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in search of health: LANDSCAPE AND DISEASE

IN AMERICAN ENVIRONMENTAL HISTORY

The most important characteristic of an organism is that capacity for internal self-renewal known as health.

There are two organisms whose processes of self-renewal have been subjected to human interference and control. One of these is man himself (medicine and public health). The other is land (agriculture and conservation).

Aldo Leopold, A Sand County Almanac

HEALTH. TO ALDO LEOPOLD it was the most vital function of living organisms. Land, like the human body, Leopold argued, was subject to disturbances that resulted in sickness and possessed a physiological capacity for self-renewal once disturbed. The allusions to land health in *A Sand County Almanac*, a text heralded for laying the foundations of biocentrism, are striking.¹ How are we to make sense of this seemingly incongruous mixture of medicine—the most anthropocentric of scientific arts—with conservation—the province and values of which Leopold hoped to ground largely in nonhuman nature? Why, if health was so central to Leopold's conservation thought and practice, has it not been a subject more central to environmental history?²

Perhaps it is because we have too readily embraced the dichotomies—humans versus nature, urban versus rural, local versus global—that have structured environmental thought and debate and the historical narratives we write about them. One consequence is that concerns about natural resources are separated chronologically, conceptually, and spatially from those of human health. Consider,

for example, the main themes that get played out in undergraduate courses and texts addressing one important strand of American environmental history: the emergence of American environmentalism. In the late nineteenth and early twentieth centuries, the conservation movement was driven predominately by middle- and upper-class urban professionals, whose focus on the efficient management or preservation of the nation's forests, streams, fish, and wildlife for recreation and use led to the establishment of the first national parks, forest reserves, and federal and state agencies governing the regulation and control of natural resources. After the Second World War, rising standards of living led increasing numbers of Americans to embrace environmental concerns associated with health and well-being that formed the seeds of the 1960s environmental movement.³ So the story goes.

Over the last decade, urban environmental historians have attempted to dislodge this prevailing view. The historical scope of American environmentalism, once focused upon wilderness preservation and natural-resource management, has expanded to include the struggles of citizens and scientists combating environmental hazards of the city and the workplace. In the battle that Progressive reformers such as Alice Hamilton launched against the pollution and waste of the industrial city, health emerged as both a medical and environmental concern.⁴ But even with this much-needed revisionist perspective, the city remains remote from the country; health is a subject that occupies a place distant from conservation. And the history of environmental ideas, values, and social movements in the United States takes place in a relative vacuum, largely isolated from the movements of scientific ideas, people, and flora and fauna across the globe.

What if we were to take Leopold's metaphor of land health, not as a mere rhetorical flourish, but one grounded in the historical, material, and social relations of knowledge and place? How might a focus upon health reveal new patterns in the historical landscape of American environmentalism, whereby the spaces between health and conservation, humans and nature, city and country, and American and European environmental history appear not so vast?

This essay offers a preliminary historiographic survey of landscape and disease in American environmental history. It is a search for past places where health dwelled prominently in the landscape and shaped human-environment interactions. Whether through intimate bodily experience of illness and place, or through abstracted scientific knowledge of ecological communities, conceptions of health have been integral to environmental experience and understanding. As Leopold recognized, health is a relational concept. Health acquires meaning only by virtue of the relationships between and among living organisms—be they the cells of the human body or the species of a biotic community—and their environments. Knowledge, too, is a relational concept. It is the product of a network of material, social, and symbolic relations between and among human and non-human actors. In cutting across the categories of human and non-human, health offers a useful means for rethinking nature and how we come to know the natural world.⁵

HEALING NATURE

DURING THE 1930s, when Leopold first introduced metaphors of health and disease into his maturing, ecological approach to conservation, biologists and physicians both in the United States and abroad spoke to a perceived “crisis” in medicine. The initial success of the germ theory of disease in the late nineteenth century had dominated understanding of the etiology and pathology of disease, locating illness in a single cause, the microbe. But a number of factors during the interwar years—including the 1918-1919 influenza pandemic, tropical diseases that plagued development efforts, the dominance of the laboratory over the bedside, and increasing medical specialization, to name a few—sparked a renewed interest in a more integrated, and sometimes even holistic approach to the understanding of disease, one in which the relationship between the individual and its environment regained importance.⁶ In place of medical heroes such as Robert Koch and Louis Pasteur, some biologists in the interwar years looked instead to the ancient Greek physician Hippocrates, whom they credited with introducing the concept of health as a state of equilibrium between the organism and its total environment. As outlined in the Hippocratic treatise, *Airs, Waters, and Places*, disease resulted from an imbalance or disturbance in the natural state of the body to be found in the environmental complex of physical and social factors that governed the life of the patient as a whole. In etiology and pathology, the Hippocratic view stood in marked contrast to later bacteriological theory that claimed disease could be readily traced to a single external agent.

In this neo-Hippocratic revival, health became defined through the normal self-regulating functions of the body; pathology was but an extension of physiology. That functional understanding of disease elided the firmly entrenched human/nature divide. All living organisms—plants, animals, and humans—and all living organizations—cells, individuals, populations, communities, and societies—shared in properties of self-regulation and maintenance. Whether one was writing about sickness of the body, land, or society, the same biological principles of equilibrium applied.

The renowned Harvard physiologist, Walter B. Cannon, readily moved between the body physiologic and body politic in his writings, as would many other biologists in the interwar years, including Leopold. The ease with which they did so was greatly facilitated by a conception of pathology informed not by bacteriology, but by physiology. Based upon his research on the physiological regulation of the sympathetic nervous system in the 1920s, Cannon introduced the concept of homeostasis to refer to the condition of stability, or controlled equilibrium, that the body constantly reestablishes in its interactions with the disturbing influences of the internal and external environments. The pancreas, for example, monitors glucose levels in the blood, altering the concentration of insulin or glucagon hormones to maintain a dynamic equilibrium of blood sugar levels in keeping with the energy demands of the body. Inability to produce insulin upsets this self-regulatory system; disorder in normal functioning constitutes the disease known as diabetes.⁷

In the midst of the Depression, when government, industry, and universities became preoccupied with how to bring large economic fluctuations under control, Cannon suggested to Wallace Donham, dean of the Harvard Business School, that “the mechanisms for stabilization which are used in the body physiologic might be serviceable also in the body politic.”⁸ In the epilogue to his popular 1932 book, *The Wisdom of the Body*, Cannon reflected on what lessons might be learned from the animal organism in healing the nation’s ailing political economy. Society was still at a relatively “rudimentary stage of development,” Cannon argued, akin to that of simple amphibian creatures whose lack of internal thermoregulation made them much more dependent on the external environment than mammals. To achieve greater independence and stability, the United States would need to sacrifice its allegiance to the free market. Just as the organism displays “specially organized control ... to preserve the constancy of the fluid matrix,” society should be invested with the “power to limit the production of goods,” lay aside stores, and “require the accumulation of wage reserves for later use” in the face of “social perturbation.”⁹ Cannon did not seek social stability through “a fixed and rigid social system” such as communism or socialism. A supporter of the anti-Franco resistance in Spain, he envisioned a liberal social democracy, in keeping with the economic policies of the New Deal, whereby “adaptable industrial and commercial functions assure continuous supplies of elementary human needs.”¹⁰

Three years after the publication of Cannon’s *The Wisdom of the Body*, Leopold, in a speech titled “Land Pathology,” drew upon a similar neo-Hippocratic discourse that equated the pathological with functional imbalance to craft a powerful message that he believed would resonate with his audience and hopefully awaken them to a new ethical relationship with the land. Speaking to the Sigma Xi chapter of the University of Wisconsin one day after Black Sunday—when clouds of dust eclipsed the afternoon sun on the parched Great Plains and clogged the lungs of humans, livestock, and wildlife, during a period of economic depression that threatened the very health of the nation—Leopold suggested that “society had developed an unstable adjustment to its environment, from which both must eventually suffer damage or even ruin. Regarding society and land collectively as an organism, that organism has suddenly developed pathological symptoms, i.e. self-accelerating rather than self-compensating departures from normal functioning.”¹¹ In *A Sand County Almanac*, Leopold would flesh out these ideas of land health (the capacity of self-renewal) and land sickness (a symptom of disorganization) in ways that further revealed his debt to a Hippocratic model of disease that circulated among the biological disciplines well-disposed to a physiological conception of life. For example, his argument for wilderness as furnishing a “base datum of normality, a picture of how healthy land maintains itself as an organism,” incorporated a functionalist understanding of the normal and the pathological that informed the sciences of economy in the nineteenth and twentieth centuries: physiology (animal economy), ecology (nature’s economy), and political economy. In that perspective, health moved readily across the human/nature divide.¹²

Although the social organism analogy that Cannon and Leopold invoked was used throughout the first half of the twentieth century to support a variety of political visions—from apartheid in South Africa, to fascism in Germany, to social democracy in the United States—embedded within it was an assumption that nature offered moral guidelines and prescriptions for human society.¹³ Once again, Cannon traced these appeals to the wisdom and healing powers of nature to Hippocrates, who introduced the “idea that disease is cured by natural powers, by a *vis medicatrix naturae*,” which “implies the existence of agencies which are ready to operate correctively when the normal state of the organism is upset.”¹⁴ Writing in the 1930s, the Italian historian of medicine and physician Arturo Castiglioni saw in this Hippocratic conception a vision of “man as an indestructible part of Cosmos, bound to it and subject to its laws.” He contrasted this with another philosophical tradition, that of Galen, which he associated with modern experimental medicine, in which disease was considered “as an exterior and incidental fact that must be conquered: a battle between a pathogenic cause and the physician who tries to dominate it.”¹⁵ As the Rockefeller Institute comparative pathologist and environmentalist René Dubos later observed, the Hippocratic physician “was to be skilled in nature” and “should never forget that disturbances in any organ correspond to a disturbance of the whole person.” “To heal even an eye,” Dubos argued, “one must heal the head and even the whole body.”¹⁶

