
Nineteenth-Century Medical Landscapes: John H. Rauch, Frederick Law Olmsted, and the Search for Salubrity

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A fascinating period of urban design developed during the nineteenth century in America. Its course was relatively short-lived, but its underlying ideas pervaded the American mind-set and influenced the built environment through the development of what could be called a salubrious urban landscape. This new landscape was in large part the result of medical theories advocating either the elimination or the accentuation of natural and built environments, based on their disease and health potentials. Those medical theories postulated that disease-laden air—often called miasma or malaria—was produced by particular landforms, climates, animal waste, and vegetable decomposition, and was the source of epidemic disease.¹

The impact of the miasmatic theory on the landscape in the United States was felt most fully from the 1840s into the 1880s—at which time it was largely discredited by the medical profession, although it continued to be embraced by sanitarians and lay persons well into the 1890s.²

1. For a broader overview of the evolution of medical ideas, including environmental etiology, see John Harley Warner, *The Therapeutic Perspective: Medical Practice, Knowledge, and Identity in America, 1820–1885* (Cambridge: Harvard University Press, 1986); George Rosen, *A History of Public Health* (New York: MD Publications, 1958); Charles-Edward Amory Winslow, *The Conquest of Epidemic Disease: A Chapter in the History of Ideas* (Princeton: Princeton University Press, 1944).

2. Regarding the professionalization of public health officials and their continued reliance on the miasma theory, see John Duffy, *The Sanitarians: A History of American Public Health* (Urbana: University of Illinois Press, 1992), pp. 126–37. Edwin Chadwick employed

During this period the medical community had greater influence on the physical shape of the city than at any other time in America's history. The impact of this health/environment dualism was extensive and has resulted in contemporary examinations by many historians regarding its social, economic, political, and architectural consequences.³ A brief list of some of the topics investigated includes the public health movement, the establishment of urban sanitary infrastructure and street improvement, the development of antiurban sentiment in the reform movement, the creation and modification of new building types, the rise of suburban development, and the rural cemetery and urban park movements.⁴ De-

the miasmatic theory in his famous report that resulted in Britain's 1848 Public Health Law. For a fresh look at Chadwick, see Sylvia Tesh, "Miasma and 'Social Factors' in Disease Causality: Lessons from the Nineteenth Century," *J. Health Polit. Policy & Law*, 1995, 20: 1001–24; Christopher Hamlin, "Finding a Function for Public Health: Disease Theory or Political Philosophy?" *ibid.*, pp. 1024–31; John V. Pickstone, "Dearth, Dirt and Fever Epidemics: Rewriting the History of British 'Public Health,' 1780–1850," in *Epidemics and Ideas: Essays on the Historical Perception of Pestilence*, ed. Terence O. Ranger and Paul Slack (Cambridge: Cambridge University Press, 1992), pp. 125–48.

3. While there is tremendous breadth on the topic of environmental links to health, there is also considerable variation regarding the topic's perceived significance. For general urban development, see *Cities in American History*, ed. Kenneth T. Jackson and Stanley K. Schultz (New York: Knopf, 1972); Howard Chudacoff, *The Evolution of American Urban Society* (Englewood Cliffs, N.J.: Prentice-Hall, 1981). For representative works concerning the influence of medical thought on the development of urban social structure, see David Ward, *Poverty, Ethnicity, and the American City, 1840–1925: Changing Conceptions of the Slum and the Ghetto* (Cambridge: Cambridge University Press, 1989); John F. Bodnar, *Steeltown: Immigration and Industrialization, 1870–1940* (Pittsburgh: University of Pittsburgh Press, 1990); Elizabeth Hafkin Pleck, *Black Migration and Poverty, Boston, 1865–1900* (New York: Academic Press, 1979). While often very narrow in scope, worthwhile economic and political interpretations concerning medical influences on urban development include John S. Garner, *The Model Company Town: Urban Design through Private Enterprise in Nineteenth-Century New England* (Amherst: University of Massachusetts Press, 1984); Richard E. Foglesong, *Planning the Capitalist City: The Colonial Era to the 1920s* (Princeton: Princeton University Press, 1986); Martin V. Melosi, *Pollution and Reform in American Cities, 1870–1930* (Austin: University of Texas Press, 1980); Roy Lubove, *The Progressives and the Slums: Tenement House Reform in New York City: 1890–1917* (Pittsburgh: University of Pittsburgh Press, 1963). For representative offerings concerning the development of medically influenced architectural types, see John Burnett, *A Social History of Housing, 1815–1985* (London: Methuen, 1986); Richard Plunz, *A History of Housing in New York City: Dwelling Type and Social Change in the American Metropolis* (New York: Columbia University Press, 1990).

4. Works concerning period sanitation and street engineering necessarily tend to treat the influence of medical thought on urban development with greater emphasis. Two worthwhile studies of sanitary infrastructure and street improvement are Ann Durkin Keating, *Invisible Networks: Exploring the History of Local Utilities and Public Works* (Malabar, Fla.: Krieger, 1994); Stanley Clay Schultz and Clay McShane, "To Engineer the Metropolis:

spite these numerous investigations, limited attention has been paid to the interpretation and application of specific medical theory as applied to the design of cities.⁵ The purpose of this paper is to document that correlation through an examination of the shared vocabularies of place and environmental characteristics developed by nineteenth-century physicians and urban designers. We suggest that this shared vocabulary was a result of several factors: the ascendance of environmentally based theories in nineteenth-century etiologic thought and the broad acceptance of miasma theories by American physicians; the ensuing interpretation and incorporation of those environmental characteristics within designs proposed by physicians and urban designers; and the subsequent general public acceptance and diffusion of ideas about environment's link to health and disease.

We will focus first on nineteenth-century American theoretical responses—especially the importance of environment-based theories at mid-century—and the role of medical topographies, the U.S. Sanitary Commission, and sanitary reform in the popularization of those theories. We will then examine the writings and ideas of two prominent citizens, John Henry Rauch and Frederick Law Olmsted, to determine how medical theory influenced built form. Chicago physician Rauch was a staunch proponent of miasmatic theory and a national leader in the public health movement. His medical reports and environmental analyses of Chicago resulted in specific urban interventions that ultimately affected

Sewers, Sanitation, and City Planning in Late-Nineteenth-Century America," *J. Amer. Hist.*, 1978, 65: 389–411. While numerous authors address suburban development, the influence of medical thought on that development is consistently of secondary or passing concern; see Henry C. Binford, *The First Suburbs: Residential Communities in the Boston Periphery, 1815–1860* (Chicago: University of Chicago Press, 1985); Sam Bass Warner, Jr., *Streetcar Suburbs: The Process of Growth in Boston, 1870–1900* (New York: Atheneum, 1973). Works addressing the various aspects of the reform movement are more varied in their consideration of medical issues; representative examples include Norris A. Magnuson, *Salvation in the Slums: Evangelical Social Work, 1865–1920* (Metuchen, N.J.: Scarecrow Press, 1977); Sarah S. Elkind, "Building a Better Jungle: Anti-Urban Sentiment, Public Works, and Political Reform in American Cities, 1880–1930," *J. Urban Hist.*, November 1997, 24: 53–77. Significant studies of the rural cemetery and urban park movements include Blanche Linden-Ward, *Silent City on a Hill: Landscapes of Memory and Boston's Mount Auburn Cemetery* (Columbus: Ohio State University Press, 1989); Kenneth T. Jackson, *Silent Cities: The Evolution of the American Cemetery* (New York: Princeton Architectural Press, 1989); David Schuyler, *The New Urban Landscape: The Redefinition of City Form in Nineteenth-Century America* (Baltimore: Johns Hopkins University Press, 1986).

