FLOURISHING THOUGHT

Democracy in an Age of Data Hoards

RUTH A. MILLER

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At the end of the twentieth century, scholarship in the humanities and human sciences underwent what has since been called the posthuman turn. Cultural and political theorists began to argue that nonhumans were as capable of political activity as embodied human subjects—provided that politics remained embedded in matter rather than in thought. Humans and nonhumans together could produce flourishing democracies if and only if democracy could be defined as a set of material, rather than intellectual, processes. The posthumanist canon thus developed as a canon that celebrated matter before all else. Now, challenging this assumption, Ruth Miller argues that what nonhuman systems contribute to democracy is not a new variation on materialism but a new variation on political *thought*.

Drawing on recent feminist theories of nonhuman life and politics, Miller begins by showing that reproduction and flourishing, on the one hand, and contemplation and sensitivity, on the other, are not antithetical. Instead, processes of life and processes of thought are indistinguishable. After identifying this interrelation in both historical and contemporary democratic politics, Miller investigates four alleged threats to democratic engagement—global surveillance, stored embryos, human clones, and reproductive trash—and finds that these menacing accumulations of matter and information are in fact not politically damaging but politically productive. As a consequence, she questions the usefulness of individual rights such as privacy and dignity, contests the value of the rational metaphysics underlying human-centered political participation, and reevaluates the gender relations that derive from this type of participation. Ultimately, in place of these human-centered structures, Miller posits a more meditative mode of democratic process.

Miller's argument has huge implications for reframing some of today's major ethical, social, and security issues, from the debates over proper use and disposal of embryonic tissue to alarms about data gathering by states and corporations.

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For Jack, who wants to be bacteria when he grows up

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1 • *Introduction*

Yellow, translucent slime covers western Africa in a cropped photograph of a globe.[1] The headline is, "If slime mould ruled the world," and the subheader is, "given enough agar and oats, how would the amoeba-like slime mould go about colonising the Earth?"[2] The image is striking, but no one is meant to believe that the slime actually desires world domination. The thrust of the article is that the slime mold's unexpected and scrappy intelligence—its surprising ability to plan, remember, and make choices—is worthy of amused tolerance. As intelligent creatures themselves, humans might make good use of the brainless, unicellular, multinucleate, and nearly smart organism's remarkable thoughtfulness. An "obliging slime mould," for example, "might spur unorthodox approaches to planning future traffic routes, or predicting the spread of global disease. In taking over the planet, slime mould might help us find our own way in the world."[3] This reporting is from the *Guardian* newspaper's website, fall of 2012.

A little less than a year later, a different image appeared on the same website: a flat, two-dimensional map of the world, black backdrop, focused on the northern hemisphere, and delineated by color-coded nation-state. The headline over this image is "Boundless Informant: the NSA's secret tool to track global surveillance data."[4] Here readers are no longer expected to be tolerant or amused. The U.S. National Security Agency is, quite clearly, bent on world domination, it has the tools to make such domination possible, and responsible citizens must work to block the spread of surveillance networks of the Boundless Informant sort. Of particular concern is the NSA's collection of bulk metadata—information about information, or "the records of communications . . . rather than the content of an email or instant message"—because such collection is diffuse rather than targeted (and thus eludes rather than facilitates regulation).[5] In a

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thirty-day period alone, according to the article, the NSA collected "3 billion pieces of information from US computer networks."[6] Obviously, there is nothing thoughtful, beneficial, or even useful about such collection. In taking over the planet, these data flows will never help humans to find their "own way in the world."

And yet—is it possible that the work of the slime mold and the work of Boundless Informant might have more to do with one another than they appear to? The parallelism of the *Guardian*'s images and the rhetoric, if not the tone of its reporting on them,[7] at least hints at some connection. Might it be worthwhile to explore the politics and the penchant for global colonization that drive each of these diffuse, flourishing, decentralized, and information-driven systems? The hypothesis driving this book is that, yes, the growth of slime mold and extension of mass surveillance systems can say quite a lot about one another. One might even speculate that, radically human-centered *Guardian* reporting to the side, the only responsible way to understand and to respond to programs like Boundless Informant is to take slime mold seriously, not to be amused, and to consider the political relevance of other boundless things. The only responsible way to approach Threats to Democracy, in titled capitals—threats such as data mining—is, perhaps, to keep the slime mold at the forefront of discussions of democracy and of the practices that seem to undermine democratic engagement.

To give slime, data, and other boundless things their political due, however, is also to step back from the ephemeral and impressionistic, if sometimes intense, journalistic reporting on day-to-day scientific breakthroughs, moments of tolerant humanist self-discovery, and the wildly varied menaces to liberal democracy that go along with both. There is, against the journalism, a more substantial story to be told. Lurking within the *Guardian*'s intertwined rhetoric of mold, colonialism, and surveillance, after all, is, likewise, a more solid, grounded, and enduring history of boundless, spreading things and systems that encroach on—or at least become relevant to—modern modes of political belonging. That slime and data merit the same literary devices in journalistic reporting of this sort hints at a deeper and slower set of historical connections between the two. Those historical connections—and how these connections might dampen the shrill rhetoric of democracy always under assault—are the subject of this book.

The linchpin holding together the political histories of spreading, creeping things, systems, assemblages, and accumulations that appear over the following pages is the assertion that the growth of these things is as thoughtful as it is reproductive, and as political as it is thoughtful. Each

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of the case studies in the boundless stuff that forms the subject of this book—dissociated embryonic material, cloned human cells, toxic and polluting trash, and proliferating data—is a case study in reproductive or replicating activity that is also political activity, and a variation on political thought. The growing, reproducing, and flourishing systems that populate the following chapters are also thinking, processing, and political systems. Like slime and data, these systems are—whether organic, inorganic, technological, environmental, or informational—systems whose growth or reproduction is thought in exactly the same way that any growing computational system is thinking. But, once more—and also like the slime mold's engulfing of the earth and the replication of Boundless Informant across nation-states—the thought of these accumulations and assemblages is infinitely more beneficial to democracy than it is an attack on democracy.

Let us be honest, therefore: the following pages pose as entertaining descriptive histories; but they are normative as well. Each of the stories that emerges throughout the book is not only a narrative of how, in the past—distant as well as recent—boundless, flourishing reproduction or replication became a robust type of democratic thought, but also a defense of, or apology for, the political activity of growing, colonizing systems and things. Each is a statement about the democratic potential and value of these systemic or accumulating variations on growth, thought, and life. And finally, each is an invitation to consider the thought or replication of these organic and inorganic, technological and environmental collections, environments, and assemblages as a healthy, productive, and useful aspect of contemporary democratic process.

Slime mold, in many ways, does not need such an apology—as the *Guardian* makes clear, slime is plucky and endearing, quite open to human tolerance. Embryonic material likewise need not be defended to any great degree. Its political role is more complex or contested than that of slime mold, but in general commentators do not invest it, at least in and of itself, with a noticeably negative moral value or ethical significance. To insist on the political value and ethical promise of human clones, reproductive trash, and mass surveillance or data hoarding, however, is likely not to meet with a great deal of scholarly or public approval. More to the point, readers who might, for example, countenance a defense of data hoarding, for reasons of what they might term security, are apt to find the logic underpinning its defense here—a logic that rests on the democratic potential, embedded in feminist theoretical interpretations of democracy, of organic and inorganic reproductive processes—obscure or counterproduc-

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tive. Similarly, an audience that might be sympathetic to human cloning—for reasons of radical feminist activism, perhaps—would likely find a defense of mass surveillance abhorrent, whatever the logic.

Nonetheless, if these respective sets of readers suspend their disbelief over the course of the following chapters, they might discover an unexpected value in pursuing this (obscure) logic to its (abhorrent) end. It may, after all, be the case that data hoarding is less a horrifying symptom of democratic malaise than a minor variation on what has always been a healthy, productive mode of thoughtful, feminist political engagement. It may be the case that data operations, taken on their own terms, are issues, specifically, of reproduction and political thought—inextricably entangled with the reproductive and intellectual operations of similarly unbounded organic systems. And it thus may be the case that data hoarding is, itself, a means of introducing, or reintroducing, thought, contemplation, and reflection into politics. Finally, and most broadly, it may therefore also be likely that the misbehaving embryos, human clones, endless waste, and proliferating data that appear in this book are not systems to fear. Rather, they offer unexpected new avenues of feminist political engagement—avenues that have seemed closed off to mass democratic populations in recent years, if they were ever open to these populations in the first place.

Data Hoards

The punch line of this book is a distasteful conclusion concerning the value and political potential of data mining and mass surveillance. Before sketching in detail the ongoing debates surrounding data mining, therefore—and how a focus on growth and reproduction might reformulate these debates[8]—we need to outline some of the basic issues that appear in conversations about it. The most troubling quality of data hoarding, then—this practice that seems to have multiplied beyond all measure over the past few decades—is that it fractures classic, human-centered liberal democratic structures from within. Data hoarding is not external to democracy—not in any clear way in opposition to democratic norms or practices—but rather very much integral to mass democratic engagement. As Jack Balkin has written in his "National Surveillance State," bulk data collection arose from the need of modern democracies to provide "basic social services" to their growing populations—it cannot be dissociated from the daily practice of democratic governance.[9]

At least conventionally, data hoarding is a problem, that is, because it

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is a product of democratic thought, a recognized practice of democratic governments and yet, also, intuitively somehow contrary to democratic ideals. As much as the revelations of the NSA's data mining angered and mortified a particular segment of liberal democratic society, after all, these revelations have not set up any clear divide between, for example, the NSA as an antidemocratic institution, on the one hand, and various elected legislative bodies as prodemocratic institutions, on the other. Nor has there been any explicit statement as to the point at which a data-collecting state seeking the welfare of its citizenry gives way to a data-hoarding state surveilling its population. On the contrary, and as many of the revelatory documents themselves make clear, the NSA developed programs such as Boundless Informant by working together with legislators to see to it that these programs both reinforced generally accepted state practice and also conformed to a U.S. right-to-privacy doctrine that was elaborated before the turn of the twentieth century—a doctrine specifically linked to procedures the United States put into place as a nascent democratic welfare state.[10] The *problem*, once again, as it is ordinarily posed, is thus that this adherence to a liberal democratic rule of law in no way hampered the collection of the *Guardian*'s "3 billion pieces of information" over "a thirty day period." Far from it: the rule of law made such collection possible.

The frustration that characterizes so many of the conversations concerning data hoarding, therefore, might best be expressed as follows: as much as the revelation of the NSA's data-mining practices—as a cipher for the broader problem of contemporary mass surveillance—may (or may not) have prompted a rethinking of the liberty-security balance, or a reinterpretation of the nature of privacy rights, in the United States, this revelation and the soul searching that followed it did not, and could not, prevent practices such as bulk data collection from continuing in the future. Rather, the repeated, circular recourse to the rhetoric of law, rights, and privacy in these conversations suggests the opposite. Data mining, as a product of mass democracy, operates comfortably as a democratic practice, even as it calls into question the relevance of classic liberal democratic ideals. Indeed, it seems that liberal democratic governments can respond to the self-perpetuating growth of information-based mass democratic practices only by mobilizing a vocabulary—of embodied, rational, differentiated, individual human citizens—that has already proved itself useless in expressing, much less blocking, these practices. Mass democratic data mining eludes the vocabulary of human-centered liberal democracy.

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Once more, therefore, the furor over programs such as Boundless Informant seems to arise primarily from the fact that these programs showcase the fractures within existing liberal democratic theory, not from the fact that they reveal a coherent liberal democracy under an external, antidemocratic attack. These programs make clear that democracy as it is conventionally understood—rights based, rational, and human centered—simultaneously produces diffuse, flourishing, irrational, antihuman policies and is also completely incapable of handling these policies, or for that matter even talking about them. The ongoing debates surrounding data hoarding all take this crisis implicitly or explicitly as their starting point. They invoke liberty, security, privacy, and rights, in various formulations, either to shore up (on the left) liberal ideals against a mass democratic attack or to insist (on the right) that liberalism must be put to rest even as an authoritarian mass democracy flourishes.

This is where the slime mold comes into play. Focusing on the slime—now standing in for data, or, for that matter, embryonic material, cloned human cells, and trash—can help to relax this seemingly irresolvable opposition between liberal democracy and mass democracy. It can reveal to readers the likelihood that the tension between liberal democratic vocabularies and mass democratic practices that seems to have arisen here—a tension at least as old as Carl Schmitt[11]—is not in fact the real problem. On the contrary, focusing on the nonhuman elements of this story allows for the possibility that what data mining questions is the validity of *both* liberal democracy *and* mass democracy in their conventional human-centered manifestations. Data mining, in other words, may pose a threat for reasons that have nothing to do with liberty, welfare, and security, but rather because it demonstrates so obviously that information and systems themselves can become political actors and take political center stage.[12] Data hoarding terrifies commentators not because it undermines privacy or other rights, but because it raises the very real possibility of a democratic structure that is *in fact* more natural to slime mold or data processing than to embodied human subjects—even while this structure remains undeniably democratic.

Again, though, if data mining is a threat less because it stretches the liberal democracy–mass democracy tension to a breaking point, and more because it forces onlookers to acknowledge the political work that information and information processes themselves do, then its ethical value is different from what it initially appears to be. Rather than a symptom of democratic crisis, data mining in this new context becomes instead one further variation on healthy democratic thought and practice. Moreover, if the defining charac-

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teristic of this system is, specifically, its boundless quality—the fact that it grows, proliferates, and replicates or reproduces itself without end—then it stands to reason that the democracy at the center of which it operates is likewise a democracy that runs on endless growth.

To the extent that data hoards—along with other organic and inorganic boundless things and collectives—are characterized by their growth, by their creeping, encroaching quality, then, the democratic work that they do must likewise be characterized by growth and spreading. Or, put differently, the democracy of systems, hoards, assemblages, and accumulations that data mining invites onlookers to consider is a democracy characterized in large part by its reproductive or replicating capacity. Taking the *informational* aspects of data mining seriously—a move that any complete discussion of the practice requires—therefore means recognizing not only the possibility, at least, that data mining might be a functional rather than dysfunctional part of democratic engagement, but also the likelihood that the democracy of which data collection forms a central part is a democracy of replication, reproduction, and growth. Or, more pointedly, as Jussi Parikka has written in a different context, "Data mining might be a leading hype term . . . of the moment but it is enabled only by the sort of mining that we associate with the ground and its ungrounding."[13] Data mining is one variation on the global physicality of mass democratic process.

Feminist Theories of Thought

But information systems—whether of the data-mining type or the slime mold type—are not only systems that replicate or reproduce themselves; they are also systems that analyze, process, and think. Indeed, given the key role that information, data, and the algorithmic analysis of both play in the work as well as the growth of inorganic Boundless Informant–style collections *as well as* organic slime mold-style collections, thought is as key to their political activity as reproduction or material engagement with their world is. Or, to put it in a perhaps more provocative way, it may be that the democracy conjured up in the recent conversations surrounding data mining is a democracy natural to slime mold and its analogues because of how slime *thinks* rather than because of what it does or how it, materially, exists (in the apparent absence or irrelevance of thought). In this sense, the nonhuman quality of this democracy that bubbles up out of growth, replication, or reproduction is a democracy that demands the intellectual energy of its participants more even than classic, human-centered liberal democracy has.

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Although a number of commentators over the past two decades have made compelling arguments that democratic and constitutional practice must consider nonhumans as political actors or actants,[14] therefore, the politics and the political histories that appear over the following chapters are different from conventional posthumanist or materialist accounts. Put differently, they reflect, perhaps, less the mainstream—if increasingly harassed[15]—posthumanist canon that has celebrated the embedded, material, contingent vibrancy or vitality of unbounded existence than they do the more explicitly feminist, often less feted, work that has taken cognition as the underlying problem (and, in some cases, clarification) of nonhuman or posthuman political existence.

Much of this feminist work has questioned the assumptions driving mainstream posthumanist philosophy—assumptions that frequently reify Cartesian dualism by arguing that the problem, such as it was, of human-centered political theory was simply that it privileged the abstract, rational thought side of the mind-matter opposition over the embedded, embodied material side of it. Rather than simply shifting emphasis and importance to the "other," material term, this feminist writing has instead questioned the relevance of the Cartesian dichotomy between thought and matter to theories of political engagement—and in some cases even the accuracy of scholarship that attributes such binaries to René Descartes in the first place.[16] Far from tolerating nonhuman assemblages for their remarkable ability to *live*, this feminist writing, in short, has analyzed the capacity of these assemblages to *think* (and, as a corollary, perhaps to live).

A good fourteen years ago, for example, Rosi Braidotti drew on the writing of Luce Irigaray and Gilles Deleuze, in her *Metamorphosis*, in order to reconfigure "consciousness" in (what, a few years later, would popularly be identified as) posthumanist terms. Passing quickly over the nonproblem of Cartesian dualism,[17] Braidotti insisted that restoring the relevance of thought to contemporary political philosophy was not simply a question of finding the magical balance between mind and body, and not the easy result of "a mere reversal of the dialectics into irrationality."[18] On the contrary, this revitalization of thought within political theory could occur, she wrote, only by taking "a different path of becoming,"[19] only after defining consciousness with reference to "flows of variations, constantly transforming within patterns of continuity,"[20] and only by recognizing its work across "processes, flows," and the "in-between-states."[21] Unlike the later figures who helped to establish the posthumanist canon, in other words, Braidotti refused the easy exultation in matter in and of itself—an exultation that then gave rise, as a corollary, to, essentially, thought as an after-

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thought. Braidotti took on the much more difficult task of theorizing thought or consciousness *first*, and only *from there* repositioning life or living matter.

In the inverted scenario she posits, consciousness is no longer a minor corollary to a new materialist politics. It is no longer the embarrassing bit of a supposedly Cartesian opposition that cannot be eliminated, and that—thus—needs to be inserted, quietly, without fanfare, into the more vocal and confident narratives of vitality or living, growing things. On the contrary, thought and consciousness in Braidotti's early posthumanist feminist theory are central, robust, and dynamic—they operate via reproduction or replication, alongside "the surprisingly generative" posthuman body as well as within the "generative disorder" of "contemporary molecular biology" (with each in turn creating a space for the "'gender trouble' going on in societies where sexed identities and organic functions are in a state of flux").[22] Thought, put bluntly, is thus never subordinate to generative, material, reproductive fields. Far from it; in Braidotti's work, thought is a key *variation* on material life and growth, a manifestation, in and of itself, of organic and inorganic functions in flux.

Not only did Braidotti's work in this way set the stage for many early twenty-first-century feminist theories of nonhuman consciousness, but it also made possible some intriguing feminist reinterpretations of transformative historical and philosophical figures—in particular those who have appeared as villains, or at least foils, in more mainstream posthumanist or new materialist political philosophy. Descartes, for example, once again, need no longer be the doomed initiator of four centuries of disembodied (sexist) rationalism. As Claire Colebrook has recently argued in a simultaneous critique of the classic embrace of supposed Cartesian dualism, of the "late twentieth-century anti-cognitive turn to life as vitalism,"[23] and of the conventional posthumanist dismissal of "cognition-oriented models,"[24] Cartesian theories of cognition by no means presuppose the total separation of generation or growth, on the one hand, and of thought or consciousness, on the other. Indeed, the very fear of the "brain" (as vulnerable bare life or matter in the first camp and as violent, disembodied rationality in the second) derives not from a specious dualism that in any case never existed, but rather from the overlap, in the brain itself, of generative *and* perceptive power.[25] The brain is a problem not because it operates in opposition to one side (or the other) of the duality, but because it inhabits, so easily, both. Given this slight shift in the role of thought in life, in other words, Cartesian subjectivity—and the proto-democratic politics that goes with it—becomes far more (productively) complex.

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Charles Darwin, similarly, no longer fits the cartoonish mold of hero to those who favor the linear (seemingly rational) transmission of genetic traits from one discrete body to the next—representative of active thought always tyrannizing inert matter—and villain to those who champion the generative capacities of unbounded accumulations or assemblages, beyond the tyranny of such logic. Rather, as Elizabeth Grosz, following much more closely the path described earlier by Braidotti—and drawing especially on Deleuzian theories of life "lived in excess of a subject, beyond consciousness"[26]—has argued, Darwin might easily be placed in the midst of a philosophical tradition that privileges the nonlinear contagion of thought and matter, of life as a process of ongoing, dynamic exchange. Indeed, although she brackets consciousness (along with subjectivity) in her analysis of Darwin's ongoing relevance to philosophy and political theory, Grosz by no means excises thought writ large from her discussion. The life, she writes, that has historically interested Darwin as well as Deleuze is a life as much of replicating information as it is of reproducing matter; it is the vitality of "nonliving events," "unpredictable emergences," "the weather, the ocean, gravitational forces," and "nonliving forces," as much as it is the vitality of organisms flourishing and dying.[27] In short, Darwin, like Descartes—and, to make the object of this detour plain, like Boundless Informant, human cloning, stored embryonic matter, and trash or pollution—take on far more complex, and productive, political connotations when invoking this tradition of feminist posthumanism that understands thought to complement, rather than oppose, life. They are not simply villains or saviors.

The chapters that follow here, then, once more, are embedded in this same feminist theoretical tradition. The intersection of Boundless Informant and the slime mold suggests that nonhumans are politically vital and central to contemporary democracy not because political practice must include everything that is "vibrant," environmental, or material, regardless of its thought or speech[28]—or, not only because of that. Instead, nonhumans are political, quite narrowly, because of their *intellectual* life—because how and when they think makes democracy happen. To be clear, however: this nonhuman political thought at the center of nonhuman democratic engagement is not the amusing, almost human thought chronicled by the *Guardian* in 2012. It is not almost rational, pseudopsychological, and seemingly but not actually self-aware or self-interested.

Instead, the thought that scenarios such as the rapid proliferation of democratic data collection programs highlight as political is so because it is radically *nonhuman*, because it has nothing to do with human cognition,

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human psychology, or human self-narrative. This democratic thought is absent any notion of the self, absent any awareness, absent any investment in the absolute or abstract, and absent any rational goal. It is the thought that Braidotti approaches obliquely, via material and informational flow and disorder, the thought that Colebrook associates with theorists' apparent hatred of the brain, and the thought that Grosz situates in the life and vitality that unfold across geological rather than biological time. But it is still, emphatically, thought. And, as will become apparent over the following pages, it is far more relevant to ongoing permutations of mass democracy than the embodied, psychological, rational cognition that is classically situated in a unique human or humanesque mind.

In fact, it is worth speculating that the reason that cognition has gradually disappeared from studies of democratic theory *outside* the realm of feminist theory[29]—feminist theorists are nowadays some of the few scholars willing to take consciousness seriously—is not that thought in general has become politically anachronistic in an era of biopolitical mass democracy, but that *human* thought, specifically, has become anachronistic. Human thought has disappeared from studies of politics—in favor of, variously, bodies, speech, and identity—not because thought itself seems no longer to touch on politics, but because humans seem not to. When nonhuman modes of thinking enter into analyses of political engagement, however, it is surprising how central thinking and contemplation become (again) to democratic theory. Exploring the political value of slime mold's thinking on its *own* terms, therefore, as not human, and not even close to human, as a variation on the consciousness that has animated so much recent feminist theory, can lead to more effective ways of dealing with the various, seemingly daily, crises of democracy—crises such as rampant data mining—that appear in political conversation writ large.

The thought that works in tandem with reproduction throughout the ensuing pages should in this way be both familiar—or even nostalgic—*and* alien or uncomfortable to mainstream students of democratic theory. It should be familiar because it is the thought that so many liberal theorists continue to mourn, the thought that the era of biopolitics—with its mass regulation of biological life, reproduction, and death—seemed to eradicate. It is the laudable thought that, initially at least, made democratic political existence an existence toward which populations were rightly striving—the thought that allowed democratic citizens to live not only life, but the good life. Finally, it is the same classic political thought that prompts optimistic commentaries on the survival of democratic ideals despite the setbacks and the assaults. Indeed, as the following stories make

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clear, democratic thought *as thought* is not only still with us, but it has historically always been a prominent aspect of political engagement, and it has been bolstered rather than undermined by, among other mass democratic practices, the emergence of biopolitics. Biologically inflected mass democracy, in short, has made political thought possible *because* it concerns itself with life, reproduction, and death.

But the fact that this democratic thought is so closely tied to the organic and inorganic reproduction—or replication—at the heart of feminist interpretation likewise means that it is in many ways removed from the rationality or cognition of its earlier manifestations. It is alien, or at the very least not human. It is categorically not the thought of self-conscious, aware, embodied, and discrete human minds. Or, if it does touch cognition, its operation across human minds is incidental to its work. As a result, the democratic thought or contemplation that is flourishing today and, as will become apparent, was likewise well established historically, invites a reconsideration of a series of fundamental assumptions about what constitutes appropriate political engagement. At the very least, given its scholarly life within, primarily, the realm of feminist theory, its gendered manifestations demand recognition.

After all, if the thought of algorithms, cells, or bacteria—thought that involves processing, but not awareness, memory but not self-consciousness, and comparison but not abstraction—is the thought that constitutes, as well as materially and informationally reproducing and replicating, the classic political good life, if this thought is inextricably linked to the "gender trouble" at the heart of contemporary political engagement, then both the practices and ideals of contemporary democracy are in need of reconsideration. This shift in perspective demands far more, for example, than a new or increased awareness of environmental interconnectedness. It requires more than a tolerance of different modes of material or embodied existence. It insists on more than a simple reevaluation of the role of reproduction or sexuality in the formulation of political identity or behavior. And it asks for more than a reconsideration of the threats—if any—posed by organic or inorganic systems and boundless things.

Rather, and as just a beginning, this shift in perspective invites commentators to spend less time finding the nearly human intellectual value of *nonhuman* thought or behavior and more time seeking out the nonhuman potential of *human* cognition. It suggests that politically worthwhile thought is not the thought that mirrors human awareness, but instead the thought that expands on nonhuman processing. It suggests that the gender operations that contemporary democratic systems are constantly trying both to celebrate and manage are, perhaps, more relevant to nonhuman

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assemblages than they are to human bodies. And, as a result, it vindicates the insistence of liberal theorists that democratic *thinking* is not dead, even while it opens countless avenues of political contemplation that these theorists never imagined.

Democracy

The terms "democracy," "liberal democracy," and "mass democracy" are as yet, though, a little bit vague—a quick definition here would help to move the argument along. Like much of the mainstream literature in the posthumanist canon,[30] the chapters that follow intervene in what is now a centuries-old debate that pits the efficacy and ethics of a democracy that celebrates (or protects) the discrete, rational, speaking, embodied individual (liberal democracy) against the efficacy and ethics of a democracy that celebrates (or protects) an undifferentiated collective of such—effaced—individuals (mass democracy). This dichotomy may be farcical—and nearly as old as the debate is the refusal to engage in it, the insistence that there is no opposition, tension, or even relationship between the two interpretations of democratic engagement. Nonetheless, once modern democracy comes to be defined, in its broadest terms, as a system of government in which, horizontally, all humans (and all things related to humans) are equally political, equally open to expression in a language of law and rights,[31] the split between linking this equality to the discrete, thinking, embodied individual and associating it with the general, flourishing, unbounded mass emerges as the starting point for much political theory.

There is no need to insist upon a different starting point now. What follows over this short definitional section, therefore, is a summary, first, of the classic articulation of the relationship or tension between liberal democracy and mass democracy, second, of the likewise classic feminist scholarship that, particularly in the late twentieth century, identified and critiqued the gendered aspects of this tension, third, of the revivification at the beginning of the twenty-first century of Michel Foucault's biopolitical theory as a useful alternative to preexisting responses to the tension, and finally, fourth, how the next few chapters respond to this well-established trend in scholarly democratic theory. Once again, the apparent opposition between liberal and mass democracy has already been described, at length, as more apparent than an opposition—especially by political theorists working in the posthumanist canon—but the fact that the opposition is for the most part a fantasy does not detract from its usefulness as a framework of inquiry.

Moreover, the purpose of this study is not to revisit the many points of

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intersection between these two supposedly distinct interpretations—liberal and mass—of democracy. Instead, by accepting the tension between the two interpretations as a useful jumping-off point for analysis, the research here reconceives the *threats* to democracy writ large that always seem to emerge from the (imagined) gap between the liberal individual and the democratic mass—it addresses the fractures that seem to arise in democratic structures, given their less than stable theoretical foundation, given their precarious balancing act on two apparently oppositional poles. Or, put in yet another way, the claim driving the book, more modestly, is that *if* one attribute of liberal democracy—thought—can be equated with one attribute of mass democracy—reproductive flourishing—as a nonhuman rather than a human activity, *then* democracy writ large perhaps need not be described as always, inevitably, eternally in crisis.

Liberal democracy, then, taking as its key figure the rational, speaking, embodied individual, is ordinarily defined as a democracy that protects, before all else, the freedom of rights-based citizenship. Histories of this variation on democracy in fact situate the citizen as a rights-bearing individual within a particular eighteenth-century moment that, in this traditional story, established (usually constitutionally) a new space for political humans to be active, thinking, speaking, free from coercion, and, perhaps most importantly, protected from threats to such physical or linguistic activities and freedoms. These same histories frequently identify a second, simultaneous, eighteenth-century moment as a time when an additional, less salubrious, yet still constitutional, *authoritarian* take on citizenship emerged—a time when a sort of shadow democratic citizen came to the fore, still political, but now possessing only passive rights and always subordinated to a relentless, mute collective.[32] In his *Formations of the Secular*, for example, Talal Asad has encapsulated this ongoing eighteenth-century tension in the late twentieth-century problem of European identity cards:

> In Britain, identity cards are thought of as a threat to the liberty of individual subjects (that is, *citizens*), and in the European Union states they are seen as a guarantee that a collective object (that is, the *population*) will be provided efficiently with equal welfare. The former focuses on liberty as an active right, the latter on welfare as a passive one.[33]

Key, here, once more, is the fact that both of these variations on political existence, active versus passive, individual versus collective, liberal versus mass—in this example as well as in countless others—are democratic. Both rest on the idea that genuine governance can happen only when all

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humans, recognized as such, are political and when all human relationships are expressed in the legal language of rights. Additionally, though, and implicit in many such articulations of democratic engagement (if not necessarily in Asad's more sophisticated critique of liberal secularism) is also the idea that there is a "good" democracy—the democracy that takes as its representative the active, thoughtful, speaking individual—constantly shoring up the barriers against a "bad" democracy, always ready to tip over into totalitarianism, into a mass politics of passive, unthinking, mute, regulated matter.

Once more, this tension between liberal and mass democracy is as old as modern democratic theory—as are an array of responses to it (with many, once more, questioning any opposition at all). One of the major, early feminist theoretical replies to the problem, for example, was to challenge the implicit corollary to setting up, in this way, the underlying problem facing democracy—namely the conclusion that active, liberal citizenship is always, self-evidently, the ideal, unless (or, more pointedly, "except when") the constitution that produced such citizenship is faced with a crisis or emergency.[34] As Carole Pateman wrote, influentially, in the 1980s, a significant problem with the original social contract theory that gave rise to *both* liberal *and* mass or authoritarian variations on democracy[35] was that the supposedly universal civil freedom inherent in democratic theory was a "masculine attribute"—and indeed, that women "attain the formal standing of civil individuals, but as embodied feminine beings . . . [and are] never 'individuals' in the same sense as men."[36]

Pateman's contribution to democratic political theory, in other words, was to demonstrate that the tension between active, rational individual freedom and passive, reproductive mass subjection (once more, and emphatically, both equally democratic modes of existence) was a problem, specifically, of gender.[37] The reproductive activity of women as embodied citizens disqualified them from liberty—and thus, unless the gendered aspects of this originary establishment of civil freedom were acknowledged, aiming at a liberal ideal while defending against the totalitarian cautionary tale was, at best, doomed to failure, and at worst unethical. Important to keep in mind, however, is that even as she challenged both the clear distinction between liberal and mass democracy and the value or ethics of uncritically advocating the liberal, individualist side of this distinction, Pateman nonetheless implicitly attributed positive moral value to the liberal democracy of thought and speech. The problem is not that liberal individualism is ethically or empirically flawed but that the democratic theory that created a space for the active play of this individualism a

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priori disqualified women, as reproductive bodies, from entry into this space. It is still more desirable to be a liberal individual than it is to be dissolved into a democratic mass—and liberalism is still therefore vulnerable to threats emanating from this mass.

Writing at the same time as Pateman, Foucault identified a similar problem with conventional analyses of the supposed tension between the liberal and mass democracies that developed out of modern social contract theory. For Foucault, though, this problem was more historical than it was (he insisted) ethical. In his 1975–1976 lectures "Society Must Be Defended," and in the first volume of his *History of Sexuality*, Foucault argued that, from the eighteenth century onward, the rhetoric of liberal rights had always been, and without contradiction, a means of expressing mass democratic practices—and in particular, the management of biological life, reproduction, health, and flourishing in the name of collective political existence. As it is most frequently understood today—and this will be familiar to many readers, some of whom might ask themselves why we are returning now to a scholarly trend that played itself out at least five years ago—this biopolitical mode of democratic engagement became prominent near the end of the eighteenth century when, Foucault wrote, the sovereign right over life changed. With modern social contract theory, the classical good life disappeared as a political goal, to be replaced by extended, indefinite, biological living. As Foucault influentially put it (and again, skip ahead if you have heard this), the classical or juridical sovereign right to "let live and make die" gave way to a biopolitical sovereign right to "make live and let die." For what it is worth, a major theme of this book is that—unfashionable[38] though it may be—this biopolitical interpretation of democracy still needs unpacking.

Alongside this shift in the sovereign right over life, a number of other biopolitical modes of democratic governance also appeared. Drawing always on the liberal rhetoric of rights, various states, for example, instituted policies to regulate healthy populations, to increase birthrates, to promote clean environments, and to collect an ever increasing amount of statistical data on these problems. Birth and death ceased to be politically relevant to the individual citizen and instead became politically relevant to the biologically defined population.[39] Likewise, the environment gradually became a problem of human life or vitality, while the storage of data or information concerning collective health and vitality became one of the predominant means of expressing the right to life.[40] In addition to operating as a response to the always blurry distinctions between liberal and authoritarian democratic process,[41] then, Foucault's theory of biopolitics

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was also a way to explain the proliferating discourses, institutions, and policies that emerged from what appeared to be a fundamental redefinition of political life at the end of the eighteenth century.

Foucault's scholarship presents itself as pure description—normative prescriptions, he insisted throughout his writing and lectures, simply did not interest him. Nonetheless, at the end of the twentieth century and in the first few years of the twenty-first century, as biopolitics became a fashionable lens through which to address the seeming ongoing malaise of the liberal ideal, writers drawing on Foucault's work found in it an apparently clear ethical message: just as before the liberal democracy of active participation, of linguistic freedom, and of educated thought was threatened by the mass democracy of passive matter, mindlessly, thoughtlessly reproducing itself and flourishing. Bare life was a demon that would always haunt rational thought.[42]

A number of feminist theorists—notably, once again, Braidotti—questioned the validity of this conclusion. Drawing on both feminist methodologies and what would become posthumanist analytical frameworks, Braidotti challenged the assumption that unbounded life or vitality was necessarily the violent ghost plaguing proper democratic engagement—or, for that matter, that life defined as such was always operating in opposition to consciousness.[43] Unlike Pateman, who demonstrated that sexuality, as a problem, underpinned the initial tension in the democratic social contract (even if imagined) between liberal citizens who spoke and thought and mass subjects who lived and reproduced—and who in turn criticized the association with women exclusively with the latter—Braidotti critiqued, from the direction of posthumanist philosophy, the notion that (gendered) life is necessarily the undesirable term in the set of relations. Life, broadly defined, can easily be the starting point for an affirmative, rather than death-obsessed, variation on a truly mass democracy.[44]

As the following chapters address various nonhuman, boundless, and accumulating threats and menaces to democratic engagement—and then reconfigure these threats as potential political norms—therefore, they draw implicitly and explicitly on the tradition that scholars such as Pateman and Braidotti *both* have established. At the same time, although life is obviously key to the description of nonhuman democracy described here, it is not the aspect of, for example, Foucauldian biopolitics that is the most relevant to the play of *thought*—drawn from liberalism (even if outside the rational metaphysics that underlies liberal politics)—that the book identifies as a defining characteristic of these threats. Indeed, the argument that unfolds over the book ignores for the most part the more familiar aspects

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of biopolitics—discipline, governmentality, and the management of populations through policies that "make live and let die." Instead, it foregrounds a more muted part of Foucault's description of biopolitics—his discussion of the statistics that proliferate in modern mass democracies—in order to make the case that, historically, nonhuman assemblages or systems that think *as* they reproduce or replicate have always been democratic actors. As a result, such systems simply cannot be threats to contemporary democratic engagement.

Matthew Fuller and Andrew Goffey have made a related case for taking the work of statistics or data sets seriously in their own right. Noting that Ian Hacking has pinpointed "the bureaucracy of statistics" as a key element in histories of governance and democracy, for example, Fuller and Goffey go on to write that it is "of greater interest" to "consider the role that the dataset might have as an active medium in its own right," to address

> the classifications by which machines must think humans and determine the actions open to them . . . we are correct to explore the specific kind of statistical knowledge enveloped in datasets as a component part of discursive strategies. But with the growth of forms of machine readability, under which data in various forms become a significant parameter in programmable operations, something of a shift occurs. Under such circumstances, machine classification—in conjunction with bureaucratic labor of more humanly devised taxonomies—starts to operate in quite decisive forms of "action on action."[45]

A key component of this discursive, democratic, yet nearly completely nonhuman "action on action," however, as the following chapters will posit, is, in addition, its gender dynamics and gendered dimensions.

Indeed, unlike Foucault, who developed his response (biopolitics) to the classic problem fracturing modern democracy without paying any attention to gender or gendered power, the chapters here posit gender as a central category of this ongoing theorizing of democratic practice. The gender that is linked to the simultaneously thinking and reproducing political life here, however, is not human gender, not a property of human bodies, but a set of systemic operations that resonate politically without bodies, subjects, or sexuality. The primary points to draw from these quick historical definitions of liberal democracy, mass democracy, and biopolitics, in other words, are, in summary form, the following: as much as the rational metaphysics of liberal democracy has seemed to lend itself to human-centered politics, and as much as the regulation of reproduction

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and the flourishing of mass democracy have seemed to lend themselves to, potentially, nonhuman or posthuman political structures, these attributions are not necessarily valid. On the contrary, implicit in the complex interplay—rather than easy opposition—between liberal and mass (or authoritarian) interpretations of democratic engagement is the possibility that what has always seemed to be liberal thought can be equally a quality of nonhuman political activity—and indeed, a product of nonhuman reproduction or replication. Not only is democracy a problem of gender, in other words, it is a problem of the systemic gender of assemblages such as Boundless Informant.

Literature Review

It should be clear by now that this book enters into a number of conversations that have developed over the past decades in a variety of scholarly disciplines and fields. In some cases, the book offers explicit challenges to the conventions and axioms of these fields. In most cases, though, it extends and develops these conversations. In this introduction, therefore, it may be better to describe some of the well-established themes on which the book plays than to summarize in detail the challenges to existing work raised throughout it—challenges that are in any case elaborated at length in its main chapters.

To begin, for example, there has been a great deal of writing over the past few decades in science studies fields on the overlap between human and nonhuman, as well as between organic and inorganic, thought. Since the late twentieth century, an increasingly influential notion driving biological inquiry, as well as the cultural study of biological research, has been that human thought, physiologically, operates on a series of spectrums, rather than as a unique, fixed mode of engagement with the world (that is, as the thing that makes us human). Most prominently, work of the sort popularized in the *Guardian* on the remarkable similarities between human and nonhuman as well as between human and *non-animal*—bacterial, viral, or plant, for example—thinking has exploded.[46] This work, in particular, has devalued the brain as the sole, self-contained space of human thought, and it has found thinking to be an activity that operates not only across bodies but also across bodily or cellular membranes and multifaceted organic environments.

Second, and less expected perhaps, researchers over the past few decades have also increasingly identified adult human thought with embryonic growth or development. This trend in research took its impetus primarily

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from the biologist Alain Prochiantz's compelling critique in the 1990s of earlier work that had defined the brain as a unique, immutable organ of cognition—again, as the thing that makes us who we are. In the late 1990s, Prochiantz discovered a series of similarities between what anthropologist Tobias Rees has called embryonic "plasticity" and "adult cerebral plasticity."[47] More specifically, Prochiantz's research on "the nervous system" as a system no different from an embryonic system—"an emergent form, a form in formation, with homeoproteins as key to ceaseless formation processes"[48]—upset at least a century's worth of scientific scholarship that had described the adult brain as a fully formed tool of cognition. Not only has recent biological research made it increasingly difficult to distinguish human thought from bacterial, viral, or plant thought, therefore, but, via work like Prochiantz's, this research has also linked human thought, physiologically, to the growth or flourishing of embryonic matter—to reproduction, growth, and replication.

This insistence that human thought is not qualitatively distinct from any other type of thought (or growth) has not, though, been limited to work on how human cognition echoes other organic processes. A final, likely more familiar, spectrum on which human thought has appeared in scientific writing is the spectrum that stretches between organic and inorganic existence. Since the idea that human intelligence might reflect what is ordinarily described as artificial intelligence is relatively familiar, this claim has been subject to more extensive criticism than the claims that have driven more recent writing. Rees, for example, argues that one *contribution* that Prochiantz's work has made has been to put to rest the idea that the human brain has anything to do with "the image of the immutable machine that dominated neuroscience."[49] Prochiantz's own writing, however, addresses this apparent disjuncture between organic thought and inorganic thought—even the inorganic thought produced by the much-maligned machine—with more subtlety.

Prochiantz notes, for example, that scientists have historically associated organic or human thinking not only with simple mechanical modes of inorganic thought, but with varied inorganic systems, and with systems infinitely more complex than the self-contained supercomputers of mid-twentieth-century science fiction. The physicist Léon Brillouin, for example, wrote in the early twentieth century that the striking similarities among first, "living phenomena," second, entropy as it is expressed in the laws of thermodynamics, and third, information theory as cyberneticists were developing it, hinted that living organisms might, themselves, be best described as embedded, open-ended, entropic information-processing sys-

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tems.[50] The physicist and mathematician D'Arcy Thompson[51] in the late nineteenth century and Alan Turing in the mid-twentieth century likewise highlighted the similarities between inorganic information-processing systems—"machines" much more broadly defined than they are in classic artificial intelligence scenarios—and organic nervous systems.[52] Those who have associated human thought with inorganic nonhuman thought, as well as organic with inorganic life, in other words, have, according to Prochiantz, done so specifically because they have appreciated the *dynamic* or *open-ended*, rather than "fixed," quality of *inorganic* systems, machines, and computational processing.[53] These commentators have found the similarities between human and computational thought to rest in their similarly *incomplete* or *contingent* qualities.

Although Prochiantz's conclusion—via a more sophisticated, yet nonetheless insistent, redefinition of what is essentially thought-as-psychology or thought-as-awareness[54]—is that scholars should not take these analogies too far, the history that he provides of organic *and* inorganic thought and life as, first, interrelated, and second, more multifaceted than a fixed brain model might suggest, is still well taken. He makes clear that positioning human thought on these spectrums is no newer to biology than it is to cultural studies of biology. Moreover, he shows that there is a well-established tradition among scientists not only of decentering adult human cognition as the high point (and model) of thought, but of taking other types of contemplation as norms and points of departure.

Drawing on this work in both research science and the cultural study of science, the following chapters explore the political implications of this recent explosion in scientific writing—an explosion that itself is the product of a deeply rooted scholarly and scientific tradition. These chapters ask what might happen if these alternative, nonhuman thought processes become the normative thought processes of democratic engagement. The book takes seriously, in other words, not just the idea that human thought is far from unique, but the idea that human thought is perhaps not the best model or starting point for political analysis. And, as a result, these chapters make a case for the political *value* of reimagining the thoughtfulness at the heart of classic democratic engagement—a thoughtfulness that is not in any clear way human, at least as the human is conventionally defined.

A more circumscribed second field in which to excavate the democratic potential of nonhuman thought and growth is—as Prochiantz's neuroscientific-embryological work hints—historical and sociological writing on embryology and genetics. Embryos fascinated eighteenth-, nineteenth-, and twentieth-century natural historians and the physiologists who

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worked as their contemporaries. The eighteenth-century naturalist Georges-Louis Leclerc Buffon, for example, frequently initiated his wide-ranging descriptions of organic and inorganic environments and systems with a discussion of the growth, reproduction, replication, and thought of embryos and embryonic material.[55] Likewise, the nineteenth-century physiologist William Thierry Preyer found, via a narrower focus on the life and thought of newborns, fetuses, and embryos, ample reason to situate embryonic material on a spectrum of organic and inorganic contemplation and sensitivity.[56] These are just two examples from a rich field of literature linking embryonic thought, growth, and replication to systemic or environmental thought, growth, and reproduction. But these are also examples that, among many others, lend themselves well to political analysis.

Indeed, the complexity of this natural-historical writing in embryology has given rise to at least three decades' worth of recent scholarship, especially in sociology, cultural studies, and politics, that describes, analyzes, and critiques its political ramifications. Ongoing studies of historical embryology, for example, not only have emphasized the remarkable aesthetic depth of the past two centuries of writing in embryology and genetics,[57] but also have posited that research into reproduction, genes, embryonic development, and embryonic growth has allowed for a peculiarly creative redefinition of both reproduction and thought within the scholarly community writ large.[58] Setting aside the discrete body or the fully formed brain as the models of, first, reproductive matter, and second, thinking matter, embryologists almost by necessity explored—if not always accepting—unbounded, environmental variations on both replication and thinking.

In some cases, it is true, recent scholarship has highlighted the ethically troubling conclusions that historical embryologists and geneticists drew from their work. The early twentieth-century identification of genetic information with computational information, to take just one example, was clearly both dehumanizing and instrumentalizing as it distilled life into code, and frequently militarized code.[59] But this dehumanization, again, to the extent that it explicitly marginalized the embodied, rational human as the only relevant political (and reproductive) actor, also—and as other historians of embryology have pointed out—was helpful to reframing thought and reproduction *as* political activities.[60] Or, put differently, even the scholarship that criticizes the more disturbing research of nineteenth- and twentieth-century embryologists by no means undercuts the contribution that these embryologists made, and perhaps uniquely made, to reimagining both thought and reproduction as issues relevant to democratic theory.

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The premise on which the following chapters proceed, therefore, is that this ongoing critical scholarship on embryology—*because of* the debates that continue to motivate it—is essential to any theory of mass democracy that takes both life and thought seriously. Embryologists have, historically, and as a result of the unique qualities of their field, been unafraid of redefining life, growth, reproduction, and thought in sometimes ethically questionable ways. Their work, and the work of those who read it, must consequently form the basis of studies that address life, growth, reproduction, and thought as *political* activities—especially to the extent that these activities lend themselves to practices such as data hoarding. Or, put differently, recent permutations of democratic engagement demand a return to seemingly arcane fields such as historical embryology and genetic research. Contemporary mass democracy cannot be made sense of without an examination of its historical links to widely varied interpretations of organic and inorganic growth, information processing, and replication.

A third—and likely less unexpected—field with which the book engages is the field of bioethics, and in particular the bioethics of reproduction. Like science studies, the study of bioethics has been moving gradually away from frameworks of inquiry that take the embodied, rational, human actor as the only figure worth addressing. Catherine Mills, for example, has made a convincing argument that a responsible ethics of reproduction, especially given ongoing trends in reproductive technology, must consider the broader material environments within which reproduction occurs. In particular, Mills writes that conventional liberal bioethical theories have failed to consider the possibility that "new technologies also produce opportunities for new ways of thinking about ourselves and our ethical practices."[61] Conventional takes on the ethics of reproduction, that is to say, have *irresponsibly* ignored the environmental, material, and informational character of life.[62]

More effective interpretations of reproduction in the age of biotechnology, therefore, would, according to Mills, incorporate a variety of embodied and disembodied material perspectives. Indeed, such interpretations would introduce alternative definitions of life and alternative modes of political engagement into a sphere that conventional bioethical theory leaves narrow and exclusive. Or, as Mills puts it, leaving aside the rational human subject as the only subject relevant to reproductive politics might lead us to a "richer conception of corporeal life and its role in establishing ethical responsiveness."[63] Seeking this richer conception of corporal (and here, informational) life is one key aim driving all of the chapters of the book.

At the same time, the stories told over the following pages are not seeking answers to the same *questions* that animate Mills's study. Their purpose,

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once more, is, first, to unearth a preexisting history of reproduction as a mode of political thought, and, second, to describe the democratic implications of this history—to explore what a democracy that takes such reproduction and thought seriously might entail. But obviously, work such as Mills's is vital to framing the book's argument. Inspired by Mills's ethical analysis, the chapters that follow describe the political implications of reproduction as a radically open-ended, material activity that brackets liberal choice models and that, *therefore*, possesses enormous democratic potential.

A final major field on which this book touches, obviously, is the field of gender and sexuality studies—or, more pointedly, gender studies but *not* sexuality studies. Once again, the reproduction that becomes political in this book—the reproduction at the heart of the thoughtful democratic biopolitics sketched here—is specifically *a*sexual. While it is true that sexual reproduction can, given the open quality of the nonhuman democracy presented here, approach this asexual norm, it can do so only by bracketing its sexual qualities. To repeat, therefore, it is the thought and the reproduction, or the thought *as* reproduction, of the encroaching, yellow slime mold that is the touchstone of these histories. To the extent that self-contained, rational organisms that reproduce sexually, in discrete, unitary, finite, or initiating moments, engage in these politics, they can do so only by mimicking the reproduction of boundless, environmental, thoughtful, and above all irrational systems and environments. They reproduce, they work through gender operations, but they neither have nor do sex. Or, if they do engage in sexual activity as information transfer, this sexual activity is irrelevant to their reproduction, replication, and thought.

The idea that gender might operate—and operate in a politically resonant, systemic manner—without bodies, without subjects, and without sexuality is not new to the field of feminist theory. Indeed, the claim has been sufficiently influential over the past decades to have provoked a likewise influential, and equally thoughtful, critical response. Whereas scholars such as Luciana Parisi have argued that there is much to be said for exploring what she has described as the "molecular" operation of "femininity" across fields, systems, and environments,[64] for example, other scholars have questioned the validity of this approach. Attempts to theorize gender in the absence of subjectivity or sexuality not only evoke twentieth-century attacks on women's identity and subjectivity, this literature posits, but they also shut down the political force of gender or femininity as a category of belonging.[65]

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This book is thus indebted both to Braidotti's work on the affirmative quality of, for example, posthuman or "bare" life,[66] *and also* to Parisi's work on the molecular operations of femininity. At the same time, however, the conclusion that the book is proposing is not that defining gender as a set of systemic operations that work without bodies, subjects, or sexualities is more *ethical* than classic definitions of gender that invoke identity and embodiment. Rather, it is that, historically, such gender operations have been in play—and that in consequence they cannot be ignored. On the contrary, it is the duty of historians and feminist theorists to recount and describe such operations as well as their political implications. If this aspect of political history is ignored, addressing the complexities of contemporary democratic engagement in any sort of responsible way becomes impossible.

One might hope, in fact, that as these grounded, empirical, and contained stories—rather than grand narratives—of systemic or environmental gender operations play out, the productive qualities of their complexity and their evasion of conventional ethical categories will become clear. Gender is not *better* understood as something that operates without subjects, bodies, or sexualities. Rather, interpreting gender in this way can be helpful under certain, specific circumstances, such as when it becomes necessary to address the politics of human cloning, reproductive waste disposal, or data hoarding. More broadly, thinking about gender as a set of systemic operations can help scholars to recognize the relevance of feminist theory to a number of policies that are ordinarily, and inappropriately, deemed unrelated to feminist thinking. The *Guardian*, after all, failed altogether to mention gender either in its reporting on the slime mold or in its (relentlessly "masterful")[67] reporting on NSA data mining.

But this failure does not mean that gender is not central to these issues. By insisting that the following stories are stories not only of nonhuman democracy, not only of nonhuman thought and reproduction, but also of nonhuman, systemic, or environmental *gender*, indeed, the book offers up a productive, alternative framework for analyzing an array of supposed threats to democracy—and in particular threats such as data hoarding and human cloning. At the very least, it reminds readers that gender is no more absent from recent variations on democratic political engagement than information, data, environments, biological material, or reproduction have been. On the contrary, these stories cannot be told without an awareness of gender.

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Outline

The first main chapter of the book is an extended definition of nonhuman reproduction and nonhuman thought as (identical) democratic activities—a description of the political potential of boundless consciousness. The chapter begins with a return to Michel Foucault's theory of biopolitics, but it reimagines biopolitical mass democracy as a democracy characterized, once again, by the play of ideas, information, and statistical analysis. Accordingly, this chapter challenges a conventional interpretation of Foucauldian biopolitics that reads the history of mass democracy as a history of the gradual *exclusion* of thinking from political life. According to this conventional scholarship, when post-eighteenth-century states took pure or bare life as the centerpiece of political engagement—and when democratic practice began to facilitate the extension of life on a mass, or "species"-wide[68] scale—classic associations between politics and thought (especially when thought is equated with speech) fell apart.[69] When modern democratic engagement began to happen at the level of biological life, and in particular at the level of biologically reproductive life, this trend in scholarly writing asserts, intellectual life became politically irrelevant to democratic engagement. Thought could not be political in an era of mass democracy.

An aspect of Foucault's writing on biopolitics that this scholarship has for the most part not explored in detail, however, is its emphasis on the proliferation, in modern mass democracies, not only of biological life, but also of *statistics* on this life.[70] This scholarship, in other words, has not paid sufficient attention to Foucault's claim that *data collection* is as vital to mass democracy as reproductive or reproducing bodies. Moreover, by downplaying the massive, unbounded collection of data or information central to Foucault's theorization of nineteenth- and twentieth-century biopolitics, this scholarship has been blindsided by many recent and contemporary variations on democratic engagement—variations that look quite a lot like biopolitics, even if sexual reproduction is not their heart. Reasserting that the replication of data is as key to biopolitics as the reproduction of bodies—and presenting clearly, essentially in list format, four defining characteristics of the thought that this replicating data of reproducing bodies produces—therefore, can be a first step in sketching a theory of mass democracy that does *not* do away with thinking. Quite the opposite, thinking through information—analysis and contemplation—becomes a vital function within these new, specifically biopolitical, democratic practices.