Belief that the healing powers of the physician derived from nature’s own processes was a fundamental part of this neo-Hippocratic view. It was a lesson that Leopold saw equally applied to the art and science of conservation. In fact, that dual utility may have been one of the attractions. While Leopold recognized in his “Land Pathology” address that science could “invent more and more tools, which might be capable of squeezing a living even out of a ruined countryside,” he, for one, had no interest in being “a cell in that kind of body politic.”¹⁷ It is suggestive that the shift in Leopold’s attitudes from a utilitarian, managerial ethos in his early years in the U.S. Forest Service to an ecological viewpoint, the glimmerings of which appear in “Land Pathology,” were accompanied by a more holistic, functional understanding of organisms and disease closely linked to Hippocratic thought. “In general,” Leopold wrote in *A Sand County Almanac*, “the trend of evidence indicates that in land, just as in the human body, the symptoms may lie in one organ and the cause in another. The practices we now call conservation are, to a large extent, local alleviations of biotic pain. They are necessary, but they must not be confused with cures. The art of land doctoring is being practiced with vigor, but the science of land health is yet to be born.”¹⁸

In healing nature, the ecologist’s task, like that of the Hippocratic physician, was to restore equilibrium by aiding the processes of nature that laid within. Biologists had found in a physiological conception of the normal and the pathological a common discourse in the interwar years that enabled a freer exchange of ideas across the life sciences, from human physiology to wildlife management, and an integration of biological levels of organization, from human cells to ecological communities.

ECOLOGIES OF DISEASE

IDEAS OF LAND health that Leopold employed in his efforts to stabilize and manage the integrated economy of people, plants, animals, and soil in Wisconsin were not the product of a lone individual, but of a transnational network of institutions, scientists, and political economies. Almost a decade ago, Richard Grove first reminded American environmental historians that conservationist attitudes were not endemic to the North American landscape. In *Green Imperialism*, Grove offered a compelling account of how early environmental ideas were dependent upon the experiences of colonial naturalists, medical officers, and merchants who, in their struggles to turn tropical edenic islands into productive economies, witnessed the devastating impact that environmental degradation had wrought upon natural and human communities. If we have been slow to integrate the history of American conservation into more global networks of exchange, that is because we have failed to see the professional discipline of ecology as a site of international trade.¹⁹ Scientific ideas and environmental attitudes may have been located in particular historical landscapes, but they were also mobile, adaptable to new environments. Leopold's notion of land health is an example. It may have flourished in the soil of American environmentalism, but its embryonic form took shape in other milieu: a Depression-era climate of crisis and instability, a neo-Hippocratic revival in medicine that strengthened the links between pathology and physiology, and a more widespread concern for stabilizing and increasing the productivity of nature's economy.

As chairman of Wisconsin's Citizens' Deer Committee and member of the state's Conservation Commission, Leopold struggled during the 1940s to address the problem of Wisconsin's growing deer population. By focusing on a single species rather than the entire ecosystem, game managers in the past displayed the kind of intellectual hubris that led bacteriologists ignorant of the body's ecology to believe, for example, that the isolation of the tubercule bacillus would lead to the eradication of the disease. Both lacked ecological vision. The assumption that "human predation by rifle is the biotic equivalent of wolf predation" had led to violent disturbances in the balanced equilibrium of community relationships. Boom-and-bust cycles of deer populations, which Leopold followed on the Kaibab, the George Reserve in Michigan, the Lower Peninsula of Michigan, and in Pennsylvania, jeopardized not only the deer herds, but the health and productive capacity of the land. Minimizing these "irruptions" in population cycles would become a major effort in helping stabilize both the economy of nature and Wisconsin's hunting and tourism industry.²⁰

Although rooted in the regional landscape of Wisconsin, the ideas and tools that Leopold utilized were enmeshed within material, cultural, and political-economic conditions global in scale; they were part of the transnational material flows of capital, commodities, and people and regimes of accumulation that structure knowledge and place.²¹ Leopold's understanding of the dynamics of population cycles and his use of the term irruptions owed much to Charles Elton, a leading British animal ecologist in the interwar years, who became Leopold's

guiding counsel on matters of professional ecology and a dear and trusted friend. The two met in 1931 at the Matamek Conference on Biological Cycles, funded by the wealthy American businessman Copley Armory, who believed that scientists with an intimate knowledge of population cycles in nature's economy might be able to advise on the fluctuating business cycles that troubled national economies. A consultant to the Hudson Bay Company and the Empire Marketing Board, Elton possessed expertise in the growth dynamics of parasite, pest, and wildlife populations that proved to be a valuable economic asset in reviving the fur industry and in the exploitation and development of natural resources in Britain's expanding colonies.

In Britain, ecology had become firmly enmeshed within the economy of empire. Indeed, colonial environments proved instrumental in the development of ecological ideas.²² In tropical Africa, for example, endemic diseases such as malaria and sleeping sickness posed significant obstacles to European colonization. As initial hopes of eradication waned, government officials, epidemiologists, and experts in tropical medicine began in the 1920s to embrace a more complex, ecological understanding of the relationships between environment and disease. Medical entomology, parasitology, population and community ecology, and veterinary science all became relevant to understanding how abiotic and biotic factors governed the dynamics of host-parasite interactions and the distribution and abundance of tropical diseases.

Elton was at the center of that shift, and his work on disease ecology undoubtedly was instrumental in Leopold's increasing embrace of a physiological outlook in which disease signified a disruption in the balanced functioning of the community as organism. The relationships between conservation and health that Leopold articulated did not come into being solely on American shores.²³

A professor of zoology at the University of Oxford and head of the Bureau of Animal Populations, Charles Elton spent his rather limited days of field research in the frigid tundra, not the torrid tropics. But his understanding of food dynamics and animal population cycles easily translated to different animal communities.²⁴ In his classic text, *Animal Ecology*, Elton outlined the economic and social relationships within the animal community that regulated animal numbers. General functional principles related to food cycles and the pyramid of numbers that Elton introduced became a part of Leopold's vocabulary; so too did Elton's understanding of the community as a complex, precarious web of interactions. A system of checks and balances kept the community in dynamic equilibrium; any disturbance in the environment could lead to violent irruptions in a given animal population with unforeseen consequences.

Elton was particularly interested in epizootic diseases as a force governing community structure. "Diseases caused by various parasitic animals," he reasoned, were "nothing more than a breaking away of parasites from the control of the host and increasing at an enormous speed." "Malaria, sleeping-sickness, all such diseases," Elton suggested, "are the result of over-increase of parasites, just as mouse plagues are the result of over-increase in mice."²⁵ Disease was to be seen as a symptom, not a cause, of imbalance in the relationships between

organisms and their environments. Elton's view resonated with what his mentor, Julian Huxley, observed as a trend in medicine away from a focus on germs and their eradication to disease as a "phenomenon of general biology, into whose causation the constitution and physiology of the patient and the effects of the environment entered as importantly as did the specific parasites."²⁶

As the ecological diaspora of native species to new lands increased, Elton believed animal and human communities faced a growing threat of epidemic disease; he was quick to exploit this fear to bolster the discipline of ecology. At the end of his 1941 book, *Voles, Mice, and Lemmings*—a dense, lengthy study of the environmental history of mice and vole plagues in Europe coupled with his work on the ecology of wildlife cycles in the Canadian Arctic—Elton portrayed the far north as a region in which poor living conditions, pandemic dog and fox diseases, and fluctuating natural and human food supplies threatened economic and ecological stability. It was an impending disaster that Elton believed deserved as "much money, trained scientific workers, field stations, and continuity of attention as has been given to the study of malaria ... or sleeping sickness."²⁷ Twenty years later, in his highly influential book, *The Ecology of Invasions by Animals and Plants*, Elton returned to similar themes. "The mingling of thousands of kinds of organisms from different parts of the world," he argued, was "setting up terrific dislocations in nature" that created conditions ripe for outbreaks of disease and threatened our "living resources, and economic livelihood."²⁸

If such appeals proved to be useful in garnering support for Elton's Bureau of Animal Populations, it was in the south, not the north, where the ecological principles Elton and others developed seemed to hold the greatest promise for increasing the economic stability and health of the British empire. In the introduction to Elton's *Animal Ecology*, Julian Huxley urged that if "man is to assert his predominance in those regions of the globe whose climate gives such an initial advantage to his cold-blooded rivals, the plant pest and, most of all, the insect," the "proper application of scientific knowledge" would be needed.²⁹ As Helen Tilley has shown, Huxley returned from his 1929-1930 travels in East Africa on behalf of the Colonial Office Advisory Committee on Native Education "captivated by the issues of sleeping sickness and African trypanosomiasis" and convinced of the importance of ecological research on "vector species and parasites in relation to their hosts and environments."³⁰ Believing that ecology was "destined to a great future," he and Elton pushed in the early 1930s for the establishment of a Bureau of African Ecology that would integrate research in animal, medical, and human ecology to assist economic development.³¹ Although the bureau never became reality, the ecological perspective advocated by Huxley and Elton did become part of colonial administrative efforts. From 1927 to 1931, for example, the South African plant ecologist John C. Phillips, as deputy director of the Department of Tsetse Research in the Tanganyika Territory, approached the problem of African trypanosomiasis as a problem in community relationships in which humans, animals, plants, and parasites all played a role.³²