5. One notable exception is the work of Jon A. Peterson, who looked at the general implications of medical thought on urban built form in "The Impact of Sanitary Reform upon American Urban Planning, 1840–1890," *J. Soc. Hist.*, 1979, 13: 83–103.

that city's form. Olmsted, the preeminent landscape architect of his century, helped to develop a design vocabulary that incorporated miasma theories and shaped urban morphology. The representative roles of physician as observer, theoretician, and advocate of environmental change, and of landscape architect as interpreter, advocate, and implementer of medical theory, are not unique to Rauch and Olmsted. While the identification of a shared vocabulary is significant in establishing the critical linkage between medical theory and its cross-disciplinary application, the particular significance of our study is the scope of the theory's subsequent effect on urban landscapes widely accepted then, and now, as the uniquely American urban condition.

Miasmatic Definitions and Influence on American Medicine

Inspiration for the miasma-based etiology was originally provided by the Hippocratic treatise *Airs, Waters, Places*. This treatise, in its many interpretations, influenced Western Europe over the centuries, until mid-nineteenth-century experiments directed medical attention toward a germ etiology.⁶ The Hippocratic environmental inquiry was also utilized in eighteenth- and nineteenth-century America. To understand its development in America, medical historiography of nineteenth-century Britain offers valuable insight regarding miasma's ascendance and evolution into an adaptable, and therefore credible, theory. Indeed, John Harley Warner suggests that American physicians paid particular attention to medical trends in Britain during this time because of the similarities they found there to American medical practices. American physicians, he explains, "looked to Britain not so much for a source of therapeutic change as for a voice to second their own therapeutic positions."⁷ Therefore a brief look at British etiologic thought regarding the role of miasma is warranted.

Of particular interest is Christopher Hamlin's recent exploration of the complex dynamic of nineteenth-century British medical dialectics and etiologic stance. Hamlin presents an alternative framework to the traditional contagionists vs. anticontagionists discussion by suggesting that the medical dialogue was actually about "predisposing" causes—elements that act upon the patient to weaken disease resistance—and

6. For a history of the Hippocratic connection of climate and landform to health, see Frederick Sargent II, *Hippocratic Heritage: A History of Ideas about Weather and Human Health* (New York: Pergamon Press, 1982).

7. Warner, *Therapeutic Perspective* (n. 1), p. 198.

“exciting” causes, which have a direct or immediate effect on an individual’s health. He describes the development of the British public health movement as a shift away from a wholistic, socially based understanding of disease (predispositionists) toward the Chadwickian concept of public health that focused upon an environment-based, miasmatic imperative as a single exciting cause. To Hamlin, it was this dismissal of predisposing factors that led to an “absurd Chadwickian orthodoxy.”⁸ He also describes an important development in the miasmatic argument that helps to explain its presence in public health policy—namely, Southwood Smith’s reconstitution of the definition and function of the exciting cause (exposure to miasma) into a predisposing role as well, capturing both arguments in one. It was that transformation which “effectively emasculated the concept of predisposition by enormously expanding the importance of an hypothetical morbid poison.”⁹ By allowing exposure to miasma to play the role of predisposing the victim to disease, the argument became much more adaptable to the many manifestations of illness and helped to explain the degree to which certain individuals were more susceptible than others.

An example of the liberating effect of such an etiologic modification can be seen in an 1851 report by an American almshouse physician, Thomas Hepburn Buckler, on a cholera outbreak that had occurred at his institution, near Baltimore. He described deadly miasmatic exhalations emanating from overflowing privies and decomposing animals as predisposing the residents to the disease. The same “morbid poison” was also responsible for diminishing their chances for recovery. While he carefully avoided drawing a conclusion on the cause of the outbreak, referring to it as an “indigenous disease” of “spontaneous origin” in the unhealthful environment surrounding the almshouse, he did venture to suggest that “the disease depended on some wide spread influence, which required in every instance the operation of miasmatic or malarious exhalations to bring it into action. It is only at the cross-roads of the general and local cause . . . that the disease was found.”¹⁰ The concept of predisposition is subsumed within the miasmatic etiology as utilized by Buckler. His description is in step with Southwood Smith’s mid-1830s contribution to the growing miasma-based public health policy in Brit-

8. Christopher Hamlin, “Predisposing Causes and Public Health in Early Nineteenth-Century Medical Thought,” *Bull. Soc. Hist. Med.*, 1992, 5: 43–70; quotation on p. 70.

9. *Ibid.*, p. 62.

10. Thomas Hepburn Buckler, *A History of Epidemic Cholera, as it appeared at The Baltimore City and County Alms-house, in the summer of 1849: with some remarks on the medical topography and diseases of this region* (Baltimore: Patent Cylinder Press, 1851).

ain. Buckler, as had Smith, suggested that the exciting cause (the miasmatic gas) by its very presence acted as a predisposing element, serving first to weaken the physical constitution and then to bring the disease into action. Buckler clearly saw the impact of miasmatic exposure over time, for he described a pattern in which medical students “florid with health” would soon become sickly, pale, and dull from exposure to the almshouse.¹¹ During the cholera outbreak it was determined that “the malaria acting probably as the strong predisposing cause of ill health, exerted its influence by depressing the nervous system and lowering vitality. . . . Thus predisposed, the inmates were rendered not only more susceptible to the . . . morbid poisons, or to the action of any other exciting causes of disease; but . . . their chances of recovery were greatly diminished.”¹²

With this dual function, miasma could be considered a plausible explanation for the seeming vagaries of disease—which does much to explain its presence in medical theory and its eventual adoption in public health policy. But this alone does not sufficiently explain the overwhelming acceptance of environment-based etiology by American physicians. It would take a perceived crisis within the profession to complete the transformation. Warner’s work regarding the principle of specificity charts the tumultuous waters of the medical profession in the early to mid-nineteenth century as it attempted to redefine its role in society. This was a period in which the profession became solidly aligned with an environmental imperative and an empiricist approach.

In *The Therapeutic Perspective*, Warner describes the change in the American medical profession’s epistemologic approach, beginning in the second quarter of the nineteenth century, as “among the most important and revealing transformations of medical therapeutics in nineteenth-century America.”¹³ Citing the level of “desperation” felt within a profession that believed itself to be in decline, he documents the critical shift from rationalistic systems and aggressive treatment—epitomized by the teachings and practice of Benjamin Rush—to a reliance on medical theory that embraced the principle of specificity, defined by Warner as an “individualized match between medical therapy and the specific characteristics of a particular patient and of the social and physical environ-

11. *Ibid.*, p. 36.

12. *Ibid.*, p. 28. Appended to the document was a meteorologic chart prepared by another physician documenting the presence of “electricity” in the atmosphere during the outbreak. Buckler makes no reference to these data in his report, and we do not know to what degree he saw those atmospheric conditions as contributing to the outbreak.

13. Warner, *Therapeutic Perspective* (n. 1), p. 37.

ments.”¹⁴ From the 1820s to the 1850s the principle of specificity—and the environmental empiricism it heralded—had come to represent the American medical profession’s quest for professional unity and public approbation, both of which had seriously deteriorated in the first part of the century. Specificity required making observations both at the bedside and in the locale: “As long as specificity rather than universalism reigned, much of the wisdom valued by the profession was necessarily tied to the place where it was generated and used: it was in essence *local knowledge*.”¹⁵ A great deal of effort therefore went into meteorologic and landform observations and the documentation of disease in a given area, which in turn were analyzed with a keen eye to etiologic indications. Miasmatic theory was comfortably in step with this new intellectual direction taken by the medical profession.¹⁶

The constant pressure for urban growth, the attendant threat of epidemic disease, and the accepted principle of specificity with its awareness of place and climate suggest an intellectual climate that supported miasmatic explanations among American medical professionals. With the ascendance of miasmatic theory, and the expanding scope of environmental inquiry, an attendant shift in landscape perception followed. Naturalistic and man-made landscape and urban conditions were seen increasingly in terms of their benign and pathogenic characteristics.

14. *Ibid.*, p. 58.

15. *Ibid.*, p. 72.