Although this first chapter of the book is a return to classic Foucauldian

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biopolitics, in other words, it is a return that highlights the *intellectual* aspects of biopolitical engagement. By exploring the reproduction *and* thought of bacteria, cells, viruses, and mold, this chapter make clear that a quite reasonable twenty-first-century outcome of Foucault's three-century history of the politics of life is a democracy that values thought as much as—and indeed as a type of—reproduction. But, once again, this democratic thought is not human psychology, cognition, or awareness, and it is certainly not embodied or rational. Rather, politically relevant thought—the thought that *can* facilitate democratic engagement—is the nonpsychological thought of slime mold, bacteria, paramecia, and somatic cells as well as, obviously, data hoards. In short, this chapter suggests, it is very much possible for mass democracy to facilitate *both* reproduction *and* thought—but this reproduction and thought cannot take embodied existence or embodied cognition as their norm. Instead, any democracy that takes reproduction seriously (as, arguably, all modern democracies do)[71] must consider the intellectual qualities of nonhuman, unbounded, and disembodied reproductive work.

The next three chapters of the book—each addressing traditional threats to human-centered theories of democracy—provide evidence of the *value* of shifting toward nonhuman modes of democratic engagement. Each of these chapters describes one conventional, apparent assault on democracy, describes the democratic rights or practices that are understood to be weakened under these circumstances, and then explains how the threat—posed as such—is not genuine in the historical and political context of nonhuman democracy. Each of these chapters also, in making the case *against* various menacing unbounded accumulations, describes how nonhuman gender operations play out within these shifted scenarios. Each begins, at least, to draft a story of the gender of embryonic material, cloned human cells, digital and reproductive rubbish, and, of course, data hoards.

More specifically, the first of these central chapters explores the political challenges conventionally posed by human fetuses and human embryos. Stepping back from the traditional approach to the embryo or fetus as something that always exists in the future—as a potential body, potential human, or potential subject or person, and thus always a threat to *ongoing* democratic practice—this chapter explores an alternative, if less influential trend, in writing on embryonic life and thought. This alternative writing—produced over centuries, in a variety of national contexts, and incorporating the eighteenth-century work of naturalists like Buffon; popular science publications such as those of Félix Hément, a nineteenth-century Parisian inspector general of public schools; the medical-political theory of early

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twentieth-century Young Turks like Bahaeddin Şakir; and the late twentieth-century IVF policy of the U.S. state of Louisiana—situates embryos emphatically in the present. It addresses embryos as ongoing, living, thinking environments or systems rather than as potential (and thus incoherent) embodied, rational actors.

The effects of this history on contemporary democratic theory are extraordinary. Refusing for the most part to distinguish among the material growth of the embryo, the distribution of information across an embryonic system, and affective embryonic life, this writing, across centuries and geographies, posits little difference between reproduction and life or among reproduction, life, and thought. Reproduction is not limited to a single act or a single moment—a discrete point of linear information transfer between two bodies—after which the growth, and then eventually the life and thought, of a body and embodied subject begin. Rather, reproduction is an ongoing set of informational and material operations across informational and material systems. Reproduction, life, and thought are coextensive.

Once again, the political implications of this historical writing on embryos are difficult to overstate. Most relevant for the purposes of this book, though, this writing makes clear that the challenge that the embryo poses to human-centered democracy—that is, the challenge of the "person" who has, as yet, no body or identity—is largely irrelevant to democratic engagement. If anything, the more pressing question the embryo raises is not what it means to be politically human, but whether politically relevant thought and life are the unique preserve of the human. Taking the embryo as present slime or data rather than future person—as so much of this literature in fact does—shifts our understanding of what is, and is not, politically relevant biological or intellectual activity.

The second of these central chapters addresses a more recent challenge to human-centered democracy—the practice of human cloning. Human cloning—like rampant surveillance—is frequently described as one of the gravest existing threats to human-centered democracy. Late twentieth- and early twenty-first-century anticloning policy and legal literature, indeed, verges on the frantic in its attempts to block what is ordinarily seen as an assault on human identity, human dignity, and the "integrity of the human species."[72] Cloning, this writing and the policymaking assert, obliterates the most basic unit of democratic engagement—the unique, and uniquely embodied, individual citizen. Moreover, it does so via a particularly pernicious variation on reproductive activity that replaces an initiating, circumscribed moment of reproductive information *transfer*

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with a set of reproductive information *operations* that never reach an obvious end point.

A number of feminist theorists have already pointed out that this literature, especially given its tone, is more than a little bit misogynist and homophobic in that the only aspect of cloning that makes it *uniquely* threatening to the "species" is the fact that it allows women—via somatic cell nuclear transfer[73]—to reproduce themselves without sperm.[74] This chapter of the book, though, takes the existing critical feminist literature a step further in order to ask whether human cloning might also be maligned as an unmitigated evil in the policy literature because it represents an alternative, functional, yet nonhuman mode of democratic engagement—because cloning can so easily be reinterpreted not as a threat to democracy but as one of the most radically democratic activities in which a citizen might engage.

Indeed, as misogynist and homophobic as the anticloning literature is, there are other aspects of it worth exploring. The literature outlining human cloning's assault on human dignity and the human species, for example, seems for the most part to derive its rhetorical force not only from the fact that cloning is something women can do on their own, but, once again, from the fact that cloning fails to differentiate between a single moment of reproduction as information transfer and a later process of growth, development, and life. The reason that women must be prevented from cloning, in other words, is in large part that if cloning does become licit, governments will not be able to distinguish between the growth or flourishing of these women (as their somatic cells become reproductive) and the reproductive activity of these women (as their egg cells grow). Or, as Braidotti has put it more generally, parthenogenesis is a threat, in many ways, because it is a "sign of the potentially lethal powers of the undomesticated female," and of "the monstrousness of the female imagination."[75] Cloning involves not linear information transfer, but the simultaneous proliferation of information *and* organic material across gendered systems—and this coming together of information and growth, the anticloning literature argues, is an attack on both the dignity and the integrity of the human species.

Once again, though, if contemporary democracy rests on the *coexistence* of life and thought (as it does in its nonhuman formulations) rather than on an *opposition* between life and thought (as it does in its human-centered formulations)—if biopolitical mass democracy is contemplative—then cloning becomes not antidemocratic but a radically democratic activity. That is to say, just as resituating the embryo in this alternative political

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framework alters our understanding of what is politically relevant, resituating the clone in the same political framework alters our understanding of what is politically threatening. It becomes clear that the fear in the "integrity of the species" vocabulary is not that particular (cloned) individuals might lack identity and thus dignity. The policy literature—as feminist theorists have already pointed out—is for the most part unconcerned with the fate or activities of this or that particular person, including (and now against much of the feminist writing on this topic) the fate or activities of this or that homosexual versus heterosexual person. Rather, as this second chapter posits, the fear in the "integrity of the species" vocabulary has to do with policing *reproduction*—regardless of sexuality. It is a fear that reproduction will remain political, that it will remain a democratic activity, but that it will do so in the absence of people and, for that matter, in the absence of bodies. Clones, like embryos, are threatening because of their political potential, not because they represent a political dead end.

The third of the central chapters of the book turns to an additional accumulation of matter and information that commentators frequently decry as both an existential and political menace. This third threat is waste—and especially reproductive waste. Trash—or what gets designated trash—may seem to some readers as less of a pressing political issue than human cloning or data mining. But the disposal of reproductive trash—of, say, embryos, fetuses, stem cells, and the like—immediately raises the apparent problem of, again, what it means to be human. The purpose of shifting focus to trash in this third chapter is thus, first, to demonstrate broadly, once more, that nonhuman democratic theory can chart a path around issues that seem to stall human-centered liberal democracy. Second, and more narrowly, it is to explore the role that gender (and especially gender as a series of nonhuman, systemic, informational operations) can play in making waste politically vital, functional, and healthy.

Ordinarily, trash, and especially reproductive trash, is defined as a problem of identity or of identification. If a collection of cells, for example, is identified as a *product* of reproduction, and thus potentially a person, and if this collection of cells is trashed, then this disposal is unjust, unethical, or criminal. If a collection of cells is identified as a *by-product* of reproduction, however, and thus not potentially a person, then its disposal is licit. To the extent that there is a debate about reproductive trash in a human-centered democratic context, therefore, this debate circulates around definitional issues. In the state of Louisiana, nearly all reproductive tissue is designated a product of reproduction and

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potentially a person; thus nearly all disposal of embryonic material is illegal.[76] In Turkey, contrarily, many reproductive tissues are designated by-products of reproduction, not potentially persons, and thus their disposal is legal.[77] The conventional debate in human-centered law and policy circles concerns where on the spectrum between these two poles a particular item of trash ought to be placed.

This last central chapter of the book, however, posits that the definitional or identification debate is in fact a sideshow in the wider story of trash and democracy. Moreover, it asserts that there is a more dangerous tension than that between various identities or subjectivities driving the relationship between waste and politics. The real problem that reproductive trash poses to democracy, this chapter concludes, is a problem of *gender*. Just as reproduction and thought become systemic and environmental in this altered framework, so too does gender. The only way to understand the increasing centrality of trash or waste within democratic rhetoric,[78] therefore, is to recognize the role that gender plays in making trash not only political, but politically functional.

The first half of the chapter thus excavates from the historical literature evidence that gender, like life, reproduction, and thought, has always been a series of simultaneously informational and material operations across open-ended fields and systems. The second half of the chapter uses trash as a case study to demonstrate how such systemic gender operations work. This part of the chapter starts with the classic designation of asexual reproduction as, first, female (that is, gendered, but obviously not sexed female),[79] and second, always heading toward death and waste. This designation—which, again, dominates the scientific as well as the cultural and political rhetoric today—rests on the idea that asexual reproduction is exhausting and aging, and that it eventually and irrevocably damages DNA, whereas sexual reproduction is rejuvenating and valuable.[80] Or, as Sarah Franklin has put it, "Sexual reproduction is associated with the higher species because it can be seen as more complex and advanced, whereas replication or mere division is associated with less developed life forms."[81]

This series of designations and associations is, of course, open to feminist criticism. The question driving this last central chapter of the book, however, is not whether it might be possible to destabilize these associations, but rather what their implications are within a nonhuman, rather than human-centered, democratic context—within a democratic context that takes systems rather than bodies, and contemplation rather than cognition, as its norms. This chapter begins to answer this question by propos-

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ing that when reproduction is an ongoing thought process, a series of operations that shift informational and material systems—and when it is not a single initiating moment aimed at a discrete product (along with disposable by-products)—there is no such thing as trash. Distinguishing between valuable product and disposable by-product is impossible in this framework. And hence, when things are designated "trash" in a nonhuman political context—at least as the previous chapters of the book defined nonhuman democracy—this designation is not an indicator of value, but rather an indicator of gender.

Moreover, it is only *as* a gendered actor that this trash can become political. In short, therefore, gendering a system, excavating its gender operations, alongside its reproduction, life, and thought, is what makes a system democratic. Gender, and only gender, lends contemporary democracy it political coherence. Or, to get at this point from the direction that the *Guardian* proposes, the slime mold's world domination rests on the fact that its growth, reproduction, and thought are indistinguishable—while the transparent stuff it leaves behind, to dry up, is less trash than it is, in even the *Guardian*'s reporting, a thoughtful, political engagement with the world. The slime mold's thought-as-life, in other words, becomes political specifically because it is gendered and gendered female.[82] And it is the slime mold's thought-as-life, once more, that is the touchstone of this book.

At the same time, of course, each of these three central chapters inverts the *Guardian*'s framework of analysis. Rather than tolerating slime mold because of how provocatively similar its thinking is to human thinking, slime mold instead becomes the political norm—and the analytical goal becomes to explore how humans or, better, reproductive material that is frequently designated "human" can think and always has thought, like slime mold. Here, that is to say, there is political value in growth and reproduction not because brainless, unbounded things seem almost capable of thinking as if they had a brain, but because things, like embryos, inappropriately defined, from their inception, as almost embodied and almost cognitive seem quite capable of being brainless. And, as brainless, yet thoughtful, systems, these things achieve a mode of democratic engagement that is not open, or at least not natural, to discrete, isolated, embodied human subjects. Problems that seem irresolvable in classic, human-centered democracy turn out not to be problems at all. And anger-inducing assaults on democratic values and ideals turn out not to be assaults. Rather, they are variations on living in the world.

The fifth and final major chapter of the book takes these modes of

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analysis and the conclusions that derive from them as a basis for investigating in more detail the interactions between human clones and democratic data hoards. Even the most relentlessly human-centered liberal democratic writing on rampant surveillance—and especially the collection of bulk metadata—has to some extent accepted that it is an issue that lends itself better to data-centered than to human-centered analyses. Indeed, as much as the rational, embodied human subject remains the concept to protect in this writing, the theory of privacy, for example, that much of this writing elaborates is a theory perhaps unintentionally absent bodies, absent minds, and absent even persons. The final chapter of the book thus begins with a review of the more conventional literature on surveillance, data hoarding, and privacy, and then takes this literature's novel doctrine of privacy-absent-people as a jumping-off point for exploring data mining as a problem of *non*human democracy.

The second part of the chapter uses evidence from public and internal NSA documents produced between 2004 and 2013 in order to trace parallels between the political challenges posed by data hoarding, on the one hand, and the political challenges posed by embryos, human clones, and reproductive trash, on the other. Not only does data mining lend itself to reevaluation as a simultaneously reproductive and contemplative process—as a type of replication, copying, storage, and transmission not in any significant way different from organic replication, copying, storage, and transmission—but data mining can and should be reframed as a problem of *gender*. As both scholarship on surveillance and the NSA's own reports suggest, the bulk collection of metadata is particularly difficult to deal with right now because metadata is, like reproductive waste, simultaneously dead trash—disposed of because it is no longer performing its function—and enormously valuable (that is, neither dead nor trash).

But shifting from a debate concerning the appropriate versus inappropriate designation of metadata (like reproductive waste) as trash to a conversation about how such designations hint at the system's underlying gender operations can help to chart a way around this difficulty. The final chapter of the book thus posits that the collection of bulk metadata is, fundamentally, an asexually reproductive, yet gendered female, process—and therefore a process very much at the heart of *functional* democratic engagement. Moreover, recognizing data collection to be, itself, a democratic operation might be a useful first step in appreciating—if not accepting—the nonhuman, information-driven interactions that modern democracy makes possible.

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Conclusion

The chapters that follow are, first and foremost, simple histories, from a variety of geographical regions, of eighteenth- through twenty-first-century scientists, naturalists, jurists, policymakers, and ethicists addressing nonhuman reproduction, replication, and thought. These histories demonstrate that the political and legal significance of nonhuman reproduction and thought did not develop out of recent, late twentieth- or early twenty-first-century biotechnological, technological, or computational innovation, but has instead been an enduring problem in transnational law and politics. Whether the examples come from eighteenth-century France, the nineteenth-century Ottoman Empire, or the twentieth-century United States, the point to be taken from them is that nonhuman thought and nonhuman replication are not only alive and well in contemporary politics, but always have been in the past.

Indeed, these historical descriptions of the politically resonant thought and reproduction of slime and data provide a much-needed context for recent scientific work sidelining human cognitive models. The writing of biological researchers such as Dennis Bray[83] and Alain Prochiantz,[84] recent articles in journals such as *Cell*,[85] and science studies commentaries by scholars such as Hannah Landecker[86] and Luciana Parisi,[87] in other words, can both frame a discussion of *and* be productively compared to, say, the medical-legal commentary on the "thought," "life," and thus legal status of anencephalic fetal material published in 1909 by the Ottoman medical expert Bahaeddin Şakir.[88] Likewise, and in turn, writing such as Şakir's can be read against the eighteenth-century writing of Buffon[89] and the mid- to late-twentieth-century writing of American journalists seeking to understand embryonic development.[90] Excavating the connections, across both time and space, that such parallel readings expose is crucial to recognizing the complexity and importance of the nonhuman in historical, scientific, *and* public policy narratives.

Locating this preexisting history of nonhuman life and thought in various comparative legal, scientific, and political traditions, indeed, is arguably the *only* way to understand ongoing conversations concerning nonhuman *legal* status. By reading this historical writing on nonhuman thought and reproduction alongside more recent bioethical statements, such as those produced by French, Turkish, and EU policymakers on human cloning,[91] to take just one example, the book thus prompts a reconsideration of the apparent political problems posed by nonhuman reproduction and thought. Once more, in conventional writing and

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policymaking, biotechnological innovation such as cloning is addressed primarily as an issue of sexuality, while informational innovation such as data mining is addressed primarily as a problem of property or privacy. In turn, the legal questions to be answered in such realms are "Is this mode of sexual activity permitted or forbidden?" and "Who owns or has access to this particular bit of information or speech?" The histories that populate the chapters that follow, however, provide ample evidence of alternative approaches to these variations on reproduction and information—approaches that ask more open-ended questions, and that thereby allow for more nuanced legal answers to them. These traditions, in short, have much to contribute to the contemporary legal, political, and policy conversations about biotechnological and informational innovation that have, in many ways, stalled in recent years.

Insisting that history can add nuance and context to contemporary policy debates, of course, is hardly a revolutionary scholarly move. Before turning to the central chapters of this book, therefore, it may be useful also to provide fair warning of some of the less conventional aspects of the historical narratives that follow. First, therefore, these stories are deliberately impressionistic. There is no attempt in the following pages to privilege or create a hierarchy of the political activity, the reproduction, the replication, or the thought of any of the figures, fields, or processes that appear and develop. Readers will thus find the scholarly or scientific research of well-educated, rational human commentators—respected scientists such as Buffon, more ethically questionable figures such as Şakir, and speculative researchers such as Rudolph Leuckart—set up next to the reproduction of bacteria, the processing of algorithms, and the replication viruses, which in turn develop alongside the growth and flourishing of clones, chimeras, salt crystals, skin cells, paramecia, polyps, and decomposing flesh. The operations and environments populating these narratives, that is to say, are deliberately horizontal—and they are so not in order to make some specious point about the liberal equality of discrete, self-contained subjects (or, for that matter, all interconnected environmental matter) but in order to eradicate any comfortable separation among the thought, reproduction, and politics of everything that emerges in these stories.

Second, the histories told here are geographically eclectic. Most of the texts that form the basis of these narratives appeared first in the Ottoman Empire, Turkey, France, and the United States. One could thus read the book as solely a story of reproduction, the scholarly or scientific study of reproduction, and, in turn, the politics of reproduction and eventually

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reproductive technology in eighteenth-, nineteenth-, twentieth-, and twenty-first-century Ottoman Turkey, republican Turkey, old regime France, republican France, and the United States. But to limit the reading of the book to this coherent, linear history would miss much of its point. The purpose of bringing these, again, impressionistic and eclectic texts, activities, ideas, and arguments into contact with one another is to try to recover a more diffuse, yet also perhaps more relevant, history of reproduction as political thought. It is to try to rescue the study of biopolitical mass democracy from its current scholarly malaise—and to recuperate it as a study of politics, growth, flourishing, *and* contemplation. Finally, and perhaps most importantly, the purpose of this history is to invite readers—of the *Guardian* or otherwise—to stop patronizing the slime mold, to stop hating the database, and to think a bit more about the democratic potential of all of the uncannily boundless things that continue to appear in our political world.

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2 • *Boundless Thought*

Foucault's history of biological life as an emergent political concern in the eighteenth and nineteenth centuries did not divorce yellow, translucent slime mold from modern democratic theory. Nor did it ignore data hoarding. Both nonhuman organic material and increasingly autonomous statistical or informational activities were key aspects of the life- and environment-obsessed governance at the heart of Foucault's biopolitical stories of democracy and vitality. As Hannah Landecker has pointed out, however, Foucault's history of biopolitics "derives from an archaeology of nineteenth century sciences, not twentieth century ones,"[1] and thus decades of biological research separate Foucault's initial theorization of biopolitical life from contemporary work on life, reproduction, and thought. An effective return to the political problems posed by life, environments, information, data, and matter thus needs to start with recent trends in the natural sciences.

One issue that has increasingly concerned biologists since Foucault wrote, for example, has been the *intellectual* life lived by organic material and biological systems. Discussions of cellular decision making, choice, and sensitivity have appeared with greater and greater frequency in scientific papers,[2] alongside models of life that replace bounded, if complex, bodies with unbounded organic environments. Living, in other words, has been gradually equated with thinking. Moreover, rather than trying to determine what bodies might constitute a thinking organic whole and what bodies might be relegated to unthinking part, biologists have instead tried to understand how life as a series of interconnected systems might, *collectively*, decide, feel, or contemplate. The discrete, bounded, potentially rational body has disappeared from much of biological as well as cognitive science, if not, of course, from mainstream political science. And life has begun to refer to fields, environments, and infinitely divisible parts that think as they process, interact, integrate, and disintegrate.

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The disappearance of the potentially rational, discrete body from biological science has not, however, returned scientists or philosophers of science to the quasi- or pseudo-Cartesian realm of disembodied thought working on inert matter. Nor has it led inevitably to theories of extended or distributed, if material, cognition. On the contrary, *cognition*, whether disembodied or distributed, is of negligible importance to this research. Once again, thought happens in these scenarios as organic matter does *work*; it does not happen as brains formulate abstract absolutes. It manifests itself in decision making, choice, sensitivity, memory, and contemplation or intuition. Cognitive awareness and *self*-consciousness (or, for that matter, consciousness of others) are of little concern to the researchers dealing with these issues—despite a sometimes deliberate misinterpretation of their theories by philosophically inclined observers.[3] To repeat, though: the absence of psychology and cognition in these models by no means undermines their explanatory or definitional value—scientists today are making a good case for reintroducing thought as a key component of life, even if this life now operates throughout fields, environments, systems, or accumulations.

This emphasis on material biological systems and processes as thought processes—on life as matter that contemplates—was, once again, not as apparent in the natural sciences when Foucault wrote. Although he described the explosion of data and information as one symptom of biopolitical governance, for example, he also situated the biological life that generated this data squarely within sexually reproducing bodies that were for the most part only incidentally thinking, contemplating, or feeling (if not necessarily speaking) bodies. As much as replicating data, shifting material-information systems, and simultaneously physical and political life were key players in Foucault's initial articulation of biopolitical mass democracy, that is to say, they also occupied, in his view, separate spheres. In the mid-twentieth century, when Foucault wrote, natural scientists concerned with life and reproduction were not, for the most part, equally concerned with thought.

But the late twentieth-century turn in the natural and biological sciences toward thought as the defining characteristic of life—and, in particular, environmental or systemic life—also did not leave Foucault's biopolitical theory an anachronistic artifact. On the contrary, reading these recent redefinitions of life as a *new* chapter in the history of biopolitics if anything vindicates Foucault's argument that mass democracy is and has been a biopolitical enterprise. Taking as a starting point for political analysis this recent scientific work on the intellectual endeavors of unbounded

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living systems, accumulations, and environments, in other words, can help to make explicit the implicit connections in Foucault's theorization between, on the one hand, information, processing, and environments and, on the other hand, biological life, reproduction, and embodied matter. Or, put differently, there is already a hint in Foucault's mid-twentieth-century writing on biopolitics of the late twentieth- and early twenty-first-century scientific work on unbounded thought and the reproduction or replication that gives rise to it. There is nothing in recent scientific research that undermines Foucauldian theories of biopolitical mass democracy; political theorists simply need to take seriously the implications of "life" as something less than completely relevant to bodies—of life embedded in information processing.

The rest of this chapter, therefore, describes a series of defining characteristics of the unbounded, nonhuman, nonanimal, and in some cases inorganic thought that has concerned scientists of life in recent years. Once again, biologists, cognitive scientists, information theorists, and philosophers or historians of science have all become increasingly fascinated by the intellectual as reproductive or replicating life of, for example, bacteria, mold, single cells, and algorithms. Central to these recent theorizations of unbounded thought, reproduction, and life, however, has been—against the *Guardian*'s reporting—the remarkable effectiveness, complexity, and depth of a type of thought that is in most ways completely *alien* to abstract, psychological, self-aware human cognition. The thought of unbounded, growing, replicating systems—organic as well as inorganic—instead derives from the sensitivity and memory of these systems, the randomness of their decision making, and the comparative rather than absolute quality of their conclusions. Unlike abstract cognition, divorced from growth, replication, or reproduction, this unbounded thought is always embedded, contingent, and productive. It is thought that is synonymous with the flourishing of material and informational environments. It has nothing to do with rationality or psychology. And it is the thought most likely to play a part in contemporary mass democracy.

Sensitivity and Memory

Biologists have been exploring the sensitivity and memory that characterize the collective intellectual life of organic systems—whether these systems are mapped onto a single cell or spread throughout an aggregate of living material such as a slime mold—for a number of decades now. There are hundreds[4] of papers on bacterial memory, cellular decision making,

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and amoebic sensitivity circulating throughout the scientific community, and each makes a case that this organic material, fundamentally, thinks. Many of these studies also explore the broader, theoretical implications of this shift toward thought in the natural sciences—some forging a deliberate connection between the intellectual life of organic material and the intellectual life of the human being. The purpose of crafting this connection between human and nonhuman thought, however, is by no means to tell a teleological story that leads from primitive, porous, cellular sensitivity to rational, embodied human cognition. Quite the opposite: linking, for example, the slime mold's memory to the human's memory has shored up efforts on the part of most of these scholars to do away with the progress narrative altogether—to address human cognition as one mode, and *only* one, among many, of thinking life.

In his book *Wetware*, for example, the biologist Dennis Bray makes a series of provocative biological and cybernetic claims about the intellectual life of single cells. Bray's book is a good place to start a review of the more recent scientific writing on life or reproduction as thought, however, for a perhaps unexpected reason: it seems to *undermine* any claim that the past few decades of work in cell biology support a rearticulation of politics or biopolitics. Not only does Bray operate comfortably within what initially appears to be a progress narrative from the basic thought of cells to the complex thought of rational, embodied human subjects, he is also emphatic that his work is not political.

Wetware, indeed, is replete with disclaimers that warn against extrapolating metaphysical conclusions from biological or cybernetic research, and Bray repeatedly asks readers not use his writing as a platform for making cultural claims[5]—he reminds his audience over and over again that the cellular thought he is describing is *not* the same as awareness or self-consciousness; it is *not* human thought.[6] His story, he urges, is a story only of the natural and physical sciences. It is not philosophical or political, and his point appears to be similar to, if infinitely more sophisticated than, the *Guardian*'s: humans should respect cellular thought because it is so unexpectedly close to human thought, even if, obviously, it never reaches the pinnacle of human psychology and rationality.

But this interplay between proposition and apology throughout Bray's study is worth exploring in more detail. Bray's insistence, for example, that cellular thought must be distinguished from human cognition, even as it hints at the origins of such cognition, does not detract from the book's potential to broaden the category "thought." On the contrary, one might easily conclude that the very tension between the familiarity and the dis-

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tinctiveness of cellular memory and sensitivity in Bray's account is what lends it its philosophical punch. Here is a type of thought, after all, as old as life, that, while relevant to human cognition, need not be addressed using the tired, and increasingly ineffective, frameworks of inquiry that have characterized (human) epistemology for the past few centuries—frameworks that have, once again, led to the gradual and frustrated removal of "thought" from the conventional articulation of the political and then biopolitical category "life." Here, that is to say, is a possible entry point (or reentry point), despite itself, for thought in the politics of life.

But what might this revivified thought entail? Bray describes two key aspects of nonhuman, cellular thought—memory and sensitivity. With regard to memory, Bray writes that "by capturing a picture of their surroundings in molecular terms, biological systems acquire knowledge of the world in a way no other chemical or physical system can."[7] At the same time, however, although both are biological systems broadly defined, "higher organisms have a brain and spinal cord," whereas "single cells have networks of interacting proteins."[8] Each of these organic systems—whether organized, complex "higher organism" or a single cell or accumulation of cells—is uniquely capable of capturing memories and sensitivities at the molecular level, but only the former, "higher organisms," can translate these memories and sensitivities into information and abstraction that is meaningful to a brain. Cells and cellular systems are remarkably similar to higher organisms, in that they, too, rely on memory and sensitivity embedded in molecular environments to live. But they fail to shift this memory and sensitivity from the molecular or environmental plane to the cognitive or psychological plane.

This lack of rationality and psychology typical of cellular thought remains a framing device for countless similar moments of comparison and contrast throughout Bray's book. In comparing the memory of bacteria to the memory of complex organisms, for example, Bray writes that although bacterial psychology, unlike human psychology, is difficult to identify, "from a superficial, operational sense the bacterial memory and the short-term memory of a higher animal perform similar functions."[9] At the same time, however, "the storage of memories by higher animals," unlike "highly predictable and stereotypical" bacterial memory, is "dependent upon the training regime and the internal psychological state of the organism."[10] As a result, the memory of "higher animals" is necessarily more sophisticated than the memory of bacteria. Bacteria do remember in the same way that "higher organisms" remember, but their memories are characterized by organization, repetition, and operation

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rather than by the idiosyncratic psychological content that might be invested in them when they become part of a self-conscious narrative. Bacteria *remember*, whereas higher organisms translate memory into narrative and abstraction.

A third set of passages, in which Bray turns from memory to sensitivity, continues to play on this theme. "Living cells," Bray states, "have an intrinsic sensitivity to their environment—a reflexivity, a capacity to detect and record salient features of their surroundings—that is essential for their survival. I believe," he writes, "these features to be deeply woven into the molecular fabric of living cells."[11] This ability to feel and to remember their world, however, does not mean that cells are conscious. "Seed corn of consciousness" though they may be, Bray continues by emphasizing the point that cellular sensitivity and memory do not suggest a cellular "sense of self."[12] Like bacterial memory, cellular sensitivity is *pure* sensitivity, unadulterated by narrative. Or, put differently, according to Bray's analysis, cells, bacteria, and other unbounded organic systems think, feel, remember, and acquire knowledge. They are sensitive to the world. But they do so as environments or accumulations rather than as bounded organisms. Hence, they seem always on the *verge* of evolving into something higher and something less prone to thought-as-growth, but they never quite reach the pinnacle that is discrete, embodied, psychological, self-aware rationality.

But might there be other conclusions to draw from the series of comparisons and contrasts that Bray presents to his readers? It is true, for example, that organisms that think with brains must be "higher" than systems that think via networks of interacting proteins in any formulation that privileges cognition, abstraction, psychology, or rationality over pure memory or sensitivity. Intriguingly, however, the aspect of biological thought broadly defined that Bray argues makes it more sophisticated than "chemical or physical" (i.e., inorganic) systems is its environmental or "molecular," *rather* than its contained, qualities. What makes biological thinking more successful than nonbiological thinking, in other words, is, according to Bray's own analysis, paradoxically also the thing that differentiates the thought of lower cellular environments from the thought of "higher organisms."

After all, whereas higher organisms apparently locate thought, at least after it is translated into rationality or psychology, within a single, bounded space—the brain—cellular environments store their memories, knowledge, and sensitivities within the molecules that compose themselves and their environments—within the molecular composition of their world. Rather than giving one small part of themselves over to memory and sen-

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sitivity, cells turn themselves and, or as, their surroundings *into* memory and sensitivity. More to the point, it is *this* all-encompassing quality of their thought that, according to Bray, allows them to outstrip their chemical and physical counterparts. Biological thinking is superior to inorganic thinking, for Bray, because of its "lower" unbounded qualities rather than because of its "higher" bounded qualities.

These passages, in other words, do seem to lend themselves to an alternative set of conclusions—a set of conclusions that it is difficult to believe Bray himself does not to some extent endorse. Bray may appear to be telling a story of progress, for example: the thought that is "woven into the molecular fabric of living cells" is not, itself, human consciousness. It is perhaps the precursor to consciousness, the mode of thinking that makes the self (and the other) comprehensible, but readers must avoid leaping to the conclusion that cells can think in the way that humans or higher organisms can. Readers ought to respect cellular knowledge and memory, Bray seems to say, because this knowledge and memory are not as far removed from human self-awareness as they might appear to be—but we must not go too far. Once more, bacterial memory is unexpectedly similar to, but in no way as sophisticated as, psychologically inflected human memory; cellular sensitivity may hold a clue to the origins of human consciousness, but, unconscious itself, it could never be as effective as a sensitivity grounded in an awareness of the self. An obvious reading of these passages is that there is a clearly delineated set of hierarchical steps from lower to higher thought.

These passages, however, do not need to be read in such a way. Indeed, Bray himself is never quite clear about whether readers should celebrate the self-conscious, psychological, cognitive thought that characterizes, perhaps uniquely, the human mind, or whether they should evaluate this thought more critically. Moreover, even if his audience *does* want to place open organic or cellular systems at the beginning of the story and the contained human mind at the end, Bray writes in such a way that readers could easily interpret the book as a tale of degeneration rather than celebration. What had once been a total correspondence among matter, environment, and thought became, in the end, an impoverished, disconnected mind and self. What had once been, quite concretely, an infinitely variable memory and sensitivity of and through the world became a series of rational choices predicated on a simple sense of I and other. What had been memory and sensitivity became psychology. Bacterial memory, after all, is *memory*, and even working memory, in a way that subject formation or self-narrative never can be. Such thinking, knowledge, sensitivity, and

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contemplation are thus perhaps *more* sophisticated than consciousness in that they evaluate and incorporate all things and assemblages rather than distilling all things into a story of the self.

Consider, for example, a final moment in the book, where Bray describes the quite successfully irrational, multifaceted, environmental quality of cellular thought. "The images captured by the cell," he writes

> include everything from recent events to the distant past, rather like a picture taken on a family vacation. In the foreground are the fluxes of ions and small molecules that capture the moment . . . [I]n the middle distance, protein molecules display evidence of the recent past encountered by the cell in their states of chemical modification and conformational shape . . . [I]n the background of the composition we have the genetically specified chemical terrain shaped over millennia by evolution—sequences in DNA and structures of proteins that have remained virtually unchanged . . . a living cell contains an image of the world because it is born of the world.[13]

External memory may be a tempting term to use to describe what the cell is doing in this scenario—but it is also inaccurate. There is, after all, no divide here between the living thing that is thinking, feeling, or remembering and the environment that is thought or felt or in which the memory is stored—there is no external, no other. Rather, cellular knowledge is an environmental operation that—*because* it eludes self-consciousness or awareness—can incorporate not only recent experiences but a temporal image, "over millennia," of the world.

Or, perhaps, our intuitive understanding of "external memory"—linked to digital storage—is flawed. As Jennifer Gabrys has pointed out, digital time is immediate *and* geological in the same way that Bray's cellular time is—an amalgam of the "nanosecond" *and* extended "digital decay."[14] A "network" far more than a "storage shed," she writes, understanding decaying computational memory is "less about placing ourselves on a known—even if imperceptible—timescale and much more about a set of unfolding temporal effects . . . indeed, digital decay can be so disorienting that it may be difficult to gauge . . . whether the rubbish is in the past . . . or the future."[15] So perhaps external memory is the proper term—provided we accept a completely new interpretation of digital life and thought.

Against the backdrop of such sensitivity and memory—whether bacterial or digital—then, cognition and self-consciousness seem to be narrow, impoverished, and ineffective; they reveal, if anything, a *lack* of experience of the environment. Self-aware cognition replaces knowledge of the world

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with a psychological narrative (or fantasy) of mind and body, of self and other. In turn, it arguably precludes both biological *and* political engagement with this world (here is a minor punch line of this chapter). Indeed, one might go as far as to posit that describing biopolitics with reference only to these discrete, self-aware bodies is a particularly *dangerous* move—likely to miss the point of *both* biological *and* political life.

Once more, Bray would be unhappy with readers drawing this sort of political conclusion from his research—and he certainly makes no claim that his writing on cellular thought has anything to do with political theory. Misusing—or abusing—the book in this way, however, *can* lead to an intriguing set of inferences about the type of thought—irrational, sensitive, environmental, and irrevocably bound up with life—most natural to modern mass democracy. Although the following chapters endorse neither the progress narrative nor the tale of degeneration that can be drawn from this brief foray into unbounded, nonhuman, nonanimal sensitivity and memory, therefore, they do draw on work such as Bray's in order to offer a potentially useful definition of political thought that is neither psychology nor rationality.

Moreover, they suggest that the biopolitical mass democracy of which these cellular or bacterial variations on memory and sensitivity might form a part is a democracy that not only can, but *must*, take into account the centrality of thought to life. There is a conflation of memory and sensitivity, on the one hand, and vitality on the other in these scenarios that is simply not possible in a realm in which thought is an activity limited to the mind. By eradicating the gap that forms between thought and life when memory or sensitivity is translated into psychology or rationality, in other words, bacterial and cellular thought make *impossible* the supposed totalitarian nightmare of that much-regulated, unthinking "bare life." There is no life without thought here because life is synonymous with thought.

Indeed, the thinking life of the unbounded system as it appears in this writing also seems potentially more politically *productive* than the rational cognition of the bounded, psychological body. Since distinctions between cell and environment, or even between bacteria and environment, are impossible to determine when evaluating cellular or bacterial sensitivity and memory, there can be no internal, separate, discrete *space* for the storage of memories or sensitivities. On the contrary, cells and bacteria transform entire environments *into* memory and sensitivity. And, as a result, rather than a linear transmission of political memory or information from one body to another, political memory and sensitivity grow and flourish across entire living environments. In this way, data, too, become alive and

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active in a bacterial or cellular biopolitical context, in a way that they cannot in a human-centered politics—while data operations become flourishing, vital processes that can only contribute to democratic engagement.

Accidental and Comparative Decision Making

The strange political effectiveness of this unbounded thought is suggested in more targeted studies of cellular intellectual life as well. In a 2011 article in *Cell*, for example, Gabor Balazsi, Alexander van Oudenaarden, and James J. Collins emphasize not only the effectiveness of environmental, as opposed to embodied, decision making, but also the virtue of irrational, glitch-ridden decision making against its rational or psychological counterpart. Balazsi et al.'s goal in the article is to compare the decision making undertaken by unicellular organisms and the decision making undertaken by the cells of complex organisms (mammals especially) in order to determine how the former, as parts of the latter, deal with noise, chaos, or randomness. The authors note, for example, that whereas a disconnected population of single-celled organisms is unlikely to be negatively affected by the introduction of random error into their environment or their code, "the tremendous population expansion that cells [in a complex organism] undergo during embryonic development poses a serious danger of error amplification, implying that stochastic cellular decision making should be less common than in unicellular organisms."[16] Balazsi et al.'s project, therefore, is to describe the "noise control mechanisms" that dampen extreme variations on cellular decision making and that allow for embryonic development, among other complex cellular processes, to occur without the introduction of fatal errors.[17]

Important for the purposes of this chapter are the rhetorical strategies that Balazsi et al. use to frame these conclusions. For example, they describe the decision making undertaken by various different types of organisms and cells—viruses, unicellular animals, and bacteria—in order to contextualize their discussion of the embryonic cells of the complex organisms that are their specific interest. In addition, within this framework of analysis, one of their most important givens is that the notion that genetically identical cells working within identical environments will always act in predictable ways contains significant flaws—that "extensive theoretical and experimental work has started to seriously challenge this simplistic deterministic view."[18] Emphasizing the interplay between various different types of cells and environments (or among cells *as* environments),[19] Balazsi et al. state that "intrinsic noise enables the phenotypic diversification of

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completely identical cells exposed to the same environment and further facilitates cellular decision making for cells already slightly different."[20] Cells *and* environments, of *all* kinds, in other words, are subject to glitches—and the same glitch can alter the thought of an entire cellular environment in unpredictable ways.

The abilities of cells and environments to respond successfully to these potential errors, therefore, depends a great deal on the breadth of their intellectual life—on their ability to know, remember, and feel themselves *as* their environments, whether these environments are part of complex organisms or not. Granting that even viruses are less predictable than many earlier researchers had assumed,[21] Balazsi et al. thus support their conclusions with what may be—given Bray's work—a strangely familiar comparison between the linear thought of the largely self-contained virus and the environmental thought of their bacterial, if not embryonic, counterparts. "Bacteria," they write,

> are masters of cellular decision making, which enables them to hedge bets in a fluctuating, often stressful environment. This may explain their presence in the most extreme and unpredictable environments. Unlike viruses, which typically decide between lysis and lysogeny, genetically identical bacteria can select their fates randomly from a spectrum of multiple options . . . [U]nlike viruses, bacteria can combine cellular decision making with other mechanisms (such as cell-cell communication) to achieve more complex population-level behaviors. Cellular decision making appears suppressed when cell-cell communication becomes prominent (as in quorum sensing), suggesting that microbial individuality is undesired when genetically identical bacteria assume multicellular behaviors. The above examples indicate that many bacterial species are capable of population-level behaviors. Moreover, these examples suggest that the simplest forms of multicellular behavior do not require physical contact or communication between cells.[22]

Bacteria, then, are "masters of cellular decision making" because they make their choices randomly, they fail to distinguish between a discrete cellular body and an accumulation or an environment, and they likewise fail to distinguish among discrete cells. Unlike viruses (and, for Bray, humans), which are characterized by their isolation, by their life as a series of discrete reproductive acts, and, perhaps above all, by their drive to replicate and communicate, in a linear fashion, distinct, coherent strands of information—essentially to pass messages—bacteria think and remember through

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environments that are in turn open-ended systems. Bacteria are matter that is alive because it thinks broadly, regardless of its communicative activities, rather than because it communicates narrowly and in a single direction.

Obviously the point here is not that human thought is somehow the same as viral thought. But the echoes of Bray's distinction between the higher organism's self-contained, communicative, and psychologically self-aware state and the virus's (unfit because discrete) communicative-reproductive state is evocative. In fact, if the intuitive organic hierarchy that appears to frame Bray's comparisons falls out of the picture, there seems to be an unambiguous—or indeed emphatic—insistence in both studies on the *superiority* of thinking outside the confines of a bounded, self-aware body. Bacteria are alive, and are flourishingly alive, first, because they are *thinking* and, second, because they *are not* cognitive, rational, or self-aware. Bacterial decision making is worthy of respect because it does *not* lead in any noticeable way, after millions of years of evolution, to psychology or consciousness. Psychology and message transmission are something of a dead end here.

The remarkably adaptive quality of this irrational intellectual life appears in other recent discussions of cellular decision making as well—standing in distinct contrast to the parody of self-interest that the *Guardian* describes in its search for the slime mold's protohuman awareness. Tanya Latty and Madeleine Beekman, for example, have extended in intriguing ways research into the *effectiveness* of "irrational decision-making"—here in amoeboid organisms. Noting that slime mold [*Physarum polycephalum*], for example, "lack[s] a brain, and [that] all information processing occurs via highly decentralized processes," Latty and Beekman, like Balazsi et al., question the usefulness of "economic and behavioural models [of thought] based on absolute valuation."[23] The conclusive, rational choice that would lead to the preservation of a single, discrete organism with some proto-variation on human-style consciousness or cognition is absent, in other words, from this mode of thinking and life. Slime mold, like higher organisms, may engage in a cost-benefit analysis when it comes to seeking food,[24] but given that, for slime, eating is as much thinking or decision making as moving toward food or allocating biomass to certain areas is thinking or decision making, there is no cognitive understanding of a tension between self-interested body and harsh environment to frame this behavior.

As Latty and Beekman continue, indeed, although it may very well be that "comparative decision-making processes" are more common than "absolute decision-making mechanisms" because the former produce simi-

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lar results with less computational effort—that is, because they are more efficient—their study also posits an alternative explanation. They propose, additionally, that "comparative decision-making strategies may arise as an unavoidable consequence of the way in which living systems process information."[25] The comparative and experiential, as opposed to the cognitive, rational, and absolute approach to information processing, that is to say, may very well be the result of a quite normal lack of a divide between body and system. This type of thought may be the *productive* result of the *absence* of any distinction among organism, matter, environment, and information. Irrational thought may be more about intellectual life than it is about efficiency.

If the default position is that organism, environment, and information always overlap—if, to draw from Bray, an organism's memory or thought is woven into its own molecular fabric *and* the molecular fabric of its environment—then comparative decision making *would* be the most effective *and* the most productive mode of thought in which to engage. Rational, self-aware cognition of the sort that characterizes higher organisms would fail to take advantage of the knowledge, sensitivities, and information embedded throughout the system. Or, as Latty and Beekman conclude, "Although we have shown that P. polycephalum behaves 'irrationally' this does not necessarily imply that its behaviour is maladaptive."[26] The irrationality of contemplating as a system rather than communicating or transmitting information from discrete body to discrete body is instead—as Balazsi et al. put it—quite "masterful." Perhaps more than that, though, it is characteristic of a wholly or exclusively intellectual life, of a life lived in thought.

This irrational, comparative, and far from abstract or absolute decision making also lends itself remarkably well to alternative variations on mass democracy. It conjures up the possibility that democratic engagement need not always operate in a future populated by rational, embodied "persons"—by persons whose completion can only ever be postponed—but that, indeed, democracy can also exist in the present; democracy need not be constantly deferred. In the process, this variation on decision making also nullifies the ostensible political threats posed by the ongoing, flourishing, yet always incomplete organic or informational assemblages that repeatedly evade the status of "person" altogether. Endless, this type of thought ends the constant democratic crisis. Unbounded thought as it appears in this writing, therefore, seems to be at the very least an intriguing substitute for human-centered mass democratic engagement. In a very basic way, it creates a small space for democratic processes actually to begin.

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Processing

But can this mass democratic life-as-thought also be found in nonbiological or inorganic growing systems? Each of the studies of cellular decision making that has appeared thus far has taken the organic quality of life and thought as a given. These cells and environments that think—whether they are the multinucleate cells of the slime mold, unicellular organisms, bacteria, viruses, or mammalian cells—are biological. They are the product of organic evolution, and they demonstrate, in addition to thinking, other fundamentally "living" behaviors such as eating, growing, and producing waste. They are on an organic spectrum with humans, they are related to psychological beings, and hence they qualify for what Prochiantz, for example, determined to be both life and thought.

These studies also, however, suggest, at the very least, a blurring of the lines between organic life as thought and inorganic (especially computational) life as thought. This gesture is clear in the subtitle of Bray's book, *A Computer in Every Cell*, as well as in the information theory methodologies on which Balazsi et al. draw and Latty and Beekman's designation of slime mold as an "information processing system." Whereas Bray, Balazsi et al., and Latty and Beekman suggest a coming together of organic and inorganic life, however, scholars such as Parisi explore the implications of a systemic thought that is purely inorganic, computational, and algorithmic—even while it remains as relevant to cellular thinking as, if not more relevant than, the thought produced by discrete, rational brains.

Indeed, in her *Contagious Architecture*[27] Parisi challenges scholars to take seriously the contemplative potential of an algorithmic processing—what she calls a "soft thought"—that is "as irreducible to the neural networks of the brain-mind as are bacterial and vegetal modes of cognition."[28] The richly contemplative quality of algorithmic processing, she continues, has in fact been obscured as a direct result of the ongoing political emphasis on "cognitivism" or "enactivism"—in short, on the classic or conventional biological emphasis on the brain as the seat of thought and feeling. On the one hand, she writes, cognitivism and enactivism assume that "algorithmic computations are equivalent to programmed procedures, sets of executable instructions, which define cognition in terms of data performance on differing forms of hardware."[29] On the other hand, traditional biological models of thought assume that the brain evolved, specifically, as an organ *to* think, and that thus anything divorced from a brain or brain-like structure, even if it looks like thought, is not in fact such a process.[30]

But, Parisi emphasizes, neither of these assumptions withstands close

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scrutiny. Moreover, and perhaps more to the point, neither can help commentators to appreciate the extensive, nonprocedural, and often random (or, to invoke Latty and Beekman, irrational) intellectual activities in which algorithms clearly, empirically engage. If anything, the rapid expansion of algorithmic thinking over the past decades *undermines* "the neural or biological body's status as the house of soft thought"—suggesting that thought may be only *incidentally* "linked to the brain . . . contingent on an accident in the evolution of multicellular organisms."[31] *As* an accident, therefore, "the brain-thought link cannot by rights exclude the possibility of a form of thought that is not mediated by a neural network or even less by a brain."[32] It cannot preclude the potential for thought that exists *within* the flourishing error, accident, or glitch—within the intuitive leaps of an algorithm that has begun, by mistake, to process impossibly infinite quantities of data.[33] Like bacteria that thrive *because* of their processing errors and their random decision making, that is to say, algorithmic or inorganic thought, too, seems to come alive *because* of the glitches it encounters.

At the same time, associating the soft thought of inorganic processing with the thinking life of bacteria is to misread Parisi's book. One of Parisi's primary goals in *Contagious Architecture* is to divorce thought from both "mechanical functionalism" and "embedded vitalism"—to make a case for thought that is explicitly *not* life.[34] Both the political obsession with life and the simultaneous embrace and fear of the machine, she writes, are obstacles to appreciating the work of algorithmic contemplation.[35] At the same time, however, the sympathetic references to organic life (such as plants and bacteria) and to the mechanical existence of buildings and computers that appear throughout the book suggest, at least, that one might, if carefully, nonetheless recuperate vitality and the machine when theorizing an intellectual life that remains politically relevant. Misreading Parisi *and* Bray together, in fact, can lead to some productive conclusions concerning the character of contemporary democratic engagement.

The life-as-thought that emerges in both Boundless Informant and the slime mold, after all, by no means privileges bodies, neural networks, or brains. And the machines that are engulfed in these organic and inorganic political and reproductive systems are similarly indefinable as tools or hardware. This flourishing, if sometimes inorganic, vitality whose defining characteristic is its thought, in fact, is arguably the same systemic if contained, material if symbolic, and irrational if adaptable vitality that might very well be associated with a processing algorithm. As Parisi herself writes when introducing the concept of "contagion"—or the "immanence of

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randomness in programming" that occurs as "infinite amounts of data" enter a function—the "contagious architecture of these actualities is constructing a new digital space, within which programmed architectural forms and urban infrastructures expose not only new modes of living but also new modes of thinking."[36] Her emphasis is on thought. But life is prowling there too.

Consider, for example, Parisi's more detailed characterization of algorithmic thought. It is, again, immanent and comparative rather than absolute.[37] It is always ongoing, incomplete, and without end as it deals in "infinities and multiplicities" that can never be fully processed.[38] It is subject to accidents, glitches, and inefficiency.[39] It is not a tool of rationality.[40] And it is constantly building up symbolic or digital environments,[41] transforming the storage and transmission of data, transforming processing, into an architectural exercise.[42] Once more, these characteristics of algorithmic soft thought seem to have little to do with the thought of living organisms (or of machines) as they are ordinarily described. But are they really so completely immune from life?

What about, for example, the comparative rather than absolute decision making undertaken by Latty and Beekman's slime mold? Is this organic and vital, but not cognitive, mode of information processing also divorced from algorithmic contemplation? As Latty and Beekman make clear, slime mold, too, never reaches an absolute end to its thought. Its thinking, too, never transcends its environment, it never reaches some final conclusion that places it, the thinking being, apart from its food or its surroundings, and indeed, its thinking is—consider the image on the *Guardian*'s website—if anything, architectural. The slime mold is evolutionarily *incapable* of transforming its contemplative processes into a theory of self and thought other. It thinks through, or as, its environment, it continues processing and comparing information, and—perhaps most important—it never stops this processing. But the slime mold is, to repeat, very much alive. And its life-as-thought hints that perhaps the algorithm could also be alive in its thought. Clearly organic life is not an option to the algorithm—but political life and intellectual life seem very much available to it, once we set aside, as Parisi encourages us to do, rational metaphysics as the sole model of thought or intellect.

Or, alternatively, what about Balazsi et al.'s bacterial master decision makers? Remember, bacteria were successful thinkers above all because they not only dealt with "noise," with incomputable information and data, but because they incorporated this noise into their own processing. Moreover, and more important here, these bacteria produced and built bacterial

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environments that were predicated on, essentially, sorting, sharing, and reproducing this flawed code. The incomputable environments that they created were hospitable to them because, like algorithmic environments, these environments were informationally indistinguishable from their supposed inhabitants (which were subject to the same glitches they were). Like the algorithmic building project, that is to say, the bacterial building project rested, first, on the noise or randomness of the information it processed but never completely digested. Second, this building project drew on an environment that began thinking—irrationally—the moment it was thought. Once again, therefore, the bacterial thought processes that produced *living* thinking environments seem not all that far removed from the algorithmic thought processes that produce ostensibly *not*-living thinking environments. Vitality seems always to be ready to reinsert itself into thought—and something that looks a lot like life is always creeping into these accidental, and *thus* architectural, thinking environments.

Or, finally, what about the potential creative misreading of Parisi alongside Bray? What if readers consider, for example, the series of oppositions between algorithmic thought and, specifically, human thought within which Parisi frames her argument—unexpectedly evocative as they are of Bray's similar set of contrasts between *cellular* thought and human thought. Bray is, despite his vocabulary, coy about making a case for the superiority of one type of thinking over another, or for any clear-cut teleological move from ostensibly lower modes of contemplation to ostensibly higher modes. Parisi certainly does not argue for the superiority of algorithmic thinking. Her point, however, that an emphasis on rational cognition situated in the brain has obscured any effective appreciation of alternative types of contemplation does lend itself to more overt normative conclusions than Bray's argument does. But one of these conclusions—that perhaps thought should be divorced from life—might, once more, be reconsidered given the similarities between her own, antiorganic and antimechanical argument and Bray's overtly biological and quasi mechanistic one.

Parisi, for example, makes the excellent point that theories of both distributed cognition and "qualitative data"—each of which have been used to celebrate the multifaceted qualities of inorganic thought—actually reinforce the flawed assumption that human consciousness is the only genuine model of thought. Theories of distributed cognition, in particular, allow "cognition"—thought situated in the brain—essentially to colonize the external world, to map the brain onto matter in a sort of radical, if unintentional, pseudo-Cartesian fantasy.[43] Moreover, introducing "qualitative data" into functions via external feedback similarly

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fails to challenge the association between "logic [and] rationality" or "aesthetics [and] sensation" that underlie human consciousness.[44] *Unlike* human thought, therefore, algorithmic thought assigns aesthetics to *logic*[45] and thereby ceases to "exist in direct relation to human thinking."[46] Or, put differently, algorithmic contemplation as it is described in Parisi's study might be best differentiated from human thought in that it aestheticizes logic or information processing, in that it is "a concrete mode of abstraction" that exists specifically to think through "patternless data," and in that it is inconclusive or incomplete—in that it considers the "infinities in finite actualities that cannot be contained in a totalizing method of computation."[47]

Whereas Bray emphasizes self-awareness—or psychology—as the key quality that differentiates human thought from nonhuman thought (or, at least, the thought of "higher organisms" from cellular thought), Parisi emphasizes *processing* as the key quality that differentiates nonhuman thought from human thought. And each thus seems to be framing the contrast between human and nonhuman thought in quite different ways. When considering what sort of processing might *lead* to Bray's psychological self-awareness and what sort of absence of consciousness might lend itself to Parisi's soft thought, however, a series of similarities between these two sets of contrasts begin to emerge. After all, in order to create a coherent self-narrative or to come to an understanding of self and other or subject and environment, an organism must engage in rational, or what Parisi calls totalizing, thought. Bray's human psychology seems, that is to say, to lend itself very well to Parisi's human processing. And meanwhile Parisi's algorithmic processing lends itself equally well to Bray's nonhuman absence of awareness. Eternal processing, after all, *is* nonhuman because it cannot be wrapped up, because it cannot end in psychology.