Disease was thus at the ecological nexus of animal and human communities. Far from reinforcing a divide between humans and nature, disease ecology, in all

its protean forms, necessitated the insertion of humans back into the environment. Humans were but one species in a web of economic and sociological relationships structured around predator-prey and host-parasite relationships. In the years during and after the Second World War, when the advent of sulphanilimide drugs seemed to mark the triumph of humans over nature, writers like F. Macfarlane Burnet and René Dubos (who, in keeping with Elton, regarded "disease as a manifestation of the interaction of living beings") warned of such technological optimism. In their minds, the history of disease and human civilization in its *longue durée* only reinforced the need for a greater awareness of humans as but one among many actors on the ecological theater in the evolutionary play of life.³³

Few environmental historians recognize the debt a generation of historical scholarship on disease, environment, and imperialism owes to this earlier work on disease ecology.³⁴ William McNeill's pioneering book, *Plagues and Peoples*, depicted the historical rise and fall of human civilizations as dependent upon the disruption and adjustment in the ecological balance between humans and infectious disease. As his footnotes reveal, he imported that model directly from previous scientific scholarship in disease ecology. Similarly, works such as Alfred Crosby's *The Columbian Exchange* and *Ecological Imperialism* or Jared Diamond's *Guns, Germs, and Steel* portrayed the history of European expansion as a story of ecological invasion: The losers were the victims of a biological hand dealt by evolution that could not successfully compete in a game of war.³⁵ Yet the continual portrayal of the vanquished as limited by their environment in these ecological histories of empire should prompt more critical reflection on how environmental history appropriates scientific knowledge to grant agency to nature.

For a field in which place has figured so centrally in its narratives, why has environmental history been so reticent to see scientific knowledge about nature as a historical product of particular material and social relations?³⁶ Political economy, for example, is as much a force in the production of scientific knowledge as it is in the transformation of landscapes. If scholarship in science studies has taught us anything over the past two decades, it is the importance of seeing how forms of knowledge are brought into being and sustained by economic, political, and cultural circumstances.³⁷ The economy of empire nurtured and sustained Elton's integrated, functionalist approach to animal and human ecology. As Warwick Anderson has argued, the "persisting impact of colonial development policies" and the "lasting effects of agricultural change and human resettlement" offered a particularly conducive environment for a biological approach to infectious disease, one attentive to the relationships between disease, environment, and evolutionary processes.³⁸ But disease ecology also emerged in a period when the prospects of Britain's efforts at exploitation and development in Africa looked less promising. Scientific narratives of disease ecology offered a cautionary tale in which the biogeography of the tropics imposed constraints upon human societies. Since the seventeenth century, science has served as an important tool of empire; we should be wary when it is likewise deployed to buttress empire's deterministic history.

The United States has not been immune from its own imperial ambitions. In Latin America, the Philippines, Southeast Asia, and Liberia, the United States has utilized capital, labor, science, and technology to reconfigure ecosystem relationships—to make new natures and new economies. In a recent article in *Environmental History*, Paul Sutter offered a highly informative overview of how American environmental historians might profit from scholarship in non-U.S. environmental history attentive to colonial and imperial relations.³⁹ Landscape and disease are important themes. In the conquest and occupation of the Philippines, the banana empire of the United Fruit Company, the building of the Panama Canal, and the establishment of the Firestone Plantations Company in Liberia, disease plays an important role in the historical production of nature.⁴⁰ But what kind of role?

Unlike past scholarship that relied upon disease ecology to animate microbes as universal agents of empire, we need to examine more critically the ways in which such non-human actors came into being and acquired agency as disease becomes a more central analytic category within environmental history. The actions of nonhuman actors such as rats, lice, or fleas are connected to, not independent of, histories of knowledge production through which such objects gain new meaning and power in the world. The mosquito, *Aedes aegypti*, for example, held a different relationship and place in the Caribbean landscape after Walter Reed and the United States Army Yellow Fever Commission identified it as a vector of yellow fever. Only in relationship to Reed and the technical apparatus of tropical medicine did *Aedes aegypti* become transformed into a powerful force of nature, one that mobilized the expertise of sanitary engineers, physicians, and entomologists and the vast resources of the United States government. “Can the mosquito speak?” asks Timothy Mitchell in *Rule of Experts*. His answer provides a compelling historical analysis of the interactions between dams, blood-borne parasites, synthetic chemicals, mechanized war, and famine in the state of Egypt that eschews any simple account of nonhuman agency. “What is called nature or the material world,” Mitchell argues, “moves, like the plasmodium, in and out of human forms, or occurs as arrangements, like the river Nile, that are social as well as natural, technical as well as material.”⁴¹ His account profoundly challenges environmental historians to see different patterns of relationship between landscape and disease. Rather than consider the mosquito as an entity whose action upon the landscape exists apart from humans, we might instead regard its being and action as dependent upon a relational network of people, things, and forces at any given historical moment in time. Nature is an outcome, not the cause of changes in the land. Like health, it is a product of the interrelationships between and among human and nonhuman actors.

THE PURIFICATION OF NATURE

THE NETWORKS IN which Leopold’s notion of land health originated and flourished extended not only across different biological disciplines and different spatial scales, from regional natural-resource issues to more global economic concerns, they also extended back in time. The neo-Hippocratic revival, of which

Leopold was a part, had deep roots in the historical landscape of America. The fluidity between organism and environment, central to a notion of health as physiological balance, may appear foreign to a perspective informed by contemporary biomedicine, but the permeability of body and place was integral to the lived experience of nineteenth-century American settlers. One argument Leopold made for the preservation of wilderness was for the perpetuation of “more virile and primitive skills in pioneering travel and subsistence” that were part of that settler experience.⁴²

“Healthy” land, “sickly” places, and “salubrity,” as Conevery Bolton Valenčius illuminates, conveyed the experience of travelers encountering new lands. Their personal well-being and that of the nation were dependent upon airs, waters, and places.⁴³ Hippocrates’ advice to ancient Greek physicians to know the “influence of climate, water supply, and situation on health” was a lesson embodied in the thoughts, beliefs, and practices of those who struck out for a new life on the western frontier.⁴⁴

“Euro-Americans,” Linda Nash notes, “evaluated new landscapes not only in terms of their resource potential or aesthetic qualities, but through their effects on health.” Temperature and altitude, vegetation and soil type, wind direction and humidity, cloudiness and seasonal change were important barometric measures of health.⁴⁵ While Joseph Henry, the Smithsonian Institution’s first secretary, supplied many volunteers across the expanding territory with thermometers, barometers, and hygrometers to measure and record detailed monthly weather reports that were centrally linked by telegraph to Washington, such scientific equipment at first merely enhanced the precision of the body as a self-registering instrument—an accurate barometer and seasonal calendar—of environmental change.⁴⁶ Change of place precipitated bodily change manifested through illness. Seasoning, the process by which the body acclimated to a new climate and topography, took time. For those fortunate enough to survive, the return of health signified a restoration of balance between the body and the land.

Out of this collective experience of bodies and instruments, an atlas of health and place emerged in antebellum America that shaped medical practice, settlement patterns, and regional identity. *A Systematic Treatise, Historical, Etiological, and Practical, on the Principal Diseases of the Interior Valley of North America*, written by the Cincinnati physician Daniel Drake, was the first such atlas. Drake’s two-volume comprehensive survey of the distinctive disease patterns of malaria, typhus, yellow fever, and other diseases was a fount of knowledge on the physical geography, climate, mineral resources, natural history, illnesses, and customs and habits of peoples that occupied “the great intermontane region” between the Rockies and the Alleghenies, bounded on the north by the Polar Sea and on the south by the Gulf of Mexico. In the nineteenth-century preoccupation with medical geography, knowledge of the body and the environment went hand in hand.⁴⁷

Although scholars have begun to document how integral perceptions of environment and disease were to the settlement, exploitation, and development of the western frontier, we have yet to explore fully the extent to which health

shaped human-environment interactions and regional economic development across the North American landscape.⁴⁸ Some areas of the country, such as California's Central Valley, with its heat, daily temperature fluctuations, low-lying elevation, dense seasonal fogs, and poisoning winds, seemed natural harbors of "inscrutable vapors" or "miasmas," the presumed origin of yellow fever, typhus, and various intermittent and remittent fevers. Cultivation through agriculture might rid the land of its sickly attributes and turn it into a vital economic region, but frontier anxieties had first to be overcome, bodies seasoned, and the land transformed.⁴⁹ In contrast, providence had endowed the mountain land of Colorado with a nature healthful in atmosphere and bountiful in resources. As railroad promoters and town boosters proclaimed, the Rocky Mountain region, where the air contained no "subtle, malarious taint" and the high altitude and brilliant sunshine invigorated weary bodies, was, by its very nature, destined for greatness.⁵⁰

By the late 1800s, as the population base of the United States shifted from rural areas to metropolitan centers with the rise of industrialization, the healing properties of nature also began to change. In antebellum America, sickly and salubrious places were common; not all of nonhuman nature was beneficial to health. But the increasingly crowded conditions of American cities, the filth and stench of the streets, and the epidemic outbreaks of cholera, typhoid, and other infectious diseases suggested that the real threat to health was the nature of the city, made through human hands. The introduction of the germ theory of disease in the 1880s, and the alleged bacteriological revolution that followed in its wake, only reinforced this view. In the urban spaces of America, the individual, not the environment, increasingly became the harbinger of illness. Individual behavior, family background, economic status, and the customs and habits of particular ethnic groups came under increasing scrutiny by public health officials combating the diseases of the city.⁵¹

With expanding industrialization, escalating immigration, and the closing of the frontier, Americans came to regard nature, not as a part of themselves, but as a place apart from the decadence and decay of urban landscapes and the human bodies that inhabited them. How changing conceptions of health and illness helped to reinforce this divide between humans and nature, city and country, that has dominated the historiography of American environmentalism, merits investigation. It is no coincidence, however, that this separation occurred at the same time that the intimate, complex, and porous relations between bodies and landscapes were becoming less fluid and medical understanding increasingly looked upon disease not as an imbalance between the organism and its environment, but as a product of infectious microbes carried by humans, and as an outcome of the degenerate environment spawned by urban civilization. With the spread of civilization, the *fin-de-siècle's* emerging disease, nature came to occupy a landscape more distant and pure from the places where humans increasingly toiled and lived.

