Ian Shapiro calls for a more realist, problem-solving approach to overturn the assumption that ideas or beliefs are elemental and constitutive of reality.[41] Margaret Archer advocates a mode of social realism that "makes our real embodied selves living in the real world really loadbearing."[42] David Harvey warns against the "serious danger" of proceeding as if "material and absolute space did not matter." Harvey concedes that evocations of the proletariat or multitude in motion, or of the effects engendered by postmodern spatial constructions, are illuminating. But he also points out that "no one knows what any of that means until real bodies go into the absolute spaces of the streets." Harvey thus cites approvingly the materialist claim that rights "mean nothing without the ability to concretize them in absolute space and time."[43] From this materialist point of view, it is ideological naïveté to believe that significant social change can be engendered solely by reconstructing subjectivities, discourses, ethics, and identities—that is, without also altering their socioeconomic conditions or tracing crucial aspects of their reproduction to the economic interests they unwittingly serve. Similarly, John Smith and

Chris Jenks observe that paradoxically, "radical constructivisms rest on the over-estimation of *human* construction and authorship." They argue that to claim that something is constructed often has the unintended effect of recentering the human subject as the locus of agency despite the intention to undermine such claims.[44] In other words, a constructivism that presumes matter's passivity or plasticity in the face of power may echo an earlier ontology for which matter is inert stuff awaiting cultural imprint.

Yet what sort of materialism is being retrieved, reinvented, and advocated here? Is it primarily a *methodological* or *epistemological* reorientation toward more realist, sociological analysis? Or is its principal concern a different *focus* that catches more material (and specifically, political-economic) aspects of society and power in its sights? Surely, it is both. For, from a methodological perspective, although a turn to more realist, empirical modes of investigation implies a rejection of the more radical aspects of recent constructivism, it by no means entails any definitive antithesis. In light of critiques leveled at crude empiricism's ignorance of the relationships that subtend facts and at representationalist beliefs that knowledge is a mirror of nature, new materialist realisms can hardly ignore the role of *social* construction. For example, when Peter Berger and Thomas Luckmann published their pathbreaking *The Social Construction of Reality* in 1966, they drew on a phenomenological (" 'empirical' but not 'scientific' ") approach to everyday life in order to explore how commonsense meaning emerges through intersubjective interaction. Understanding society as emerging through an ongoing dialectic between objective and subjective reality, they had no qualms about referring to social reality.[45] Similarly, when Marx developed historical materialism as a critical advance over metaphysical materialism, it was in order to show that things which seem natural and thus unassailable—such as markets, the bourgeois family, the liberal state, or the free, autonomous self—are actually social, historical constructions which are amenable to social change, yet whose collective and systemic logic renders them difficult to recognize and, a fortiori, to transform. Indeed, it is this insight that more recent constructivists have radicalized in order to contest a broader series of constitutive processes inherent in language and discourse. Yet, new materialists stubbornly insist on the generativity and resilience of the material forms with which social actors interact, forms which circumscribe, encourage, and test their discourses. They dwell on the particular salience of economic and state power

in shaping, constraining, and constituting life chances and existential opportunities. The challenge for them is thus to track the complex circuits at work whereby discursive and material forms are inextricable yet irreducible and material structures are simultaneously over- and underdetermined.

It is entirely possible, then, to accept social constructionist arguments while also insisting that the material realm is irreducible to culture or discourse and that cultural artifacts are not arbitrary vis-à-vis nature. Even as the most prosaic or carnal lifeworld unfolds within a socially constructed milieu, it does not follow that a) material objects or structures are devoid of efficacy in the way they affect either our moods or well-being, or our concepts and theories, b) matter is without recalcitrance or directedness in its own brutish way, or c) acknowledging nondiscursive material efficacy is equivalent to espousing a metaphysical claim regarding the Real as ultimate truth. For critical materialists, society is simultaneously materially real and socially constructed: our material lives are always culturally mediated, but they are not only cultural. As in new materialist ontologies, the challenge here is to give materiality its due while recognizing its plural dimensions and its complex, contingent modes of appearing.

We now turn to the second aspect of a new critical materialism, where returning to a more materialist mode of social analysis suggests a shift of perspective or focus within social theory. Alongside ethical concerns about subjectivity, normative concerns about social justice, cultural concerns about postmodern diversity, and discursive concerns about the construction of gender or ethnicity, this entails paying attention to the material, historical, and sociological structures of international political economy that lend context as well as practical inertia to identities that entail unequal life chances. It calls for a detailed phenomenology of diverse lives as they are actually lived—often in ways that are at odds with abstract normative theories or official ideologies.

