FEVERISH BODIES, ENLIGHTENED MINDS: YELLOW FEVER AND COMMON-SENSE NATURAL PHILOSOPHY
IN THE EARLY AMERICAN REPUBLIC, 1793-1805

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From 1793 to 1805, yellow fever scourged the major port cities of the United States, devastating inhabitants in a series of terrifying epidemics. In this dissertation, I examine the efforts of a coterie of natural philosophers as they sought to determine the cause of yellow fever, the most pressing and contentious natural philosophical problem of early republican period. It centers on the controversy that developed between “contagionists”—those who believed that yellow fever was a contagious disease and that Americans imported it from the West Indies—and the “localists”—those who held that the disease arose from pestilential miasmas, situated within the afflicted cities. Rather than deterring inquiry, the debate about the cause of yellow fever, no less than the urgency of the disease itself, propelled research forward. Inquiries grew more sophisticated, as the students of the disease incorporated new methods and new knowledge into their studies.

Drawing from private correspondences, books, articles and essays, and above all dozens of cheaply-bound medical pamphlets that circulated through the fever-stricken cities, I reconstruct the ideas and arguments of the investigators. Four, thematically-organized chapters discuss the fever investigators’ uses of “facts,” history, chemistry, and natural theology as ways of making sense of yellow fever. As time wore on, localists steadily pushed the argument in their favor, winning more and more converts to their view, and the contagionists increasingly retired from the debate. I conclude the localist victory rested on defining features of their natural philosophical epistemology, especially the prominence of common-sense reasoning, a product of their deep Protestant pieties, which taught that
human beings possessed innate, divinely-given mental capacities. Without proving that yellow fever arose from miasmas, they did make it appear much more plausible as an element in God’s world.

The localist ascendancy came at a price, however. Years of bitter fighting left investigators divided into rival camps. The breakdown exposed the fragility of common-sense natural philosophy and opened the way for a new era of natural philosophy and medicine.
For Amanda and for my parents
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Introduction:

In the autumn of 1793, a pestilence swept through Philadelphia, the United States’ political capital as well as its center of economic, cultural, and scientific activity. “The destroying scourge crept in among us, and nipped in the bud the fairest blossoms that imagination could form,” Mathew Carey, an Irish émigré printer and bookseller, wrote in his fantastically popular *A Short Account of the Malignant Fever Lately Prevalent in Philadelphia*, published almost immediately after the plague ceased.¹ Doctors quickly identified the disease. Referring to it alternately as the “bilious remitting” fever, the “malignant” fever, or even the “synochus icteroides”—depending on their favorite nosology, or disease classification system—they all nevertheless recognized it by its more colloquial appellation: yellow fever. Indeed, they hardly could have mistaken it.

Yellow fever strikes its victims in two distinct phases. In the first, victims exhibit generalized symptoms, including fever, headache, chills, languor, and perhaps some nausea and vomiting as well. Patients then experience a remission, from which most emerge unscathed and without relapse. Those unlucky enough to experience the second stage can expect an intensification of the fever, delirium, a deep jaundice, which is indicative of liver damage, and, finally, the dreaded “black vomit,” a foul mixture containing partially-digested blood, and an almost sure sign of approaching death. In modern settings, perhaps one in ten victims of yellow fever will die, but in the Philadelphia of 1793, a city of about 50,000 people, that percentage was apparently much higher.² Appearing first in late July, along the crowded and busy wharfs of the commercial center, the fever quickly infiltrated the adjoining neighborhoods, and then the city as a whole. Yellow fever raged for the rest of August, September, and October, until

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finally the scourge ceased with the frosts of the approaching winter. All told, the yellow fever epidemic of 1793 carried off as many as 5,000 lives in the short span of three months.

The story of Philadelphia’s great plague has been told many times before. In 1949, John Harvey Powell offered his grand, and still unparalleled, narrative of the epidemic, *Bring out Your Dead: The Great Plague of Yellow Fever in Philadelphia in 1793*. Since then, numerous historians have used the Philadelphia epidemic as the setting for their studies about pertinent themes in the early history of the United States, including race, politics, and commerce. The plague has also become a staple in histories of medicine and medical practice in the early republic. By contrast, only few historians have highlighted the fact that yellow fever did not disappear in 1793, but returned again and again, not only in Philadelphia, but in New York, Baltimore, Boston, and in other smaller cities and towns all along the eastern seaboard. And so, in the history of the early republic, yellow fever exists as a curiosity, always in the background of important events (except for a few months in 1793), and certainly in the backs of the minds of key figures.

Though ignored or overlooked by most historians of the era, yellow fever constituted the most pressing natural philosophical problem of the early national period. From 1793 to 1805, yellow fever

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3. For details of the plague, see Carey, *A Short Account of the Malignant Fever*, passim. Historians have disagreed about the number of people who died. Carey, 112-116, compiled a list of church burials, 4,042 in all. His total does not account for the dozens of people buried outside of church grounds, like the hundreds deposited in the city’s potter’s field, a burial place for the unclaimed. Eve Kornfeld, “Crisis in the Capital: The Cultural Significance of Philadelphia’s Great Yellow Fever Epidemic,” *Pennsylvania History* 3 (1984), 189, puts the number at 5,000.


returned to the United States every year, killing hundreds, sometimes thousands, with each visitation. It struck Philadelphia in 1793 (almost 5,000 dead), 1797 (about 1,500 dead), 1798 (3,645 dead), 1799 (about 1,000 dead), and then less severely in 1802, 1803, and 1805; New York hosted yellow fever almost every year from 1795-1805, with major epidemics in 1795 (800 dead), 1798 (2,080 dead), and 1803 (about 700 dead); Baltimore experienced a major epidemic in 1800 (1197 dead), and it, along with Boston, Charleston, and New Orleans hosted several relatively minor epidemics, which each nevertheless resulted in dozens, sometimes hundreds, of deaths.  

But, while shocking, it was not the sheer numbers of deaths alone that grieved early republicans. At a time when anxiety about the future of the new nation was high, yellow fever troubled Americans because it spread discord, and discord in the body politic threatened death to the republic. Annual visitations from yellow fever halted commerce in the nation’s busiest port cities for many months at a time; burdensome quarantine regulations further disrupted trade. Periodic outbreaks also interfered with the workings of the national government, forcing the president and Congress to evacuate the capital in Philadelphia on multiple occasions. Tumult extended to the people of the cities too. Each year during the sultry days of summer and autumn thousands of the “better sorts” left the cities. Their departure not only interfered with the normal operations of the cities, it also fostered resentment amongst lower classes, whose impoverishment all but forced them to remain in the diseased environments. More ominously still, yellow fever epidemics eroded public virtue, the very cornerstone of a prosperous republic. Carey’s *Short Account* provided dramatic testimony to the breakdown of morality. “Who, without horror,” he wrote, “can reflect on a husband deserting his wife.”

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8 Sean P. Taylor provides some sense of the problem as the “lower sorts” imagined it in his dissertation, “‘We Live in the Midst of Death’: Yellow Fever, Moral Economy and the Lower Sorts in Philadelphia, 1793-1805” (PhD diss., Northern Illinois University, 2002).
9 The literature on the relationship between virtue and republicanism is vast. For a good start, see Drew McCoy, *The Elusive Republic: Political Economy in Jeffersonian America* (New York: Norton, 1982).
. . a wife unfeelingly abandoning her husband on his death bed—parents forsaking their only children without remorse—children ungratefully flying from their parents, often without an enquiry after their health or safety?” To Carey, such scenes seemed “to indicate a total dissolution of the bonds of society in the nearest and dearest connexions.”

The crisis of yellow fever appeared to involve the very fate of the republic. Repeated occurrences aroused fears that the disease would never cease and that decay would inevitably follow. In a memorial published by the College of Physicians of Philadelphia in 1798, after a particularly devastating round of epidemics, College members warned that if appropriate health laws were not erected, “Our sea-port towns may soon become uninhabitable.”

In his doctoral dissertation for the University of Pennsylvania, published just after epidemics had killed 700 people in New York and more than 200 in Philadelphia, Stubbins Ffirth predicted direly that, if left unchecked, yellow fever would “occasion . . . the loss of our commerce by shutting all foreign ports against our vessels, and of course the annihilation of our agriculture, our manufactures, and the down fall of the fair superstructure of science and of liberty.” Though yellow fever—“the scourge of our cities, the terror of our neighbors, the destruction of our friends,” as he described it—would never deplete the cities of their inhabitants, it might very well ruin the commercial reputation of the United States and undermine its vitality.

With so much at stake, the country’s leading medical and scientific thinkers directed their inquiring minds towards one deceptively simple, yet incredibly important question—what caused yellow fever? Understanding the cause of yellow fever, after all, indicated the means of its prevention, and ultimately its elimination from American territories. The intellectual ferment began almost immediately. Within weeks of the termination of the first major epidemic in Philadelphia in 1793, doctors and other

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10 Carey, A Short Account of the Malignant Fever, 30-31.
learned inquirers, such as Benjamin Rush and William Currie, published the first essays on the cause and nature of the fever. Thereafter, treatises poured from the presses. The people who studied the cause of yellow fever—the “investigators,” as I will call them—shared defining characteristics of the American Enlightenment, with its basis in Scottish thought.¹³ The investigators were all men, they all enjoyed at least a modicum of leisure and wealth, and they were usually, though not always, trained physicians. The cause of yellow fever, after all, did not fall under the purview of doctors alone.¹⁴ The investigators would more properly be considered natural philosophers, gentlemen-scholars, or enlightened philosophes, who were used to applying their minds to various types of philosophical problems, natural or otherwise. Noah Webster, the Federalist newspaperman and future lexicographer, expressed it best in the introduction to his massive history of diseases, a work intended to demonstrate the cause of yellow fever from a careful consideration of past epidemics—“I considered and still consider the question as resting principally on fact, and not on medical skill; therefore proper to be investigated and discussed by any man who has leisure and means, as well as by physicians.”¹⁵

The investigators also shared philosophical, epistemological, and theological understandings of the world, formed through their common involvements with two institutions, university and church.¹⁶

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¹³ Historians have alternately celebrated and lamented the proliferation of “enlightenments.” For Dorinda Outram, for example, the multiplicity of regional enlightenments has “made it impossible any longer to see the Enlightenment as a unified phenomenon.” Dorinda Outram, The Enlightenment, 2nd ed. (New York: Cambridge University Press, 2005), 4. Viewed not as a “fixed body of doctrine,” but rather a “set of general values,” the concept still holds. Richard Sher, The Enlightenment and the Book: Scottish Authors and Their Publishers in Eighteenth-Century Britain, Ireland, and America (Chicago: University of Chicago Press, 2006), quote from 16. The most complete work on the American version is Henry May, The Enlightenment in America (New York: Oxford University Press, 1976).

