Introduction:
A Cloud over History

*By Gregg Mitman, Michelle Murphy, and Christopher Sellers**

WHILE THOUSANDS of government delegates, corporate leaders, and NGO representatives made final travel plans in August 2002 for the United Nations' World Summit on Sustainable Development, in Johannesburg, South Africa, a cocktail unlike any to be served at the diplomatic dinners there was mixing above the southern Indian Ocean. One week before the Rio+10 conference the United Nations Environment Program (UNEP) released findings of the Indian Ocean Experiment (INDOEX), a study begun seven years earlier by a team of 200 European, Indian, and U.S. scientists. Originally funded to carry questions about global climate change from computer model to field, the team had recently found its attention riveted by a two-mile thick cloud of pollution blanketing southern Asia. The consequences of this "Asian haze" for climate, agriculture, and health were just becoming known. "More research is needed," Klaus Toepfer, UNEP executive director, told the press, "but initial findings clearly indicate that this growing cocktail of soot, particles, aerosols and other pollutants [is] becoming a major environmental hazard for Asia. There are also global implications, not least because a pollution parcel like this, which stretches three kilometers high, can travel half way around the globe in a week."[1]

Like a host of predecessors, from carcinogens to acid rain to global warming, the so-called Asian Brown Cloud entered human history through scientific reports. Though its elements had been merging for years, perhaps decades, to form a growing mist, spreading farther across continent and ocean and affecting more and more lives, the Brown Cloud only found a name and international notoriety through the agency

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[1] UNEP, "Regional and Global Impacts of Vast Pollution Cloud Detailed in New Scientific Study," press release, 13 Aug. 2002, http://www.unic.org.in/News/2002/pr/pr86Aug2002.html (quote); UNEP and Center for Clouds, Chemistry, and Climate, The Asian Brown Cloud: Climate and Other Environmental Impacts (Pathumthani, Thailand, 2002), http://www.rrcap.unep.org.

of a privileged few, mainly scientists. The reports of mothers who had brought gasping children into Bombay hospitals whenever a haze had hung over the city, long before the UNEP issued its report, had not been enough. Once the privileged few had noted this dun nimbus, however, it became, with lightning speed, both a real, coherent thing and a serious problem in environmental health in many more people's eyes. By exploring the implications of recent phenomena such as the Asian Brown Cloud, this *Osiris* volume announces a fundamental revision in the way we understand the history of environment and health. Environment and health have long been seen as having separate histories. Given the children's problems in Bombay, for instance, an earlier generation of historians might have pigeonholed the Asian haze as an episode in the history of public health. That rubric, however, hardly does justice to a "discovery" spurred by investigation of global climate and chemistry rather than disease. Signaling a dramatic reversal of the momentum in early-twentieth-century public health "from the environment to the individual," the Brown Cloud suggests how late-twentieth-century developments have outrun long-accepted narratives of public health as well as medical history.[2] The Asian haze also brings into sharp relief persistent assumptions in environmental history and the history of ecology that human health questions are somehow less ecological than those addressing the nonhuman world. Thus the Brown Cloud exemplifies how the once-separate histories of health and of environment have become intertwined in our own time. It points us toward histories that encompass both.[3]

Building upon earlier as well as more recent precedents in medical, science, and environmental history, this edited volume represents a collective effort to fathom more fully the past that has so thoroughly shaped modern environments. If the Brown Cloud is any guide, the long rise and evolution of industrial production over the past three centuries and the concomitant transformations of both cities and farms form a larger historical backdrop for this modern tale. At issue in this volume is modern matter, akin to that of the Brown Cloud, substances neither named nor manufactured until the nineteenth and twentieth centuries. The economic systems spewing out particles and gases and stirring up germs and parasites examined within these pages are those of the past 150 years, in both the industrialized West and other parts of the world. The preponderance of toxic, over infectious, agents of illness in these papers reflects a long-term "epidemiological transition" that reduced the toll of contagious disease, especially in North America and Europe. Though the research here looks at many parts of the globe, the majority of the volume's scholars work in the United States, lending a local shape to our historiographic debates and frames. Nevertheless, we hope this collection will stimulate venturesome longer-term and larger-scale theses, including those that move beyond the seat of a particular Western version of modernity.

[2] Though the quote is from Paul Starr, *The Social Transformation of American Medicine: The Rise of a Sovereign Profession and the Making of a Vast Industry* (New York, 1982), 181; it also summarizes a large body of literature, beginning with Hibbert Hill, *The New Public Health* (New York, 1916).

[3] These divergent histories have been less prominent among environmental and medical historians writing on colonial settings. See, e.g., Richard Grove, *Green Imperialism: Colonial Expansion, Tropical Island Edens, and the Origins of Environmentalism, 1600–1860* (New York, 1995); Mark Harrison, "'The Tender Frame of Man': Disease, Climate, and Racial Difference in India and the West Indies," *Bulletin of the History of Medicine* 70 (1996): 68–93; Warwick Anderson, "Immunities of Empire: Race, Disease, and the New Tropical Medicine, 1900–1920," ibid., 94–118; and Michael A. Osborne, "European Visions: Science, the Tropics, and the War on Nature," in *Nature et environnement,* ed. Christophe Bonneuil and Y. Chatelin (Paris, 1996), 21–32.

To aid understanding of the historical "conditions of possibility" for a phenomenon such as the Brown Cloud, we feel the history of environment and health must take "interdisciplinary" as its watchword. In medieval times, Europeans envisioned extensive correspondence between their bodies and the cosmos; in more recent times, the rise of specialist disciplines has tended to sever this connection. Thus today's historians of environment and health face a long tradition of chopping "health" and "environment" into distinct and separate realms of knowledge and practice. In the workshop out of which this volume grew, historians of various stripes as well as anthropologists and geographers came together to explore, discuss, and debate a wide variety of topics and approaches to a history of health and environment. Choices of topic, emphasis, and method revealed productive tensions, not just across the fields of science, medical, and environmental history but also across different veins of scientific expertise: engineering versus medicine, ecology versus public health, bacteriology versus toxicology. We believe a fuller appreciation and understanding of the history of environment and health will come as historians from neighboring fields listen and learn, from one another and from those in other disciplines. Anthropologists and sociologists have shown how interviews and ethnography can highlight the multisited practices and plights of workers, activists, laypersons, and experts. Geographers have offered methodologies that connect landscapes and natural processes with human-made national boundaries and economic systems. In this volume, the inclusion of anthropologists and geographers reveals a field characterized by an emergent traffic among scholarly methodologies, including scientific ones, rather than a legacy of work in a single discipline.