16. While Warner sets the stage for understanding the reasons behind a rise in environmental etiologic thought, others have suggested the importance of miasma within this particular culture. James Cassedy has documented the development of American etiologic thought in antebellum America and suggests that in the six to eight decades prior to the war “a large proportion” of the medical profession endorsed some form of causal link between the physical environment and its phenomena—climate, winds, soil, topography, drainage, etc.—with disease: James H. Cassedy, *Medicine and American Growth 1800–1860* (Madison: University of Wisconsin Press, 1986), p. 34. Charles E. Rosenberg, in *Explaining Epidemics and Other Studies in the History of Medicine* (Cambridge: Cambridge University Press, 1992), p. 117, has written that “almost all” physicians in the 1830s knew of miasma and understood its essential role in producing disease. Michael Owen Jones has documented the popularity of “medical geographies” written between 1770 and 1830 by pioneer settlers (laypersons and medical professionals alike) as they described the new environments encountered in their travels and documented attendant affects on health: Michael Owen Jones, “Climate and Disease: The Traveller Describes America,” *Bull. Hist. Med.*, 1967, 41: 254–66. Phyllis Allen Richmond “glanced” at the etiologic sections of books and journals and reported on the regularity of miasmatic theories; she wrote: “The atmospheric, chemical, and miasmatic theories so dominated etiologic thought in the 1870’s that when alternative views arose, . . . American reviewers were cautious and non-committal” (Phyllis Allen Richmond, “American Attitudes Toward the Germ Theory of Disease [1860–1880],” *J. Hist. Med. & Allied Sci.*, October 1954, 9: 430).

Dissemination of miasmatic theories among the medical profession occurred through medical journals, physicians' reports, and medical topographies. The last was an important method for communicating these ideas to one another, as well as to interested laypersons. The on-site observations recorded particular geographic combinations, which, in turn, were linked to physical health. Salubrity was clearly associated with landform and atmosphere.

Miasma in Medical Topographies, and the Development of Salubrious Landscapes

It is well known that musquetoos [*sic*] and other noxious insects are most numerous in wet and marshy places . . . where morbidic miasmata are exhaled in greatest quantity and contaminate the atmosphere. It may therefore be considered an indication of nature, that wherever those insects are very numerous, there also unwholesome exhalations prevail, inimical and dangerous to health, and destructive to human existence.

Jabez W. Heustis, M.D., 1817¹⁷

Given the immediate and pressing issues of urban health, the landscape with its pockets of “unwholesome exhalations” must have held significant appeal as a topic for investigation. Not only was the landscape comprehensible, but it could be manipulated with immediate results, and the atmosphere could be measured (temperature, wind direction, rainfall, etc.), providing clinical data ripe for interpretation. Very early evidence of this tendency toward environmental analysis is seen in the advice tendered by Cadwallader Colden after a 1741 yellow fever epidemic hit New York City. Colden, a physician and lieutenant governor of the state, wrote of the crucial link between environment and urban health in a 1743 essay, “Observations on the Fever which prevailed in the City of New-York.”¹⁸ His report in large part consisted of an abstract of the work of Giovanni Maria Lancisi (1654–1720)—physician to Pope Clement XI. A contem-

17. Jabez Wiggins Heustis, *Physical Observations, and Medical Tracts and Researches on the Topography and Diseases of Louisiana* (New York: T & J Swords, 1817), p. 42.

18. Cadwallader Colden, “Observations on the Fever which prevailed in the City of New-York in 1741 and 2,” *Amer. Med. & Philos. Reg.*, 1811, 1: 310–30. It can be assumed that Colden’s word carried significant weight. As a member of the American intelligentsia, he was in frequent correspondence with botanist John Bartram. As well, Benjamin Franklin sought his judgment before going public with his ideas: see preface to *The Letters and Papers of Cadwallader Colden* (Pennsylvania State University Library; New York: New York Historical Society, 1918), vol. 1 (1730–42), microform.

porary of Colden, Lancisi wrote of the fevers in Rome caused by faulty air and soil, suggesting that the different states of the vapors caused different symptoms, and that Rome needed to be cleaned and its system of disposing of refuse improved. Then, by way of advice, Colden cited the success of London in ridding itself of the plague by adopting improvements in drainage and street configuration. Before the great fire in that city, Colden explained, the streets were narrow, ill-paved, and with few drains. After the fire, new streets were built to better standards: they were straight, open, sufficiently wide for the free flow of air, and had many drains. As a result, he wrote, the plague was absent for many years. Proof has not been found that New York City officials implemented his suggestions, but past authors have stated that this was likely.¹⁹

Colden was an early harbinger of an ensuing period of environmental investigation in the nineteenth century. The popular empirical method for investigation was the medical topography, used by Northern European physicians in the seventeenth and eighteenth centuries as they chronicled unfamiliar climates, flora, fauna, and disease. The classical medical topography adopted by like-minded American physicians in the nineteenth century was influenced by a growing interest in the development of statistical data in urban France, and was theoretically aligned with the Chadwickian miasmatic theory.²⁰ Widely published, the new topographies significantly influenced the exchange of ideas, research, and medical theory in America. Evidence of such exchange is found in Heustis's 1817 medical topography of Louisiana (cited above), in which he refers to the work of Thomas Sydenham and states confidently:

It is a fact confirmed by the general experience of mankind, that diseases are essentially influenced and diversified in their character and symptoms, by the local circumstances of climate and situation. In all inquiries, therefore, upon the subject of endemic diseases, the physical appearance and condition of the country are entitled to primary consideration.²¹

19. Martha J. Lamb, *History of the City of New York, Its Origin, Rise, and Progress*, vol. 1 (New York: A. S. Barnes, 1877), p. 589, seems to indicate that part of his advice was indeed adopted by city officials, but she offers no verification. Saul Jarcho, in "Cadwallader Colden as a Student of Infectious Disease," *Bull. Hist. Med.*, 1955, 29: 103, relies on Lamb's evaluation.

20. In Paris, Parent-Duchâtelet and Louis-René Villermé, through statistical analysis, maintained that disease was a manifestation of poverty. Conversely, Chadwick in England believed that poverty was not a causative factor but was rather a manifestation of disease and ill health. He concluded that the most appropriate intervention was environmental modification, especially the removal of pathogenic conditions. For an excellent history of the origins of the British and French public health movements, see Ann F. La Berge, *Mission and Method: The Early Nineteenth-Century French Public Health Movement* (Cambridge: Cambridge University Press, 1992).

21. Heustis, *Physical Observations* (n. 17), p. 13.

The condition of the city, in particular, came under close scrutiny. As early as 1795, Matthew Davis recognized that the “part of the town very much crowded by poor inhabitants, and contain[ing] a great number of lodging houses . . . is unquestionably the most unhealthy part of the city.”²² By the 1830s, medical topographies had shown much higher morbidity and mortality rates in cities than in rural areas, and it became increasingly accepted among medical theorists that the locus of disease was the dirty, crowded industrial city. In addition, specific landforms—especially those with water as a component—were identified and labeled according to their benign or pathogenic character. William Currie’s *Historical Account of the Climate and Diseases of the United States of America* (1792), James Lind’s *Essay on Diseases Incidental to Europeans in Hot Climates* (1811), and Lionel Chalmers’s *Account of the Weather and Disease of South Carolina* (1815), to name a few, associated disease with swamps, fens, marshes, and mist. Representative of the era, Lind suggested that “a copious vapor from water, mud, and all marshy or damp places”²³ was long associated with epidemic disease, and that “the surface of the ground in many places becomes hard, and encrusted with a dry scurf, which pens up the vapors below, and, by a continuance of the rains for some time, this crust is softened, and the long pent up vapors set free which thence [also] become the cause of sickness.”²⁴ One of the most frequently invoked prescriptions (shared by these authors) for the control of miasma was to drain damp and saturated lands and to provide plenty of fresh air. Heustis also indicated the role of wind direction as a precipitating cause of scurvy; rainy seasons, he advised, especially render the disease epidemic and malignant. Daniel Drake further refined soil, wetland, temperature, seasons, water-bodies, and settlement characteristics as significant environmental elements in disease causation. In his exhaustive *Systematic Treatise* (1854), he described soil composition as a critical factor in autumnal fever, noting that decaying organic matter supplied “the material out of which a poisonous gas is formed,” and that, “all other circumstances being equal, autumnal fever prevails most where the amount of organic matter is greatest and least where it is least.”²⁵ He

22. Matthew L. Davis, *A Brief Account of the Epidemical Fever Which Lately Prevailed in the City of New York, With the Different Proclamations, Reports, and Letters of Gov. Jay . . .* (New York: Matthew L. Davis, 1795), p. 39.