¹⁴ Doctors only made up the majority of the investigators because they habitually thought about disease, and because of the structure of eighteenth- and early-nineteenth-century education. In an age of dawning scientific professionalization, when disciplinary boundaries blended into one another, and when whole disciplines such as biology were only beginning to emerge, medical education still proved the best of way of attaining a broad familiarity with the natural sciences. Richard Yeo, “Classifying the Sciences,” in The Cambridge History of Science: Eighteenth-Century Science, ed. Roy Porter (New York: Cambridge University Press, 2003), 241-266.

¹⁵ Noah Webster, Brief History of Epidemic and Pestilential Diseases (Hartford: Hudson and Goodwin, 1799), viii.

¹⁶ On the agreement between science and religion in the colonial and early republican periods, see Nina Reid-Maroney, Philadelphia’s Enlightenment, 1740-1800: Kingdom of Christ, Empire of Reason (Westport: Greenwood, 2001); Mark Noll, Princeton and the Republic, 1768-1822: the Search for a Christian Enlightenment in the Era of
Whether educated at the University of Edinburgh, home of the finest medical school in the English-speaking world, or at one the domestic schools modeled after it, Americans had fully embraced the prevailing epistemological precepts of the latest natural philosophy, here defined simply as inquiry into natural phenomena. Knowledge of nature was to be pieced together through the slow accumulation of empirical facts, not arrived at through mental abstraction or pure thought. Philosophers were to be men of the world—they were to examine its phenomena, weigh it, measure it, observe it, and reserve judgment until they had patiently gathered enough data from which to draw accurate conclusions. Yet, as devout Protestants of various denominations, the American investigators also saw the natural world, its laws and its wonders, as the very evidence of God’s design, a design which of course extended to his favorite creatures, human beings. Accordingly, the American philosophes, like the Scots from whom they borrowed the concept, also believed in a guiding principle, an innate, divine rational capacity, which they termed common sense. Common sense not only enabled humans to discern right from wrong behavior (it is often referred to as “moral sense”), it also allowed them to discern truth from falsehood in philosophy. It would exert formative influence over the course of the yellow fever debate.

But, despite the broad similarity of the investigators, from the very beginning, the study of the disease was riven with controversy and conflict, for researchers could not agree on the cause of yellow fever. Yellow fever did not resemble the other epidemic diseases with which Americans had grown familiar. It exhibited odd behaviors that baffled those who tried to understand it. The disease prevailed only in the confines of populous cities. It raged only in the hot and wet periods of summer and autumn, and it struck with apparent discrimination—it afflicted some with particular severity, while others escaped almost entirely. The students of yellow fever immediately split into two schools of thought respecting the origin of the distemper. One group, the “contagionists,” held that it was a contagious

disease and that Americans had imported it from the West Indies. The disease did prevail in the Caribbean and the appearance of yellow fever in American cities was always preceded by the arrival of infected ships. As a corrective, contagionists advocated stern quarantine regulations, which would cut off the avenues through which yellow fever infiltrated the sea ports. For the other group, the “miasmatists” or “localists,” the environmental specificity of the illness proved too compelling—they proposed, to the contrary, that yellow fever grew out of local, or domestic sources, and that people could only catch the disease from exposure to those sources. They pushed for sanitation laws and encouraged greater environmental vigilance.

Rather than deterring inquiry, the seeming intractability of the debate over the cause of yellow fever, no less than the urgency of the disease itself, propelled research forward. Inquiries grew more sophisticated, as the students of the disease incorporated new methods and new knowledge into their researches. Investigators reached out to little-explored areas of disease inquiry, such as history, chemistry, and natural theology in order to determine the origins of the mysterious disease. The very inscrutability of yellow fever, in short, plunged inquirers deeper and deeper into their own intellectual worlds. By the time yellow fever ceased to afflict the major seaports of the United States and the importance of its study gradually faded, the investigators had produced a substantial, diverse, and creative body of work about yellow fever and disease in general. Moreover, towards the end of epidemic period, something fairly remarkable and surprising had happened. The contagionists had almost all either converted or retired from view, and a consensus had emerged around the domestic theory of yellow fever’s origin.

“Feverish Bodies, Enlightened Minds” examines the intellectual ferment of the epidemic period, 1793-1805. It reconstructs the various ideas and arguments of the investigators from available primary source material—private correspondences; books, such as Noah Webster’s Brief History of Epidemic and
Pestilential Diseases; articles and essays, most notably those found in the Medical Repository, a journal created in 1797 as a conduit for fever discourse; and especially the dozens of medical treatises, cheaply-bound pamphlets of varying lengths, published privately by investigators, and addressed to question of yellow fever’s origin. It also deals with the investigators themselves, with the aim of discerning the personal, historical, and philosophical factors that impelled them to embrace the points-of-view they did. Finally, this dissertation attempts to evaluate the historical significance of the yellow fever debate—its effects on the investigators and its lasting influence on the practice of science and medicine in the United States. Perhaps above all, I want to understand why the majority of fever investigators came to embrace miasmatism.

We should, though, remind ourselves that while the localists effectively won the debate in their own time, they did not determine the true cause of yellow fever. That feat would come about a hundred years later, when the United States Army Yellow Fever Commission led by Walter Reed, investigating the theory of the Cuban doctor, Carlos Finlay, performed the experiments that convincingly implicated the Aedes aegypti mosquito as the vector of yellow fever. Another quarter century later, researchers located the virus responsible for the disease.17 Both originated in Africa thousands of years ago, and were subsequently introduced to the New World as part of the Columbian Exchange, probably for the first time in the seventeenth century. A finicky animal, the Aedes aegypti prefers to breed in small artificial containers of water, such as those in cities, and it dies when the temperature drops below 6˚C (about 43˚F). That is why the disease only struck in the warm and humid months of the late summer and fall. Unable to survive the frigid winters of the urban northeast and mid-Atlantic, the mosquitoes, along with the virus, had to be imported each year that yellow fever struck.18 From 1793 to 1805,

18 For the history and nature of the yellow fever virus and Aedes Aegypti mosquitoes, see Jean Slosek, “Aedes Aegypti Mosquitoes in the Americas: A Review of Their Interactions with the Human Population,” Social Science
warfare in the West Indies provided the necessary epidemiological ingredients for an explosion of yellow fever. By prompting the introduction of thousands of non-immune soldiers, the Haitian Revolution ensured that the female *Aedes aegypti* mosquitoes had plenty of persons upon whom to feed and infect with the yellow fever virus. With the vector and virus flourishing in the martial environment, soldiers, traders, and refugees very easily carried them to the United States, only a short distance away.19

All this begs the question: if the investigators failed to determine the true cause of yellow fever, and if they only supported theories that are now dead and almost entirely forgotten, why study their efforts? For generations, historians had no good answers to this question, and so they concentrated on projects more amenable to their overarching interest, the search for progress. As such, they either focused on the institutional development of medicine—the rise of the self-conscious medical profession, the development of medical licensing laws, and the growth of hospitals—or the advent of more accurate, more “scientific” ways of understanding sickness and health. Seldom did these pursuits lead them much further back than the nineteenth century, when a new brand of medicine, centered on the clinical observation of hospital-bound patients, coupled with autopsy, revolutionized the art of medical care, and when the laboratory work of scientists such as Louis Pasteur and Thomas Koch disclosed the micro-parasitic causes of infectious diseases.20 Even the exemplary study by Charles Rosenberg, *Cholera Years*, which established a new standard of excellence for historical studies of disease, displayed the same preoccupation with progress. Rosenberg charted the evolution of more scientific ways of

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20 As to the former of these developments, the rise of the “anatomico-clinical” method, especially as it emerged from the Paris Clinic, the classic account is Erwin Ackerknecht, *Medicine at the Paris Hospital, 1794-1848* (Baltimore: Johns Hopkins University Press, 1967); even Michel Foucault finds the origins of modern medicine—especially its panoptical clinical gaze—in the Paris School. See Foucault, *The Birth of the Clinic: An Archaeology of Medical Perception*, trans. A.M. Sheridan Smith (New York: Pantheon Books, 1973). For the latter developments, the rise of microbiology in disease studies, see Nancy Tomes, *The Gospel of Germs: Men, Women, and the Microbe in American Life* (Cambridge: Harvard University Press, 1998).
understanding cholera over the course of three epidemics, spanning about forty years in nineteenth-century America.\(^{21}\)

Over the past several decades, however, historians of science and medicine have exposed alternatives to the crude narrative of progress. Since the publication of Thomas Kuhn’s groundbreaking book, *The Structure of Scientific Revolutions* (1962), it has become axiomatic to claim that science does not proceed through the uninterrupted accumulation of knowledge, but that historically-situated figures “construct” scientific ideas from a combination of factors. As Kuhn himself very ably wrote of the matter, “An apparently arbitrary element, compounded of personal and historical accident, is always a formative ingredient of the beliefs espoused by a given scientific community at a given time.”\(^{22}\) Beginning in earnest in 1980s, historians of science embracing “constructivism” (to borrow Jan Golinski’s term for the broad movement that started with Kuhn) started to produce excellent studies that established the centrality of historical contexts in the making of natural knowledge, while also effectively banishing the ghost of the teleology of progress.\(^{23}\) The approaches of constructivism have also penetrated the history of the United States, albeit far more slowly and selectively than in European history. The nineteenth century still dominates most studies in the histories of medicine and disease in particular.\(^{24}\) On the other hand, historians of American science have shown much more interest in the


eighteenth century and early republic. Recent works such as James Delbourgo’s *A Most Amazing Scene of Wonders* and Andrew Lewis’ *A Democracy of Facts* have expertly shown how natural philosophic ideas entered and impacted the early republic, while also revealing how changes in the structure and practice of natural philosophy reflected changes in American society.\(^{25}\)

At the simplest level, this dissertation offers a treatment of the intellectual ferment of the yellow fever years on its own terms. The search for the cause of yellow fever offers a poignant example of the construction of natural knowledge, and at a time and place still little studied by historians of science, medicine, and disease. “Feverish Bodies, Enlightened Minds” opens a window onto views of nature and disease that have since been discarded by newer perspectives, and it tries show why they looked so compelling to the people who saw them.\(^{26}\) In doing so, it also exposes the investigators’ wider beliefs and assumptions about the natural world and the proper means of investigating it. It will, in other words, help to explain what “apparently arbitrary element” shaped the yellow fever ferment, and why investigators, initially divided, came overwhelmingly to accept localism (despite its being, from a modern perspective, incorrect).\(^{27}\)

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In the following pages, I will argue that the content of yellow fever ferment, as well as the undisputed success of localism, grew from and were dependent on the essential tension between the investigators’ commitments to common-sense rationalism (which itself was expressive of their religious tendencies) and their simultaneous devotion to what we now call a scientific epistemology, with its emphasis on empiricism and inductivism. Indeed, this uneasy alliance (though they never imagined it as such) was itself a unique construct, a negotiation, between ways of looking at the world that were growing apart by the late-eighteenth century, but had not quite separated. To claim that these worldviews were religion and science might be putting it too simply. They were, rather, ways of knowing, epistemologies. One of them urged philosophers to regard themselves as children, and to form no ideas of truth that did not descend from phenomena immediately before them. The other taught that God’s purpose pervaded everything, including the human intellect in the form of common sense, and that truth emerged from a reasoned consideration of His will. Together, these epistemologies combined in the view that the natural philosopher must use empirical evidence and inductive reasoning to construct ideas and theories about natural phenomena, but that their ultimate truth rested with their plausibility as common-sense elements in God’s world, a world which they already believed they understood. In test after test, through multiple areas of study, localists steadily triumphed over the contagionists because they better assembled the facts of yellow fever into plausible theories about its origins from local miasmas.