Interest in the history of environment and health has numerous roots outside public health history. Many scholars who recently have moved into this terrain have been motivated and inspired by social movements to combat the inequitable distribution of, and exposure to, environmental hazards. Environmental hazard has emerged as an important wing of worldwide political struggles for social justice and equality. In the United States, for example, the environmental justice movement, which became a major political force in the 1980s and 1990s, shifted the agenda of many environmental groups from land preservation and a generalized "pollution" to confrontation with problems of urban and industrial wastelands and a reckoning with the geography of race and poverty.[4]

[4] On environmental justice and racism in an American context, see Robert Bullard, *Dumping on Dixie: Race, Class, and Environmental Quality* (Boulder, Colo., 1990); Giovanna Di Chiro, "Nature as Community: The Convergence of Environment and Social Justice," in *Uncommon Ground: Rethinking the Human Place in Nature,* ed. William Cronon (New York, 1996), 298–321; Michael Egan, "Subaltern Environmentalism in the United States: A Historiographic Review," *Environment and History* 8 (2002): 21–41; Daniel Faber, ed., *The Struggle for Ecological Democracy: Environmental Justice Movements in the United States* (New York, 1998); Robert Gottlieb, *Forcing the Spring: The Transformation of the Environmental Movement* (Washington, D.C., 1993); Dolores Greenberg, "Reconstructing Race and Protest: Environmental Justice in New York City," *Environmental History* 5 (2000): 223–50; George Lipsitz, "The Possessive Investment in Whiteness," *American Quarterly* 47 (1995): 369–466; Eileen Maura McGurty, "From NIMBY to Civil Rights: The Origins of the Environmental Justice Movement," *Environmental History* 3 (1997): 301–23; and Laura Pulido, *Environmentalism and Economic Justice: Two Chicano Struggles in the Southwest* (Tucson, Ariz., 1996). On environmental justice in other national or global contexts, see, e.g., David A. McDonald, ed., *Environmental Justice in South Africa* (Athens, Ohio, 2002); Nancy Peluso and Michael Watts, eds., *Violent Environments* (Ithaca, N.Y., 2001); Richard Peet and Michael Watts, eds., *Liberation Ecologies: Environment, Development, Social Movements* (London, 1996); Ramachandra Guha, *Environmentalism: A Global History* (New York, 2000); Kim Fortun, *Advocacy After Bhopal: Environmentalism, Disaster, New Global Orders* (Chicago, 2001); and Anna Tsing and Paul Greenough, eds., *Nature in the Global South: Environmental Projects in South and Southeast Asia* (Durham, N. C., 2003).

Interest in environment and health has also been inspired by scholarship arising over the past two decades at some especially fertile intersections between environmental and medical history. Historians of urban sanitation such as Martin Melosi and Joel Tarr have brought out the continuing importance of infrastructure, engineering, and an environmental focus to modern public health. Historians of occupational health have woven together workplace and medical histories in a variety of ways, from Arthur McEvoy's proposal for an "ecology of the workplace" to Chris Sellers's argument about the workplace origins of modern environmental health science.[5] Environmental historians responding to the challenge of environmental justice, too, have turned increasingly to the health dimensions of topics such as pollution and industrial wastes, dimensions downplayed by earlier historians of conservation and environmentalism.[6]

Thus contemporary environmental problems, new social movements, and past historical scholarship have inspired an emerging body of research on the subject of environment and health. Not just historians of differing agendas and interests but also anthropologists, sociologists, and geographers have turned to explore the nexus of place, health, and political economy in diverse sites and times around the world. We are struck by the overlap and interchange that has already occurred, which we hope this collection will continue to nourish. Environmental history, for example, through its penchant for broad historical narratives that give agency to both nature and humans, has offered a compelling yet underutilized model to historians of science interested in connecting their field's preoccupation with local sites of knowledge production to narratives that reach across larger spatial and temporal scales.[7] Similarly, the

[5] Martin Melosi, *The Sanitary City: Urban Infrastructure in America from Colonial Times to the Present* (Baltimore, 2000); Joel Tarr, *The Search for the Ultimate Sink* (Akron, Ohio, 1996); Arthur McEvoy, "Working Environments: An Ecological Approach to Industrial Health History," *Technology and Culture* 36 (suppl.) (1995): 145–73; and Christopher Sellers, *Hazards of the Job: From Industrial Disease to Environmental Health Science* (Chapel Hill, N. C., 1997). See also Jacqueline Corn, *Response to Occupational Health Hazards: A Historical Perspective* (New York, 1992); Claudia Clark, *Radium Girls: Women and Industrial Health Reform, 1910–1935* (Chapel Hill, N. C., 1997); Alan Derickson, *Black Lung: Anatomy of a Public Health Disaster* (Ithaca, N.Y., 1998); Gabrielle Hecht, "Rupture Talk in the Nuclear Age: Conjugating Colonial Power in Africa," *Social Studies of Science* 32 (2002): 691–727; Jock McCulloch, *Asbestos Blues: Labour, Capital, Physicians, and the State in South Africa* (Bloomington, Ind., 2002); Michelle Murphy, "Toxicity in the Details: The History of the Women's Office Worker Movement and Occupational Health in the Late Capitalist Office," *Labor History* 41 (2000): 189–213; Randall M. Packard, *White Plague, Black Labor: Tuberculosis and the Political Economy of Health and Disease in South Africa* (Berkeley, Calif., 1989); and David Rosner and Gerald Markowitz, *Deadly Dust: Silicosis and the Politics of Occupational Disease in Twentieth-Century America* (Princeton, N.J., 1991).

[6] Andrew Hurley, *Environmental Inequalities: Class, Race, and Industrial Pollution in Gary, Indiana, 1945–1980* (Chapel Hill, N. C., 1995); Craig Colten and Peter N. Skinner, *The Road to Love Canal* (Austin, Texas, 1996); David Stradling, *Smokestacks and Progressives: Environmentalists, Engineers, and Air Quality in America, 1881–1951* (Baltimore, 1999); Scott Dewey, *Don't Breathe the Air: Air Pollution and U.S. Environmental Politics, 1945–1970* (College Station, Texas, 2000); Stephen Moseley, *The Chimney of the World: A History of Smoke Pollution in Victorian and Edwardian Manchester* (Cambridge, 2001); and Valerie Kutz, *Tainted Desert: Environmental and Social Ruin in the American West* (New York, 1998). For a more thorough historiographic review, see Jeffrey Stine and Joel Tarr, "At the Intersection of Histories: Technology and the Environment," *Technol. Cult.* 39 (1998): 601–41.