What we have in mind in referring to a critical new materialism is a range of approaches in which interest is currently being rekindled in the wake of poststructuralism and which complement one another in a fairly pragmatic way. They include the Weberian insights of critical theory regarding the bureaucratic state, whose tentacles reach increasingly deeply to control ordinary lives through governance and governmentality, and aspects of Foucauldian genealogy that describe *how* the minutiae of power develop and practically manage embodied subjectivities. They are mani-

fest in a resurgence of interest in sociologies of everyday life, such as those developed by Pierre Bourdieu, Henri Lefebvre, and Michel de Certeau, and in a renewed interest in phenomenologies of ordinary, and particularly corporeal, experience such as those developed by Simone de Beauvoir and Maurice Merleau-Ponty. And they are apparent in new forms of nondogmatic (for example, autonomist) Marxism, too, especially in the turn to critical international political economy and critical geographies of space. In bringing them all under the umbrella of a new materialism, our aim is to discern what they have in common, namely, their interest in the emergent materialities of contemporary coexistence.

Bringing biopolitics, critical geopolitics, and political economy together with genealogies and phenomenologies of everyday life is an especially fertile development in critical materialist analysis. With this eclectic combination of approaches, scholars pay attention to the production and consumption of goods, to the uneven effects of globalization on differently located citizens, to the management, distribution, and legitimization of unequal life chances, and to the operation of power at state and quotidian levels. They examine the way identities are inflected through the circuit of markets and the ways diversity is managed in the reproduction of global capitalism. They explore the differential and often visceral effects of war, violence, climate change, and poverty, and also the relationship between biopolitics, changing demographic patterns, and biocapitalism. In short, the renewal of critical materialism after the cultural turn foregrounds an appreciation for just what it means to exist as a material individual with biological needs for survival yet inhabiting a world of natural and artificial objects, well-honed micropowers of governmentality, and the more anonymous but no less compelling effects of international economic structures.

Characteristic of such efforts is the way they echo elements of the new materialisms we remarked upon earlier: they insist upon the openness, contingency, unevenness, and complexity of materialization as an ongoing process within which social actors and theorists are irremediably immersed. Thus, these "new" critical materialists situate citizens, ideas, and values (as well as theorists themselves) within the fields of material forces and power relations that reproduce and circumscribe their existence and coexistence. They trace the various logics of, and interrelationships between, broad political and economic structures and critically inter-

rogate the complicated causalities that link them to everyday experiences. What is crucial here is detailed, evidence-based knowledge of domestic and international politics and of shifting geopolitical relations. For while there is no question of indulging in economic reductionism or determinism, critical materialists pay close attention to global and regional market economies whose workings have such immense consequences for the survival and opportunities of ordinary but manifestly unequal people.

With these new critical materialisms, the capitalist system is not understood in any narrowly economistic way but rather is treated as a detotalized totality that includes a multitude of interconnected phenomena and processes that sustain its unpredictable proliferation and unexpected crises, as well as its productivity and reproduction. In other words, new critical materialists, including those working with new forms of open Marxism, envisage a dense, inexhaustible field that resists theoretical totalization even as they investigate its complex material structures, trajectories, and reversible causalities. This renewed attention to structures of political economy complements new materialist sensitivities to the resilience of matter in the face of its reconstruction, the agency of nonsubjective structures, the importance of bodily experience, and the myriad interrelated material systems needed to sustain citizens before they can vote or deliberate. That is, the new critical materialisms are congruent with new materialist ontologies inasmuch as they understand materiality in a relational, emergent sense as contingent materialization—a process within which more or less enduring structures and assemblages sediment and congeal, sometimes as a result of their internal inertia but also as a manifestation of the powerful interests invested therein.

Further, these theoretical approaches are consonant with complex systems theory in their recognition that particular effects are the outcome of intricate interlocking systems whose interactions and dynamic processes are variable and, for the most part, unpredictable. Indeed, markets play a significant role in explaining and shaping the outcomes of bio- and ecosystems. For example, as we noted earlier, biotechnological developments that pose significant ethical and political questions also cycle through the market. They facilitate the commodification of body parts or microbes within the bioeconomy, encourage elective health procedures, and promise to reconfigure the carbon-based economy that is central to contemporary capitalism and its distribution of rich and poor nations. The state's

biopolitical interests in the nation's health also circle through the food and pharmaceutical industries, while private companies profit from a market in carbon trading and organic food fuelled by ecological anxieties. Whatever passes through these economic circuits is redistributed to the material advantage of some rather than others, while entering into systemic relations that outrun the comprehension or intentions of individual actors. Questions about livable lives are thus as economic as they are ethical and political.