Beyond explaining the localist victory, I would also like to illustrate how the problem of yellow fever took on additional meanings in the ideologically charged atmosphere of the early republic. As the fledgling American republic struggled to set itself on a virtuous and prosperous path, as the supposed excesses of deist-conspirators sank France into misery and despair (and threatened to do the same elsewhere), as the “black Jacobins” in St. Domingue raged against their former oppressors, and, of

Milwaukee and the The Politics of Health Reform (Princeton: Princeton University Press, 1982). I take up the consideration of this historiographic tradition at greater length in the Epilogue.
course, as yellow fever erupted in the American port cities, the very tools and perspectives that the investigators and others used to discover truth became motives for action, and thus matters worth fighting for. In their tumultuous world, the fever investigators, pious Christians and scientifically-minded natural philosophers, struggled not merely to determine the cause of yellow fever, but to secure the supremacy of a certain way of attaining truth, which accorded well with religion and science. We can see these concerns reflected, if only dimly at times, in the yellow fever debate.

Structurally, “Feverish Bodies, Enlightened Minds” proceeds thematically. The bulk of the dissertation examines the content of early-republican yellow fever discourse, with individual chapters that address specific areas of disease inquiry. Chapter Two discusses the investigators’ uses of historical sources, as well as their compositions of disease histories, as a way of evaluating the patterns through which diseases such as yellow fever normally operated, and therefore shedding light on the origins of the yellow fever epidemics. In particular, it follows the efforts of the localist Noah Webster and the contagionist James Tytler, both of whom composed massive histories of disease in the late 1790s, though with far different results. Chapter Three follows the investigators’ appropriation of Antoine Laurent Lavoisier’s groundbreaking discoveries in chemistry, collectively dubbed the “Chemical Revolution,” in order to apprehend the chemical construction of the invisible particles that caused yellow fever. It traces the tentacles of Lavoisian chemistry in the United States, and its rather peculiar reception by American fever investigators, especially Samuel Latham Mitchill, Felix Pascalis Ouvière, and Isaac Cathrall, among others. Chapter Four deals more directly with the investigators’ religious understandings of yellow fever. Turning to natural theology, investigators such as Benjamin Rush, Mitchill, and Webster sought to reconcile their picture of yellow fever’s cause with divine purpose, as seen through the evidence of design. In each area of inquiry—historical, chemical, and theological—the localists’ arguments tipped the balance in their favor. Finally, Chapter Five considers the effects of the debate. However pleasing in the short term, localist supremacy did not come without its share of tragic
irony. Imbued with the utmost faith in the accuracy of their theories, constructive dialogue among investigators gave way before mutual accusations of conspiracy. Investigators would sooner believe that their opponents were wickedly deluded than they would question the infallibility of common sense, the divine gift of reason, which purported to establish truth based on plausibility, and which valorized intuition over impersonal proofs. The breakdown thus exposed a fatal flaw in common-sense natural philosophy and opened the way for a new phase of medicine and disease inquiry, which would come to dominate in the nineteenth century.

First, we will go back to 1793, when yellow fever first appeared in the United States, and to the years immediately following, as the problem of yellow fever took shape.
Chapter 1: Contexts and Causes

We [doctors] are employed in . . . a necessary calling that enforces to us the weakness and mortality of human nature. This earthly frame, a minute fabric, a center of wonders, is forever subject to Diseases and Death. The very air we breathe too often proves noxious, our food often is armed with poison, the very elements conspire the ruin of our constitutions, and Death forever lies lurking to deceive us.¹

--Benjamin Rush, 1761

What caused yellow fever? The question was on most everyone’s mind in the United States’ capital in the winter of 1793, as legions of Philadelphians, some twenty thousand in all, trudged back into the city they had abandoned only months before. Those seeking answers would have found them, lots of them; indeed, more than they would have liked. People were talking and the newspapers were all abuzz with word of the disease. According to Mathew Carey, “almost all” Philadelphians believed that the disease had been imported, probably along with the two thousand French-speaking refugees from St. Domingue, who had arrived in the ports of Philadelphia earlier that summer, some of them allegedly infected with yellow fever.² Others pointed their fingers at the conditions of the city, at the stinking cesspools, the decaying animal carcasses, rotten vegetables, and stagnant pools of water that bred pestilential miasma. A pseudonymous writer for John Fenno’s Gazette of the United States, masquerading as William Penn, the founder of Philadelphia writing from the “Elysian fields,” chided his contemporaries for straying from his plan for the city. “It was my intention in laying the plan of Philadelphia,” the ghost of Penn wrote, “to provide for the health as well as the beauty and conveniency of the place.” The author, evidently a localist, blamed city-dwellers for cutting down trees, narrowing

the streets, and building where they should not. “Had you preserved my plan,” the imposter informed his readers, “you might have avoided the mischief which has now befallen you.” As Philadelphians moved forward toward recovery, they would need firm answers about the cause of yellow fever. Who would be there to give them?

To allay public concern, and of course to prevent the return of yellow fever, those learned in natural philosophy and medicine set out to solve the puzzle. Appropriately enough, it was Benjamin Rush who opened the commentary. The forty-eight-year-old Professor of the Theory and Practice of Medicine at the University of Pennsylvania was one of the foremost physicians in the United States, and an established figure in the nation’s intellectual life. Born in Byberry, Pennsylvania on Christmas Eve 1745, Rush studied medicine at the University of Edinburgh under the illustrious William Cullen. Once back in Philadelphia, Rush took the Professorship of Chemistry at the College of Philadelphia, and he joined the American Philosophical Society. He later served in the Continental Congress and signed the Declaration of Independence. Rush labored hard to improve the medical and scientific reputation of Philadelphia, which he once hopefully deemed the “Edinburgh of America.” To that end, he helped form the College of Physicians of Philadelphia in 1789. A fierce Protestant, full of evangelical fervor, Rush also championed numerous causes—he campaigned for temperance, wrote essays against slavery, pushed for prison reform and women’s rights, and, of course, argued for municipal sanitary reform. Rush was a man of ceaseless energy and impeccable credentials.

No one, therefore, would have been surprised when, in early December, Rush’s localist manifesto, An Enquiry into the Origin of the Late Epidemic Fever in Philadelphia, began appearing at the city’s numerous bookshops. But, however erudite, however well-respected and authoritative, Rush

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3 Gazette of the United States, December 11, 1793.
4 Rush to John Morgan, Nov. 16, 1766, in The Letters of Benjamin Rush, I:26. Morgan had only just founded the College of Philadelphia’s medical school.
5 Biographical information about appears in many sources. For a good, detailed start, see Nathan G. Goodman, Benjamin Rush: Physician and Citizen, 1746-1813 (Philadelphia: University of Pennsylvania Press, 1934), 1-42
immediately encountered opposition. Late in 1793, William Currie published *An Impartial Review of that Part of Dr. Rush’s Late Publication . . . Which Treats of the Origin of the Disease*, a pointed rebuttal of Rush’s first treatise. Currie and Rush actually had much in common—like Rush, Currie studied medicine with Dr. Cullen at the University of Edinburgh, he belonged to the American Philosophical Society, and he had helped to create the College of Physicians. He was also a native of Pennsylvania and an Episcopalian (his father had been an Episcopal clergyman). Currie, however, disagreed vehemently with Rush over the cause of yellow fever. The rivalry that emerged in the aftermath of the first epidemic lasted for the rest of the epidemic period. And so, in the spring of 1794, when Rush published his second treatise, *An Account of the Bilious Remitting Yellow Fever, as it Appeared in Philadelphia, in the Year 1793* (a far lengthier effort, in which he argued strenuously for the local origins of the past epidemic), Currie immediately followed with his own a full-length work, *A Treatise on the Synochus Icteroides, or Yellow Fever*. By that time, too, several others had joined the conversation. In their own treatises, Jean Devèze, an emigrant doctor from St. Domingue, and David de Isaac Cohen Nassy, a doctor and member of the American Philosophical Society, sided with the localists. On the other side, Dr. John Beale Bordley Jr., the scion of a wealthy Maryland family, and Isaac Cathrall decided on importation. Even the printer and bookseller, Mathew Carey, entered the fray with a short contagionist piece.

The first major epidemic in New York in 1795, which killed almost a thousand people out of around 40,000, elicited a similar response. In New York, Dr. Valentine Seamen, a member of the city’s Health Committee, and Dr. Richard Bayley, then professor of anatomy and surgery at Columbia College, championed the localist perspective in separate essays. Alexander Hosack added to the ferment with a treatise on the contagionist cause; so did Samuel Bard, though his work has been lost. The 1795 epidemic also attracted the attention of Noah Webster, editor of the *American Minerva*, a newspaper

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organ of the federalist creed (and still years from his much more famous work as a lexicographer), who compiled essays from the localists, Elihu Hubbard Smith and Dr. Samuel Latham Mitchill, Professor of Chemistry at Columbia College, as well as the contagionist, Dr. Eneas Monson. Meanwhile, the return of yellow fever to Baltimore in 1795 brought in commentators such as Joseph Mackrill, John Davidge, and an anonymous writer, identified only as a “Gentleman of the Faculty.” Likewise, in Charleston, the return of yellow fever aroused the alarm of its leading intellectuals, such as George Carter and David Ramsay, better known for his historical works than for any of his medical views.