[7] Overviews of environmental history include Donald Worster, Alfred Crosby, Richard White et al., "A Roundtable: Environmental History," *Journal of American History* 76 (1990): 1087–147; Alfred Crosby, "The Past and Present of Environmental History," *American Historical Review* 100 (1995): 1177–89; Theodore Steinberg, "Down to Earth: Nature, Agency, and Power in History," *Amer. Hist. Rev.* 107 (2002): 798–820; and Richard White, "Environmental History: Watching a Historical Field Mature," *Pacific Historical Review* 70 (2001): 103–12.

shift within medical geography and environmental history to more place-centered approaches and more embodied local geographies of health and disease offers an important point of contact with historians of science similarly engaged with questions about the place-centered, situatedness of scientific knowledge.[8] We hope historians of science and medicine will continue to seek common ground with geographers and environmental historians well versed in studying the material, cultural, and social relations embedded in place, be it an immigrant neighborhood, a city, or a therapeutic landscape.

In the essays in this volume and in related scholarship, we believe a lively dialogue and fusion of differing methodologies, narrative strategies, and conceptual approaches to the subject of environment and health is underway. Drawing together approaches from different disciplines, this emergent history of environment and health is highlighting subjects that have largely fallen between the cracks of environmental history, geography, history of science, medical history, and science studies.[9] Productive tensions and approaches can be seen within the pairings of papers in this volume. Cutting across all the essays here are three major themes: scale, materiality, and uncertainty. Each theme has grounded the perspective of our authors in important ways; by the same token, each imposes its own array of questions and choices on this, as well as future, scholarship. By pulling out the interweaving of these themes throughout the papers, we mean to provide an underpinning for further dialogue across fields and for scholarly creativity and insight to come.

SCALE

The Asian Brown Cloud is but a visible sink of transnational material flows that bind economics, resources, people, and pollutants across molecular, local, regional, and global scales. In their UNEP Assessment Report, INDOEX scientists spoke of the "enormous range of scales" with which they had to grapple. "From the severe health effects caused by indoor air pollution, to those of urban and rural pollution, [to] the impact of the aerosol on regional and even global climate change," scientists found themselves moving between local factories and global climate changes, between ecological cycles and multinational economic projects, between the United Nations and commixing molecules. Inefficient coal-burning in Thailand, from power stations sold as cheap exports to it and to other developing countries, and forest fires in Indonesia, caused by the illegal clearing of land for palm oil plantations, linked local and regional

[8] Robin Kearns and Wilbert Gesler, *Putting Health into Place: Landscape, Identity, and Well-Being* (Syracuse, N.Y., 1998); Crosbie Smith and Jon Agar, *Making Space for Science: Territorial Themes in the Shaping of Knowledge* (New York, 1998); Adi Ophir, Steven Shapin, and Simon Schaffer, eds., *The Place of Knowledge: The Spatial Setting and Its Relation to the Production of Knowledge, Science in Context* 4 (1991): 3–218; David Livingstone, "The Spaces of Knowledge: Contributions Towards a Historical Geography of Science," *Environment and Planning D: Society and Space* 13 (1995): 5–34; Nicolaas Rupke, ed., *Medical Geography in Historical Perspective* (London, 2000); Gregg Mitman, "Hay Fever Holiday: Health, Leisure, and Place in Gilded Age America," *Bull. Hist. Med.* 77 (2003): 600–35; Susan Craddock, *City of Plagues: Disease, Poverty, and Deviance in San Francisco* (Minneapolis, Minn., 2000); and Isabel Dyck, Nancy Davis Lewis, and Sarah McLafferty, eds., *Geographies of Women's Health* (New York, 2001).

[9] Recent historiographic essays working across some of these "cracks" include Conevery Bolton Valenčius, "Histories of Medical Geography," in Rupke, *Medical Geography* (cit. n. 8), 3–28; Christopher Sellers, "Thoreau's Body: Towards an Embodied Environmental History," *Environmental History* 4 (1999): 487–514; and Warwick Anderson, "Introduction: Postcolonial Technoscience," *Soc. Stud. Sci.* 32 (2002): 643–58.

issues of environment and health to world economies. Just days before the World Summit in Johannesburg, Greenpeace activists from Europe grabbed news headlines when they landed a hot-air balloon reading "Save the Climate" on a coal plant in Lampang, Thailand. In West Kalimantan, Indonesia, street entrepreneurs sold facemasks to the choking citizenry, and CNN flashed pictures of the masked children to its audience. Onlookers were reminded that for global problems in environmental health, ecological and environmental inequities in different nations could not be readily separated either from each other or from the politics of class, as when workers in Delhi, India, participated in massive marches to protest the loss of their jobs due to an Indian Supreme Court ruling that ordered the closing and relocation of small industries polluting the air.[10] For this volume, phenomena such as the Asian Brown Cloud raise the question, How do we develop multisited analyses linking historical narratives of environment and health across multiple scales, from the local and regional to the transnational and global?

While the brown haze hovered across southern Asia, news of its reach extended across the global information networks of CNN.com, environmental list servers, and international governing bodies. On the eve of the World Summit, through virtual technology, the Asian Brown Cloud became a global environmental health problem, one that disregarded the borders of sovereign nations, against which UN officials called for countries of the world to unite. But the points of intervention recommended by UNEP scientists—enhanced technoscientific surveillance, international cooperation between scientists and government officials—were largely predetermined by the modes of representation through which the Brown Cloud had become an artifact of expert and elite concern. Framing this global problem through a technoscientific imaginary, the UNEP report engaged in a politics of scale; that is, its technoscientific production emphasized particular scales—molecular, ecosystem, planetary—in which environmental health problems as well as solutions were conceived to reside. "We have the initial findings and the technological and financial resources available," noted Klaus Toepfer. "Let's now develop the science and find the political and moral will to achieve this for the sake of Asia, for the sake of the world."[11]

Arguably, this particular construal of the global depended on a largely American model of the relationships between expertise and political order, a vision hinging on intergovernmental harmonization, technical assistance, and international cooperation in scientific research that emerged after the Second World War.[12] As Nick King observes in this volume, international public health campaigns of the 1990s that focused on emerging diseases, such as AIDS, mad cow disease, Ebola, and West Nile virus, took up a similarly scalar politics, which guided their choices of geographic frames and causal analyses of those diseases, as well as the interventions they proposed. Books such as *The Hot Zone* and Hollywood blockbusters such as *Outbreak* helped create a particular imperialist imaginary whose "global" pretenses belied the fact that it was located not so much in any abstract global space as in specific locales: media, biomedical research communities, and institutions of public health and national security, mostly based in the United States.

[10] UNEP and Center for Clouds, Chemistry, and Climate, *Asian Brown Cloud* (cit. n. 1), 7.