As should already be clear, the renewed critical materialisms are not synonymous with a revival of Marxism. Yet, this legacy does remain important, not least because traditionally Marxism has been the critique of capitalism par excellence. A critical understanding of global capitalism and its multifarious effects remains crucial for contemporary critical materialists, for some of whom a Marxist label has helped to signify their opposition to dominant neoliberal trends. But coming after poststructuralism and its criticisms, no workable version of Marxism can advance a historical metanarrative, aspire to the identification of determining economic laws, valorize an originary, pristine nature, or envisage communism as history's idealized material destiny. As a method that facilitates and orients an ongoing critical analysis of emergent economic and geopolitical structures, revised versions of Marxism accommodate novel approaches and perspectives that help them forge the conceptual and empirical tools needed to gain insight into the intricacies of twenty-first-century global capitalism. In its more authentic modes, a dialectical approach calls, after all, for appropriate theories and concepts to be engendered out of an interrogation of the material conditions of the times, not to be imposed as a rigid formula aiming for accurate representation.

Work by the Regulation School is one example of such a living Marxism construed as ongoing, critical analysis of the material conditions of the times.[46] This is a Marxism that takes seriously the political in political economy and that sees the state, governance, and production as entwined. This view encourages its exponents to incorporate Foucauldian analyses of governmentality, biopolitics, and the role of discourse in maintaining social order, while taking heed of the state's enduring importance for maintaining conditions conducive to capital accumulation. Focusing on regimes of capital accumulation and the regulative structures that help reproduce them, it takes into account the intersectionality of social rela-

tions while still recognizing the importance of class. If it examines everyday customs and practices as well as the broader geopolitical developments they sustain or disrupt, this is because it is aware of the complicated, reversible relationships that link micro- and macrolevel processes. It investigates the emergence of new social and economic forms, such as post-Fordism, examines potential sources of rupture immanent to the system and its reproduction, and also remains sensitive to global developments that are uneven, contingent, and pluralist.[47]

From the vantage of the new recessionary phase of capitalism that commenced in 2008, it is abundantly clear just how important is such ongoing analysis and identification of its material elements. For example, if there is a lesson to be learned from recent events associated with subprime lending and the consequent banking crisis, it is how few people any longer grasp the complexities of the deregulated financial system, and yet how many are affected, in so many places worldwide and in such immediately material ways, by any hiatus in financial markets.[48] Among social theorists it has been fashionable to talk about deterritorialized, dematerialized capital flows. Yet it is the poverty of individuals induced to take on mortgages they could ill afford that remains the material bottom line underpinning the elaborate but fragile structures of recent financial growth. Spasms in the convoluted flows of capital and futures causes immense and immediate material hardship for real individuals. People lose their life savings, their pensions, their homes, and their jobs; industries are brought to a standstill and national economies to their knees. Indeed, the effects of neoliberal financialization have included the dispossession of peoples from their land, the privatization of services and commodification of formerly free or communally owned goods, internal migrations into cities without jobs but with burgeoning slums and mass poverty, and external migrations by those seeking better standards of living far from their indigenous homelands.[49] These are some of the economic and political conditions sometimes eclipsed in the celebration of pluralistic immigrant cultures: it is surely incumbent on social theorists to study the differential effects of world population growth, the reasons for mass migration, the social and economic backgrounds in which divergent immigrant cultures were nurtured, and the broader effects on global population movements of a volatile global economy.

In summary, we have associated new materialism with renewed atten-

tion to the dense causes and effects of global political economy and thus with questions of social justice for embodied individuals. We have also noted the affinity between the rhythms of materialization discerned in the socioeconomic processes of global capitalism and those described in the previous sections of our analysis. Commensurate with these dimensions of the new critical materialisms is what we are calling a multimodal methodology, one congruent with the multitiered ontologies, the complex systems, and the stratified reality we have been describing. In particular, we emphasize here the way new materialist analysis traces the complex and reversible causalities that run between different levels of the social system and especially between the microlevel or everyday, and the macrolevel or structural. Indeed, there is currently a surge of interest in everyday life, one that is elaborated through a combination of phenomenological, anthropological, and ethnographic studies on the one hand, and genealogical and sociological studies on the other.[50] Interestingly, some indication of how new materialists might investigate both the quotidian and structural dimensions of late capitalism can already be found in work by Althusser and Foucault. Here we present a few aspects of their ideas that we find salient and provocative for a multimodal materialism.