But, once more, this thinking and processing are by no means divorced from *living*. Indeed, as much as Parisi's account of the massive disjuncture between algorithmic contemplation and human contemplation seems to undermine Bray's suggestion that the former—as wetware—may be more related to human cognition than anyone might realize, and as much as Bray's arguments seem to undermine Parisi's point that vitalism and mechanism are absent from noncognitive thinking, the two taken together lead to an evocative conclusion. Specifically, Bray's inclusive gesture—his insistence that readers consider human and nonhuman thought *together*—lends to Parisi's work an unexpected political punch. In addition to describing a purely alternative way of thinking in the world, and in addition to

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explaining the seemingly inexplicable operation and proliferation of digital space-time, Parisi's study of algorithmic contemplation can now also serve as a jumping-off point for theorizing how democratic governance is faring in the face of the rapid *extension* or *growth* of this thought.

After all, if there *is* a link among algorithmic contemplation, vitality, machines, and—because, as Bray notes, they cannot be completely ignored—humans, then the thought that Parisi describes can easily become political. It indeed might be the type of thought most relevant to contemporary politics, as well as to contemporary biopolitics. Existing on a spectrum with human consciousness, it can be, despite itself, strikingly familiar to classical human-centered political theory. Evading the pitfalls of the cognitive theory that associates thought with awareness or an embodied brain, however, it need not be abandoned as an anachronistic irrelevance in the face of a contemporary mass politics of regulated, reproducing bodies. Vitality is still very much present in this alternative politics of life—but this vitality is not necessarily organic, and it is certainly not embodied.

Bracketing human cognition, in fact, might very well be a prerequisite to introducing—or reintroducing—thought into political life. Doing so, for example, can help to eliminate the impossible or absurd choice between life or reproduction, on the one hand, and thought, memory, sensitivity, or choice, on the other, that seems to present itself when self-awareness is the defining characteristic of political thought. Drawing on these alternative—organic as well as inorganic—models of life and thought, indeed, allows for each to operate harmoniously, inextricably, as political functions. And, in turn, we are presented not with absurd choices, but with a mass democratic biopolitics that is not only less gloomy than many traditional accounts would have it, but that is also more explanatory when encountering, as readers increasingly seem to do, slime and data out to colonize the world.

Reproductive Thought

Where, though, does Foucault's fundamental biopolitical behavior—reproduction—fit into this alternative framing of mass democracy? Some commentators might insist that it simply does not. Conventional interpretations of biopolitics, once again, have tended to situate life within bodies and, typically, sexually reproductive bodies. As much as scholars have argued that sexuality has gradually disappeared from biopolitical governance, to be replaced by a more isolated political focus on reproduction,[48] therefore, this disappearance—itself contested—has not similarly brack-

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eted bodies and human variations on life. If the human subject is removed from theories of biopolitics, these commentators might argue, then biopolitics loses any resonance or specificity. As a result, it seems that even if thought does not disintegrate in the face of a politics of life, it does, more narrowly, when faced with a politics of *reproductive* life.

At the same time, however, disembodied environments, fields, and systems—organic as well as inorganic—have never been entirely absent from biopolitical theory, and addressing biopolitical reproduction as an environmental, rather than an embodied, phenomenon is by no means a departure from other, equally well-established interpretations of modern mass democracy. But what have these environmental variations on the reproduction at the heart of modern mass democracy entailed—and how might they be grounded within ongoing scientific work on life as thought? Can a democracy that takes recent scientific research into unbounded life and thought as its starting point survive the politicization and regulation of reproduction?

First of all, and once again, a crucial quality of the living environments or systems that concern recent biological research is that these environments or systems, themselves, think. They also process information and store memories. Moreover, they think, process information, and store memories quite frequently as a means of growing, replicating themselves, or reproducing themselves. Hidden within ongoing research into slime, bacteria, cells, and processing algorithms, therefore, is in fact a quite straightforward story of potentially *political* environments—environments that not only live as thought, but that also, if more narrowly, reproduce as a thought activity.

Returning, for example, to Balazsi et al.'s comparisons between bacterial thought and viral thought can lead to an even more tightly focused set of comparisons between bacterial *reproduction* and viral *reproduction*. In describing how bacterial and then viral thought responds to—or becomes part of—its environment, Balazsi et al. note first that many bacteria assign separate and distinct functions to different cellular groups. "Photosynthesis and nitrogen fixation are essential but mutually exclusive functions in many cell types," they state at one point in their paper, and so "cyanobacteria dedicate a subpopulation of cells entirely to nitrogen fixation while the rest of the cells remain photosynthetic."[49] Other examples of this sort of distribution of labor include "the segregation of somatic cells from germ cells . . . in which the tasks of locomotion and replication are allocated to different subpopulations."[50]

On the one hand, then, each cell is, again, an individual of a sort—

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making a decision to perform one function over another. On the other hand, however, the performance of these functions becomes *thought*, becomes a method of engaging with matter and, or as, information, only given their embeddedness—and then dissolution into—a bacterial environment. The fact that the reproductive germ cell houses information, a message, that might be communicated or passed on in this way does not privilege it over the somatic cell as more intellectual or more relevant to thought. Indeed, the fact that it *is* a germ cell rather than a somatic cell is an accident of its environment: both think *as* they navigate and reproduce environmentally.[51]

The extent to which, within a living, intellectual environment, reproduction becomes a mode of thought, alongside other modes of thought, however, becomes more clear when Balazsi et al. introduce viruses into their analysis. Starting with the point that, generally, "alliances between replicators and sensor molecules may have formed to ensure that replication occurred efficiently and separately under the appropriate circumstances,"[52] Balazsi et al. turn to a type of life that has, thus far, *evaded* such "alliances"—namely viruses. Viruses, they write,

> are among the simplest nucleic acid-based replicating entities, which presently can only multiply inside of the cells they parasitize. Nevertheless, viral decisions taking place in host cells are in every aspect similar to the bacterial, fungal, and metazoan cellular fate choices . . . indicating that cellular decision making is a misnomer. In fact, "cellular" decisions are taken by more or less autonomous replicating systems that reside inside and manipulate the behavior of carrier cells to maximize the chance of their own propagation.[53]

If viral thought *is* similar to bacterial and other cellular thought, in other words, then the quasi-embodied quality of bacterial or cellular existence—the membrane supposedly separating individual cell from individual cell—is perhaps even less of a boundary or border than it seems to be. Viral decision making involves *free-floating* intellectual, systemic reproduction. It is a function of replicating systems *without* boundaries, systems that may briefly colonize cellular bodies but that are in no way even metaphorically embodied.

Moreover, according to Balazsi et al., this free-floating thought—or this set of thought operations across disembodied environments, systems, or accumulations—is more related to other modes of living thought than it initially appears to be. Indeed, if this analogy between viral reproduction

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and other reproduction holds, then the body of the cell, to the extent that it does exist and can be differentiated from its environment, is perhaps its least important attribute. Reproduction-as-thought has little or nothing to do with a cell's body and everything to do with its existence as a material-informational *environment*. It is as viruses and other cells *think* through these environments, in other words, that they continue to reproduce. And so, in a relentless sort of way, life, environment, reproduction, and thought become a unified, ongoing, systemic process.

Once more, the political implications of this collapse of life, environment, reproduction, and thought into one another are difficult to overstate. And one of the most immediate of these implications, of course, is that this collapse demands a radical shift in perspective on reproduction as a democratic activity—a reinterpretation of the type of life, reproduction, and thought that are central to democratic engagement. Reproduction remains key to political theory here—as, obviously, does life. But this reproduction ceases to relate to discrete, bounded, identifiable bodies. And the life that is reproduced or replicated—and politicized—is an environmental life, a life characterized by thought if never cognition.

But science studies scholars have in fact already begun to concern themselves with the repercussions, in a variety of fields, of this shift in perspective. In what is something of a criticism of this trend in scientific research, for example, Landecker describes at some length the ethical and political challenges posed by "growing living cells of complex organisms outside of the body, often referred to as the *in vitro* culture of cells. Cells in this form," she writes, "are maintained continuously as indefinitely self-reproducing populations (called cell lines)."[54] The potential problem with this method of producing organic material, Landecker continues, is that alongside the reemergence of "the *idea* of the cell . . . with all of its fundamental-unit-of-life gravity," scholars are witnessing the privileging of "a very particular kind of cell—a plastic, temporally adjustable, highly autonomous cell . . . one that often comes packaged with the conditions of its own *in vitro* existence."[55]

Landecker convincingly critiques a number of implications of this production of organic material ("biologicals") for research. She reminds her readers, for example, that "the genetic diagnosis at the core of amniocentesis depends on the ability to culture cells taken from the body, i.e. to grow and reproduce them *in vitro* for a certain period of time," and that this variation on the process, at least, divorces the concept, "reproduction" almost completely from reproductive or reproducing bodies.[56] Similarly,

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she notes that these new trends in biological research have created a situation in which "how we handle nematode matter or yeast matter or chicken matter may be more formative for what we do with and how we think about human matter than any particularity of human matter as human."[57] Finally, and perhaps most evocative, she argues that experimentation on mass-produced biologicals that seeks, specifically, to create new medical technology

> imparts a new kind of relevance of *in vitro* plant cells to people, or at least their health and wealth. Transfection is a key experimental tool for understanding how cells work, but increasingly the emphasis has been on its role in making cells do things they wouldn't otherwise do. In other words, parasites also see cells as something to transfect into, [and] there is a certain adoption of the parasite's point of view in regarding cells and the plants or animals they constitute as DNA and protein factories.[58]

Not only, then, does one of the earliest examples of popular *in vitro* cell culturing—amniocentesis—remove the embodied organism from conversations about reproduction, but, given more recent trends in this direction, the distinction between human and nonhuman evaporates as scientists think through what *had* been purely "human matter." Moreover, and perhaps most troubling to Landecker, scientists risk adopting "the parasite's" or the "virus's" point of view on life, thought, and reproduction when they introduce this commercially fabricated organic matter into their experiments.

In short, therefore, this transformation in biological research—the industrialization of cellular manufacturing as a variation on envisioning reproduction as an environmental process—has created a situation in which neither the reproducing body nor the thinking body has any salience in analyses of life or thought. This new cell biology, in other words, produces a rhetoric *not* of cells as little bodies, almost like human bodies, and not even of cells as little thinking bodies, not quite like human bodies. Instead, it posits a scenario composed of thinking, reproducing, organic environments—organic environments always potentially subject to transfection (if not infection) and dissolution into thinking, if parasitized, systems.

But is this transformation in thinking about life necessarily undesirable? Landecker's approach is critical—although certainly not condemnatory. One might push her mostly value-neutral discussion even further, how-

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ever, and begin to explore the *beneficial* qualities of these ongoing trends in the biotech industry. As Myra J. Hird has written, for example, it may be worthwhile to consider "engaging seriously with . . . bacteria"—and it may make sense to "theorize an ethics—outside pathogen histories and characterizations—that engages seriously with the microcosms."[59] It may be useful, in other words, to keep an open mind about taking the parasite's point of view—to consider affirmatively the disembodied, yet material, existence of living, thinking microcosms.

One potential benefit of addressing life (and thought) in such a way, for example, is, perhaps unexpectedly, that it helps in challenging the neo-Darwinian privileging of genetic information over matter or material environments.[60] Scholars and scientists can approach the operation of viruses (or for that matter germ plasm) not *just* as a form of colonization that aids (genetic) information transmission, but as, simultaneously, a form of *construction*—the building up of living, thinking, and, yes, *also*, if less relevantly, communicating environments. As a result, the human-centric (or at least, embodied organism-centric) tradition that privileges the "communication" part of viral behavior over the "matter" or "contemplation" part of viral behavior can be questioned.

But one can get there only *if*, as Landecker implicitly criticizes biotech researchers for doing, one adopts the parasite's point of view—only by looking beyond the fear of the relentless string of code out to replicate at all costs, and out to force cells and self-contained bodies to do things they would not ordinarily do (out, in short, to impose their overwhelming thought on matter). When scholars, scientists, and political theorists think about viral or genetic code as one further example of integrated, thoughtful, and *environmental* life—life that very much exists across decontextualized cell lines—the affirmative potential is there. Or, as Hird suggests, there may be a number of hidden benefits in adopting the parasite's point of view—not least of which is recognizing the intellectual quality of reproductive behavior.

Or, put in yet another way, and as Parisi has also pointed out, adopting this environmental interpretation of genetic organization leads almost inevitably to the conclusion that "the evolutionary model of sexual reproduction . . . needs to be re-worked through the far-from-equilibrium dynamics of molecular selection and the symbiotic networks of cellular bodies."[61] Reproductive life, in other words, becomes in this alternative context an issue not of preserving "individual variations through sexual reproduction (genetic inheritance)," but of a type of thoughtful action, distributed throughout an organic or inorganic environment—the "clon-

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ing of bacterial variations enfolded in every cellular and multi-cellular body."[62] Adopting the parasite's point of view, ignoring whole-part distinctions, and embracing cell lines and *in vitro* biologicals—as biotech researchers frequently have—thus opens the door for a biopolitics of reproduction *as* thought, a political life that is contemplative even as it is material and vital. It allows for a politics of life as well as of *reproductive* life to remain a politics of thought, sensitivity, memory, choice, and intellect.

Conclusion

Just as ignoring human cognition and awareness—bracketing the psychological fantasy of self and other—can recuperate political thought in the form of life, removing or dissolving the self-contained body can recuperate political thought in the form of reproduction. And thus biopolitics, broadly defined, can be reinterpreted as a relentless politics of thought. If the past thirty years of scientific research is any indication, in fact, theories of biopolitical democracy can ignore *neither* unbounded thought *nor* unbounded life. Each resonates clearly and distinctly across countless permutations of contemporary democratic engagement. Or, put differently, the embedded, unconscious, unaware sensitivity and memory of cells, the irrational, accidental, glitch-ridden decision making of bacteria, the architectural, environmental, endless processing of algorithms, and the explicitly unbounded and disembodied intellectual activity of viruses and biologicals all seem quite at home in this updated version of Foucauldian biopolitics. At the very least, taking these processes and environments seriously as *potential* political participants seems to offer intriguing alternative solutions to many of the problems that continue to plague, or infect, the politics of life.

Or, if they do not offer solutions per se, they do offer productive alternative framing devices. They make it possible, for example, to ask whether the designation of some reproductive or informational material as "human" and some reproductive or informational material as "trash" is valid or useful. Similarly, they invite scholars to consider whether the historical regulation of bodies that reproduce, sexually or asexually, with all of the implications for gender that this regulation has entailed, is even relevant in a universe in which life and reproduction are purely environmental. And finally, they demand that political theorists rethink, from a gender-conscious perspective, many of the classic questions that concerned an earlier generation of human-centered writing, and that seemed, then, to have little to do with reproduction. Dignity, integrity, and privacy, after all,

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are quite a different affair when life and thought are cellular, bacterial, algorithmic, environmental, and material—but never embodied.

These questions, though, once again, can be addressed only given this reconfigured theory of biopolitics—given this theory that takes as a starting point the idea that political life *can* be synonymous with political thought, and that this political life operates equally well across organic and inorganic environments as it does within self-contained, embodied organisms. It may well be the case that Foucault's theorization of biopolitics drew on prevailing nineteenth-century scientific theory. But this prevailing interpretation is not the only interpretation available to twenty-first-century researchers. As Foucault's own references to data, information, and environments make clear, an equally healthy—if perhaps less influential—biology of contemplation and diffusion has always competed with the more mainstream literature.

Moreover, and as Prochiantz has noted, this biology—or even physics or mathematics—of thought and diffusion gave rise, if obliquely, to many of the ideas that began to dominate scientific research in the late twentieth and early twenty-first centuries. It thus perhaps makes sense for scholars to look for the origins of late twentieth- and early twenty-first-century biopolitical mass democracy not only in recent scientific work, but in this earlier writing as well. Indeed, turning to the eighteenth- and nineteenth-century natural historical literature on life and reproduction may very well provide clues that can help both to identify productive variations on mass democracy and to situate these variations on democratic activity within an established, three-century-old tradition. These historical examples of the science and politics of life and thought are the subject of the following three chapters.

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3 • *Embryos*

This chapter, and the two that follow it, can be read in a number of ways. First, and most obviously, they are histories of the science and politics of life and reproduction—especially in France, the Ottoman Empire, Turkey, and the United States. Readers might also, though, prefer to read what follows as a retooled history of mass democracy—a history that takes embryonic material, human clones, and reproductive or replicating waste as case studies in contemporary democratic engagement. Indeed, one key, if implicit, theme that emerges over the following pages is that it is as useful to reframe boundless political thought in a discussion of eighteenth- and nineteenth-century scientific theory and practice as it was—in the previous chapter—to do so in light of recent scientific research. As the work of these eighteenth-, nineteenth-, and early twentieth-century natural historians, natural philosophers, physicians, and laboratory scientists makes clear, the notion that unbounded thought, environmental life, and disembodied reproduction or growth might be better political models than human cognition and embodied human reproduction was not an invention of the twenty-first century. On the contrary, thinking as a variation on reproductive flourishing was central to much of the scientific and medical writing produced in these areas—even if this writing had to wait until the late twentieth century to be appreciated.

It needs to be repeated, however, that neither this earlier eighteenth- and nineteenth-century writing, nor the later twentieth-century writing, on biological and informational processes as intellectual processes—on life as unbounded matter or data that think—was prominent in the natural sciences when, for example, Foucault wrote in the mid-twentieth century. Although the explosion of data and information is one symptom of biopolitical governance, more often than not—drawing on midcentury scientific and medical wisdom—the biological life that generated this data has

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been associated solely with sexually reproducing bodies that are for the most part only incidentally thinking, contemplating, or feeling (if not necessarily speaking) bodies. As much as replicating data, shifting material-information systems, and simultaneously physical and political life have been key to the work of mass democracy, in other words, they have also occupied, in most conventional political theory, separate spheres. In the mid-twentieth century, those who concerned themselves with life and reproduction were not, for the most part, those who concerned themselves with thought and contemplation.

But this mid-twentieth-century lack of interest in life as thought does not mean that the later twentieth-century resurgence of thought or contemplation within biology developed out of a literary vacuum. Throughout the eighteenth and nineteenth centuries—the period that Foucault identified with the emergence of biopolitical modes of governance[1]—a number of natural scientists were also, if less influentially than their whole-organism-minded counterparts, describing life as a variation on noncognitive thought—and also thought as a variation on flourishing life. As a corollary, many of these same natural scientists were describing reproduction as an ongoing series of thought *processes* (rather than as a single, initiating moment of information transfer). Many of these writers were vocally unconvinced that the bounded, organized, complex, sexually reproducing body was the most useful reference point for discussions of what was alive and thinking—politically *or* physically.

Taking open systems—and, intriguingly, open systems that might result in human life as well as other life—as their starting point, these environment- or accumulation-concerned natural scientists can thus be read as precursors or contributors to a *long-standing* politics of life as thought. These writers make repeated references to human life as life no different from other life—to life as a continuum of intellectual processes that operate across assemblages, fields. or accumulations. They make varied, elaborate claims that it is both more ethical and more empirically valid to describe human life and human reproduction with reference to environmental life or reproduction than to insist that nonhuman life is always *almost* adhering to a human norm. And finally, rather than asking the thinking, living, open-ended systems that are their interest to conform to some conventional model of the embodied, self-aware, cognitive, bounded, sexually reproductive political person—far from congratulating the slime mold on its almost-rational or almost-psychological behavior—these eighteenth-, nineteenth-, and twentieth-century natural scientists observe no difference between the life, reproduction, and thought of organic or infor-

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mational systems and the life, reproduction, and thought of rational, embodied, psychological persons.

There is, in short, an unmistakable collision between these eighteenth- and nineteenth-century writers and their late twentieth- and early twenty-first-century counterparts. And it is at the site of this collision that political theorists can, first, bring theories of mass democracy up to date with more recent trends in scientific research and, second, excavate an alternative, or additional, *history* of contemplative mass democracy. Indeed, the narrative that develops out of this writing unambiguously defines the thought at the center of mass democratic governance as intellectual if not necessarily cognitive—and the life and reproduction at the center of this governance as environmental if not necessarily organic. In the process, this history makes clear not only that life, reproduction, and thought are *beginning* to collapse into one another—as slime mold and Boundless Informant each envelop the world—but that these processes have always, historically, been inseparable. Most bluntly, of course, this writing demonstrates that we not only *can* introduce thought to the politics of life, but that we must reckon with a three-century-old tradition of doing so.

Again, though, the relevance of this reformulated theory and history of mass politics can be found only within a series of case studies that are calculated to leave readers unsettled—within a study of apparent Threats to Democracy. The embryonic material, human clones, and trash or waste that highlight the usefulness of an unbounded, intellectual mass politics, in other words, do so specifically because they upset both conventional liberal democratic ideals and traditional, human-centered interpretations of mass democracy. They work as case studies because they elude any framework of inquiry that does *not* take bacterial memory, cellular sensitivity, amoeboid decision making, algorithmic processing, and viral reproduction as its starting point. They are case studies, therefore, both in the effectiveness of political life as political thought *and* in the ineffectiveness of democracies that separate the two, and that are, as a result, always on the verge of crumbling into dust.

This chapter, on embryonic material, operates in the same realm—seeking, first, to disturb. It begins with a brief explanation of why embryonic material has, classically, posed a problem for democratic theory—or an exploration of how classic political theory has failed to cope simultaneously with thought and life. From there the chapter turns to eighteenth-, nineteenth-, and early twentieth-century medical and scientific writing from France, the Ottoman Empire, Turkey, and the United States (with a brief, initial detour into classical Greece) that *has* taken embryonic mate-

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rial as a starting point for theorizing, first, life as thought and, second, reproduction as a thought activity. Having explored this literature, the chapter makes a case for the ongoing political relevance of these medical and scientific interpretations of both life and thought, especially as they play out across embryonic material and information. In general, the purpose of the chapter is not to provide a solution to the problem that the embryo poses to democratic theory so much as it is to demonstrate that the problem, such as it is, has never existed.

The Threat

One of the aspects of embryonic development—and especially human embryonic development—that has most troubled democratic theorists over the centuries has been that embryos seem to bear as much resemblance to slime as they do to embodied agents or subjects. Cognition is not an obvious characteristic of embryos. Self-organized—or self-organizing—as they may be, embodiment also eludes them. And, despite the centuries-old rhetorical separation of woman-environment from embryo-organism—a separation that has prompted feminist challenges for at least the past hundred years[2]—embryos are, by definition, unviable as pure selves. They may be removed from women's bodies, but they cannot be removed from gendered environments. Like slime and data, they *are* environments, they are contingent, and the decision making that governs their life is disassembled rather than organized—even as this decision making grants to embryos, like slime and data, an enormously, perhaps monstrously, successful growth.

An influential response to this problem—to this question of whether embryonic material ought to be described as slime or as an embodied subject—has been to play up the embryo's *potential* completion. The embryo is a potential body, it is governed by a potential brain, and it must therefore possess the dignity of a potential life in and of itself. In the modern period, this impetus has led to the repeated reframing of the embryo as its own person—separate from a woman's body—that has invited such sustained feminist criticism. This criticism is well taken—and this particular trend in writing on embryos is without question in need of a corrective. If anything, it is more powerful today than it was in the past.[3]

But this response to the troubling intermediary position between slime and person that the human embryo (and, by extension, other animal embryos) occupies has not been the *sole* response to the problem that the not-quite-organized embryo poses. A second collection of scientists and

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political theorists have considered the implications of the embryo as, in fact, slime and data. They have asked what life—and even political life—might be if it operates across an embryonic *environment*. The visual representation of the embryo (and the critical challenges to widespread ultrasound technology) that has been so key to the first trend in thinking about development has thus been absent from much of this work—or, if it has been present, it has played up the systemic rather than embodied qualities of this organic material.

Embryos, in this second set of analyses, for example, can involve themselves only in incomplete and comparative *present* contemplation, rather than in absolute or unitary *future* cognition. Embryonic material cannot be separated from its environment because it is, already, a thinking environment. And, to the extent that embryonic life or existence *can* be represented, it can be represented only as a system or accumulation—as a symbolic, algorithmic field—and never as, say, an image or a picture. The embryo in this alternative science and history of development is, in short, an environmental, informational variation on thinking life. It eludes the future—the deferred cognitive, bounded, body with dignity—altogether.

As much as these configurations and reconfigurations of embryonic material smack of the modern period—and of modern democratic theory, especially—however, many find their antecedents as early as classical Greek interpretations of life and existence (or, at the very least, as early as modern readings of this classical Greek writing). Indeed, a number of eighteenth- and nineteenth-century responses to the problem that the embryo posed to theories of life—and especially to theories of thinking life—in both Europe and West Asia explicitly invoked this classical Greek work on embryonic development. Although it is a bit of a detour in the modern history of mass democracy that this chapter is initiating, therefore, it makes sense to pause for a few pages to become acquainted with this ancient thought.

As Devin Henry writes, embryonic "self-organisation" was "particularly perplexing to the ancients," and one way in which philosophers such as Alexander, Simplicius, and Aristotle worked through their bewilderment was to draw on technological explanatory models.[4] Machines of various sorts became the analytical reference points that domesticated the embryo—that transformed it from the thing that divorced biological existence from intellectual existence to the thing from which all animals, and all men (*sic*), as thinking biological organisms, derived. As Henry continues, however, the *type* of technological model that could turn embryonic development into something comprehensible or contained varied consid-

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erably from philosopher to philosopher. Moreover, what, specifically, might constitute life, or thinking life, likewise varied drastically.[5]

In Alexander's writing, for example, the primary question that demanded response was how something "devoid of reason" could "follow a 'rational' sequence in the sense of proceeding in an orderly and determinate manner for the sake of some end."[6] The problem that the embryo posed this particular theory of thinking life, in other words, was how something that could have no rational understanding of an end—no conscious investment in completion—could, nonetheless, operate in such a way that it seemed always to move toward this same completion. Alexander's solution to this problem was to posit "automata" as models of embryonic development. "On this 'relay' model of development," Henry writes, "each thing that comes into being is 'naturally suited' to produce the thing that comes after it, not according to reason or choice, but simply in virtue of its nature."[7] Each preceding developmental state, that is to say, was the condition for the developmental state that succeeded it. The machine or technology that could serve as a model for embryonic development was a machine that cascaded—whose organization depended not on a plan, but on increasingly complex responses to initiating conditions.

In order to resolve the confusion caused by the irrational rationality of the embryo, therefore, Alexander abandoned completion altogether. Finding or recovering a hidden goal or end that might motivate developing embryonic material was not his interest. On the contrary, by distributing thought *as* process over and across each stage of development—by situating thought in the move from one contingent stage to the next—Alexander removed the problem of the end, of completion, altogether from any consideration of thinking life. Thought by no means disappeared from life when rationality was sidelined. But what constituted thought changed drastically. Rather than thought manifesting itself in a goal achieved, thinking occurred throughout the developmental process, at each interval. Thinking life was always contingent and never quite finished. Although there was something that looked like an end to embryonic development, thinking *life*, as a process, was systemic and iterative, never absolute.

Henry juxtaposes and contrasts Alexander's argument that "the specific path an embryo follows . . . is determined at each point along the way by the nature of the antecedent state" with interpretations proposed by other philosophers who were apparently less willing than Alexander to jettison completion.[8] Simplicius, for example, argued that the embryo's "path" is "'anticipated' by its nature at the start of development."[9] And this "anticipation," Henry continues, results from a "principle inherited by an off-

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spring," which "is like a set of instructions or recipe for building the parent."[10] Unlike Alexander, in other words, Simplicius finds an "anticipation" of the end product at the initial moment of conception—an anticipation that is gradually fulfilled as embryonic material reaches its final, complete form. Simplicius's analysis differs from that of Alexander, that is to say, because Alexander's does not specify "beforehand . . . anything like a recipe or set of instructions."[11]

Concerned with completion as Simplicius may have been, however, it was Aristotle's theory of embryonic development, according to Henry, that was the most reliant of the three on the notion that there is some end, goal, or finished product presupposed at conception—that embryonic development is always rational. Indeed, bringing together Alexander's notion of the developing embryo as a cascading mechanical automaton and Simplicius's notion of the developing embryo as a machine subject to sets of instructions—positing, Henry writes, the embryo as "a pre-programmed automaton"[12]—Aristotle even suggests a protodivide between the rational brain thinking through the "instructions" and the inert material body that follows them. This interpretation of embryonic development, Henry concludes, is in fact very useful to Aristotle for a number of reasons that are worth exploring in detail:

> First, the movements of a pre-programmed automaton are one and continuous in the required sense: all of its movements are generated by a single common source of motion inside the device itself (the computer programme). Second, the execution of a programme is precisely the kind of non-causal sequence of which development is said to be an instance: the movement of each part owes its existence to the execution of a single developmental programme and not to the agency of each other. Finally, a pre-programmed automaton would provide Aristotle with a much better spermatic model. In this case the nature in the male could be said to control the sperm's movements, not by being in contact with it at the time, but by having programmed those movements into it at the start. Moreover, we do not encounter the problem of a "mechanized" sperm, since the internal motion that moves our modern automaton is not a causal sequence passing through a network of physical gears but the execution of a programme, which for Aristotle would be the actualisation a single potential for the whole ordered process.[13]

In short, then, Aristotle's "programmed automaton" model of embryonic development seems to resuscitate rationality as the defining characteristic

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thinking life, and then to situate rationality in the male body that produces the sperm. Whereas Alexander's thinking life was contingent, materially embedded, and always incomplete, Simplicius reintroduced absolute—if perhaps troublingly intuitive—thought in the form of "anticipation," and then Aristotle managed to situate what is essentially a model of the rational, masculine brain that works on the inert, feminine body at the very moment of embryonic conception. The classical technological or mechanical model of embryonic development seems to lend itself as much to a narrow, cognitive, embodied definition of contemplative life as does the twentieth-century model of the potential human, possessing dignity and inhabiting the maternal environment.

And yet—it might be worthwhile to dwell a bit longer on Simplicius's "anticipation" embedded in "recipes" or "instructions" and on Aristotle's "computer program," introduced via the rational, masculine sperm. There is, after all, nothing complete or absolute in a set of instructions any more than there is any rational grasp of a *determined* future outcome in the expectation that is anticipation. Recipes and instructions are sets of symbols. More particularly, they are symbolic processes that, in and of themselves, think through results.[14] Instructions and recipes, that is to say, are no more capable of comprehending, rationally, an abstract final product than the contingent thought that occurs at each stage of the purely mechanical automaton's development might be. A subject may well be able to read instructions as a metaphysical exercise, but to the extent that instructions do work, it is as themselves materialized symbols—a situation that is particularly clear in the embryo-as-recipe formulation.

Simplicius, therefore, despite himself, in fact seems to be defining thinking life in much the same way that Alexander is. There is, without question, a more clearly *symbolic* dimension to Simplicius's interpretation, resting on "recipes," than there is to Alexander's. But these are symbols that, again, themselves, do work, as sets of instructions, as *code*. These are not symbols that exist to be read—to represent complete, abstract concepts or to transmit comprehensible messages from cognitive mind to cognitive mind. They are almost literally algorithms, and as such they are by definition iterative processes rather than coherent, absolute concepts. They have nothing to do with rational—or certainly psychological—communication.

They are algorithms, moreover, that arguably reach their *least* rational and *most* systemic or environmental manifestation in, again, likely despite himself, Aristotle's work bringing together Alexander's automaton and Simplicius's instructions. The execution of the developmental program,

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indeed, like all computer programs, does not operate prior to, or on, matter, but through it. Aristotle's model of embryonic development is thus very much computational in the contemporary sense of the term—but it is computational in that it assumes a total simultaneity of symbol and matter. The program becomes thought only as it executes, and it executes only as matter or machine. As a result, Aristotle's interpretation of embryonic development—his response to the assault on thought that embryonic life seems to mount—perhaps more than Alexander's, removes rationality from the equation. There is, without question, a contemplation permeating embryonic life in all three scenarios. But there is no possibility of cognition, no possibility of abstract comprehension. There are only relentlessly materialized symbols that, like viruses (or as viruses, given the role of the sperm that transmits the program), collapse life, thought, reproduction, and environment into a single process.

In the work of all three classical philosophers, then, it seems that cognition is marginal to theories of thinking life *because* of the mechanical and technological models on which they rely, not despite them—because each of these thinkers evokes computation in order to resolve the problem that the embryo poses to thinking life. Machines, and in particular computational machines, engage in contingent, embedded, relational, and nonabsolute thought *by definition*. They engage in thought *processes*. Although contemplation and intuition—in the form, perhaps, of anticipation—can remain very much aspects of this mechanical, environmental mode of thinking life, therefore, the separation of user from tool, subject from environment, self from other, and product from system cannot. And this is a conclusion that Alexander, Simplicius, and Aristotle all, perhaps unexpectedly, draw.

At the same time, of course, despite the gestures toward classical Greek thought, this early association between technology or machines and the potential life that was the embryo appears not to have survived into the modern period. The modern science of embryonic development—although still very much anxious about the disconnect between embryonic intellectual life and rational human thinking life—has concerned itself primarily with the embryo as a person: organic, embodied, and possessing dignity. In modern work, the embryo is always on the verge of embodiment, and therefore always *on the verge* of thought—as cognition. It is always embedded in the more conventional interpretation of Aristotle's work.

There are, however, nonetheless clear traces, at least, of the machine, of the mechanical environment, and of the symbolic environment as mechan-

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ical environment surviving in eighteenth- and nineteenth-century discussions of embryonic life. Indeed, the initial move in scientific, medical, and political work concerned with embryonic life in the present—rather than with what embryos might become in the future—has been, familiarly, to bracket rationality, to discount the mind, to discount the brain, and yet to retain memory, sensitivity, decision making, and information processing as defining characteristics of life. These historical accounts of embryonic development *as* development, in fact, taken together, hint at an ongoing story of biopolitical life as intellectual life. They sketch a type of thought that is life because it is embedded in matter or data, because it is systemic, because it is always incomplete, and because it reaches its most intuitive moments when it encounters accidents, flaws, or glitches. They sketch living, thinking systems that resonate loudly across modern democratic politics as well as modern scientific research.

A Series of Resolutions

Georges-Louis Leclerc Buffon, whose mid-eighteenth-century writing on environmental life as a set of systems rather than as a set of subjects remains a centerpiece of scholarly writing in natural history, is a perfect figure with whom to initiate a search for resolutions to the embryonic threat. Over the course of his multivolume story of life and its animal, vegetable, and even mineral development, Buffon builds up a distinctive—and arguably also computational—theory of life as a mode of thought. On occasion, he explicitly disagrees with Aristotle and those influenced by Aristotle—positing, to provide just one example, a theory of "female semen"[15] that situates the initiation of embryonic development as much in the female body as in the male. But, much *like* Aristotle, this apparent emphasis on a prime or principal author of embryonic development—a protorational energy, whether masculine or feminine, bent on a coherent end point or finished product—is more than counterbalanced by a repeated return to the contingent, incomplete, and environmental quality of embryonic development writ large.

Consider, for example, Buffon's introductory discussion of the relationship between an egg—in this case a chicken's egg—and a viable, living organism. An egg, Buffon writes, has a life and an organization, a growth and development, that it takes upon itself and directs on its own. It does not live, he continues, like an animal or like a plant—it is distinct from both. It organizes, always in the same way, and eventually it arrives at its perfection, which is the accomplishment of its form.[16] According to Buf-

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fon, the egg contains its own completion—it is an absolute, and perhaps an abstract absolute. It is a materialization of rationality—and it thus seems to have little to do with the contingent thinking that even Aristotle at least *suggested* was an attribute of embryonic life. But then Buffon concludes this passage in an unexpected way. He writes that the egg is something that "one can easily consider as a part *and* a whole in and of itself."[17]

Even while he plays on the theme of the embryo as potential life and potential thought, that is to say—and even while he associates life with completion or perfection, with absolute, rational thought—Buffon also undermines the possibility of completion or comprehension in *ongoing* embryonic life. Embryonic life, he states, is both potential plant or animal life *and completely different* from this plant or animal life. The embryo's organization might very well lead to an animal life that, in turn, might be a foundation for the rational animal that is the living human. But this organization is also its own life and thought—a life and thought distinct from its future form. Because the embryo's future perfection (a fully formed plant or a fully formed animal) differs in quality from its current, organizing existence—because its life as part is irreconcilable with its life as whole—the embryo thus, according to Buffon, demands consideration on its own terms. It is a mistake to address embryonic life solely as potential animal (or human) life. The existing, ongoing, present life of the organizing embryo in many ways trumps in importance its potential plant or animal life in Buffon's work.

But what does this distinctive, embryonic life entail? According to Buffon, once again, the life peculiar to the embryo works and organizes itself—and hence, it thinks. Because it can never be categorized as whole or as part, however, it thinks only in contingent, environmental, systemic ways very much at odds with the absolute ideal to which it ostensibly aspires. The embryo is a disparate type of life that works, and therefore thinks, on its own terms. Indeed, in order to emphasize this point, Buffon repeatedly compares cognition as it plays out in the brain to fertilization and embryonic development as they play out not just in the womb, but across the body, and then across multiple bodies and environments. Moreover, throughout the course of these analogies, thought becomes increasingly contingent on living matter, while life becomes increasingly intellectual.

In making the case that viviparous organisms have eggs in the same way that oviparous organisms have eggs, for example, he writes that the womb itself conceives the fetus via "a type of contagion that the male liquor communicates to it."[18] In the same way that a magnet communicates magnetic

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qualities to iron, he explains further, the masculine contagion infects the womb and the entire female body.[19] Moreover, in the same way that the brain conceives ideas, the womb conceives a fetus—and just as "the ideas that the brain conceives are similar to the images of the objects it receives through the senses, the fetus, which is the idea of the womb, resembles that which produces it."[20] Meanwhile, sperm, although "organized bodies," are better described as "natural machines than as animals,"[21] moving, as they do, like artificial automatons rather than like organisms, without rest,[22] and above all, without "will."[23]

This is an unexpected set of associations. Most pointedly, of course, in elaborating his theory of embryonic development as the product of "contagion," Buffon makes clear, repeatedly and emphatically, that biological conception *is* an intellectual activity. Conceiving ideas and conceiving organic matter are, for him, the same process. Living matter and thinking cannot be dissociated from one another. In addition, however, the contagion that is thinking life is also similar to the communication of attractive qualities from mineral to mineral—and sperm, the organisms that seem *most* bent on an end point or goal, are *without* will because they are without rest, machines rather than animals.

The type of thought that organic conception entails, therefore, is not only indistinguishable from the matter through which it operates. It is also relational rather than absolute—it is contingent on matter *interacting* with matter, and it results in comparison rather than in abstraction. Moreover, this thinking life, when it is manifested in sperm, at least, is explicitly mechanical. Without end, without rest, this thought activity continues processing without any (rational) intention of reaching its end. This is a thought that operates throughout a simultaneously organic, mechanical, and computational system—a thought that is almost completely irrelevant to rational cognition situated in a mind or self-contained body.

Moreover, it is a type of thought that natural historians and embryologists describe in increasingly elaborate detail over the next few centuries. At the beginning of the nineteenth century, for example, J. B. Demangeon wrote in his comparative study of "generation" that the physical laws that guide embryonic development might be compared to those that govern the aggregation of "metals, salts, [and] earth."[24] From there, he compares "nervous fluid" with "spermatic fluid," noting that although they are not the same, one might draw an analogy between the two, in that they both "vivify," they both produce heat, force, liveliness, they both give off "subtle effluvia," they both can be phosphorescent, and, above all, they both rely upon one another: one fluid cannot be

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exhausted without exhausting the other, each is secreted from the same source, almost "infinitely," and the secretion of each—"sympathetic" with the other—is excellent evidence that "the organs of the body are like cogs in a machine, in which one cannot be harmed without the rest going haywire."[25]

In short, the rules that govern organic life parallel the rules that govern the life of metals and other minerals, while the living fluid that produces life (spermatic fluid) is inseparable from the equally living fluid that produces thought and feeling. Moreover, the reference point for understanding this overlap, first, between organic and inorganic life and, second, between thought and life is not the rational mind. It is the rotation of cogs in a machine that is always on the verge of encountering a glitch ("going haywire"). Intellectual life is at the basis of "generation" here, just as it was at the basis of Buffon's natural history—but, once again, this intellectual life is environmental, mechanical, and irrational. It is thought without cognition or psychology—thought through ever-circulating fluid and ever-growing matter and information.

This fascination with the interrelation between "nerves," the "nervous system," or "nervous fluid" and semen or developmental or generational fluids continued into the nineteenth century. Writing in 1846, for example, Auguste Duméril notes in his *Evolution of the Foetus* that whereas some commentators prefer to study all parts of a developing embryo simultaneously—thus addressing it as a whole—it is more effective to examine each part, or unit, in itself. He himself, he continues, prefers to start with the nervous system because the nervous system develops, he states, before any other part of the organism.[26] Or, as G. A. DeLattre writes in 1863, nerves and the "cerebral-spinal axis" arise spontaneously, "where they are" in the body—physicians and scientists do not see them evolving.[27] Each, however, is nonetheless foundational to the development of embryonic life.

Both of these studies separate "the nervous system" from other bodily systems, and both focus on this system as an active, organic, and open-ended environment (composed of fluids, points, and axes) rather than as a tool (like the brain-as-mind) in service to a discrete whole (like a self-contained embryonic body). Each study then associates this nervous system or environment (uniquely) with the beginnings or origins of development. Life and nervous thought in this way go together in these analyses—they are fundamental or original to one another—*but*, importantly, neither has anything to do with cognition. Thought and life are detached from tools of cognition or embodied wholes, and then they are

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associated unambiguously with flowing, working environments or accumulations of nerves, fluids, points, axes, and intersections.

Alongside this series of associations between the embryonic environment of thought and feeling and the elaboration of embryonic life, there is an equally emphatic set of studies that downplay the importance of the brain as the site of embodied cognition. Over the last two decades of the nineteenth century, in particular, commentators on development, life, and thought insisted that the brain was in many ways the least relevant organ to studies of thinking life. Some of these commentators were more careful than others, it is true. In describing "the origin of living beings" in 1889, for example, Félix Hément wrote that only the *manifestations* of thought are produced by brain matter. Whereas it is true, he explained, that thought requires a brain in the same way that measuring time requires a clock and in the same way that the creation of an animal requires an egg, it is not the case that the substance of the brain, the metal parts of the clock, or the yellow and white of the egg produce, alone, thought, time, or life. The most that a commentator might conclude about the relation between these tools and their manifestations, he writes, is that the manifestations cannot be produced *without* such tools.[28]

For Hément, in other words, the brain is both indispensable and *insufficient* to a discussion of thought. What makes the brain indispensable, however, is not that it is the seat of all thinking, but that it is composed of an accumulation of matter without which thought could not happen. The brain is key, in other words, not because its product—cognition—is greater than the sum of its parts. It is central to thought not because it represents an abstract, pure rationality or psychology that can transcend matter. On the contrary, Hément insists that the brain is simply a thing among other things. By comparing brain matter to the metal of a clock and the yellow and white of an egg, Hément evokes less a potential, final, dematerialized product, less a future rationality or psychology that might operate beyond the organ that initiates it than a present, and always present, collection of pieces that are *already*, in any case, thinking. The stuff inside the egg is already developing—just as the stuff that makes up the brain is already thinking. Hément writes, in fact, that when we put this matter together, the tool that we create is not a tool of thought, it is a tool for *measuring* thought in the same way that a clock is a tool for measuring time. No one would argue that thought ceases to exist in the absence of a brain any more than time ceases to exist in the absence of the clock. But similarly, no one can discount the materiality of thought any more than one can discount the materiality of development through the egg. Thought, in short, for Hément, is embedded in matter that is never quite yet put together.

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Just as Buffon's analogy between the brain that conceives ideas and the womb that conceives embryos seems to isolate the brain as the organ of thought even while it eliminates any distinction between the two modes of conception, then, Hément's set of associations between brain and egg, on the one hand, and brain and clock, on the other, devalues the brain as the seat of thought. The point of both analyses, separated by more than a century, is that readers cannot divorce organic conception from the conception of thought—and that, as a result, each must be described as the product of a wide-ranging system that is, in turn, part of an open-ended environment or accumulation. Each uses the brain as a *starting point* for a description of thought that ranges beyond discrete organic function—a description that includes entire, unbounded material and informational environments within the intellectual process.

Whereas Hément's discounting of the brain as the seat of thought (and, in turn, life) was speculative, other commentators, writing in the same decades, were more emphatic. William Thierry Preyer, for example, born in England, writing in German, and translated extensively into French, played insistently on the theme of the brain's relative lack of importance, first, to developing life and second, to the thought that characterizes this life. Departing from earlier writers in that he posits the circulation of the blood, rather than "nervous fluid," as the embryo's originary bodily function,[29] he nonetheless finds in this function the same noncognitive living thought that Duméril and DeLattre had found in the circulation of nervous and, or as, spermatic fluid. More to the point, however, Preyer also describes in great detail the nonexistence—and eventually, the unimportance—of the brain to embryonic development, sensitivity, or intellect.

Initially, Preyer simply underlines (literally) the lack of "muscle fibers" and "nervous elements" in the early organization of the circulatory system. The first contractions of the heart, he writes, are of "extreme physiological importance" because they indicate an enormous amount of energy output when there is still no trace of muscles or nerves. The cells that constitute the heart move themselves by virtue of their own ability to contract, not because they are directed to do so by some external organ of cognition.[30] Put differently, he continues a number of pages later, "it is notable that neither the *brain* nor the *spinal cord* is necessary to the movements of the heart," a point that can be proved both by examining embryonic specimens in a laboratory setting and by considering the life of infants born without brains or developed respiratory systems.[31] Preyer then dwells at some length on what readers might learn from the behavior of these anencephalic embryos, fetuses, and newborns—of particular interest to physiologists, he repeats, because they demonstrate the minimal importance of

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cerebral function to development and movement.[32] Most interesting to Preyer himself is how such organisms can *feel* such threats as the lack of air or nutrition, despite their missing brains.[33]

Preyer addresses this question from a variety of directions in his study, conducting experiments on, among other things, the ability of embryos to feel pain, to smell, and to sleep or wake. His repeatedly drawn conclusion is that although these embryos can experience such states, they cannot think rationally about them—the brain-as-mind, once more, is unimportant to their intellectual existence. With regard to pain, for example, he writes that whereas peripheral sensory nerves can be influenced by an anesthetic, its internal application has quite "weak" results. The brain thus (again) does not play an appreciable role in sensing pain, and indeed, his readers might conclude that "*the sensibility of the embryo manifests itself later than its motility*."[34] As far as smell is concerned, he makes an intriguing point that since olfactory *hallucinations* are rare (unlike visual hallucinations), an embryo cannot smell. It can neither remember earlier smells nor have a sensation of smell (unlike, implicitly, sight).[35] Finally, he argues that since a fetus has no sense of self—in the way that a person with a working brain has—the fetus cannot be said to sleep or to waken. It is in an intermediate, always quasi-sleeping state—a state, once more, that does not and cannot rely on mental cognition.[36]

Preyer's argument here is complicated. While making an emphatic negative point—the brain-as-mind is irrelevant to embryonic, fetal, or for that matter neonatal development—his positive point is more elusive. He is, first of all, by no means suggesting that embryos lack any capacity for thought. He insists on the sensitivity of the embryos, fetuses, and newborns he studies, and in this book as well as his more influential *Mental Development of the Child* he makes an extended case for infant and prenatal thinking, but not cognition.[37] But what might this thinking entail, if not cognition, if not psychology, and if not brain function? A clue might be found in the experiments he conducts and in the conclusions he draws from these experiments.

When he writes that sensibility manifests itself later than motility, for example, he does so against the backdrop of an experiment that indicated to him that whereas "peripheral" nervous function exists early on, an internal, central nervous coordinator of this function does not. Preyer's point, therefore, is not that no nervous experience exists—merely that it is distributed *throughout* a developing system and is impossible to coordinate in aid of some rational or distinct abstract goal. Preyer is describing, in other words, a diffuse system of thought that *is* thought

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because it is loosely connected, nothing more than peripheral motor reactions. In the absence of a brain, in other words, motility is *itself* sensibility—thinking happens via movement, just as it does in a slime mold or an algorithm. The absence of self-awareness, in short, does not disqualify a system from thought *or* feeling in Preyer's work, any more than it did in the work of Bray or Balazsi et al.

Consider, indeed, the interplay of scent, sight, sleep, and hallucination in the second two experiments that Preyer conducts. Once again, Preyer's conclusion having completed these experiments is that embryos can neither smell nor be called "awake" because both olfactory sensitivity and wakefulness require, first, the ability to remember in narrative form, and second, the ability to distinguish, psychologically, between self and environment or other. Sight and quasi wakefulness (i.e., dreaming), however, and intriguingly, do not, according to Preyer, demand these psychological and rational prerequisites—and the evidence that Preyer marshals in support of this distinction is the well-documented existence of visual (but not olfactory) hallucinations. Embryos without brains and narrative memory can see but not smell, that is to say, because rational adult humans, *despite* their brains and their memories, occasionally hallucinate and dream.

To emphasize, however, Preyer is not asking his readers to assume, therefore, that dreaming and hallucination are not modes of thought. He merely wants us to remember that they are not modes of *rational* or *psychological* thought, and that they do nothing in aid of the constant transformation of memory into self-narrative that is at the heart of psychological existence. The fact that the embryo's contemplative existence bears more than a passing resemblance to hallucination or dreaming, therefore, is evidence, for Preyer, of an alternative, equally viable—perhaps more viable—theory of thought as life. Put differently, just as motility *becomes* sensibility across embryonic systems—as it does across bacterial or computational systems—so too might motility become memory. What embryos lack, in other words—and what keeps them always quasi asleep (and unable to smell)—is not memory, not even working memory, but *narrative* memory. Embryos certainly do not remember in the psychological sense, Preyer seems to be saying, but (and again like bacteria or algorithms) their knowledge, contemplation, and movement may constitute a type of irrational, diffuse, environmental memory. Preyer's insistence that his readers bracket the brain in their understanding of embryonic development, in short, opens the door to an evocative, alternative theory of embryonic thought.

Over the course of the nineteenth century, then, commentators remained open to developmental theories that assigned to embryos,

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fetuses, and newborns a contingent, environmental, unbounded, and arguably computational style of thought—emphatically irrational, frequently absent a brain, but nonetheless viable and, in every sense of the word, vital. This tradition continued into the twentieth century as well, even as students of development became aware that politically relevant thought—and especially the thought that went with political life—was being defined with increasing narrowness as actual or potential rational cognition. Indeed, an unexpected counterpoint to political and legal philosophies that assigned life to the embodied, self-contained, self-conscious, objective, active individual citizen was an elaborate theory of unbounded thought as unbounded life. To be clear: this counterpoint was by no means the erotic obliteration of the self in the face of a Romantic, environmental sublime—it had little to do with classic romanticism. On the contrary, there was no preexisting self to *be* obliterated, and the environment that itself thought was always lowly, comparative, in error, and incomplete.

Bahaeddin Şakir, for example, a physician, a founding member of the Young Turk Committee of Union and Progress, and later implicated in the Armenian genocide, framed a series of lectures on medical law, published in 1908, within a commentary on the tension between a legal or political establishment that demanded positive, coherent medical knowledge of life versus death and a medical establishment that remained open to unbounded reinterpretations of what, precisely, might constitute life or death. Şakir begins this discussion with his thoughts on the law of abortion—noting the importance of providing coherent and absolute specialist knowledge of embryonic development to lawyers and judges.[38] He builds on this point by presenting readers of the lectures with precise information on how long (in hours and days) a fetus at various stages of development might "live" postabortion.[39]

In the midst of this clear-cut account of how and when an embryo or fetus might live or die, however, Şakir also introduces a number of complex—and not easily answered—questions about how and why specialists might *determine* life or death, and what role fetal or embryonic thought, especially, might play in these determinations. Like Preyer, for example, Şakir finds embryos with no brain or heart a productive arena for research into the broader question of embryonic life and thought.[40] The examination of anencephalic fetuses, he writes, can prompt physicians to reconsider their narrowly defined interpretations of life and death. A fetus without a heart or head is considered "alive" by neither law nor medicine, he explains, but it is nonetheless worth questioning this assumption, "as scientists if not as lawyers."[41] Indeed, he continues,

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although neither the physicians associated with the law nor lawyers themselves consider "children" (*atfal*) born without a head to be living, and although specialists of embryonic development can speak with certainty on such matters to *judges*, it is difficult to be certain, as scientists, that some sign of viable life has not escaped one's notice. Might it be worthwhile to explore, for example, the viability of a newborn child born with a brain "filled with water, soft like paste or dough, and embellished or traced with lines like tangled grass?" Şakir's answer is that perhaps it is worthwhile: no matter how carefully an autopsy might be conducted, observers cannot be certain that evidence of life does not exist—and that such a child might in fact live or be alive.[42]

Şakir, in other words, implicitly criticizes both what he sees as the narrow definition of "life" accepted by a conventional, rights-based legal establishment and the corollary to this definition: the brain as the seat of both thought and life. Moreover, in order to question the efficacy of such a definition, Şakir presents his audience with an unusually evocative description of an apparently useless, putrefying brain in a "child" that might, nonetheless, be, or have been, alive. Associating the brain with liquid, with unformed or unfinished dough, with filigree, and with tangled grass, Şakir suggests—in an echo, to some extent, of Hément with his dismantled brain matter—the environmental or systemic potential of what lawyers and judges want to understand in binary, as a present or absent self-contained organ.