[11] UNEP, "Regional and Global Impacts" (cit. n. 1).

[12] See, e.g, Clark Miller, "Scientific Internationalism in American Foreign Policy: The Case of Meteorology, 1947–1961," in *Changing the Atmosphere: Expert Knowledge and Environmental Governance,* ed. Clark Miller, A. Miller, and Paul N. Edwards (Cambridge, Mass., 2001), 167–218.

How and why scientists, public health officials, and governing bodies circumscribe the multiple scales at work in the production of landscapes of exposure are questions raised by many of the essays here. They also ask, Who or what gets lost in the movements across divergent scales when scientists travel from global climate models to the molecular biology of viruses or from the biochemistry and physiology of radioiodine to U.S. census statistics? In his paper, Scott Kirsch demonstrates how the Atomic Energy Commission (AEC) used spatial representations of fallout data that excluded people to distance scientists from the human consequences of nuclear testing. An oppositional scientist within the AEC then drew on information from local ranchers and Utah public health scientists to produce new kinds of maps and models that reinserted people into the spaces of the Nevada nuclear test sites. Such analyses point to how the representations of environmental health problems depend upon a scale politics—a preordained investment in particular geographically-defined ways of seeing and intervening—in which they are embedded and which they help sustain.

Claims to describe the globe have rhetorical power yet, by their very nature, incline toward the grandiose. Most scholars here, as elsewhere, have opted for more modest claims on the transnational scale, choosing to follow the specific path of a colonial scientist as he is posted at imperial capitals, to track the ecological spread of an insect across a region, or to trace the reach of a multinational corporation as it finds resources in one place and manufacturers in another, creating a toxic plume that blows as far as the wind. Stretching across not just factories, farms, and homes, but national boundaries, the Asian Brown Cloud resembles many other phenomena in the history of environment and health. Like numerous scholars in the humanities and social sciences today, those studying environmental health have been devoting growing attention to transnational events and processes. For some, attending to transnational process involves examining precisely how people, pollutants, economic arrangements, and activism extend across national boundaries. In Giovanna Di Chiro's paper, the border between the United States and Mexico is not just a transfer point but also a concrete limit directly felt in people's lives and survived through transnational advocacy networks. Such networks are not new. Historians of slavery emancipation have drawn out the lively world of transatlantic abolitionism; in this volume, Harold Platt discusses the transatlantic traffic of reformers in the Progressive Era.[13]

What counts as a transnational, as opposed to a more local, process? In Chris Sellers's paper on fluoridated water, the groundwater movement of natural fluoride may traverse county, national, or other political borders, but these human-drawn political lines mean nothing to the nonhuman actors crossing them. The work of geographers such as Saskia Sassen and Cindi Katz, among others, has troubled the opposition of categories such as global-local and transnational-national.[14] Does local history have to be bounded by geographic proximity and state lines, or might an international community of disease ecologists be another form of the local? What defines the local across which so many processes flow? To what extent are neighborhoods actually more "local," produced against, as well as through, global processes? Instead of

[13] Paul Gilroy, *The Black Atlantic: Modernity and Double Consciousness* (Cambridge, Mass., 1995); Daniel Rogers, *Atlantic Crossings: Social Politics in a Progressive Age* (Cambridge, Mass., 1998).

[14] Saskia Sassen, "Spatialities and Temporalities of the Global Elements for a Theorization," *Public Culture* 12 (2000): 215–32; Cindi Katz, "On the Grounds of Globalization: A Topography for Feminist Political Engagement," *Signs* 26 (2001): 1213–34.

seeing space as a pregiven presence across which people, commodities, and natural processes surge, we would perhaps do better to see localness of place as constituted precisely by the movement, tensions, and connections it bears. For example, Gregg Mitman shows that as frontier towns such as Denver became linked to transnational markets through which drugs and capital flowed, new spaces of hope built through biomedical research were nevertheless shaped by Denver's history and landscape as a health resort. As other papers here show, from Susan Jones's contrast between urban and rural responses to a suggested human threat from bovine tuberculosis to Conevery Bolton Valenčius's juxtaposition of the comforting emotional environment of New England to that of the healing physical environment of Santa Fe, multisited analysis is an important methodology for revealing the work of scale and connection constituting so many issues of environment and health.

If economies of scale have been important in considering the historical relationships between environment and health, so, too, have ecologies of scale. Whether the community, region, population, or ecosystem, the ecological unit of analysis has greatly affected what is, and is not, seen by both historians and their subjects. Following reigning practices in environmental history, many papers in this volume center on health topics without mentioning ecological science per se; nevertheless they broach issues of complexity and relationality via historical imaginaries that are arguably "ecological."

New scholarship on the environmental dimensions of twentieth-century public health has raised new questions about the variety of "environmental" and "ecological" perspectives that emerged and the ways they have overlapped, intertwined, or clashed. While Anglo-American health scientists were more likely to style their work as "environmental," important visions of this work drew upon a relational sense defined by systems and material flows, with roots in both engineering and ecological science. In the United States, for example, Rachel Carson's classic *Silent Spring,* which helped make ecology a household word in the 1960s, drew upon the emerging field of ecosystem ecology, along with older balance of nature concepts and the public health discipline of environmental toxicology, to trace the health effects of pesticides on humans and wildlife. Parallel scientific developments of her time greatly aided her integrated perspective. For instance, among health scientists, a rising focus on the hazardous effects of the inorganic realm brought closer alignment with the work of Atomic Energy Commission ecologists, who were funded to help alleviate public fears about nuclear fallout and for whom the ecosystem served as the unit of analysis to investigate the flows of radioactive materials through soils, water, vegetation, and wildlife. At the same time, as Linda Nash observes in her essay, Carson's consumer-oriented focus on the ecology of suburban spaces and federal wildlife refuges—the habitats of professional ecologists—made the bodies and hazardous environments of farmworkers relatively invisible to her and her readers.[15] While historians such as Samuel Hays have suggested that public concern over environmental health emerged

[15] Thomas Dunlap, *DDT: Scientists, Citizens, and Public Policy* (Princeton, N.J., 1982); Linda Lears, *Rachel Carson: Witness for Nature* (New York, 1997); and Christopher Sellers, "Body, Place, and State: The Makings of an Environmentalist Imaginary in the Post-WWII U.S.," *Radical History Review* 74 (1999): 31–64. On the AEC, ecologists, and fallout concerns, see Stephen Bocking, "Ecosystems, Ecologists, and the Atom: Environmental Research at Oak Ridge National Laboratory," *Journal of the History of Biology* 28 (1995): 1–47; Joel B. Hagen, *An Entangled Bank: The Origins of Ecosystem Ecology* (New Brunswick, N.J., 1992), 100–21; and Chunglin Kwa, "Radiation Ecology, Systems Ecology, and the Management of the Environment," in *Science and Nature: Essays in the History of the Environmental Sciences,* ed. Michael Shortland (Oxford, 1993), 213–49.

in post–World War II America because of increased standards of living, the papers in this volume suggest that such a view is an artifact of the past historiography of U.S. environmentalism.[16] Attention has moved beyond the spaces of wilderness and middle-class suburbs into the city and factory, into war zones and colonial projects.

