1. Feminist science studies scholarship, of which this book is an example, has made important contributions to our understanding of the history of knowledge and science by focusing on how knowledge is created by a wide range of actors—not just white male experts. The works of scholars such as Adele Clarke, Ruth Schwartz Cowan, Rayna Rapp, and many others have set new standards of analysis that attend to the roles a wide range of nonexpert human actors play in knowledge production and biomedical practice. The sociology of environmental health has also emphasized the importance of knowledge practices from below, as is discussed more fully in chap. 4.

2. See, e.g., Tomes, *Gospel of Germs*.

3. There were many "nonspecific" illnesses, or syndromes, that emerged in the late twentieth century. Despite, or perhaps because of, their proliferation, they are usually controversial. All have in common either a lack of identifiable cause or a diversity of expression, or both. In addition to sick building syndrome and multiple chemical sensitivity, nonspecific illnesses include Gulf War syndrome, chronic fatigue syndrome, acquired immunodeficiency syndrome, cumulative trauma disorder (also called repetitive strain injury), and a host of psychological disorders.

4. I have appropriated the term *materialize* from Judith Butler, who wrote, "What I propose in the place of these conceptions of construction is a return to the notion of matter, not as a site or surface, but as a process of materialization that stabilizes over time to produce the effect of boundary, fixity, and surface we call matter. That matter is always materialized has, I think, to be thought in relation to the productive and, indeed, materializing effects of regulatory power in the Foucaultian sense"; Butler, *Bodies That Matter*, 9–10. Reading Foucault as a materialist, as I also do, Butler describes materiality as an effect of power (2). However, in the bulk of her analyses Butler is primarily concerned with the materialization that occurs through the performativity of language. See, e.g., Butler, "Performativity's Social Magic." In this book I depict materialization as the effect of power as exercised through the concrete arrangements of objects, actions, and subjects, rather than emphasizing the realm of the discursive.

5. *Historical ontology*, as Ian Hacking points out in his book of that title, is a term used by Michel Foucault in his essay, "What Is Enlightenment?," though Foucault himself does not go on to make much use of the term. Much of the strand of scholarship on science concerned with historical ontology is intellectually indebted in some way to Foucault. The scholarship on how objects or phenomena come to exist has also been significantly shaped by the work of Bruno Latour and the actor network theory method of science studies that he influenced. Also important has been the work of historian Lorraine Daston. See Latour, *Pasteurization of France*; and Daston, "Coming into Being of Scientific Objects."

6. Historical ontology builds on historical epistemology. Scholars concerned with historical epistemology examine the historical formation of knowledge production. Scholars also concerned with how objects and their effects come to exist take up questions of historical ontology as well. On this difference, see Hacking, *Historical Ontology*. I use the term *apprehended* purposefully to indicate both the sense of knowing and of a physical capture.

7. For other works that emphasize the multiplicity of objects and ontologies, see Law and Mol, "Notes on Materiality and Sociality"; Law and Mol, *Complexities*; Locke, *Twice Dead*; Mol, *Body Multiple*; and Verran, *Science and an African Logic*.

8. There is a long tradition in science studies of looking at disagreements between different disciplines or scientists. While attending to both the winners and losers in a disagreement, this strand of scholarship has tended to look at how controversies were resolved by one side that successfully defined the terms of valid knowledge. For a classic work in this vein, see Shapin and Schaffer, *Leviathan and the Air-Pump*. Other work has focused on how encounters between different disciplines in collaborative ventures can be productive. See, e.g., Clarke, *Disciplining Reproduction*; and Galison, *Image and Logic*.

9. For an overview of this literature as it relates to environmental health, see Mitman, Murphy, and Sellers, "Cloud over History."

10. See, e.g., Kim Fortun, *Advocacy after Bhopal*; Kirsch, "Harold Knapp"; Nash, "Fruits of Ill-Health"; Petryna, *Life Exposed*; and Luise White, "Poisoned Food."

11. On the history of perception and imperception in modern Europe, see Crary, *Suspensions of Perception*. On the history of ignorance, see Robert Proctor's forthcoming work on agnatology.

12. By using the concept of domains of imperceptibility I do not pretend to be able to capture the radical outside of knowledge. However, I do want to argue that if we identify something as outside, as imperceptible, as unknowable, that something is materialized to some small degree and is thus not radically outside.