While Foucault's work has been widely used to study the powerful effects of discursive constructs and to pose posthumanist questions about agency and ethics, what we emphasize here is the concrete material analysis genealogy encourages vis-à-vis the prosaic details of bodily existence. This is the aspect that has often commended itself to feminists eager to investigate the construction of female flesh.[51] Of particular significance is Foucault's insistence that genealogy requires "a knowledge of details": that it documents a discontinuous, "effective history" of the body that is "broken down by rhythms of work, rest, and holidays . . . poisoned by food or values, through eating habits or moral laws"; a body that also "constructs resistances." In its emphasis on "the body, the nervous system, nutrition, digestion and energies,"[52] such an approach takes seriously the material intricacies of existence and the way bodies are constituted as productive but docile matter through disciplining, enhancing, and redirecting their visceral capacities.[53] This in turn opens the way to understanding a more general field or economy of power relations in which bodily capacities are rendered determinate. Foucault describes the kind of micropractices that are at stake in pacifying and reproducing social regimes in order to demon-

strate how thoroughly our ordinary, material existence is affected by, and saturated with, power and how protean yet banal many of its tactics remain. While he insists that the development of such powers is not to be explained simply as an effect of, or as functional for, broader structural changes associated with capital, demography, or state building, he does show that these micro- and macromodalities (the everyday and the structural) are mutually interdependent. In other words, he recognizes the multimodal materialist analysis needed to explain the production and reproduction of the modern social order. The matter whose materialization Foucault describes is malleable, socially produced, and inscribed with its histories; paradoxically, it is obliged to acquire (additional, redirected) agentic capacities as an aspect of its subjection.

This attention to material detail and to the plural dimensions and power relations in which such details are to be understood is elaborated in Althusser's essay "Ideology and Ideological State Apparatuses (Notes towards an Investigation)." Althusser's work attracted considerable attention when it first appeared because of the way it developed a materialist alternative to more reductionist or teleological forms of Marxism that rejected its then dominant mechanical and humanist modes. Althusser claims in this particular essay that Marx had envisaged social structure in terms of levels or instances, each with their own "indices of effectivity" and ways of relating to other levels.[54] From this perspective, it is insufficient to regard the state as simply functional for reproducing the social relations of production; one needs to examine its complex, differential elements that are both repressive and ideological in their operations. Similarly, it is necessary to pay attention to "all the direct or indirect forms of exploitation" and to the "subtle everyday domination" whose material details are redolent, we suggest, of Foucault's descriptions in *Discipline and Punish*.

Althusser goes on to distinguish between the Repressive State Apparatus (RSA) and the Ideological State Apparatus (ISA), but he acknowledges that both utilize a mixture of coercive and ideological means: "Very subtle explicit or tacit combinations may be woven" and these need to be "studied in detail" (19f.). Thus parts of the ideological apparatus, such as the church, school, or family, use symbolic modes of discipline that include various forms of punishment, expulsion, or exclusion. And while "the relations of production are first reproduced by the materiality of the processes of production and circulation," ideological relations are also

"immediately present in the same processes" (22 n. 12). Habits of working or practices of consuming help to stabilize the system as something that is daily renewed as the familiar, material horizon of ordinary lives and maintained through their routinized performances. As such, the capitalist economy, the juridico-political domain, and the material quotidian are interrelated but not in any fixed or formulaic way. It is these different levels and their shifting interconnections that a multimodal materialist analysis investigates.

Of especial interest here is Althusser's insistence that despite its apparently ideal forms, ideology "has a material existence" (39). "Of course," he adds in a caveat that is crucial for our appropriation of his argument, "the material existence of the ideology in an apparatus and its practices does not have the same modality as the material existence of a paving-stone or a rifle. But, at the risk of being taken for a Neo-Aristotelian, . . . I shall say that [in Marx] matter is discussed in many senses, or that it exists in different modalities, all rooted in the last instance in 'physical' matter" (40). This recognition of different modalities of matter allows Althusser to explain that for the complicit subject, "the ideas of his belief are material in that his ideas are his material actions inserted into material practices governed by material rituals which are themselves defined by the material ideological apparatus from which derive the ideas of the subject" (43). He accordingly draws attention to the way "ideas" are inscribed in actions whose repetitive, ritualized performances are borne by concrete individuals who are thereby practically constituted as compliant or agentic subjects. While such performances are institutionalized in rituals and ceremonies, they also become sedimented at a corporeal level, where they are repeated as habits or taken for granted know-how: lodged in the bodily memory that Bourdieu calls *habitus* or which phenomenologists refer to as a lifeworld. It is indeed this nonreflexive habituality and the way it imbues objects with familiarity that makes artifacts, commodities, and practices seem so natural that they are not questioned. It is in this sense that ideology or power operate most effectively when embedded in the material, practical horizons and institutions of everyday life. Althusser's materialism here is surely exemplified by Foucault's insistence that an analytics of power must focus on its "real and effective practices"; that "we should try to discover how it is that subjects are gradually, progressively, really and materially constituted through a multiplicity of organisms, forces, ener-

gies, materials, desires, thoughts, etc. We should try to grasp subjection in its material instances as a constitution of subjects."[55] In conjunction with the broader system dynamics and ecological perspectives mentioned earlier in this essay, such interventions suggest to us a multimodal analysis that is post- rather than (as in Althusser's earlier work) antihumanist.