The material flows of energy and matter circulating the globe made visible through environmental sciences such as ecosystem ecology, meteorology, and environmental engineering have not been the only intellectual building blocks of the ecological and environmental imaginaries through which bodily threats are conceived. The recent popularity of ecological world history, as evidenced by best-selling books such as Jared Diamond's *Guns, Germs, and Steel,* reveals yet another ecology at play, one in which humans and microbes are seen as equal actors in a large-scale evolutionary drama. Diamond's book is indebted to a previous generation of scholarship in environmental history, one that includes William McNeill's *Plagues and People* and Alfred Crosby's *The Columbian Exchange,* which in turn borrowed heavily from the work of Australian parasitologist F. Macfarlane Burnet and American bacteriologist Rene Dubos in constructing global ecological narratives.[17] Both Warwick Anderson and Helen Tilley in this volume document the intellectual tradition of this research in tropical medicine and population ecology and its colonial and settler society contexts. Scaling up into global environmental problems, later experts fashioned sometimes apocalyptic ecological imaginaries that focused upon population, disease, and environment as the primary forces driving past and future human societies.[18]

Although the rise of laboratory medicine supposedly eclipsed a Hippocratic emphasis on airs, waters, and places by the early twentieth century, we find a persistence of Hippocratic concerns through this period and beyond. We can, in retrospect, identify many notions of regional disease and health as "ecological," whether informed by medical geography and climatotherapy in the nineteenth century or by self-identified "ecological" conceptions of community in the twentieth century. Environmental and medical historians have only recently begun to explore how scientific and popular practices as well as regional economies were shaped by ideas and experiences of the interplay between health and nature. Aldo Leopold's extensive references to the health of the land and conservation as the art of land doctoring offer one indication of the ways in which ecological conceptions of conservation and community borrowed heavily from Hippocratic ideals and experiential wisdom of the relationships between the health of body and place.[19] Throughout the volume, contributors find themselves in dialogue with a range of environmental sciences and lay visions of ecology, either in framing the scale of analysis or in exploring how

[16] Samuel Hays, *Beauty, Health, and Permanence: Environmental Politics in the United States, 1955–1985* (Cambridge, 1985).

[17] Jared Diamond, *Guns, Germs, and Steel: The Fate of Human Societies* (New York, 1997); William McNeill, *Plagues and Peoples* (Garden City, N.Y., 1976); Alfred Crosby, *The Columbian Exchange;* and idem, *Ecological Imperialism: The Biological Expansion of Europe, 900–1900* (Cambridge, 1986).

[18] Robert Kaplan, *The Coming Anarchy: Shattering the Dreams of the Post Cold War* (New York, 2000); Thomas Homer-Dixon, *Environment, Scarcity, and Violence* (Princeton, N.J., 1999).

[19] For an exploration of the ways in which notions of community ecology played into twentieth-century biomedicine, see Gregg Mitman, "Natural History and the Clinic: The Regional Ecology of Allergy in America," *Studies in the History and Philosophy of the Biological and Biomedical Sciences* 34 (2003): 491–510. Aldo Leopold, *A Sand County Almanac* (New York, 1949). On the persistence of aerial concerns, see Christopher Sellers, "The Dearth of the Clinic: Lead, Air, and Agency in Twentieth-Century America," *Journal of the History of Medicine and Allied Sciences* 58 (2003): 255–91.

ecological ideas and practices are themselves embedded in particular economic, political, social, and material relations.

MATERIALITY

Just who or what made the Asian Brown Cloud? Clearly, scientists were central to its transformation into a widely recognized menace to global public health. Just as clearly, however, what they christened the Brown Cloud comprised materials in whose production these scientists had no hand. The haze whose traces they captured in satellite photos and whose components they trapped on board ship and plane had other origins. The Brown Cloud was generated in and among other places, Thai power plants, Indonesian forest fires, chemical reactions within otherwise natural clouds, and the propulsion of soot and gas across vast distances. The diverse origins and dynamics of the Brown Cloud's nonhuman nature connect with human narratives of global capital, imperialism, and inequality.

Transnational events such as the Asian haze have helped inspire the most recent burst of interest in the history of environment and health among not only scientists and activists but also environmental historians and other scholars. Anthropologist Arjun Appardurai has proclaimed the circulations of people, technology, ideas, media, and money to be the "five dimensions of global cultural flows"; environmental historians, in particular, have made the case for a sixth—an ecological—dimension.[20] This dimension encompasses a wide range of material flows, from commodities to the inadvertent byproducts of industry and agriculture to more obscure and natural processes that have not always fallen within the analytic domain of human culture. A fine example of what environmental historians have been up to is J. R. McNeill's *Something New under the Sun,* which surveys the international streaming of goods and pollutants and what the author finds to be a dramatic broadening of this ecological dimension, of human intervention in, and exploitation of, the natural world in the twentieth century.[21]

The project of forging "ecological" versions of health history has involved spotlighting those material flows and processes many social theorists are apt to neglect. Such a project often starts with an assumption that these material flows are composed of relatively consistent entities—whether the fluoride in Sellers's paper, the tsetse fly in Tilley's, or pesticides in Nash's. These nonhuman natures retain enough constancy for the historian to follow their trajectory into times and places in which their existence was framed in terms far different from those used today. Whereas historians of science historicize their scientist's subjects by demonstrating the vast diversity of "science" across space and historical time, ecological approaches to history, by moving material actors to center stage, open the doors of inquiry into a widening variety of roles nonhuman actors have played in the human past, even when there were no recognizable scientists around to describe them. Often drawing upon the latest scientific findings to help guide the search for past ecological relationships, environmental history approaches here and elsewhere emphasize contingency and change along these material dimensions of the human past, especially as creatures or chemicals become caught up in the projects of human societies and economies. Much of the narrative and

[20] Arjun Appadurai, *Modernity at Large: Cultural Dimensions of Globalization* (Minneapolis, Minn., 1997), 33.