Yet, as the winter of 1796-97 settled over the eastern seaboard, the investigators were no closer to ascertaining the true cause of yellow fever than when they started three winters before. Localists and contagionists still vied for recognition as the purveyors of the authoritative explanation for the cause of yellow fever. How did this happen? The question has been answered before, though never satisfactorily. Most historians have answered that the investigators’ choices of causal explanations, and the subsequent appearance of controversy, reflected their predetermined commitments to one explanation or the other. John Harvey Powell, author of the preeminent book on the 1793 epidemic, explained the nascent controversy over the cause of yellow fever as an inevitability—“It was more than normal, it was inevitable, that such men should disagree,” he claimed, for they had placed theory before fact. Similarly, in a celebrated essay, Martin Pernick marshaled evidence to show that the investigator’s theoretical choices reflected their political attachments—localists were republicans and

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8 Joseph Mackrill, The History of the yellow fever, with the most successful method of treatment (Baltimore: John Hayes, 1796); Gentlemen of the Faculty, Observations on Doctor Mackrill’s History of the Yellow Fever (Baltimore: John Hayes, 1796); John Beale Davidge, A Treatise on the Autumnal Endemical Epidemic of Tropical Climates, Vulgarly Called the Yellow Fever, Containing its Origin, History, Nature, and Cure (Baltimore: W. Pechin, 1798).


10 Powell, Bring Out Your Dead, 36.
contagionists federalists, he argued.11 Their interpretations reflected historians’ condescension towards the medicine of the eighteenth century, whose seeming backwardness could only be explained by citing the essentially irrational commitments of its practitioners. The eighteenth century was a century of “sects,” as William Rothstein tells us, which had to give way before real “science” could take over.12

Of course, no such “sects” ever existed. Political leanings did not determine one’s choice of causal theory—disease inquirers routinely appealed to both localism and contagionism to explain different diseases. Furthermore, in 1793 it had been than thirty years since any of the major port cities in the North America suffered a yellow fever visitation. Far from having entrenched opinions about the origin of the fever, most had no opinions at all. Indeed, like Rush and Currie, the investigators shared much more in common than their differences over the cause of yellow fever might suggest. Curious and cosmopolitan, pious and enlightened, the fever investigators took pride in their scientific perspectives on nature, and they all harbored special animosity for theoretical abstractions and pre-determined opinions.

The present chapter examines the investigators’ initial forays into yellow fever, beginning with a look at the historical lineages of contagionism and localism. The bulk of the chapter focuses on the relative impacts of scientific epistemology, evidenced by an eagerness for the facts of each epidemic occurrence, and common-sense reasoning, which told the investigators that they would find the cause of yellow fever and that it would appear as a consistent element in a harmonious and intelligible natural world. Far from resolving the conflict over the cause of yellow fever, the combination of scientific epistemology and common-sense philosophy—the twin pillars of natural philosophy in the early

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republic—uniquely created it. The facts only really supplied both sides with compelling evidence and arguments. Common sense, on the other hand, exacerbated the crisis of yellow fever, for by equating the inability to understand yellow fever with the inability to understand God’s design, common sense transformed a purely natural philosophical problem into a dire threat to the very integrity of their science. In some sense, then, the chapter ends with a beginning. After the first few years of inquiry, the investigators remained evenly divided between localism and contagionism, but they had exposed the major philosophical flaws in their opponents’ arguments that would drive debate forward, and lead ultimately to the triumph of the localists.

At the end of the eighteenth century, medical thinkers everywhere in the Western world accepted two models of disease transmission. We know these already as the localist and contagionist models. Both had ancient lineages, though contagionism most certainly predated its counterpart. Some indications suggest that the concept of contagion has no distinct theoretical origin, but that it evolved naturally from the human fear of sick people. In his chapter on the “Primitive Concepts of Contagion,” Winslow marshals evidence from ethnographic fieldwork and early historical texts, including the Bible, to argue that people predictably envision disease as an entity that can be caught from others. In other words, when humans notice that one person with disease often turns into many people with disease, they are inclined to think that something has passed between them. He makes his case by highlighting the prominence of practices of quarantine and the isolation of sick people, even in people remote in space and time. In the Bible, the removal of infected people, notably lepers, was even codified into law. By the Athenian golden age of the fifth century BC, elements of the Greek populace had certainly embraced theories of contagion. Thucydides, in writing about the plague that afflicted the Athenians during the

Peloponnesian War, tells us that many citizens thought that the disease originated in Ethiopia and then spread to areas in Greece.\textsuperscript{14}

Vague concepts of contagion persisted into the sixteenth century, until the seminal work of the Veronese humanist scholar, Girolamo Fracastoro (1478-1553). Fracastoro specifically took issue with the ambiguity of his predecessors—they had postulated contagion, he thought, without really considering what it meant. In his famous book, \textit{De Contagione et Contagiosis Morbis et Eorum Curatione} (1546), he set about to correct these problems. Fracastoro depicted contagions as specific types of “imperceptible particles,” or \textit{seminaria}, which began in one body and then spread to other bodies. The infected body produced identical \textit{seminaria}, which could be transmitted to others. The \textit{seminaria} possessed specific, unchanging natures and they could be reproduced infinitely, so long as they came into contact with bodies conducive to them. Fracastoro further specified that some particles spread only through direct contact between bodies, while others could survive for long periods of time without a host.\textsuperscript{15} \textit{De Contagione} also had its limitations. Crucially, for example, Fracastoro did not know what produced the \textit{seminaria}, though he hypothesized that they might originate in the body or in the outside world as a result of unfavorable planetary alignments.

The fever investigators essentially borrowed from the tradition established by Fracastoro, imagining the material cause of yellow fever as a specific, though invisible, particle of some sort. As Professor Richard Bayley wrote in 1796, “By contagion we understand something peculiar and specific, possessing properties essentially different from anything else.”\textsuperscript{16} Isaac Cathrall further specified three ways through which these “peculiar” and “specific” particles infected hitherto healthy individuals: first, through “immediate contact with the patient’s body”; second, through “the matter of contagion arising from the morbid body impregnating the atmosphere of the chamber, and being applied to susceptible

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\textsuperscript{14} Thucydides, \textit{The History of the Peloponnesian War}, Book II: 48.
\textsuperscript{15} Winslow, \textit{Conquest of Epidemic Disease}, 131-136.
\textsuperscript{16} Richard Bayley, \textit{An Account of the Epidemic Fever Which Prevailed in the City of New York}, 38.
\end{flushleft}
constitutions”; and last, from “substances which had imbibed the matter of contagion” and had “the power of retaining and communicating it in an active state, such as woollens, furs, &c.” Cathrall himself likened the contagion of yellow fever to the contagion of the much-better understood smallpox, a baneful disease in the eighteenth century. Long experience with smallpox had shown unmistakably that it operated through contagion. American doctors even practiced variolation—the process through which a piece of the scab of smallpox pustule was inserted subcutaneously in a healthy person so as to induce a mild form of the illness and bestow lifelong immunity—clearly indicating their knowledge of its contagiousness. No one, not even the most ardent localist when it came to yellow fever, doubted that smallpox was contagious.

Unlike contagionism, localism can be traced back to a discernible point in history—not surprisingly, the fifth century BC, and the Hippocratic corpus. Like contagionism, however, localism grew from observations about the patterns of certain diseases. Hippocratic authors acknowledged the presence of a class of diseases, known as fevers, which were not manifestly contagious, but which spread to humans via environmental corruptions, or miasmas, the Greek word for “impurity.” Undoubtedly, they were referring to malaria, an endemic disease long present in Greece, which is caused by any of a number of protozoa, called plasmodia, and spread through the bites of female mosquitoes of the genus *Anopheles*. Since *Anopheles* mosquitoes prevail in specific environmental conditions, hot and wet areas, the fevers they transmitted appeared to have been caused by those conditions.

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19 As an example, Rush admitted the contagiousness of smallpox throughout his life. See Rush, *Observations upon the Origin of the Malignant Bilious, or Yellow Fever in Philadelphia*, (Philadelphia: Budd and Bartram, 1799), 11-12.
In North America, too, localism, or miasmatism, appealed to the scores of doctors who confronted the deadly ravages of malarial “fevers.” Known to Americans as the “bilious,” “remitting,” “intermitting”, or “autumnal” fevers, the \textit{falciparum} and \textit{vivax} varieties of the malaria plasmodia, along with its insect vector, \textit{Anopheles quadrimaculatus}, imposed a harsh reign over the Low Country of the American South. Malaria also struck farther north, in and around cities such as Philadelphia and New York, where it was known as the “autumnal” fever, for its tendency to prevail during the hot, rainy time of year.\textsuperscript{21} Given its environmental specificity, however, everyone agreed that these “fevers” were caused by miasmas. In his health manual for inhabitants of the malarial Low Country, the South Carolinian David Ramsay claimed that the seasonal fevers arose “from the separate or combined influence of heat, moisture, and marsh miasmata.”\textsuperscript{22} Even William Currie, probably the most energetic advocate of the contagiousness of yellow fever during the epidemic period, wrote a small treatise in 1789, in which he clearly acknowledged the local origins of Philadelphia’s “autumnal” fevers.\textsuperscript{23}

The American yellow fever investigators believed miasmas to be composed of countless particles of matter, which emitted from decaying or putrid substances—such as rotting carcasses or the fetid matter in swamps and stagnant waters—and then hovered in the air in the same way that dust or pollen might. Localists often likened miasmas to odors—describing them, for example, as “putrid” or “noxious” “effluvia” or “exhalations”—which also were believed to be composed of the constitutive elements of the matter from which they came. Thus, the characteristic smell of, say, wood came from


\textsuperscript{23} This was William Currie, \textit{A Dissertation on the Autumnal Remitting Fever} (Philadelphia: Printed by Peter Stewart, 1789). By one of those funny twists, Currie actually dedicated the treatise to Benjamin Rush, who was to become his rival during the yellow fever years, noting that it was a “testimony of the very exalted Opinion which the Author entertains, of his [Rush’s] amiable and engaging Manners as a Gentleman, and of his distinguished Abilities in the Several Departments of Science, and especially in that of Medicine.”
small, nearly invisible, or slightly visible pieces of wood floating in the vicinity. In one curious instance, a localist writer even tried to use the alleged malodorousness of yellow fever to prove that it originated from miasma. The author, identified only as “F. O. P.,” claimed to have met a foreign man, long resident in the West Indies, who “was endowed with a particular degree of acuteness in his olfactory organs.” Whenever this foreign gentleman (also left unnamed) entered the city of Philadelphia, he could smell something “disagreeable” about its atmosphere. From this F. O. P. concluded that the disease arose from local circumstances, for, he asserted, it would be “impossible that an imported disorder could contaminate the whole atmosphere during three months.” The story is a unique one—most did not believe that yellow fever actually had an odor—but it does show how early-national natural philosophers conceived of material construction of miasmas.