This last point is elaborated by a final aspect of Althusser's work that we cite here because of its affinity with some of the new materialist ontologies discussed above. It emerges elusively, scattered across a few brief texts (1982–86) that were published posthumously and whose recent publication is only now prompting an engagement with Althusser's later allusions to an aleatory materialism.[56] In these essays, Althusser refers to materialism as the hardest question of all. Aleatory materialism, or a "materialism of the encounter," refers to an underground current in the history of philosophy that he finds running from Epicurus through Spinoza, Marx, and Wittgenstein, to Heidegger and himself. It is distinguished by its nonteleological principles and its consequent ignoring of origins or ends. Instead, it emphasizes emptiness, contingency, and chance. Althusser implies that materialism might itself be no more than a temporarily convenient label and that its aim might be to engender a certain sensitivity —a theoretical practice—rather than to define an ontology as such.

The idea of the encounter alludes to a chance conjuncture of atoms, the event, whose consequence may be the provisional configuring of facts or forms. History emerges here as the continuous transformation of provisional forms by new, indecipherable and unanticipated events, with the corollary lesson that an aleatory intervention may be more efficacious than the patient understanding of trajectories and working through of continuities whose internal logic of development is assumed to endure. In politics, this means that the state is always inscribed with the possibility of its imminent collapse or reconfiguration, where the utter indifference of the people to rule and their unresponsiveness to interpellation by the state apparatus yields the permanent possibility of a revolutionary event capable of halting the political machine. Such events occur in what Althusser calls the void: the space in which the encounter occurs that reconfigures the current conjuncture's elements. However, although the constitution of new phenomena (such as western capitalism) is now viewed as entirely contingent rather than as the destiny of forces maturing in an earlier phase, such phenomena may still have necessary effects and persist for a

greater or lesser period of time. While the choreography of the encounter suggests an affinity with chaos theory, Althusser's own approach suggests that he was not equating aleatory materialism with a new set of theoretical, systemic abstractions but with an empirical, concrete analysis of the forms and forces at work. What we would like to emphasize here is that in a multimodal materialist analysis of relationships of power, it is important to recognize their diverse temporalities by examining their more enduring structures and operations as well as their vulnerability to ruptures and transformation—all the while acknowledging that they have no predestined, necessary, or predictable trajectory.

If we have found it useful to cite some of Althusser's and Foucault's more materialist pronouncements in concluding this section, it is not in order to advise fidelity to their theories as such. Rather, it is because we find aspects of their work provocative in suggesting how ordinary material practices might be critically investigated. They encourage us to explore the complex ways in which such familiar practices are effects of more distant power relations that they also help to reproduce. And contra Foucault's insistence on his own nonnormative positivism, what makes such analyses grist for the critical materialist is the recognition that such dense networks of relationships support socioeconomic structures that sustain the privileges and interests of some rather than others, that these advantages are not randomly, much less fairly, distributed, and that understanding how they operate and are maintained is a crucial task for the engaged social theorist, especially one who eschews any lingering faith in the inevitability of either the present or the future.

The New Materialisms: A Collection of Essays

The essays in this volume explore many of the themes and questions we have considered in this introduction. Indeed, in identifying what we have categorized as three principal directions of analysis in the new materialisms, we have been immensely indebted to the way the essays' evocative insights resonate together, sometimes reinforcing but at other times challenging one another. As we had anticipated when we solicited them, the essays are richly diverse both in their understanding of what the new materialisms might be or portend and in the philosophical traditions and conventions they elaborate and contest. Yet collectively, they offer some-

thing more than simple diversity. Broadly, the authors concur in their recognition that new materialist ontologies demand a rethinking of, and renewed attention to, the dynamics of materialization. They also share an acknowledgment that such a project demands, as a corollary, a radical reappraisal of the contours of the subject, a reassessment of the possibility and texture of ethics, an examination of new domains of power and unfamiliar frames for imagining justice, and an exploration of the sources, quality, and dimensions of agency. Indeed, as editors, what we have found so striking is that each essay is both profoundly philosophical and also insistently politically engaged: even without our explicit directive, each writer endeavors to link ontological and metaphysical questions with their ethical and political correlates and implications. The essays' convergence on this point binds them into a coherent yet multifaceted constellation.