[21] J. R. McNeill, *Something New under the Sun: An Environmental History of the Twentieth-Century World* (New York, 2000).

analytical power in this approach derives from an assumption that nonhuman substances or organisms have concrete effects on history that we, as historians, can recognize, even if past actors saw them quite differently or not at all.

It is worth noting that many historians of science, as well as other scholars, prefer different ways of treating objects historically. They would rather historicize scientific conceptions such as "ecology" than use them as analytical frames.[22] That being said, many kinds of materialist approaches abound in the history of science and, like the materialist approaches of environmental history, inform many of the papers in this volume. The work of Michel Foucault and his attention to the effects of architecture and practice on epistemology and subject positions have influenced countless historians interested in tracing the process, not just the outcome, of epistemological regimes. In the field of history of science, scholars such as Lorraine Daston and Ian Hacking have built on Foucault to develop the term "historical ontology" to describe the historicity of things as formed in relation to epistemological traditions.[23] In science studies, the work of Bruno Latour and "actor network theory" have inspired inquiries into the social production of scientific objects as nonhuman agents, making the argument that only once germs had been produced in 1864 had they been there all long. Building on actor network theory, others have more recently opened up questions about ontological diversity, by showing how objects produced simultaneously by different domains of knowledge and practice can become imbued with conflicting, yet no less material, qualities and boundaries.[24] The materiality of instruments, scientific practices, and information in producing artifacts has also provided focal points for much scholarship in science studies over the past decade.[25] Additionally, Margaret Lock's concept of "local biologies" draws attention to the ways physical embodiment is produced through political and cultural circumstances.[26] A similar range of approaches to materiality characterizes this volume.

Scholarship wrestling with the intersection between environment and health almost inevitably confronts tangles of economy and flesh. Thus another important materialist tradition informing the work in this volume is historical-geographic materialism and its attention to the concrete effects of capitalism and political economy in

[22] Paolo Palladino, *Entomology, Ecology, and Agriculture: The Making of Scientific Careers in North America, 1885–1985* (Amsterdam, 1996); Gregg Mitman, *The State of Nature: Ecology, Community, and American Social Thought, 1900–1950* (Chicago, 1992); Peter J. Taylor and Ann S. Blum, "Ecosystems as Circuits: Diagrams and the Limits of Physical Analogies," *Biology and Philosophy* 6 (1991): 275–94; Gregg Mitman and Kevin Dann, "Essay Review: Exploring the Border of Environmental History and the History of Ecology," *J. Hist. Biol.* 30 (1997): 291–302; and Peter J. Taylor, "Technocratic Optimism: H. T. Odum and the Partial Transformation of Ecological Metaphor After World War 2," *J. Hist. Biol.* 21 (1988): 213–44.

[23] Lorraine Daston, "Historical Epistemology," in *Questions of Evidence: Proof, Practices, and Persuasion across the Disciplines,* ed. James Chandler, Arnold Davidson, and Harold Harootunian (Chicago, 1994), 282–89; Ian Hacking, *Historical Ontology* (Cambridge, Mass., 2002).

[24] Bruno Latour, *Pandora's Hope: Essays on the Reality of Science Studies* (Cambridge, Mass., 1999); Anne Marie Mol, *The Body Multiple: Ontology in Medical Practice* (Durham, N. C., 2002); and Michel Callon and John Law, "Agency and the Hybrid Collectif," *South Atlantic Quarterly* 94 (1995): 481–507.

[25] Andrew Pickering, *The Mangle of Practice: Time, Agency, and Science* (Chicago, 1995); Adele Clarke and Joan Fujimura, eds., *The Right Tools for the Job: At Work in Twentieth-Century Life Sciences* (Princeton, N.J., 1992); and N. Katherine Hayles, "The Materiality of Informatics," *Configurations* 1 (1992): 147–70.

[26] Margaret Lock, *Encounters with Aging: Menopause in Japan and North America* (Berkeley, Calif., 1995); Barbara Duden, *The Woman beneath the Skin: A Doctor's Patients in Eighteenth-Century Germany,* trans. Thomas Dunlap (Cambridge, Mass., 1991).

the production of body and place. Economic regimes of accumulation and production coalesce in particular locations and seep into the character, sensibility, and experience of everyday life. Sweeping notions such as Donald Worster's adaptation of the Marxian "modes of production" and David Harvey's "regimes of accumulation" designate large-scale historical patterns, the practices and cultures by which resources are extracted, manufactured into commodities, distributed, and consumed. Also including the patchwork of state regulations (or lack of them) and its own characteristic stratifications of labor, each "mode" or "regime" gives shape to the locales it encompasses.[27] The regime of colonial accumulation under the British Empire, for example, featured an escalating extraction of materials from African mines, whose byproducts generated scattered local epidemics of respiratory disease among black mine workers. Colonization also set in motion the spread of colonial public health administrations that saw the colonies as their own laboratories in which to develop Western science.[28]

The factories, mines, and shipyards of industrial capitalism, like the regimes of colonial accumulation, similarly transformed the earth, altering beyond recognition the landscapes and neighborhoods immediately surrounding industrial sites.[29] Inside the workplaces of shipyards, nuclear reactors, and manufacturers, industrial exposures intensified in flurries of asbestos, silica, lead, and radiation. Disasters and accidents, or purposeful acts of violence, scarred entire regions. In Arthur McIvor and Ronald Johnson's paper, the stark and heedless pathology of asbestosis provides a core reality they can map on to Glasgow itself, around which the awareness of their asbestos workers circles and lands, and with which it then struggles. From Glasgow shipyards to the Chernobyl plant that shadows Adriana Petryna's sufferers to the Bhopal chemical plant that Kim Fortun's scientists study, the modern industrial workplace produces not just commodities, chemicals, and uneven power relations but also its own varieties of disease. Michelle Murphy shows how the very office building in which EPA scientists worked had its own effects, insulating their work in such a way that they could reimagine their white-collar employment in labor union terms, while at the same time averting their eyes from the environmental plight of poor black communities, including those just beyond the agency's doors.

Scholars working at the intersection of environment and health feel free to take the factuality of many hazards for granted: that Chernobyl and Bhopal did indeed kill many people, that urban pollution exacerbates asthma, that tropical environments cause sleeping sickness through tsetse flies. Historically, however, as each of these new certainties has crystallized, a multitude of new uncertainties has sprouted around them. Much history of environment and health is about what we don't, or don't quite, know.

[27] Worster et al., "Roundtable" (cit. n. 7); David Harvey, *The Condition of Postmodernity* (New York, 1990); idem, *Justice, Nature, and the Geography of Difference* (Cambridge, Mass., 1996); and idem, *Spaces of Capital* (New York, 2001). For other historical accounts of how capitalism changed place, see William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York, 1992); Mike Davis, *Late Victorian Holocausts: El Nino Famines and the Making of the Third World* (New York, 2001).