In addition, rather than informing his readers and listeners that the anencephalic brain is simply not there, as Preyer does, Şakir instead describes the brain as a *different kind* of matter. In this way, Şakir also unexpectedly prefigures Bray's discussion of the relative autonomy of "nerve cell[s] in the brain." A nerve cell in the brain, Bray writes, may in fact be no different from "a free-living cell," given that it lives in "a rich and ever-changing broth of ions and neurotransmitters," and has thus had "every opportunity . . . evolving over millennia to learn how to extract information from this chemical soup—to recognize important changes."[43] The conclusion readers are expected to draw from this comparison is, like the conclusions they are meant to draw from so much of Bray's book, that *every* cell, even a cell that is part of a more complex organism, is a thinking quasi individual, engaging in intellectual behavior that, though imperfect, could *lead* after millennia of evolution to human cognition and human psychology.

But Bray's point, like Şakir's, is also more complex than this conclusion would suggest. Bray's choice of comparison between nerve cells in the

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brain and free-living cells constitutes, after all, a rhetorical move as well as an analytical one. Its purpose is *also* to destabilize a reader's preexisting association between thought, on the one hand, and the brain as a contained organ (of thought), on the other. It is to delink thought from embodied (human) existence. Like Bray's connected, yet also diffuse, cellular environments that operate *throughout* the brain—and even the most rational brain—therefore, Şakir's anencephalic brain is connected but diffuse, fluid like water, capable of a different sort of growth like dough, and networked or open-ended like filigree or tangled grass. The description of the dead brain that by no means suggests a dead or unthinking "child" is deliberately beautiful—this is a brain that, *because* it is not the seat of cognition or rationality, is a touchstone for an alternative theory of, once again, unbounded thought and unbounded life. Şakir's unexpected departure from the Young Turks' positivist embrace of rationality leads him to an echo of the theory of embryonic life and thought that the far more spiritually inclined Preyer reached thirty years before, and that the far more intellectually disciplined Bray reached a century later.

Rethinking the Resolutions

Is this thinking, reproducing matter, however, in any way relevant to democratic engagement or, especially, to democratic engagement that takes intellectual existence seriously? Remember, embryos are ordinarily understood to pose, if anything, a *challenge* to the politics of thinking life and thus to classic democratic theory. Moreover, the conventional response to this challenge has been either to posit the embryo as a potential, future rational, embodied citizen in order to protect thought as a democratic ideal or to jettison thought altogether in order to focus on the democratic quality of biological existence, health, and reproduction. Traditionally, the embryo has posed a threat to political theories that *advocate* thought as a prerequisite to democracy, and this threat has been met with a *bifurcation* of intellectual life and biological life. More to the point, perhaps, as of the nineteenth century, biological life seemed very much to be in the political ascendant, with thought bracketed or even eliminated altogether. Thought and reproduction, that is to say, have been seemingly at odds with one another over the past two centuries, and the notion that thinking might be identical to reproduction is as difficult to accept now as it was, apparently, in the mid-nineteenth century.

There has also been, however, as the previous pages have shown, at least one alternative response to the political problem posed by the embryo that

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is simultaneously slime and citizen—a response that deals with growing, processing embryonic material and information in and of itself, rather than as something *potentially* quite different. This alternative response has been to reconceive thought. A number of scholars over the eighteenth, nineteenth, and twentieth centuries, again, presented their readers and audiences with a theory of life-*as*-thought, a theory very much removed from the dichotomy between vitality and intellect. This theory, once more, first, defined thought as incomplete, irrational, and ongoing rather than as absolute, rational, and aiming perpetually toward completion. Second, it located thought in the physical work and activity of developing embryonic material. The scholars advocating this alternative theory developed, in fact, a solution to the problem that embryos posed to political life as thinking life: intellectual existence and biological existence need not be in tension with one another, they posited, if intellectual existence is *coterminous* with biological existence. In this alternative set of stories, embryos were not a challenge to democratic engagement but a basis for it.

Reproduction is not identical to life, however, and the modern political emphasis on reproduction seems to make difficult any obvious resolution of the mass democratic tension between thought and vitality. Embryonic material itself may very well think, but its political value derives from the fact that it is an outcome of reproduction that, in turn, will ideally reproduce itself. Hence, the problem seems to remain: either the embryo is a potential, future, embodied citizen that can master its reproductive capacities via liberal thought (or choice) *or* the embryo is a collection of biological material, capable of flourishing but not of thinking. One can either try to find the potential discrete, thinking individual within the flourishing embryonic environment *or* one can address the embryo as undirected organic growth. The earlier dichotomy between an embryo that directed itself and an embryo that was directed—this dichotomy that dissipated when commentators eliminated "direction" from their definition of thought—in this way seems to reassert itself when the question becomes whether the embryo is an organism that can reproduce itself or an environment that is reproduced. Redefining thought, it seems, is not sufficient to resolving the democratic problem that the embryo poses.

Once more, though, the reappearance of this dichotomy between thought and life or between contemplation and biology when reproduction, in particular, is the issue at stake is not the end of intellectual variations on biopolitics. Indeed, a number of scholars responded to this iteration of the classic life-thought opposition by using the same rhetorical tools that had served them before. Thought already had been shifted from

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the potential or future brain of the embryo to the present embryonic environment. Now, reproduction, too, was redefined as an environmental process, a process of growth or accumulation rather than communication or data transfer. Removing reproduction from the potential or future *body* of the embryo, scholars, scientists, and commentators increasingly associated reproductive activity with open-ended, unbounded assemblages rather than with discrete, contained, present or future bodies. Embryos were neither the products of bodily reproduction nor future reproductive bodies themselves. Quite the contrary: embryonic environments, indistinct from wider organic and inorganic, material and informational, environments were understood to reproduce *themselves*.

And, as a result, the thinking that had already been associated with embryonic *development* became now also a function of embryonic *reproduction*. Throughout eighteenth-, nineteenth-, twentieth-, and twenty-first-century literature, in fact, there appear a series of interconnected arguments concerning the intellectual qualities of not just life, but also of reproduction. First, for example, whole-versus-part distinctions became increasingly irrelevant to discussions of embryos—embryonic individualization, especially, losing meaning as organisms broadly defined were linked to unbounded cellular or molecular fields. Second, any line between an embryonic environment and its wider physical, material, or informational environment was eliminated. Third, it was only *as* embryonic environments reproduced themselves that, like viral environments, they were understood to think, process information, and remember—thinking and reproduction thus collapsing into one another. And finally, fourth, this embryonic, environmental thought-as-reproduction became distinctly political. Just as a multifaceted story of life-as-thought emerges in these three centuries of literature on embryos, in other words, so too does an equally rich story of reproduction-as-thought.

In an extended analysis of "reproduction in general," for example, Buffon begins by comparing the "perfection" of the germ of a plant to that of the fetus of an animal—with the latter differing from the former only in its greater development or complexity.[44] From there, Buffon goes on to argue that life and liveliness are "physical properties" of *all* matter, regardless of how dispersed it is.[45] Indeed, he writes, there is in nature "an infinite number of permanent organic elements, all of them alive," whose substance is the same as that of organized beings, just as there is an infinite number of "inanimate/crude ("brute") particles that resemble inanimate/crude ("brut") bodies."[46] Even as it may take "millions of little cubes of accumulated salt to make a single grain of sea salt," for example, it also

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takes "millions of organic elements to create a single germ that might contain one polyp."[47]

As a result, just as one must "separate, break up, and dissolve a cube of sea salt to see, through crystallization, the small cubes of which it is made," one must also separate the elements of a polyp to recognize the whole.[48] Or, putting it in a different way, he writes that all living beings, no matter how complex, are composed of "active" and "living" "molecules," and that animal and plant life, especially, is nothing more nor less than the product of the interaction of these "particular," discrete, "tiny lives."[49] Before even getting to the main topic of this section of his work, "reproduction in general," that is to say, Buffon insists that his readers recognize that "life," regardless of how organized or complex it may be, is also diffuse, open-ended, and dependent on a system of *disconnected* bits of molecular "lives." Moreover, "life," especially as it relates to reproduction, is as relevant to mineral existence as it is to plant or animal existence—one cannot properly describe animal life without likewise describing plant and mineral life. Even as he repeatedly stresses "nature's" organic rather than inorganic goal, therefore, the open-ended, diffuse, yet concrete quality of "life" writ large repeatedly leads Buffon back to something that might be called *in*organic vitality. And it is this inorganic vitality that readers must keep in mind when they turn, he writes, to reproduction.

Having introduced his topic in this way, Buffon explores both its broader and its narrower implications. First, and perhaps most important to the theory of reproduction and thought that he is outlining, he argues that in nature, the "abstract" never exists—rather, everything operates in *concrete relation* to everything else. Indeed, despite an increasingly specialized taxonomic theory, a specialist cannot, he argues, even be certain that one organism or collection of inorganic particles is more "composed" than any other. On the contrary, organisms of all sorts, he argues, are the product of the relations that exist among *all* material particles. One can judge, therefore, only by appearances and by preconceived (human) ideas of what constitutes complexity or composition.[50]

Although scholars choose to draw lines among animals, plants, and minerals, Buffon continues—and although these same scholars, with reason, choose to rank organisms (and inorganic collections of particles) according to their greater or lesser adherence to an abstract model "animal," or abstract model "plant"—therefore, such division, Buffon hints, is arbitrary. Such "lines of separation" simply do not exist "in nature," he writes, even if they exist in human minds.[51] Not only is the "life" that is particularly relevant to reproduction a life that operates across organic as

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well as inorganic environments rather than being situated in specific, complex, organized, biological bodies, in other words, it is also something that can only be alien to abstract, cognitive, human thought. If there is a thought that goes along with life, this thought is relational, concrete, and systemic.

Given this interpretation of life or liveliness as less the embodied result of a distinct act—reproduction—than a set of concrete, systemic, and environmental relations or operations, Buffon posits furthermore that the *death* that is ordinarily held up as the antithesis to reproduction also eludes such simple categorizations. He writes, for example, that there are beings that are not "plant," "animal," or "mineral"—beings that "infest" what are frequently the dead or dying bodies of these same plants, animals, and minerals—and that these beings are as much alive as the body they inhabit (and, in fact, *become*) might or might not be.[52] It is, moreover, important, Buffon continues, to examine as closely as one can these "intermediate beings" of organized bodies that, without reproducing like animals and plants, nonetheless possess a type of life and movement—beings that, without being animals or plants, can enter into the "constitution" of one or the other.[53] These are beings, in short, that according to Buffon's analysis, are living *because* of death.

Moreover, if readers do examine such beings, he writes earlier on in the chapter, they will realize that reproduction or generation is nothing more than a change of form that operates via the coming together of particles—while the "destruction" of the "organized being" happens via the division of these particles.[54] And so, although the proper division that a scholar ought to make when conceiving of matter is—given the diffuse quality of "life" and the arbitrariness of abstract taxonomies—between "living matter" and "dead matter" rather than between "organized matter" and "crude/brute matter," even this division will quickly resolve itself into a *spectrum*. After all, Buffon concludes, the "principle substance" underlying the rocks, marble, sand, and dirt that one ordinarily describes as "brute/crude" is nothing less than the debris or waste of dead animals and plants.[55] And thus Buffon returns to his fundamental point with reference to reproduction: the life relevant to reproduction is always systemic and environmental, inorganic as well as organic

Once again, what is worth emphasizing in this discussion of life as concrete rather than abstract, as environmental rather than embodied, and as present equally in inorganic "dead" things and organic "lively" things is that it all operates as a framework for describing *reproduction*. The implicit point that Buffon is making is that *all* reproduction, including human

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reproduction, is embedded in life as a thinking, processing environment, accumulation, or system. A few pages before telling his readers about the "lively molecules" that make up all organisms, for example, Buffon makes clear that even the animal or human *womb* is more embedded in environmental processes than it is contained by discrete bodies. More specifically, he writes that during pregnancy, the womb does not grow simply in volume, but also in mass, and that it thus has its own "type of life" or its own "vegetation or development."[56]

The womb is therefore, to Buffon, "not simply a sack that is destined to receive semen and contain a fetus," it is "not simply an ordinary extension of the body"; rather, its development is as much a variation on generation as the development of the fetus itself, or of any other animal or plant.[57] In short, in other words, "this type of growth is a true development, an increase [*accroissement*]" that can happen "only via the intimate penetration of organic molecules that are analogous to the substance of this part."[58] Furthermore, and now with reference to the placenta, he continues that one cannot say that the placenta nourishes the animal any more than the animal nourishes the placenta—the two, rather, much like the fetus and the womb, grow and develop together, as a undifferentiated living system.[59]

Buffon's insistence that the womb (and placenta) have a life of their own is not new—and it could easily be read as a continuation of the Aristotelian theory of feminine hysteria. These passages could serve simply as an additional underpinning to what is ordinarily read as a philosophy of embodied, rational masculinity that becomes coherent against the backdrop of an unruly, not-quite embodied femininity. But given the theory of life writ large that Buffon develops prior to introducing his interpretation of the work of the womb—this theory of *all* life as a distributed, environmental, molecular, concrete, relational, and not necessarily organic accumulation or system—it is difficult to maintain such a reading.

Buffon seems, if anything, unimpressed with *all* bodies—gendered male, gendered female, animal, plant, bacterial, or mineral. Although it is true that his focus on the womb rather than on a particular, whole female body very much discounts the potential for, say, pregnant women to act as embodied, rational political beings, his theory of life also seems to eliminate this possibility for *everything else*. There is no more room for masculine embodied citizens in his interpretation of life, reproduction, and thought than there is for feminine embodied citizens. Since embodiment, writ large, is the least important aspect of life to Buffon, his focus on what sort of life the womb, mapped onto the embryo, mapped onto the lively

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molecules that infuse it, might live seems to lose this protoliberal, patriarchal corollary.

Indeed, given that the growth of the womb and the nourishment of the placenta that are more than mere growth and more than mere nourishment—that are *development* and *life*—appear alongside his theory that the womb conceives the fetus in the same way that the brain conceives an idea, it appears that Buffon's emphasis, if anything, is on the equality of all living matter. He has very little interest in describing the inability of certain female bodies to do things that other male bodies might be able to do. On the contrary, by addressing reproduction with reference, first, to the impossibility of finding discrete individuals that, in a contained way, might live, second to the spectrum from organic to inorganic, lively to dead, across which this systemic life might distribute itself, and third to organs of reproduction that, in fact, have as little to do with creating life as organs of thought have to do with creating ideas—both having everything to do with, themselves, *living* and *thinking*—Buffon seems to have radically *redefined*, outside of embodiment and subjectivity, both the biological and the political role of reproduction.

Specifically, he has suggested that reproduction is never, even among humans, the *initiation* of life but rather one of many activities or operations that shift or move living systems. Reproduction is an operation that reorganizes the elements of these systems and that reconfigures relations within these systems, but that in no way begins vitality—any more than death ends it. The reason that the womb conceives an embryo in the same way that a brain conceives an idea is that *neither* is a self-contained organ devoted to a single end or goal (reproduction or thinking). Rather, both are embedded within and diffused throughout systems that think as they live—whose thought operations are the operations of reproduction. Or, put differently, whereas before Buffon's writing developed a theory of life as a system of concrete thought, here it highlights reproduction as one operation within this system. As Buffon emphasizes, one cannot disregard the activities of the tiniest living particles—and just as the biological virus quite specifically thinks as it replicates its information, *as* it reproduces, so too does any other element or collection of elements devoted to growth or flourishing.

By the nineteenth century, variations on this theme of reproduction as thought had begun to appear in a number of venues, often in the work of scholars and commentators who, in other ways, were at methodological odds with one another. Consider, for example, historian Nick Hopwood's discussion of the nineteenth-century controversy concerning mechanical

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models of embryonic growth. Hopwood begins with a thoughtful, extended analysis of the overlap between embryology and mechanical engineering, in which scholars seeking respectability for what were seen as "crude" mechanical models, "represented," say "the nervous system as a telegraph, the eye as a photometer, and the ear as a tuning-fork interrupter with attached resonators."[60] From there, Hopwood describes the unexpected eventual success of such campaigns—noting that tools such as the microtome, as they made cutting increasingly thin slices of specimens possible, seemed to give the embryo over to mechanical representation. Such tools, he writes, were key to the "reorientation of the objects of research from living organisms in their environments to the internal topography of fixed and sectioned specimens."[61]

No longer "crude," in other words, modeling became central to the study of embryos—and for a number of decades, scientists capable of, first, observing fixed, detailed, sectioned specimens and, second, re-creating or modeling these specimens or sections of specimens, even according to engineering models, were apparently winning the argument. Despite the (to some, damaging) "loss of the capacity to visualize whole organisms," that is to say, despite the related "loss of an appreciation for how [these organisms] functioned in environments," and despite the fact that sectioning seemed to "alienat[e] [students of embryology] from life,"[62] sectioning, observing, and modeling became among the more respectable means of defining and interpreting embryonic development. By the 1960s, one anatomist, Erich Blechschmidt, had "filled a room in his institute with a collection of fifty plastic embryos, on average 1.8 m tall, and each reconstructed from thousands of serial sections."[63]

But later on in the twentieth century, Hopwood continues, accepted best practice among embryologists shifted yet again. Indeed, "Until recently," he writes, "a theory-dominated historiography conspired with experimentalist condescension toward the work of visualizing form to hide plastic reconstruction from view."[64] Even this quite recent shift, however, has been subject to challenge. As Hopwood concludes, "Developmental biologists interested in the mechanisms of embryogenesis can hardly fail to notice how much of their time is now spent inventing new and often computerized means of visualizing intricate patterns in two dimensions and, increasingly, in three."[65] There is thus, according to Hopwood, a direct link between contemporary work in developmental biology and the work of nineteenth-century embryologists whose practice of making "the form of the embryonic body tangible in the first place" helped to persuade them "of the importance of mechanical principles in its development."[66]

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This is a fascinating narrative—and a narrative that seems to rest, once again, on a tension, if a productive tension, between two incompatible modes of describing and representing reproductive life. On the one hand, there are those concerned with, apparently, the body as an implicitly unthinking machine in parts, with the developing embryo as something that can be isolated, observed, divided, fixed, immobilized, modeled, and *turned* mechanical. On the other hand, there are the opponents of this approach—those concerned both explicitly and implicitly with something called "life" and something called "the environment." These nonmechanistically inclined scholars are theorists rather than engineers. Rather than isolating, sectioning, and necessarily killing their specimens, they ask how these specimens operate, think, and live as wholes. They are concerned with embodied life and its relation to life-giving environments. Once again, it would seem that these two approaches are destined always to rise and fall in inverse relation to one another—as one is in the ascendant, the other must necessarily be in eclipse.

But are these two approaches as opposed to one another as they appear to be? Is the one really about dead, isolated, unthinking machines and the other really about live, embodied, contemplative organisms? One way to approach these questions is to return to a debate in the field of biotechnology that has appeared already in the book. Hannah Landecker, recall, critiqued the recent commodification of "biologicals" for laboratory consumption in much the same way that whole-organism-minded embryologists criticized their "engineering" counterparts. Once again, the problem with young scientists purchasing their materials rather than growing them whole, as Landecker explained it, was that these scientists became alienated from "life"—from the organism as a whole, operating within its natural environment. As Landecker put it, new scientists in the biotech industry took on in this way, and perhaps disturbingly, the perspective of the parasite or virus that they were ostensibly seeking to control. The important distinctions between body and environment, between whole and part, and—perhaps most important for the purposes of this chapter—between life as thought and life as reproduction fell apart when the purchase of biologicals became widespread.

Once again, though, this shift does not necessarily suggest an unproductive set of scientific techniques. Indeed, if one returns to Hopwood's narrative, and if one observes this story of two techniques in constant tension with one another from, precisely, the perspective of the parasite, perhaps what presents itself is not an opposition, but a mutually reinforcing story of reproductive life as thought. Perhaps, that is to say, the mechanical

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engineers were *also* environmentalists. And perhaps it is only by reading the two stories together that commentators can find the informational *as intellectual* reproductive life at the heart of nineteenth- and early twentieth-century embryology.

The move, for example, from taking specific, self-contained machines—say, tuning forks—as a model for the development of an embryonic part to stocking entire rooms with ever-thinner slices of specimens in order to describe the general operation of embryonic development resembles nothing so much as the move that happened across the same 150 years from embedding computational thought in a single, discrete mechanical operation to distributing it across a room of switches. Blechschmidt's mid-twentieth-century room-sized embryo—this embryo that is *both* distributed *and* contained—this embryo that seems so gratuitously divided and unraveled while also controlled and fixed, is the organic equivalent of a Turing machine. It is as environmental as the ostensibly natural environments within which the nonmechanistically inclined liked to place their, again, ostensibly more living, organisms, but it is also mechanical and informational. It is about the coming together of life, thought, information, and operation.

Or, put differently, *unlike* the natural environment/natural organism model, the model suggested in the room-sized embryo—as both organism and operation—does not ignore *reproduction*. By insisting on the simultaneity of machine, organism, information, and environment, on the simultaneity of parts and on the absence of a whole, the room-sized embryo model does not reduce reproduction to the mysterious, occult moment that initiates the process that one *can* understand—growth or flourishing. On the contrary, by emphasizing the constant play of information across these material systems, it keeps reproduction in motion as, once more, an operation that repeatedly shifts fields of matter and thought.

The room-sized embryo in slices, in other words, is in many ways a logical conclusion to Hément's egg—each is both mill and store, both set of instructions and source of information or vitality to replicate. But the room-sized embryo in slices is also, like its contemporary, the room-sized computer, a *combination* of machine, information, and thought. By refusing to separate embryo from environment, by turning the embryo itself *into* an environment, it holds out the possibility of a biopolitics that is intellectual as well as reproductive—a biopolitics that makes difficult, if not impossible, any argument between those who seem to work with dead things and those who seem to work with live things. Life and thought, together, operate throughout and across these environmental systems.

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Conclusion

But what about these later twentieth-century and early twenty-first-century discussions of embryonic development, life, and thought? Are they as conducive to alternative interpretations of embryonic life as a mode of incomplete, informational, open-ended, accidental, and present rather than future thought as their eighteenth-, nineteenth-, and early twentieth-century counterparts seem to have been? One place to look for an answer to these questions is, once more, in the debate concerning the relationship between mature cerebral plasticity and embryonic plasticity that Prochiantz's work reopened.[67] Indeed, Prochiantz's work, in particular, seemed to have revivified these earlier conversations about the mutability, rather than fixity, of the brain *and* embryo as thinking matter.

As Rees, observing Prochiantz's lab, has noted, for example, Prochiantz's conclusions in the late 1980s struck the neuroscience community as "simply impossible."[68] In particular, Prochiantz's observation, that homeoproteins—molecules that before had been "associated exclusively with embryogenesis"—not only appeared in the adult brain but also could cross cellular membranes within the brain, was difficult to accept.[69] Among the implications of such a description were that "embryogenetic processes" might continue "in the mature nervous system," that "new neurons could emerge or that old ones could change their form or the form of their connections," that "new synapses could grow," and that plasticity rather than fixity might be "the main feature of the [mature] brain."[70]

More broadly, Prochiantz's work implied that the apparent early twentieth-century triumph of geneticists or theorists of "mechanistic" development—those who claimed that "development is merely a mechanical, physicochemical realization of preformed traits embedded in genes"—over biologists or "experimental embryologists," who described development as "an 'undetermined' and 'open' process that cannot be reduced to any kind of deterministic preformationist concept," had been grossly overstated.[71] Rather, "Plastic reasoning," as Rees puts it, "opened up the possibility of thinking . . . the nervous system as an emergent form, a form in formation, with homeoproteins as the key to ceaseless formation processes."[72]

Even more fundamental, or fundamentally disturbing, to existing neuroscientific (and political) theory, Prochiantz's work reconceived, Rees writes, what it meant to be human. After first, linking "thought"—the characteristic that apparently differentiates humans from all other organisms—directly to the "embryological processes" that so many other

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nonhuman, and even nonanimal, things undergo, Prochiantz went on to suggest a striking corollary:

> If human evolution is due to the emergence of adult cerebral plasticity, and if this plasticity is due to the continued expression of homeotic genes in the mature nervous system, then . . . the event that makes all of us human [is] the nonautonomous transfer of homeoproteins in the adult brain.[73]

Just as Buffon, Demangeon, Duméril, Hément, DeLattre, Preyer, and Şakir had insisted upon a *unique* relationship between embryonic development and thought, contemplation, or sensitivity, in other words, so too did Prochiantz. And just as these earlier commentators thereby shattered existing theories of what it meant to exist politically, as a *human* being, so too did Prochiantz. Prochiantz's work changed what it meant to be human, and therefore what it meant to be political. For, as Rees concludes this section of his argument, "Where once fixity reigned, now plasticity rules. Where once the basic feature of the neurological human was its relative immutability, it is now its openness toward the future, its capacity for ongoing adaptation."[74] Where once the defining characteristic of human thought was its discrete, abstract, and generalizing ability to reach a fixed goal, now it was its open-ended, unbounded, incomplete, dependent, and frequently random processing.

But by emphasizing Prochiantz's assault on existing theories of what it means to be *human*, is Rees perhaps missing an additional, equally vital, implication of Prochiantz's work? After all, it does seem that Prochiantz, like his predecessors, is effectively marginalizing the brain-as-mind even as he is using it as a starting point for his analysis. By describing it not as a self-contained, fixed organ of cognition, but as a mass of living, thinking, dispersed matter, a cellular environment with strikingly permeable cellular membranes traversed by molecules that were always thought to be the sort to stay put, as an open-ended organic system that, importantly, is best mapped onto the equally open-ended *embryonic* system of anything *but* rational cognition, he, too, seems to be suggesting that thought is less the work of the brain than of a constantly operating (and indeed malfunctioning) accumulation or assemblage.

And just as this devaluing of cognition blurred or eliminated the line between what had been a purely human contemplative life and the contemplative life of other organisms, environments, or inorganic processes—between, essentially, thinking humans and thinking bacteria or thinking information processes—in the eighteenth-, nineteenth-, and early twenty-

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century embryological writing, so too, it seems, does the work of Prochiantz. Yes, that is to say, Prochiantz's research resonates beyond the field of neuroscience—there are clear political or philosophical challenges embedded in his work. But this is not so much because he and his team redefined what it meant to be *human*; on the contrary, it is because they redefined the type of thought that used to relegate politics to a purely human sphere. By demonstrating that human thought is, at best, a variation on open-ended embryonic growth, they have posited that human cognition is for the most part a sideshow in the infinitely more vital work of unbounded thought. The brain is a good place to look for this alternative mode of thinking life—but this is only because the brain, plastic as it is, maps so well onto, or seeps so well into, other, extended, systems of thought.

Indeed, the relative triviality of both the brain-as-mind *and* the human as possessor of such a mind leads, unexpectedly, perhaps, back to Aristotle, Alexander, and Simplicius. Once again, Rees frames Prochiantz's work within the two-century-old conflict between mechanistic models of thought and (or as) development and plastic models of thought and development—with Prochiantz launching a surprisingly effective set of arguments in favor of the latter. Models that draw on machines or technology suggest fixed, determined ends, he, like Henry, implies, and these models are always at odds with the contingent, iterative models that emphasize plasticity. But, just as Aristotle's conclusions regarding embryonic development can be read as a synchronization of machine or technology and chaotic processing—as computational—so too can Prochiantz's.

The concrete matter that thinks as it does work, that evolves and contemplates as it makes mistakes, that is always growing, shrinking, and changing is nothing if not mechanical—especially when remembering, as Demangeon did, the productive, even while irrational, capacity of machines to go "haywire." Granting to machines their informational, cascading, and *dysfunctional* iterative qualities, in other words, leaves mechanistic models anything but deterministic. And indeed, in this way Prochiantz's writing can be read as, itself, one further iteration of a well-established scholarly tradition that recognizes the radically inclusive character not just of life but of thought, a tradition that seeks out intellectual life not just in human brains, not just in human bodies, but in the molecules that work through cellular and informational environments, an intellectual life that emerges not just in complex organisms, but also in the cells that reproduce themselves across and beyond these organisms, and an intellectual life that appears just as clearly in the inorganic, mechanical processes that sometimes mimic or model organic processing, but that have their own, unique work to do.

More pointedly, this story of environmental, organic, and also inor-

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ganic thinking life—of life that is mechanical *and* indeterminate—is also a story of a similarly inclusive *political* life. After all, with the possible exception of Preyer, none of the scholars who contributed to this broadly sketched story of life-as-thought—this story of a biopolitics of thought that manifests itself, among other places, in embryonic development—was an enemy of Enlightenment or post-Enlightenment political engagement. None doubted the validity of some variation on modern, rational, democratic engagement. On the contrary, it was the blending of modern political or biopolitical mores and modern research into the simultaneity of life and thought that granted to their interventions—deliberate or not—its political and democratic punch.

It is *because* Şakir was so deeply invested in the positivist state-building initiated by the Young Turks that his oddly evocative conflation of what sounds quite a lot like Darwin's heath[75] and the anencephalic newborn's brain resonates. His point is that there is room even in this most rational and objective—sometimes troublingly so—of political structures for open-ended, contingent models of life and thought. Similarly, it is *because* Hément also served as inspector general of French public instruction that his description of the brain as a collection of operating, developing *stuff*—stuff that may or may not come together as a complete organ—carried with it its political implications. Schools molded children into rational, self-conscious, disciplined individual citizens—into discrete political subjects. But political belonging, it seemed, need not necessarily rely on individualization *or* subjectivity. The environmental matter that never quite came together into a whole was also thinking, also intellectual, and also, if implicitly, participating in French democracy.

The embryo, therefore, yes, did pose a seemingly insurmountable challenge to political theories of life—and thinking life—in a variety of historical and geographical contexts. But the easy response to this challenge—describing the embryo as pure potential, as potential life, potential thought, and potential embodied, rational citizen with rights—was by no means the only response that appeared over the millennia. Alongside stories that relegated the embryo to the role of problem or prologue to proper human political engagement appeared equally insistent, and frequently more haunting, stories of the embryo in the, or its, *present* rather than future—of the embryo *as* embryo, never quite complete, never quite whole, but always working, developing, and thinking. Taken together, these stories not only contributed an important counterpoint to the more vocal narrative of embodied political subjectivity, but also rescued reflection, meditation, memory, sensitivity, and a sense of the present from the trash heap of political or biopolitical history.

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Or, as Rees's reading of Prochiantz implies, there is a *virtue* to approaching the embryo as a model rather than as something to be modeled. There is an ethical as well as a scientific value in asking *not* how or whether embryonic material might think, but how or whether thinking can be embryonic—in locating embryogenesis quite *specifically* in what had been the fixed and, to biopolitical theory, *already* largely irrelevant, organ of cognition. It was only by taking the embryo as a model for thought that scientists such as Prochiantz were able to reconfigure not just neuroscientific research paradigms, but also democratic theory. And it has only been by mapping the brain onto the developing embryo that scholars over the past three centuries—if not the past two millennia—have been able to explore the muted but vitally important affirmative qualities of the politics of life. It is only by conflating thought and development that scholars have been able to demonstrate that matter and information can be intellectual as well as reproductive—and that reproducing matter *is* thinking matter.

Although historical scholarship on embryology and fetal development is only one place, of many, to begin a history of this alternative mass democracy—this history of life as thought, but not necessarily as organic thought—it is also, at least in some ways, a uniquely valuable field in which to undertake such an endeavor. The egg, the embryo, and the fetus have—more than many other material and informational formulations—traditionally posed radical challenges to what are otherwise intuitively acceptable definitions of both political life and political thought. Embryos are a difficulty for democratic theorists. But starting with embryonic material makes sense *because* it is uncomfortable—because it unsettles.

This does not mean, of course, that conventional, human-centered political theory has not risen to the challenge posed by the embryo. Over the centuries a number of responses to embryonic uncertainty have been floated. Once again, though, ordinarily, the responses to these challenges—responses that remain remarkably consistent throughout the classical, early modern, and modern periods—have addressed the political threats posed by embryonic life by highlighting embryonic *potential*. By always situating the embryo in the future, by always assuming a single, reproductive moment in the past, and by always ignoring the messy present, these responses have managed to fit the embryo nicely into stories of life *either* as thought *or* as organic flourishing. Conventional political theory can thus argue *either* that life is potential rationality *or* that life is potential reproduction, and, depending on its ideological commitment, it can invest embryonic material with such life or not.

As this chapter has demonstrated, however, this move, influential as it

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has been, is not the only move characteristic of modern work on life and embryos. Embedded within the varied, and sometimes deliberately antagonistic, eighteenth-, nineteenth-, twentieth-, and twenty-first-century texts that make up the scientific and political narrative of the embryo is also a well-articulated alternative to this future-oriented approach. Within this literature are repeated reconceptions of what embryonic thought—and thus embryonic life—entails. Evacuating rationality—the search for defined goals, abstraction, and completeness—from their definitions of thought, students of embryology, relying on a variety of methods, instead favored a definition of thought that invoked the incomplete, the irrational, the operational, and the endless. By reconceiving thought in this way, these researchers began to situate thinking life in an ongoing set of unbounded environmental operations, rather than in a discrete and finite, if always potential, body. The apparent dichotomy between biological life and thinking life—this dichotomy that ostensibly could be resolved only in the future—in this way evaporated.

Moreover, having reconceived life and thought in this way, a path was cleared not only for a new theory of political existence as thinking existence, but for a theory of reproductive activity as a thought operation. With the virus, bacterium, or slime as an implicit if not explicit model, with embryonic life *as* environmental life, reproduction ceased to be a single, initiating act, and instead became an ongoing set of systemic operations. Once rationality had ceased to be the key quality of thought, once thought became embedded, material, and contingent, describing organic operations like reproduction *as* thought operations—conflating information transfer with material growth—became not only possible, but necessary. Or, put differently, addressing reproduction as an infinite computational function became, in every sense of the word, natural. Historical work in the field of embryology has thus, perhaps unexpectedly, set up a solid foundation for the flourishing of both life *and* thought in the contemporary democratic public sphere.

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4 • Clones

The eighteenth-, nineteenth-, and early twentieth-century physicians and natural philosophers who populated the previous chapter did not have to deal with the legal and policy implications of humans—or those defined as humans—in *fact* reproducing (or replicating) themselves in nonhuman ways. As much as they insisted that human life, reproduction, and thought were far from unique—and that human life, reproduction, and thought adhered to unbounded, environmental, systemic norms just as all other life, reproduction, and thought did—these writers for the most part remained theorists. Or, at the very least, they remained observers. It is true, for example, that they dealt ably with the political problem of the *embryo* as both slime and potential person. But they did not explore the implications of fully formed, adult humans becoming, likewise, both slime and person.

When human cloning, however—that is, the ability of adult humans to grow and replicate themselves, rather than reproducing themselves—became not only a theoretical, but a practical, possibility, this problem exploded with a vengeance. Clones raised the specter of, specifically, a politics of unbounded thought and unbounded life—a politics of thinking, rational bodies as, simultaneously, mold. Remember, slime mold—despite its plucky ability to emulate human behavior—cannot quite participate in classic, human-centered liberal democratic governance. As much as, say, Bruno Latour's democracy of things or politics of nature is as open to slime as it is open to any other actant,[1] the type of democracy that claims the right to life—and, moreover, thinking life—as its prerogative is also a type of democracy that excludes the *stuff* of which slime is made. There is simply no liberal democratic work that slime mold, bacteria, or viruses—organic or not—can do. There is no place for unbounded, growing, replicating, creeping things and information in a rights-based liberal democratic political structure.

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This claim seems self-evident. Indeed, given a classic, narrow definition of democracy as rights-based liberal democracy, it is difficult to imagine any figures aside from humans and the things that might become honorary humans participating. Moreover, the reasons for excluding the nonhuman from this mode of democracy are manifold. Lacking bodies that might achieve integrity, lacking speech that might achieve rationality, lacking life that might be differentiated from the vitality surrounding them, these nonhuman elements cannot be described or captured in the language of rights that underpins liberal democratic engagement. Again, their inability to become political—or, for that matter, biopolitical—seems intuitively obvious.

Even more obvious is the absurdity of organic nonhuman things like slime, as well as inorganic nonhuman things like algorithms or digital viruses, *reproducing* in a properly political or democratic manner. Indeed, such elements do *not* reproduce; instead, once again, they replicate and clone themselves. Or, if they do not specifically "clone" via the transfer of somatic nuclear material into an enucleated egg cell, they do fail to respect human or classically mammalian boundaries in their reproductive behavior. It is, as the previous chapters have demonstrated, difficult if not impossible to distinguish the reproductive activity of slime and viruses from their thinking and apparently nonreproductive flourishing. It is impossible to distinguish the behaviors that cannot be political from the behaviors that rights-based liberal democracy values and protects.

But, as the previous chapters have *also* demonstrated, it is sometimes, if disconcertingly so, equally difficult to distinguish the reproductive activity of humans or mammals, especially in their embryonic mode, from the thought and growth of these humans and mammals. Can one really argue, therefore, that it is, in particular, their method of reproduction that disqualifies slime mold, algorithms, and bacteria from the realm of democratic politics? Is it in fact the case that reproduction, in and of itself, is the behavior that places an accumulation of matter or information within or outside of democratic governance?

The answer to this last question is complicated. Initially, when considering the legal and political rhetoric surrounding cloning in particular, it seems quite clearly to be yes. Cloning is an assault on human integrity and dignity and thus a deal breaker in classic, rights-based social contract theory. The mainstream political rhetoric surrounding cloning, especially human cloning, and especially since the 1997 cloning of Dolly the sheep, is frequently panic-stricken in its attempts to demonstrate that reproductive behavior of this sort eradicates dignity—and thus any potential par-

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ticipation in democratic politics. Cloning, an unacceptable reproductive behavior, makes democratic citizenship *impossible* in a way that very little else does. Hence slime, algorithms, and bacteria must be disqualified from democratic engagement.

And yet, once again, consider the remarkable fluidity, or the historically blurred boundaries, among life, reproduction, and thought, that have appeared thus far in this book—and consider also the refusal of so many physicians and scientists to distinguish between inorganic and organic replication and contemplation. Working within such a literary, scientific, and historical context, one might begin to posit a different answer to the question above. It might be the case, indeed, that cloning is not only *possible* in a democratic context, but a radically democratic act—a hyperbolic example of reproduction-as-thought, of the replication of living informational environments, and of the affirmative story of contemplative biopolitics that appears so persistently, if quietly, in eighteenth-, nineteenth-, twentieth-, and twenty-first-century natural historical study. If anything, the clone, when addressed from the perspective of this more muted political and scientific history, is a healthy variation on the sort of life that modern democracy claims to support—provided, however, always, that one accepts, rather than rejects, the integration of reproductive life, on the one hand, and intellectual life on the other.

Moreover, resituating cloning in this alternative historical context also sets a foundation for rereading much of the *contemporary* legal and political writing that has defined cloning as one of the most insidious threats to today's democracy. Dignity may very well be the touchstone of this recent work. But the nature of this dignity has been linked, in turn, to a set of assumptions about how life, reproduction, and thought operate that are open to criticism and that seem to stray even from classic articulations of democratic engagement. In particular, this rhetoric of dignity demands the separation of a citizen's reproductive activity from that citizen's thought or intellectual activity with no room for reconsideration. Indeed, one might even interpret the legal and political fear of clones that appears in so much of this writing as, narrowly, a fear not of crumbling democracies but of, very specifically, the *coming together* of thought and reproduction—a fear of life, specifically, as *thought*.

What might happen, however, if dignity ceases to be an unquestioned good—the cornerstone of democratic engagement? The rest of this chapter addresses this question from the perspective of mass democratic life and thought. In order to do so, it mobilizes the same rhetorical strategies that characterized the previous chapter—drawing on a seemingly unsettling or

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disturbing variation on life, reproduction, or thought, on a *threat* posed by life, reproduction, or thought, in order to demonstrate the functionality and potential of a democratic politics of unbounded life alongside unbounded thought. The argument underlying the histories of this threat is that human dignity exists as a political artifact specifically to police the boundary between reproduction, on the one hand, and growth and thought on the other. It exists, rhetorically, legally, and politically, to disallow any variation on reproduction that is not a form of discrete, linear, bounded, finite information transfer between bodies.

As a corollary, however, these histories also suggest that such policing is doomed to failure—and that a healthy democracy of unbounded life, unbounded thought, *and* unbounded reproduction already exists. Indeed, it is precisely the coming together of reproduction, information processing, and growth as a single, integrated activity that helps this democracy to flourish. Or, put differently, the second part of the chapter reconceives what clones are doing in democracy. Like the boundless activities of embryos, slime, bacteria, and viruses, the very malleability of clones, their very lack of something called dignity, may become the thing that shores up contemporary democratic engagement.

A Quick Definition of Cloning as Thought

Prior to 1997, and prior to the mid-twentieth-century work on mammalian cloning more broadly defined, a number of scholars and researchers had already begun to question models of reproduction that emphasized the implicitly rational, intellectual activity of genes on the implicitly inert matter or environment that was the egg.[2] Although this research sometimes led to attempts at what is now called somatic cell nuclear transfer (i.e., cloning), just as frequently it did not. This early work on reproduction that was irrational but not unthinking—that was environmental but not inoperative—is, nonetheless, a good jumping-off point for a discussion of cloning, more specifically, today. This earlier writing, indeed, gets directly at the coming together of thought and life that occurs in a variety of alternative methods of reproduction, at the lack of any division between organic and inorganic existence within such alternative reproductive environments, and thus at the potential redefinition of reproduction as an unbounded thought *operation*—rather than as an initiating act in a rational progression toward purely human political participation—that lurks in the behavior of clones.

Two *New York Times* articles from the 1930s, for example, describe the

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implications of challenges (even if eventually discredited ones) to traditional accounts of conventional sexual reproduction. The first, from 1937, addresses the research of Ethel Harvey on enucleated sea urchin eggs. Harvey, the article states, had demonstrated via the stimulation of "egg fragments lacking both maternal and paternal chromosomes" that "the early stages of development can . . . take place without chromosomes."[3] Implicit in her work on the embryos that have grown in this way, and that may even be "free-swimming," the article continues, is the fact that "maternal cytoplasm . . . has within itself the potentialities of determining at least the early stages of development"—and thus that "only the more specific and differential characteristics are controlled by the genes, whereas the general and fundamental characteristics of living matter are cytoplasmic."[4]

A second article, from 1939, describes the work of what geneticists at the turn of the nineteenth century dubbed "organizer cells." Here Ross G. Harrison is credited with being able "to determine that stage at which an embryo change[s] from a mere mass of living protoplasms into an organized structure of various cell types which develop[s] into an individual."[5] This determination, the article contends, rests on what Harrison calls "organizer cells," cells that travel in a mysterious way throughout the embryo, and which provide the "organizing stimulus" to this preexisting mass of "living protoplasms." Indeed, when Harrison cuts "the 'organizer cells' out of the embryo," the embryo "continues to grow by cell divisions, but it forms no differentiated cells with which to make the bodily organs."[6] In short, the *New York Times* reports, Harrison has discovered the mechanism that turns living matter from something that grows and flourishes in an undifferentiated way into something that *develops*, that operates as an organized system—and this mechanism is the circulating, traveling "organizer cell."

The point of bringing these two articles to the forefront of our discussion is not to claim that they are accurate. Moreover, they seem in many ways to be at odds with one another. The first emphasizes the capabilities of "cytoplasm"—capabilities manifested in the embryo's ability to grow, move, and swim "freely" without any chromosomal contribution. The second emphasizes the "organizing" work of a particular set of driven, traveling cells. "Protoplasm" may be living in this second scenario, but it is living in a *relevant* way only after a collection of effectively goal-driven cells have organized it, forced it into differentiation. The first article privileges life as environmental growth, and the second privileges life as systemic intellectual operation.

At the same time, however, both articles also, in a series of *complemen-*

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tary moves, suggest the insufficiency of any theory of reproduction that privileges individualization alone—of any theory that links the production of self-contained, organic individuals directly to the work of genetic code. In both, for example, the narrative, at least that provided by the *New York Times*, is a narrative of *relations*. It is a story of interaction between the "fundamental" characteristics of life, which are "cytoplasmic" or "protoplasmic," and the "differentiated" characteristics of life, which are chromosomal or genetic. Moreover, by suggesting this set of relations—analogous, essentially, to the set of relations between, say, machine code and programming language[7]—these researchers and those reporting on them are proposing a scenario in which neither the supposed environment nor the supposed code is purely inert *or* purely active. Rather, once again, there are two *types* of code in this story—two types of code that operate alongside of, and thereby reconfigure, one another. There is the flourishing cytoplasmic or protoplasmic code and there is the organizing chromosomal code. There is the systemic environment and the environmental system.

Or, put differently, the environment and the system, as they are described by Harvey and Ross, activate each other. Environment and system continually interact, and in the process, environment and system produce and *reproduce* one another. Both articles in this way hint that reproduction continues to occur *throughout* life. The idea that reproduction merely begins life, after which a preexisting code goes into effect to organize a reproductive product—the self-contained, potentially rational, embodied organism—is far removed from the work of Harvey *and* Ross. On the contrary, again, at least as presented in the *New York Times*, both researchers have reconfigured reproduction into a set of processes that continue as long as living systems grow, flourish, and operate. Reproduction here is an ongoing set of symbolic operations that shift living systems or environments. It is not an act that initiates the growth of a specific, potential individual.

Once more, neither of these theories would likely be taken up by contemporary researchers in biology or biotechnology. And, more pointedly, both are dead ends when it comes to contemporary work in somatic cell nuclear transfer. At the same time, however, the work of both, especially as it is encapsulated in the *New York Times*, begins to raise some of the biological, political, and biopolitical problems inherent in cloning. After all, what does cloning do? Like Harvey's enucleated sea urchin cells and Ross's travelling organizer cells, it makes an apparent mockery of individualization. *But*—and this point is key—it engages in this mockery *not* by potentially creating a series of identical living beings. As countless commentators

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have noted, clones are not replicas of one another or of their parent—any more than "identical" twins are actually identical.[8]

On the contrary, the reason that cloning mocks individualization, the reason that it poses the biological and political threats that it does, is that it obliterates conventional interpretations of reproduction itself. Cloning is a threat, in other words, not to the unique existence of specific, individual *products* of reproduction; it is a threat to the unique existence of specific, individual *acts* of reproduction. Cloning eradicates individualization by demonstrating, as Harvey and Ross did, that reproduction continues, as a process, throughout life, and that reproduction can thus easily be reconceived as a set of thought operations that occur across living environments. Reproduction, cloning forces its observers to recognize, is not a single moment, not an act that initiates the growth of a specific "person"; it is instead evidence of the thought that undifferentiated environmental matter can produce. The product, or by-product, of reproduction—the person—is irrelevant to the problem.

Turning, for example, first to a brief history of the problem that the celebration of individualization has *always* posed to responsible biological or political work, and second to a representative twenty-first-century legal-scientific document on cloning, leads one to conclude that, indeed, cloning has always suggested not the threat of identical reproductive products, but of reproduction as, itself, an ongoing thought process. In their thoughtful discussion of what they call the "ongoing narrative of parts and wholes," for example, Lynn K. Nyhart and Scott Lidgard argue that, especially in the decades prior to the 1859 publication of *Origin of Species*, "the problem of the individual" became "a major component of the debate between reductionist physiologists and more teleologically inclined morphologists over the relations between parts and wholes in the organic world."[9] Via a close reading of Rudolf Leuckart's *Polymorphismus der Individuen*—which, they state, "was one of those relatively rare cases where individuality itself was drawn out as *the* problem"[10]—they find a fascinating alternative story of what constitutes an "individual" and thus what might threaten individualization in biology. In particular, biological individuality—defined as "the making of a singular living being that could be considered a distinct 'whole' based on its morphology, its physiology, and the continuity and integration of its parts"—operated in tension with classical interpretations of the "individual as an imperfect embodiment of an idealized 'kind' or 'type.'"[11]

As a result, they continue, although "the problem of part-whole relations in defining the biological individual was hardly new" in the nine-

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teenth century,[12] the relationship between modes of *reproduction* and this individualization took on particular salience in that period. "New attention to alternation of generations, parthenogenesis, and hermaphroditic reproduction in the decades around the mid-century," they write, "called into question the hegemony of sexual reproduction."[13] And Leuckart, in particular, understood reproduction in all of its variations to be one of many "simple functional needs, alongside locomotion, nutrition, and others."[14] Or, as Nyhart and Lidgard conclude this section,

> In Leuckart's presentation, both sexual and asexual generation were tasks best handled within the colony by special individuals, just as feeding and locomotion were . . . [G]eneration was just another functional task required for the maintenance and perpetuation of life, neither mysterious nor special, as [other scientists] seemed to want to make it.[15]

An initial tension between classical (or political) interpretations of individuality as uniqueness and biological interpretations of individuality as wholeness thus gave way to an argument over the relationship between types of reproduction and types of individuality (or wholeness). Those who continued to focus on the whole individual also privileged sexual reproduction as, first, an initiating act that, second, ended in the creation of more individuals.

Those, however, who questioned the usefulness of wholeness or individuality as frameworks of inquiry likewise questioned the primacy of sexual reproduction as a single, individual, complete act. Leuckart, for example, situated varied types of sexual and asexual reproduction *on a continuum* with other "functional needs." Reproduction, generation, feeding, locomotion, and other physical activities overlapped with one another. All were required, in an undifferentiated way, for the "maintenance and perpetuation," rather than *initiation*, of life. All were part of a broader series of operations, and reproduction thereby ceased to be the mysterious act that produced individuals—and potential political subjects.

Here, then, is an alternative history of reproduction that associates reproductive activity—via cloning or otherwise—not with the creation of particular individuals, but with ongoing, systemic, organic processes. Here, in other words, there is a jumping-off point for rethinking the ethical and political implications of variations on reproduction—cloning especially—that seem to pose a problem to politics. Indeed, despite the repeated return in the policy literature to the self-evident, historical quality

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of the threat that human clones pose—this threat to classical notions of the discrete, self-conscious, inviolate, and thus dignified political individual—one can see in work such as Leuckart's evidence that this threat is perhaps quite different from what it appears to be.

Moreover, embedding an analysis of human cloning in this alternative historical and scientific literature suggests that the problem that clones raise is less self-evident than contingent, less political than biopolitical—and less biopolitical in the organic sense of the term than in the informational sense. Clones seem to be a threat, that is to say, at least if one takes this literature seriously, because they question the unquestionable association between the reproductive act, on the one hand, and the production of an individual on the other. They make clear not only that reproduction *can* be a thought process whose environmental character is more important than its initiating character, but that reproduction is, perhaps, *rightly* such a thought process, and in fact a politically relevant thought process in its own right, divorced from its apparently discrete product. Clones invite their observers—and this is where their ostensible threat lies—to consider the possibility that if reproduction is a mode of political thought, then asexual reproduction, somatic cell nuclear transfer, is perhaps an ideal variation on political contemplation.

When turning to more recent variations on the work of early twentieth-century scientists such as Harvey and Ross, indeed, one finds an extraordinarily convoluted understanding of the ostensibly self-evident good of embodied individualization. In a report issued by the UK Human Fertilisation and Embryology Authority (HFEA) in October 2007, for example, the question of what might constitute appropriate variations on cloning is repeatedly linked to human betterment—that is, how and whether cloning might serve embodied human subjects. But even as the report appears to engage in a conventional cost-benefit analysis—seeking to identify the point at which human genetic material acquires dignity and thus the point at which this material cannot be instrumentalized for the good of others—it dismantles this traditional framing device. Indeed, the question driving it becomes not when individualization happens, not when individualization gives rise to a potential embodied subject, but whether individualization is even relevant to reproductive activities like cloning. Like Harvey, Ross, and Leuckart, that is to say, the HFEA report brackets any extended discussion of the *product* of reproduction and begins to focus instead on the implications of reproduction as a political process and as a thought process.

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More specifically, again, the report *introduces* cloning with reference to the embodied human political subject—and its touchstone is the potential therapeutic uses of cloned cells (i.e., embryonic stem cells). Somatic cell nuclear transfer, in particular, the report states, "holds the key to potentially significant advances in medicine," and the cells that derive from it could be "used as a source of patient specific cells to replace damaged tissue (the concept known as therapeutic cloning)."[16] By framing its recommendations in a language of therapy, medical knowledge, and the good of the patient, the report, once more, is drawing on a classically liberal democratic rhetoric. A certain technological innovation—cloning—will benefit both the rational, goal-oriented search for knowledge undertaken by the human brain *and* the shoring up of bodily borders of ill and vulnerable subject-citizens. If there are costs involved in the process, these costs would need to undermine rational thought and bodily integrity *more* than cloning supports them in order to tip the balance away from the procedure. Otherwise, cloning could become licit in a liberal democratic context.

When the report turns to these potential costs of cloning, however—and when it begins to address and mitigate these costs—the simple rhetoric of goal-oriented human cognition and discrete human bodies begins to unravel. The problem ceases to be *what* cloning produces or reproduces—a therapeutic tool or a potential person with dignity—and instead becomes the quality of cloning itself as a reproductive and political process. Moreover, this human-centered rhetoric of reproduction as an initiating act that can result only in a person or a tool starts to fall apart, *specifically*, when the report tries to define what is and is not "human" as cloning occurs. In a move that evokes both Ross's and Harvey's discussion of "cytoplasm," and Leuckart's fascination with reproduction as an unbounded systemic operation, the report makes a case study of so-called hybrid embryos, asking "whether embryos containing human nuclear DNA and both human and animal mitochondrial DNA would be a human embryo," and what the therapeutic and political potential of such hybrids would be.[17] The report concludes, drawing on the opinion of the Scientific and Clinical Advances Group (SCAG), that "these hybrids should be classed as human."[18]

In order to bolster this conclusion, the report draws on both historical precedent and biological convention. Historically, it states, "the use of interspecies nuclear transfer" has been a means of investigating "the roles of the nucleus and cytoplasm" or "the interactions between nuclear and mitochondrial genomes."[19] In general, this historical work has suggested the governing role of nucleus over "cytoplasm" or mitochondria—and thus the humanity of anything growing from human nuclear DNA. More

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recently, the report continues, biologists have noted that hybrid embryos with human nuclear DNA "will gradually become more human derived. By 14 days the embryo will be entirely human with respect to protein and RNA apart from 13 proteins encoded by the animal mitochondria."[20] One possible reason for this shift from hybrid toward human, the report speculates, is that "the human nucleus" may "preferentially replicat[e] the human mitochondria present."[21]

Like Ross, HFEA thus seems to be telling a story of a governing, nearly cognitive nucleus—a sort of protobrain—working on the inert environmental matter represented by cytoplasm and mitochondria. The nucleus makes rational-seeming decisions, and regardless of where you put it, the nucleus is the all-important determiner of human *identity*. The nucleus-brain preferentially replicates human mitochondria and not nonhuman mitochondria, and it thereby makes the embryo human. The nucleus metaphorically envisions an end point to embryonic growth, and it directs the environment it inhabits toward this endpoint. The environment surrounding the nucleus may be capable of growth—it may even be indispensable to the nucleus' project—but it can never decide on identity.