23. James Lind, *An Essay on Diseases Incidental to Europeans in Hot Climates*, 1st Amer. ed. from 6th London ed. (Philadelphia: W. Duane, 1811), pp. 13–37; quotation on p. 13.

24. *Ibid.*, p. 36.

25. Daniel Drake, *A Systematic Treatise, Historical, Etiological, and Practical, on the Principal Diseases of the Interior Valley of North America, as They Appear in the Caucasian, African, Indian and Esquimaux Varieties of Its Population*, ed. S. Hanbury Smith and Francis G. Smith, 2d ser. (Philadelphia: Lippincott, Brambo, 1854), pp. 23–30, quotation on p. 23.

suggested that solar heat was a significant factor in the etiology of yellow fever: it “impregnate[d] the air with vapor, giving it a high dew point,”²⁶ and evaporated “the superfluous water of ponds, swamps, marshes and lagging streams . . . promoting the extraction of gases” and the assumed undiscovered gas malaria.²⁷ Cataracts and rapids were, in his opinion, especially unhealthy because they liberate gases by agitation.

Drake’s, Currie’s, and other physicians’ studies provided a medical basis for the elimination, remediation, and enhancement of landscapes associated with specific soil types, climates, topographies, and settlement patterns. As the ethnologic evidence mounted, so did the impulse toward the development of a body of landscape and urban design responses to the threat of disease. Indicated as problematic were moving water—especially if there were a high degree of water agitation—standing water, moisture in the soil, the presence of wetland conditions, a lack of air circulation (in streets and dwellings), high population densities, and the decay of vegetative and animal matter. Considered remedial were the presence of trees for oxygenation and mechanical cleansing of the air, wide and well-drained streets, fresh air, wide open spaces, and the removal of miasma-generating elements, such as graveyards, located near human habitat. Miasmatic theory incorporated these environmental characteristics in its rationale of disease causation, which in turn formed the basis for the creation of benign environmental typologies. These typologies include parks and open spaces; the planting of street trees; the removal of urban wetlands and cemeteries; the filling of low-lying lands; the straightening and/or widening of streets; and the design of new boulevards and suburbs. It was on the basis of these landscape typologies that a new design vocabulary was provided to public health officials, environmental designers, and city officials that would then be translated into a distinct urban morphology.

Transformation into Urban Morphology

How was this theoretical environmental framework translated into public information, and eventually into the urban landscape? How did medical theory turn into built form? We suggest that this transformation was the result of a convergence of factors around mid-century, with emphasis on the birth of the public health movement. The Civil War has been described as a watershed event in the history of the public health

26. *Ibid.*, p. 25.

27. *Ibid.*, pp. 29–30.

movement, which, into the twentieth century, still adopted miasmatic theories as basic to sanitary reform. The nudge toward public health came from the U.S. Sanitary Commission, which had adopted a miasmatic etiology as evidenced in their medical reports. These reports were published to disseminate the latest, and most practical, medical knowledge to physicians in the field. Under the guidance of the general secretary of the Commission, Frederick Law Olmsted,²⁸ a series of brief essays or handbooks were printed and distributed among medical officers in the army. In one report written in 1861, entitled “Military Hygiene and Therapeutics,” it was suggested that when first locating a camp it was important to avoid marsh lands, or malarious areas. If it was necessary, for strategic purposes, to camp in the vicinity of an extensive marsh, “the ground should always . . . be selected on the windward side, so that the prevailing winds should carry away the noxious emanations from the soil.”²⁹ Regarding the location and design of the regimental hospital (referring to both new structures and the adaptive reuse of churches and school buildings), ventilation was of special importance: each patient required no less than 800 cubic feet of fresh air; there should be numerous openings in the walls for cross-ventilation; patients should be located only in above-ground rooms, because these are much more salubrious than below-ground quarters; no unnecessary articles should be in the rooms because, in part, they would absorb the noxious vapors; and finally, no window should open onto areas of foul air.

In another report, entitled “Miasmatic Fevers,” the authors acknowledge their ignorance of the “intimate nature” of marsh miasmata.³⁰ Then, having establishing the absence of solid theory on the topic, they continue with a lengthy, twenty-three-page description of its general manifestations and attendant environmental conditions. John Duffy states that the U.S. Sanitary Commission taught disease prevention by advocating the avoidance of miasmatic conditions and increased sanitary efforts to a large segment of the American population, affecting the lives of millions. That the country’s first public health department was formed on the heels of the war in 1865 and its emphasis was on cleanliness and

28. At the time of his appointment to the Commission, Olmsted was a well-known author and had recently received public attention for the design of Central Park. The park was under construction when he took a leave of absence and went to Washington, D.C. to begin his war work. He was especially noted for his organizational skills in the administration of large projects, which helps explain his prominence in the Commission.

29. Alfred C. Post and W. H. Van Buren, “Military Hygiene and Therapeutics,” in United States Sanitary Commission, *Military, Medical and Surgical Essays Prepared for the United States Sanitary Commission 1862–1864* (Washington, D.C., 1865), 27 pp.; quotation on p. 8.

30. John T. Metcalf et al., “Miasmatic Fevers,” in *ibid.*, 23 pp.; quotation on p. 1.

improved ventilation—the same emphasis given in the military camps—he suggests, is not a coincidence. He notes that the equation of disease with dirt was by then firmly entrenched.³¹ That claim is supported in another Sanitary Commission report written by Elisha Harris, one of the foremost public health physicians of the day, in which he indicates the pervasiveness of the knowledge that pure atmosphere and proper cleanliness were paramount in the control of infectious diseases: “We need not enumerate the sources of a vitiated atmosphere and consequent endemic infections in camps and barracks; they are known to every soldier.”³²

Relative to the education received from the war experience, the city itself was an edifying entity. The worsening of the urban condition and the identification of the dense urban core as a known locus for disease certainly played a part in the eventual public adoption of miasma-based etiology. Urban historians have written about the changes taking place throughout the century as cities became increasingly affected by manufacturing and industry; as immigrants and country-dwellers filled city streets and housing; and as inexplicable epidemics took thousands of lives. Cholera was particularly devastating, but not altogether unpredictable. By mid-century a growing number of physicians and laypersons were coming to recognize the unmistakable correlation of the vast streams of immigrants and disease. These observers followed tides of immigrant movement inland and saw cholera occur in their wake. With its improper sanitation and overcrowding, the specter of “city” must have loomed large.

To round out the picture of the growing obviousness of dense populations and urban filth as being associated with epidemics, there is recent research that explores the *popular* acceptance of sanitary reform. Nancy Tomes states that, for a variety of reasons, the “sanitarian message gained an early and wide hearing among the urban middle and upper classes.”³³ She suggests that historians of medicine and public health have traditionally dismissed the antebellum commitment to public education adopted by public health officials as being only peripheral to the story of the American public health movement. In refutation of this attitude, she describes an informed and individually proactive American public who

31. Duffy, *Sanitarians* (n. 2), pp. 113–29.

32. Elisha Harris, “Hints for the Control and Prevention of Infectious Diseases in Camps, Transports and Hospitals,” in *Military, Medical* (n. 29), 28 pp., quotation on p. 23.