Localism and contagionism offered early republicans compelling models with which to consider the origins of new and unfamiliar diseases such as yellow fever. Both held that small pieces of noxious material entered the fragile, temperamental human body, inducing states of disease. Moreover, both applied to certain types of diseases. Clearly, then, the fever investigators did not simply appeal to their favorite theory in order to explain yellow fever. But they were still faced with an important question: given the existence of two long-standing, widely-accepted models of disease transmission and causation, how were they to determine which one applied to yellow fever?

Though they disagreed vehemently over the cause of yellow fever, contagionists and localists agreed that the problem of yellow fever demanded facts. What was a fact and why did facts have so much

importance? The great lexicographer Samuel Johnson defined “fact” as “a thing done; an effect produced,” adding that it could also be described as “reality; not supposition; not speculation.” But even if the facts did not qualify as “suppositions” or “speculations,” philosophers nevertheless used them in the act of speculation. A fact was only fact, that is, if someone used it to test a theory or idea. Furthermore, the facts, philosophers of the eighteenth-century realized, did not descend unmediated from the phenomena they were supposed to represent. To the contrary, people made facts, and so the validity of facts depended intimately on the accuracy and reliability with which they recorded and on the honesty of those who recorded them. For the investigators, then, the facts were discrete parcels of faithfully-recorded, first-hand information about yellow fever, such as where, when, and whom the disease struck. Facts enabled investigators to reconstruct the precise sequence of events that preceded the first appearance of yellow fever, and to follow its course through the pestilential environment. In the disease-stricken cities, where panic and rumors swirled, the facts might just be capable of setting the record straight.

And so, in one way or the other, everyone courted the facts. Justifying his choice of causal explanation, the contagionist Isaac Cathrall stated that it was the notion “supported by the greatest number of facts.” In his Account of the Epidemic Fever which Prevailed in the City of New York, the localist Richard Bayley likewise emphasized the centrality of facts: “It is the main object of the writer of this pamphlet to lay before the public a few facts on this important subject; and in doing this, he is conscious that the chief merit of these will consist in the diligence with which they are collected, and the fidelity with which they are detailed.” Later in the same document, Bayley reiterated his commitment to the facts.

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26 Samuel Johnson, A Dictionary of the English Language (Dublin:1775), unpaginated, find under the heading “fact.”
28 Isaac Cathrall, A Medical Sketch of the Synochus Maligna, or Malignant Contagious Fever (Philadelphia: Thomas Dobson, 1794), 3.
to the facts, “The object I have in view is to reconcile those opinions [localism and contagionism], as far
as that can be effected, by bringing into one view all the facts I have been able to collect on the subject.
These shall form the principal data upon which any future reasoning may be founded.”

By seeking the facts, the investigators hoped also to avoid the pitfalls of theory—deceptive and
dangerous notions, devoid of factual basis, which frequently led inquiring minds astray. In his
Observations on the Cause, Nature, and Treatment of the Epidemic Disorder, for example, the localist
David de Isaac Cohen Nassy of Philadelphia asserted that he reached his own conclusions without the
undue influence of theory. “What I am to advance,” he wrote, “shall be less founded on theory, which
often deceives, than on practice, and my clinical observations. Thus I will only say what I have seen, or
believe myself to have seen.” In the same manner, the contagionist William Currie announced his
treatise’s freedom from theory—“Instead of attending to systematic arrangement,” a byword for
speculative philosophical discourse, “he [himself, the author] has contented himself with enumerating
symptoms and circumstances as they occurred to him, while engaged in practice.” The result, he hoped,
would prove beneficial to subsequent readers, who might one day, too, confront the mystery of yellow
fever: “If it should ever appear here again . . . physicians may not again be at a loss for a directory,
derived from actual experience and observation.”

The investigators’ eagerness for the facts and hostility towards theory underscored their
common allegiance to a type of natural philosophical investigation that had its roots in what we now call
the Scientific Revolution. In fact, the investigators often specifically cast themselves as the descendants
from the likes of Francis Bacon, Isaac Newton, and other luminaries of the seventeenth century, whose

29 Richard Bayley, An Account of the Epidemic Fever which Prevailed in the City of New York, during Part of the
Summer and Fall of 1795 (New York: T. and J. Swords, 1796), 6, 13.
30 David de Isaac Cohen Nassy, Observations on the Cause, Nature, and Treatment of the Epidemic Disorder,
31 William Currie, A Treatise on the Synochus Icterioides, or Yellow Fever; As It Lately Appeared in Philadelphia
efforts to escape the bonds of Aristotelian scholasticism (a method of explanation through which new knowledge was produced by way of logical deduction from established premises) prompted a thoroughgoing reconceptualization of natural philosophy.\textsuperscript{32} To be sure, the investigators distilled their own simplified message from the works of their seventeenth-century forebears, but it was not an entirely inaccurate one. Knowledge of nature, they believed, rested on two essential foundations: empirical evidence and inductive reasoning.\textsuperscript{33} In other words, the philosopher was to seek the evidence of the senses and experience, which he (not, with very few exceptions, she) could then amass in sufficient quantity so as to infer general rules of nature. Such a method promised to deliver natural philosophy from the misconceptions of theory and lead to production of useful knowledge.

Though generally unheralded as an age of great discoveries in natural philosophy, the eighteenth-century Enlightenment nevertheless did mark a time of “completion” or “consolidation,” when the perspectives of the new natural philosophy “became part of the mind set of the European and American elite.”\textsuperscript{34} In North America, natural philosophy first sprouted in the major universities of the British colonies. Harvard instituted a professorship in mathematics and natural philosophy in 1727, chaired first by Isaac Greenwood. At the College of New Jersey, founded in 1746, a succession of presidents—Aaron Burr Sr., Samuel Davies, Samuel Finley, John Witherspoon, and Samuel Stanhope


\textsuperscript{33} Virtually all recent scholars of the Scientific Revolution deny that it was a single, unified phenomenon with a clear, unambiguous research program. See Steven Shapin, The Scientific Revolution (Chicago: University of Chicago Press, 1996); Lisa Jardine, Ingenious Pursuits: Building the Scientific Revolution (New York: Anchor Books, 2000); Margaret Osler, ed., Rethinking the Scientific Revolution (New York: Cambridge University Press, 2000). Thus, the elevation of empiricism and inductivism, while certainly one of the legacies of the Scientific Revolution, was not its central contribution. Indeed, some of the key works of the period, like Newton’s Principia Mathematica, which the investigators greatly admired, could not be described in that way.

Smith—championed natural philosophical inquiry.  

Natural philosophy made headway at Yale under the direction of the president Ezra Stiles (1778-1795), an avid astronomer, a past Tutor of natural philosophy and mathematics. Columbia College (known as King’s College from its foundation in 1754 to 1784) and the University of Pennsylvania (the College of Philadelphia until 1789) also boasted courses of instruction in natural philosophy. By the 1790s, the nation’s most distinguished knowledge-makers had long since advocated inquiry on the empirical and inductive model. As Phineas Jenks, a graduate from the University of Pennsylvania, wrote in his *Essay on the Analogy of the Asiatic and African Plague and the American Yellow Fever* (1804): “At this enlightened era, when science pervades every philosophic inquiry . . . induction from facts and ocular demonstration are alone admissible.”

In the study of disease, the empirical turn ironically led inquirers back to the ancient world, the very nursery of rationalistic philosophy, and the works imputed to Hippocrates. More than any specific ideas or practices, the Hippocratic tradition promoted general ways of thinking about disease and the body. In widely-read works such as *Airs, Waters, Places*, and *Epidemics*, the Hippocratic authors urged doctors, above all else, to mind the environmental conditions of the places where they practiced and to take comprehensive notes of the phenomena that accompanied diseases. Due largely to the advocacy of Thomas Sydenham, the famed seventeenth-century English physician, Hippocratic thought enjoyed a renaissance in the eighteenth century. Nicknamed the “English Hippocrates,” Sydenham encouraged his contemporaries to emulate the Greek father of medicine by composing accurate case histories and taking diligent notes of the precise circumstances—that is, the facts—that accompanied each

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37 Phineas Jenks, *An Essay on the Analogy of the Asiatic and African Plague and the American Yellow Fever, with a View to Prove that They are the Same Disease Varied by Climate and Other Circumstances* (Philadelphia: Hugh Maxwell, 1804), 13.
38 Hippocrates probably existed, but the works that bear his name were undoubtedly written by many people, the students of Hippocrates.
occurrence of disease.\textsuperscript{39} The “facts,” Sydenham and the many who came after him believed, would point out the true cause of the disease, or at least supply subsequent investigators with a firm empirical base from which to compare their own observations.

By the eighteenth century, neo-Hippocratic thought had gained wide currency among an increasing number of medical practitioners in the Europe and the New World.\textsuperscript{40} The German physician, Friedrich Hoffmann at the University of Halle, and the Italians, Bernardino Ramazzini at the University of Padua, and Giovanni Lancisi, incorporated neo-Hippocratic perspectives into their own justly-celebrated works; so too did William Cullen, mentor to dozens of American students at the University of Edinburgh.\textsuperscript{41} Meanwhile, in the wider Atlantic world, doctors such as James Lind, the man who popularized the prophylactic for scurvy, and countless voyagers and settlers adopted the empirical approach of Hippocrates to help them understand the new and often strange diseases—scurvy, malaria, and of course yellow fever—they encountered onboard ships and in unfamiliar tropical environments. During the Seven Years War, the American Revolution, and the Haitian Revolution, military doctors stationed in the West Indies—such as William Hillary, author of \textit{Observations on the Changes of the Air and the Concomitant Epidemical Diseases} (1766); Robert Jackson, author of \textit{A Treatise on the Fevers of Jamaica} (1791); and John Hunter, who wrote \textit{Observations on the Diseases of the Army in Jamaica} (1788)—regularly marshaled Hippocratic perspectives to answer questions about yellow fever, the dread disease of newcomers in the sultry West Indies.