Although the "germ theory, and more generally the doctrine of specific etiology of disease," may have broken "the spell of the Hippocratic doctrine," as René Dubos

has argued, the *vis medicatrix naturae* found new strength, not in medicine, where the powers of the physician gradually replaced those of nature, but in the healing arts of landscape architecture, ecology, and conservation.⁵² Here, I argue, in the emerging environmental professions, which aimed to combat the general malaise of civilization overcoming the nation, the Hippocratic doctrine found a new home. Consider, for example, one place where urban anxieties about health in the late nineteenth century helped to distill a more purified tonic of nature: environmental design.

In 1890, Charles Eliot, son of Harvard president Charles W. Eliot and apprentice to the landscape architect Frederick Law Olmsted, published in *Garden and Forest* a plan for the establishment of a statewide preservation and conservation organization in Massachusetts. Approved by the state legislature only fifteen months after Eliot's article first appeared, the Trustees of Public Reservations, a model for the British National Trust, was an incorporated association of citizens with the right to acquire and hold, free of taxes, small parcels of land that represented "surviving fragments characteristic of the primitive wilderness of New England."⁵³ Just as some "generous men and women buy and give to a museum fine works of art," so too, Eliot argued, should they be encouraged to give for "the use and enjoyment of the public fine and strongly characterized works of Nature." As chief architect for Boston's Metropolitan Park Commission, Eliot was a leader in regional landscape planning, and health figured centrally in his concept of design. Although he recognized that "further progress of civilization" was dependent "mainly upon the influences by which men's minds and characters are affected while living in great cities," Eliot believed "grave dangers" lay within. "Disease" was "more prevalent in town than out." Vice, crime, and the "very poor in city slums" led to a "degraded race." Where did Eliot suggest that an "antidote to the poisonous struggling and excitement of city life" might be found? In the "pure air and open spaces" of nature.⁵⁴ Just a decade later, John Muir looked hopefully upon the "thousands of tired, nerve-shaken, over-civilized people" venturing into the mountains "to get rid of rust and disease" and finding "that mountain parks and reservations are useful not only as fountains of timber and irrigating rivers, but as fountains of life."⁵⁵ Yet what was to be done for those who had "no valuable commodity to spare," no wherewithal to "fly the town" to summer seaside or mountain resorts? To postpone the building of country parks on city's edge was, Eliot argued, "very poor economy of human life ... and money."⁵⁶ Like many late-nineteenth-century reformers, from those involved in the city parks movement to the Fresh Air Fund, Eliot believed that bringing nature close to the city's edge would greatly benefit the physical and moral health of those living where concrete, refuse, and squalor seemed to proliferate. Nature, in their view, also would help ameliorate conditions in which the despair and discontent that threatened the health of the nation seemed to breed.

Although we are apt to interpret Eliot's remarks figuratively, we should be wary of the impulse to map rational arguments for the aesthetic and psychological benefits of nature, shorn of their material basis, onto past bodies and landscapes. The therapeutic benefit of nature that Eliot espoused and built into the urban

landscape was not some ethereal idea. Like the meditations on nature of Ralph Waldo Emerson, Henry David Thoreau, and other New England transcendentalists that Eliot imbibed, it had earthly substance, embodied in the illness experience of childhood and family. We know far too little about the ways in which sickness compelled nineteenth-century writers to seek solace in nature, but the pattern is striking. Tuberculosis, known to its nineteenth-century sufferers as consumption, accounted for 20 percent of the deaths in antebellum America. It was the leading cause of death in Concord. Emerson came from a consumptive family; so, too, did Thoreau, who died of the disease at the age of forty-four. Nine years before his death, Thoreau wrote that “nature is but another name for health,” and his sojourn to Minnesota’s Lake Minnetonka, among other places, was a journey in search of the “wilderness cure.”⁵⁷ As a child, Charles Eliot appeared to have inherited the same frail, melancholic constitution of his mother, a characteristic nineteenth-century sign of consumption to which his mother likely succumbed when Charles was but ten years old. His father, seeking to ensure that a similar fate not befall his son, sought a “strenuous life” for his child and arranged for summers spent camping, sailing, and hiking Mount Desert Island in Maine or travels farther north to Quebec. How these consumptive experiences shaped nineteenth-century attitudes toward nature and the transformation of landscapes, such as the Adirondacks, where thousands of sufferers fled in search of relief, awaits its author. A cursory glance suggests that disease was as integral to the experience of landscape in the nineteenth century as the romantic sublime. Eliot knew the healing powers of nature firsthand, and he sought to bring their influence into the city where they might work their miracles on the “forces of darkness, the forces which drag men down, the forces which push men into the arms of ignorance, sin, and death.”⁵⁸

Yet it was not only in the city where nature as an antidote to civilization needed to be restored and preserved. Health could be as compelling a reason for conservation in the late nineteenth and early twentieth centuries as arguments more familiar to environmental historians focused on clear watersheds, sustainable timber harvests, and replenished grazing lands. Consider, for example, the Gilded Age response to the appearance of a new disease of civilization on American shores: hay fever. Widely regarded as a symptom of the rapid progress, moral complacency, and physical degeneracy of modern civilized life, hay fever became the pride of America’s leisure class and the basis of a substantial tourist economy that began to flourish in the 1880s. In mid-August each year, thousands of wealthy hay fever sufferers fled the heat, filth, and dust of the cities to lounge at luxurious hay fever resorts in the cultivated wilderness of the White Mountains in New Hampshire, the Adirondacks in upper New York State, and the Great Lakes shores of the Midwest. Seeking relief from the watery eyes, flowing nose, sneezing fits, and attacks of asthma that developed with seasonal regularity, these health seekers, who included statesmen such as Daniel Webster and literary figures such as Helen Hunt Jackson and Grace Greenwood, played an important role in the local and regional transformation of the North American landscape in the name of health.⁵⁹

In the White Mountains, for example, hay fever tourists may have been outsiders to the local community, but their wealth, patronage, and illness combined to make them a powerful force in regional development and land use. Not only were they the primary reason the region's tourist season was extended into the early fall, they also played an active and influential role in the establishment of Franconia Notch State Park and the White Mountain National Forest. When the Appalachian Mountain Club, the Society for the Preservation of New Hampshire Forests, and the New Hampshire Forestry Commission launched a campaign in the 1890s to establish a federal forest reserve in the White Mountains, hay feverites were among its most active supporters. The dense forests and high mountains of the region created a barrier to southerly winds, which always seemed to aggravate symptoms when they appeared. Many hay fever sufferers believed that the "passage of the south winds through [the] forests robbed [them] of their noxious elements." "Forests," as one member of the U.S. Hay Fever Association remarked, "bore an important relation to the disease and should not be destroyed."⁶⁰ This sentiment accorded well with popular medical opinion in the 1880s, when doctors and others ascribed therapeutic value to coniferous forests, particularly in the treatment of malaria and consumption.⁶¹ That view helped to sway state legislatures. In its report to the 1891 New Hampshire legislature, the Forestry Commission listed the "life-giving and health restoring qualities" of the White Mountain region as one of four primary reasons to protect and preserve the state's forests.⁶² John D. Quackenbos, an activist for the Society for the Preservation of New Hampshire Forests, similarly praised the therapeutic benefits of "the rank scenting ozones and balsamic aromas" of New Hampshire's evergreens to help enlist support for public ownership of the White Mountain forests.

Although environmental historians have been quick to dismiss Quackenbos's claim as "medical nonsense," it was grounded in lay experience and scientific knowledge at the time.⁶³ The example points once again to the dangers that arise when environmental historians fail to consider scientific knowledge as a historic product of time and place. The dismissal of such knowledge because it fails to accord with contemporary medical opinion robs this knowledge of the very real agency it had in the making of historical landscapes. The terebinthine properties of New England's coniferous forests and their perceived healthful benefits may evade the senses and wisdom of contemporary allergy sufferers and physicians, but they were no less real to nineteenth-century hay feverites, who acted upon their sensory experience in ways that aimed to preserve the region's therapeutic qualities.