33. Nancy Tomes, “The Private Side of Public Health: Sanitary Science, Domestic Hygiene, and the Germ Theory, 1870–1900,” *Bull. Hist. Med.*, 1990, 64: 509–39; quotation on p. 511.

took steps toward avoiding miasma in their own households—just as we today “make efforts to evade carcinogens such as asbestos and radon.”³⁴ By the 1870s, Tomes suggests, the public was an informed and engaged partner with urban sanitary reformers. Her research points to a public widely and actively involved in bringing the latest medical knowledge into their homes as public health reformers were working on the larger urban landscape. Complementing this idea of public acceptance of miasmatic theory, James Cassedy describes a period in the early nineteenth century in which well-heeled Americans traveled to more healthful locations, either to maintain their good health or for curative reasons—which suggests that there was a wide, and rather early, acceptance of the environmental etiology among the general public.³⁵

The convergence of these factors, especially when combined with an ever-increasing awareness that clinical intervention could actually do very little to change the course of disease or to stay the associated incidence of death, suggests a receptive public in need of guidance. Given the inefficacies in medical practice, the best to be hoped for was the prevention of disease—which led physicians, lay health reformers, and the public to concentrate on known (or at least highly suspected) areas of influence, such as the physical environment, personal hygiene, and public sanitation. As will be seen in the writings of both John Henry Rauch and Frederick Law Olmsted, improving the physical environment—including the elimination of miasmatic landscapes and the implementation of urban forms thought to negate miasma’s harmful effects—was an essential action toward the protection of public health. The emergence of both these men as vocal advocates for an improved urban situation can be understood as a product of this mid-century cultural milieu: Rauch, a physician responding to his profession’s rally around specificity and environmental examination; and Olmsted, an intelligent and socially motivated landscape architect translating this new medical terminology into designed form.³⁶ Rauch, in particular, was immersed in

34. *Ibid.*, p. 512.

35. Cassedy, *Medicine* (n. 16), pp. 54–59.

36. Olmsted’s work and voluminous writings have been analyzed thoroughly and aptly by a number of historians, and most thoroughly by Laura Wood Roper. For Olmsted’s philosophy toward a changing urban culture, see the excellent discussion in Thomas Bender, *Toward an Urban Vision: Ideas and Institutions in Nineteenth-Century America* (Lexington: University Press of Kentucky, 1975), chap. 7; Bender also includes a helpful analysis of additional sources of Olmsted’s urban reflections in the “Bibliographical Essay,” pp. 266–68. Rauch’s involvement as a Civil War physician preceded his immersion in the public health issues of Chicago and his eventual leadership role in the Department of Health for the State of Illinois. It is obvious that his was a deeply held, personal mission of public health advocacy.

the contemporary issues regarding public health. He embraced a miasmatic etiology and ardently argued for both the development of benign landscapes and the remediation of those considered pathogenic in his adopted city of Chicago. This is no better evidenced than in the two following examples: the removal of Chicago's City Cemetery, and the development of the city's first park system. In addition, Rauch's association with Olmsted will be seen to further reflect the causal link between medical theory and the urban design theory and practice of that period.

From Medical Theory to Urban Design: Rauch's Mission of Health in Chicago

Chicago's early situation was considered to be precarious, and from its beginning the city fought a national reputation for unhealthfulness.³⁷ The flat topography, high water table, and clay soils resulted in serious drainage problems. As early as 1835 the *Chicago Democrat* was goading residents into action: "The atmosphere has already become poisoned" as a result of standing water that was "green" and "putrid" from decaying vegetable matter; "Our town still continues healthy, but we warn our fellow-citizens that unless something be done . . . they may expect sickness and the pestilence for they will surely come."³⁸ The situation was so severe that the city established a Drainage Commission, which in 1852 established a new official grade necessitating the raising of the streets and buildings. In 1857 and 1868 the "damp and unhealthful" street grades were raised again.³⁹

John Henry Rauch (1828–94) returned to Chicago after the Civil War, while the city was struggling with its unhealthy streets, and promptly began to point to other health concerns. His achievements were significant: in 1849 he had graduated from the University of Pennsylvania medical school; he was a professor and chair at Rush Medical College,

37. Specifically regarding Chicago, see Isaac D. Rawlings, *The Rise and Fall of Disease in Illinois* (Springfield: Illinois State Department of Health, 1927), 1: 101–14; Thomas Neville Bonner, *Medicine in Chicago: 1850–1950*, 2d ed. (Urbana: University of Illinois Press, 1991), p. 7.

38. *Chicago Democrat*, 17 June 1835, n.p. (Chicago Historical Society).

39. Bessie Louise Pierce, *A History of Chicago* (New York: Knopf, 1937–57), 2: 317. While the raising of buildings and streets was an extreme measure—the Board of Health reported that within two decades 4,000 acres of the city had been "raised to a grade of 3 to 5 feet above the bottomless quagmire which formerly bordered this shore of Lake Michigan" (quoted in Sophonisba Breckinridge, "Tenement-house Legislation in Chicago," in *The Tenements of Chicago: 1908–1935*, ed. Edith Abbott [New York: Arno Press, 1970; 1936], p. 40)—it was an action taken as much for the health of its residents as for the health of business in the rapidly growing city.

Chicago; during the Civil War he served as a medical director and surgeon; he was one of the first members of Chicago's Board of Health, and that city's sanitary superintendent from 1867 to 1873. In later years, he was president of the American Public Health Association (1876–77), and the first president of the Illinois State Board of Health (1877). There is no question that Rauch was a firm advocate of the miasmatic theory and employed Warner's specificity principles by measuring atmospheric conditions and making observations of landforms and decaying matter, which he then evaluated in relation to the incidence of death and disease in the city.

Chicago's City Cemetery

Rauch's influence on Chicago's urban design began in 1859 with a report on the dangers of urban burials entitled *Intramural Interments in Populous Cities and Their Influence upon Health and Epidemics*. Informally circulated at first and then published in 1866, the report was critical to the final conversion of the cemetery grounds into Chicago's first large public park, Lincoln Park.⁴⁰ With its circulation and his continued outspoken advocacy, Rauch established himself as the city's leading medical authority on environment-based etiology. In the document he explained that the decay of vegetable and animal matter transmits "pestiferous exhalations" to exposed air and water, which are capable of spreading infection; that the presence of such gases, and those created by humans in an imperfectly ventilated space, is an exciting cause of disease; and, that fresh air can do much to dilute miasmata.⁴¹ Humans, Rauch determined, require a minimum of 333 cubic feet of fresh air each day for proper respiration; a lesser amount renders the body prone to disease and far less capable of resisting the "baneful agencies" of the poisoned atmosphere.⁴² His primary target in the report was the City Cemetery, located just north of the city along Lake Michigan. Suspecting the cemetery as a point source for the pollution of the city's potable water supply, he

40. John H. Rauch, *Intramural Interments in Populous Cities and Their Influence upon Health and Epidemics* (Chicago: Tribune Co., 1866), pp. 56–57. For a description of Rauch's role, see Francis Eastman, "The Public Parks of Chicago," in *Chicago City Manual* (Chicago: Bureau of Statistics, 1914), pp. 7–31, especially p. 13; Glen Holt, "Private Plans for Public Spaces: The Origins of Chicago's Park System, 1850–1875," in *Chicago History* (Chicago: Chicago Historical Society, 1979), pp. 173–84. In addition to Rauch's compelling medical testimony, pressure was placed on the city council for the development of a park on the cemetery grounds by investors of the North Chicago Street Railway Company, comprised of prominent citizens, who, in seeking to obtain the rights to build a road, argued the potential for future residential development of the area, as well as the probable conversion of the cemetery to a public park.

41. Rauch, *Intramural Interments* (n. 40), pp. 56–60; quotation on p. 59.

42. *Ibid.*, p. 24.

documented the direction of shoreline currents (south, toward the city reservoir) and charted several years of water-level fluctuation and corresponding rates of putrefaction in the cemetery, finding a correlation between high water and advanced rates of decay. The lake, he grimly explained, with its undulating high-water mark, was a constant drain upon the cemetery grounds and their putrefying contents. Was it surprising, he wrote, that “complaints . . . [were] made of the character of the water . . . carrying with it the offensive and deadly results of the decomposing process into the common reservoir from which the water is taken?”⁴³ In addition to this direct source of contamination, he examined the role of atmosphere and soil conditions in spreading the volatile emanations being released into the air.