By that time, too, Hippocratic ideas had begun to take root in the earliest American medical schools—the first of which was founded in 1765 at the College of Philadelphia, followed in 1768 by the

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  \item The spread of the neo-Hippocratic thought is best discussed by James C. Riley, \textit{The Eighteenth-Century Campaign to Avoid Disease} (Basingstoke, Hampshire: MacMillan, 1987).
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one at King’s College. Modeled after the medical school at the University of Edinburgh, the American medical schools and their teachers adopted the foci of their predecessor institution and its illustrious neo-Hippocratic physician, Dr. Cullen. At the University of Pennsylvania, for example, students could take in lectures from Rush, known popularly as both the “Hippocrates of America” and the “American Sydenham” for his advocacy of the importance of facts and observations in the study of disease. At the King’s College medical school, Professor Samuel Bard likewise endorsed Hippocratic ideas. In 1769, Bard told his students, “In the Prosecution of your Studies, let such Authors as have transmitted to us Observations founded upon Nature, claim your particular Attention. Of these, HIPPOCRATES shines the foremost.”

Hippocratic thought also spread outside the academy walls, in the numerous clubs and voluntary associations, which had begun to spring up in the budding cities of the British colonies, then the United States. Associations performed vital tasks—they encouraged inquiry into numerous subjects, they gave learned people platforms from which to advertise their findings, and they also facilitated the dissemination of research by sponsoring publications (which could be quite expensive). The American Philosophical Society, co-founded by the rigid empiricist and experimental philosopher Benjamin Franklin, was the first and best known of these associations; by the 1790s, several specialized societies

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43 For the influence of the University of Edinburgh, see Deborah Brunton, “The Transfer of Medical Education: Teaching at the Edinburgh and Philadelphia Medical Schools,” in *Scotland and America in the Age of the Enlightenment*, 242-258; J. Rendall, “The Influence of the Edinburgh Medical School on America in the Eighteenth Century,” in *The Early Years of the Edinburgh Medical School*, ed. R.G.W. Anderson and A.D.C. Simpson (Edinburgh, 1976), 95-124. For works on American students who studied at Edinburgh, see Helen Brock, “Scotland and American Medicine,” in Helen Brock and William Brock, *Scotus Americanus: A Survey of the Sources for the Links between Scotland and American in the Eighteenth Century* (Edinburgh: University of Edinburgh Press, 1982), 114-126. In her Appendix, Helen Brock lists all individuals she could find who studied at Edinburgh and then practiced in the thirteen colonies. There were hundreds.
44 As with the other neo-Hippocratics, Rush’s relationship with Hippocrates was conflicted—he knew Hippocrates’ ideas were quite flawed, but nevertheless celebrated his methods, especially as they were distilled by Sydenham. Carl J. Richard, *The Founders and the Classics: Greece, Rome, and the American Enlightenment* (Cambridge: Harvard University Press, 1994), 202-204, 212.
promoted the study of medicine and disease specifically. The College of Physicians of Philadelphia, the
Medical Society of the state of New York, and the Medical Society of South Carolina, to name a few, all
served as integral conduits of medical knowledge. The founders of the College of Physicians, including
Rush and Currie, envisioned their society as a means of promoting the Hippocratic approach, with its
sensitivity to the facts that accompanied disease occurrences. As its charter explained, “The objects of
this College are to advance the science of medicine, and thereby to lessen human misery, by
investigating the diseases and remedies which are peculiar to this country; by observing the effects of
different seasons, climates and situations upon the human body; by recording the changes which are
produced in diseases, by the progress of agriculture arts, population and manners.”

Finally, an expansive trans-Atlantic book trade linked early republicans with an extensive
medical literature about disease coming from Europe and beyond. Though they might lack the same
periodical literature that circulated in the European capitals, the early republicans certainly did not lack
for books. The catalogues of booksellers and lending libraries teemed with the latest medical and
scientific works. Especially in Philadelphia and New York, investigators had easy access to most
important medical books, such as Cullen’s *Institutes of Medicine* or his three-volume *Practice of Physic.*
More importantly, the early republican disease investigators could, and in fact did, very easily obtain
neo-Hippocratic works about yellow fever in Africa, the West Indies, and even in parts of North America.
The treatises of the fever investigators contain frequent references to the books of the neo-Hippocratic
military physicians, Hillary, Hunter, and Jackson; and to other important works, such as Joseph Lind’s
*Diseases Incident to Europeans in Hot Climates*, Dr. Charles Lining’s *A Description of the American Yellow

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47 The lineaments of the book and trade and its importance specifically on medical subjects are best treated by
fever, which Prevailed at Charleston, in South Carolina, in the year 1748, and Dr. John Mitchell’s works on the yellow fever epidemics in Virginia in 1737, 1741, and 1742. Investigators also reached out to works about other diseases in remote places. They regularly cited from Alexander Russell’s The Natural History of Aleppo (1756), a book noted for its Hippocratic attention to detail, not only in regards to the plague epidemics that sometimes ravaged Aleppo, but to the climatic and topographic details of the city, as well as its human and animal inhabitants.

Enthusiasm for this medical Enlightenment reverberated through the young nation’s medical community. In an oration delivered to the Medical Society of South Carolina on the first day of the nineteenth century, the doctor and historian David Ramsay reflected on the scientific lineage of modern medicine and its salutary influence. “Lord Bacon may justly be called the father of modern science,” Ramsay observed. “Though no physician, he directed physicians to the proper mode of advancing their own profession. He broke the fetters which had bound the human mind from the days of Aristotle, and pointed out the true way for extending and improving useful knowledge. His new mode of philosophizing by experiments, and observations, laid the foundation of the discoveries of the immortal Newton.” Ramsay then traced the scientific epistemology to its medical application—“Sydenham applied the same principles to the healing art, and fought for its improvement, by carefully observing the rise and progress of diseases.” Thanks to the more sophisticated ways of understanding disease, he declared, “The plague, pestilential fevers, putrid scurvies and dysenteries, have much abated in the 18th century.” As a way of confirming these improvements, he urged his listeners to take notice of the plagues that still regularly beset Constantinople, Aleppo, Grand Cairo, and the “other places, on which the sun of medical philosophy has never shone.”

48 David Ramsay, A Review of the Improvements, Progress and State of Medicine in the XVIIith Century (Charleston: W.P. Young, 1801), 34.
And yet, while Ramsay’s joyous declarations may well testify to the enthusiasm for the medical Enlightenment of the eighteenth century, they also show its limitations. Despite the advances of the century, disease continued to afflict even those places on which the sun of medical philosophy had shown. Addressing the recent epidemics, Ramsay spoke (in what must have been a more subdued tone), “The general prevalence of the yellow fever, in the sea ports of the United States, for the last seven years, seems to form a local exception.”49 A local exception? The occasion did call for positive reflection and hopeful prognostication, but anxiety simmers just below the surface. Ramsay knew, just as his audience did too, that diseases posed extraordinary challenges, and that their ultimate extinction would not come easily, despite his rosy depiction of the diminution of “the plague, pestilential fevers, putrid scurvy and dysenteries” all over the Western world in the eighteenth century.

Drawn to the facts for their basis in empirical and inductive epistemology, the investigators soon learned that facts opened themselves to many interpretations. Thus, while they might agree on what the facts were, they disagreed markedly over what they meant. For instance, everyone agreed, it was an undeniable fact, that yellow fever conformed closely to the boundaries of the affected cities, and seldom strayed far beyond. Even the contagionist, Isaac Cathrall, noted with some surprise, “It was a singular fact, that when carried in the country, it never was, but in one instance, that I am acquainted with, propagated beyond the person who carried it.”50 The localists took the spatial limitations of the fever as decisive proof that it was not spread through contagion, but by means of a miasmatic vapor, or pestilential quality of the air, situated locally within the cities. Writing to his erstwhile friend and mentor, John Morgan of the College of Physicians, Rush averred that the disease’s failure to move outside of Philadelphia in 1793 obviously meant that it had been “deprived of the aid of miasmata from

49 Ibid., 34.
50 Isaac Cathrall, A Medical Sketch of the Synochus Maligna, or Malignant Contagious Fever, 7.
the putrid matter which first produced it in our city.” Valentine Seaman marshaled much the same argument in his account of the origin of the 1795 epidemic in New York.

Localists drew similar conclusions from the time of the season and the climatic conditions during which yellow fever struck, another undisputable fact about the disease. Each year, the epidemics began in the late summer and continued through the autumn, the period of the year when heat, humidity, and heavy rains—the acknowledged ingredients of pestilential fevers—afforded putrid matter copious opportunities to develop into deleterious miasmas. Rush, for instance, wrote that the epidemic in 1793 occurred when the climate nearly resembled a “TROPICAL season.” In consequence, Rush continued, “We ought not to be surprised if tropical diseases, even of the most malignant nature, are ENGENDERED amongst us.” Furthermore, each year that it struck, yellow fever prevailed at the exact time when the common remitting, or autumnal, fevers usually struck. Since the remitting fevers were known to be the effects of the environment, investigators conjectured that yellow fever must only represent a higher degree of the common fevers, and that it must, therefore, also derive from the surrounding conditions. The symptoms prognoses of each of the fevers did bear certain striking resemblances—high fever, lassitude, nausea, and they operated in stages, often with complete remissions of symptoms.

The contagionists looked at the very same facts, but reached different conclusions. For one, yellow fever could not be caused by environmental conditions, they argued, because it induced symptoms unlike the “native” diseases of the West Indies and American South. Joseph Mackrill, a physician from Baltimore who had practiced in the West Indies, conceded that though yellow fever began like the native diseases of the West Indies, patients quickly manifested unusual symptoms,

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54 Academy of Medicine of Philadelphia, Letter to Thomas Mifflin, December 1, 1797, in Rush, *Medical Inquiries and Observations* 5 (Philadelphia: Budd and Bartram, 1798), 44.
especially, he noted, a “slow and oppressed” pulse. In his *Observations on the Causes and Cure of Remitting or Bilious Fevers*, his second work on the malarial fevers, Currie further highlighted the singular features of yellow fever. “The malignant yellow fever is distinguished at its commencement, from the worst cases of the bilious remitting fever, by the suddenness of its attack . . . greater severity of pain in the forepart of the head and eyes . . . and especially by the costiveness or dysenteric state of the bowels.” More to the point, yellow fever terminated in truly unique fashion—“the bilious colour of the skin, and the coffee ground, or black vomitings.” Far from being a relative of the bilious remitting fevers of tropical or semi-tropical climates, yellow fever’s distinctive symptoms made it unlike any other disease, except, Currie concluded ominously, the “plague.”