[28] Packard, *White Plague, Black Labor* (cit. n. 5); Megan Vaughan, *Curing Their Ills: Colonial Power and African Illness* (Stanford, Calif., 1991).

[29] See, e.g., Theodore Steinberg, *Nature Incorporated: Industrialization and the Waters of New England* (Cambridge, 1991). See also the following historiographic reviews: Stine and Tarr, "At the Intersections of Histories" (cit. n. 6); Chris Rosen and Chris Sellers, "The Nature of the Firm: Towards an Ecocultural Approach to Business History," *Business History Review* 73 (1999): 577–600.

UNCERTAINTY

Brown clouds of particulates hovering over a continent, poisons exhaling from strange lands, pesticides clinging to perfect fruits—the connection between place and bodies is often understood in terms of *exposure,* as contact between misplaced matter and flesh. Whereas most medical and public health history foregrounds disease itself, as manifested within individual bodies (pathology) or in populations (epidemics), most papers in this volume revolve around myriad historical forms of exposure. Privilege and violence are built into these forms: from the worrisome miasmas that stalked settler societies, to the stench and filth attributed to the "great unwashed" of the urban metropolis or the colonies, to the variety of perils made possible by industrial production in the West and elsewhere.[30] So, too, are competing notions of expertise. While biological exposures carried by wayward insects or human others were studied by sanitarians, epidemiologists, and disease ecologists, chemical and industrial exposures became the concern of industrial hygienists, engineers, and toxicologists. Although individual contributions to this volume concentrate on one side or the other of the resultant division between biological and nonbiological exposures, the collection as a whole points to how these differing kinds of expertise, and the uncertainties embedded within them, arose side by side.

A century of modern scientific scrutiny has made clear that chemically defined exposures often prove notoriously complex and, thus, difficult to address through public health policy. Seen through a late-twentieth-century toxicological or juridical lens, the demands for certainty about the chemical causes of illnesses are scandalously hard to meet. The lack of certitude reverberates here and in many other realms of the history of environment and health, for instance, realms in which presidents and prime ministers justify their refusal to ratify international environmental agreements, such as the Kyoto Protocol, by pointing to a lack of scientific consensus.

Uncertainty is perhaps the single most pervasive characteristic of the history of exposure collectively sketched by our volume. It inheres in the very material formation of many environmental health problems, starting with the time lag between exposure and possible health effect. But just as we understand perceptions of the natural world as historically constructed, situated, and conditioned, so we can approach uncertainty as a historical artifact, produced by particular ways of apprehending the world or by clashes between different versions of the world. Compelled to affirm the materiality of pesticides, viruses, or poisoned revolutionaries, historians are nevertheless confronted with contests over knowledge, both scientific and popular, within which cyclones of uncertainty swirl. Exploring the shape and tenor of uncertainty in different times and places, these papers contribute to a novel historical vein: the history of invisibility, imperceptibility, and doubt. If nonhuman actors have concrete effects in the history of environmental health, so, too, does the deployment of uncertainty—"geographies of unknowing" to Kirsch, "regimes of imperceptibility" to Murphy. The controversial nature of many environmental health problems raises the tricky question of how exposures remain

[30] See, e.g., Conevery Bolton Valenčius, *The Health of the Country: How American Settlers Understood Themselves and Their Land* (New York, 2002); Alain Corbin, *The Foul and the Fragrant: Odor and the French Social Imaginary,* trans. Miria Kochan (Cambridge, Mass., 1988); and Tom Lutz, *American Nervousness, 1903: An Anecdotal History* (Ithaca, N.Y., 1991).

unknown or come to seem less known, even as others become more known.[31] When, how, where, and under what modes of production do uncertainty and its frequent intellectual companions, such as "risk" and "complexity," accrete in modern cultures?

Changing modes of disclosure and information management provide important insights into the historical production of uncertainty. As Kirsch and Petryna show, knowledge about radiation was withheld, managed, and tailored in ways to calm public fears or thwart legal action in the name of national security during the cold war. Surveillance, a longstanding scientific response to environmental uncertainty, has been ratcheted up in intensity by the public health experts in King's paper, as the technocratic optimism of environmental sciences in the 1960s has yielded to recognition of the global scale and complexity of many disease threats. Today, as Fortun suggests in her account of EPA's digitalized "environmental subject," representational simplicity can dictate what appears known or unknown in the production of Web-based informational systems displaying regional toxic hazards.

Inquiries into uncertainty also build on a lively body of literature on postwar science and what Ulrich Beck labeled the "risk society."[32] This volume, however, also takes up the production of uncertainties that lurked in the practice of field scientists and laypersons before, or outside of, the formal enunciation of any risk calculus. Tilley's colonial medical officers, for example, working in the field as well as the lab, developed tropical medicine in ways that emphasized complex interactions, control rather than disease eradication, and the integration of human and nonhuman nature. Moreover, faced with a vast array of nonscientific ways of apprehending environmental health problems, scientific practice could often prove weak in its ability to link exposures to health effects and to induce political or social transformation. We learn from Nash's and Murphy's papers that twentieth-century environmental and occupational health scientists in the United States had trouble resolving questions about environmental pathology, hindered as they were by their techniques, by their personal distance from the "fields" they studied, and by the transient, variable nature of the exposures in question.

Fortifying clashes in values, the collision of multiple, intersecting, or competing epistemologies has been integral to the formation of uncertainty. The experts in controversies over environmental exposures covered by these papers often have not been the doctors or public health specialists featured in most medical history narratives, more or less committed to curing and preventing disease. A pesticide, for instance, is conceived and manufactured to be dangerous to certain kinds of life by chemists, entomologists, agri-business, the military, advertising firms, and state agencies. Health issues pertaining to pesticide exposure have involved the knowledge and actions of many additional groups: industrial hygienists, toxicologists, wildlife ecologists, lawyers, farmers, and citizens. While the history of environment and health encompasses a wide range of experts and their epistemological frames, it also builds on work, such as that of sociologists Phil Brown and Steve Epstein, exploring interac-

[31] Robert Proctor, *Cancer Wars: How Politics Shape What We Know and Don't Know About Cancer* (New York, 1995); Lisa Mitchell and Alberto Cambriosio, "The Invisible Topography of Power: Electromagnetic Fields, Bodies, and the Environment," *Soc. Stud. Sci.* 27 (1997): 221–71; and Michelle Murphy, "The Elsewhere within Here: Or How to Build Yourself a Body in Safe Space," *Configurations* 8 (2000): 87–120.