Having established his case based on contemporary medical knowledge, and having shown that the custom of urban burials was “universally condemned” by the highest medical authorities in Europe and America, Rauch presented the alternative: the solution would be to stop all further burial on city grounds and establish a “rural cemetery” far removed from the dense population of the city. Rural cemeteries had already taken the nation by storm, the first being built outside Boston in 1831, with Philadelphia and Brooklyn soon following. Andrew Jackson Downing—a noted horticulturist and aesthete—claimed in 1849 that “there is scarcely a city of note in the whole country that has not its rural cemetery,” the value of which lay as much in the benefits for public health as in the elevation of American taste.⁴⁴ Indeed, Chicago had three private rural cemeteries under construction at the time of Rauch’s writing; the best known, Graceland, was designed by landscape architect H. W. S. Cleveland.⁴⁵ In general, their rise in popularity was the result of concerns over the inefficient use of urban land and the capacity limits of existing city cemeteries, in addition to fears of endangering public health.⁴⁶ In the case of Rauch, however, his proposal to abandon the city cemetery arose solely out of his painstaking environmental observations that so convinced and alarmed him. His suggestions for the cemetery’s design and siting were based on a miasmatic etiology; he expressed no concern for either aesthetics or economics in his report. His was a purely salubrious solution. The cemetery, he explained, should be built on a hill to take advantage of mitigating breezes, and should contain abundant vegeta-

43. *Ibid.*, pp. 56–57.

44. Andrew Jackson Downing, “Your Leader, on Cemeteries and Public Gardens,” *Horticulturist & J. Rural Art & Rural Taste* [ed. Andrew Jackson Downing], 1849, 4: 139.

45. Holt, “Private Plans” (n. 40), pp. 175–76.

46. Schuyler, *New Urban Landscape* (n. 4), p. 41.

tion to absorb the deleterious gases for the benefit of their own growth while maintaining the surrounding atmosphere in its original pure state. And what of the existing urban burial grounds? “There is no time for delay,” he wrote; “Let immediate steps be taken to prevent all future interments within the Corporate limits, and as soon as practicable let arrangements be made for the gradual removal, at proper times and seasons, of the remains already interred, with the ultimate view of converting these grounds into a public park,” the planting of which would detoxify the severely contaminated soils and contain gases that, if emitted into the air, would prove “otherwise injurious.”⁴⁷

The use of medical theory to advocate a very specific landscape typology is indicative of the sort of dialogue occurring between city officials, physicians, and environmental designers across the nation at mid-century in cities large and small. Certainly Chicago, a disease-weary city that had already experienced three major cholera epidemics in 1834, 1849–50, and 1854, was receptive to the solution. An end note in Rauch’s report, hastily included as the last page was being printed, shared the contents of an ominous telegraph message reporting the appearance of cholera in Florida—and indeed, cholera hit the city again in 1866.

The Establishment of Chicago’s Park System

Rauch would be given further opportunity to expound on his environmentally based medical theories and to affect Chicago’s built environment. The designation of Lincoln Park brought with it a political battle over the proposed establishment of autonomous park commissions not only for the North Side (the location of Lincoln Park), but also for the West and South Sides of the city—a battle that would provide Rauch a forum to again address the city’s need for salubrious landscapes. The debate over the creation of the three politically powerful park commissioner positions is a story fraught with behind-the-scenes intrigue and political maneuverings. The process involved prominent businessmen and wealthy real estate speculators jockeying for position in anticipation of the financial bonanza to be brought by the development of large parks, as well as the power and independent budget that came with commissioner positions. In contrast, Rauch’s immediate involvement was without concern for personal gain and, given his future efforts in sanitary reform, his was clearly an honest appeal for the public health benefits of

47. Rauch, *Intramural Interments* (n. 40), p. 66. The footnote in the text served to warn readers that no removals should be made from May to November, known as the most dangerous months for epidemics.

parks.⁴⁸ In a letter to Olmsted in 1869 Rauch, perhaps naively, explained that his name was not put forward as candidate for one of the commissioner positions because it was felt he could be of most help as an independent.⁴⁹ As the political battle over the creation of the three park commissions reached its peak, reinforcement was sought through public advocate Rauch: in November 1868, the Chicago Academy of Sciences asked him to prepare a report on public parks to be read before their assembly.⁵⁰ One year later, Rauch, then employed as city sanitary superintendent, published his second extensive report, entitled *Public Parks: Their Effects upon the Moral, Physical and Sanitary Conditions of the Inhabitants of Large Cities; With Special Reference to the City of Chicago*.⁵¹ That document provided historic precedent for urban park development and evidenced parks' benefit to public health.

Public Parks had all the elements of the first report (a historical overview, citation of current medical ideas, and extensive documentation of climate, winds, and temperatures correlated with incidence of epidemic and mortality rates) but was more detailed and specific to Chicago. Of all of Rauch's convictions, none was more fervently held than the importance of fresh air: "It is . . . well known, that of all the circumstances affecting health, none is so important as the condition of the air we breathe. On it, more emphatically than on the food we eat, depends the purity of the blood and the right exercise of every function of the

48. Eastman's "Public Parks" (n. 40) is a straightforward account of the birth of the three park commissions, with observations of the attendant political power plays.

49. Rauch to F. L. Olmsted, 13 April 1869, in *The Papers of Frederick Law Olmsted* (Pennsylvania State University Library; Washington, D.C.: Library of Congress Photoduplication Service, 1975), microfilm (hereafter *Olmsted Papers*).

50. The Academy had previously concerned itself exclusively with the promotion of scientific knowledge and investigation. Why, then, would it throw its weight into the park debate? One possible connection is through Ezra B. McCagg, member of the Academy and a lawyer specializing in real estate law (McCagg's law partner, J. Young Scammon, was one of the founding members of the Academy). Instrumental in the passage of Lincoln Park, McCagg held one of the powerful Lincoln Park commissioner positions and was a colleague of Olmsted. According to Eastman, a gentleman's agreement was made for the support of park commissions in the West and South districts in return for the earlier passage of the Lincoln Park Commission. See Eastman, "Public Parks" (n. 40), p. 15. The park commissioners were governor-appointed and enjoyed financial independence from the municipality.

51. John H. Rauch, *Public Parks: Their Effects upon the Moral, Physical and Sanitary Condition of the Inhabitants of Large Cities; With Special Reference to the City of Chicago* (Chicago: S. C. Griggs, 1869).

system.”⁵² This conviction, first expressed in *Intramural Interments*, was more fully elaborated in the second report. Rauch offered many reasons why parks would improve air quality. Chicago was, he wrote, for the most part destitute of trees, and it was obvious that “tree planting would not only break the force of the wind [which spreads miasma], supply warmth in winter, and coolness in summer and thus moderate the extremes of temperature [which influence miasmatic releases and morbidity rates], but at the same time absorb to a considerable extent the noxious gases which are generated in every populous city,—supplying oxygen, and thus contributing to the public health”; the planting of trees and the strategic placement of parks, he summarized, would diminish “the mortality of preventable diseases” and improve general health.⁵³

Rauch’s medical mandate swayed park commission opponents, and it may have softened public sentiment toward the underlying land speculation attending park development. Indeed, he called for harmonious action in what he saw as a matter of general community interest. He explained that locating a park in one section of the city would benefit all residents because miasma does not reside in any one community: “the subtle and invisible influence may be wafted to the remotest parts, abated in virulence, but still pestiferous.”⁵⁴ In February 1869 the Illinois General Assembly passed bills creating the South, West, and Lincoln Park Commissions, thus promising that well-drained park lands would surround the city. Writing ten years later, Rauch boasted that “at least one million” trees had been planted in the city’s environs, and with the planned construction of almost 2,500 acres of park land he determined (after a careful examination of the meteorologic record) that “the [resultant] drainage of the city and of the outside lands, and this extensive tree-planting, have already diminished the climate extremes incident to our particular location,” which resulted in diminished mortality rates and the improved general health of all city residents.⁵⁵

52. Rauch, *Intramural Interments* (n. 40), p. 23. Vegetation’s role in purifying “vitiated” air and producing oxygen was finally becoming common knowledge in America. For example, the production of oxygen by trees was patiently described in two earlier articles in the scholarly *North American Review*: “The Chemistry of Vegetation,” 1845, 60 (126): 157–95; “Trees and Their Uses,” 1857, 85 (176): 178–205.