Localists and contagionists alike also noticed (it was a fact) that past inhabitants of the West Indies largely escaped the disease, while those from temperate climates fell victim with astonishing regularity. Most also noted that Africans possessed some special ability to resist yellow fever. At the outset of the 1793 epidemic in Philadelphia, Benjamin Rush even encouraged black people to volunteer for service at the makeshift hospital, believing that they were naturally immune. He later realized his mistake, since black people can contract yellow fever, but he still maintained that they did not acquire it as frequently nor as severely as white people. The contagionist, Isaac Cathrall, likewise remarked that “blacks of every description, were less liable to it [yellow fever] than the white inhabitants; and the negroes originally from the coast of Africa were scarcely ever affected.” And, in New York, Valentine Seaman claimed that blacks acquired yellow fever as frequently as whites, but that it was not “so fatal to

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55 Joseph Mackrill, 17-18.
58 Isaac Cathrall, *A Medical Sketch of the Synochus Maligna, or Malignant Contagious Fever; as it Lately Appeared in the City of Philadelphia* (Philadelphia: Thomas Dobson, 1794), 6.
Good evidence suggests that they probably were correct. As inhabitants of the continent where yellow fever originated more than 3,000 years ago, Africans from yellow fever endemic zones probably had acquired some degree of genetic immunity to the disease.\textsuperscript{59}

Some interpreted the selectivity of yellow fever as a certain indication of its generation from local sources. As Hippocratic thinkers, localists liked to point out that the human body existed in a constantly-evolving, dynamic manner with its surroundings. If West Indians and Africans resisted yellow fever better than the strangers to tropical climates, it was only because their bodies had adapted to the environmental conditions that produced the fatal malady. On the other hand, as pieces of noxious matter, totally unrelated to the environment in which they occurred, contagions theoretically should have attacked all human beings equally. Indeed, according to the localists, observation had confirmed this suspicion. It was an acknowledged fact, Seaman declared in his treatise, that contagious diseases affected people of “every clime and color.”\textsuperscript{61} Yellow fever, it would seem, could not be contagious.

The contagionists simply altered the direction of the argument. Commenting on the “notorious fact” that West Indians and Africans escaped the worst effects of yellow fever, Currie claimed it only proved that the disease differed fundamentally from the remitting fevers, which, everyone knew, affected all people equally.\textsuperscript{62} Currie thus neatly undermined a major pillar of the localist view, the notion that yellow fever was only a higher grade of the common fevers (i.e. malaria). Since yellow fever

\textsuperscript{59} Valentine Seaman, \textit{An Account of the Epidemic Yellow Fever}, 6.
\textsuperscript{60} This is an unduly controversial issue. Sheldon Watts, for example, has denied the notion of genetic immunity in Africans; see his “Yellow Fever Immunities in West Africa and the Americas in the Age of Slavery and beyond: A Reappraisal,” \textit{Journal of Social History} 34, no. 4 (Summer, 2001), pp. 955-967. The preponderance of the evidence suggests its likelihood. K. F. Kiple and V. H. Kiple, ”Black Yellow Fever Immunities, Innate and Acquired, as Revealed in the American South,” \textit{Social Science and History} I (1977): 419-36; John McNeill, \textit{Mosquito Empires}, 44-45. For genomic evidence that shows yellow fever’s age and place of origin, see Oyewale Tomori, “Yellow Fever: The Recurring Plague,” \textit{Critical Reviews in Clinical Laboratory Sciences} 41:4 (2004), 397-398.
\textsuperscript{61} Valentine Seaman, \textit{Account of the Epidemic Yellow Fever}, 20.
\textsuperscript{62} Currie was partially wrong. Many people from Africa and the Mediterranean region with the sickle cell trait have an ability to resist the worst effects of malaria.
was different from the malarial fevers, then it must be its own unique disease, native to the West Indies, and therefore imported to the United States.\textsuperscript{63}

For the contagionists, all perspectives, all objections, fell before one overarching fact. They could always trace the first appearances of yellow fever back to incoming ships, which contained passengers with yellow fever. Writing of the 1793 epidemic, Mathew Carey correlated the first cases of the disease in early August with the arrival of three ships in late July—the \textit{Amelia}, from St. Domingue, and the privateer, \textit{Sans Culotte}, with its prize, the \textit{Flora}. Carey even demonstrated that the \textit{Amelia} docked at the wharf near the house of the first reported victim of the epidemic, a woman known as Mrs. Lemaigre.\textsuperscript{64} Subsequent investigators did not have to look hard for similar concurrences of events. In 1795, the Health Officer of the port of New York, Malachai Treat, visited a vessel called the \textit{Zephyr} from Port-au-Prince, which he ordered into quarantine after noticing that it carried victims of yellow fever. When, shortly thereafter, Treat sickened and died with the same fever that was then erupting in the city, numerous observers simply concluded that the \textit{Zephyr} had imported yellow fever, that Treat had contracted the disease, and that it had subsequently spread through the rest of the city.\textsuperscript{65} In Philadelphia in 1798, examiners similarly linked the arrival of the \textit{Deborah}, an infected vessel from St. Domingue, to the following epidemic.\textsuperscript{66} In the minds of the contagionists, the coincidence of diseased ships and yellow fever outbreaks seemed clear evidence of cause and effect. Indeed, it supplied the most irrefutable evidence, verified by the most unmistakable connections, of the importation of yellow fever.

\textsuperscript{63} William Currie, \textit{A Treatise on the Synochus Icteroides, or Yellow Fever; as it Lately Appeared in the City of Philadelphia} (Philadelphia: Thomas Dobson, 1794), 12-13.

\textsuperscript{64} Mathew Carey, \textit{A Short Account of the Malignant Fever} (Philadelphia: Mathew Carey, 1793), 16-20.


So much for the facts. By the end of the first few years, using only the facts, investigators quickly settled into a stalemate, with both sides having marshaled compelling arguments supported by strong evidence. We should hardly be surprised. The facts themselves only reflected the confounding etiology of yellow fever. Striking according to the vagaries of its insect vector, the pesky *Aedes aegypti* mosquito, yellow fever behaved strangely. The contagionists were right to point to the arrival of infected vessels—yellow fever did require importation, because *A. aegypti* could not survive the winters of the northeastern seaboard. But, the localists were correct to implicate the environmental specificity of yellow fever and the conditions of the port cities—high temperatures, rainfall, and the copious numbers of artificial containers capable of holding water did ensure the survival and propagation of the mosquitoes. However flattering they might be to their conceptions of themselves as men of science, the facts themselves would never reveal true cause of yellow fever. But the question was: if not with the facts, then how could they determine what caused yellow fever?

Had the investigators been as stringent about the facts as they had advertised, they might have acknowledged that no one interpretation of the facts was any more convincing than the other. The truth is, though, that they never quite depended on the facts as much as they had claimed. It was not that facts were flawed, nor that the investigators feigned their commitments to empirical evidence and inductive reasoning, the hallmarks of their natural philosophical heritage. The investigators, rather, balked at the perceived excesses of natural philosophical thought, and especially its dangerous association with a theory of the mind called “empiricism,” which held that *only* empirical phenomena and inductive reasoning would lead to true knowledge of nature. In its strictest form, the natural philosophical epistemology neglected the innate rational capacity of the mind, a gift of God, according to the investigators, and a scientific truth in its own right. Even as the investigators touted their well-
meaning attachments to the facts, they all the while believed in a guiding rational principle, which they trusted, like the grace of God, to order those facts so as to point out truth.

For most of the history of Western thought, philosophers believed that the human mind possessed innate powers of reasoning. Beginning in the late-seventeenth century, however, thinkers began to reject the time-worn mental theories in favor a new picture of the mind, and its severely limited capacities, known as empiricism. In this particular form, empiricism represented a species of thought first articulated by John Locke in his *An Essay Concerning Human Understanding* (1690), and then adopted by later British philosophers such as George Berkeley and David Hume, and, in the French tradition, by Étienne Bonnot de Condillac. The “empiricists,” as they have been termed, held that humans were born without innate ideas. Locke, for example, used the memorable and oft-repeated phrase *tabula rasa,* or “blank slate,” to describe the condition of the mind at birth. The empiricists, to the contrary, believed that humans accumulated all of their ideas, all of their knowledge, through sensory-impressions, which the mind then stored away and categorized according to their type and likeness. Hume, the most skeptical of the empiricists—and the vilest in the minds of later detractors—had gone so far as to argue that empiricism cast doubt upon the human ability to understand cause and effect. Since the mind grasped nothing *a priori,* and since all it contained came from experience, Hume reasoned, then everything that humans thought they knew about causation must really only be the product of events “constantly conjoined” in time and space. “We only learn by experience the frequent CONJUNCTION of objects, without being ever able to comprehend any thing like CONNEXION between them.” In other words, when one event or “object” is always followed by another, we assume that they have a causal relationship, without truly understanding the force or power that produces it.

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67 For a cogent introduction to a very difficult concept, see Paul S. McDonald, *History of the Concept of the Mind* (Burlington: Ashgate, 2003).
According to Hume, even something as obvious as the law of gravity could never be grasped *a priori*, and therefore never fully comprehended, despite Newton’s mathematical demonstrations of its uniform operations throughout the known universe.\(^6^9\)

Hume’s skepticism, embodied in his theory of the mind, sparked a cross-denominational backlash by Christian natural philosophers in both Europe and North America. The empirical view of the mind threatened long-held and cherished notions about the nature of God and His creation. To suggest that the mind was an empty vessel that could only store away empirical data meant that the human body—that “minute fabric, a center of wonders,” as Rush described it—was a mere machine that possessed no remnant of its divine origin. What is more, by denying innate ideas, Hume also the rejected the human ability to comprehend the design of God’s world, the ultimate end of natural philosophy for the devout. Hume’s empiricism left humans as blank automatons in a world that they could never truly understand. More ominously, if taken to its extreme, it amounted to a rejection of God’s benevolence. The fever investigators easily grasped its irreligious implications. As Rush rather bluntly put it in one of his many fever treatises, “It would be a denial of goodness to the Supreme Being to suppose, he had not endued the common faculties of man, with the means of discovering, and obviating the common physical evils of his life.”\(^7^0\) In his own *Medico-chymical Dissertations on the Causes of the Epidemic Called Yellow Fever*, Felix Ouvière likewise remarked, “The capacity to acquire a

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\(^6^9\) For the sake of clarity, Hume was not suggesting that his readers should reject the belief in gravity, or that they should abandon pursuit of scientific knowledge of cause and effect. Hume knew that the laws of gravity and motion were very good ones. In fact, he once wrote, “The production of motion by impulse and gravity is an universal law, which has hitherto admitted of no exception” (*Enquiry*, Section VI: 47). Hume also wanted to throw up cautionary signs to his contemporaries. Even the most accurate of knowledge, he taught, rested on the tenuous basis of the capacities of the human mind. If someone were to assert an idea as a true one, then he or she must be able to back it up with mountains of empirical evidence—at least enough to establish the “constant conjunction” of the phenomena in question. Additionally, Hume wanted to discourage philosophers from indulging in speculation, or putting faith in hypotheses and theories. “In vain . . . should we pretend to determine any single event, or infer any cause or effect, without the assistance of observation and experience,” he wrote in the very same work in which he denied the knowability of causation” (*Enquiry*, Section IV: 11).

sufficient knowledge of the laws of nature, is a gift bestowed upon us by the Supreme Ruler, to the end that we may derive from it all those blessings which it is susceptible of yielding.”71 For the investigators, pious Protestants and natural philosophers, empiricism simply would not do.