[32] Ulrich Beck, *Risk Society: Towards a New Modernity,* trans. Mark Ritter (London, 1992).

tions between professional and popular epistemology.[33] Signaling the centrality of this type of research in the field, at least half of the papers in this volume explore lay knowledge and activism.

With these emphases come methodological dilemmas. Among them: How do we, as historians, navigate alternative or conflicting accounts of a phenomenon when laypeople and experts, or different groups of experts, disagree? As individuals assemble knowledge out of diverse and intersecting epistemologies, each with its own complicated terrain of knowing and unknowing, historians confront a politics not just of epistemology but of ontology as well.[34] How should historians handle the ontological status of exposures when claims about them are so diverse at any given moment, controverted by different strands of science as well as by nonscientific epistemologies? Luise White's paper foregrounds this problem. Though poisoning presented the same signs and symptoms to all the groups involved in Zimbabwe's war of liberation, nearly incommensurable worldviews stirred controversies about the poisoning's external causes, in particular, about the existence of chemical warfare. Ambiguous expert conclusions unfolded alongside mercenary memoirs, rumors, and the agitation of witches working both sides of the war, giving chemical warfare a schizophrenic ontological purchase. On a historiographical level, attention to both the materiality of exposures and the multiple uncertainties that may be involved in their description raises interesting questions and challenges, since their terms of existence can prove so historically variable and so politically charged.

To historical actors themselves, uncertainties about relationships between bodies and places abound. Inhabiting landscapes where exposure is sustained by powerful interests and forces, individuals and communities worry about personal and family well-being, while often being forced to confront stark differences in scientific opinion. In the face of such uncertainties, they frequently raise difficult and troubling questions about identity and place—about who, as well as where, they are. Senses of self and belonging evolved through experiences of exposure and health as well as new encounters with related state, scientific, and economic regimes. Study of these changing relationships between health, identity, and place has rich precedents upon which to draw: anthropological and historical work on identity and nationalism, scholarship in feminist science studies on the relationship between bodies and epistemology, and explorations of place in the formation of community identities conducted by urban and environmental historians, as well as cultural geographers.[35] In this volume, Adriana Petryna develops the term "biological citizenship" to examine the ways individuals exposed to radiation around Chernobyl fashioned identities and lives anew at the intersection between medicine, unemployment, and state. McIvor and Johnston ask how masculinity shaped the way Scottish shipbuilders heard and articulated each other's testimonies of asbestos exposure, adding a new set of questions to the rapidly

[33] Phil Brown, *No Safe Place: Toxic Waste, Leukemia, and Community Action* (Berkeley, Calif., 1997); Steven Epstein, *Impure Science: Aids Activism and the Politics of Knowledge* (Berkeley, Calif., 1998); Steve Kroll-Smith, Phil Brown, and Valerie Gunter, eds., *Illness and The Environment: A Reader in Contested Medicine* (New York, 2000); and Brian Wynne, "Sheep Farming After Chernobyl: A Case Study in Communicating Scientific Information," in *Dirty Words: Writing on the History and Culture of Pollution,* ed. Hannah Bradby (London, 1990), 139–54.

[34] For an example of a recent work explicitly attending to the politics of clashing ontologies, see Helen Verran, *Science and an African Logic* (Chicago, 2002).

[35] See, e.g., Donna Haraway, "Situated Knowledge: The Science Question in Feminism and the Privilege of Partial Perspective," *Feminist Studies* 14 (1988): 575–99.

developing field of occupational health history. The subjectivity of scientists who enter into such controversies also needs interrogation. With its examination of state scientists in racially segregated regions and colonies, EPA investigators and policy makers in Washington, D.C., sanitary scientists and engineers hoping to influence Progressive Era politics, and others, this volume raises many questions about how scientists, doctors, and other experts have envisioned themselves and their epistemologies and practices in contexts of unequal power relations.[36]

These many examinations of identity and crises highlight the need for a wary, critical eye not only toward the inequitable distribution of hazards but also toward the power inequities at play in efforts to diagnose and solve environmental health problems. What historian Peggy Pascoe calls "relations of rescue" are often at work among the historical groups and contests depicted in this volume.[37] It matters immensely just who imagines themselves to be rescuing whom, whether they seek to save or cure the victims of exposure or to compensate or atone for the resultant health problems. In Nash's paper, state investigations into pesticides were motivated more by concerns over consumer safety than by the plight of migrant farmworkers, while in Jones's paper, public health veterinarians charged with the prevention of bovine tuberculosis balanced the protection of children against the economic security of the dairy industry. Historical perspectives encourage consideration of the subtle ways rescue projects were embedded within, not separate from, the generation of uneven distributions of health dangers. Through our methodological choices and commitment to particular actors or groups that our narratives aim to aid, we as scholars have staked out our own relations of rescue as well.

CONCLUSION

Whatever choices each of our authors or readers may make, the array of approaches and topics in this volume reflects the fertility of our collective search for new versions of the past that can help us to better understand the Brown Cloud in our present. As this volume suggests, the multitudinous exposures permeating our modern world have already sparked a proliferation of new scholarly insights into the broader origins of those exposures. These essays may augur greater historiographic changes to come. We anticipate it will become increasingly difficult to write the history of modern public health without asking many more questions about environment, ecology, and place. By the same token, histories of modern environments a few years hence may seem incomplete if they ignore a place's health implications, uncertainties, and impacts. Study of past expertise in environment and health, as it reaches out to encompass lay epistemology and ontology, may help lead a mutation of the "history of science" into a "history of knowledge."

As the first edited collection to strive after ways of bringing together histories of environment and illness long told asunder, this volume of *Osiris* treads into intellectual borderlands. Of these, as well as of future scholars, the borderlands demand a diffi-

[36] Warwick Anderson, "The Trespass Speaks: White Masculinity and Colonial Breakdown," *Amer. Hist. Rev.* 102 (1997): 1343–70; Jill Morawski, "White Experimenters, White Blood, and Other White Conditions: Locating the Psychologist's Race," in *Off White: Readings on Race, Power, and Society*, ed. M. Fine, L. Weis, L. Powell et al. (New York, 1997), 13–28.

[37] Peggy Pascoe, *The Search for Female Moral Authority in the American West, 1874–1939* (Oxford, 1990).

cult navigation. Coursing between certainty and uncertainty, between material flow and perception, between bodies and all manner of places, from the vast to the microscopic, the history of environment and health is spawning methods and messages as varied as the constituents of the Asian haze. These essays we see as only a beginning. We hope they will serve as stimulus for much further exploration by historians and other scholars into what it means to write history in the era of the Brown Cloud.