But also like Ross—and here echoing Harvey and Leuckart as well—even while creating this apparent distinction between nucleus and bounded cellular environment, HFEA simultaneously undercuts, or even obliterates, the actual importance of identity to any effective interpretation of reproductive life writ large. After all, the only way to make a pronouncement on whether a nucleus is *functionally* human is to watch it as it works—to evaluate its interactions within, and as part of, the cellular environment. There is, in other words, no initiating moment of reproduction in this story—no moment at which the thing that will be human is set, inevitably, into motion. Rather the work that the nucleus ostensibly does, *as* it develops, *is* reproduction. The supposed identity that is embedded in the nucleus only becomes an identity via the *process* of shifting the cytoplasm or mitochondria, via an ongoing *process* of reproduction, and via the movement and repeated rearticulation of an environment that may or may not contain some elements of the not-human, waiting to be replaced or rearticulated.

This work, therefore—seemingly so cognitive and goal-oriented—that signals to HFEA the embryo's identity is actually an unending operation of a series of switches. It is a process in binary (human vs. not-human) that fails to complete, that can never reach an end point at which *all* of the cellular material can be deemed "human," and that is thus by definition always subject to glitches, to eternal processing. Once again, there is never

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a point in this scenario at which *all* of the system has reached some purely human end, at which reproduction gives over to development. The switches are binary—but the environment itself can never be. So, in short, this apparent story of a single, reproductive moment at which a brain-like human nucleus determines the identity of an inert, nonhuman environment—and that thus produces a potential human, with a therapeutic *and* political human identity—becomes in fact a story of the *impossibility* of forming any politically relevant human or not-human identity via reproduction.

One cannot identify the embryo as human or not-human until its cytoplasmic or mitochondrial environment begins to shift toward one condition and away from the other. One cannot say that *human* reproduction has happened until the environmental, rather than cognitive, operation has completed. But this operation never can *be* complete because there will always be nonhuman elements of the cellular system waiting to be activated or deactivated—switched on or off. HFEA's attempt to naturalize cloning as a type of reproduction relevant to human-centered liberal democratic norms thus veers into a decidedly bacterial arena.

Cloning is indeed exposed through this logic to be one further, if extreme, example of reproduction as process rather than act—to be a series of operations that *detach* thought from embodied identity even while they highlight the relentlessly material, political, and intellectual quality of a reproductive environment. The reproducing and reproductive material that engages in cloning may or may not be human—and, for that matter, it may or may not be alive[22]—but its identity as organism, or organic, is, it turns out, not actually all that relevant. Relevant instead is cloning's potential to return thought to contemporary democratic engagement.

Or, put differently, just as Ross, Harvey, and Leuckart—albeit in different ways and for different reasons—suggested that individualization and identity may not be what is at stake in reproductive activity, so too does the HFEA report. Moreover, just as all three challenged any definition of reproduction as a single, discrete act that produces a single discrete organism, so too does the HFEA report. All of these documents are replete with evidence that cloning is of particular political importance *because* it undermines differentiation—and thus eradicates dignity. Cloning, as an attack on discrete, initiating acts of biological reproduction, invites its observers to consider the possibility that, once again, reproduction is a variation on open-ended, environmental, material information processing, a type of *thought*, and that it is thereby central to quite *classical* democratic theory. In this way, it is politically indispensable.

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The Threat

Surprisingly, perhaps, the work that attacks rather than naturalizes cloning plays on these themes with even greater enthusiasm than its more neutral counterpart. Indeed, although an initial reading of this anticloning work suggests that it is deeply embedded in a conventional rhetoric of embodied, human, democratic subjects under constant attack from nondemocratic entities that might unethically support cloning—unscrupulous corporations or technology-obsessed scientists, among others—spending time with it allows for a more nuanced reading. While it is without question true, for example, that one of the key questions at stake in cloning remains the potential assault this mode of reproduction launches against rationality, psychology, and hence dignity, it also becomes clear—even as these alternative reproductive behaviors are denounced—that cloning likewise makes possible an alternatively productive interpretation of democratic engagement. Moreover, it is uncertain whether the anticloning writing itself is completely satisfied with taking the discrete, thinking, embodied organism as the most relevant being in discussions of reproduction. There are ongoing hints within it of a quite other, and once again unbounded, interpretation of both biological and political life.

Yes, that is to say, the work that condemns cloning makes clear that redefining reproduction as an environmental process—as a set of operations that continue throughout life, rather than as a platform for the growth of a specific person—undercuts conventional interpretations of democratic rights and dignity. But this work also poses, perhaps unintentionally, a key question concerning the value of dignity as a democratic concept. It drives its readers to wonder whether the loss of bodies and psychology, and hence dignity, is in fact a loss. When reading the anticloning literature that appeared after 1997 especially, it becomes difficult to avoid the conclusion that the fear of clones is, very specifically, a fear of undignified reproductive activities that are *more democratic* than dignified reproductive acts. The fear of cloning in legal and policy literature, in short, seems in many ways to be a fear of thoughtful—if irrational—political life.

Before turning to this policy literature, though, it would be useful to address some of the more scholarly challenges to cloning that have emerged alongside of it. A number of feminist theorists, for example, have charted a middle way between, on the one hand, accepting the conventional bioethical policy that defines human cloning as an assault on dignity and, on the other, embracing cloning as, effectively, an ecofemi-

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nist form of protest (or for that matter, as a form of radical democratic engagement). Scholars such as Victoria Davion and Luciana Parisi, to name two, have been rightly suspicious of the language of embodied subjectivity that appears in anticloning legislation and policy literature. But they have also identified other aspects of cloning that make it, nonetheless, still a politically and ethically damaging process. Exploring how scholars such as Davion and Parisi have criticized existing literature on cloning, how they have reconsidered the implications of cloning, and how they have—once more, *against* the claims of this chapter—found cloning to be a politically and ethically questionable mode of reproductive behavior would be an efficient entryway into the more policy-oriented literature that is the subject of this chapter.

In her article "Coming Down to Earth on Cloning," therefore, Davion locates her analysis of cloning within a criticism of the rhetoric that defines cloning as a unique—and uniquely dangerous—activity. Davion argues in particular that differentiating cloning from other types of reproduction—and condemning it, in turn, as *exceptionally* "unnatural"—is ethically suspect for two reasons. The first is that it reinforces a homophobic trend in much of the conversation and legislation surrounding reproduction broadly defined. The only difference between cloning and other reproductive technologies, Davion points out, is that "all other technologies involve the use of sperm and eggs, but cloning does not require sperm at all. Hence, it is not sexual in that it does not require biological material from two people of opposite sexes. Even more startling, one woman can provide all of the biological materials necessary to produce a child."[23] If cloning is uniquely unnatural, therefore, it is implicitly so only because commentators and legislators assume that natural procreation must involve both a sperm and an egg—"this 'repugnance'" to cloning thereby "goes beyond the idea that both a man and a woman should be involved in raising a child to the idea that the creation of a child must involve both a man and a woman."[24]

The rhetoric of human dignity that surrounds the legislation on cloning, Davion continues, in this way reinscribes the notion that "there is something defective about people who are not heterosexual."[25] Indeed, the logical conclusion to such argumentation, she writes, is that the "human body" not only must engage in heterosexual behaviors, but it "must inscribe and represent heterosexuality."[26] Or, put differently, only the idea "that every 'real' human being must inscribe heterosexuality" could lead to the frequent expression in anticloning legislation "that clones might not be fully human."[27]

That the debate about cloning is actually a debate about appropriate

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(heterosexual) versus inappropriate (homosexual) reproductive behavior, rather than about the life of a reproduced product (the human "person" with or without dignity), becomes even more apparent in some of the policy conclusions that have arisen from it. As Davion remarks,

> The idea that clones would lack individuality is highly problematic, as twins or "natural clones" are thought to be individuals with human dignity and moral agency. So, once again, we return to the question of how the term "natural" is used prescriptively in ways that threaten to discriminate against people.[28]

For example, when U.S. senator Orrin Hatch condemns abortion as a crime against human life but supports therapeutic cloning, Davion argues, his reasoning has little to do with the preservation of human life—rather it has to do with how reproduction might or might not be human. For Hatch, if an egg is not fertilized with sperm and implanted in a woman's womb, the *procedure* is unnatural, and *hence* the product is not human.[29] As a result, aborted embryos are, to Hatch, dead babies, whereas cloned embryos are biological material.

In short, therefore, the assumptions driving traditional arguments against cloning—first, that cloning is radically different from other types of reproduction and, second (as a result), that human clones themselves lack dignity and thus complete humanity—are, according to Davion, deeply flawed. They play up the extent to which the rhetoric of cloning is about appropriate sexuality wed to appropriate reproduction rather than about the protection of human life. And as a result, as Davion concludes this part of her argument, conventional anticloning rhetoric is inherently discriminatory.

But the next part of Davion's essay charts an alternative set of ethical challenges to cloning. Indeed, the second reason that Davion criticizes the rhetoric of cloning as a *unique*, radically different type of reproductive activity is that this rhetoric obscures a more troubling threat that cloning might pose—namely the threat of reifying existing socioeconomic, identity-based hierarchies. It is *because* cloning is so normal, she claims, that it is unethical. Or, as she writes more explicitly,

> In suggesting a ban on research into human cloning, the National Advisory Board warned that the ban should not interfere with research in other reproductive technologies. Cloning was clearly set apart, seen as radically different. My conclusion is that this is exactly wrong. To understand the

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> ethics of human cloning we need to see it as similar in many ways to other technologies that allow wealthy white heterosexual people to reproduce themselves.[30]

Davion's concern, in other words, remains a classic democratic concern. She worries that cloning stands in the way of identity-based structures of equality, and she suggests that—because it would be potentially available, like other reproductive technologies, only to wealthy, white, heterosexual people—it assaults the dignity of embodied human political subjects. The conventional rhetoric surrounding cloning is without question discriminatory—exposing the concern of legislators to be reproductive *behavior* rather than "life," or the products of reproduction. But so too is cloning itself. Each reinforces the barriers between oppressed *human* democratic subjects and their ability to engage in human-centered democratic politics.

Parisi's criticism of the mainstream rhetoric against cloning—alongside her complementary argument against cloning—rests on a similarly thoughtful feminist platform. Unlike Davion, Parisi is less concerned with identity and embodiment than with the implications of cloning-as-reproduction broadly defined. Starting with the same point that there is nothing "unnatural" about cloning, Parisi continues that indeed, "cloning and bacterial sex" are "the most ancient mode of sex and reproduction," and that "cloning is not opposed to nature but unfolds in a continuum with unicellular and multicellular modes of sex and reproduction."[31] From there, though, Parisi explores the broadly political and systemic implications of situating cloning on a spectrum with other types of reproduction, rather than highlighting it as unique or uniquely challenging to human identity or dignity.

This "bacterial sex" that serves as Parisi's touchstone, for example, far from undercutting political dignity, instead undercuts a "genealogical concept of evolution (linear development)"; in turn, it "defines the emergence of new machines of sex and reproduction (mitochondrial hypersex, meiotic sex) enfolded in all multicellular bodies."[32] Cloning, in other words, challenges not political dignity, but the link between political dignity and *linear development*—it challenges the arbitrary insistence that dignity is characteristic only of self-contained, rational bodies related to one another through lines of filiation. As a result, Parisi concludes, cloning is one of *many* types of reproductive activity that can potentially reconfigure our attitudes toward life and politics. It is *one* mode of information transfer

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that brackets the self-contained, filiated organism as life's, and political life's, norm.

Endosymbiosis, for example—an additional, if in some sense inverted, variation on this type of information transfer—is in a number of ways ethically and politically identical to cloning, Parisi implies. Like cloning, endosymbiosis as a "natural" or "normal" type of information transfer removes the self-contained, multicellular organism—related via filiation (and thus via heterosexual behavior) to a single line of paternal ancestors—from conversations about identity and thus, for the purposes of this chapter, dignity. Or, as Parisi puts it, in "this world of molecular sexes," in which information is expressed "through contagion rather than filiation,"

> The cell with the nucleus is not an individual and independent body favoured by natural selection and random mutation. Rather, it emerges from an assemblage of singular bacterial bodies . . . incorporating and eating each other. Not only is the eukaryotic cell an uncanny assembly of microbes but also meiotic sex—the doubling and reduction of chromosomes—that eventually bounds up with sexual reproduction—is a divergence from a sort of cannibalism between eukaryotic cells.[33]

Echoing Leuckart, in other words, Parisi refuses to distinguish between information transfer, growth, or reproduction, on the one hand, and other physical processes—in particular feeding—on the other. Not only is cloning not a unique reproductive activity—with all of the political and ethical repercussions of uniqueness—but reproduction is not a unique organic or informational activity. Highlighting both the natural and "ancient" quality of cloning—situating it on a spectrum with other modes of reproduction *as well as* other types of living processes—Parisi makes clear that conventional anticloning literature, at best, misses the ethical and political point of sex. At worst, she continues, this literature reinforces a narrow interpretation of relations—in which only filial interactions can have political, ethical, or even biological meaning. Whereas Davion noted the inherently homophobic quality of conventional anticloning literature, that is to say, Parisi demonstrates its patriarchal quality.

Also like Davion, however, Parisi cautions her readers against, therefore, embracing human cloning as a reproductive activity that might elude conventional homophobic or patriarchal theories of identity and dignity. Indeed, Parisi writes, "parthenogenetic desire" is by no means at odds with "Oedipal reproduction" because "these movements . . . are not engendered

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by the same system of signification."[34] On the contrary, "This parthenogenetic autonomy from filiative pleasure indicates a new variation of the machines of sex on the biocultural stratum mapping the incorporeal rather than biological or discursive mutations of a body-sex."[35] In short, the parthenogenetic desire that drives cloning produces, also, a new variation on embodied, rather than bacterial, sexual activity.

Or, to get at this idea from a more comparative perspective, whereas Davion is suspicious of cloning because, she argues, it reinforces oppressive, *preexisting* identity categories and hierarchies, Parisi is suspicious of cloning because it creates *new*, equally pernicious, and—if paradoxically—equally Cartesian categories of embodied sexual identity. Both caution against any wholesale acceptance of cloning because of what cloning says about identity (and thus dignity). Both are very much aware of the pitfalls of conventional anticloning literature's reliance on "dignity" as the thing that cloning—uniquely—assaults. But both also *reintroduce* dignity, albeit in infinitely more nuanced forms, into their discussions of what Parisi describes as "bacterial sex."[36]

This reintroduction is not in any way badly conceived. Indeed, the recurrence of identity and dignity in these conversations signals the ongoing *political* relevance of nonhuman or "molecular" reproductive behavior. But discussions of cloning that return to these issues also, in this way, remain discussions about the *products* of reproduction (even as they highlight the, for them, suspect focus on sexual behavior). Reproductive activity in and of itself—as an ongoing, boundless, informational, environmental, or systemic process—remains largely unexamined. And this lack of commentary on reproductive activity itself is a shame because readers *can* find a healthy set of references to it in the less sophisticated policy literature related to cloning.

In fact, one might even make a case that the fear driving this policy literature—even as it, too, returns repeatedly to dignity and identity—is a fear not, as Davion suggests, of homosexual reproductive products and not, as Parisi suggests, of contagious rather than filial sexual products, but of reproductive activity as a material or materialized mode of thought and contemplation. The anticloning policy literature, in other words, seems very much to be a literature that, despite itself, has to do with reproduction-as-thought as much as, if not more than, reproduction as the behavior that produces subjects and identities.

Since the mid-1980s, for example, the French government has been increasingly concerned with the political and ethical repercussions of technological reproduction in general, and human cloning in particular. This

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concern has expressed itself primarily in repeated attempts to define, delimit, and regulate the embryo. In an initial 1984 opinion on the status of the embryo, the National Ethics Commission argued that "the embryo or fetus must be recognized as a potential human person who is or was alive and who must be respected by all concerned."[37] As a number of commentators have noted, however, this generalized emphasis on potentiality can lead (and has lead) both to the conclusion that the embryo thus has "a high moral status" *and* to the conclusion that the embryo thus has no personal status.[38]

As a result, "potentiality" itself quickly came under scrutiny, and successive French Ethics Commissions linked the concept, first, to "viability," and then, in turn, to "factors external to the embryo," such as "extra corporality" and eventually family.[39] As Giovanni Maio notes, the commission in this way did not "define the status of the embryo ontologically; instead, it ma[de] it dependent upon the context"—and, once again, not just its biological context, but its "psychosocial" familial context, its "relationship to other people."[40] But even these repeated attempts to anchor the embryo's potential human status to concrete platforms as diverse as the womb and the sentimental family left open questions as to what the embryo might do—and what could be done to it.

In 2000 the commission introduced the concept of "virtual solidarity" in reimagining, yet again, the embryo's relationship with other people, here, however, with the patients its biological material might help rather than with the family its affective existence might bolster: "the embryo and the future patients" that might benefit from embryonic research, the commission argued, existed in "a state of solidarity"—and the commission could thereby ethically value this "'virtual intergenerational solidarity'" more, Maio writes, than "the protection of the embryo 'which has no future.'"[41] Whereas an embryo's intergenerational solidarity with its *parents* created a platform for endowing it with dignity and protection, that is to say, the same embryo's intergenerational solidarity with *patients* made it possible for it to serve as biotechnological research material. The potential personality of the embryo, now embedded in a *series* of social relationships, remained a rhetorically vital, but emphatically *contentless*, category.

Repeated attempts to add stable content to the rhetorical framework suggested by the embryo as potential human embedded in an organic as well as social or familial environment ended in similar confusion. As Dragoş Chilea writes, French bioethical laws continued to "protect" embryos from what were assumed to be undesirable practices by fine-tuning the characteristics of their potential human identity and thus dig-

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nity. Gradually, however, embryonic human identity ceased to have to do with the individual political subject that the embryo would become and that would operate in solidarity with other individual political subjects, and developed in relation to its future as a manifestation or representation of "the human species" writ large. Doing inappropriate things to or with embryos thereby became an assault not on the dignity of the individual but on the dignity or "integrity" of the "human species"—protected here in the French *health* code.[42]

Moreover, the most pernicious assault on these ideals would occur should the embryo serve the commercial or industrial interests of others.[43] Chilea's conclusion—that, given the unsatisfying and impressionistic direction in which this legislation has gone, it may be time to rethink what we mean when we associate human identity with embryos[44]—is thus well taken. Again, though, rather than adding ever more protective ("good" familial or social rather than "bad" commercial or industrial) *relations* to what continues to be defined as a potential human, it may make more sense to rethink the embryo's status without taking human concerns into consideration at all. Or, put differently, one might ask, once again, *what* is so frightening about doing inappropriate things—like cloning—to or with embryos and whether a shift in perspective might dispel these fears. What, specifically, is the threat against which the legislation is protecting this genetic material?

Narrowing the focus to the problem that *cloning* posed to French—and European—bioethics laws can help to address these questions more effectively. First of all, it is worth noting that the pivotal point of this more than three-decade-long attempt to refine the legal definition of the embryo occurred in the mid-1990s, when mammalian cloning became a popular concern. The shift in French law away from embedding the embryo, as a future individual, within a set of social and familial relationships and toward embedding the embryo, as a future manifestation of a mass reproductive ideal, within the abstract notion of the human species, in other words, appeared just as cloning became the new reference point in conversations about embryonic material. It was, in short, the fear of *clones*, specifically, that led French legislators to think less about appropriate versus inappropriate familial, sexual, or social interactions than about the integrity (or criminal lack thereof) of the human species.

This shift, it is true, by no means suggested that the law became, somehow, less discriminatory or muddled. Davion, for example, would no doubt find it unsurprising that French policy on cloning was only one part of a well-established and interconnected preexisting set of laws regu-

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lating sexuality—a set of laws that sought, alongside other things, to prevent homosexual couples from reproducing themselves. Among the arguments that French legislators presented in the 1980s and 1990s to prevent homosexual couples from using artificial reproductive technology, for example, were, first, that reproductive technologies were intended as a "palliative for *natural* infertility"—with homosexual reproduction thus defined as, specifically, "unnatural." And second, the French government stated that "protecting a child" was more important than "satisfying a [homosexual] desire for biological filiation"—homosexual couples "could adopt" instead.[45]

The homophobic quality of French anticloning legislation, embedded in a broader French policy denying homosexual couples artificial reproductive technology, in other words, is very much as Davion describes anticloning legislation elsewhere.[46] And its character should hardly be surprising—these laws were part of an entrenched, general rhetoric that associated potentially violated, artificial, unnatural products of *reproduction* with, first and foremost, inappropriate *sexual* behavior. Homosexual reproduction was unnatural in a way that, say, hormone-stimulated heterosexual IVF was not, and it was at least in part for *this* reason that cloning was such a radically criminal endeavor. Or, put differently—and, again, not unexpectedly—it was precisely the increasingly frantic attempts on the part of the French government to protect identity and dignity that led to this relentlessly discriminatory and regulatory rhetoric of political belonging.

But, granting that human identity and dignity were simultaneously the concern and the unintentional victims of French reproductive legislation—that, again, these inclusive, protective measures victimized the very citizens they sought to liberate—one might *also* look at what, more fundamentally, was frightening to these legislators about cloning. Arguably, when French policymakers began to concern themselves with the integrity of the human species, they were doing more than policing sexual behavior—even if policing sexual behavior remained one incidental result of these policies. Indeed, turning to the text of the anticloning laws themselves leads to the conclusion that the threat inherent in the term "integrity of the human species"—the lack of integrity, or the *disintegration*, of the human species—is less the threat posed by individuals who might, via their sexual behavior, undermine preexisting political structures than the threat posed by an altogether and radically different variation on political engagement writ large.

If the human species disintegrates, after all, one can no longer insist that

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politics is the preserve, solely, of the human, regardless of this human's sexual behavior. If the law seeks to prevent this disintegration, then the issue at stake is, specifically, the issue of who, or what, can be political. And, moreover, if *cloning*—a particular type of *reproduction*—is the greatest threat to the integrity of the species and in turn to the human quality of political engagement, if reproduction (rather than, say, speech, privacy, property, or for that matter, sex) is what leads to this terrifying disintegration of the human, then clearly cloning *as* reproduction has hyperbolic *political* meaning. Cloning does pose a threat—and a pernicious threat—to human (if only human) democracy. It does not pose the same threat, however, that other criminal or treasonous human behaviors are ordinarily understood to pose.

The underlying (and discriminatory) message of French anticloning policy, therefore, is arguably *not* that some people might seek their sexual pleasure in the wrong (homosexual) places, and that we would rather that those people not achieve full political subjectivity. The homophobia of this policy—disturbing as it is—is not, arguably, the key political issue. Rather, the underlying message of the legislation is that "people" may cease to have anything to do with politics at all—and that reproduction, as a specifically political activity, might continue in the absence of "people," as its own, disembodied but materialized, mode of democratic engagement. The muted theme in this French anticloning policy literature, in other words, is that cloning is a disturbingly attractive variation on reproduction-as-political thought, and that cloning must be eradicated before it undercuts purely human variations on democratic engagement. The disintegration of the human species is shorthand for the development of a nonhuman politics that rests on reproduction as thought.

Consider, for example, a 1999 report issued by the French Ministry of Health that retells the previous five years of legislative history with a view toward allowing, if narrowly, therapeutic use of embryos. First, it is worth noting that of all of the technological and implicitly unnatural things that embryos might do—and of all of the things that the ministry may or may not decide to regulate rather than criminalize—cloning is the most evocative for the report's writers. Cloning circa 1997, they argue, was the practice, *in particular*, that "revealed the nature of the problems" posed by the "progress of life sciences."[47] Moreover, they continue, one of the key potential victims of decriminalized reproductive technology—and again, especially a potentially decriminalized cloning—is "the dignity of the human person and his descendants."[48]

Although the disintegration of the "human species" as a cautionary tale

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is still a year away in French legislation, in other words, it is unquestionably lurking behind this new terminology. Cloning assaults not just the potential individual that the embryo might become, but also "the human person" as an abstract, and *also that abstract person's lineage*. In an echo of Parisi's point, the fear here is not a fear that particular human beings might be prevented from achieving their complete, self-contained, embodied political subjectivity. The fear is that filial information transfer might be disrupted—that, as Parisi puts it, genetic information might pass through material environments via "contagion" rather than via linear transfer. The fear is of reproduction as an environmental thought process.

And indeed, as much as this report and those that follow return repeatedly to how cloning eradicates individuality and instrumentalizes the human being—two practices that in turn undercut human dignity—it is clear that these two terms have little meaning in the text beyond their rhetorical force in classic liberal speech. Even the policymakers have realized, it seems, that neither unique embodied individualism nor the supposed Kantian threat of instrumentalization resonates in a democracy that takes reproduction seriously—now *or in the past*. The 1999 report, for example, insists that cloning—especially given what it describes as the specious, thoughtless arguments produced in favor of it, arguments that fail to consider the relationships among humans or between humans and environment—represents a terrifying "fantasy and intolerable instrumentalization of the human being."[49] Cloning, the report continues, is thus not completely mistreated in earlier French legislation that forbid, outright, any "intervention that sought to create an infant or a human embryo whose genome was identical to another human being's."[50]

But the writers of the report frame these conclusions regarding the horror of "identical" genetic material and the political evil inherent in instrumentalizing others within a tellingly detailed discussion of the cloning process. Cloning, they write, "can be defined as a technique consisting of reproducing genetically identical living organisms." It can operate on "simple cells (cellular cloning)" or on "humans, animals, or plants (reproductive cloning)." It is important, though, to recognize that there are a number of different methods of engaging in the second of these processes (that is, "reproductive cloning"). In particular, scientists might either produce a "cleavage in an embryo" and thereby "create two genetically identical distinct individuals," or they might transfer genetic material into an enucleated egg cell. Although these methods are both technological, this section of the report nonetheless concludes with the point that "it is inexact to consider reproductive cloning as unnatural in that asexual reproduction

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exists among plants as well as among invertebrates or even vertebrates (fish, amphibians, and reptiles)."[51]

In order to bolster their argument that cloning eradicates human individuality, represents a fantastic and intolerable instrumentalization of the human being, and thereby assaults human dignity, the human person, and the human person's descendants, in other words, the report's writers present their readers with a series of familiar taxonomic hierarchies and with a set of classic methodological distinctions. There is a division, for example, between "simple cells" that do not actually "reproduce" and multicellular organisms that do. And there is also a more detailed and elaborate hierarchy of multicellular organisms that do reproduce asexually—plants, invertebrates, and "even" some vertebrates. At the same time, methodologically, there is the slightly less "technological" method of splitting an existing embryo in order to produce a clone and the slightly more "technological" method of somatic cell nuclear transfer. The message that the report's writers are sending to their readers, that is to say, is not just that cloning is an assault on human dignity. Rather, it is, in a more nuanced way, that even if cloning *is* natural in that lesser organisms do it, it is still something that higher organisms, like humans, emphatically cannot—and still remain human.

Indeed, readers might think a bit more carefully about the foundational distinction with which this section of the report begins—the distinction between cells that do not "reproduce" (but that may clone themselves), and multicellular organisms that do "reproduce," even sometimes via cloning. By differentiating between what "simple" organic material does and what multicellular organisms do, the report's writers are doing more than just describing an apparently gradual move from less complex to more complex organisms in the plant and animal realms. They are also positing a clear break between lower things that grow and higher things that reproduce. The defining characteristic of simple things, in fact, seems to be *specifically* that they grow or flourish, but do not reproduce, whereas the defining characteristic of complex things is, again *specifically*, that they perform reproductive acts. To the extent, therefore, that things can move from lower to higher rungs in the hierarchy of life, these things must also move further and further away from growth and closer and closer to "reproduction."

The assault on human dignity, the instrumentalization of the human being, and the disruption to human lineage that cloning threatens are thus all squarely based on the assumption that it is inappropriate for biological and genetic material that might be identified as human to

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grow or flourish in the same way that "simple cells" do. Human dignity is assaulted, quite explicitly, when human matter as information *spreads* but fails to *reproduce*—when it flourishes but fails to create a lineage. The problem with cloning, therefore, is not that this mode of reproduction that is somehow also *not* reproduction, this variation on, effectively, materialized information transfer, will instrumentalize a self-contained rational unique individual or produce unacceptable copies of preexisting individuals. The problem with cloning is that it raises the specter of human reproduction that is simultaneously growth and thought. And, in turn, it thereby reveals the potential for a democratic politics in which instrumentalization and identicalness simply have no ethical or rhetorical resonance.

Indeed, the implicit, threat inherent in the *method* of cloning (nuclear transfer) that the report identifies as more worrisome—in this method that is more "technological," more of a technique, more the sort of thing that, say, machines or algorithms might do—highlights the extent to which French legislators are frightened, in particular, of the potential success of a mode of democracy unconcerned with the Kantian imperative. Put differently, if the reproductive activity of machines, algorithms, and cells is as valid and as politically meaningful as any other reproductive activity, then protecting the uniqueness of the self-contained human individual becomes something of a sideshow. Or, to return to Davion, the concern of the report's writers is clearly not only to protect a hypothetical group of specific human beings who may, via cloning, be prevented from achieving political subjectivity. In addition, it is that accepting cloning may also be accepting a mode of democratic engagement that is open to political life in the *absence* of subjectivity. Their concern, once more, is that if citizens take cloning seriously, citizens may also have to take seriously the possibility of a democratic engagement that rests on reproduction as thought.

This interpretation of the role (or lack of a role) that instrumentalization and identical existence play in anticloning literature becomes more convincing when looking at the legislation produced by the Council of Europe—the legislation that set the basis for French law. A 1997 European draft protocol banning cloning, for example, repeats at some length that the concept that cloning assaults is, once more, human dignity. Indeed, over the space of a single page, the protocol notes that "the instrumentalisation of human beings through the deliberate creation of genetically identical human beings is contrary to human dignity," that laws on bioethics seek to "protect the dignity and identity of all human beings," that "deliberately cloning humans is a threat to human identity, as it would give up

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the indispensable protection against the predetermination of the human genetic constitution by a third party," and that the "prohibition to clone human beings is based first and foremost on human dignity which is endangered by instrumentalisation through artificial human cloning."[52] So cloning is a threat to human dignity. And it is a threat, first, because it might produce genetically identical human beings and second, because it involves a third party determining the genetic constitution of an individual yet to be born.

But, once more, when the protocol situates its understanding of cloning within a more general story of politics and reproduction, and when it addresses potential criticisms to its analysis, the references to identity, instrumentalization, dignity, and identical existence become more complicated. First, for example, the protocol argues that if a human being is "'genetically identical' to another human being," then this human "shar[es] with another the same nuclear gene set."[53] The quality of an egg's nuclear material is indeed key to the drafters of the protocol, and when they define "identical" they always distill this concept into "identical" nuclear DNA. While insisting that "the Protocol does not intend to discriminate in any fashion against natural monozygotic twins," for example, its drafters nonetheless state that the law "restricts genetic identity to sharing the same nuclear gene set," that "'nuclear' means . . . only genes of the nucleus," and that "the mitochondrial genes" are not "looked at with respect to identity."[54] The fact that nuclear identity by no means produces an identity of organisms (or, for that matter subjects) is thus made *explicitly* irrelevant to the concepts enshrined in the protocol—"the term 'the same nuclear gene set' . . . takes into account the fact that during development some genes may undergo somatic mutation."[55] Identity, in other words, becomes here purely and literally a question of what an egg's initial nuclear material might look like.

In order to support these arguments and in order to defend their (to some, idiosyncratic) definition of "identical," the drafters of the protocol in fact go on to make two additional points. First, they argue that "as naturally occurring genetic recombination is likely to create more freedom for the human being than a predetermined genetic make up, it is in the interest of all persons to keep the essentially random nature of the composition of their own genes."[56] Second, however, they also write that although "the protocol does enshrine clear barriers against any attempt artificially to produce genetically identical human beings," it is "not concerned with hormone stimulation to treat infertility in women and which might result in the birth of twins.[57] In short, that is to say, being identical is both

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unnatural and unfree—unless a person is a twin, conceived either via hormone stimulation treatment or not.

The line between "natural" reproduction and "artificial" reproduction—as well as the freedom that goes with the former and the lack of freedom associated with the latter—is thus, to put it mildly, blurry at best in this document. A woman who is treated with hormones such that her eggs (fertilized with sperm) split repeatedly into twins with (initially) identical nuclear gene sets is reproducing naturally. Her offspring possess identity and dignity and can be free. A woman who is not treated with hormones, but whose egg (fertilized via nuclear transfer) grows into a person with an (initial) nuclear gene set identical to her own is reproducing artificially. Her offspring lacks identity and dignity and cannot be free. Artificiality, in other words, is specifically determined by how the egg is fertilized—by sexual behavior—rather than by the fact that (*a*) fertilization occurred in a lab via a "third party," or (*b*) that fertilization produced two or more bodies with initially identical nuclear gene sets. The discriminatory quality of the text is obvious.[58]

Once again, though, criticizing the European legislation within the framework of classic, human-centered liberal democratic theory—effective though it may be—does not get at the more basic problem that clones are posing to European self-definition. Indeed, like the French legislation that drew on it, the European legislation of the late 1990s seems not just to be policing sexual behavior or identity (in the name of policing reproduction). More so, it is attempting to prevent an acceptance of cloning that might open up an era of alternative, environmental, and nonhuman democratic engagement. Given the emphasis on nuclear genetic material in the document, for example, it seems clear that when its drafters refer to cloning as "artificial" reproduction, they are understanding the behavior to be the same reproduction that is "*not*" reproduction in the French legislation—that is, the activity that lower or simple organisms do. Women who clone are spreading, growing, or flourishing—they are being "simple cells" rather than embodied organisms. And, as a result, they are very specifically assaulting *human* identity and dignity.

But obviously cloning *is* reproduction—even if, at the same time, it is also spreading, growing, and flourishing. It is reproduction, however, that is terrifying to European legislators wed to a classic liberal tradition because it suggests not embodied subjects rationally choosing to reproduce themselves in a linear, controlled manner, but a disembodied, if nonetheless material and environmental thought process that is anything but linear. Cloning is materialized information transfer that occurs across systems,

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fields, assemblages, and environments. And it is, once more, *therefore* a threat to democracy.

As a result, and perhaps more to the point, European and French legislators can thus insist on the relevance of human-centered democracy only if they suspend their disbelief in four separate ways. First, they must pretend that the cell is analogous to the self-contained human body. Second, they must likewise pretend that the cell's nucleus is analogous to the brain. Third, they must insist that the brain, in turn, is the seat of both cognition and identity. And fourth, they must conclude that identity and dignity lie in the nuclear material of a fertilized egg cell with a clear, uninterrupted lineage extending both into the past and into the future. Cloning, by exploding this fantasy, likewise explodes the foundations of liberal democracy.

Moreover, by being uncomfortably "natural" not just in the sense that sometimes salamanders do it, but also in the sense that it is the inheritor of an already centuries-old scholarly tradition of situating both life and *political* life across fields or systems rather than within self-contained bodies whose brain is their identity, cloning is particularly dangerous. It is a problem not just because it destabilizes classic, human-centered models of democratic engagement but because it offers up a healthy, historically valid alternative to these models. The very defensiveness of the definitions and responses to potential criticisms that appear throughout the protocol indicate that its drafters are, once again, quite aware that the actual threat posed by cloning is not to identity or dignity but to a democratic structure that *values* identity and dignity.

A Series of Resolutions

Scholars commenting on European and French anticloning legislation have explored a number of these limitations and internal contradictions. Although these scholars do not suggest that the fear driving anticloning legislation is a fear of an alternative nonhuman mode of democratic engagement, they do point to the aspects of liberal democracy that seem to be strained or broken in this legal work. Bertrand Pulman, for example, takes, as a starting point for addressing some of the most potentially troubling "issues involved in cloning,"[59] the 2004 French Penal Code's introduction of cloning as a crime "against the human species." In particular, Pulman makes the case that the classic language of liberal democracy on which European legislators have drawn in drafting their anticloning policy is, at best, logically inconsistent.

Drawing on the work of anthropologist Philippe Descola, for example,

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Pulman explores the "limitations" of any legislation that begins with the idea that "the right to a singular genetic identity as guaranteed by sexual reproduction is . . . the very foundation of human dignity."[60] First, and again most obviously, he notes that "monozygotic twins readily do without that type of dignity" already.[61] Moreover, he continues, if one insists that "the absolute singularity of the genome . . . is a fundamental right that defines the dignity of the person," one risks "having other genetic information serve as a justification for normative principles . . . [C]ondemning human cloning by invoking everyone's right to a singular genetic identity also works to perpetuate an unfortunate tendency to confuse the individual with the genome."[62]

From there, Pulman turns to the supposed violation involved in "the frightening break in filiation principles" that cloning may perpetuate.[63] As much as those in favor of linear filiation may insist that cloning "could lead to the making of an individual whose filial line would be truncated, a nearly isolated individual, without forebears [and thus without identity]," Pulman argues that such a scenario is by no means the horror that it appears, to some, to be.[64] "The work of anthropologists," he writes, "suggests the limits of this interpretation, in that they have presented us with descriptions of kinship systems that function extremely differently from ours."[65] A *linear* lineage of discrete, self-contained bodies, in other words, is not the only framework for understanding affective, familial, or political relationships.

Finally, Pulman criticizes the rhetoric of instrumentality on which French and European policymakers rely when they prohibit cloning. Noting that their touchstone is the Kantian interpretation of "humanity" and how to protect this concept, he writes that according to these legislators' "understanding, to fabricate an individual through cloning is to negate autonomy. Because a clone's identity would be determined by an alienating external will, clones necessarily will be enslaved and reified."[66] As Franklin writes, cloning invokes among such commentators a "sexuality based on narcissistic identification (gay clones) and slavery (either as 'slavish imitation,' or in the association of clones with a worker class of slaves or drones)."[67] The problem with this interpretation, however, is that assumes that *only* this single reproductive process, *only* cloning, poses this fundamental danger. Or, as Pulman puts it, drawing now on the work of Marc Auge, "Human beings can already be produced for explicit ends external to them—without cloning." The notion that "there can be both 'natural' fabrication full of good intentions and another kind" is thus deeply flawed.[68]

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Once again, Pulman's goal in this article is to critique anticloning legislation on its own terms. His purpose is not to condemn the liberal democratic context within which European and French legislators are operating, but to suggest that these legislators are using liberal democratic rhetoric *incorrectly*. They do not properly define dignity, kinship, human relations, *or* instrumentality, and—perhaps more of a problem—they clearly do not understand what the cloning process involves. One might, though, also push Pulman's criticism further than his already nuanced argument goes. Indeed, it is possible to conclude from his work that the problem with this anticloning legislation is, again, not that legislators use their own rhetoric incorrectly, but that their incorrect use of the rhetoric is a symptom of a larger problem. The internal flaws in their arguments could hint that the issue at stake in their work is not how properly to prohibit or allow cloning in a liberal democracy but how cloning eradicates liberal democratic assumptions about embodied humans who possess dignity, kinship ties, discrete relationships, and subjectivity.

Indeed, reading Pulman's critique of French and European anticloning legislation alongside the legislation itself unearths, once more, evidence not only that liberal vocabulary is incapable of addressing cloning—or simply reproduction—as a democratic activity, but that an alternative vocabulary is readily available. Remember, for example, that French legislation gradually detached "dignity" from the potential person or individual and associated it instead with humanity writ large and eventually with the integrity of the human species. This shift could easily be read as a story of changing interpretations of human subjectivity and human existence—as a purely human story. But, at the same time, there is also an alternative tale of a gradually increasing fear of a *particular type* of disintegration—a disintegration not just of bodily borders but of lines of information transfer wed to the identity of the species—within this shifting vocabulary.

This story, in other words, is as much a story of what might happen if reproduction is embraced as an ongoing thought activity spread across environmental fields as it is a story of what might happen if reproduction, defined as a single act that links a linear chain of ancestors, is misused. It suggests a fear of a *politics*, and a democratic politics, that does in fact take reproduction seriously—that recognizes reproduction as a variation on contemplative life. Obviously, though, the fact that French and European policymakers fear this alternative variation on democratic engagement does not make it, objectively, something to fear.

On the contrary, a number of affirmative qualities of this alternative style of democratic engagement suggest themselves. Pulman, for example, once

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again, highlights three problems especially in French and European anticloning legislation. First, he emphasizes the lack of any obvious connection between possessing a singular (nuclear) genetic identity and possessing dignity, despite the unquestioned assumption in the European policy that such a connection must exist.[69] Second, he questions whether a break in lines of filiation would actually lead to the total isolation that the anticloning legislation suggests it would. And finally, he challenges the idea that cloning is the only type of reproduction that instrumentalizes a reproductive product—that produces an organism for ends other than itself. Pulman's negative arguments—his challenges to liberal anticloning writing, again, on its own terms—are well taken. But within these challenges, once more, there is a hint not just of how clones can disrupt classical liberal principles and vocabularies, but of how they can act as the basis for a possibly more effective and affirmative mode of democratic engagement.

If, taking Pulman's set of criticisms as a starting point, one goes a step further to ask whether nuclear genetic material is not only *not central* to identity but *irrelevant* to it, for example, one might draw the related conclusion that replicating genetic material broadly defined is a healthy variation on reproduction as political thought. Likewise, one might argue not just that linear filiation is one of *many* ways of tracing relations—and thus not necessary to political relations—but that deliberately breaking down lines of filiation can open up a realm of freedom rather than unfreedom. Disrupting these lines of filiation, after all, creates a situation in which isolation ceases to be a threat not because some individuals are, arbitrarily, protected against such isolation but because it is a physical impossibility. There can be no isolated subject when embodied subjectivity, linked to a single line of patriarchal ancestors, is no longer the prerequisite to political activity.

Finally, recognizing, as Pulman urges, that all reproduction potentially involves an instrumentalization of its products—that very few reproductive products are created purely for their own purposes—invites readers to go further and remove the moral value associated with the almost necessarily alienating act of procreation. One might, in other words, pursue the premise that all types of reproduction *always* involve an instrumentalization of *all* matter and information. Working from such a premise allows political theorists to begin to consider the possibility that not being an end in oneself—that being used, useful, working toward an irrational *lack* of an end—that eluding any sense of self *as well as of others* is more politically healthy than being constantly concerned that one, or another, might be in danger of instrumentalization.

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If reproduction as thought celebrates instrumentalization, being instrumentalized need no longer be a source of shame. Or, put differently, Pulman's critique of French and European anticloning legislation—alongside the legislation itself—suggests not only that classical liberal vocabulary becomes invalid when trying to discuss the role of clones in contemporary democratic politics, but that the fear underlying this anticloning legislation is a fear of an alternative, healthy democratic theory that *can* take reproduction seriously. It is a fear of a democratic politics of thought and life rather than of identity and dignity.

That anticloning law and policy is driven by this fear of reproduction as thought becomes equally clear, indeed, when reading legislation expressed in more explicitly technological, as opposed to political, language. The primary concern, according to this second, if more muted, theme in the anticloning legislation, is that even granting that democratic—or even liberal democratic—philosophy cannot coherently prohibit this variation on reproductive activity, the potential damage that cloning can do to a genome is, itself, sufficient to institute a ban on the process. In particular, the fear in this literature is that the genetic information or material that is "copied" in the cloning process may be weaker than the information or material that produced it. As a result, this argument continues, the product of this reproduction is operating at a disadvantage. It may or may not possess dignity—but its life is without question under threat.

Consider, for example, just one variation on this theme. According to this argument against cloning, in addition to the possibility of undesirable "mutations . . . aris[ing] in the donor cells during cell culture," or the potential for a lack of compatibility between "stored gene products (RNAs and proteins) in the oocytes" and the "donor nucleus," there is also the potential for "telomere shortening in the donor cell" that could "limit the life span of the clone."[70] Such concerns, according to this analysis, lead to the conclusion that "meiosis, which precedes sexual reproduction, affords humans another opportunity for DNA repair and therefore should not be avoided in favor of asexual (somatic) reproduction."[71] Linear sexual reproduction, that is to say, is *healthier* than cloning because it limits the potential for undesirable mutations, because it helps to prevent incompatibility between genetic materials, because it allows for DNA repair, and because it thus, in turn, produces an organism that will likely live longer than a cloned organism.

This take on why cloning, even if it is not necessarily an assault on dignity, could be considered an assault on life is intriguing less because it provides an additional argument against the procedure than because it

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throws into relief, once again, the assumptions driving the more overtly political literature. First, the underlying threat that must be countered—the threat that the references to mutation and genetic incompatibility for the most part frame—is the threat of a shortened lifespan for a single, embodied organism. Clones potentially will live shorter lives than their noncloned counterparts, and this is an unacceptable outcome. Second, this undesirable shortening of lifespan occurs, the article states, because asexual or somatic reproduction leads to telomere shortening, whereas sexual reproduction allows for DNA repair. As cells divide, their telomeres are less and less capable of protecting the integrity of their genetic information—and eventually, as the DNA strands break apart, the cells die, and in turn the organism dies. In essence, therefore, replication and growth are death, whereas sexual reproduction is life.

The following chapter explores some of the gender-relevant implications of this set of associations between life and sexual reproduction, on the one hand, and death and asexual reproduction, on the other. For now, though, it is worth emphasizing their political implications and how these relate to the fear of human cloning as a fear of an alternative, nonhuman, environmental mode of democratic engagement. First, and most obviously, the idea that extended biological life is always a good thing—and that it is the implicit duty of medical and political institutions to facilitate this extended life—is a classically biopolitical assumption (and an assumption with which few, intuitively, would disagree). It echoes with great clarity the "make live and let die" formula that Foucault influentially attributed to the modern, mass democratic state.[72]

But this particular variation on making live and letting die—linked to the problem of cloning—is also in many ways a departure from classic articulations of biopolitical duty and regulation. Indeed, by situating the threat of an organism's shortened lifespan with, specifically, telomere shortening, this variation on the anticloning literature is in fact *marginalizing* the biological and political activity of embodied political subjects. After all, the activity that undermines the health of the organism, and thus the health of the species, here is not being vulnerable to infection, failing to adhere to proper hygienic conventions, or even refusing to consider the genetic quality of a reproductive partner. The activity that undermines health or life is not an activity in which a discrete body engages or fails to engage. On the contrary, health and life are assaulted in this formulation at the cellular level—as the cell, on its own, inappropriately replicates its genetic information. As much as this argument seems to be concerned with the life (and implicitly the dignity) of the clone as a liberal person,

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therefore, it is actually commenting on the problematic relationship between *disembodied* reproduction and politics. Reproduction that is a series of rational, linear, discrete events is politically acceptable. Reproduction that is an ongoing process, in the absence of bodies, is not.

Or, put differently, by isolating nuclear genetic material as both the material that constitutes an organism's (here the cloned human's) identity and the material that—when used incorrectly—potentially assaults life (here the cloned human's individual lifespan wed to the life of the species), this mode of argumentation is making two seemingly contradictory moves. First, it is privileging liberal, human-centered definitions of life—life situated in specific, individual discrete bodies with finite ends and finite beginnings, life that is necessarily always leading to rationality and subjectivity—as the life in need of protection. At the same time, however, and just as the policy literature in France and Europe writ large did, this work on telomere shortening is highlighting the extent to which cloning assaults *not* the idea or ideal of a discrete, embodied, rational political subject, but the idea or ideal of a discrete, unitary reproductive act in which such a subject might engage.

The fear of clones underlying this work, then, is, once more, a quite specific fear of reproduction as an ongoing series of information operations, of reproduction as, simultaneously, the storage, copying, and transmission of information *and* the flourishing of matter. Even in the most technological of the anticloning literature, that is to say, what is at stake is an alternative *politics*. As much as anticloning literature may reach for a language of political life situated in rational, embodied, human subjects, the only language open to it is the language of systemic, material, environmental contemplation. Once clones enter the political scene, it becomes impossible to describe the life and thought at the center of democratic engagement as anything *but* unbounded and environmental. Clones *infect* law and policy debate—transforming it necessarily into a conversation not about what product of reproduction might grow into a thoughtful human and thus political subject, but about what sort of politics will emerge from a situation in which growth, reproduction, and thought are undifferentiated.

Conclusion

The fact that this contemporary policy literature on cloning seems always to trip over itself—to end in precisely the rhetorical place that it is seeking at all costs to avoid—is very much a function of its denial of two centuries'

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worth of scientific and political writing on, specifically, reproduction as unbounded thought wed to cumulative growth. Dolly the sheep raised the specter of *human* women whose reproduction and growth might not be distinguished from one another—whose somatic and informational behavior, and whose material and intellectual activities, could easily become identical. But centuries before 1997, scientists and political thinkers were already grappling with countless variations on this supposed problem—they had already been exploring the implications of reproduction as an ongoing activity in and for itself rather than as a finite act aiming at a single goal.

Indeed, the embryonic research that appeared in the previous chapter both suggested and sometimes stated outright the irrelevance of the products of the so-called reproductive act—that is, "persons." Reproduction and its supposed products were, together, in these studies, undifferentiated facets of a likewise undifferentiated material and informational flourishing. In the genetic research that set the stage for *this* chapter, this irrelevance became impossible to ignore. Regardless of whether it was early twentieth-century *New York Times* articles on "cytoplasm," information, and growth or mid-nineteenth-century physiological research that deliberately bracketed individualization and focused instead on reproduction as a type of eating, a sturdy platform was being set into place for a biological and political conversation about what reproductive activities like cloning—if not their product, clones—might do for, rather than against, democracy. There is a nagging, preexisting history, in other words, of asking whether cloning might be less of a threat to politics than a healthy political act.

And hence dignity enters the conversation. As both the critical scholarship on anticloning policy and the muddled policy literature itself demonstrate, "dignity" is a problematic rhetorical device when cloning is the issue at stake. As much as mainstream policy literature has always tried, in the name of dignity, to separate reproduction from thought and growth, it has, despite itself, repeatedly reintegrated reproduction *into* thought—and life into information processing. One might in fact easily read European policy on cloning with an eye less to what this policy suggests about the quality, relevance, or effectiveness of liberal, human-centered political theory than to what it hints, once more, about the democratic potential of nonhuman, undifferentiated types of life and thought.

Yes, in other words, the legislation and policy are couched in a language of human dignity, human identity, and human subjectivity. But, as the scholarly criticism of this legislation makes evident, this liberal language

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not only falls apart when trying to *prevent* practices such as cloning; it also fails when trying simply to *address* or *describe* such practices. Cloning is literally unspeakable when the only vocabulary available to policymakers is a vocabulary of embodied human subjects. As a result, it perhaps makes good sense that these policymakers would turn, even if unintentionally, to the concepts underlying the unbounded, nonhuman politics that does *not* grind to a halt in the face of biotechnological activity.

But, at the same time, these conversations also result in more than simply the dissolution of human-centered liberal politics. In addition, there emerge in these discussions the contours of an alternative mass democracy, a mode of democratic engagement less vulnerable to the assault of early twenty-first-century existence broadly defined. Slime mold, in other words, does not just pose a problem for human-centered liberal politics to solve (even as liberal theorists are tolerating its penchant for world domination). It also opens up a new realm of democratic activity (unconcerned with tolerance or the lack thereof). Or, put differently, as slime reproduces, it does not simply grow, it does not simply alter the world, it also becomes political, and *effectively* political. Cloning—as a growth that mimics the growth of the slime mold—is thus also not just something that contemporary democracy may or may not come to tolerate. Rather, cloning can serve as a basis for an altogether different type of democracy. Cloning might become, itself, a radically democratic act. The spread of slime, the flourishing of bacteria, and the growth of somatic material, one might even speculate, are radically democratic *because* of their assault on liberal human-centered ideals.

Cloning, for example, does not simply showcase the absurdity of the assumption that nuclear genetic material is the only truly vital genetic material, not to mention the only biological material relevant to "identity"[73]—although obviously it does that too. In addition, it brings to the fore the absurdity of the broader theories of identity on which this assumption rests. And, in turn, cloning creates a forum for a democratic politics that productively ignores identity—a politics that recognizes the interrelated interactions of materialized information operating across systems and environments. Likewise, cloning does not just eradicate lines of filiation—although, once again, it does that too. Also, it draws attention to the patriarchal quality of political systems that seek to preserve such lines in the name of protecting individuals from "isolation." Isolation, in fact, becomes an empty threat when discrete, embodied subjects with curtailed sets of relationships give way to living systems and environments. Or, put differently, the problem of the isolated individual evaporates when the discrete individual is no longer a coherent political concept.

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Finally, cloning does not merely question the outright, unquestioned condemnation of instrumentality among democratic theorists. In addition, it demonstrates the poverty of the Kantian fear of the external will that drives this condemnation. Leaving aside the hysterical sense of self—the psychological fantasy—that always accompanies human-centered politics, in other words, cloning posits a mode of political engagement that does away with the dichotomy between external will and internalized dignity. As a corollary, it obliterates the snide human-centered tolerance of things that might one day be almost human, and thus almost immune to external will. In short, not only *can* slime be political as it flourishes, regardless of will or dignity, across the *Guardian*'s cardboard globe—and not only *can* information be democratic as it replicates over blacked-out maps without any concern for human anxieties—but they can be politically and democratically vital in their own right.