13. For an elaboration on this concept, see chap. 1.

14. *Multiplicity* is a concept I have taken from Brian Massumi's English translation of the work of Gilles Deleuze and Félix Guattari. One of the most interesting and useful aspects of multiplicity is the way it displaces difference from within objects and instead posits multiplicity as running through and connecting objects; Deleuze and Guattari, *Thousand Plateaus*, 8. I find their concept of multiplicity a useful way of amending my largely Foucaultian analytic toolbox by allowing me to attend to the encounter between different epistemes and how objects are constituted in such encounters. While I have used several concepts from the work of Deleuze and Guattari to formulate the methodology for this book, my argument here differs substantially from much of the current scholarship in Deleuze studies. Many Deleuze scholars interested in science have followed Deleuze's lead and used scientific and mathematical concepts to formulate their own philosophies of ontology. This book, in contrast, seeks to historicize science and seeks to contribute to analytic approaches in science studies, environmental history, the history of health, and the history of knowledge production.

15. Brian Massumi wrote a wonderful discussion of *and* in his "user's guide" to *A Thousand Plateaus* that describes the *and* in relation to a brick. Massumi, *User's Guide*, 6.

16. Deleuze and Guattari use the excellent example of the wasp and the orchid to describe how two objects materialize each other (though they use the terms "territorialize" or "become"). Deleuze and Guattari, *Thousand Plateaus*, 10. For another example of mutual capture, see Massumi's opening description of the meeting of wood and the woodworker in Massumi, *User's Guide*.

17. Instead of using Foucault's term *discursive formations*, I prefer to use the term *assemblage* from Deleuze and Guattari to emphasize the material culture of formations. Foucault, *Archaeology of Knowledge*, 38. However, "assemblage" is a very complicated part of Deleuze and Guattari's philosophy, and I have appropriated the term and simplified it to my own ends. I prefer it because of its materialist implications: assemblages are formed of not only words, but also objects, actions, and subjects. Foucault also saw "rules of formation" as setting the conditions of existence in a discipline's discourse. For Foucault, rules of formation gave shape to the self-evidencies at work in arrangements of subjects, words, and practices. See ibid. Deleuze and Guattari, building on Foucault, used *assemblage* to describe how words and objects ordered each other and made each other possible according to an "abstract diagram." See Deleuze and Guattari, *Thousand Plateaus*, 503–5.

18. The verb *articulate* is useful because it refers not only to speech, but also to physicality, such as the way the joint articulates an arm.

19. I use *historical regularities* in a Foucauldian sense to mean the abstract

condition of possibility for what was sayable and perceivable in a particular historical circumstance. For example, in vol. 1 of *The History of Sexuality*, Foucault argues that the Victorian period was characterized not by the repression of sex (which is what one might conclude if one took words literally) but by a proliferation of discussions of sex; it "was taken charge of, tracked down as it were, by a discourse that aimed to allow it no obscurity, no respite"; *History of Sexuality*, 20. Cracking open this discourse, Foucault argues that in fact the condition of possibility for speaking about sex was to explain it as a secret. Regularities, then, are abstracted functions—object functions, subject functions, discursive functions—that set the limits of materialization. What I am trying to get at by "cracking open" is an abstraction, a map of functions or conditions of possibility, not a description of empirical specificities. Deleuze explains this "cracking open" in Deleuze, *Foucault*.

20. Foucault says something similar in his discussion of the "formation of objects": "One cannot speak of anything at any time; it is not easy to say something new; it is not enough for us to open our eyes, to pay attention, or to be aware, for new objects suddenly to light up and emerge out of the ground. But this difficulty is not only a negative one; it must not be attached to some obstacle whose power appears to be, exclusively, to blind, to hinder, to prevent discovery, to conceal the purity of the evidence or the dumb obstinacy of the things themselves; the object does not await in limbo the order that will free it and enable it to become embodied in a visible and prolix objectivity; it does not pre-exist itself, held back by some obstacle at the first edges of light. It exists under the positive conditions of a complex group of relations"; Foucault, *Archaeology of Knowledge*, 44–45. On the agency of nonhuman actors as theorized within science studies, see Latour, *Pasteurization of France* and "Mixing Humans and Nonhumans."

21. Chap. 3 elaborates on and gives an empirical account of rematerialization.

22. Deleuze and Guattari write of "lines of flight" rather than resistance. I think one of their most useful insights about "lines of flight" is that they are dangerous. Just as they can cut across dominant formations and open up possibilities, they are also reterritorializations, which do not escape and can in fact be dangerous and deadly. This is one of the concluding points of chap. 7 in this book. See Deleuze and Parnet, "Many Politics."

23. Spivak explains my position well: "Deconstruction, whatever it may be, is not most valuably an exposure of error, certainly not other people's error, other people's essentialism. The most serious critique in deconstruction is the critique of things that are extremely useful, things without which we cannot live"; Spivak, "In a Word," 4.