53. Rauch, *Public Parks* (n. 51), p. 79 n. It is interesting to note that the bulk of his eighty-four-page report focuses on environmental factors in preventing disease; only at the very end does he briefly mention the psychological and moral benefits of parks, the two arguments that prevail in historiographic depictions of the era.

54. *Ibid.*, pp. 83–84.

55. John Henry Rauch, *The Sanitary Problems of Chicago, Past and Present* (Cambridge, Mass.: Riverside Press, 1879), p. 15.

The significant role that Rauch's second publication played in the eventual development of Chicago's park system is suggested by several factors. First, much of the success of his work in Chicago ultimately required an informed public and it is probable that *Public Parks* was an important educational tool for Chicago residents. Second, the fact that the request for the report came from the prestigious Academy of Sciences indicates a certain weight behind the physician and the perceived value of the report. Yet, given the murky political implications, the degree to which *Public Parks* had a direct influence on the park system is not as clear as is Rauch's influence in cemetery removal and the subsequent development of Lincoln Park. Nevertheless, it was certainly true that he was a tireless public health promoter and public advocate, and it is evident that his medical theories helped bring about significant change to Chicago's built environment.

Rauch translated miasmatic medical theory into a guide for the development of landscape typologies conducive to health, including the removal of urban burial sites and soil remediation through extensive tree planting; the creation of rural cemeteries with very specific characteristics; the introduction of fresh air and oxygen throughout the city by the planting of trees; and the development of an extensive park system that, in turn, influenced the microclimate of the city and the health of its residents. That Rauch, as a physician, should have been concerned with the public health of Chicago residents is not surprising, and, given the medical theories of the day, his staunch attachment to an environmental etiology is easily understood. But his impact is largely limited to one city. To what degree his fascination with this particular etiology was representative of a larger public understanding of disease can be better seen through the writings and designs of Frederick Law Olmsted, this nation's leading landscape architect of the post-Civil War generation.

Miasma's National Impact: The Work of Frederick Law Olmsted

As Rauch was busy preparing *Public Parks*, the suburban village of Riverside, Illinois, was being planned nine miles southwest of Chicago's city center. Impressed by the design, Rauch mentioned Riverside in glowing terms in his report. Enviously he noted that the situation for the development was admirable, being a respectable twenty feet above the river's edge, and thereby ensuring healthful drainage, as was not possible in Chicago. Along the banks of the river and elsewhere on the site were groves of trees, making it "one of the most . . . healthful places of residence" in and around Chicago.⁵⁶ Adding to the appeal of this subur-

56. Rauch, *Public Parks* (n. 51), p. 31n.

ban design was the inclusion of a broad, well-drained, tree-lined avenue to connect Riverside with Chicago, which, in addition to its aesthetic contribution, “will exercise a vast influence in moderating the extremes of our climate, and go far to protect the city from the injurious effects of the south-west winds at certain seasons of the year.”⁵⁷ Rauch’s enthusiasm for Riverside was virtually uncontained, and perhaps some of it was generated from the identity of its designers: the preeminent landscape architectural firm of Olmsted and Vaux. But what attracted the attention of Rauch to Olmsted’s work went beyond admiration of the designer’s art: the physician and the landscape architect were bonded by a shared vocabulary of health, founded on landscape typology. Rauch had been in correspondence with Olmsted—designer of this country’s first public park—regarding the preparation of his second report. Olmsted reviewed the first draft of *Public Parks* and offered suggestions for improvement. When the three park commissions were established in Chicago, both North Park Commissioner Ezra B. McCagg and Rauch separately contacted Olmsted, inviting his firm to become involved in the parks’ design.⁵⁸ Eventually, Olmsted and Vaux did produce a design for Chicago’s South Park.

Known primarily for their design of Central Park (1858), the firm’s interest in creating healthful environments was not confined to suburban developments, nor did it begin with Riverside in 1869. Olmsted’s environmental interest can be traced through his earlier activities as a journalist, his design of Central Park, his affiliation with the U.S. Sanitary Commission, and his proposals for dozens of urban schemes throughout the United States. Olmsted historian Laura Wood Roper describes young Olmsted as an accurate and shrewd observer of nineteenth-century American life in his various roles as park planner, scientific farmer, and journalist.⁵⁹ His walking tour of England gained him modest acclaim for his *Walks and Talks of an American Farmer in England in the Years 1850–51* (1852), as did his travels through the South for the *New York Daily Times*. His partnership in Dix and Edwards, publishers of *Putnam’s Monthly* and the American version of Charles Dickens’s *Household Words*, brought him

57. Ibid.

58. Regarding preparation of the report *Public Parks*, see Rauch to Olmsted, 12, 20, and 21 January 1869, *Olmsted Papers* (n. 49). Regarding Olmsted and Vaux’s involvement in the design of the park, see Rauch to Olmsted, 13, 21, and 22 April 1869; McCagg to Olmsted, 1 May 1869, *ibid.*

59. Laura Wood Roper, *FLO: A Biography of Frederick Law Olmsted* (Baltimore: Johns Hopkins University Press, 1973).

influence among the cultivated, for in his position there he often came into contact with noted authors such as Andrew Jackson Downing, and with the prominent naturalist Louis Agassiz and the botanist Asa Grey. His early knowledge of miasmatic theories may also have come through the writings of British author John Claudius Loudon, one of the more prolific writers in early-nineteenth-century Britain. While Loudon published on subjects as diverse as political economy, natural history, architecture, and landscape design, his writings on urban health provided clear examples of his knowledge of British miasmatic theories as related to environmental design.⁶⁰

Additionally, Olmsted was a friend and constant correspondent with George E. Waring Jr., the nationally renowned sanitation engineer of the day.⁶¹ Olmsted's familiarity with miasma theory and its design applications in urban settings deepened as a result of his collaboration with Waring during his tenure at Central Park. Waring, in charge of the drainage systems for the park, was convinced of the environmental characteristics associated with miasma and the resultant effects on health. He was also well versed in the status of the public health movement in England, and had read numerous physicians' reports alluding to miasma. In *Draining for Profit, and Draining for Health*, he cited the work of Drs. Bartlett, La Roche, and Chadwick concerning the connections of miasma and wet, low, and moist places with various fevers and other diseases.⁶² Situated within this intellectual milieu Olmsted would have had ample reinforcement regarding his own ideas about the remediation of landscapes for healthful purposes.

The official entrance of Olmsted into the public health arena came with his appointment as general secretary of the Sanitary Commission during the Civil War. The position brought him into contact with the country's most devoted practitioners and advocates for public health—among them New York's Elisha Harris, as well as Rauch, then a member of Chicago's branch of the Sanitary Commission. Olmsted worked closely

60. Loudon, in his own *Architectural Magazine and Journal* (London: Longman etc., 1838), 5: 619, references noted phrenologist George Combe's *The Constitution of Man: Considered in Relation to External Objects*, 5th ed. (Edinburgh: J. Anderson, Jr., 1835), and John Macculloch, *Malaria; An Essay on the Production and Propagation of This Poison, and on the Nature and Localities of the Places by Which It Is Produced . . .* (Philadelphia: T. Kite, 1829); and Sir James Clark, *The Influence of Climate in the Prevention and Cure of Chronic Diseases . . .* (London: T. and G. Underwood, 1830), as essential to understanding urban design.