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5 • *Trash*

What, though, if the slime or the information gets thrown into the trash? What happens to political thought when biologicals and data become waste? This outcome is by no means uncommon in contemporary democracies of reproduction and replication—whether this garbage takes the form of unviable embryonic material, organs that cease to be vital, or stored data that gets dumped or processed into irrelevance. This third case study chapter of the book, therefore, takes the problem of trash—material or informational, properly recycled or polluting—as an additional example that, hopefully, will unsettle readers. Trash, especially reproductive trash, is of increasing concern to theorists of contemporary democracy. In fact, trash has become an increasingly prominent topic within scholarship in general over the past decade, with analyses of the politics and life of rubbish extending far beyond waste's initial definition as matter displaced or out of place.[1]

Jussi Parikka, for example, has described at length what he calls the afterlife of digital garbage in his discussion of "zombie media"—an afterlife characterized by the "undead nature of obsolete media technologies and devices" that retain their political and material force because "media never dies, but remains as residue."[2] Jennifer Gabrys, in a likewise extended theorization of digital rubbish broadly defined, has made similar points. Far from reinforcing supposed oppositions or dichotomies between presence and absence, life and death, usefulness and obsolescence, she writes, garbage is rather an ongoing, dynamic, and lively operation or process. "What appears to be waste," she writes, may even acquire value specifically through its movement or circulation," while spam and junk mail—as particularly telling exhibits—are not only active but reproductive: "Estimates still refer to nothing less than an exponential increase in spam . . . billions of spam messages circulate through the internet," and "Spam is lucrative precisely because it flows in massive quantities."[3]

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Once again, though, spam is just one example of many of trash—digital, material, and reproductive—that continues to live, operate, and acquire value *as* trash in contemporary democratic contexts. Indeed, Gabrys also describes the undead extension of stored or archived data—where the "volatility" of computational memory can both push what is not supposed to be dead or trash into "oblivion" and also revivify things deemed "waste" via the recall of what had previously been obsolete records.[4] Given this "dual operation of disposal and recovery," Gabrys continues, "waste and the memory of waste" thus "operate in that murky space of salvage, a space that does not lead to . . . usual historical narratives or repeated performances of progress."[5] On the contrary, Gabrys concludes, the spaces and storage areas produced by garbage, waste, or trash are not only dynamic, not only operative, but also "sticky": "When waste returns and resurfaces, it becomes clear that disposal is about more than matter out of place."[6] And therefore, like dust, waste might be best understood "as a process involving transformation and remainder, not erasure through expenditure,"[7] as a system not always on the verge of erasure or eradication, but "generative and dynamic"; trash might even be a particularly evocative "terrain of ethics."[8] Or, as Fuller and Goffey have put it in an analysis of a related topic, an information "leak" may not be just an accident, but also the result of "the trash that takes itself out," of "waste dumps," or of "secondhand trades in magnetic memory, [and] tingles running through discarded hard drives."[9] In short, trash is very much thinking, reproductive, and lively.

What follows in this chapter, therefore, is in many ways an extension of, or contribution to, Parikka's, Gabrys's, and Fuller and Goffey's reconceptions of waste and rubbish as political or ethical processes or systems—here, though, with gender posited as an additional quality of trash as living political actor. As these quick summaries of rubbish in contemporary democracy *already* suggest, the line between reproductive waste and other waste—in particular digital waste—is not easy to determine. To the extent that garbage is, by definition, the stuff that flourishes because it becomes obsolete, that lives only when it is designated as dead, or that turns spaces of eradication into spaces of transformation, therefore, it is clearly as relevant to the organic matter that coalesces and disperses within, say, Buffon's reproductive spheres as it is to the information or data that proliferate, via contagion, within Parisi's algorithmic nonspaces. Missing from the existing accounts of the politics of trash, that is to say, is not the point that these systems of rubbish are reproductive and democratic in much the same way that other material and informational systems are reproductive

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and democratic. Rather, it is that gender and thought together are likewise central to them—just as they are to more conventional accounts of the originary democratic social contract.

Or, put differently, just as the previous two chapters posited that a theory of mass democracy as nonhuman thought can produce a more coherent set of responses to the ostensible threats posed by embryonic material and human cloning than classic, human-centered liberal democratic theory can, this chapter posits that this nonhuman democratic theory can also resolve the problem posed by trash in a more satisfying way. Again, embryonic material reentered politics in this shifted context as an endless and present—rather than future and complete—set of information operations. Cloning became radically democratic as it collapsed reproduction into growth *as* thought. Trash, this chapter asserts—the disposing or dispersal of matter and information—can be likewise read as a productive democratic thought process. Here, though, the device that transforms trash into a democratic actor is, even more explicitly, *gender*. In a mass democracy of unbounded thought and life, one might even insist, the question of waste becomes, very specifically, a question of gender. As a corollary, one cannot begin to understand the role of waste—informational or material—in contemporary democracy without taking gender into account.

More conventional accounts than Gabrys's or Parikka's of information or biologicals in the trash—or, more specifically, of reproductive and reproducing material, both organic and informational, in the trash—of course, are not couched in gender analysis either, although they do frequently take the classic, embodied human as their starting point. The conventional rhetoric surrounding the disposal of embryos or of organic cells, for example, is that this material is either a *by-product* of a single reproductive act (unviable and thus properly waste) or a *product* of this reproductive act (viable and thus unethically or inappropriately termed waste). Conventional law and policy addressing reproductive trash, therefore, seek either to establish which reproductive matter is without value and which is with value—and hence what can be thrown away—or to protect any and all reproductive matter from being defined as garbage. To the extent that gender plays a role in these rhetorical, ethical, legal, and political conversations, it thus remains linked to bodies and discourse. Gendered bodies tethered to sexual bodies make reproductive material or information, and reproductive material or information might potentially become embodied and thereby gendered.

But if reproduction is less a discrete act aiming at a particular end (the embodied organism) than an ongoing thought process—an operation that

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shifts systems and fields of information as matter—then this interpretation of reproductive matter in the trash becomes more complicated. First, for example, it becomes difficult to define any aspect of reproductive processing as a product *or* a by-product (that is, as a valuable end *or* a worthless end)—and it is in turn difficult to assign reproductive material value according to its proximity to "waste." Agonizing over the products of reproduction that might accidentally slip into the trash becomes an affective response without any clear legal, political, or ethical anchor. Second, and perhaps more important, the *history* of biologicals and information as waste (or not-waste) takes on a series of important and unexpected implications. Indeed, it becomes apparent that the last three centuries of stories about trashed incipient life, about slime slipping into waste, or about information irrevocably stored or dispersed can easily be read as a set of well-established stories of trash as gender, of storage and disposal as gender operations, and of waste as a key, and now gendered, democratic actor.

The remainder of this chapter ties these historical and political themes together. It does so, however, in a sort of reversed order. Rather than examining the threat posed by trash to conventional accounts of democratic engagement and then presenting a series of resolutions—from the direction of nonhuman political thought—to this threat, the chapter instead starts with the resolutions and only then turns to the literature of trash as a (now neutralized) menace. The first section of the chapter, therefore, reinvokes the eighteenth-, nineteenth-, and early twentieth-century French, U.S., and Ottoman naturalist literature in order to extract evidence of a preexisting theory of reproductive waste disposal as a gender operation. It provides a brief history, first, of reproductive matter and information that has been stored, discarded, or dispersed and, second, of how these disposal processes have been defined historically as functions of gender and femininity. The second section of the chapter turns to contemporary Turkish, French, and U.S. writing on human reproductive waste in particular in order to trace how these associations have developed in recent years. It draws on scholarly as well as policy literature to support the claim that, today as well, waste remains a function of gender, and that *therefore—because* of its gender implications—it is also a vital democratic actor.

A Series of Resolutions

The reproductive material and information that eighteenth-, nineteenth-, and twentieth-century scientists, scholars, and commentators took as a

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basis for their theories of boundless life and boundless thought lived and contemplated as easily in the trash as it did in or on the organic environments, glass, laboratories, and autopsy tables that served as its most frequent literary backdrops. At the same time, however, the stuff that ends up in the trash is rarely the centerpiece of scientific, political, or policy writing. Waste is, intuitively, at least, *deemed* waste because it is unviable or meaningless—worthless because it is somehow not quite *as* living or *as* thinking as the matter and information that evades such storage, recycling, or disposal. It would be a mistake, though, to think that historical literature on life, reproduction, and thought is any more silent on the question of waste than its contemporary scholarly counterparts.

Indeed, just as there is a rich tradition in this writing of reimagining the politics of life and thought as a nonhuman politics or as a politics of dynamic assemblages, there is a likewise rich—if more muted—tradition of situating trash or waste within this broader theory of vitality and information processing. What begins in the eighteenth century as a more general study of how life is dispersed or disposed of—how life and thought, dissipating, become recycled or dissociated—turns in the late nineteenth and early twentieth centuries into an analysis of, narrowly, life and thought transformed into death and garbage. In addition, whereas the eighteenth-century writing introduces gender to this story of trash—with the processes of dispersal, disposal, and dissociation linked increasingly to the operations of gender—by the late nineteenth century, waste is defined even more pointedly as a problem of femininity.

As a result, these conversations hint at two key conclusions. The first is that there can be no such thing as waste, at least as it is conventionally understood, in an unbounded, nonhuman political context. Waste, as Gabrys, Parikka, and others have noted, is always vital and thinking, even as it is stored, recycled, or dissipated. It is no different from any other political actor. The second conclusion is that this waste, reimagined, is one of the most important, *gendered*, political actors in today's mass democracy. These stories make clear, in other words, not only that the political problems posed by waste are simultaneously problems of gender, but that trash, as a gendered actor, is always both present and fundamental to modern democratic functioning.

Buffon's eighteenth-century work on reproduction and reproductive environments is, once again, a good place to begin a history of waste as political actor because it lends itself so easily to a rereading of political life and political thought from the perspective of material and informational systems like trash. Indeed, within Buffon's detailed account of reproduc-

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tive activity as a set of cascading thought operations that build up accumulations, fields, and environments is an elegant articulation, first, of the gendered qualities of theses accumulations, fields, and environments and, second, of how these gendered qualities are manifested *in particular* within living systems that process waste. Although his writing—in part because his theory of reproduction and gender is so much more nuanced than those who followed him—is less targeted and less invested in making a point about the political dangers of femininity, therefore, it also sets a sturdy foundation for the conversation, with all of its political and ethical complexity, that developed in later centuries.

Buffon was unusual among his contemporaries (as well as among those who came before and after him) in that he was unconvinced that there was any difference between what males and females contributed to reproduction.[10] Indeed, Buffon deliberately challenged the classic model of a male life force that initiated female growth by positing, in particular, the existence of female semen that worked along with male semen as reproduction occurred. Female semen, Buffon wrote, was visible, along with its male counterpart, under a microscope, and it was uniquely responsible for the disposal or dispersal of both life and thought across reproductive environmental systems.[11] The rhetorical path that Buffon follows to this conclusion, however, is both unexpected and worth charting in detail.

In elaborating his theory of female semen, Buffon first brings the analogy between the womb and the brain that appeared in the third chapter of this book together with the seemingly unrelated point that both viviparous and oviparous animals begin with eggs.[12] Rather than going from there to, say, the metaphor of the idea fertilizing the egg, however, Buffon moves in an unexpected direction. Leaving aside the work of female semen for the moment, he writes that the womb itself is more important to reproduction than male semen is, except to the extent that male semen helps to transform the womb into a reproductive environment. Specifically, "The womb conceives the fetus by a kind of contagion that the male liquor communicates to it, almost like a magnet communicates magnetic virtue [*vertu*] to iron."[13] Moreover, "Not only does the masculine contagion act on the womb, but it communicates itself to the whole female body, which is fertilized in its entirety."[14]

Having made this point about the relation among the womb, the female body, and male semen, Buffon returns to the role of female semen, which, he writes, helps to integrate and naturalize male semen into this environmental, rather than embodied, process. "If all animals and plants

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contain an infinite number of living organic parts," Buffon explains, "one should find these same parts in their semen . . . and the animalcules that one sees in the semen of males are only these same living organic molecules, or at least they are the first reunion or assemblage of these molecules."[15] As a result, "Female semen should contain, like that of the male, living organic molecules, similar to those of the male"—"since living organic parts are common to animals and plants, one should also find them in the semen of plants."[16] Female semen is itself the evidence, in other words, that all semen is always part of a broadly reproductive atmosphere or environment.

Finally, Buffon harmonizes his theory of fertilization across bodies as environments with his theory of male and female semen as similar assemblages of living organic molecules in order to posit what to him is, in consequence, a more coherent interpretation of the creation of embryonic or fetal material. In particular, he writes that within these reproductive environments, male and female semen must, "via some mechanism," form itself into "many fetuses, some male and some female," which, in turn, coalesce according to the "molecules that represent the sexual parts," in separate "spheres of attraction," each distinct because each could have only one "center."[17] Following the moment at which the simultaneous work of male and female semen infuses a "female" reproductive field with a magnetic type of energy, in other words, the embryonic material that operates across it coalesces into a number of fetuses that in turn come together randomly, according to the centripetal force acting within each sphere of attraction. The end result may be (incidentally) separate, sexually defined bodies, but the reproductive *process*, according to Buffon, is a process in which an accumulation or field of infinite and infinitely tiny reproductive data points integrate, operate, coalesce, and—more importantly—disintegrate, disperse, and dissipate.

Like Parisi (if unexpectedly so), Buffon thus questions the validity of theories of reproduction that take the egg and sperm—and thus lineage—as their touchstone. Yes, he writes, egg and sperm are *part* of the reproductive process. But more important to this process is the magnetized or infected womb-as-body-as-brain as field or environment—a field or environment in turn linked directly to animal and plant systems writ large. Reproduction infects *all* living matter in Buffon's model. And information is contagious, as it is in Parisi's. As a result, there is no matter or information—even that which dissipates instead of coalescing—that can be termed unviable, or waste. Storage and dispersal are as key to ongoing

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reproductive functioning and processing as any random product that may or may not integrate itself back into the living environment.

Moreover, and indeed far more prominently than in Parisi's work, Buffon's discussion maintains gender as a key aspect of this process of coalescence and dispersal. Indeed, Buffon's initial designation of some parts or processes of the reproductive environment as "male" and some parts or processes as female departs early on from any simple association between things that are sexed male and things that are sexed female. Nor is gender related to any present or future body or identity—any potential subject or self—in this scenario. On the contrary, gender, in Buffon's theory, has next to nothing to do either with what a particular sex may or may not contribute to reproduction or with what sort of subject may emerge from a single reproductive act. On the contrary, gender is quite narrowly about environmental integration and—again importantly—disposal.

Buffon, for example, is explicit that the embryonic material that coalesces and disintegrates as part of this reproductive process cannot be dissociated from a simultaneously gendered and reproductive system writ large. The female body that is magnetized is emphatically identical to the embryonic material that is also magnetized.[18] And thus embryonic material is both reproductive *and* gendered (but not sexed) in the same way that all other living, organic plant or animal material is—it, like *all* reproductive matter and information, is part of a gendered system that aims specifically at integration, storage, and dispersal. Although Buffon does identify these early, coalescing fetuses by sex-as-gender ("some male and some female"), in fact, this identification is in many ways deceptive. Once more, "male" and "female" have nothing to do in Buffon's theory either with embodiment and discourse, on the one hand, *or* with what males and females are supposed to contribute, sexually, to reproduction, on the other. To Buffon, there is no sexual or discursive difference between the two.

Rather, gender is a product of the same desire that Parisi associated with, for example, the relationship between the virus and cells comprising the human organism. "Male" and "female" *happen*, according to Buffon, as living, thoughtful, reproductive accumulations, assemblages, or fields shift into and out of spheres of attraction, as infinite living, material, and informational "molecules" interact with and repel one another, *and as matter or information is thereby replicated and eventually dispersed*. For Buffon, that is to say, reproduction is a systemic or environmental thought process, and gender can be determined only with reference to reproductive operations that trash as much as they create. Furthermore, embryonic material is as reproductive and as gendered (but again, not sexed) as the "parents" that

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ostensibly created it. Not only is gender a set of operations across environments, fields, or accumulations, but it is a set of operations that determine what, specifically, dissipates or gets perpetually stored—and it is equally present in the matter and information that are supposedly reproducing, the matter and information that are supposedly reproduced, and the matter and information that are supposedly by-products of this activity. No part of the reproductive environment is more or less vital than the other. Trash, here, is simultaneously living, reproductive, thoughtful, and gendered.

Many of the commentators and scholars of reproduction or embryology who wrote after Buffon—even as they rejected the apparent equality underlying his theory of female semen—accepted as a given these gendered aspects of the dispersal of matter and information, or of the disposal of waste, within these reproductive, environmental, and eventually informational systems. Hément, writing in the nineteenth century, for example, by no means challenged the model of female sexual or reproductive passivity. Nonetheless, he, like Buffon, made an unexpected case for the environmental quality of gender, for the intrinsic gender of reproductive accumulations, and for the conflation of gender and waste.

Starting his analysis of reproductive waste with an examination of the asexual reproductive activity of paramecia, for example, Hément writes that the splitting of an asexual organism is actually identical to the splitting of a fertilized egg—it is just that the egg retains its unity as it subdivides, whereas a paramecium does not.[19] Hément's purpose in insisting on the *sameness* of sexual and asexual reproduction, however, is not to make a case about the equal viability of each method of replication. On the contrary, his point is that even if "not every animal comes from an egg, [every animal] always traces its origin from a being similar to itself."[20] The question motivating Hément's analysis, therefore, is, narrowly, how to trace origins—or how to project similarity forward. How, he asks, does the viable thing that is truly living and thinking find the lineage that proves its thought and life are real?

Intriguingly, it does *not* do so, as one might expect, by making claims to what might later be termed its genetic inheritance. On the contrary, Hément writes that sperm

> are in the air, they are more or less numerous, they have favored habitats, but they are everywhere. They can multiply themselves with extreme speed . . . [but] their presence in the air does not alter the transparence of the atmosphere more than the myriad of corpuscles that are lit by a sun-

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> beam . . . nothing is born without parents and nearly everything comes from a grain or something analogous to a seed.[21]

Or, as he writes a few pages earlier, the world itself "is a true ensemencement."[22] Hément's purpose in insisting on the flow of sperm everywhere is, once again, if paradoxically, to demonstrate that *linear* sexual reproduction is always more viable than environmental asexual reproduction. Indeed, all life *is* life because it cannot escape an originary (masculine) seed and thus a coherent lineage. Undercutting arguments about spontaneous generation and relentlessly privileging sexual reproduction (with "parents" and "seeds") over asexual reproduction, Hément insists that sexuality, with its links back to the seed, is not only the more effective, evolved mode of reproduction, but the only mode of reproduction in fact available. Even things that may look asexual are, at the beginning, the product of male semen.

Even with his overwhelming emphasis on the lineage of *every* organism, on the crucial importance of discrete parents, and on the communicative-informational activity of semen, however, Hément is, if unexpectedly, also reinforcing an alternative theory of reproduction as contagion and of gender as an operation that scatters waste across environments or systems. By suggesting that the only way to argue in favor of the initiating role of "the seed," for example, Hément is also insisting that such seeds are indistinguishable from the air, or for that matter, from "everything." And he is thus *obliterating* any obvious line between sexually reproductive information transfer and the undifferentiated, random accumulation, growth, and dispersal of all information and matter. In order for linear filiation to occur in Hément's model, life, as a *field*, must be—as it is in Buffon's work—uniformly reproductive, with the seed no more prominent than any other material element.

The image that Hément presents to his readers, therefore, is not the conventional image of a discrete female egg, mapped onto a discrete female womb, mapped onto a discrete female body that is invaded and impregnated by a likewise discrete male seed—an initiating act in a line of nuclear genetic transmission. On the contrary, lineage is possible, for Hément, only if readers take as a given the reproductive and reproducing quality of *all* organic material, material that "reproduces itself" apparently without an embodied platform just as easily and frequently as it does via the more conventional model of *embodied* insemination. Lineage is one narrow function of a much more diffuse process of environmental association, dissociation, storage, and dispersal.

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Indeed, the fact that Hément describes sperm as organic molecules that not only initiate reproduction in an egg, but are themselves reproduced while simultaneously reproducing themselves is arguably not just clumsy phrasing on his part. His point, like Buffon's, is that reproduction cannot be defined as a distinct, singular act that launches a series of links in a linear chain. Rather, both life and reproduction are environmental processes and, in turn, gender—now appearing not just in how the seed is designated, but in how "everything" is designated—is best approached as an environmental thought activity that either stores or disperses this life. In the same way that Buffon presents his readers with a theory of gender as attraction and repulsion across fields and spheres, that is to say, Hément provides his readers with a similar definition of gender as a set of operations that dissipates life. Gender is, once more, a process of ordering and reordering, of coalescing and dissociating, of grouping things and activities into constantly shifting sets of associations, and, most importantly, of storing and dispersing excess reproductive matter and information.

By the end of the nineteenth century, commentators had moved away from the theory of "aura seminalis" that both Buffon and Hément, if critically, seem to accept, in favor of more apparently materialist definitions of reproduction. At the same time, however, gender—and then, more pointedly, "femininity"—remained prominent in conversations about the dispersal of *waste* across reproductive environments. The nineteenth-century American anatomist Charles Sedgwick Minot, for example, while explicitly rejecting the "notion of the 'aura seminalis'" and reminding his readers that "fecundation implied a material contact of the semen with the ova,"[23] also insists, repeatedly, that this shift in perspective by no means leads inevitably to a theory of sexuality predicated on contributions to a single reproductive act. "Sexuality," Minot argues, "is a *relation* of substances or forces,"[24] "male or female sexuality is an intracellular relation of parts, some modification of the interplay of forces within the cells," and there is thus no "visible male or female substance known to the biologist."[25]

In making this case, Minot is not operating in Buffon's world of simultaneously active and passive, simultaneously male and female reproductive work. On the contrary, as much as Minot downplays discrete male matter and discrete female matter in a theory of reproduction that rests on the systemic interplay of forces, substances, and unbounded molecular parts, he also begins to attribute distinct *gender* roles to various reproductive acts and—more evocative, and more reminiscent of later policy literature—distinct gender roles to *styles* of reproduction. According to Minot, for

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example, the "ovum" is gendered female long before it becomes part of a sexual act; in addition, and more to the point, the egg is also "an old cell" moving toward "senescence."[26] The "spermatozoon," contrarily, is gendered male, "a young cell," and therefore not so evocative of death.[27] Sexual reproduction, presented in this way, thus involves not just an interrelation of parts, but an interrelation of parts divided along gender (but, once more, not sex) lines, with "female" linked to age and death and "male" linked to youth and life.

This set of associations becomes more pronounced when Minot explains his emphatic point that "*sexuality is coextensive with life*" and that asexual organisms, for which sexual reproduction "is a secondary and not a primary or essential characteristic of life," are thus not quite as alive as those with distinctive sexes.[28] It is, indeed, not just the case that the sperm is rejuvenating when compared to the egg, but that "the sexual process" broadly defined "is a rejuvenating one" compared to the asexual reproductive process.[29] Minot continues that "this does not prove that *all* living organisms require sexual rejuvenation from time to time," but it does nonetheless suggest, at least, that "it may be that all cells as they divide asexually lose their growth power, so that there comes a time when there must be a rejuvenation or restoration of the growth power."[30]

On the one hand, then, Minot states that it is incorrect to attribute "male" or "female" characteristics to reproductive matter *as* matter. Reproduction is an ongoing set of environmental relations—among forces, substances, and cells—and it has little to do with a particular bit of male body impregnating a particular bit of female body. On the other hand, however, the sexually reproductive act—that is, the single operation, among many, that involves a (male) sperm joining its genetic material to a (female) egg—is superior to other reproductive activity. And sexual reproduction is superior, bluntly, because it forestalls death. The (female) egg, already weak and aging, is rescued by the (male) sperm, young and active, from unnecessary termination.[31] Far from taking the unbounded, environmental thought process of reproducing cells as a model for sexual reproduction (as Hément does), therefore, Minot's analysis goes in nearly the opposite direction. Here one seems to find a conventional (misogynist) statement of the value of sexual reproduction: sexual reproduction is rejuvenating, it forestalls death, and it protects the embodied organism from the weakness and senescence of its old (egg) cells.

But, despite its departure from the work of both Buffon and Hément, is Minot's analysis really such a turning point? Is the shift in focus from reproductive air, space, and environment toward reproductive bodily

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material—even if this bodily material cannot be described as distinctively "male" and "female"—also a shift toward a theory of (proper) reproduction via a single sexual act and (proper) gender as something determined by what a body might contribute, discursively if not biologically, to this act? Arguably it is not—and indeed, a careful reading of Minot's claim concerning the rejuvenating quality of sexual, as opposed to asexual, reproduction—can help readers to rethink variations on this claim as they reappear over the twentieth and twenty-first centuries, and especially as they appear in conversations about the value, or lack thereof, of aging, dying reproductive material in the trash.

Once again, when Minot writes, first, that "male or female sexuality is an intracellular relation of parts, some modification of the interplay of forces within the cells," he seems to be making the case that "male" and "female" have only to do with what they contribute to reproduction—even if this sexuality cannot be fixed to any body. While doing away with embodiment (if not matter) and making a useful case for sexuality operating across fields or systems, Minot seems to be maintaining *gender* as a set of assumptions about what differently sexed-as-gendered bodies can give to the reproductive act. Moreover, underlying Minot's argument is, to repeat, the idea that "sexuality is coextensive with life." If something is not sexual—if, say, its reproduction is a thought process or identical to eating, as it was for Leuckart and others—then, Minot implies, it is not quite alive. Unlike sexual reproduction, which has to do with youth and life, asexual reproduction evokes old age and death.

But Minot draws from this disembodied, material, and yet conventionally gendered theory of reproduction a series of unexpected corollaries. Indeed, it is in the seemingly most misogynist of his conclusions—that the female is death—that Minot's theory of gender becomes unexpectedly productive and multifaceted. Once again, by insisting that when female and male come together in a sexually reproductive act, the male (sperm) is rejuvenating whereas the female (egg) is old, weak, and dying, Minot is adding an additional gender dimension to the story of asexual as well as sexual reproduction. He is explicitly denying a one-to-one correspondence between female sex and female gender by privileging "death" as the defining characteristic of the "female." He is suggesting, in other words, that both the egg *and* the asexually reproducing organism—which dies *as* it reproduces—are "female." And, in this way, Minot is theorizing a reproductive activity that is unquestionably *gendered* but, since it is asexual, never sexed "female." Minot insists that asexual reproduction—making copies and throwing them away—is a *gender*

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operation but not a *sexual act*. And this definition of asexual reproduction is as useful as it is troubling—not least because it brings home the inherently misogynist, *as well as* homophobic, nature of, for example, anti-cloning rhetoric.

Indeed, by insisting that both asexual reproduction and the sexually reproductive activities of a "female" egg evoke death rather than life, Minot and those who followed him are offering to their readers a surprisingly broad-ranging definition of femininity as a process. To the extent that the "female" has anything do with sexual reproduction, after all, it cannot be, given this formulation, what the "female" does or does not contribute to the reproductive act. On the contrary, female gender—detached, again, from sexuality—is more general than that. Femininity, for Minot—and, again, arguably for those who continue to associate the female with asexual reproduction—is instead the process of disintegration and dispersal that organic death in the form of splitting or telomere shortening entails. Death-as-female here results *specifically* from replication-as-female. And female gender is thus in turn an operation that evokes death and unviability (or at least the death of the sexually reproductive embodied organism) *because* it coalesces as it disperses, because it stores as it copies.

As misogynist as this association may seem (and, again, it continues to appear in work on the merits of sexual versus asexual reproduction in a variety of contexts), therefore, it need not be read as such. Once again, disintegration or dispersal (of the organism, or, given EU legislation on cloning, the species) looks like death only to an embodied, sexual, potential subject. Minot himself, if again paradoxically, argues against such a narrow interpretation of life or reproductive activity. Reproductive activity—to Minot as well as to earlier commentators such as Buffon and Hément—is not a way to make ever more distinctive bodies. Instead, it is, once more, as much an intellectual as a material activity, a process that shifts living, thinking systems writ large. Moreover, not only does reproduction shift these fields, it also copies and replicates them. That this inherently political activity should take on gender dimensions is perhaps inevitable—but that the value of these gender operations should be linked solely to their potential to form *unique embodied subjects* is not.

There is, then, once again, more to gender even in a work like Minot's than what a discrete organism can or cannot do to or with other discrete organisms—biologically or discursively. Gender is repeatedly—and, frequently, despite the conclusions surrounding it—a series of integrations and disintegrations across fields. Gender happens as a result of systemic shifts toward and away from coalescence. Or, put differently, Buffon,

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Hément, *and* Minot all define gender as a series of attractions and repulsions, integrations and disintegrations, replications and storages—the production of waste—across accumulations of matter and information. It is true that death and age did not concern the earlier writers as much as it did their later nineteenth- and twentieth-century counterparts. But the entry of death and age into their conversation—along with the end of the "aura seminalis"—does not spell the end of their theory of gender. If anything, it demonstrates how this theory of gender *as* waste can extend in unexpected, and unexpectedly productive, directions across centuries and in fact into the contemporary period.

But what about waste in the early twentieth century, then—what about reproductive material and information that fell into the trash more recently? One, perhaps self-evident, characteristic of this reproductive material or information was that it ordinarily became waste because it was politically, if not necessarily biologically, dead or unviable. A second, less self-evident, but nonetheless important aspect of this waste is that it was likewise politically, if not necessarily biologically, frequently gendered female. And finally, a third and fourth set of qualities attached to this waste were, one, that its death did not at all preclude its ability to reproduce itself and, two, that its unviability by no means disqualified it from relating to gender. Far from it: given the uncanny ability of trash of all kinds to persist in flourishing even as it disintegrates and disperses, even *as* it becomes unviable, it is quite pointedly reproducing, and just as pointedly performing its gender.

A common, and not invalid, response to these various aspects of trash—and in particular reproductive trash—in the contemporary political landscape has been indignation that things frequently defined as female are devalued as trash and death whereas things frequently defined as male are celebrated and valorized as life. But this response has not been the only one available to observers. Another approach to the strange twentieth-century flourishing of waste was to situate it in a politics of nonhuman life as thought, and thereby to realize that "trash," writ large, was a complicated ethical and political category of analysis—a category that need not immediately provoke indignation.

Once again, and obviously, a conventional twentieth-century definition of trash is that it was the stuff that was not valued. But recent as well as historical evidence from a variety of fields—ranging from information theory to architecture—refutes this inverse relation between waste and value. Indeed, within the narrower realm of reproductive disposal, within stories of embryos and fetuses that were disposed of, stored, incinerated,

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or rejected, there is ample support for the idea that, more often than not, "trash" was a politically productive concept—a term that hinted at a healthy and useful interaction between gender on the one hand and mass democratic engagement on the other.

Şakir, for example, troubling though his writing—especially on these topics—may be, is as helpful in starting this exploration of the modern politics of trash, gender, and reproduction as Buffon was in initiating a discussion of eighteenth- and nineteenth-century literature on life and the disposal of matter and information. In particular, Şakir's analysis of how to determine the cause of "death" of aborted or miscarried fetuses or stillborn infants—and how, in turn, to distinguish between reproductive or maternal bodies and reproduced or infant bodies—is a useful entry point for thinking about reproductive trash in modern, twentieth-century democracies. Not only is Şakir's work overtly political—a set of lectures that aims specifically at integrating reproductive trash or waste into an early twentieth-century positivist criminal law system—but it also highlights the complexity of the role of this waste, as a *gendered* political actor. Indeed, within Şakir's conventional story of maternal feminine bodies and criminal women is a sophisticated analysis of reproductive waste that replicates, stores, and disperses *itself*, and that in the process becomes a fundamental, and fundamentally gendered, democratic operation.

On the subject of criminal versus not-criminal prenatal or fetal death, for example, Şakir writes, first, that the conditions of a woman's ovaries will not provide any proof of a recent abortion, and so it is not helpful to try to find evidence of culpable fetal death across solely reproductive maternal bodies.[32] Similarly, however, in a lecture that addresses the use and abuse of fetal autopsies, especially when fetuses or newborns are discovered with crushed skulls, with mutilated bodies, or having been immersed in toilets or sewers,[33] he writes that "there is no difference between spontaneous, natural amputation/abortion and criminal amputation/abortion," nor is there any way to distinguish between criminal mutilation and cephalotripsy and craniotomies of stillborns.[34] It is thus, according to Şakir, just as difficult to find evidence of legal guilt with reference to reproduced bodies as it is with reference to reproductive bodies. Bodies, in short, regardless of whether they are adult or prenatal, are a nonstarter in the political realm to which Şakir is seeking to contribute.

As a result, Şakir speculates that it might be more useful for his readers and listeners to think about how fetuses, embryos, or newborns might be *destroyed*, as matter or information, and to try to develop a coherent medical-legal framework of inquiry from there. With this thought in

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mind, he engages in an extended discussion of both the "incineration" of newborns and their disposal in cesspools, toilets, and sewers. He asks, for example, whether "burning or incinerating a child is a difficult and extended task." In answering this question, he goes into some detail about the steps a perpetrator must take—hypothesizing, for example, that burning will last as long as the "dried and desiccated corpse" has "soundness and energy." Or, in any case, he concludes, the corpse must be treated for at least longer than a half an hour, especially without chemicals, and the oven must never be opened because an open door can both compromise the task and produce "bad smells." If the incineration is undertaken properly, though, it is very possible to accomplish, and indeed, even a "servant girl" who may have given birth "secretly" can easily do it.[35]

Şakir's discussion of disposing of newborns in sewers, toilets, or cesspools, as opposed to ovens, is less hypothetical—based on specimens to which he had access. He writes, for example, that he once examined a male newborn child, of around 1.25 kilos, that had been immersed in the bottom of a sewer. The cranial bones were scattered but showed no signs of crushing or refraction, the body was decomposing, the trachea artery seemed healthy, the head and heart were filled, although the condition of the blood in the heart made it clear that the immersion could not have been an accident. The stomach and liver contained air and were rotten, the intestines were occupied by a thick, filthy material, and many of the body parts were similar to yeast. The child, Şakir concludes, had likely been in the sewer for around a month.[36]

There is nothing about these stories of the disposal of waste of reproductive material—and how a medical expert working for a legal establishment might evaluate it—that suggests a celebration of the transformation of this material. They are shocking—and readers, depending on their ethical stance, may find Şakir's narrative ghoulish rather than informative. Moreover, Şakir's cold calculation of whether an expert might effectively read signs of guilt on an inert woman's body, not to mention his references to the practices of "servant girls," seems not to lend itself to a particularly sophisticated theory of gender *or* waste. The text is, unquestionably, and at the very least, an attack on women as political subjects.

At the same time, however, there does seem to be at least the beginning of a useful interpretation of gender, reproduction, trash, and law underlying his analysis that may be worth exploring—a theory that in fact weakens the political force of the assaults he is launching against Ottoman women citizens. In particular, if one considers how Şakir understood the role of the medical expert in relation to the trashed reproductive material

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and information that is his interest, one can begin, at least, to draw from these stories a theory of gender, waste, and life that links Şakir's writing both back to earlier work on reproductive environments and forward to ongoing permutations of nonhuman life and thought in contemporary mass democracies.

Şakir's self-appointed challenge, as a medical expert, for example, is to determine whether the disposal of reproductive material is valid or not—whether a crime has been committed. It is to determine whether the fetus, stillborn, or infant was or was not properly designated "trash." If it *was* trash, unviable, and already dead, then the legal system could not find as much guilt as it could if the material was not trash—viable before it was destroyed. At the same time, though, Şakir's repeated conclusion is that—as important as it may be to make a determination of "trash" or "not trash" for the purposes of trials—doing so is next to impossible. Given the evidence he analyzes and his speculations resting on this evidence, both everything *and* nothing in the reproductive realm is, *and* is not, trash.

Moreover, Şakir is particularly convinced of the impossibility of making this determination because, first and foremost, there is no distinction between a fetal and a maternal body. He deliberately conflates, for example, "abortion" and "amputation" throughout the text, as well as the "natural" and "unnatural" injuries that might occur during and after birth. Even during birth or labor, Şakir cautions against politically or legally separating reproducing and reproductive bodies into discrete units. And the extent to which reproductive material can be understood only as a manifestation of a more general, unbounded, environmental material or informational assemblage or accumulation becomes most pronounced in Şakir's universe when he shifts focus to the actual disposal of fetal material. There is, in short, paradoxically, *no* death or waste, as it is conventionally understood, in this discussion—any more than there is a distinction between or among reproducing and reproductive fields. Even as Şakir describes the fire, water, and sewage into which this simultaneously reproducing and reproductive material and information might be introduced, he is very much echoing eighteenth- and nineteenth-century writing on waste or trash as dissociation, storage, or dispersal.

Şakir's primary concern throughout his discussion of incineration, after all, is not whether or how the infant died, but whether and how the *fire* will die—the *connection* between the life or "energy" of the fire and the life or energy of the "corpse." The fire, once again, will last, Şakir writes, as long as the corpse is "sound" or "has energy." Even the dead body, that is to say, ought to be evaluated, according to Şakir's analysis, with reference

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to what it may or may not release into its environment, or as part of an environment. In the scenario that Şakir presents to his readers, *nothing* is ever *finished* as a living system. Nothing is ever wasted. Rather, things, systems, and accumulations are always living and always processing—and they are living, in large part, because Şakir cannot distinguish among maternal, fetal, and environmental reproductive matter and information.

Or, put differently, the reason that medical experts cannot determine what might and might not be trash is not that women's bodies, as discrete organisms, are unruly, mute, or keep their secrets. On the contrary, it is that—*as* "the servant girl" simultaneously gives birth and incinerates the corpse—there is no waste to destroy. Şakir insists that *if* legal and political structures take reproduction seriously, there can be no such thing as trash—and hence no possible determination of embodied, subjective guilt *or* innocence. Rather, in the place of a wasted subject or body, there is a system or an accumulation—and indeed a system that quite explicitly cannot distinguish among the "girl," the reproductive material, and, for that matter, the fire.

The extent to which trash is an impossible category to determine when politics takes life and reproduction seriously becomes even more pronounced in Şakir's analysis of the "child" left in the cesspool for a month. Although Şakir *does* determine intent in this case via a reading of the corpse (the body was not in the sewer "accidentally"), he does not make any determination about the deliberate taking of life. Indeed, once again, although one can easily read Şakir's painstakingly detailed description of how the body decomposed as the ghoulish gratification of the active expert objectifying the passive dead "child" in the name of cognitive truth, there are other interpretations of this text available as well. The purpose of taking stock of each of the body parts or organs, *and how each has changed*, for example, seems to be less to search for the truth of life or death than to determine the nature or quality of the decomposing body as trash or not trash. By noting that there was air in the liver and stomach, filth in the intestines, and blood in the heart and brain, Şakir is suggesting that what happens in the sewer is not *just* decomposition or disintegration. Rather—as organs and body parts gradually begin to resemble and copy one another as well as their environment—it is to suggest that the body is also replicated.

Şakir, in short, is not simply making a case about entropy or decay here—about the work of stored and potential energy. Instead, "waste" in this context means, quite narrowly, *relations* of replication and copying—it means becoming food, yes, but also more than that. The child's body in the

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sewer both copies itself and copies its environment—as well as environmental information. Rather than death or waste, therefore—even in this most tasteless of narratives—Şakir is presenting his readers with a variation on reproductive *life* and *thought*: life and thought, however, that integrate, reintegrate, replicate, disperse, and dissipate. Even in this ghoulish system, what is in the sewer cannot be waste. The sewer is instead a space of storage and copying—the processes that both Şakir's contemporaries and those scientists and policymakers who followed him associated specifically with "female" asexuality, with splitting and replication. Implicitly, therefore, the reason that a medical expert *should* have difficulty determining guilt or innocence—trash or not trash—in this context is that a human-centered legal system cannot coherently address the environmental, *gendered* reproductive activities that, Şakir suggests, must concern any democracy that purports to take life seriously.

The (Neutralized) Threat

The trope of reproductive material trashed or made into waste remained pronounced throughout the twentieth century, and indeed it is a staple of media reporting today. Once again, though, even as waste appears in this literature as one of the most persistent assaults on democratic engagement—or, more narrowly, on the embodied democratic citizen—it also becomes gradually more ethically complicated, more a commentary on the play of nonhuman gender operations across democratic fields and environments than a cautionary tale about matter (inappropriately) displaced. Republican Turkish newspapers, like newspapers in other parts of the world, for example, repeatedly remind their readers of the constant, lurking threat that reproductive garbage, especially, poses to recently formed or potential human beings—but then these newspapers immediately redefine or neutralize this threat as a nonhuman set of gender operations resting on a specifically "female" asexuality or "female" replication. The result is a contemporary narrative that very much reflects the three-century history of rubbish as gender that appeared in the first part of this chapter.

A sample of four articles—from 2003, 2007, and 2010—will help to illustrate this gradual shift in focus from human-centered concerns about legal guilt, subjectivity, and the products of reproduction to nonhuman issues such as the gendered play of waste across reproductive environments and systems. In each of these articles—on fetuses found in the trash, in the post, and in cemeteries—the initial concern presented to readers is the

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guilt or innocence of human political subjects and the violence done to actual or potential human citizens. At the same time, however, each story also seems to be grappling with the same *absence* or *evaporation* of trash that concerned Şakir and those who preceded him. Moreover, each seems to find in the trash evidence that a democracy that takes reproduction seriously cannot take waste as an intuitive given—and that such a democracy must also accept the role that gender plays in making trash a thoughtful political actor.

In the first article, "A Scandal of a Fetus in the Trash," journalist Fatih Karaçalı writes that the broken skulls and brains of ten stillborn infants and fetuses had been thrown in the trash of Çukurova University hospital in Adana after their internal organs had been removed. The researchers in the pathology department of the University explained in response to this discovery that their policy was to destroy [*imha*] the "old" stillborns and fetuses after a waiting period, and also whenever new specimens arrived.[37] In a second article from 2003, Eraydın Aytekin identifies a similar scandal surrounding the inappropriate use of reproductive material. Here, the issue is a six-month fetus, found in the trash in Sivas, and then sent for an autopsy, via the post, to the Forensic Medical Institute in Istanbul. The Turkish postal service, Aytekin notes, upon being questioned about its activities and about whether it had any comment on the scandal, stated that its "duty was to deliver the parcel, sealed and packaged, to its recipient," making no comment on the parcel's contents.[38]

Journalist Seçkin Kırarslan added a new dimension to the story of inappropriately treated reproductive material with a third article on a fetus found in a cemetery. Here, police investigated after a dog dug up what appeared to be fetal material in a graveyard. The state prosecutor then ordered that the fetus be taken from the cemetery to the state morgue. The investigation into the "mother," from whom the stillborn fetus was removed via cesarean section, and who then apparently buried the body in the cemetery, the article states, was continuing.[39] Finally, in 2010, reporters revisited the conventional narrative of the fetus (simply) placed in the trash. In an article from January of that year, readers learn that scrap/salvage dealers in Maltepe stumbled upon a five-month-old fetus, wrapped in a bag, and placed in the trash under a bridge. They alerted police officers, who arrived on the scene and then transported the fetus to the local Institute of Forensic Medicine.[40]

Once again, all of these articles lend themselves to straightforward, human-centered analysis. Something with actual or potential political

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existence (the fetus or newborn) is denied this existence because it is either instrumentalized prior to destruction or because it is simply destroyed. The issue at stake in the reporting seems to be the lack of respect, especially given the initial instrumentalization of the fetus in many of the stories, that guilty humans display in their inappropriately destructive behaviors toward other (potential) humans. The ethical or political problem is that things emphatically *not* trash—and clearly viable—are treated, inappropriately, as waste.

But if the lessons to be learned from these stories are so self-evident, why do they continue to appear with such regularity in the global media, and why do they garner such constant public attention? How can they continue to be news—continue to have political value in the public sphere—when they are so repetitive and so obvious? Again, these four stories are a small sample of examples from an enormous global archive of writing on the subject. One answer to these questions is that these stories are not as obvious as they appear to be—and that they are about more than potentially living human things that are criminally destroyed. Perhaps, indeed, the reason that the reporting resonates is that it is describing something that, disturbingly, *cannot* be destroyed. It may be that the media stories are actually about things that *evade* any association with trash, conventionally defined, at all.

Moreover, the reason, in these articles, that reproductive material cannot become trash may be not just that the fetal material or information is rescued and turned over to labs and courts that might reinvest it with its proper political status. On the contrary, there is a strong suggestion in this literature that this second step—whereby the reproductive material becomes political again in the human sphere—is in fact irrelevant to contemporary mass democratic practice. These stories, in other words, seem far more to be about living, reproductive material that never lost its political existence to begin with. They are about trash that never was trash, but rather a manifestation of some other, alternative, political, reproductive environment.

Consider, for example, the three modes of disposal that suggest "waste" in these scenarios—material kept in biohazard containers outside of hospitals, material traveling in the post, material buried superficially in a cemetery, and material placed in a dumpster under a bridge. Of these, the problem of the cemetery as, emphatically, *not* a place of rest may loom largest. Indeed, one could easily speculate—given that the material is *removed* from its burial spot—that respect due to the *dead* is not at all the issue at stake in these stories. Here, after all, the matter, via its removal, is

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designated quite explicitly as *not dead*. Cemeteries are for dead things, and reproductive material does not belong there. But, if it is not dead, then what is it?

Given what it does in the second article, one thing it is, is moving—in this case, like Gabrys's spam or junk mail, through the postal system. Indeed, although the chilling nonstatement of the postmaster could be read as a classic example of instrumentalization—of objectifying something that should be respected as a (potential) subject—there are also other ways of interpreting this passage. With the reference to "duty," to facilitating flow, regardless of what objects are flowing, for example, the postmaster could instead be recognizing the hyperbolic political *value* of the packaged material, of being part of an information system. What matters politically, in other words, may *in fact* not be what is in the "packet," but rather that the packet, just like other material and informational packets in physical and digital systems defined more by their waste than by their content, is mobile and connected. The postmaster could thus very much be highlighting the simultaneity of functional reproductive environments and functional informational environments.

Or, finally, there are the two conventional stories of trashed reproductive material—the first describing the scandal of bits and pieces of fetuses found in containers, with their "useful" body parts removed, and second concerning the decomposing five-month fetus put in a sack in a dumpster under a bridge. If the story of reproductive material removed from the cemetery suggests that such material is not in fact dead, and if the story of the reproductive material in the post suggests that its political value lies in its movement throughout material or informational systems rather than in its potential to become a discrete, embodied citizen, these last two stories take the argument further—making clear, for example, that Şakir's initial speculation that the term "waste" might be replaced with "replication, reproduction, or copying" remains valid in contemporary legal and political conversations as well.

Once again, of particular horror to the reporter in the first story is the fact that the brain matter and the crushed skulls of the fetuses were in containers outside while the useful organs were still being stored in the hospital. The ethical problem identified by the article, in other words, was not just the problem of instrumentalization but the problem of instrumentalization via completely inappropriate *taxonomy*. Rather than recognizing the ten fetuses or infants as self-contained, embodied individuals, each with a discrete set of organs and body parts, the medical researchers instead grouped this reproductive material by organ *type*. Instead of identifying

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the material and information as potentially productive of ten unique human bodies, they instead concerned themselves with ten skulls, ten sets of brain matter, and ten of each type of internal organ. The horrific aspect of the story was thus primarily the fact that the unique, nonreplicable quality of every individual body was demonstrated to be a fantasy—it was the fact that all bodies, and especially all reproductive or reproduced bodies, are very *much* subject to copying. There were ten identical hearts, livers, sets of kidneys, and other body parts—and the disappearance of ten discrete human beings in this organizational process was largely forgotten.

"Waste," therefore, gradually comes to mean in these articles very narrowly and specifically "replication," "copying," or "storing" in exactly the same way that it meant "copying" for Şakir, or for that matter, Buffon. The problem with the garbage heap is not that it is a place where political and biological life is extinguished. On the contrary, and as Parikka, Gabrys, and Fuller and Goffey have all stated in different contexts, the garbage heap is a place where an alternative mode of political and biological life becomes possible—one that allows for growth and flourishing via integration and disintegration, replication and storage, a growth and flourishing that scientists and commentators at least since the late nineteenth century have associated with gender, and more pointedly with "femininity."

Indeed, the last article, concerning the scrap dealers finding a fetus in a bag in a dumpster under a bridge simply reinforces this gendered framing of trashed reproductive material and democracy. Here, after all, there is a discrete, seemingly embodied potential human citizen—and the argument driving the article is that the very thing that had apparent value to cold medical researchers (who desired its internal organs) does not have value to scrap dealers. But why would scrap dealers, especially, not find the reproductive material something worth selling? Why does reproductive material not count as "salvage"? One answer to these questions is that the primary purpose of finding and selling scrap is (metaphorically—or actually, as in Gabrys's discussion of the oddly nonlinear narrative of salvage) to breathe new life into trash—to renew it or to make it as valuable as it once was. Scrap dealers look through the trash for things that still have *embodied* life in them—that can continue to have the same identity they had before being thrown away.

Trashed fetal material, though, cannot, it seems, be part of this process. Environmental reproductive activity of this sort, again, does not maintain preexisting material or political borders, boundaries, or identities—it disrupts these boundaries as it grows, accumulates, replicates, and dissipates. Reproductive material cannot be salvage; it can only be growth. There is no

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body or subject to save—all that remains are the "female" data and matter that continue to conflate growth and information transfer. As these four samples from the enormous archive of media reporting on fetal material in the trash make clear, therefore, there can be, again, in fact no trash in a mass democracy because biological life, political life, political value, and specifically gendered political engagement all continue unabated—despite the *irrelevant* work of the figures in the forensic pathology labs who rescue these abused fetuses.

Moreover, this attitude toward reproductive material or information, waste, and gender becomes, if anything, more pronounced in writing that grapples with embryos or stem cells rather than with fetuses and newborns. Contemporary legal responses to the disposal of embryonic material, the medical establishment's determination of how and when this material might be used, stored, or destroyed, and the bureaucratic practice of actually storing or trashing early embryos, indeed, all make sense *only* when framed in the theory of trash and gender that this chapter has been elaborating. Each set of processes rests, if implicitly, on the idea that there is no such thing as waste, and that, instead, in a democracy of life and thought, there are only gender operations that copy, replicate, and store. Each of these flashpoints in bioethical and political debate is a problem of gender, reproduction, and environments *rather* than of sexuality, identity, and bodies.

Emine Elif Vatanoğlu-Lutz, for example, has discussed in some detail how Turkish legislators have responded to the problem of trashed embryonic material—especially in the context of the 2003 Biomedical Convention of Oviedo.[41] According to Vatanoğlu-Lutz, neither the Oviedo convention nor Turkish law is sufficiently aware of the complexity of fetal or embryonic existence. Turkish law, in particular, limits the definition of the "person" who is protected from scientific experimentation (or, more broadly, instrumentalization) to those who have developed beyond the embryonic stage. Embryonic material, in turn, is covered only by regulations pertaining to tissues and tissue transplantation.[42]

Vatanoğlu-Lutz finds this situation troubling for two reasons, both of which relate to the problem of "human dignity." First, embryonic or fetal material might be "used for the pharmaceutical industry" and hence promote the use of "human body parts for financial gain."[43] Second, by associating fetal material with ordinary organs or tissues, the law as it stands "allows people who discriminate between male and female children to terminate undesirable gender fetuses."[44] In short, then, failing to endow embryonic material with political dignity—and, more so, treating it as

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transferable (or disposable) "tissue"—threatens to instrumentalize *and* commercialize human body parts as well as to allow for the death and disposal of female fetuses.

French legislation on the disposal, transfer, and storage of embryonic material plays on similar themes. As Stephanie Hennette-Vauchez writes, French law *has* historically granted embryos respect as "human beings," if not as "persons"—and hence, throughout the 1980s and 1990s, they could be political subjects, but not subjects of criminal law (i.e., they could not be protected from something called "homicide" even while assaults on them could be identified as crimes against the human species).[45] By 1994, however, the law became more complicated, reaffirming the dignity of "all human beings—save in vitro embryos."[46] By 2004, the French government had begun to authorize research conducted on embryos, "albeit on the basis of a temporary exception to the prior prohibition rule."[47] Hennette-Vauchez speculates that the primary reason for this new openness to instrumentalizing embryonic material was "semantic"—"the very moment the debate was presented as being about 'embryonic stem cells'—as opposed to 'embryos'—coincided with the vanishing, or the successful silencing, of much of the reluctance and opposition that had been central to bioethical debate in France over the last 10 years."[48]

There are, though, a number of qualities that embryos in France must possess before they can be given over to research. As Hennette-Vauchez continues, embryos subject to research "cannot be created solely for research purposes," they must be the product of "assisted reproduction protocols," they must be "spare embryos" rather than embryos conserved for implantation in a womb, and they must have undergone "preimplantation diagnosis" suggesting that they could *not* be implanted in a womb.[49] Evoking the late twentieth-century distinction in French law between embryos in a womb that had dignity and embryos in glass that did not, this new set of distinctions thus also creates what appears to be a clear-cut definition of what can and cannot be used and trashed. In essence, reproductive material becomes "spare" when it has failed to attach itself to a womb and when it has failed to develop in the direction of embodied, human personhood.

This approach to the use, transfer, and disposal of reproductive material seems very much at odds with one last example of a state regulating the treatment of embryos. According to the U.S. state of Louisiana's law, every IVF embryo is *both* a "human" *and* a "juridical person."[50] As a result, reproductive material in Louisiana can never be destroyed, it can *only* be stored. As Susan L. Crockin puts it, "The embryo cannot be owned or

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destroyed by either the 'in vitro fertilization patients' who created it or the clinic, which may be deemed a 'temporary guardian.'"[51] This interpretation of the legal status of the frozen embryos creates a situation in which "unused IVF embryos" must be "placed" with another family, even as they cannot be owned, used, or wasted. Here, therefore, storage, transfer, and placement appear to be the antidote to the ethical problem posed by trash.[52] If the embryonic material and information is stored, then it is not at risk of becoming garbage.

Once again, these three interpretations of the ethical and political problems posed by embryonic material that is not growing in a womb seem to be operating very much in opposition to one another. Although each appears to take the embodied human subject as its norm, each also draws wildly different conclusions as to how reproductive material might conform or fail to conform to this norm. In the first, Turkish law associates embryonic material almost completely with transferable and disposable (if not owned) organs and tissues—a situation that Vatanoğlu-Lutz finds inappropriate because it instrumentalizes potential human beings and reinforces gender-based violence. In the second, French law differentiates between, on the one hand, reproductive material that is, or that can be, implanted in the womb and, on the other, reproductive material in glass or in a laboratory that is spare. The first type can be stored or transferred but not used or wasted. The second type can be used or wasted but, by definition, not stored or transferred. Finally, Louisiana's relatively idiosyncratic law protects embryonic material, regardless of its provenance or environment—glass or womb—from *ever* becoming garbage. This material cannot be owned, it certainly cannot be destroyed—it can only be transferred or, more commonly, stored in increasingly elaborate "guardian" facilities.

At the same time, though, shifting focus away from how embryos themselves are defined in these laws and toward how *trash* is defined leads to some different conclusions about the similarities and differences between or among Turkish, French, and Louisianan policy. In particular, it becomes apparent that these laws are by no means taking the embodied human subject as their *only* norm. Indeed, in their less human-centric expressions, each is in fact postulating the existence of a series of politically vital gender operations that *are* gendered because they copy, replicate, and store rather than waste. Consider, for example, Vatanoğlu-Lutz's nightmare scenario—the embryo or fetus aborted because it is female. Once more, the point here seems to be straightforward: that unjust or violent structures are a problem for everyone, but they particularly threaten women or girls. The

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law that fails to recognize the dignity of embryonic material is damaging to all embryos, but it is more pointedly damaging to embryos that are sexed, and thus gendered, female.