At the same time, the themes and questions that emerge and reemerge in the essays make it difficult to separate, group, and order them in a definitive way. Drawing on what we learned from the essays as well as our own researches for the project, we decided to divide the text into three sections whose topics—"the force of materiality," "political matters," and "economies of disruption"—rehearse the themes that organize the distinct sections of this introduction: ontology, bioethics/politics, and critical materialisms. Since the authors all engage questions about the forms of subjectivity, power, agency, and ethics opened up by new materialist ontologies, it would have been entirely possible to place most of the essays under any of the rubrics that divide the text. We must acknowledge, then, that there is a respect in which the ordering of the essays is somewhat arbitrary, and we invite readers to reinvent the collection by reading the essays in whichever order commends itself to them. For us, this has meant grouping the essays in a way that allows the discordance and resonance produced by the textual proximity of sources, framings, and focal questions to provoke illuminating reconsiderations and conceptual shifts.

The essays in the first section, "The Force of Materiality," explore the ontologies of the new materialisms, suggesting how we might conceive of matter and materiality outside of the dualism of the material and the ideal. In her comparative study of the vitalist philosophies of Hans Driesch and Henri Bergson, Jane Bennett explores efforts to specify and give a philosophical and scientific language to the liveliness of living matter while also warning of the ways vitalism can be given troubling new life in the po-

litical rhetoric of Nazism or the contemporary "culture of life." In tracing Jacques Derrida's and Gilles Deleuze's distinctive projects of figuring materiality outside of the grasping hold of consciousness, Pheng Cheah marks the ways the new materialist ontologies call into radical question some of the foundational concepts in politics. Diana Coole uses Maurice Merleau-Ponty, among other thinkers, to trace the philosophical paths by which phenomenologists have tried to refigure perception and agency by relocating and reimagining the body-in-the-world. Emphasizing and analyzing the impersonal character of both Friedrich Nietzsche's notion of the will to power and Sigmund Freud's account of psychic life, Melissa Orlie explores how we might imagine creativity and freedom from within a new materialist framework.

The essays in the second section, "Political Matters," investigate how the ontological, scientific, and technological dimensions of the new materialisms demand a reformulation of the forms and domains of power, ethics, and politics. Elizabeth Grosz analyzes Henri Bergson's effort to sidestep the "freedom versus determinism" problem that is often posed as an obstacle to political elaborations of new materialist ontologies. She explores the feminist political possibilities in Bergson's contention that freedom is best conceived not as a characteristic of a subject but rather as a characteristic of acts that express the subject. Samantha Frost draws out Thomas Hobbes's materialist analysis of the ways the passions orient subjects in space and time to suggest that fear is a passion through which individuals produce a sense of themselves as autonomous agents. William Connolly weaves together insights about perception and power gathered from Maurice Merleau-Ponty, Michel Foucault, Gilles Deleuze, and contemporary neuroscience to explore how our attachment to the world shapes the texture of political judgment and critique. And finally, situating pain and death in relation to impersonal life processes, Rosi Braidotti reassesses contemporary forms of biopower and sketches the possibility of an affirmative ethics and citizenship.

The essays in the third section, "Economies of Disruption," analyze the relationship between the materiality of the corpus and the materiality of practice, exploring the ways social and economic practices produce and reproduce embodied subjectivity and existential inequalities, as well as the spaces of, and possibilities for, political transformation. Using Alfred Sohn-Rethel, Louis Althusser, and Slavoj Žižek to reexamine historical

materialism and its progressivist teleology, Rey Chow considers the potential for terror as well as progress when iterative practices are presented as a model of political agency. Reading Edmund Husserl's phenomenology alongside Karl Marx's historical materialism, Sara Ahmed meditates on the ways the materialization of bodies is bound up with the materialization and objectification of the world(s) in which they live. Sonia Kruks uses Simone de Beauvoir's diagnoses of the infirmities and oppressions of old age to illustrate how the materialisms in existential phenomenology, Marxism, and social constructivism can, in tandem, provide fruitful insights on the genesis, experience, and perpetuation of injustice. Jason Edwards supplements Karl Marx's and Louis Althusser's analyses of the development of capitalism with Henri Lefebvre's studies of the practices of everyday life, in order to propose an expansive and more politically useful conception of the material practices that reproduce global capitalism and structure the geopolitical system.

We conclude by sincerely thanking all our contributors and by reiterating our great pleasure at presenting these essays. We do so in the conviction that, collectively, they set the new materialisms on course to become a significant orientation for social research after the cultural turn. Our hope is that they will not only encourage debate about a new materialist paradigm but also inspire innovative investigations of the fragile, volatile world we inhabit.

Notes

1 White, *Sustaining Affirmation*, 3f.

2 See Israel, *Radical Enlightenment* for a rich elaboration of the history of Spinoza's work. See also Tuck, *Philosophy and Government, 1572–1651* for a historical analysis of the development of Cartesian and non-Cartesian materialist philosophies.