Built into the landscape of city parks and eastern forest reserves, health also was a prominent feature of the western frontier. It should not surprise us then that the voices of health seekers and those expressing caution about natural-resource exploitation in the West were often one and the same. Helen Hunt Jackson was one outspoken critic of the health effects of unbridled resource consumption in the name of industrial expansion and progress. Her first published prose, which won the praise and admiration of America's leading

transcendentalist poet, Ralph Waldo Emerson, was an ode to the town of Bethlehem, New Hampshire. There Jackson first found refuge from hay fever: there the nervous energies of the city gave way to the relaxed setting of pristine nature. By the late 1860s, however, Jackson wrote in “protest against the spread of civilization.” Driven by the almighty dollar, hotel proprietors had turned this little hamlet into a thriving tourist economy that threatened to defile the region and sully its therapeutic benefits. The healing balm of nature beckoned Jackson west. Like many health seekers, she found relief in the new promised land of Colorado, taking up permanent residence there in 1874. But as Jackson shed her New England life for that of a western woman, she also looked with ambivalence upon the rapid development of the region taking place before her.⁶⁴

The influx of health seekers, prospectors, business entrepreneurs, and investors to the Colorado Territory was aided in part by Jackson’s popular writings and the railroad interests of her husband, William Palmer Jackson, but most importantly, by a nature bountiful in beauty, health, and mineral riches. To many a nineteenth-century asthmatic, consumptive, or hay feverite who came to Colorado in search of relief, God had seemingly created through the particular contours of soil, vegetation, and altitude a place where they could “breathe His air with comfort and ease.”⁶⁵ Yet, in the quest for material progress, Coloradans ignored at their peril the most valuable natural treasure adorned by providence: health. The smoke that belched from mining regions of the Rockies—like that of Black Hawk, just west of Denver, where seventeen furnaces of the Boston and Colorado Smelting Works reduced six tons of ore daily—offered a sign of financial prosperity to civic boosters, but to health seekers like Jackson, the “yellow, suffocating smoke,” which stood in stark contrast to the “cool, dry, bracing mountain air,” served as a fearful reminder of where progress might lead.⁶⁶ Hillsides stripped of timber and dirty mountain streams were already a common sight when Jackson settled in Colorado in the 1870s. By the early 1900s, only 20 percent of Colorado’s original forests remained.⁶⁷ “Whatever gains in its material success,” Jackson wrote of one small town that banked its future on mining, “it will have lost something when the whistle of railroad trains and the noisy bustle of many people’s living shall have driven off the antelope and the deer, which now come down to the river to drink.”⁶⁸ Traveling through the dirty gulches, mines, and “toppling houses” of the mining district of Central City and Georgetown, Hunt predicted a future when the “mill-wheels will stand still; the mines will be empty; and pilgrims will seek the heights ... not because they hold silver and gold, but because they are gracious and beautiful and health-giving.”⁶⁹ When Colorado’s economy faltered after silver prices plummeted in the early 1890s, Jackson took it upon herself to remind her fellow citizens once again that “the contagion of the haste to be rich is as deadly as the contagion of disease.”⁷⁰ Keenly aware of the environmental and social impact of reckless mining and the precariousness of Colorado’s future, Jackson saw the state’s destiny not in the overexploitation of its mineral resources, but in the preservation and protection of its climate, where “asthma, throat diseases, and earlier stages of consumption” were “almost without exception, cured by [the] dry and rarified air.”⁷¹

Jackson was not the only prominent nineteenth-century writer whose travels west in search of health inspired a growing conservation ethic. The early years that Theodore Roosevelt spent in search of health—voyaging to the Alps, the Adirondacks, the White Mountains, and the Badlands, where a change of air was believed to offer respite from his symptoms of chronic asthma—were also pivotal in his growing appreciation of wilderness. But we have yet to fully investigate how such illness experiences translated into political action mobilized around the conservation of forests, fields, and streams.⁷²

While the relationships between health, public sentiment, and legislative action in the Progressive conservation movement merit more serious attention, one thing is certain. In the late nineteenth century, a largely urban, wealthy, refined class of individuals found in their very constitution a nervous predisposition to the maladies of civilization.⁷³ Their cure rested in the purity of nature. If pollution, as Mary Douglas suggests, is matter out of place, then late nineteenth-century America was a period when the quest for purity proved all the more compelling because it was a period rife with displacement.⁷⁴ The large influx of southern and eastern European immigrants, the shift from a rural to an urban population, and the rapid movement by railroad of capital, goods, and people across once-isolated regions, resulted in new anxieties and illnesses. Cathartics in various forms were administered by established white, middle- and upper-class professionals to cleanse the landscape of foreign bodies and restore the healing powers of nature.⁷⁵ The removal of Native Americans from the national parks is one purge in the purification of nature familiar to environmental historians.⁷⁶ Here I wish to suggest another that has yet to be sufficiently explored.

Environmental historians have long known that many of the leaders of the Progressive conservation movement—Theodore Roosevelt, Madison Grant, Henry Fairfield Osborn, and Gifford Pinchot, to name a few—also were some of the staunchest supporters of eugenics.⁷⁷ While that link has been seized upon with pride by race hygienists publishing in far-right journals such as the *Mankind Quarterly*, which has heralded the progressive-mindedness and foresight of individuals like Madison Grant, founder of the Save the Redwoods League and author of the nativist tract, *The Passing of the Great Race*, the connection of conservation and eugenics is something that few American environmental historians seem willing to confront.⁷⁸ But the recent, highly contested and publicized election over anti-immigration candidates for the Sierra Club's board of directors should remind us how long and deep the braided streams of conservation and nativist sentiments in America flow. The fear of contagion, of admixture, of pollution is the common bridge that spans these intertwined currents. And it is through a history of landscape and disease, I suggest, that American environmental historians might begin to write what Karl Jacoby has aptly described as the "hidden history" of conservation, a history from below that would bring issues of social justice more to the fore of American environmental history.⁷⁹

Arguments for conservation of the nation's germ plasm were often seen as but one part of a broader legislative platform for the more efficient management

of the nation's resources. At the second of the annual National Conservation Congresses held between 1909 and 1913 to promote public awareness of the need for conservation, Mrs. Matthew T. Scott, president-general of the Daughters of the American Revolution, captured the ways in which conservation of America's racial and natural heritage were regarded as equally important in preserving the health of the nation. "We, the mothers of this generation,—ancestresses of future generations—have a right to insist upon the conserving not only of soil, forest, birds, minerals, fishes, waterways, in the interest of our future home-makers," Scott proclaimed, "but also upon the conserving of the supremacy of the Caucasian race in our land."⁸⁰ Such remarks were not simply lofty political rhetoric. They had a concrete basis in the contested and sometimes violent struggles over land use that erupted at the turn of the twentieth century. As America's urban wealthy elite sought refuge in nature from the maladies of civilization, they often encountered impure bodies, people whom they regarded as polluting their beloved landscapes by living "in nature in the wrong way."⁸¹

The Ramapo Mountains of New Jersey, an area that Kevin Dann explores in mapping what he aptly labels "the geography of feeble-mindedness," was one such place where the push for the conservation of America's biological resources—both human and natural—were tied to contests over land use. Home to a group of people given the derogatory name the Jackson-Whites in reference to their mixed-race heritage and mixed subsistence/cash economic lifestyle, the region also had become the seasonal home to some of the nation's most prominent captains of industry, such as Edward H. Harriman, railroad magnate and political ally of Theodore Roosevelt, whose thirty-square-mile estate offered sanctuary from New York City's "great honeycomb of humanity creeping through an artificial world, crowded too close for the health of mind and body." In 1910, one year after her husband's death, Mary Harriman donated \$10,000 toward the establishment of the Eugenics Record Office, believing in the aims of its director, Charles Benedict Davenport, "to develop ... the physical and social regeneration of our beloved country."⁸² Among the elite, some felt that the Jackson-Whites and other rural people who squatted, poached game, and stole timber resources adjacent to and on the landscapes of regeneration to which America's patrician class thronged, marred the purity and virtue of nature and thereby threatened the health of both the individual and the nation. White trash, river rats, or human weeds, they needed to be uprooted from the landscape.⁸³ Many of these rural families—the infamous "Jukes" of the Catskills, for example—became the target and subject of eugenic field researchers. Classified as degenerates, they were physically removed from the land and placed in state institutions where they were instructed in more "productive" and healthful relationships to nature.⁸⁴ But whose well-being, whose health, was preserved? Race and class have always figured prominently in the history of environment and health in America. This was no less true in the designation of wilderness areas than in the placement of toxic waste dumps in the United States.⁸⁵

CONCLUSION

OUR TRAVELS IN search of health have taken us on an expansive voyage, from wildlife management in Wisconsin to colonial administration in the British empire, from the ecology of disease to the ecology of knowledge, from the western frontier to landscapes of regeneration in city parks and wilderness retreats. We return to our starting point: Leopold and *A Sand County Almanac*. But it is perhaps not quite the same place where we began. At journey's end, perhaps you can agree that it is unsettling that this classic text in environmental history is so often taught in ways that reinforce categories we inherited from the opening decades of the twentieth century. We forget or fail to recognize that Leopold both resurrected and brought forth the idea of land health in a period when healing rested not so much in purity that entailed a separation of humans from nature—as had been the case for a previous generation—but in the integration of animal, political, and natural economy. Shortly after Leopold's death, Frank Fraser Darling, Clarence Glacken, Marston Bates, Carl Sauer, Lewis Mumford and others would echo this view at the 1955 Wenner-Gren symposium on "Man's Role in Changing the Face of the Earth." The constellation of anthropologists, ecologists, economists, historians, geologists, geographers, and planners who gathered at the conference—a list that was a virtual who's who of people that had an impact on the first generation of environmental historians—had come to recognize animal, plant, and human ecology as part of the same landscape and field of inquiry.⁸⁶

While environmental historians have perhaps shunned health because it conjures up charges of anthropocentrism, the virtue of health in the interwar years was precisely that it cut across the human/nature divide. We should not let the categories of our historical actors blind us into thinking that the subject of health is limited to urban environmental history while it somehow has less relevance to the history of rural landscapes. Air and water, microbes and pollen, toxic chemicals and radiation move in and out of urban and rural landscapes, through bodies, both human and nonhuman. How such matter takes on form, acquires agency in bodies and landscapes, becomes a commodity in the consumption of health, or is turned into danger and risk, these are all topics worthy of much more thorough study than I have been able to outline here. My suspicion is that when health is more fully integrated into the landscape of American environmental history, it will yield natures far more textured, complex, and diverse than we have granted the past.