61. There is sustained and at times affectionate correspondence from Waring to Olmsted in *Olmsted Papers* (n. 49).

62. George E. Waring, Jr., *Draining for Profit, and Draining for Health*, 2d ed. (New York: Orange Judd Company, 1879).

with these and other nationally recognized physicians and sanitarians, and was keenly aware of both American and English medical studies of epidemic disease. His appointment by the New York Legislature in 1870 to a committee of experts to study, in part, the prevalence of malaria and the feasibility of development on Staten Island speaks to his reputation as environmental designer and health advocate. The resultant report, dated 1871 with Olmsted as main author, relies heavily on the expertise of physicians, sanitary engineers, and geologists, and his own planning and design theories.⁶³ The role of medical theory in his design solutions is clearly evident here, for his suggestions were stimulated in large part by the island's prevalence of malaria, defined in the report as a poison in the atmosphere. He explained that houses must be adequately separated to allow for the free flow of air, which would diffuse any contaminants, and that the presence of trees would also help to purify the air.⁶⁴ Highlighting the importance of the environmental correlation to health and, additionally, to proper planning, Olmsted included a detailed "interview" with Elisha Harris on the topic of malaria. Responding to Olmsted's questions, Harris addressed public health issues as related to the landscape characteristics found on Staten Island—an extensive and deliberate discussion that consumed roughly one-third of the report. Noting that the exact cause for this poisoned air was not known, physician Harris nonetheless preferred an environmental etiology, one of gases emanating from certain soil conditions or decaying vegetative matter, exposed to particular conditions of moisture and temperature. The design implications were discussed at length. The poisoned air, he explained, is largely neutralized in passing through foliage; trees also serve the important function of absorbing excessive moisture from the soil and shading the soil to prevent rapid heating and the subsequent release of the gases. Houses surrounded by trees at a slight distance were preferable to excessive shading, while belts of trees were known to be a malarial barrier.⁶⁵ The discussion of malaria, trees, drainage, soil quality, moisture, and pure air was as thorough a dissection of the prevailing environmental etiology as could be found in the reports and medical topographies written by any physician at the time.

Olmsted's understandings of an environmentally based etiology regarding density, ventilation, landscape condition, and certain character-

63. Frederick Law Olmsted et al., "Report to the Staten Island Improvement Commission of a Preliminary Scheme of Improvements" (1871), in *Landscape into Cityscape: Frederick Law Olmsted's Plans for a Greater New York City*, ed. Albert Fein (Ithaca: Cornell University Press, 1968), pp. 173–300.

64. *Ibid.*, p. 199.

65. *Ibid.*, pp. 207–37.

istics of water and open space also served as a rationale for a larger benign urban scheme. In an 1877 report to the Board of the Department of Public Works of New York City concerning the layout of two new wards, Olmsted as coauthor recommended more open space and less-dense urban patterns, because “in the middle of all these dark, narrow cubes there must be a large amount of ill-ventilated space, which can only be imperfectly lighted through distant skylights, or by an unwholesome combustion of gas.”⁶⁶ Based on assumptions that industrializing cities would continue to grow, and that their growth and economic diversification were essential components of progress toward a higher level of civilization, he stated that planning for growth was indispensable if conditions of misery, disease, and other “evils” associated with urban areas were to be avoided. He suggested incremental growth while incorporating specific landscape typologies, in accord with the prevailing medical etiologies.

In particular, three landscape typologies stand out in Olmsted’s writings: low-density urban and suburban neighborhoods, large pleasure parks, and smaller local parks—all connected by tree-lined parkways and promenades. In support of lower densities, he stated:

we are able to reach the conviction, beyond all reasonable doubt, that at least, the larger share of the immunity from the visits of the plague and other forms of pestilence, and from sweeping fires, and the larger part of the improved general health and increased length of life which civilized towns have lately enjoyed is due to the abandonment of the old-fashioned compact way of building towns, and the gradual adoption of the custom of laying them out with much larger spaces open to the sun-light and fresh air; a custom the introduction of which was due to no intelligent anticipation of such results.⁶⁷

His suggestions concerning the establishment of urban parks also rest, in part, on the importance of light and air:

the most serious drawback to the prosperity of town communities has always been dependent on conditions . . . which have led to stagnation of air and excessive deprivation of sun-light.⁶⁸

66. Frederick Law Olmsted and J. J. R. Croes, “Preliminary Report . . . upon the Laying Out of the Twenty-third and Twenty-fourth Wards” (1877), in *Civilizing American Cities: A Selection of Frederick Law Olmsted’s Writings on City Landscapes*, ed. S. B. Sutton (Cambridge: MIT Press, 1971), pp. 41–51, quotation on p. 49.

67. Olmsted, Vaux & Co., *Observation on the Progress of Improvements in Street Plans, with Special Reference to the Park-way Proposed to Be Laid Out in Brooklyn, 1868* (Brooklyn: I. van Anden’s Print, 1868), p. 17.

68. *Ibid.*, p. 18.

Air is disinfected by sunlight and foliage. Foliage also acts mechanically to purify the air by screening it. Opportunity and inducement to escape at frequent intervals from the confined and vitiated air of the commercial quarter, and to supply the lungs with air screened and purified by trees [is necessary for the protection of health].⁶⁹

In defense of his proposals for tree-lined boulevards, he noted:

If such streets were made still broader in parts, with spacious malls, the advantage [in scenery and in air quality] would be increased. If each of them were given the proper capacity, and laid out with laterals and connections in suitable directions to serve as a convenient trunk of communication between two large districts of the town or the business center and the suburbs, a very great number of people might thus be placed every day under influences counteracting those with which we desire to contend.⁷⁰

These landscape typologies associated with Olmsted's larger urban scheme are representative of the kinds of environmental modification endorsed throughout his extensive career. The scope and scale of his projects were far-reaching. One Olmsted scholar has documented that after his partnership with Vaux dissolved, he went on to carry out an additional 550 commissions for projects such as Mount Royal Park, Montreal (1874–81); Belle Isle Park, Detroit (1881–84); the U.S. Capitol grounds (1874–91); and Stanford University campus (1886–91), as well as park systems for numerous cities including Buffalo, Boston, Rochester, and Louisville.⁷¹ With Olmsted's extensive work one can chart the application of etiologic ideas, from small designs of neighborhood parks and tree-lined streets, to the larger application of great urban parks and suburbs, to connected greenbelts surrounding cities, all of which provided armature for healthy cities. The significance of his work, though, does not rest simply on the scope of his own professional impact. His successes were not the result of a forceful personality and professional zeal; rather, he succeeded because he was inextricably linked to the prevalent ideas of the day. He spoke a language of landscape and health that provided a foundation for discussion in each urban community in which he was employed. His clients were concerned and active citizens; both parties mutually supported the perspective of an essential environmental connection to health.

69. Frederick Law Olmsted, "Public Parks and the Enlargement of Towns" (1870), in Sutton, *Civilizing American Cities* (n. 66), pp. 52–99, quotation on p. 70.

70. *Ibid.*, p. 72.

71. Charles E. Beveridge, "Frederick Law Olmsted," in *American Landscape Architecture: Designers and Places*, ed. William H. Tishler (Washington, D.C.: Preservation Press, 1989), p. 38.

Conclusion

This research documents a unique period of urban development that owed its very character to contemporary medical theory. Beginning with the formulation of the general understanding of miasma—developed over time, and shared with physicians and laypersons alike through the popular early- to mid-century medical topographies—and the subsequent translation into benign and pathogenic landscape typologies, one can document the growing importance of an environment-based etiology to a resultant urban morphology. Physicians and concerned laypersons became empiricists of the physical landscape and atmosphere in an attempt to better understand issues of health and well-being. Physicians supplied the essential connection for the development of a salubrious landscape by evaluating specific characteristics of air, land, and water that were believed to affect human health; in so doing, they contributed to a general public understanding of the correlation of health and environment.

The impact on the built urban environment and its surroundings cannot be questioned: medical theory, in many ways, directly informed urban design theory. While we have focused on the writings of two well-respected men, we suggest that their belief in an environmental etiology, with its resultant landscape interventions, was neither isolated nor an anomaly across the country. Indeed, the legacy of these public interventions is still very much a part of the American experience of place—from cityscape to suburbia—as the present-day landscape offers evidence of the nineteenth-century search for salubrity.