But what is this damage—this process of trashing—that might be done to the female embryo? In essence, it is that the classically sexed-gendered female figure is made identical to tissues or body parts that circulate throughout wider living systems. The damage to this embryo, in other words, is that it is identified with organs. It is deemed "trash" not because it is disposed of per se but because it is so easily extracted, separated, categorized, copied, and transferred across environments. The classically sexed-gendered female embryo is damaged, that is to say, because it is embedded in disembodied, but nonetheless material, living fields. The threat here is a threat, therefore, as much to classical notions of sex and gender as it is to any particular potential human being.

Or, put differently, Vatanoğlu-Lutz's nightmare scenario *is* a nightmare only because the classically gendered female embryo is always on the verge of functioning across a system rather than as a body—always on the verge of being informationally and materially sorted, copied, and stored. And this transition into systemic rather than embodied operations represents an assault, Vatanoğlu-Lutz argues, on the embryo's dignity. The threatened female embryo as Vatanoğlu-Lutz describes it is, indeed, in no obvious way different from, say, Hément's or Minot's paramecium. Hément and Minot both mobilized the reproduction of the paramecium in order to detach gender from sex, and then associated gender simultaneously with death and sexless replication, with making copies. Vatanoğlu-Lutz's analysis of the female embryo that tragically becomes identical to tissues or organs likewise detaches gender from sex (once it is made a body part, it no longer has a sexual identity) and associates this material with an asexual, but nonetheless gendered, system of death and replication (that is, organ transplantation). The female embryo becomes *trash*, therefore, once again, specifically when it loses its sexual identity and enters an alternative, gendered, material, but disembodied field of copying, storage, and transfer.

This situating of trashed reproductive material in gendered but not sexual environments or systems becomes only more pronounced in the French and Louisianan laws, where trash is, first, reproductive material in glass, and second completely replaced by storage. In France, for example, just as in Turkey, an embryo becomes trash when it is no longer part of a maternal body. It is true that in Turkey, at least according to Vatanoğlu-Lutz's analysis, the clue that an embryo has become trash is that it is determined to be no different from organs or other tissues, whereas in

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France, the clue that an embryo has become trash is that it has "failed." But the French assumption—that what *makes* the embryonic material a failure is that it is not going to develop into an embodied person—is identical to the Turkish assumption in its results, in that being designated "trash" in both cases means becoming a tool for therapy or therapeutic research. Indeed, in France, just as in Turkey, becoming waste clearly does not mean being thrown away but rather being recontextualized as information or material that can be stored, copied, or transferred. It means, in short, an evasion of classic, embodied sex-as-gender, and an embrace of environmental gender operations that flourish in the absence of sex. The fact that Vatanoğlu-Lutz's argument deemed this evasion an assault on dignity, whereas the French law deems it a failure, does not alter the fact that it can also be, as the previous chapters have demonstrated, a politically vital state of existence.

Given the complex afterlife of these reproductive by-products, the fact that Louisiana's law and practice do not even admit the *possibility* of reproductive "trash" thus makes a great deal of sense. If anything, Louisiana's policy is very much in keeping with other legal and political attitudes toward embryonic material. That Louisiana's storage facilities for frozen embryos become the "guardians" of these embryos, for example, is arguably not a parody of some proper, affective mode of maternal care so much as a recognition that *all* reproductive material, reproduced *or* reproducing, is, by virtue of its environmental rather than embodied qualities, also gendered and political material. An inheritance of three centuries' worth of natural scientific literature that explicitly genders reproductive environments but not bodies—that associates femininity with replication and storage—Louisiana's policy on embryonic material, alongside its Turkish and French counterparts, makes apparent that reproduction without gender, and without gender as a series of environmental operations, is impossible. It also suggests, with its embeddedness in fraught American party-political debates, the politically resonant idea that *all* systems—anything that stores, copies, or translates—are, necessarily, reproductive, thoughtful, and gendered, if rarely sexed.

Conclusion

In a mass democratic framework that takes both life and thought seriously, then, trash is, at best, an elusive concept. One might begin to define it, however—at least in its reproductive manifestation—as any reproductive matter or information that is no longer bounded or embodied and that no longer lends itself to simple identifications of sex-as-gender, gender-as-

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subject, or product versus by-product. Trash, generally, as the burgeoning scholarship on rubbish has already begun to theorize, is what happens when reproductive matter and information enter into completely alternative taxonomies, when they are grouped by activity, purpose, process, or relation rather than by bodily boundary or identity. It is also what happens when they cease to map onto a single organism and instead disperse, coalesce, and disintegrate across informational and material systems. In short, trash, and more pointedly reproductive trash, is what happens when reproductive matter and information cease to relate to sexed, unitary, rational bodies or subjects and instead relate to gendered processes of integration and disintegration, copying and storage. The slime and data that fall into the trash, *becoming* trash, therefore, are not only biologically reproductive, not only informationally reproductive, but *politically* reproductive—and politically resonant.

Moreover, this trash—which is obviously not trash in any classic or conventional way—is emphatically without dignity. Like clones, trashed reproductive material is something that must be carefully monitored and regulated by human-centered democratic states. But the reason for this monitoring and concern is arguably not, as it initially seems to be, that reproductive trash, like cloning, endangers the existence of potential human citizens. It is not that things that could be or become humans or persons might horrifically and inappropriately be designated as waste. Rather, it seems to be more that reproductive trash, also like cloning, highlights a flaw in human-centered democracies that claim to concern themselves with reproduction, not to mention life and thought.

Whereas clones held out the possibility of a healthy, nonhuman—and *un*dignified—mode of political engagement, however, reproductive trash holds out the possibility of a similarly healthy, nonhuman, and undignified mode of *gendered* political engagement. Reproductive trash, when taken seriously, makes clear, first, that there is actually no such thing as trash, per se, in a proper democracy, second, that gender can and perhaps should be reinterpreted as a series of disembodied systemic or environmental processes in such a democracy, and, third, that all democratic systems and networks are both reproductive and gendered. Reproductive trash highlights the centrality of gender and reproduction, if not, again, sex, within *any* contemporary mass democracy that purports to value thought *or* life. The problem is not that some people might be labeled trash. It is that trash is more political than people.

It might be helpful, in fact, to anchor this chapter with one last concrete example of how clones and reproductive trash together showcase both the fragility of human-centered politics and the sturdiness of nonhuman dem-

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ocratic engagement. With that in mind, much of the anticloning legislation of the early 2000s was particularly concerned with the problem of cloned human-nonhuman hybrids. The language on hybrids and hybrid gestation in these texts was frequently hyperbolic, threatening extensive prison sentences and enormous fines to any researchers who attempted such experimentation.[53] Moreover, the activities that were deemed most emphatically criminal were placing human embryos in the bodies of nonhuman animals, creating human-nonhuman hybrids or chimeras, and placing nonhuman embryos, sperm, or ova in the bodies of humans.[54] Once again, the legal and political reasoning behind this legislation was seemingly straightforward. Assaulting existing or potential bodily borders in this way was a threat to the dignity of both the particular human individuals involved and the human species as a whole.

But what if dignity and (or as) integrity are not the end point to democratic engagement? What if democratic theory sets aside dignity—and also any investment in gender that takes dignity as its touchstone? Under such circumstances, the fear underlying this legislation develops into something more complicated than it first appears to be. In particular, it becomes clear that the problem with nonhuman hybrid clones or with clones that are gestated in the wrong maternal environment is that they are, effectively, trash—trash because they evade coherent taxonomies, because they have no bodies, subjectivities, or sexualities, and because, in turn, they cannot possess dignity. The fear animating these laws, therefore, is a fear of trash rather than of things that might be done to humans. But, once again, *as* trash, these clones—and the gendered reproductive environments of which they form a part—are by no means without political value.

Indeed, the fear that permeates these documents is arguably not even *just* a fear of trash. It is also a fear of the *politics* of trash and of the gender that such a politics evokes. It is a fear of the highly political, yet nonhuman, gender not just of paramecia, but of waste. As the bodies described in these laws cease to be bodies and instead become environments, as they incorporate, gestate, feed, rot, and disintegrate all at the same time, they demonstrate that neither democracy nor gender *can* be unique to humans, or even to discrete, coherent organisms. Rather, these are processes that incorporate all matter, all information, and all things. They are also processes that highlight how the *problems* of environments, fields, systems, accumulations, growth, and networks in contemporary democracy are problems that can be described *only* with reference to gender and reproduction—but never to dignified, and for that matter sexual, self-contained human subjects.

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6 • *Data Hoards*

The question, then, is this: do the life, thought, reproduction, and gender of embryos, clones, and trash—organic, inorganic, material, or informational—have anything to do with the commercial and governmental data mining and data hoarding that have occupied public attention over the past few years? Or, put more bluntly, does slime in fact intersect with surveillance? An intuitive answer to this question, of course, is no (and no). Although human cloning and data mining are both conventionally understood to pose extraordinary threats to liberal democratic ideals, it is difficult to see how addressing one might aid in addressing the other. Likewise, although the problem of what, precisely, constitutes waste—the stuff that can be thrown away—is an issue implicitly underlying the rhetoric surrounding both the embryonic materials and the data that are (or are not) supposed to be collected, researched, or observed, the similarities between the two seem to end there.

A hint, however, remains—in these similarities that are not similarities—that the nonhuman material and informational life, thought, reproduction, and gender that the previous chapters examined and situated historically might have more to say about data mining than they intuitively appear to. Slime and data mining evoke one another sufficiently well to provoke strangely identical language in newspapers such as the *Guardian*, and each is equally talented at evading the classic rhetorical traps of liberal democratic demonization: are they external or internal threats? Are they tools or are they actors in and of themselves? Given such similarities, one might even speculate that the *only* responsible way to address the democratic challenge that is the data hoard is to reframe it as a problem of nonhuman mass democracy—as a problem resolved via recourse to a politics of thought that takes slime as its norm.

One potential hazard of such a reframing is that the problems associ-

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ated with surveillance will cease to seem problems at all—that the ire over rampant corporate and governmental data mining might be exposed as baseless or untenable. But this conclusion is not the only one available when rethinking mass surveillance in this way. In fact, a second potential result of introducing embryos, clones, and trash, on the one hand, to data hoarding, on the other, is that, having thought more carefully about what, *narrowly*, the problem with data hoarding is, more productive solutions to it may present themselves. Or, at the very least, it may be possible to reconfigure data mining as, itself, a democratic actor rather than as a threat to political engagement. This last result, it is true, will unquestionably dampen the ire. But, at the same time, it will simultaneously strengthen, rather than further assaulting, a preexisting, and quite functional, mass democracy—albeit a mass democracy that rests equally on life *and* thought. This alternative approach, therefore, is as much beneficial as it is menacing.

Indeed, to push these claims even further, one could insist that the problem of data mining or data hoarding is a *perfect* case study of a threat that can be neutralized by the alternative mass democracy sketched over the previous chapters. Data mining is an issue, for example, that appears, at least, to be a product of recent technological innovation. But, at the same time, it just as clearly has antecedents in earlier democratic processes. It is an issue that seems to obliterate any intuitive link between identity or dignity, on the one hand, and embodied subjectivity, on the other. But, once again, it is also an issue that, thus far, seems frustratingly protean and immune to the liberal, human-centered tools that ordinarily regulate potential threats to political subjectivity. The case study in data mining that appears here, after all—the NSA's collection of metadata and the rhetoric surrounding it[1]—has become a hyperbolic, or perhaps just tragic-comic, example of how the legal doctrine and political theory of human-centered liberal democracy are completely unequipped to tackle the intuitive concerns that citizens have about this flow, and storage, of information and material.

As will become apparent, however, approaching data mining from the perspective of nonhuman democracy, as a problem of reproduction-as-thought, and thus as a problem, in particular, of gender, can help to redefine the process as a functional, nonthreatening aspect of political engagement. Excavating the gender operations underlying data mining as a system, accumulation, or assemblage, in other words, can redefine it as a key democratic activity rather than as an obstacle to democratic engagement. Moreover, rethinking mass surveillance in this way will also suggest to readers the possibility that problems such as data mining are

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problems of technological innovation only at their most superficial level. What these technologies are repeatedly demonstrating, indeed, is *not* that democracy is under attack by a new spate of antihuman technological monsters. On the contrary, they are showing that any democracy that cannot recognize the political potential of these technologies, not as tools but as actors—these technologies that have always, in some form or another, existed—is not, in any sense of the term, a proper democracy. These dysfunctions have *always* rested at the heart of human-centered political engagement—contemporary technological permutations simply make them more apparent.

The Threat

Data mining is ordinarily understood to be a threat to privacy. This threatened privacy, however, has little to do with the colloquial privacy that protects one individual from another individual's interest in his or her affairs. Rather, the privacy that data mining or data hoarding attacks—especially to the extent that each is linked to government surveillance programs writ large—is the privacy underlying a citizen's *dignity* and *integrity*. It is the privacy protected in the United States, for example, by the Fourth Amendment, and it is the privacy that serves as a framework for an array of conversations about topics as varied as abortion, bodily integrity, the appropriate use of search warrants, and the inviolability of domestic space.

That data mining is an issue of privacy, and that privacy lends itself equally well to discussions of domesticity *and* discussions of abortion—or reproduction—in the United States hints at its relevance to the problem that reproduction, broadly defined, poses to classic liberal democratic conventions. It is true, of course, that nearly every conversation about rights in even the most relentlessly communication- or human-centered state seems inevitably to end at reproduction—a situation that merely confirms the strength of Foucault's original claim that modern liberal democracy, or modern democracy in any form, has always been biopolitical.[2] But the relationship between data mining and reproduction—as well as between data mining and nonhuman reproduction-as-thought—is also more intricate than that.

Indeed, the tropes that appear in the traditional, human-centered, liberal discussion of data mining demonstrate that, even in this most conventional articulation, the problem with technological mass surveillance is, first, a problem of reproduction. Second, and almost equally important, it

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is a problem of reproductive *trash*—that is, a problem of things and information that are replicated, alive, and then (inappropriately) deemed waste, and (even more inappropriately) collected and viewed in Gabrys's uncanny space of salvage. Third, it is a problem of systems rather than of bodies. And fourth—the hypothesis now underlying this chapter—it is a problem that can be resolved only by excavating the gender operations that underlie it. Even in the human-centered liberal writing on data mining—not to mention the NSA's own internal interpretation of the policy—in other words, it becomes apparent that the tools that theories of nonhuman mass democracy make available to commentators are infinitely more effective, merely descriptively, than those that have so frequently failed human-centered democratic engagement. In short, the only privacy doctrine that resonates in an era of data hoarding is, arguably, a nonhuman privacy doctrine—a doctrine, moreover, that is strongly suggested even in the most mainstream legal writing on the topic.

In his early and influential 2004 study of surveillance at the turn of the twenty-first century, for example, Seth F. Kreimer wrote that recent, technologically sophisticated variations on surveillance were able, initially at least, to evade Fourth Amendment protections for two reasons. First, these surveillance practices were possible without any invasion of "physical spaces," and, second, government agencies could legally request records from "private parties"—for example, "bank records from bankers, or telephone logs from telephone companies"—without "either probable cause or warrant."[3] Existing Fourth Amendment protections assumed, in other words, some variation on a purely physical—be it bodily or domestic—space that could be protected from violation, alongside a clear distinction between material that had been given away (or disposed of) to third parties and material that had been preserved. Information-based surveillance practices, Kreimer wrote, exploded both the fantasy of protected bodies inhabiting protected spaces *and* the fantasy of clear borders between what was waste and what was not.

Kreimer's solution to this apparent weakness of Fourth Amendment protection in the face of technological surveillance was to shift focus away from bodies and subjects and toward information. More specifically, it was to suggest legal structures that might regulate the flow of data themselves, rather than laws that might shape the intent, ethics, or politics of the humans involved in that flow. In particular, Kreimer argued that "the challenge is to prevent misuse of data, and the more selectively data is disseminated, the less likely it will be to be misused."[4] Secure databases already block access to data—or maintain a clear, detailed series of interactions

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between specific users and specific information—in multifaceted and sophisticated ways; there is every reason to believe, therefore, that, say,

> a domestic security database could be constructed that allows general access, for example, to a subject's address, but access to her gun ownership records only to one group of analysts, and access to her attendance at political rallies only to another select group. Other technologies could prevent analysts from exporting data from their computers to any other computer not similarly authorized, allowing privacy classifications to "stick to" the data as it is shared.[5]

In short, therefore, the solution to the problem of data mining in Kreimer's early analysis is not to try to halt the collection or storage of data. Rather, it is to try to regulate the replication and transmission of data. Information naturally pools into databases, government agencies will naturally be drawn to these databases, and the best way to respond to this problem is to keep the information pooled rather than flowing—to store it indefinitely.

Indeed, a second procedure that might reinforce such a regulatory structure, Kreimer argues, is the institution of automatic "audit trails of both queries and dissemination."[6] Such trails would, Kreimer hints, effectively make replication and dissemination into a *linear* process—and thus the seemingly mindless and dangerous nonlinear proliferation of copies would be transformed into a coherent, step-by-step narrative of sharing, replete with actors and actions leading back to an originating source. "'Sticky' data tags which lay down trails as the data is disseminated," in particular, would transform what were identical copies into not-quite-copies—bits of information that, again, tell a specific story of movement, of human communication, and of message transmission.[7] But this regulation would, Kreimer argues, be infinitely more effective in maintaining the privacy of liberal citizens than an attempt to halt the collection of data in the first place. As he writes near the end of the article, "In today's environment, *ex ante* judicial control of surveillance is unlikely. One response lies in strengthening legal doctrines that exert *ex post* control against abuse of information obtained by surveillance."[8]

Three years later, Christopher Slobogin explored the same seeming weaknesses of Fourth Amendment protections, now, though, in the context of a relatively lively scholarly conversation about how to address these problems. In a paper delivered at a conference on surveillance at the University of Chicago Law School in June 2007, Slobogin first described the

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gradual extension of data-mining operations, especially those aimed at American citizens, during the early twenty-first century.[9] From there, he provided examples of the types of information collected by various government programs—information about Internet searches, information about political activity or activism, information derived from the intersection of government and private sector databases, and information in the form of metadata, among others.[10] Finally, Slobogin framed his argument in the same broad question that motivated Kreimer's work—namely, can and should the Fourth Amendment be brought into play to regulate or curb data mining.

Slobogin addresses this question from a slightly shifted perspective, however. Rather than assuming a uniform quality to all data or information—and then recommending various techniques to manage this monolithic pool—Slobogin instead argues that the primary work of Fourth Amendment legislation should be to distinguish among the different types of information that might be collected or distributed. "A careful look at data mining," he writes, "suggests that many versions of it should be subject only to minimal regulation, while other versions ought to be subject to significant constitutionally-based restrictions, whether controlled solely by the government or reliant on private entities for information."[11] More specifically, he recommends that agencies be required to provide "the highest degree of justification" when the data they collect are "private in nature and sought in connection with investigation of a particular target."[12] "Impersonal or anonymized records" or information "sought in an effort to identify a perpetrator of a past or future event," contrarily, would not require such a stringent policy of prior permission.[13]

The collection of metadata—in this case, the NSA's accumulation of phone records, but not the content of phone calls, to "conduct 'link analysis'"[14]—is thus both a particular threat to current Fourth Amendment protections and, according to Slobogin, in particular need of this data-cognizant approach. Drawing on the responses of participants to survey questions, Slobogin writes that citizens are "much more leery of this type of data mining, ranking it as more intrusive than an ID check, whether aimed at multiple record sets . . . or only one," and that if "this finding accurately represents societal views . . . event-driven data mining of private records should occur only if reasonable suspicion exists."[15] Slobogin continues that the problem with regulating the collection of metadata in this way is that the huge scale of such data collection would make "'individualized' reasonable suspicion" difficult to demonstrate.[16] The government might consequently, he argues, be required to "demon-

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strate 'generalized' or group-wide suspicion" when seeking to engage in this sort of analysis.[17]

Whereas Kreimer seeks to protect privacy by managing the replication, storage, and transmission of a uniform, preexisting pool of data, Slobogin, drawing on the intuitive responses of individual survey participants, seeks to protect this same privacy by managing the definition and quality of not-yet-collected data. Slobogin believes that a preexisting taxonomy of information—some "private in nature," some "impersonal or anonymized," some relevant to the "individual" and some relevant to "groups"—will help to regulate the capacity of government agencies to access information.[18] Although the large-scale pattern recognition that the mining of metadata is supposed to facilitate frightens survey participants and evades any recourse to classic interpretations of "reasonable suspicion," Kreimer believes that his proposal is nonetheless valid. Indeed, by defining metadata as simultaneously "private in nature" rather than "anonymized," *and* "generalized" rather than "individualized"—by defining it, in other words, as specifically subject to a theory of *privacy in the absence of the individual*—agencies can still be held accountable for its collection.

Jack Balkin has also written extensively on the constitutional issues raised by surveillance in general and data mining in particular. Two of his many essays, however—the first published in 2008 and the second in 2011—can help in tracing the evolution of his thinking. In the first, "The Constitution in the National Surveillance State," Balkin situates data mining within a more general history of the modern mass democratic state. What he calls "the National Surveillance State,"[19] he writes, is a natural extension of the "Welfare State," which "created a huge demand for data processing technologies to identify individuals.[20] Given this relationship between the information processing that, many would argue, benefits citizens and the information processing that, many are arguing today, threatens citizens, Balkin implies that perhaps it is not intellectually all that useful to address data mining as an unquestioned menace to be managed, regulated, or blocked. Rather, he argues, political theorists need to ask what *sort* of policies—and, more broadly, what type of states—are making use of this information.

Whereas Kreimer focuses on the systems that might limit the transmission and copying of preexisting data pools, therefore, and whereas Slobogin focuses on the character of the data that will be collected, Balkin focuses on the type of state that will benefit from data that are not only already collected but also already in transmission. Contrasting what he

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describes as democratic and nondemocratic states, Balkin argues that whatever a democratic state does with data is legitimate—and that, in fact, a state's illegitimate use of data is an excellent indicator that it is not democratic. There is, therefore, not a great deal that lawmakers can do in Balkin's analysis to manage or regulate the work of data or the operation of information systems—but analyzing this work and operation can, importantly, help lawmakers to identify those aspects of governance that may not reflect the democratic ideals of whatever state is benefiting from them.

This seemingly circular argument is not as paralyzing as it might appear to be. Although it does make "a traditional system of warrants" less likely to be effective, for example, it also allows for simultaneous "prior" *and* "subsequent" analysis of data collection activities—and even potential, if incomplete, management of information.[21] This ability to analyze the potential threats posed by data mining in a more fluid and holistic—if less doctrinally satisfying—way is indeed vital, Balkin suggests, "as surveillance practices shift from operations targeted at individual suspected persons to surveillance programs that do not begin with identified individuals and focus on matching and discovering patterns based on the analysis of large amounts of data and contact information."[22]

Perhaps even more useful to theorizing the relationship between data mining and democracy writ large, though—and also an entry point into Balkin's later, explicitly data-centric interpretation of surveillance practices—determining the legitimacy of data collection with reference to the type of government it serves can help to pinpoint key characteristics of highly technological democracies (and nondemocracies). It can help commentators to understand how contemporary democracy operates in an empirical and dynamic way. In a telling metaphor, for example, Balkin describes the nondemocratic users of data as "gluttons" and the democratic users of data as "gourmets." He writes that

> democratic information states are information gourmets and information philanthropists. Like gourmets they collect and collate only the information they need to ensure efficient government and national security. They do not keep tabs on citizens without justifiable reasons; they create a regular system of checks and procedures to avoid abuse. They stop collecting information when it is no longer needed and they discard information at regular intervals to protect privacy. When it is impossible or impractical to destroy information—for example, because it is stored redundantly in many different locations—democratic information states strictly regulate its subsequent use. If the information state is unable to forget, it is imperative that it be able to forgive.[23]

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The eating, storage, and waste metaphors on which Balkin relies in order to make his point here are revealing, evocative not just of Parisi's scholarship, but also Leuckart's laboratory science. Although it is more polite, for example, to describe the eventual disposal or distribution of the information that has been eaten as "philanthropic," it is perhaps more accurate, physiologically at least, to describe the traditional results of eating as "waste" or "defecation." Regardless of whether eating takes the form of gluttonish or gourmet sampling—regardless of whether its ingestion is democratic or not—that is to say, the by-product (or product) is the same, and it ends up, most likely, in, say, Şakir's highly productive sewer. This point is indeed brought home when Balkin writes that even democratic states may not be able to forget information, that sampling cannot be undone, and that, implicitly, disposal is thus simply another type of flow or storage.

Or, put differently, Balkin's eating metaphor leads to an interpretation of data mining and democracy that very much highlights not just the redundancy of individual citizens to contemporary theories of privacy, but also the redundancy of bodies to the "bodily" function that is frequently at the basis of privacy doctrine. Whereas Kreimer's work posits that privacy might best be protected by focusing on data rather than on *people*, and whereas Slobogin's work suggests that privacy can easily operate without reference to *individuals*, Balkin's early work on surveillance hints that when data mining becomes a means of determining the democratic quality (or lack thereof) of a given technological state, privacy is best understood as an issue of bodily function—eating, waste, reproduction—without *bodies*. That the normative category of the human might also disappear from privacy doctrine goes without saying—and it is the starting point of Balkin's later work on data mining.

In his 2011 essay "Information Power," for example, Balkin writes that it is not only useful, but imperative, to recognize the nonhuman operation of "globalized information networks"—networks that do incorporate people but that "are controlled by no one in particular."[24] Framing his discussion within three influential posthuman categories of analysis—drawing on what he calls "the memetic model, the Gaia model, and the proliferation of power model[25]—Balkin argues that if scholars address problems such as privacy and data mining from the "point of view" of nonhuman actants such as memes, the whole earth, or disciplinary power networks, they will appreciate not only the complexity of such problems but also why they continue to elude classic legal remedies predicated on the protection of individual (human) rights.[26]

Memes, for example—defined here as "bits of information that repli-

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cate themselves in human minds and in human created methods of information storage and retrieval"—upset liberal, individual rights-based methods of interpretation, Balkin writes, in large part because their existence not only allows for, but demands, the instrumentalization of humans.[27] Memes—"like genes," if only "metaphorical[ly]" so—survive via replication and reproduction, and humans are the "host," "platform," or "means to [that] end."[28] Moreover, memes even reconfigure the apparently fundamental liberal right to speech—that right which seems so unique to the rational, embodied human subject—into a simple mode of reproduction. As Balkin puts it,

> All communication on the Internet occurs through copying, which is how memes reproduce. If cultural reproduction is a meme's version of sex, then the Internet is just one big orgy, an endless informational bacchanal. The Internet copies information from everywhere and then transmits it in redundant copies to millions of places around the world. From a meme's perspective, the Internet is not a great achievement of human liberty. It is the most powerful technology yet devised for memes to reproduce themselves in perpetuity. The glut of information produced by the Internet leads to increasingly powerful technologies of search and retrieval—like search engines—that become central to the network because they lower the costs of finding information. These new search and retrieval technologies, in turn, produce and propagate vast amounts of metadata—information about information—thus spewing ever more memes into the global information environment.[29]

Balkin, in other words, is now supplementing his eating metaphor from the 2008 article with a reproduction—and biological or genetic reproduction—metaphor. In each case, the point to be made is that the proliferation—and then mining, replication, or storage—of data is a legal problem or a problem of privacy that can be addressed *only* by recognizing its strange relevance to material, yet disembodied, "bodily" function, its simultaneity with eating and reproduction, or with eating as reproduction. Indeed, although Balkin insists on the metaphorical quality of this mode of interpretation, his reason for doing so is not that information operates separately from organic or inorganic life. Rather, it is that he does not want his readers to assume that memes are rational or goal oriented (like genes, presumably)—he does not want them to conclude that memes *consciously* seek to use humans as a means to an end. Rather, memes reproduce in this way—and the category of privacy is

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thereby reconfigured in this way—because memes are part of a living, if not conscious, system.[30]

That this system is also thoughtful—and, in fact, that reproductive life *is* thought according to Balkin's analysis—becomes overt in the second framing device on which Balkin relies. The "Gaia model," he writes, also assumes that humans are (rightly) tools rather than an end in themselves.[31] Here, though, humans are not a platform for reproductive activity; rather, they are "information processing nodes in a developing nervous system"[32] that might lead "ultimately to a 'global brain.'"[33] Indeed, the proliferation of data throughout these global networks is continually moving the world from a system of "relatively primitive forms of ecological feedback and information exchange to an ever more complex and sophisticated system of information flows and information potentials."[34] With specific reference to the problem of surveillance or, more pointedly, data mining, therefore, Balkin writes that it is a perhaps natural—if not beneficial—outgrowth of an "emerging world" in which "we are not necessarily the central characters."[35] We might interpret a situation in which all humans "are continually tracked, traced, and monitored" as a situation in which "the world," as the key thinking actor, "is becoming increasingly 'aware' of what is happening within it." As both things and data replicate, reproduce, get stored, and get moved, the global system increasingly lives *as* thinking.[36]

Balkin's 2011 essay, then, is a refreshing take on the problem that data mining poses (or does not pose) to privacy. By pushing Kreimer's and Slobogin's emphasis on data, rather than people, to a logical conclusion, Balkin makes a compelling case that surveillance and data mining are not only badly served by purely human-centered, individual rights-based frameworks of inquiry, and not only infinitely more ethically complex than the simplistic work bemoaning the end of privacy makes them out to be, but also quite open to materialist analyses predicated on the coming together of disembodied, systemic life, reproduction, and thought.[37] The chapter is an effective antidote to the humanist scholarship that is both empirically suspect and, it seems, missing the point of data collection.

At the same time, however, it ought to be emphasized that, as "antihumanist"—in the sense that it takes the instrumentalization of the human as a situation to be discussed and analyzed rather than immediately condemned—as Balkin's essay is, it is also relentlessly human *centered*. Balkin's concern in the essay is still how issues such as data mining will affect humans—especially when humans are resituated in these new antihumanist frameworks. Moreover, even as Balkin strips the negative moral value away from the instrumentalization of the human, he retains

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and implicitly celebrates the human as the most important *tool* in these data-centric systems. It is "our" thought, speech, and communication that facilitate the replication of the meme, it is "our" role as nodes that drives the world from a "primitive" ecological system toward a developed informational system, and it is "our" subject positions that are formed via disciplinary power relations.

Indeed, the central role played by the human in this reframing becomes particularly clear when examining the vocabulary—taking human thought as its touchstone—that Balkin mobilizes in describing his three posthuman models. Even as he reminds his readers not to assume that memes are, say, goal oriented, for example, he nonetheless asks us to accept that memes have a "point of view"—that there is some specific focus or way of thinking analogous to human focus or thinking. Likewise, even as he wants readers to consider the world as a thinking system, he repeatedly describes this thought as aware and self-conscious—the product, in fact, of a humanesque "brain." And finally, the repeated references to "feedback"—that process of input whose analytical value Parisi has questioned in a different context as a necessarily human, rational process[38]—demonstrates the extent to which Balkin's antihumanist writing on data and information is nonetheless still a product of human-centered logic.

The purpose of highlighting the perhaps unexpectedly human-centered quality of Balkin's explicitly antihumanist take on information is not to insinuate that his work is therefore weak. Balkin's primary interlocutors are law scholars, and it makes sense that he would adhere to the human-centered conventions of legal scholarship even while emphasizing the potential value of asking antihumanist questions. As noted before, Balkin's work—operating in the same vein as Kreimer's and Slobogin's, even while pushing this writing to one of its logical conclusions—demonstrates the elegance with which data mining, surveillance, and privacy might be treated as problems of systems, networks, and environments rather than as problems of embodied, rational individuals. It makes clear that there is a place for nonhuman politics—not to mention nonhuman life, thought, and reproduction—even in the most classic of scholarly conversations.

Balkin's refusal to bracket the human—even if momentarily—as the central figure, if not the central agent, master, or actor, in his discussion of data in general, and data mining more specifically, however, also leads him to set aside some important implications of shifting the conversation about information and privacy in this way. Just as Kreimer wants, via sticky data tags and audits, to transform field-wide informational replication or reproduction into linear, humanesque reproduction resting on the discrete,

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unitary transmission of messages, and just as Slobogin wants to domesticate data into a story of "reasonable suspicion," Balkin wants to transform the thought of these informational, material, and environmental systems and fields into self-aware, conscious, rational human thought. Even as all make quite clear that data mining is a problem of *data*, and even as each in different ways highlights the centrality of reproduction and thought, therefore, each also brackets the potential solutions to the problem, such as it is, that data mining poses to democracy. Even as all contribute to a fascinating new theory of privacy without humans, without individual subjects, and without bodies—a theory of privacy as reproduction without people—each also chooses not to contextualize this theory within a reconfiguration of the empirical case study that gave rise to it.

After all, even though all of these analyses note that classic Fourth Amendment protections are insufficient in an era of data mining because the Fourth Amendment cannot cope with the movement of informational trash (the movement, for example, of data provided to third parties—which is thus, as Fuller and Goffey write, both thrown away *and* vital), none proposes an alternative approach to such waste. Kreimer and Slobogin continue to insist that it is possible to protect vital information from becoming waste either by managing its dissemination (in the case of Kreimer) or by regulating its collection (in the case of Slobogin). Balkin replaces what is perhaps most properly called "waste" with "philanthropy" or "awareness." No one, it seems, is willing to address reproductive, or replicated, waste as, in fact, garbage.

If, though, the human does disappear from this work that, again, *already* highlights the nonhuman, disembodied, and environmental reproduction, thought, and life at the center of data mining, the democratic potential of the trash produced by it becomes suddenly apparent. Indeed, each of these discussions serves as an excellent departure point for moving *away* from solutions that simply rehash—albeit in radical ways—preexisting, human-centered policies that seek to manage the collection and transmission of messages (a solution that, in any case, leaves aside contentless metadata altogether). Each makes it possible to look for solutions that take the operation of data seriously in its own right.

Moreover, and perhaps most pointedly, each also provides a framework for addressing the *gender* operations that underlie data collection—a framework that can help to transform this seemingly devastating assault on privacy rights and human-centered citizenship into a foundation for functional democratic engagement. The next section of this chapter draws directly on NSA documents concerning data mining in order to test the

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validity of these alternative approaches. After a detailed history of a number of key NSA data collection practices developed since the early 2000s, the section rereads these practices in light of the nonhuman gender operating throughout nonhuman, thought- and life-based democracy. In doing so, it provides a new and productive interpretation of data, surveillance, gender, and democracy.

The Resolution

When the NSA's surveillance practices entered popular, policy, and media conversations in mid-2013, an issue that particularly concerned reporters and commentators was the collection of metadata—information about information—on a mass scale, ostensibly in aid of security-supporting pattern recognition. That the accumulation of metadata was especially suspect is intriguing given that such information has little to do with communication per se. When analyzing metadata, the content of telephonic or electronic messages is ignored in favor of email addresses, telephone numbers, contacts, and IP addresses. Nonetheless, as Slobogin writes, this type of undifferentiated, mass collection of contentless or message-less data frightens many observers even more than targeted surveillance of electronic or telephonic conversations does. It might be worth asking why.

One reason—as Slobogin also hints—that the mass collection of metadata is a source of worry in a way that other surveillance practices are less so is, once again, that it seems to elude Fourth Amendment privacy protections. Perhaps more pressing, though, a second reason that it is a source of concern is that the mining of metadata is necessarily without limits. Anything and everything—*especially* to the extent that it has no clear content—is potentially relevant to the patterns that emerge from the analysis of the links and contacts that facilitate systems. Even aside from these issues, however, there is arguably something else about the collection of metadata that has made it so worrisome to liberal democratic commentators. The mining of metadata conjures up the existence of a nonhuman, nonliberal mass democracy that threatens to overwhelm classic, human-centered democracy. This is a nonhuman democracy that is not only not threatened by data mining, but that functions through such informational operations—a democracy that appreciates the reproductive value of data and that, therefore, recognizes the centrality of gender to political engagement writ large.

A review of many of the NSA's reports and memos concerning the value and potential pitfalls of working with metadata in fact suggests

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that what makes metadata attractive to security agencies is *specifically* these data's gender—even as it is likewise the gender of this stored, replicating waste that worries Slobogin's liberal democratic survey participants (as much as it did Minot and his scientific contemporaries). Metadata are functional rather than communicative—their role is to move, transfer, copy, or store messages across systems, accumulations, or fields rather than to be messages in and of themselves. Although they are functional and do work, however, they are, once again, by definition waste or trash according to classic interpretations of political engagement that understand democratic politics to happen as rational embodied subjects identify and recognize one another through meaningful dialogue.

Moreover, not only are metadata trash by virtue of lacking content, but by the time an NSA algorithm encounters them, these metadata have apparently *finished* their work, they have sent the message—and they are thus waste even in the operational sense of the term. The NSA algorithm, in short, is collecting metadata as, once again, *specifically*, trash—trash, however, that will then live, think, and reproduce when it is set loose in a new informational environment. Or, as Fuller and Goffey put it, "The seduction of data mining is that of finding exploitable patterns in vast quantities of data, modelling probabilities, predicting trends, anticipating next moves, extracting 'truth from trash.'"[39] What the documents addressing metadata make clear, therefore, is that as this revitalized trash is copied, replicated, and stored, it is, according to the NSA's own understanding of its labor, engaging explicitly in the same series of gender operations that animated Buffon's, Minot's, and indeed the state of Louisiana's biopolitical worlds.

In a 2007 memo requesting permission to extend the collection of metadata to email and telephone connections in the United States, for example, the NSA provides a number of clues as to the gendered work that this information performs. Noting that the "communications metadata" that had already been collected—"pursuant to the Foreign Intelligence Surveillance Act (FISA)"—now existed in "NSA databases," the memo's drafters argue that they are hampered from using the information as effectively as they might because their "present practice [is] to 'stop' when a chain hits a telephone number or address believed to be used by a United States person."[40] Unable, by law and custom, to modify their "contact chaining" algorithm to "chain through all telephone numbers and addresses, including those reasonably believed to be used by a United States person," they write, they are thus unable to draw from their data "valuable foreign intelligence information primarily concerning non–

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United States persons outside the United States."[41] The drafters of the memo thus request that this obstacle to their analysis be removed.

To bolster their argument that the benefit of chaining through United States contacts outweighs the costs—and is in any case not a threat to the right to privacy[42]—the drafters continue that courts have "considered e-mails to be analogous to telephone calls and to letters sent through the postal system."[43] What this means, they posit, is that "the Fourth Amendment is not implicated when the Government gathers information that appears on mail covers" and thus in the contact sections of email messages.[44] Or, more pointedly, "contact chaining and other metadata analysis" are not, they state, identical to the privacy-damaging "'interception' or 'selection' of communications" that the Fourth Amendment is supposed to regulate.[45] As of 2007, therefore, NSA agents had permission to allow their algorithms to work through data collected inside the United States.

In a report titled "Bulk Collection Programs" sent to the Department of Justice two years later, in 2009,[46] the NSA expanded on the nature and work of (as well as the ongoing challenges to) its metadata analysis. The drafters of this report described, once again, how they believed that the analysis of metadata remained in compliance with both the Fourth Amendment and FISA,[47] but this time they also addressed weaknesses in their data collection programs that might (erroneously, they argued) *appear* to be violating the rights of U.S. citizens. Repeating that bulk data collection programs were not authorized to accumulate "the content of the calls or e-mail messages" that they targeted, the report goes on to state that the programs are also "subject to an extensive regime of internal checks."[48] Moreover, the drafters of the report continue, "Although the programs collect a large amount of information, the vast majority of that information is never reviewed by anyone in the government, because the information is not responsive to the limited queries that are authorized for intelligence purposes."[49]

The problem, however, according to this report (and its 2011 reissue), was that "Department of Justice reviews" and "internal NSA oversight" had nonetheless discovered "a number of technical compliance problems and human implementation errors" in the execution of these programs.[50] In particular, "the automated tools" that perform the majority of the analysis sometimes "operat[ed] in a manner that was not completely consistent with the specific terms of the Court's orders."[51] The NSA thus created "a new position, the Director of Compliance, to help ensure the integrity of future collection."[52] Once again, the collection of metadata on a large scale continued without internal government opposition.

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At the same time, a second 2009 statement that the NSA made to the Foreign Intelligence Surveillance Court (FISC) went into more detail about the procedures implemented to prevent misuse of the system—and in particular to prevent "automated processes and tools from querying the BR [bulk records] metadata inappropriately."[53] One of the most effective obstacles to such inappropriate operation, the statement reads, was the introduction of "a software restrictive measure" called "Emphatic Access Restriction (EAR)" that blocks tools from accessing metadata "with anything but a RAS [reasonable articulable suspicion]-approved identifier."[54] Moreover, whereas "the beta version and prior versions" of EAR "contained [a] feature that gave analysts contact information that normally is available only on an unauthorized fourth hop [i.e. a fourth link in a contact network/chain that can produce hundreds of thousands of new links][55] from a RAS-approved identifier," the 2009 version "corrected to disable the feature for last-hop identifiers."[56] Here, then, although there is no contraction of the metadata collection programs, the algorithms that operate through them are becoming more sophisticated and more seemingly compliant with intuitive human-centered concerns about privacy.

Indeed, in a declaration included in the statement, Keith B. Alexander, the NSA director. stated further that although there have been several incidences of "non-compliance" or error, the NSA has worked to address each incident that has come to its attention. When it became clear, for example, that "all of the telephone identifiers" that had been added to "the alert list" were not "supported by facts giving rise a reasonable articulable suspicion,"—and that, indeed, "the majority of telephone identifiers included on the alert list had not been RAS approved"—the "Telephony Activity Detection Process was turned off," and then only "restarted . . . without the use of metadata [thus incorrectly] obtained."[57] Likewise, whenever (human) analysts "inadvertently selected an incorrect option which put [a] domestic identifier in the large list of foreign identifiers," they were subjected to "additional guidance and training" by oversight committees.[58]

Finally, system-relevant errors—for example, the gradual incorporation of "non-user specific numbers that [we]re deemed to be of little analytic value and that strain[ed] the system's capacity and decrease[d] its performance"[59]—were dealt with via additional programming. NSA "engineers," in particular, "developed a 'defeat list'" that would remove such numbers from the database and that would serve as a receptacle for data incorrectly collected.[60] A combination of algorithmic, human, and systemic malfunctions, then—all of which had to do with *excessive informa-*

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tion input of one type or another—became the platform for even more sophisticated programming and training.

Three years later, in 2012, an internal memo described the potential value of obtaining a different sort of metadata—namely, information collected from mobile phones that appear to be traveling alongside other mobile phones already targeted for investigation. The drafters of the memo limit their evaluation of "co-traveler" algorithms "to two or more locations within an analyst-specified time and space window."[61] They also note, however, that even within this limited framework of analysis, there is something of a disjuncture between data on *movement* and data on *location*. Or, as they put it, "Analytics that detect co-location may be different in nature from those that detect co-travel," and therefore, "The specific analytic need will define which of these approaches is more appropriate and efficient."[62] Having determined hypothetically that analyzing cotravel is the best option, however, an analyst might benefit from the cotraveler algorithms that the memo is evaluating. In their most basic manifestation, these algorithms "compute the date, time, and network location of a mobile phone over a given time period," and then they "look for other mobile phones that were seen in the same network locations around a one hour time window."[63]

Algorithms of this sort, the memo continues, are already able to "chain 'from,' 'through,' or 'to' communications metadata fields without regard to the nationality or location of the communicants."[64] But, the drafters of the memo also note, there are still some obstacles to their work, and it could easily become more efficient. In particular, the memo's drafters write, these algorithms would benefit from having access to "an index containing selectors whose tracks are near each other in space," and they would also become more effective if they operated alongside a "GEOAddress hashing algorithm" that describes movement and placement via "LAT/LONG information."[65] Indeed, a running theme throughout the memo is the potential benefits that might accrue from mapping the patterns that emerge via the analysis of communications metadata onto the patterns that emerge via the analysis of spatial or locational metadata—and then in distilling these patterns to a small collection of data points. Even sophisticated algorithms that identify cotravelers *and* work with "spatial chaining software [that] aggregates and presents the meeting data,"[66] the drafters insist, could operate more effectively in an environment that does not differentiate between space and contact.[67] Or, as the memo concludes, analysis of metadata of this sort demands an awareness of information that is not necessarily unique to "signals intelligence" collections—such as "the

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locations of highways and roads"—operating "on a variety of different source data formats," and "exploit[ing] divergent data sources to develop more complete pictures of target travel behavior."[68]

A final document, of a different genre, will round out this impressionistic survey of the texts surrounding the NSA's data-mining practices in the early twenty-first century. In late 2013, following the publicizing of many of the NSA's data collection and data storage techniques, U.S. president Barack Obama created a Review Group on Intelligence and Communications Technologies.[69] This committee produced a document titled "Liberty and Security in a Changing World," which, although not specifically aimed at a public audience, was nonetheless more media-friendly than the internal memos and reports that had been made public the previous summer. In addition to contextualizing the NSA's data collection activities within a broader history of surveillance and privacy in the United States from the mid-1970s to 2013, the committee also suggested to the president ways of integrating ongoing data-collection techniques into what they argued were more appropriate interpretations of privacy, "liberty," and "security."[70]

Among the most pressing of these recommendations were reforms to the collection and storage of "bulk meta-data."[71] Metadata, the committee suggests, could no longer be stored by the government and should instead be "held privately for the government to query when necessary for national security purposes."[72] Private storage, the report continues, would allow the data to remain available should analysis become politically necessary, but it would also force government agencies to demonstrate need before they accessed data. At the same time, the government would "not be permitted [any longer] to collect and store mass, undigested, non-public personal information about US persons for the purpose of enabling future queries and data-mining for foreign intelligence purposes."[73] The committee explains the logic of this recommendation by noting that after five years, "bulk telephony meta-data" is already "purged automatically from the NSA's systems on a rolling basis," and "in 2011[74] NSA abandoned a similar meta-data program for Internet communications."[75]

Finally, the committee recommends significantly limiting *human* contact with metadata,[76] even while allowing their continued storage and processing—and while also suggesting that security agencies focus on collecting the *content*, via traditional warrants, of communications rather than on identifying emergent *patterns* in massive accumulations of anonymous metadata.[77] Or, put differently, the report argues that the distinction between metadata and other information (valued for its content) is not significant enough to allow for less regulation of the former than the latter.

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Indeed, it may be necessary to discard the separate categories altogether, the report insists, to recognize that the analysis of metadata threatens privacy rights as much as—if not more than—the analysis of traditional information, and to ensure that government agents meet the same evidentiary requirements in securing metadata as they do when they request access to traditional information.[78]

This final, relatively public document seems very much at odds with the internal documents produced by NSA bureaucrats. Whereas the goal of the internal documents seemed for the most part to be to extend the scope of data collection and analysis, the goal of this final report is to limit its scope. Moreover, in order to make the case for wide-ranging pattern recognition across mass quantities of metadata, the NSA insisted that there was an overt distinction between such metadata and the content of communications—the former immune to Fourth Amendment protections and the latter very much subject to them. Contrarily, the president's committee asks whether it might be more useful to set aside the traditional distinction between information that does work (for example the information in the address line of an email or on an envelope) and information that communicates messages or meaning. In doing so, the apparently specious immunity from Fourth Amendment protections that metadata seem to enjoy might be eliminated. And finally, of course, whereas the internal NSA documents find the analysis of massive amounts of metadata beneficial, the president's committee fails to see its benefit, arguing that traditional, targeted surveillance of message content, drawing on a classic system of warrants, is more supportive of what security agencies are trying to do.

Despite these apparent differences, however, the NSA's internal documents and the report of the president's committee are identical in one important aspect. Both seek to limit the interaction between human agents, on the one hand, and the growing, replicating, reproducing fields of metadata that underlie government practice, on the other. Both are very much in favor of the continued storage of such data, both to some extent assume that the data will continue to be collected and analyzed regardless of any attempt to halt this collection, but both see their problem—albeit quite different problems—to arise from human input. Although the NSA documents mention *both* the automated tool gone out of control *and* the badly trained agent as obstacles to analysis within the rule of law, their proposed means of overcoming such obstacles are variations on curtailing the activities of the human agent while increasing the scope of the algo-

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rithm. Indeed, the NSA documents, taken together, all suggest in various ways that as long as the algorithm is sophisticated and extensive enough, and as long as the fields of data are effectively mapped onto one another, human input and human error might be eliminated altogether.

Once again, this interpretation of the problems and solutions inherent in data mining is nearly identical to the interpretation floated by the president's committee. According to the committee, metadata should continue to exist, "undigested" (and hence, presumably, immune from accidental defecation), in inaccessible, operational, yet purely informational environments, while human NSA agents should limit their analysis to the human communications of specific human targets. Like the ever-growing nonhuman facilities that are simultaneously storage spaces for, and guardians of, Louisiana's embryos, that is to say, the nonhuman environments of metadata envisioned by the president's committee are environments that both maintain *and* protect, that both foster data *and* help them to flourish. The ideal of both the NSA's internal documents and the report of the president's committee, in short, is the continued maintenance of growing, replicating fields of data that are closed to human contact. In the report of the president's committee this situation will, moreover, specifically bolster "liberty."

But what sort of liberty derives from fields of replicating data untouched by human input? Given its centrality to what remains a relentlessly biopolitical system, it is a liberty that is democratic, nonhuman, and the product, once more, of *gender* operations. Consider, after all, the assumptions and the logic that structure both the NSA documents and the report of the president's committee. In each, the givens are that the metadata are already there, that they will always be there, and that they will always grow. In each, the ideal situation, in turn, is one in which these data will remain without human contact. In each, the solution to the problem is to produce an environment in which an algorithm might work through these data specifically in the name of liberty. In each set of documents, in short, the *algorithm* becomes the key democratic actor—the process that makes liberty happen. Each assumes that liberty and democracy are a product, *solely*, of algorithmic function, of gendered replication, processing, and waste, rather than of human speech.

But each set of documents also identifies an obstacle that stands in the way of this algorithmic production of liberty and democracy. Namely, the algorithm is always on the verge of processing *too much* information. In some cases, the tool simply goes "out of control." In others, the problem of excessive information takes the form of *inappropriate* data—data, for

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example, that are not RAS approved, data that are associated with U.S. citizens, or data that are unwieldy as well as unimportant and might overwhelm the system. In every case, in other words, what seems to halt the algorithm's path toward liberty is its encounter with overlarge data fields. In every case, the obstacle is growth, excess, and waste.

And what is the solution to this problem posed by excessive data? In short, it is threefold: first, software such as EAR can block an algorithm from accessing data that are tagged in a particular way (as not RAS approved, domestic, or otherwise inappropriate); second, systems can incorporate defeat lists that stop an algorithm from processing altogether when it encounters particular fields of data; and third—if counterintuitively given the apparently limiting quality of the first two—the algorithm might be allowed to play out across seemingly unrelated fields of information (fields of spatial as well as communications data, for example) in order to make its output more coherent. These three solutions, the documents state, will facilitate the *integrity* of future data collection. If they are taken seriously, data collection will not *disintegrate*.

These three solutions taken together, however, are by no means limiting to the algorithm's processing—and indeed, the directions in which they prompt the algorithm to move, or the alternative routes they prompt the algorithm to consider, suggest the deeper and more fundamentally thoughtful, mass democratic quality of algorithmic function. Blocking specifically tagged items and creating defeat lists, for example, are limiting only if your algorithm is purely linear. And they are useful in corralling the work of the algorithm only given a coherent, finite field of information. If, though, as each set of documents assumes, the limit of metadata is infinite—and the field (created by, say, a second or third "hop") is linked but by no means linear—then creating a few, finite dead ends simply prompts the algorithm to diversify and move around them. These solutions thus produce—specifically *as* they eliminate coherent human input, *as* they advocate linear programming to block routes taken by nonlinear algorithms, and *as* they aim at liberty and integrity—environmental reproduction alongside informational disintegration. And, more to the point, these solutions advocate an environmental reproduction that explicitly *makes* liberty—alongside an informational disintegration that *makes* integrity.

These two sets of documents—ethically at odds as they may appear to be—therefore, theorize gender, reproduction, and democracy in nearly identical terms. For both sets, the thoughtful, reproductive algorithm is at the heart of democratic engagement. The reason, however, that the algo-

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rithm is capable of this political engagement is because liberty and integrity arise from the collection and storage of likewise reproductive and thoughtful informational trash—because liberty and integrity cannot happen in the absence of information and material that has been, first, gendered, and second, turned into waste. Moreover, each set of documents makes trashed information the centerpiece of its democratic theory in this way not because of what these wasted data might say about *humans*, but because they perform a particular set of nonhuman, asexual, replicating, reproductive gender operations.

This system through which the NSA's algorithms operate, that is to say, is a "feminine" system in the same way that asexually reproductive organic systems in both historical and ongoing scientific, political, and policy literature—on everything from paramecia to clones—are feminine systems. It is a system that produces integrity via disintegration and whose reproduction is a type of nonlinear flourishing or growth of thought and matter. It is a system that cannot distinguish between reproduction and growth *or* between thought and life. Moreover, as matter and information are incorporated into, or eaten by, this system (if always "undigested"), they become, explicitly the stuff of liberty, security, and integrity. It is only because data collection rests on a series of specifically feminine and reproductive operations that it can be democratic in the way that it is. The fact that it is feminine in this way does not, however, mean that the rhetoric surrounding it is misogynist; within the theory of nonhuman mass democracy described over the previous chapters, it is indeed a system that eludes the classic, liberal democratic threat of the unruly, feminine imagination altogether.

Conclusion

The NSA's data collection programs do not ordinarily find themselves the subject of gender analysis—even though these programs do seem to threaten one of the most gender-relevant sets of rights (that is "privacy" rights) that exist in contemporary democracies. The hint, though, of the operation of gender that emerges from the strange centrality of reproduction and replication to both conventional, liberal, human-centered privacy doctrine and the rhetoric surrounding highly technological, seemingly antidemocratic, surveillance practices becomes more than a hint when the scholarship and the documents are read together. Indeed, it becomes clear that excluding gender from conversations about surveillance and data mining is at best an irresponsible move. Data mining, after all—like clon-

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ing, like the disposal of reproductive trash, and like biological reproduction broadly defined—produces outright panic among the protectors of conventional liberal democratic engagement.[79] It is one of the few threats to such engagement that seems, again like human cloning, to draw uniformly violent responses.