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NOTES

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1. See, for example, J. Baird Callicott, *In Defense of the Land Ethic: Essays in Environmental Philosophy* (Albany: State University Press of New York, 1989); Susan L. Flader, *Thinking Like a Mountain: Aldo Leopold and the Evolution of an Ecological Attitude Toward Deer, Wolves, and Forests* (Columbia: University of Missouri Press, 1974); and Curt Meine, *Aldo Leopold: His Life and Work* (Madison: University of Wisconsin Press, 1988).
2. There are signs that this trend is changing in American environmental history beyond the confines of the urban environment, where the subject of health has been more visible. See, for example, the essays in Gregg Mitman, Michelle Murphy, and Christopher Sellers, eds., *Landscapes of Exposure: Knowledge and Illness in Modern Environments* (Chicago: University of Chicago Press, 2004); Conevery Bolton Valençius, *The Health of the Country: How American Settlers Understood Themselves and Their Land* (New York: Basic Books, 2002); Linda Nash, "Finishing Nature: Harmonizing Bodies and Environments in Late-Nineteenth Century California," *Environmental History* (2003): 25-52; Linda Nash, "Transforming the Central Valley: Body, Identity, and Environment in California, 1850-1870" (PhD diss., University of Washington, 2000). The 2003 American Society for Environmental History meetings also had a number of sessions devoted to health topics.
3. This is the thesis of Samuel Hays's *Beauty, Health, and Permanence: Environmental Politics in the United States, 1955-1985* (Cambridge: Cambridge University Press, 1985) that continues to prevail.
4. For a sampling of this literature, see Robert Gottlieb, *Forcing the Spring: The Transformation of the Environmental Movement* (Washington, D.C.: Island Press, 1993); Andrew Hurley, *Environmental Inequalities: Class, Race, and Industrial Pollution in Gary, Indiana, 1945-1980* (Chapel Hill: University of North Carolina Press, 1995); Martin Melosi, *The Sanitary City: Urban Infrastructure in America from Colonial Times to the Present* (Baltimore: Johns Hopkins University Press, 2000); Arthur McEvoy, "Working Environments: An Ecological Approach to Industrial Health History," *Technology and Culture* (suppl.) (1995): 145-73; Gerald Markowitz and David Rosner, *Deceit and Denial: The Deadly Politics of Industrial Pollution* (Berkeley and Los Angeles: University of California Press, 2002); David Rosner and Gerald Markowitz, *Deadly Dust: Silicosis and the Politics of Occupational Disease in Twentieth-Century America* (Princeton: Princeton University Press, 1991); Christopher Sellers, *Hazards of the Job: From Industrial Disease to Environmental Health Science* (Chapel Hill: University of North Carolina Press, 1997); David Stradling, *Smokestacks and Progressives: Environmentalists, Engineers, and Air Quality in America, 1881-1951* (Baltimore: Johns Hopkins University Press, 1999); and Joel Tarr, *The Search for the Ultimate Sink: Urban Pollution in Historical Perspective* (Akron, Ohio: University of Akron Press, 1996).

5. The focus of this essay is centered largely on the intersections of ecology, natural-resource management, and health in the United States prior to the Second World War. I have explicitly chosen not to include post-WWII developments, nor have I included areas such as occupational health or sanitation, where the connections to natural-resource concerns are more tangential.
6. See Christopher Lawrence and George Weisz, eds., *Greater Than the Parts: Holism in Biomedicine, 1920-1950* (New York: Oxford University Press, 1998).
7. Walter B. Cannon, *The Wisdom of the Body* (New York: W. W. Norton, 1932). Georges Canguilhem's *The Normal and the Pathological*, trans. Carolyn R. Fawcett, with an introduction by Michel Foucault (New York: Zone Books, 1991) still stands as the most masterful treatment of the changing historical relationships between the normal and the pathological.
8. Quoted in Stephen J. Cross and William R. Albury, "Walter B. Cannon, L. J. Henderson, and the Organic Analogy," *Osiris*, 2nd ser., (1987): 171. See also Alan Young, "Walter Cannon and the Psychophysiology of Fear," in *Greater Than the Parts*, ed. Lawrence and Weisz, 234-56.
9. Cannon, *Wisdom of the Body*, 294, 300.
10. *Ibid.*, 297.
11. Quoted in Meine, *Aldo Leopold*, 350.
12. Aldo Leopold, *A Sand County Almanac with Essays on Conservation from Round River* (New York: Ballantine Books, 1970), 274. On the history of economy and regulation in nineteenth-century life science, see Georges Canguilhem, *Ideology and Rationality in the History of the Life Sciences*, trans. Arthur Goldhammer (Cambridge: MIT Press, 1988), 81-102. See also Donald Worster, *Nature's Economy: A History of Ecological Ideas*, 2nd ed. (Cambridge: Cambridge University Press, 1994).
13. On South Africa, see Peder Anker, *Imperial Ecology: Environmental Order in the British Empire, 1895-1945* (Cambridge: Harvard University Press, 2001); on Germany, see Paul Weindling, *Health, Race, and German Politics between National Unification and Nazism, 1870-1945* (Cambridge: Cambridge University Press, 1989); on the United States, see Gregg Mitman, *The State of Nature: Ecology, Community, and American Social Thought, 1900-1950* (Chicago: University of Chicago Press, 1992). For an expansive look at the moral authority of nature in different times and places, see Lorraine Daston and Fernando Vidal, eds., *The Moral Authority of Nature* (Chicago: University of Chicago Press, 2004).
14. Cannon, *Wisdom of the Body*, 21.
15. Arthur Castiglioni, "Neo-Hippocratic Tendency of Contemporary Medical Thought," *Medical Life* (1934): 128-29.
16. René Dubos, *Mirage of Health: Utopias, Progress and Biological Change* (New York: Harper Bros., 1959), 117.
17. Quoted in Meine, *Aldo Leopold*, 350-51.
18. Leopold, *Sand County Almanac*, 274. See, also, Aldo Leopold, *For the Health of the Land*, ed. J. Baird Callicott and Eric T. Freyfogle (Washington, D.C.: Island Press, 1999), 218-26.
19. Richard Grove, *Green Imperialism: Colonial Expansion, Tropical Island Edens, and the Origins of Environmentalism, 1600-1860* (Cambridge: Cambridge University Press, 1995). See also John M. Mackenzie, "Empire and the Ecological Apocalypse: The Historiography of the Imperial Environment," in *Ecology and Empire: Environmental History of Settler Societies*, ed. Tom Griffiths and Libby Robin (Seattle: University of Washington Press, 1997), 215-28.
20. Aldo Leopold, "The Land Health Concept in Conservation," in *For the Health of the Land*, ed. Callicott and Freyfogle, 222. On Leopold's use of the term "irruption," see Flader, *Thinking Like a Mountain*, 177-80.