3 See, for example, the special issue of *Theory, Culture and Society*, "Inventive Life: Approaches to the New Vitalism," Mariam Fraser, Sarah Kember, and Celia Lury, eds. Vitalism, the editors contend in their introduction, "matters now" because its attention to "vital processes" assists in current attempts at thinking of process as a mode of being and at introducing "information, knowledge or 'mind' into social and natural entities, making them seem less inert, more process-like: bringing them alive." Fraser, Kember, and Lury, eds., "Inventive Life," 1.

4 Deleuze, *Negotiations*, 143.

5 Bennett, *The Enchantment of Modern Life*.

6 Dobson, Grace, and Lovett, *Physics*, 571. We have drawn on this text in constructing this brief excursus through modern physics, along with Calder, *Magic Universe*; Bryson, *A Short History of Nearly Everything*; Smolin, *The Trouble with Physics*; and a useful guide published in the *Financial Times Magazine*, 24/25 November 2007. Also, many thanks to Michael Weissman for assistance in explaining some of the more abstruse details.

7 There are also antiquarks and, possibly, squarks — quarks' heavier twin — too. Battersby, "Messenger from the Multiverse," 36–39.

8 Calder, *Magic Universe*, 465.

9 Lee Smolin writes that no "observation in the last thirty years has been more upsetting than the discovery of dark energy in 1998. What we mean when we say that energy is dark is that it seems to differ from all forms of energy and matter previously known, in that it is not associated with any particles or waves. It is just there." Smolin, *The Trouble with Physics*, 149.

10 Chaos theory and complexity theory are not the same thing, and scholars in the respective fields make the effort to differentiate them. However, because these theories share similar kinds of insights, in this cursory survey below, we ignore the distinctions between chaos theory and complexity theory in order to elucidate a broad trend.

11 Gleick, *Chaos*, 5.

12 Urry, "The Complexity Turn," 10–14.

13 See, for example, Chesters and Welsh, *Complexity and New Social Movements*. For these authors, the application of complexity theory to society is a pre-eminently Deleuzean undertaking.

14 For instance, see Gladwell, *The Tipping Point*.

15 Urry, "The Complexity Turn," 5.

16 Interestingly, John Searle has recently suggested that this particular understanding of the dynamic and transformative relationship between the parts and the whole of a system may be a fruitful way to derive a theory of consciousness within neurobiology. Searle, *Freedom and Neurobiology*.

17 As Monica Greco notes, accounts of complex causation "demand that we acknowledge, and learn to value as the source of qualitatively new questions, the possibility of a form of ignorance that cannot simply be deferred to future knowledge." Greco, "On the Vitality of Vitalism," 24.

18 Thus Fritjof Capra notes that "a living organism is an open system that maintains itself in a state far from equilibrium, and yet is stable." Capra, "Complexity and Life," 37.

19 Latour, *Politics of Nature*.

20 The management of risk has itself become a significant field in areas such as public health and the environment. Much of this follows in the wake of Ulrich Beck's *The Risk Society*, which illustrates its arguments with some stark examples of risks being deemed acceptable by chemical and other companies,

provided those risks were borne by others, notably those in developing countries with little access to legal redress. The case of the Bhopal chemical works in India and the shocking treatment of its victims provides an especially clear example of Beck's argument, while reinforcing the sense in which risk-management requires an intricate systems-wide approach. See Beck, *The Risk Society*; Beck, "The Terrorist Threat"; Franklin, *The Politics of Risk Society*.

21 Haraway, "A Cyborg Manifesto." See also "Annual Review," the special issue of *Theory, Culture and Society*, Mike Featherstone and Nicholas Gane, eds., which includes a series of articles considering the legacy of Haraway's notion of the cyborg.

22 Hayles, "Unfinished Work," 160. See also Hayles, "Computing the Human."

23 Hayles, *How We Became Posthuman*; Fukuyama, *Our Posthuman Future*; Cheah, *Inhuman Conditions*.

24 Wynne, "Reflexing Complexity."

25 Ibid., 72–74.

26 Daniels, *At Women's Expense*; Oyama, *The Ontogeny of Information*; Oyama, *Evolution's Eye*; Fausto-Sterling, "The Bare Bones of Sex."

27 Masters and Coplan, "Water Treatment with Silicofluorides and Lead Toxicity"; and Roger, Hone, and Doshi, "Environmental Pollution, Neurotoxicity, and Criminal Violence."

28 Jasanoff, *Designs on Nature*; Rajan, *Biocapital*.

29 Merleau-Ponty, *Phenomenology of Perception*; *The Primacy of Perception*; *The Visible and the Invisible*. For further development of this phenomenological argument see Coole, "Rethinking Agency," and Coole, "Experiencing Discourse." For a critical realist account that has many points of similarity and which also uses Merleau-Ponty's work, see Archer, *Being Human*.