The bulk collection of metadata is also, however—and also like cloning—one of the few threats to democracy that seems embedded in a type of reproduction or replication that has little to do with embodied, rational human subjects. And it is thus worth asking why this specific practice that has become *the* representative example of surveillance gone out of control—the mass collection of *metadata*—is also one of the few surveillance practices that ignores actual communication or dialogue. Why is the most pernicious threat to liberal democratic engagement in the realm of surveillance, like the most pernicious threat to liberal democratic engagement in the realm of biological reproduction, the threat that *ignores* bodies communicating with other bodies? Why is the threat that does not actually relate to human thought or human speech the most terrifying one?

One answer to these questions, again, is that data mining actually threatens to end only *human-centered* democracy. It suggests the triviality of human political engagement and, simultaneously, the vitality of a centuries-old nonhuman politics. Moreover, it threatens to normalize a mass democracy of life, reproduction, and thought that makes a centerpiece of gender analysis. In the assumptions underlying, and in the logic framing, both internal and public documents concerning data mining, in fact, gender—or the operation of gender—is fundamental to nonhuman democratic engagement of this sort. It is only as algorithms transform the simultaneously political, informational, and material systems across which they work into feminine systems that "liberty" becomes possible. It is only as these systems reproduce asexually—as they create life alongside death, both product and by-product, both integrated linear chain and disintegrated reproductive environment—that democracy happens. In many ways, this reconfiguration of mass democracy is a vindication not just of recent feminist theories of nonhuman politics, but, more fundamentally, of Carole Pateman's earlier, groundbreaking critique of the supposedly liberal social contract.

To conclude with a look at the scholarship that introduced this chapter: Kreimer, Slobogin, and Balkin all in different ways promote a theory of privacy in the absence of humans and the absence of bodies. A reading of the documents that deal with the surveillance practices that prompted

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this scholarship, however, makes clear that this nonhuman privacy is incoherent outside the frameworks of gender analysis. The privacy doctrine that data hoarding evokes—just like the broader democratic theory that it elaborates—is a privacy doctrine that protects not just thinking life, but the gender operations that make this thinking life political and democratic.

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7 • Conclusion

The relationship between translucent, yellow slime out to control the world and infinite permutations of endless data likewise bent on world domination is actually *not* all that striking a thought (or image), if one stops to consider it. Science fiction writing since at least the late twentieth century has given to readers a number of such scenarios—tales of things, environments, accumulations, growths, fields, or systems that seem not to go with one another but that nonetheless end up, at the very least, involved.[1] Indeed, even the *Guardian*'s relentlessly psychological, relationship-obsessed reporting on the NSA's data-hoarding practices transcends the simply story of rational, desiring human subjects who both appropriately[2] and inappropriately[3] chase, flee, and target one another. There is something both reproductive *and* relational about the way in which the slime and the data envelop the world.

It would be a mistake, though, to try to associate the reproductive relations of slime mold, cloned cells, embryonic growth, waste disposal, and data mining with the poetic relations of bodies and subjects, with their identities and sexualities, always in hot pursuit—just as it would be a mistake to try to find commonalities between the thought or life of these things and their embodied, animal counterparts. The story that unfolded over the previous chapters has thus been a story distinctly lacking climactic moments of sudden, intense encounter. Indeed, it has been a shameless history of everyday politics as usual.[4] It has also been a biopolitical, mass democratic story. The previous pages have been one set, of many, of uninspiring narratives of reproductive, thoughtful, gendered matter and data that—as they reproduce, as they think, and as they process gender operations—introduce, incrementally, systems, fields, accumulations, assemblages, and environments into democratic structures. The fact that this story lurks beneath, and occasionally seeps out of, the more vocal

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tales of human citizens being watched or targeted, is at the very least, peculiar.

Mass democracy, after all, regardless of whether it is reviled and feared or accepted or even celebrated, is rarely defined as a particularly psychological mode of political engagement. Once again, the unfettered, usually male, citizen of conventional liberal democratic narratives, this subject who defies oppressive, coercive governments and thereby achieves a sort of hyperbolic mastery of intersubjective relationships, does not have much footing in such a context. But, as the previous chapters have made clear, even absent bodies, absent sexualities, absent identities, and absent subjectivity, the matter and data of the biopolitical mass democracy formulated here are by no means absent *desire*.

Quite the contrary, the desire of these environments of stuff and information, these systems, accumulations, hoards, and fields, is a desire that motivates any number of material and informational interactions. These masses of data, bacteria, cells, trash, or algorithms are constantly eating, engulfing, and splitting from—if not dominating and targeting—one another. And it is *thus* that they are political. So much so, indeed, that they produce—in their manifestation as, for example, flourishing human clone or still vital trashed reproductive material—the sort of fear in human subjects that is ordinarily reserved for more conventionally evil, humanesque (antidemocratic) monsters. These processes, as the *Guardian* reporting on the slime mold makes clear, must at least *secretly* want to rule or colonize.

But as the previous chapters have also demonstrated, nonhuman thought, life, and reproduction as specifically political activities need not be feared in this way. Nonhuman political operations need not be reviled. Far from it, reading the history—at least three centuries in the making—of these activities as democratic activities, and appreciating the fact that mass democracy is, it seems, *already* nonhuman, and *productively* so, can provoke an unexpected sort of optimism. Accepting the political character of simultaneous nonhuman reproduction and nonhuman thought, for example, can aid in addressing any number of issues that conventional human-centered liberal democracy seems unable to handle. Embryonic growth, human cloning, trash disposal, and data mining need not be defined as looming menaces to overcome but, rather, as modes of democratic engagement in and of themselves. It is already intuitively apparent that these issues are political, and that they affect democratic theory. Shifting the historical framework of inquiry, and understanding the politics of nonhuman life, reproduction, and thought, can lead to an appreciation of their democratic *value* as well.

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More specifically, dwelling on how nonhuman politics plays out in such varied arenas as cellular decision making, fetal development, embryonic research, cloning, waste disposal, and data mining can help commentators to recognize that reproductive mass democracy need not jettison *thought* as a political activity. On the contrary, if thought is redefined as a nonhuman—irrational rather than teleological, comparative rather than absolute, environmental rather than psychological, and accidental rather than planned—material process, then life and thought become linked, or inseparable. Doing away with the brain as organ of thought (alone), that is to say, opens up a remarkably productive space for simultaneously thought-based and life-based democratic engagement.

In turn, reproduction becomes infinitely more varied and, if unexpectedly, also politically anchored in this context than it is when biological life and symbolic thought are assumed to be at odds with one another. Reproduction becomes not a single act, initiating the beginning of growth, and related only to the potential, formed, embodied individual that can be *either* politically alive *or* politically thoughtful. It becomes not a single moment of message transmission from one body to another. Rather, reproduction becomes an ongoing thought process, a series of life- and thought-sustaining operations that build up environments and that value matter *as* information. Reproduction becomes a simultaneously environmental, material, informational, and political process, and *hence* the democracy that takes reproduction as its centerpiece becomes a democracy that can, to repeat, cope with an array of supposed challenges to political existence.

Embryonic material, clones, trash, and mass surveillance, after all, each assault conventional liberal democratic structures with what seem to be unanswerable demands. The embryo *must* be a person in such structures—embodied, possessing dignity, and bearing political life—but it can be a person in this sense only in an imaginary future. Its present existence makes a mockery of all three. The clone, contrarily, *cannot* be a person in such structures because, with no lineage, it has no dignity—but its potential to become a person is no different from any other embryo's potential. It too, therefore, makes a mockery of conventional democratic claims to protect embodiment, integrity, and life. Reproductive trash must be *either* a person *or* not a person—one or the other, it cannot operate in both worlds. If it is a person, then its status as waste is criminal; if it is not a person, then its status as waste is legitimate. But all trash is always somewhere on a spectrum between person and not person. Hence it too obliterates any clean line between embodied and violated, alive and dead. And finally, most prominently, data hoarding *must* be regulated or curtailed in

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order to protect privacy rights. But these privacy rights cannot be attached to any specific individual subject-citizen or body. Classic democratic conventions, in short, simply cannot cope with technological *or historical* situations such as these—or, if they can, they do so by demanding a somewhat arduous suspension of disbelief.

But moving away from these classic liberal conventions—this fixation on what constitutes the *human*—and rethinking the embryo, the clone, and trash with reference instead to an intellectual mass democracy transforms these figures not only into appendages to contemporary politics, subject to toleration, but into central and indispensable political actors. The contemplative embryo, *in the present*, invites commentators to bracket conventional approaches to it. It makes clear that the challenge it poses to liberal democracy is not what it means to be politically human but whether politically relevant thought is the unique preserve of the human. By hinting that, perhaps, such thought is not so, the embryo likewise helps to turn reproductive activities into activities that contribute to democracy rather than undermining it.

The contemplative clone similarly suggests that the fear motivating the past three decades of anticloning legislation has by no means been a fear of identical, and thus not quite human, nonpersons, but a fear of an alternative, yet nonetheless politically valid, mode of reproduction. It is a fear of reproduction as growth and thought, reproduction as a multifaceted variation on information processing—rather than reproduction in opposition to growth and thought. The mass democratic clone makes clear, in short, that the fear underlying anticloning literature has never been that "persons"—the always deferred future of embryos—might be assaulted. On the contrary, it is that reproduction, as thought, might remain political in the *absence* of any persons at all. The clone is far from antidemocratic. Its democratic potential, however, lies in the disquieting fact that it opens up politics, irrevocably, to things that can never be persons and that indeed do not desire to be so.

Whereas rethinking embryos and clones as contemplative embryos and contemplative clones helps to incorporate and naturalize into democratic structures things that will never be persons and will never possess dignity, rethinking trash provides a *tool* for this process of incorporation—and that tool is gender. Indeed, one of the outcomes of taking nonhuman and inorganic life, reproduction, and thought as a democratic norm is that *sexuality* becomes politically irrelevant while *gender* takes on enormous political value. The "femininity" of asexual replication and dissipation becomes a touchstone for political engagement—and reproduction and gender

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together thus become not only important, but fundamental, categories of democratic analysis. It is in fact specifically by recognizing the gendered operations underlying informational and material systems writ large that these systems become political. All systems and all sets of material and informational interactions are, in this context, gendered, and as their gender formulates itself, they *become* political.

The functional importance of gender identification to these nonhuman, contemplative mass democratic systems does not, of course, mean that classic, human-centered liberal democratic politics does not *also* identify particular systems—and especially reproductive systems—as specifically gendered (rather than sexed). As the previous chapters have shown, conventional post-eighteenth-century liberal democratic rhetoric has always associated asexual reproduction, death, and trash with femininity. Asexuality was defined, and continues to be defined, as a process that brings an organism closer to death, a process that disqualifies an organism from dignified political participation and, above all, a female process. This association—which effectively defines femininity as death and trash—is obviously an injustice by, once again, conventional liberal democratic standards. But in the alternative framework that has been the interest of this book, a different interpretation of this set of associations can lead to a less gloomy outcome—one that, once more, recognizes gender as the most effective, and perhaps the only, tool for extending and revivifying contemporary democratic engagement.

Recall, for example, that when trash appears in a nonhuman democratic context (or, as much of the ongoing scholarship on rubbish writ large posits, in any democratic context), it ceases to *be* trash. In a nonhuman political scenario, waste is an impossibility. When gender and, in particular, things gendered female become "trash," therefore, they are not being devalued. They are, to repeat, and on the contrary, becoming hyperbolically political and functional. Just as asexual reproduction—making copies—is gendered female, and just as death—storage—is gendered female, so too, now, is translating information and matter into more politically relevant taxonomic structures—disposing of trash—gendered female. In short, gender is the operation that allows for effective democratic engagement in this alternative framework. Gendering a system—or excavating the gender of a system—is what incorporates it into democracy, what makes it a participant rather than a nightmare.

Once again, though, for gender identification to achieve this political functionality, readers must, first, accept that gender is a systemic, rather than embodied, set of operations and, second, remain open to a demo-

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cratic theory that normalizes figures like clones, embryos, *and* data hoards as nonhuman political actors. Readers must accept, in their present, disembodied, material, and informational form, things that are simultaneously accumulations and environments—and readers must accept them as political players *because* their reproductive activities are also thought processes rather than moments that initiate the growth of future subjects.

If readers do accept this scenario, then gender identification can be a remarkably productive method of dealing with the ongoing challenges to political engagement—data mining being the most obvious one here—that have been bringing liberal democratic theory to a halt. Even as it reduces the human to a marginal political figure, that is to say, this intellectual mass democracy still has as much to offer embodied, rational subjects who reproduce sexually as it does nonhuman, material, and informational fields and systems. But these embodied, rational subjects must cease to trade on the unquestioned superiority of their cognitive, psychological, and subjective modes of existence and replication. Slime and data must not only be tolerated and patronized, but they must also be respected.

Once this happens, once commentators respect and appreciate, rather than fearing or ridiculing, the political work of slime and data, there might also emerge a more nuanced understanding of what is frequently described in conventional, if not necessarily feminist, theory as the menace of reproduction and the absurdity of thought in contemporary democracies. Reproduction, on the one hand, is ordinarily described in this scholarship as both central to modern democracy and the thing that eludes governance—as the activity in dire need of political regulation but also the activity that, upon being regulated, undermines any coherent democratic norm.[5] Thought, on the other hand, is usually derided as, at worst, completely irrelevant to contemporary political practice or, at best, useful to democracy only when distilled into constant speech or chatter.[6]

In an unbounded, nonhuman democracy, however—in the political world of the slime mold and the data hoard—reproduction and thought are not only functional, but they are *the same thing*. And, as a result, the dissatisfying dismissal of each that has characterized so much recent literature can cease. Or, put differently, the influential scholarship that, convincingly, demonstrated the importance of reproduction to mass democracy need not be read as scholarship that likewise killed political thought. Quite the opposite—the political centrality of reproduction *demands* the political centrality of thought.

Or, to conclude from yet a different direction, modern mass democracy—even in its human-centered formulations—is a systemic, environmental

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practice. It is a set of operations and processes that are embedded in fields, growths, hoards, and accumulations. It is enmeshed in information and matter. As the previous chapters have shown, not a single one of these systems, fields, hoards, accumulations, growths, environments, assemblages, or series of operations is immune to the operation of gender. The gender of these systems, indeed, is what makes them political—what makes them functional in a democratic context. Whereas human-centered political histories and political analyses obscure the vital role that gender plays in democracy, however, a history of democracy that takes the data and matter as its key figures highlights this role. *Especially* when issues seem irrelevant to "gender" as it is conventionally understood—when the problem is, say, the menace of Boundless Informant—one need only to turn to unbounded, nonhuman politics to excavate the gender operations that underlie these issues. Only engaging in such work can mark the edges its political activities.

Which is not to say, of course, that readers should not take pleasure in the *Guardian*'s relentlessly human-centric variations on such stories. At the same time, though, if these readers feel a bit sheepish about the apparently irresponsible delight they take in reading about serious, worrisome issues of the NSA data-mining sort, now at least they know why. There are two histories, not one, prowling around underneath this reporting. In addition to the targeting and targeted human subjects, there are also the masses of information, data, matter, and material replicating, coalescing, and transmitting. There is not just the story of human-centered democracy under assault, but also the story of nonhuman democracy growing, flourishing, and functioning. The point in emphasizing this second set of stories is not that readers should simply buckle under to Boundless Informant because it is inevitable anyway. Rather, the point is that readers should think quite a bit more carefully about what that plucky, resourceful *Physarum polycephalum* is really doing as it creeps incrementally across a Plasticine Africa.

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Notes

Chapter 1. Introduction

1. Unless otherwise noted, all translations from the French, Ottoman, and Turkish are the author's.

2. Ian Sample, "If Slime Mould Ruled the World: Given Enough Agar and Oats, How Would the Amoeba-Like Slime Mould Go About Colonising the Earth?" *Guardian* (September 21, 2012): http://www.theguardian.com/science/blog/2012/sep/21/slime-mould-world.

3. Ibid.

4. Glenn Greenwald and Ewan MacAskill, "Boundless Informant: The NSA's Secret Tool to Track Global Surveillance Data," *Guardian* (June 11, 2013): http://www.theguardian.com/world/2013/jun/08/nsa-boundless-informant-global-datamining.

5. Ibid.

6. Ibid.

7. With, granted, an undifferentiated Africa standing in for the pictorial target of the natural spread of mold and various nation-states standing in for the pictorial target of the unnatural spread of American data mining.

8. The subject of chapter 6.

9. Jack Balkin, "The Constitution in the National Surveillance State," *Minnesota Law Review* 93 (1) (2008): 1–25, 4.

10. A report commissioned by the U.S. president after the revelations of the NSA's wide-scale data collection, even as it recommends significant reforms to, and far more extensive regulation of, this collection, also situates NSA policy within a well-established tradition of privacy-related legal doctrine. It notes with regard to soliciting information from third-party databases, for example, that, "as originally enacted in 1978, FISA [the Foreign Intelligence Surveillance Act] did not grant the government any authority to compel the production of such records. In 1998, however, after the Oklahoma City and first World Trade Center bombings, Congress amended FISA to authorize the FISC [Foreign Intelligence Surveillance Court] to issue orders compelling the production of a narrow set of records from 'a common carrier, public accommodation facility, physical storage facility or vehicle rental facility.'" Richard A. Clarke, Michael J. Morell, Geoffrey R. Stone, Cass R. Sunstein, and Peter Swire, "Liberty and

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Security in a Changing World: Report and Recommendations of the President's Review Group on Intelligence and Communications Technologies," (December 12, 2013, 80–81): http://www.whitehouse.gov/sites/default/files/docs/2013-12-12_rg_final_report.pdf.

11. Carl Schmitt, *Crisis of Parliamentary Democracy*, trans. Ellen Kennedy (Cambridge: MIT Press, 1988), 15.

12. Jack Balkin has made a convincing variation on this point as well in his "Information Power," in Ramesh Subramanian and Eddan Katz, eds. *The Global Flow of Information: Legal, Social, and Cultural Perspectives* (New York: New York University Press, 2011), 232–46, 232.

13. Jussi Parikka, *The Anthrobscene* (Minneapolis: University of Minnesota Press, 2014), 56.

14. For an extended review of this literature, see Ruth Miller, *Snarl: In Defense of Stalled Traffic and Faulty Networks* (Ann Arbor: University of Michigan Press, 2013), 2–6.

15. Slavoj Žižek's 2014 *Absolute Recoil: Towards a New Foundation of Dialectical Materialism* (New York: Verso, 2014) indicates a definite sea change in the scholarly trendiness of the "posthuman"—it may very well be going the way of "biopolitics" in the mid-2000s. Žižek, 6.

16. "So I would pause at this point to make a minor conclusion: in terms of intellectual history it is inaccurate to see a straightforward anti-Cartesianism in the very tradition that is often appealed to, today, to make the case for 'Descartes' error.' Even Nietzsche—who would seem to be the philosopher to whom one might wish to appeal in order to get beyond the Cartesian prison . . . was not so clear in attributing the blame to Descartes. Nietzsche even suggested that the modern assassination of the soul was actually counter-Cartesian and, for that very reason, utterly pious. Nietzsche saw a religious fervor in modern philosophy's extirpation of the soul, and a pseudo-Christian self-abnegation in the tradition, after Descartes, of ridding the world and life of anything like the soul." Claire Colebrook, *Sex after Life*, vol. 2 of *Essays on Extinction* (Ann Arbor: Open Humanities Press / University of Michigan Press, 2014), 60.

17. Rosi Braidotti, *Metamorphoses: Toward a Materialist Theory of Becoming* (Cambridge: Polity Press, 2002), 63.

18. Ibid., 136.

19. Ibid.

20. Ibid., 63.

21. Ibid.

22. Ibid., 228.

23. Colebrook, *Sex after Life*, 11.

24. Claire Colebrook, *Death of the Posthuman*, vol. 1 of *Essays on Extinction* (Ann Arbor: Open Humanities Press / University of Michigan Press, 2014), 20.

25. Ibid., 21.

26. Elizabeth Grosz, *Becoming Undone: Darwinian Reflections on Life, Politics and Art* (Durham: Duke University Press, 2011), 36.

27. Ibid.

28. Jane Bennett, *Vibrant Matter: A Political Ecology of Things* (Durham: Duke University Press, 2010), 62–63, 95.

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29. Consider, for example, the temporal framing of "thought"—its mourned disappearance and its hoped-for reappearance—in Giorgio Agamben's work: "Thought is form-of-life, life that cannot be segregated from its form; and anywhere the intimacy of this life appears, in the materiality of corporeal processes and of habitual ways of life no less than in theory, there and only there is thought. And it is this thought, this form-of-life, that abandoning naked life to 'Man' and to the 'Citizen,' who clothe it temporarily and represent it with their 'rights,' must become the guiding concept and the unitary center of the coming politics." Giorgio Agamben, *Means without End: Notes on Politics*, trans. Vincenzo Binetti and Cesare Casarino (Minneapolis: University of Minnesota Press, 2000), 10.1.

30. For example, Bruno Latour, *Politics of Nature: How to Bring the Sciences into Democracy*, trans. Catherine Porter (Cambridge: Harvard University Press, 2004); Jane Bennett, *Vibrant Matter: A Political Ecology of Things* (Durham: Duke University Press, 2010), 62–63, 95.

31. This is the classic articulation of social contract theory that one finds, for example, in Jean-Jacques Rousseau's "On the Social Contract." Among *many* others, see Christopher Bertram, *Routledge Philosophy Guidebook to Rousseau and the Social Contract* (London: Routledge, 2004), 92.

32. Charles Tilly, *Citizenship, Identity, and Social History* (Cambridge: Cambridge University Press, 1996), 3–4.

33. Talal Asad, *Formations of the Secular: Christianity, Islam, Modernity* (Stanford: Stanford University Press, 2003), 140.

34. Giorgio Agamben, *State of Exception*, trans. Kevin Attell (Chicago: University of Chicago Press, 2005), 12–13.

35. As Carl Schmitt also put it, Carl Schmitt, *Political Theology: Four Chapters on the Concept of Sovereignty*, trans. George Schwab (Chicago: University of Chicago Press, 2005), 5.

36. Carole Pateman, *The Sexual Contract* (Stanford: Stanford University Press, 1988), 1–2, 224.

37. "Women, womanhood and women's bodies represent the private; they represent all that is excluded from the public sphere. In the patriarchal construction of the difference between masculinity and femininity, women lack the capacities necessary for political life. . . . in the story of the creation of civil society through an original agreement, women are brought into the new social order as inhabitants of a private sphere that is part of civil society and yet is separated from the public world of freedom and equality, rights, contract, interests, and citizenship." Carole Pateman, *The Disorder of Women: Democracy, Feminism and Political Theory* (Stanford: Stanford University Press, 1989), 4.

38. Indeed, as much as references to "biopolitics" were almost necessary to theoretical scholarship published in the late 1990s and early 2000s, by the early 2010s, writers and editors who had embraced the concept a few years earlier were denying any deep investment in it. Some even celebrated their own early lack of interest in "biopolitics," expressing relief that those who had been duped into writing on it were now doing scholarly damage control. In this sense, *Replication* is a bit of a throwback. For examples of this rapid shift in scholarly fashion, see Austin Sarat and Jennifer L. Culbert, "Introduction: Interpreting the Violent State," in Austin Sarat and Jennifer L.

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Culbert, eds., *States of Violence: War, Capital Punishment, and Letting Die* (Cambridge: Cambridge University Press, 2009), 1–24, 6, 11, 21. And then, two years later, the sea change: Austin Sarat, "Introduction: Toward New Conceptions of the Relationship of Law and Sovereignty under Conditions of Emergency," in Austin Sarat, ed., *Sovereignty, Emergency, Legality* (Cambridge: Cambridge University Press, 2011), 1–15, 3. For the sense of relief never to have been interested in biopolitics in the first place, see Nomi Stolzenberg, "Political Theology with a Difference," USC Law Legal Studies Paper No. 12-23, 2012: http://lawweb.usc.edu/centers/cleo/working-papers/olin/documents/12_23_paper.pdf, 7.

39. Michel Foucault, *Society Must Be Defended*, trans. D. Macey (New York: Picador Press, 2003), 243–44.

40. Ibid., 245.

41. Ibid., 241.

42. Giorgio Agamben, *Homo Sacer: Sovereign Power and Bare Life*, trans. Daniel Heller-Roazen (Stanford: Stanford University Press, 1995).

43. Rosi Braidotti, *Transpositions: On Nomadic Ethics* (Cambridge: Polity Press, 2006), 40.

44. Ibid.

45. Matthew Fuller and Andrew Goffey, *Evil Media* (Cambridge: MIT Press, 2012), 94.

46. Dennis Bray, *Wetware: A Computer in Every Living Cell* (New Haven: Yale University Press, 2009), 26.

47. Tobias Rees, "Being Neurologically Human Today: Life and Science and Adult Cerebral Plasticity (An Ethical Analysis)," *American Ethnologist* 37 (1) (2010): 150–66, 157.

48. Ibid., 157–58.

49. Ibid., 157.

50. Alain Prochiantz, *Machine-Esprit* (Paris: Éditions Odile Jacob, 2001), 38–39.

51. Ibid., 112–13. For Thompson's own interpretation of this issue, see his thoughtful criticism of the fact that "the search for differences or fundamental contrasts between the phenomena of organic and inorganic, of animate and inanimate things, has occupied many men's minds, while the search for community of principles or essential similarities has been pursued by few; and the contrasts are apt to loom too large, great though they may be." D'Arcy Wentworth Thompson, *On Growth and Form*, vol. 1, 2nd ed. (Cambridge: Cambridge University Press, 1942), 9.

52. Prochiantz, *Machine-Esprit*, 101–2.

53. The elision here between "machine" and "computation" is deliberate. As Luciana Parisi and Stamatia Portanova have written, drawing on the work of Alfred North Whitehead, numbers (and, more narrowly, algorithms) are not simply expressions of human thought, not simply symbolic tools that help humans or subjective minds work through mathematical problems, but, themselves, thinking machines: "As Whitehead says (with specific reference to algebraic symbols), it is not human subjects that think through symbols, but the symbolic operations of algebra do the thinking for us." Luciana Parisi and Stamatia Portanova, "Soft Thought (in Architecture and Cho-

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reography)," *Computational Culture* 1 (November 2011): http://computationalculture.net/article/soft-thought, 8.

54. Prochiantz, *Machine-Esprit*, 168.

55. Georges-Louis Leclerc Buffon, *Oeuvres complètes de Buffon*, ed. J. L. de Lanessan (Paris: Larousse, 1884).

56. William Thierry Preyer, *Physiologie spéciale de l'embryon: recherches sur les phénomènes de la vie avant la naissance*, trans. (from German into French) E. Wiet (Paris: Félix Alcan, 1887), 18.

57. For example, Christopher Kelty and Hannah Landecker, "A Theory of Animation: Cells, L-Systems, and Film," *Grey Room* 17 (Fall 2004): 30–63, 49.

58. Ron Amundson, *The Changing Role of the Embryo in Evolutionary Thought: Roots of Evo-Devo* (Cambridge: Cambridge University Press, 2005), 5–6. See also Thompson, *On Growth and Form*, 339–40.

59. Catherine Walby, "Code Unknown: Histories of the Gene: The Century of the Gene by Evelyn Fox Keller; Who Wrote the Book of Life? A History of the Genetic Code by Lily E. Kay," *Social Studies of Science* 31 (5) (October 2001): 779–91, 783. (Describing and questioning the criticisms of Lily E. Kay.)

60. Walby, "Code Unknown," 786–87.

61. Catherine Mills, *Futures of Reproduction: Bioethics and Biopolitics* (London: Springer, 2011), 4.

62. Ibid., 3.

63. Ibid., 86.

64. Luciana Parisi, "Information Trading and Symbiotic Micropolitics," *Social Text* 22 (3) (Fall 2004): 24–49, 29.

65. Annette Burfoot, "Human Remains: Identity Politics in the Face of Biotechnology," *Cultural Critique* 53 (Winter 2003): 47–71, 57 (among others).

66. Braidotti, *Transpositions*, 40.

67. To provide one, of many, examples of this rhetoric, consider the first line of one (of many) of *Guardian* reporter Glenn Greenwald's editorials on the issue: "When I made the choice to report aggressively on top-secret NSA programs, I knew that I would inevitably be the target of all sorts of personal attacks and smears. You don't challenge the most powerful state on earth and expect to do so without being attacked." Over the course of this 762-word article, variations on the terms "attack," "aggression," and "challenge" appear eight times—that is, they make up 10 percent of the total text. Glenn Greenwald, "The Personal Side of Taking on the NSA: Emerging Smears," *Guardian* (June 26, 2013): http://www.theguardian.com/commentisfree/2013/jun/26/nsa-revelations-response-to-smears.

68. Foucault, *Society Must Be Defended*, 245.

69. For an excellent analysis of this argument, see Catherine Mills, "Linguistic Survival and Ethicality: Biopolitics, Subjectivity, and Testimony," in A. Norris, ed., *Remnants of Auschwitz* (Durham: Duke University Press, 2005), 198–221, 198–202.

70. Foucault, *Society Must Be Defended*, 245.

71. Ibid., 241.

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72. Dragoş Chilea, "Le régime juridique de l'identité génétique de la personne en droit européen," *Curentul Juridic* 43 (2010): 53–68, 55.

73. This is a process in which somatic nuclear material is inserted into an enucleated egg cell, which then begins to develop into an embryo and fetus.

74. Victoria Davion, "Coming Down to Earth on Cloning: An Ecofeminist Analysis of Homophobia in the Current Debate," *Hypatia* 21 (4) (2006): 58–76, 63.

75. Braidotti, *Metamorphoses*, 196.

76. Susan L. Crockin, "The 'Embryo' Wars: At the Epicenter of Science, Law, Religion, and Politics," *Family Law Quarterly* 39 (3) (2005): 599–632, 610.

77. Emine Elif Vatanoğlu-Lutz, "Research on Embryos in Turkey with Ethical and Legal Aspects / Etik ve yasal açıdan Türkiye'de embryo üzerinde araştırmalar," *Journal of the Turkish-German Gynecological Association* 13 (2012): 191–95, 193.

78. Consider, for example, the ongoing obsession with recycling—not just as way of dealing with waste but as an arguably more visible and widespread mode of political engagement than, say, voting.

79. For a representative example of this rhetoric, consider "the mother cell divides into two equal parts," or "in some cases, several new individuals can spring from the mother cell." Parramon's Editorial Team, *Essential Atlas of Biology* (Hauppauge, NY: Barron's Educational Series, 2006), 72.

80. Robert G. McKinnell and Marie A. Di Berardino, "The Biology of Cloning: History and Rationale," *BioScience* 49 (11) (1999): 875–85, 883.

81. Sarah Franklin, *Dolly Mixtures: The Remaking of Genealogy* (Durham: Duke University Press, 2007), 20.

82. That is to say, it is a collection of "mother cells" and "daughter cells."

83. Bray, *Wetware*.

84. Prochiantz, *Machine-Ésprit.*

85. Gabor Balazsi, Alexander van Oudenaarden, and James J. Collins, "Cellular Decision Making and Biological Noise: From Microbes to Mammals," *Cell* 144 (March 18, 2011): 910–25.

86. Hannah Landecker, "Living Differently in Time: Plasticity, Temporality and Cellular Biotechnologies," *Culture Machine* 7 (2005): http://www.culturemachine.net/index.php/cm/article/viewArticle/26/33.

87. Luciana Parisi, *Abstract Sex: Philosophy, Bio-technology, and the Mutations of Desire* (London: Continuum, 2004); Luciana Parisi, *Contagious Architecture: Computation, Aesthetics, and Space* (Cambridge: MIT Press, 2013).

88. Bahaeddin Şakir, *Tıp Kanunu Dersleri* (Istanbul: Mekteb-i Tıbbiye-yi Askeriye Matbaası, 1908).

89. Buffon, *Oeuvres complètes*.

90. Natalie Angier, "Molecule That Protects Embryo Is Tracked," *New York Times* (May 8, 1990), C3.

91. Chilea, "Le régime juridique"; Council of Europe, "Draft Additional Protocol to the Convention on Human Rights and Biomedicine on the Prohibition of Cloning Human Beings with Explanatory Report and Parliamentary Assembly Opinion [Adopted, September 22, 1997]," *International Legal Materials* 36 (6) (1997): 1415–22;

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Alain Graf (Rapporteur general), *Rapport final: Etats généraux de la bioéthique* (Paris: Ministère de la santé et des sports, 2009); Vatanoğlu-Lutz, "Research on Embryos."

Chapter 2. Boundless Thought

1. Landecker, "Living Differently."
2. For a review of some of this literature, seeBalazsi et al., "Cellular Decision Making."
3. Bray repeatedly cautions against such an extrapolation from his work. Bray, *Wetware*, 142–43.
4. A search on Google Scholar for "cellular decision making" returns 968 results.
5. Bray, *Wetware*, 142–43.
6. Ibid.
7. Ibid., 225.
8. Ibid., 226.
9. Ibid.
10. Ibid., 9–10.
11. Ibid., 142–43.
12. Ibid.
13. Ibid., 164–65.
14. Jennifer Gabrys, *Digital Rubbish: A Natural History of Electronics* (Ann Arbor: University of Michigan Press, 2011), 112.
15. Ibid., 112–13.
16. Balazsi et al., "Cellular Decision Making," 918.
17. Ibid., 918, 921.
18. Ibid., 910.
19. Ibid., 922.
20. Ibid., 911.
21. Ibid., 922.
22. Ibid., 916.
23. Tanya Latty and Madeleine Beekman, "Irrational Decision-Making in an Amoeboid Organism: Transitivity and Context Dependent Preferences," *Proceedings of the Royal Society B* (2010): 1–6, 1.
24. Ibid., 5.
25. Ibid.
26. Ibid.
27. Parisi, *Contagious Architecture*.
28. Ibid., 172.
29. Ibid., 185.
30. Ibid., 219.
31. Ibid.
32. Ibid.
33. Ibid., 245.
34. Ibid., 186.

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35. Ibid., 185.
36. Ibid., xiii.
37. Ibid., 245.
38. Ibid.
39. Ibid., 169.
40. Ibid.
41. Ibid.
42. Ibid.
43. Parisi and Portanova, "Soft Thought," 10.
44. Parisi, *Contagious Architecture*, xv.
45. Ibid.
46. Ibid., xvii–xviii.
47. Ibid., 175.
48. Paul Rabinow and Nikolas Rose, "Biopower Today," *BioSocieties* 1 (2006): 195–217, 208.
49. Balazsi et al., "Cellular Decision Making," 911.
50. Ibid.
51. Consider also Latty and Beekman's discussion of slime mold. Latty and Beekman, "Irrational Decision-Making," 5.
52. Balazsi et al., "Cellular Decision Making," 912.
53. Ibid.
54. Landecker, "Living Differently."
55. Ibid.
56. Ibid.
57. Ibid.
58. Ibid.
59. Myra J. Hird, "Feminist Engagements with Matter: *Judith Butler: Live Theory* by Vicki Kirby; *Psychosomatic: Feminism and the Neurological Body* by Elizabeth A. Wilson; *Abstract Sex: Philosophy, Bio-technology, and the Mutations of Desire* by Luciana Parisi; *When Species Meet* by Donna Haraway; *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning* by Karen Barad," *Feminist Studies* 35 (2) (2009), 329–46, 343–44.
60. Parisi, *Abstract Sex*, 49.
61. Ibid., 56–57.
62. Ibid.

Chapter 3. Embryos

1. Foucault, *Society Must Be Defended*, 37.
2. Nancy Ehrenreich, ed., *The Reproductive Rights Reader: Law, Medicine, and the Construction of Motherhood* (New York: New York University Press, 2008).
3. For an analysis of the role of the embryo as person in recent French legislation, for example, see Bertrand Pulman, "The Issues Involved in Cloning: Sociology and Bioethics," *Revue française de sociologie* 48 (2007): 129–56, 130. Consider also the spread of so-called chemical endangerment laws in various U.S. states. These laws

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target women who, postconception, engage in activities (drinking, drug taking, etc.) that are thought to produce a less than ideal environment for the embryo or fetus. In Alabama, women have been sentenced to up to ten years in prison for miscarrying a fetus after having taken drugs. See http://www.theguardian.com/world/2011/jun/24/america-pregnant-women-murder-charges.

4. Devin Henry, "Embryological Models in Ancient Philosophy," *Phronesis* 50 (1) (2005): 1–42, 3.

5. Ibid.

6. Ibid., 7.

7. Ibid.

8. Ibid., 26–27.

9. Ibid.

10. Ibid.

11. Ibid.

12. Ibid., 39.

13. Ibid.

14. "As Whitehead says (with specific reference to algebraic symbols), it is not human subjects that think through symbols, but the symbolic operations of algebra do the thinking for us." Parisi and Portanova, "Soft Thought," 8.

15. Florence Vienne, "Organic Molecules, Parasites, *Urthiere*: The Controversial Nature of Spermatic Animals," in Suzanne Lettow, ed., *Reproduction, Race, and Gender in Philosophy and the Early Life Sciences* (Albany: State University of New York Press, 2014), 45–64, 48. See also Jacques Roger, "From Reproduction to the Problem of Life," in Leslie Pearce Williams, trans., *Buffon: A Life in Natural History* (Ithaca, NY: Cornell University Press, 1997), 139.

16. Buffon, *Oeuvres complètes*, vol. 4, 150, 291.

17. Ibid.

18. Ibid., 207.

19. Ibid.

20. Ibid., 207–8.

21. Ibid., 292.

22. Ibid., 296.

23. Ibid., 310–11.

24. J. B. Demangeon, *Anthropogénèse, ou, génération de l'homme, avec des vues de comparaison sur les reproductions des trois règnes de la nature* (Paris: Rouen Frères, 1829), 11–13, 105–6.

25. Ibid., 140–41.

26. A. Aug. Duméril, *L'évolution du foetus: thèse présentée et soutenue à la Faculté de Médecine de Paris* (Paris: Imprimerie de Fain et Thunot, 1846), 46–47.

27. G. A. DeLattre, *Traité pratique des accouchements des maladies des femmes et des enfants* (Brest: Imprimerie et Lithographie Roger et Fils, 1863), 126.

28. Félix Hément, *L'Origine des êtres vivants* (Paris: Librairie Classique N. Fauvé et F. Nathan, 1889), 90.

29. Preyer, *Physiologie spéciale de l'embryon*, 18.

30. Ibid., 25–26.

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31. Ibid., 52.
32. Ibid., 434.
33. Ibid., 151, 169, 435.
34. Ibid., 466–67.
35. Ibid., 475.
36. Ibid., 487–88.
37. William Preyer, *Mental Development of the Child*, trans. H. W. Brown (New York: Appleton, 1903), 16.
38. Şakir, *Tıp Kanunu Dersleri*, 15.
39. Ibid., 70.
40. Ibid., 85.
41. Ibid., 16.
42. Ibid.
43. Bray, *Wetware*, 222–23.
44. Buffon, *Oeuvres complètes*, vol. 4, 150.
45. Ibid., 153.
46. Ibid., 155.
47. Ibid., 155–56.
48. Ibid.
49. Ibid., 332–33.
50. Ibid., 157.
51. Ibid., 289–90.
52. Ibid.
53. Ibid., 290.
54. Ibid., 158.
55. Ibid., 167.
56. Ibid., 325.
57. Ibid., 325.
58. Ibid.
59. Ibid., 340.
60. Nick Hopwood, "'Giving Body' to Embryos: Modeling, Mechanism, and the Microtome in Late Nineteenth-Century Anatomy," *Isis* 90 (3) (1999): 462–96, 470.
61. Ibid., 476.
62. Ibid.
63. Ibid., 492.
64. Ibid., 490.
65. Ibid.
66. Ibid.
67. Rees, "Being Neurologically Human," 151.
68. Ibid.
69. Ibid.
70. Ibid.
71. Ibid., 157–58.
72. Ibid.
73. Ibid., 157.
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Chapter 4. Clones

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2. For a fascinating feminist analysis of this biological work challenging the mastery of the gene (especially that initiated by Barbara McClintock), see Braidotti, *Transpositions*, 5–6, and Parisi, *Abstract Sex*, 49, 56–57.
3. William L. Laurence, "Life Is Created without Parents: Dr. Harvey of Princeton Tells Philosophers of Results with Fragments of Eggs, New View of Cytoplasm," *New York Times* (November 28, 1937): 1–2, 2.
4. Ibid.
5. "Change of Embryo into Cell Depicted: Yale Scientist Describes Stage at Which Protoplasm Forms Structure of Organs, Cell Evolution Shown," *New York Times* (July 4, 1939): 17, 17.
6. Ibid.
7. Miller, *Snarl*, 55–59.
8. Pulman, "Issues Involved in Cloning," 149.
9. Lynn K. Nyhart and Scott Lidgard, "Individuals at the Center of Biology: Rudolf Leuckart's *Polymorphismus der Individuen* and the Ongoing Narrative of Parts and Wholes," *Journal of the History of Biology* 44 (2011): 373–443, 373.
10. Ibid., 375.
11. Ibid., 379.
12. Ibid., 380.
13. Ibid., 398.
14. Ibid.
15. Ibid.
16. Human Fertilisation and Embryology Authority, "Hybrids and Chimeras: A Report on the Findings of the Consultation," (October 2007): http://www.hfea.gov.uk/docs/Hybrids_Report.pdf, 2.6.
17. Ibid., appendix A, pdf, 25.
18. Ibid.
19. Ibid., 1.2.1, pdf, 29.
20. Ibid., 5.18. pdf, 13.
21. Ibid., 5.22. pdf, 14.
22. Ibid., 5.1.7. pdf, 45.
23. Davion, "Coming Down to Earth," 63.
24. Ibid.
25. Ibid., 63–64.
26. Ibid.
27. Ibid.
28. Ibid., 66.
29. Ibid., 65.
30. Ibid., 74.
31. Parisi, *Abstract Sex*, 195–96.

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32. Ibid.
33. Ibid., 174.
34. Ibid., 122.
35. Ibid.
36. Ibid., 195–96.
37. Giovanni Maio, "The Embryo in Relationships: A French Debate on Stem Cell Research," *Journal of Medicine and Philosophy* 29 (5) (2004): 583–602, 588–89.
38. Ibid.
39. Ibid., 589.
40. Ibid.
41. Ibid., 592.
42. Chilea, "Le régime juridique," 55.
43. Ibid.
44. Ibid., 67.
45. As the earlier policy was described in Graf, *Rapport final*, 45.
46. See also Pulman, "Issues Involved in Cloning," 142.
47. Jean-François Thery, Frédéric Salat Baroux, and Christine Le Bihan Graf, "Les lois de bioéthique: cinq ans après" (Paris: Conseil d'Etat, December 1999): http://www.ladocumentationfrancaise.fr/rapports-publics/994001756/index.shtml, 5.
48. Ibid.
49. Ibid., 8.
50. Ibid., 9.
51. Ibid., 7.
52. Council of Europe, "Draft Additional Protocol," 1415.
53. Ibid.
54. Ibid.
55. Ibid.
56. Ibid.
57. Ibid.
58. Consider, for example, the reaction to the French interpretation of this European law as described by Pulman, "Issues Involved in Cloning," 150.
59. Ibid., 129–30.
60. Ibid., 145.
61. Ibid.
62. Ibid.
63. Ibid., 146.
64. Ibid.
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66. Ibid., 147.
67. Franklin, *Dolly Mixtures*, 27.
68. Pulman, "Issues Involved in Cloning," 147.
69. Ruth F. Chadwick, "Cloning," *Philosophy* 57 (220) (1982): 201–9, 204.
70. McKinnell and Di Berardino, "Biology of Cloning," 883.
71. Ibid.
72. Foucault, *Society Must Be Defended*, 241.
73. For a criticism of this association from the direction of feminist theory, see Parisi, *Abstract Sex*, 49, 56–57.

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Chapter 5. Trash

1. Gabrys, *Digital Rubbish*, 89.
2. Parikka, *The Anthrobscene*, 41.
3. Gabrys, *Digital Rubbish*, 67.
4. Ibid., 120–21.
5. Ibid., 125.
6. Ibid., 89.
7. Ibid., 139.
8. Ibid., 150.
9. Fuller and Goffey, *Evil Media*, 101.
10. Despite Buffon's unusual eighteenth-century dismissal of the popular model of female reproductive passivity and male reproductive activity, however, it was *not* the seeming equality of sexual or reproductive behavior that leant to Buffon's work its significance to the study of gender. On the contrary, regardless of whether commentators and scientists worked on the assumption that males and females were equally active or on the assumption that males acted on passive females, *all* of their writing suggested that gender was the key determinant of what thought and life, what information and matter, would be stored, processed, and then disposed of. All of these writers made clear that, in the realm of reproduction, life, and thought, waste is a problem of gender. It is nice, in other words, to recognize that Buffon did not follow what is ordinarily viewed as the Aristotelian, male-centered model of reproduction—but this refusal to accept female reproductive passivity is not what lends to his work its relevance to nonhuman biopolitical democracy.
11. Vienne, "Organic Molecules," 48–49.
12. Buffon, *Oeuvres complètes*, vol. 4, 207–8.
13. Ibid.
14. Ibid.
15. Ibid., 238.
16. Ibid.
17. Ibid., 337.
18. And there is thus, for example, no concern about a "mother's" discrete, female body either "accepting" or "rejecting" the embryo's discrete, male or female body. For one example (of many) of this rhetoric, see Angier, "Molecule That Protects Embryo," C3. Intriguingly, one of the first cloned interspecies hybrids was created in order to address the problem of hostile maternal environments. Aline Ferreira, "Primate Tales: Interspecies Pregnancy and Chimerical Beings," *Science Fiction Studies* 35 (2) (2008): 223–37, 223.
19. Hément, *L'Origine*, 88–89.
20. Ibid.
21. Ibid., 109–10.
22. Ibid., 106.
23. Charles Sedgwick Minot, *Human Embryology* (New York: Macmillan, 1897), 70.
24. For an alternative articulation of the importance of relations rather than taxonomy, see Thompson, *On Growth and Form*, 342.
25. Minot, *Human Embryology*, 79.

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26. Ibid.
27. Ibid.
28. Ibid., 82–83.
29. Ibid., 84.
30. Ibid.
31. Parisi (obliquely) challenges this association between asexual reproduction and death in *Abstract Sex*, 72–73.
32. Şakir, *Tıp Kanunu Dersleri*, 81.
33. Ibid., 97.
34. Ibid.
35. Ibid., 99.
36. Ibid., 105.
37. Fatih Karaçalı, "Çöplükte cenin skandalı," *Hürriyet* (July 25, 2003): http://hurarsiv.hurriyet.com.tr/goster/haber.aspx?id=161318.
38. Eraydın Aytekin, "Postayla cenin gönderildi," *Hürriyet* (March 18, 2003): http://hurarsiv.hurriyet.com.tr/goster/haber.aspx?id=134375.
39. Seçkin Kırarslan, "Zonguldak'ta mezarlıkta cenin bulundu," *Hürriyet* (February 9, 2007): http://www.hurriyet.com.tr/gundem/5922909.asp.
40. "Çöplükte cenin bulundu," *Hürriyet* (January 10, 2010): http://www.hurriyet.com.tr/gundem/13435999.asp.
41. Vatanoğlu-Lutz, "Research on Embryos," 192.
42. Ibid., 193.
43. Ibid., 194. For Vatanoğlu-Lutz's recommendations, see ibid., 195.
44. Ibid., 194. For Vatanoğlu-Lutz's recommendations, see ibid., 195.
45. Stephanie Hennette-Vauchez, "Words Count: How Interest in Stem Cells Has Made the Embryo Available—a Look at the French Law of Bioethics," *Medical Law Review* 17 (Spring 2009): 52–75, 53.
46. Ibid.
47. Ibid., 55.
48. Ibid.
49. Ibid., 71.
50. Crockin, "Embryo Wars," 610.
51. Ibid.
52. Ibid.
53. As Aline Ferreira has argued, "While there might be no such thing as scientifically fixed species identities, morally we rely on the notion of fixed species identities in the way we live our lives and treat other creatures. The sf texts considered in this paper challenge our certainty in such actions." Ferreira, "Primate Tales," 223.
54. Human Fertilisation and Embryology Authority, "Hybrids and Chimeras," 2.3.pdf 58–59.

Chapter 6. Data Hoards

1. The case study here is not a complete, narrative history of surveillance and data mining in the United States from the 1970s to the present. Rather, what follows is an

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impressionistic, yet close, reading of a small number of documents related to the collection of metadata in the early 2000s.

2. For a more extended analysis of the literature making this claim, see Ruth Miller, *The Limits of Bodily Integrity: Abortion, Adultery, and Rape Legislation in Comparative Perspective* (Aldershot: Ashgate, 2007), 3–6.

3. Seth F. Kreimer, "Watching the Watchers: Surveillance, Transparency, and Political Freedom in the War on Terror," *Journal of Constitutional Law* 7 (1) (2004): 133–81, 155.

4. Ibid., 173.

5. Ibid.

6. Ibid., 177.

7. Ibid.

8. Ibid., 181.

9. Christopher Slobogin, "Government Data Mining and the Fourth Amendment," University of Chicago Law School's Conference on Surveillance (June 15–16, 2007): 1–21, 1.

10. Ibid., 2.

11. Ibid., 4.

12. Ibid.

13. Ibid.

14. Ibid., 18.

15. Ibid.

16. Ibid.

17. Ibid.

18. Slobogin expands on this taxonomy in Christopher Slobogin, *Privacy at Risk: The New Government Surveillance and the Fourth Amendment* (Chicago: University of Chicago Press, 2011), 361–83.

19. Jack Balkin, "The Constitution in the National Surveillance State," *Minnesota Law Review* 93 (1) (2008): 1–25, 3.

20. Ibid., 6.

21. Ibid., 22.

22. Ibid.

23. Ibid., 18.

24. Balkin, "Information Power," 232.

25. Ibid.

26. Ibid., 244.

27. Ibid., 233.

28. Ibid., 234–35.

29. Ibid., 235.

30. Ibid., 236.

31. Ibid.

32. Ibid.

33. Ibid.

34. Ibid., 236–37.

35. Ibid., 238.

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36. Ibid., 238–39.

37. And complementing, perhaps, the "alternative materialism for the geophysical media age" proposed by Parikka, *The Anthrobscene*, 5.

38. Parisi, *Contagious Architecture*, xv.

39. Fuller and Goffey, *Evil Media*, 97.

40. Kenneth Weinstein, "Proposed Amendment to Department of Defense Procedures to Permit the National Security Agency to Conduct Analysis of Communications Metadata Associated with Persons in the United States" (November 20, 2007): https://www.aclu.org/files/natsec/nsa/20130816/NSA%20Memo%20to%20DOD%20-%20Proposed%20Amendment%20to%20Conduct%20Analysis%20of%20Metadata.pdf, 2.

41. Ibid.

42. Throughout these conversations, NSA agents repeatedly insist that their relationship to metadata adheres to conventional, post–Oklahoma City bombing and post–PATRIOT Act, Fourth Amendment interpretation. Clarke et al., "Liberty and Security," 80–81.

43. Ibid., 5.

44. Ibid.

45. Ibid., 9.

46. The report was reissued in an almost identical form in 2011, with the following cover letter: "We believe that making this document available to all Members of Congress, as we did with a similar document in December 2009, is an effective way to inform the legislative debate about reauthorization of Section 215. However, as you know, it is critical that Members understand the importance to national security of maintaining the secrecy of these programs, and that the SSCI's plan to make the document available to other Members is subject to the strict rules set forth below." Ronald Weich, "Report on the National Security Agency's Bulk Collection Programs for USA PATRIOT Act Reauthorization" (February 2, 2011): http://fas.org/irp/news/2013/07/2011_bulk.pdf, 1.

47. "Report on the National Security Agency's Bulk Collection Programs Affected by USA PATRIOT Act Reauthorization" (December 14, 2009): https://www.aclu.org/files/natsec/nsa/20130816/2009%20OIG%20Report%20on%20Bulk%20Collection.pdf, 3.

48. Ibid., 1.

49. Ibid.

50. Ibid., 4.

51. Ibid.

52. Ibid.

53. "Government Report in Response to FISC Primary Order of July 9, 2009" (August 20, 2009): http://fas.org/irp/agency/doj/fisa/fisc-081909.pdf, 58 (p. 14 of 110 in the PDF).

54. Ibid., 58–59; pdf, 14–15.

55. Clarke et al., "Liberty and Security," 100–104.

56. "Government Report in Response," 59; pdf, 15.

57. "Declaration of Lieutenant General Keith B. Alexander, United States Army, Director of the National Security Agency," in ibid., 75; pdf, 31.

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58. Ibid., 82; pdf, 38.
59. Ibid., 88; pdf, 44.
60. Ibid.
61. "Summary of DNR and DNI Co-Travel Analytics" (October, 2012): https://www.aclu.org/files/natsec/nsa/20140130/2013.12.10%20Cotraveler%20Overview.pdf, 4.
62. Ibid.
63. Ibid., 5.
64. Ibid.
65. Ibid., 8.
66. Ibid., 9.
67. For example, ibid., 11.
68. Ibid., 17.
69. Clarke et al., "Liberty and Security," 10.
70. Ibid.
71. Ibid., 17.
72. Ibid.
73. Ibid.
74. This program was suspended in 2009 because of the compliance issues noted earlier, restarted in 2010, and then abandoned completely in 2011.
75. Clarke et al., "Liberty and Security," 83.
76. Ibid., 98.
77. Ibid., 108.
78. Ibid., 120–21.
79. Between June 2013 and June 2014, the *Guardian*, according to its online search engine, used the term "data mining" 14,600 times, that is, on average, 40 repetitions every day.

Chapter 7. Conclusion

1. Consider, for example, the Virek figure in William Gibson, *Count Zero* (New York: Penguin, 1986).
2. In the way that reporters such as Glenn Greenwald "target" NSA agents.
3. In the way that NSA agents "target" citizens.
4. That is, the opposite of the Schmittian exception or miracle as it is articulated in Carl Schmitt, *Political Theology: Four Chapters on the Concept of Sovereignty*, trans. George Schwab (Chicago: University of Chicago Press, 2005), 5.
5. Ehrenreich, introduction to *Reproductive Rights Reader*, 1.
6. Carl Schmitt, *Crisis of Parliamentary Democracy*, trans. Ellen Kennedy (Cambridge: MIT Press, 1992), 34.

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