21. On political economy and the production of space and place, see William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York: W. W. Norton, 1992); Mike Davis, *Late Victorian Holocausts: El Niño Famines and the Making of the Third World* (London: Verso, 2001); Henri Lefebvre, *The Production of Space* (New York: Oxford University Press, 1991); David Harvey, *The Condition of Postmodernity* (Cambridge: Blackwell, 1990); David Harvey, *Justice, Nature, and the Geography of Difference* (Cambridge: Blackwell, 1996); and David Harvey, *Spaces of Capital: Towards a Critical Geography* (New York: Routledge, 2001).
22. See Anker, *Imperial Ecology*; Eugene Cittadino, *Nature as the Laboratory: Darwinian Plant Ecology in the German Empire, 1880-1900* (New York: Cambridge University Press, 1990); and Griffiths and Robin, eds., *Ecology and Empire*.
23. Curt Meine attributes the Matamek Conference and the meeting of Elton as a decisive influence in the maturing of Leopold's ecological approach to conservation. See Meine, *Aldo Leopold*, 283-84. Leopold's adoption of the term "irruption" in the early 1940s to describe deer population cycles owed much to Elton's work on animal population cycles and zoonotic diseases.
24. We know far too little about the development and reception of Elton's work in the history of ecology. For an important beginning, see Anker, *Imperial Ecology*; and David L. Cox, "Charles Elton and the Emergence of Modern Ecology" (PhD diss., Washington University, 1979). For a useful anecdotal history, see Peter Crowcroft, *Elton's Ecologists: A History of the Bureau of Animal Population* (Chicago: University of Chicago Press, 1991).
25. Charles Elton, *Animal Ecology* (1927; reprint, Chicago: University of Chicago Press, 2001), 110.
26. Julian Huxley, Introduction to Elton, *Animal Ecology*, xv.
27. Charles Elton, *Voles, Mice and Lemmings: Problems in Population Dynamics* (Oxford: Clarendon Press, 1941), 482.
28. Charles S. Elton, *The Ecology of Invasions by Animals and Plants* (London: Methuen, 1958), 18-19.
29. Huxley, Introduction, xiv.
30. Helen Tilley, "Ecologies of Complexity: Tropical Environments, African Trypanosomiasis, and the Science of Disease Control Strategies in British Colonial Africa, 1900-1940," *Osiris* (2004): 21-38, quote on 35.
31. Huxley, Introduction, xiv.
32. John F. V. Phillips, "The Application of Ecological Research Methods to the Tsetse (*Glossina* SPP) Problem in Tanganyika Territory: A Preliminary Account," *Ecology* (1930): 713-33. See also Tilley, "Ecologies of Complexity," and Anker, *Imperial Ecology*.
33. F. M. Burnet, *Biological Aspects of Infectious Disease* (Cambridge: Cambridge University Press, 1940), 4. See also Dubos, *Mirage of Health*; René Dubos, *Man Adapting* (New Haven: Yale University Press, 1965). I owe the phrases "ecological theater" and "evolutionary play" to George Evelyn Hutchinson's *The Ecological Theater and the Evolutionary Play* (New Haven: Yale University Press, 1965). It is surprising, given Dubos's influence on the environmental movement, that so little has been written about him by environmental historians.
34. For two important articles that have begun to explore the history of disease ecology and offer suggestive links to this later work in environmental history, see Warwick Anderson, "Natural Histories of Infectious Disease: Ecological Vision in Twentieth-Century Biomedical Science," *Osiris* (2004): 39-61; and Tilley, "Ecologies of Complexity."
35. William H. McNeill, *Plagues and Peoples* (New York: Doubleday, 1977); Alfred Crosby, *The Columbian Exchange: Biological and Cultural Consequences of 1492* (Westport, Conn.: Greenwood, 1972); Alfred Crosby, *Ecological Imperialism: The Biological*

- Expansion of Europe, 900-1900* (Cambridge: Cambridge University Press, 1986); Jared Diamond, *Guns, Germs, and Steel: The Fates of Human Societies* (New York: W. W. Norton, 1997). In his best-selling book, *The Hot Zone* (New York: Random House, 1994), 288, Richard Preston goes so far as to suggest that the emergence of AIDS, Ebola, and other emerging diseases is nature's way of balancing itself against "infection by the human parasite." Other earlier works, such as William Cronon's *Changes in the Land: Indians, Colonists, and the Ecology of New England* (New York: Hill & Wang, 1983); and Richard White's *Land Use, Environment, and Social Change: The Shaping of Island County, Washington* (Seattle: University of Washington Press, 1980), granted culture a more mediating role in how disease acquired agency in landscape change.
36. For an entry into this debate, see David Demeritt, "Ecology, Objectivity, and Critique in Writings on Nature and Human Societies," *Journal of Historical Geography* (1994): 22-37; and William Cronon, "Cutting Loose or Running Aground," *Journal of Historical Geography* (1994): 38-43. For a more recent attempt to open up this dialogue, see Gregg Mitman, Michelle Murphy, and Christopher Sellers, "Introduction: A Cloud over History," *Osiris* (2004): 1-20.
 37. This is based on two decades of scholarship in science and technology studies. For an eclectic sampling, see Lorraine Daston, "Historical Epistemology," in *Questions of Evidence: Proof, Practice and Persuasion across the Disciplines*, ed. James Chandler, Arnold Davidson, and Harold Harootunian (Chicago: University of Chicago Press, 1994); Donna Haraway, *Modest-Witness@Second-Millennium. FemaleMan Meets OncoMouse: Feminism and Technoscience* (New York: Routledge: 1997); Bruno Latour, *Science in Action: How to Follow Engineers and Scientists through Society* (Cambridge: Harvard University Press, 1987); Bruno Latour, *Pandora's Hope: Essays on the Reality of Science Studies* (Cambridge: Harvard University Press, 1999); Andrew Pickering, *The Mangle of Practice: Time, Agency, and Science* (Chicago: University of Chicago Press, 1995); and Simon Schaffer and Steven Shapin, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton: Princeton University Press, 1985).
 38. Anderson, "Natural Histories of Infectious Disease," 58.
 39. Paul Sutter, "Reflections: What Can U.S. Environmental Historians Learn from Non-U.S. Environmental Historiography," *Environmental History* (2003): 109-29.
 40. On the Philippines, see Michael Adas, "Improving on the Civilizing Mission? Assumptions of United States Exceptionalism in the Colonisation of the Philippines," *Itinerario* (1998): 44-66; Warwick Anderson, "The Natures of Culture: Environment and Race in the Colonial Tropics," in *Nature in the Global South: Environmental Projects in South and Southeast Asia*, ed. Paul Greenough and Anna Lowenhaupt Tsing (Durham: Duke University Press), 29-46; and Warwick Anderson, "Immunities of Empire: Race, Disease, and the New Tropical Medicine, 1900-1920," *Bulletin of the History of Medicine* (1996): 94-118. Both Adas and Anderson are working on book-length projects on the Philippines. On the banana industry, see Steve Marquardt, "'Green Havoc': Panama Disease, Environmental Change, and Labor Process in the Central American Banana Industry," *American Historical Review* (2001): 49-80; and Steve Marquardt, "Pesticides, Parakeets, and Unions in the Costa Rican Banana Industry, 1938-1962," *Latin American Research Review* (2002): 3-36. A number of scholars have begun to pursue work on the environmental history of the Panama Canal. See Stephen Frenkel, "Geographical Representations of the 'Other': The Landscape of the Panama Canal Zone," *Journal of Historical Geography* (2002): 85-99; John Lindsay-Poland, *Emperors in the Jungle: The Hidden History of the U.S. in Panama* (Durham: Duke University Press, 2003); and Paul Sutter's current research project, "Pulling the Teeth of the Tropics: Environment, Disease, Race, and the U.S. Sanitary Program in Panama." Richard Tucker, *Insatiable Appetite: The United States and the Ecological*

Degradation of the Tropical World (Berkeley and Los Angeles: University of California Press, 2000) has a small section on Firestone in Liberia. It is a subject I hope to pursue further in my next project, tentatively titled “America’s Rubber Empire: Science, Commerce, and Disease in the Making of Firestone Plantations Company.”

41. Timothy Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity* (Berkeley and Los Angeles: University of California Press, 2002), 52. Mitchell draws upon actor-network theory (ANT) in science studies to speak about hybrid agencies. I believe ANT offers one of the most useful theoretical approaches in science studies for environmental historians to rethink how nature is given voice in historical narratives. See, for example, Latour, *Pandora’s Hope*; John Law and John Hassard, eds., *Actor Network Theory and After* (Oxford: Blackwell, 1999); and Michell Callon and John Law, “Agency and Hybrid Collectif,” *South Atlantic Quarterly* (1995): 581-607.
42. Leopold, *Sand County Almanac*, 269.
43. Valençius, *Health of the Country*.
44. G. E. R. Lloyd, ed., *Hippocratic Writings* (London: Penguin Books, 1978), 148.
45. Nash, “Finishing Nature,” 25-51, quote on 25.
46. On the body as an instrument of environmental measurement and a barometer of place, see Michael Dettelbach, “The Face of Nature: Precise Measurement, Mapping, and Sensibility in the Work of Alexander von Humboldt,” *Stud. Hist. & Philos. Biol. & Biomed. Sci.* (1999): 473-504; Nash, “Finishing Nature”; and Gregg Mitman, “Hay Fever Holiday: Health, Leisure, and Place in Gilded-Age America,” *Bulletin of the History of Medicine* (2003): 600-635. On Joseph Henry, see James R. Fleming, *Meteorology in America, 1800-1870* (Baltimore: Johns Hopkins University Press, 1990).
47. Daniel Drake, *A Systematic Treatise, Historical, Etiological, and Practical, on the Principal Diseases of the Interior Valley of North America* (Cincinnati, Ohio: Winthrop B. Smith, 1850). On medical geography in nineteenth-century America, see James H. Cassedy, *Medicine and American Growth* (Madison: University of Wisconsin Press, 1986), especially chap. 3; Valençius, *Health of the Country*, especially chap. 4; Conevery Bolton Valençius, “Histories of Medical Geography,” in *Medical Geography in Historical Perspective*, ed. Nicolaas Rupke (London: Wellcome Trust Centre for the History of Medicine at UCL, 2000), 3-20; and Gregg Mitman and Ronald Numbers, “From Miasma to Asthma: The Changing Fortunes of Medical Geography in America,” *History and Philosophy of the Life Sciences* (2003): 391-412.
48. Some examples include Susan Jane Edwards, “Nature as Healer: Denver, Colorado’s Social and Built Landscapes of Health, 1880-1930,” (PhD diss., University of Colorado, 1994); Billy M. Jones, *Health-Seekers in the Southwest, 1817-1900* (Norman: University of Oklahoma Press, 1967); Nash, “Transforming the Central Valley”; Mitman, “Hay Fever Holiday”; Gregg Mitman, “Geographies of Hope: Mining the Frontiers of Health in Denver and Beyond, 1870-1965,” *Osiris* (2004): 93-111; Sheila Rothman, *Living in the Shadow of Death: Tuberculosis and the Social Experience of Illness in American History* (New York: Basic Books, 1994); Valençius, *Health of the Country*; and Conevery Bolton Valençius, “Gender and the Economy of Health on the Santa Fe Trail,” *Osiris* (2004): 79-92.
49. On California’s Central Valley, see Nash, “Finishing Nature.”
50. Denver and Rio Grande Railway Co., *Health, Wealth and Pleasure in Colorado and New Mexico* (Chicago: 1881), 15.
51. For an entry into the history of public health and the urban environment, see Melosi, *Sanitary City*.
52. Dubos, *Mirage of Health*, 127-28.
53. Quoted in Charles W. Eliot, *Charles Eliot: Landscape Architect* (1902; reprint, Amherst: University of Massachusetts Press, 1999), 317. My thanks to Eric MacDonald for bringing my attention to Eliot. On Eliot and environmental design, see Keith N. Morgan,