30 Agamben, *The Open*, 29.

31 Sunstein and Nussbaum, eds., *Animal Rights*.

32 Rose, *The Politics of Life Itself*. See also Sharp, *Strange Harvest*.

33 Goodwin, *Black Markets*; Waldby and Mitchell, *Tissue Economies*; Sharp, *Bodies, Commodities, and Biotechnologies*.

34 MacIntyre, *Dependent Rational Animal*.

35 Such issues have been subjected to serious attention in films such as *2001, A Space Odyssey*; *I, Robot*; and *Blade Runner*.

36 Agamben, *Homo Sacer*, 119. The text of Foucault's he has in mind here is *The History of Sexuality*, vol. 1.

37 Agamben, *Homo Sacer*, 136ff.

38 Ibid., 160–64.

39 See, for example, Jackson and Howe, *The Graying of the Great Powers*; and Magnus, *The Age of Aging*.

40 Honneth, "The Intellectual Legacy of Critical Theory," 345.

41 Shapiro, *The Flight from Reality in the Human Sciences*.

42 Archer, *Being Human*, 2, 4, 9, 22, 44, 111, 121.

43 Harvey, *Spaces of Global Capitalism*, 129, 147. Harvey's reference about rights is to Mitchell, *The Right to the City*.

44 Smith and Jenks, "Complexity, Ecology, and the Materiality of Information," 147.

45 Berger and Luckmann, *The Social Construction of Reality*, 34.

46 For a representative Regulation School approach, see de Angelis, "Neoliberal Governance, Reproduction and Accumulation."

47 David Harvey's commentary is indicative of this open Marxism and its materialist challenges. He observes: "If there has been some kind of transformation in the political economy of late twentieth-century capitalism, then it behooves us to establish how deep and fundamental the change might be. Signs and tokens of radical changes in labour processes, in consumer habits, in geographical and geopolitical configurations, in state powers and practices, and the like, abound. Yet we still live, in the West, in a society where production for profit remains the basic organizing principle of economic life. We need, therefore, some way to represent the shifting and churning that has gone on since the first major post-war recession of 1973, which does not lose sight of the fact that the basic rules of a capitalist mode of production continue to operate as invariant shaping forces in historical-geographical development." See Harvey, *The Condition of Postmodernity*, 121.

48 See for example, Lanchester, "Cityphilia"; and "Citiphobia."

49 Davis, *Planet of Slums*.

50 The editors of a current New Sociology series note that while the discipline had retreated from everyday issues, it is now starting to place "renewed emphasis on the mediation of everyday events and experiences by distant social forces, the intermeshing of the local and global in the production of social practices" and the need to situate "everyday social practices in the broader context of life in a globalizing world." Elliott, "Foreword," viii. New materialists might usefully begin with Henri Lefebvre's introductory words to the final volume of *The Critique of Everyday Life*. Noting how radically everyday life had changed during the course of his investigations (1947–81), Lefebvre ponders: "But what is their significance? Here our problematic emerges, and can be reformulated thus: is daily life a shelter from the changes, especially when they occur abruptly? Is it a fortress of resistance to great changes, or certain minor but significant changes? Or, contrariwise, is it the site of the main changes, whether passively or actively?" Lefebvre, *The Critique of Everyday Life*, vol. 3, 41. See also Certeau, *The Practice of Everyday Life*, which takes its impetus from Foucault's *Discipline and Punish*. What "I really wish to work out," Certeau explains, "is a *science of singularity*; that is to say, a science of the relationship that links everyday pursuits to particular circumstances. And only in the *local* network of labor and recreation can one grasp how, within a grid of socio-economic constraints, these pursuits unfailingly establish relational tactics (a struggle for life), artistic creations (an aesthetic), and auton-

omous initiatives (an ethic). The characteristically subtle logic of these 'ordinary' activities comes to light only in their details." *The Practice of Everyday Life*, ix.

51 While a more poststructuralist use of Foucault's work by feminists and queer theorists has emphasized the construction of discourses, there is a rich field of more materialist feminist studies that examines the material strategies and effects that produce gendered flesh. See, for example, Diamond and Quinby, eds., *Feminism and Foucault*. Biddy Martin's intervention concerning materialism in "Feminism, Criticism, and Foucault" (4–5) is significant, although it is the concrete nature of the analyses to which we especially wish to draw attention.

52 Foucault, "Nietzsche, Genealogy, History," 153, 155.

53 As Paul Patton argues, this way of understanding Foucault's argument does not endorse naturalism but neither does it efface the body's materiality; rather, it understands power "in its primary sense of capacity to do or become certain things" and presents power as redirecting such capacities. Patton, "Foucault's Subject of Power," 65.

54 Althusser, "Ideology and Ideological State Apparatuses (Notes towards an Investigation)," 8f.

55 Foucault, *Power/Knowledge*, 97.

56 Althusser, Philosophy of the Encounter.