- Introduction to Eliot, *Charles Eliot*, vii-1; Cynthia Zaitzevsky, *Frederic Law Olmsted and the Boston Park System* (Cambridge: Belknap Press, 1982).
54. Quoted in Eliot, *Charles Eliot*, 318, 338-39, 341.
 55. John Muir, *Our National Parks* (Boston: Houghton Mifflin, 1901), 1.
 56. Quoted in Eliot, *Charles Eliot*, 341-42.
 57. Bradford Torrey, ed., *Writings of Henry David Thoreau* (Boston: Houghton Mifflin Co., 1906), 11, 395. For a provocative reflection on Thoreau's body and the historiography of environmental history, see Christopher Sellers, "Thoreau's Body: Towards an Embodied Environmental History," *Environmental History* (1999): 486-514.
 58. Quoted in Eliot, *Charles Eliot*, 339.
 59. For a more extended analysis, upon which the material in this paragraph and the following are based, see Mitman, "Hay Fever Holiday."
 60. "Hay Fever," *White Mountain Echo*, 13 September 1879, 1.
 61. See Kenneth Thompson, "Wilderness and Health in the Nineteenth Century," *Journal of Historical Geography* (1976): 145-61; and Kenneth Thompson, "Trees as a Theme in Medical Geography and Public Health," *Bulletin of New York Academy of Medicine* (1978): 517-31.
 62. *Report of the Forestry Commission of New Hampshire, January Session, 1891* (Manchester, N.H., 1891), 20.
 63. This is the opinion of Richard W. Judd, *Common Lands, Common People: The Origins of Conservation in Northern New England* (Cambridge: Harvard University Press, 1997), 104-5, where the Quackenbos quote appears.
 64. Helen Hunt Jackson, "A Protest against the Spread of Civilization," *New York Evening Post*, 29 August 1867. Although Rothman, in *Living in the Shadow of Death*, links Jackson's journeys in search of health to consumption, the places to which Jackson traveled, the seasonality of her journeys, and the reference to hay fever by her nineteenth-century biographer suggest that hay fever was as compelling a reason for her travels as consumption. For biographical information on Jackson, see "Mrs. Helen Hunt Jackson," *Century* (December 1885): 251-59; Ruth Odell, *Helen Hunt Jackson* (New York: London, 1939); and Kate Phillips, *Helen Hunt Jackson: A Literary Life* (Berkeley and Los Angeles: University of California Press, 2003).
 65. *Colorado and Asthma* (Denver: Rocky Mountain Steam News, 1874), 15.
 66. Grace Greenwood, *New Life in New Lands: Notes of Travel* (New York: J. B. Ford & Co., 1873), 75. Greenwood, a fellow hay fever sufferer, helped to arrange Jackson's move west.
 67. See Kathleen A. Brosnan, *Uniting Mountain and Plain: Cities, Law and Environmental Change along the Front Range* (Albuquerque: University of New Mexico Press, 2002).
 68. Helen Hunt Jackson, "Alamosa," *New York Independent*, 6, 13 June 1878.
 69. Helen Hunt Jackson, *Bits of Travel at Home* (Boston: Little, Brown, and Co., 1898), 286.
 70. *Ibid.*, 384.
 71. *Ibid.*, 226.
 72. The most extensive treatment of Roosevelt's childhood spent in search of health can be found in David G. McCullough, *Mornings on Horseback* (New York: Simon & Schuster, 1981).
 73. On diseases of civilization, see Charles Rosenberg, "Pathologies of Progress: The Idea of Civilization as Risk," *Bulletin of the History of Medicine* (1998): 714-30.
 74. Mary Douglas, *Purity and Danger: An Analysis of Concepts of Pollution and Taboo* (London: Routledge & Kegan Paul, 1966).
 75. This quest for purification was coupled with an insurgent nativism that reached across urban and rural landscapes and across human and nonhuman nature. We have yet to put these literatures together. For some starting places, see Susan Craddock, *City of*

- Plagues: Disease, Poverty, and Deviance in San Francisco* (Minneapolis: University of Minnesota Press, 2000); Alan M. Kraut, *Silent Travelers: Germs, Genes, and the "Immigrant Menace"* (New York: Basic Books, 1994); Gregg Mitman, "When Pollen Became Poison: A Cultural Geography of Ragweed in America," in *The Moral Authority of Nature*, ed. Daston and Vidal, 483-65; and Philip J. Pauly, "The Beauty and Menace of the Japanese Cherry Trees: Conflicting Visions of American Ecological Independence," *Isis* (1996): 51-73.
76. Mark David Spence, *Dispossessing the Wilderness: Indian Removal and the Making of the National Parks* (New York: Oxford University Press, 1999).
 77. Carolyn Merchant, "Women of the Progressive Conservation Movement, 1900-1916," *Environmental Review* (1984): 57-85, briefly explored the connection between women and eugenics in the Progressive conservation movement. The relationship between conservation and eugenics also receives a brief discussion in Ronald Rainger, *An Agenda for Antiquity: Henry Fairfield Osborn & Vertebrate Paleontology at the American Museum of Natural History, 1890-1935* (Tuscaloosa: University of Alabama Press, 1991); and Susan R. Schrepfer, *The Fight to Save the Redwoods: A History of Environmental Reform, 1917-1978* (Madison: University of Wisconsin Press, 1983). See also Gray Brechin, "Conserving the Race: Natural Aristocracies, Eugenics, and the U.S. Conservation Movement," *Antipode* (1996): 229-45. For some helpful historiographic surveys of the vast literature on the history of American eugenics, which has also largely avoided the ties to conservation, see Philip Pauly, "Essay Review: The Eugenics Industry—Growth or Restructuring?" *Journal of the History of Biology* (1993): 131-45; and Frank Dikotter, "Race Culture: Recent Perspectives on the History of Eugenics," *American Historical Review* (1998): 467-78.
 78. See, for example, Roger Pearson, "The Concept of Heredity in the History of Western Culture, Part I," *Mankind Quarterly* (1995): 229-65.
 79. Karl Jacoby, *Crimes against Nature: Squatters, Poachers, Thieves, and the Hidden History of American Conservation* (Berkeley and Los Angeles: University of California Press, 2001).
 80. *Proceedings of the Second National Conservation Congress at Saint Paul, September 5-8, 1910* (Washington, D.C.: National Conservation Congress, 1911), 275-76.
 81. Kevin Dann, *Across the Great Border Fault: The Naturalist Myth in America* (New Brunswick, N.J.: Rutgers University Press, 2000), 143.
 82. Quoted in Dann, *Across the Great Border Fault*, 24, 115.
 83. Nicole Hahn Rafter, *White Trash: The Eugenic Family Studies, 1877-1919* (Boston: Northeastern University Press, 1988).
 84. The use of nature in the moral and physical reform programs of state institutions for the feebleminded has yet to be written.
 85. The issue of justice, rather than serving as a divide in environmental history, could actually be useful in bridging scholarship on rural and urban industrial landscapes. On the history of environmental justice in the United States, see Robert Bullard, *Dumping on Dixie: Race, Class, and Environmental Quality* (Boulder, Colo.: Westview Press, 1990); Giovanna Di Chiro, "Nature as Community: The Convergence of Environmental and Social Justice," in *Uncommon Ground: Rethinking the Human Place in Nature*, ed. William Cronon (New York: W. W. Norton, 1996), 298-321; Michael Egan, "Subaltern Environmentalism in the United States: A Historiographic Review," *Environment and History* (2002): 21-41; Gottlieb, *Forcing the Spring*; Dolores Greenberg, "Reconstructing Race and Protest: Environmental Justice in New York City," *Environmental History* (2000): 223-50; Eileen Maura McGurty, "From NIMBY to Civil Rights: The Origins of the Environmental Justice Movement," *Environmental History* (1997): 301-23; David Pellow, *Garbage Wars: The Struggle for Environmental Justice in*

Chicago (Cambridge: MIT Press, 2002); and Laura Pulido, *Environmentalism and Economic Justice: Two Chicano Struggles in the Southwest* (Tucson: University of Arizona Press, 1996).

86. See William Thomas, ed., *Man's Role in Changing the Face of the Earth* (Chicago: University of Chicago Press, 1956). An intellectual history of the field, which we desperately need, will undoubtedly trace one root of environmental history back to this seminal volume.