The philosophical alternative came with the common-sense epistemology of the Scots. To be more precise, the Scots did not invent common-sense philosophy. In some sense, it has existed since the beginning of Western philosophy. But it was the Scottish philosophers, especially Thomas Reid of University of Glasgow and James Beattie of Aberdeen, who adapted common sense to the particular intellectual setting of the eighteenth century, and especially in response to the heretical skepticism of Hume.72 Reid and Beattie set about to prove that mind did not merely accumulate sense impressions, but that it possessed innate powers of reasoning. Reid’s common-sense philosophy, for example, held that “some original principles of our constitution” made “reason and experience possible.”73 To him, the very idea that humans could attempt to use reason and gather experience suggested that the mind possessed inherent powers. As an epistemology, common sense loosened the standards of certainty; it suggested that humans could verify the truth of natural phenomena independent of strict empirical evidence.

Common-sense philosophy flourished in the American colonies, then the United States, long a bastion of Scottish learning. Most Americans found that common sense jibed with religion. As Mark Noll has very perceptively argued, since common sense held that certain truths simply exposed themselves to the common perceptions of man, it buttressed evangelical religious devotion—the dominant and unifying strain of American Protestantism in the early republic—which was based primarily upon

experiencing or feeling one’s spiritual connection with God. The corresponding triumph of “common-sense moral reasoning” encouraged Americans to build their ethical beliefs and behaviors through independent reflections on their innate moral senses, rather than through the traditional avenues of religious authority. Common-sense philosophy proved equally amenable to scores of American intellectuals, natural philosophers included, who used its relaxed epistemology in order to escape the crushing skepticism of Hume and, they thought, the cloudy sophistry that only hindered the pursuit of useful knowledge. As a result, during the revolutionary and early republican periods, common-sense philosophy increasingly infiltrated America’s Protestant academies, its universities, and its intellectual circles. As with the scientific epistemology, common sense constituted a defining feature of the intellectual history of the early republican period.

Not surprisingly, the fever investigators ranked among the most vigorous proponents of common sense. Rush, for example, was one of the earliest and most energetic patrons of common-sense philosophy in the United States. “Reverberate over and over my love to Dr. Beattie,” Rush wrote to a former student traveling to Aberdeen, the home of James Beattie. “I cannot think of him without fancying that I see Mr. Hume prostrate at his feet. He was the David who slew that giant of infidelity.”

Effusive praise for the common-sense philosophy even appeared in the yellow fever pamphlets. In his Treatise on the Autumnal Endemial Epidemick of Tropical Climates, Vulgarly Called the Yellow Fever,

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76 Sloan dedicates a chapter to Benjamin Rush and his common sense in The Scottish Enlightenment and the American College Ideal, 185-224.
John Beale Davidge of Baltimore, a physician trained at the University of Glasgow, and the future founder of the medical school at the University of Maryland, likewise signaled his debt to apostles of common sense. Comparing contagionists to the followers of other false philosophies—the physiognomy of Johann Lavater and, of course, the empiricism of Hume—Davidge, also an avowed Episcopalian, averred that his own ideas fell in line with common sense. “Were I to plunge into the vacuum of metaphysicks,” Davidge wrote, “I should believe, with the peerless Reid of Glasgow, that the human mind possessed, inherently, action, vigour, and choice; that it operated upon surrounding objects, and was not the passive sport of incidental impression.” For Davidge, as for Reid before him, common sense lit a path around the philosophical pitfalls that stood in the way of useful knowledge. For Davidge, as for the other investigators, common sense offered an invaluable tool in the search for the cause of yellow fever.

Above all, the investigators strived after the proper harmony of facts and common sense, empiricism and rationalism. In a short pamphlet detailing the faculty and curriculum at Columbia College, Samuel Latham Mitchill proudly noted that his own institution and its illustrious professors—Samuel Bard, Wright Post, William Hamersley, and Richard Bayley—had struck just the right balance between empiricism and rationalism. Borrowing a long passage from Francis Bacon’s Cogitata et Visa (1607), a key text in the rise of scientific epistemology, Mitchill introduced the short pamphlet with a metaphor from the animal kingdom:

Faculties of the arts and sciences, whether empiricists or rationalists—all philosophers must agree—Empiricists in the manner of ants collect in order to put to use, while rationalists in the manner of spiders spin webs from themselves. The bee is the middle way—it takes materials from the flowers of the gardens and the fields, but it manipulates and distributes them with its faculties. Not unlike the work of real

philosophy, which from natural history and experiments, takes material and puts it away, not in the memory as a whole, but in the mind in a developed and changed way.\(^79\)

Rather than simply storing away ideas and information, the fertile human mind, like an industrious bee, gathered them together and adapted them to its purposes. The metaphor allowed Mitchill to describe the proper balance between empirical evidence and common sense, both of which were necessary for the construction of true knowledge. What is more, it came with the approval of Bacon, the widely-recognized creator of scientific philosophy, thus placing Mitchill’s mixture of empiricism and rationalism in a lineage that went all the way back to the beginnings of the Scientific Revolution.

Indeed, from the very beginning, the proponents of common sense philosophy had tried to establish their perspective as a type of science in its own right. Both Reid and Beattie, along with their American cohorts, fully embraced the empirical and inductive methods of the latest natural philosophy; they only differed from the arch-empiricists in terms of their theories of the mind.\(^80\) Reid even attempted to prove the existence of innate ideas inductively, by comparing the similar syntactical and grammatical structures of different languages.\(^81\) The common-sense philosophers fancied themselves scientists of the mind, overturning the baseless metaphysical ravings of “sophists,” such as Hume. “The works of Dr. Reid and Dr. Beattie have produced a revolution in the science of metaphysicks in our American seminaries,” Rush noted with satisfaction. “It is now very properly limited to the history of the faculties and operations of the human mind.”\(^82\) Rush, in fact, contributed his own “Lectures on the

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\(^81\) Reid, for example, argued that the structures of languages bore witness to inherent mental powers. All languages distinguish between subject and object and all depict the operations of the mind in the active voice. The linguistic edge in evident throughout Reid’s work. See especially *Essays on the Intellectual and Active Powers of Man* (Dublin: P. Byrne and J. Milliken, 1790).

Mind” to this emerging field of scientific study. Rather than signaling a return to the philosophies of thought alone, common sense moved forward, transforming guesses and speculations into a sort of proto-psychology. Slowly, and rather slyly, then, the adherents to common-sense philosophy began to turn the tables on Hume and his severe epistemology. By trumpeting their own scientific credentials and denigrating the empiricism of the mind as backwards, medieval metaphysics, Americans sought to legitimize a rival type of knowledge-making.

Despite its value and popularity among early republicans, common sense did not offer concrete answers to the question of the cause of yellow fever, or any other elusive problem for that matter—only observations could answer decisively on these issues—but it did offer a way of proceeding, of legitimizing one’s knowledge claims, without the demonstrable, repeatable proofs required of experimental natural philosophy. It established a kind of framework for the consideration of different interpretations of the same evidence, making it possible to decide on a certain point of view based on its superior plausibility. It suggested that if something seemed true it probably was. But it did so in different ways for different people. Precisely what struck people as common sense was always open to interpretation. The very malleability of the idea would come to exert a decisive influence over the intellectual ferment of the yellow fever years.

Still, even though common sense could not resolve the impasse, it did fundamentally change the complexion of the yellow fever debate, because it suggested that the success of one’s argument would rest, not on the facts alone, but on its superior plausibility—that is, its ability to fit as a comprehensible element in the God-constructed world. Common sense thus effectively motivated the search for better explanatory devices, in addition to new evidence. It inspired investigators with the faith that they could and would convince others of the truth, even if the facts themselves could not. All human beings

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possessed common sense, after all; the investigators had only to appeal to their reason and they would recognize the truth. Rush, for his part, expressed utmost confidence in the eventual success of the truth-seekers—he might have written “localists”—for, he wrote, “They move by the light of reason, the advantages of which in medicine, compared with solitary and mechanical experience, are like the extensive benefits the science of navigation has derived from the loadstone, compared with the feeble aids it formerly derived from the sight of land, or the transient light of the stars.”84 The loadstone (usually spelled “lodestone”), the magnetic mineral used in compasses, did make for a pertinent analogy. Like a compass, reason (i.e. common sense) could offer guidance when all was dark and the way forward uncertain. Compared to “solitary and mechanical experience,” a clear reference to experimental natural philosophy, with its strict empirical edge, common sense provided a crucial supplement, for it pointed out the proper direction and it did so innately. The confidence it engendered, in Rush and in others, propelled research forward, fueling the search for more evidence and superior reasoning, which would ultimately overcome the forces of ignorance.

In a similar manner, common sense helped the investigators locate dire flaws in their opponents’ perspectives. If the investigators could trust their senses and inclinations about the natural world—if, indeed, God constructed nature so that humans could understand it—then the world must ultimately be a comprehensible place, and the things in it sensible and consistent. And yet it seemed so obvious (or perhaps “common sensical”) to both localists and contagionists that their opponents’ theories violated essential philosophical rules about the consistency and coherence of the natural world. Crucially, these failures focused on their opponents’ apparent disregard for the laws of cause and effect—oversights which, if accepted, would authorize a type of unphilosophical error just as egregious,

impious, and unacceptable as Hume’s earlier denial of cause and effect. In their own ways, these outstanding philosophical problems would drive the debate onwards as the epidemic period proceeded.

So, besides arguments from facts of each occurrence, contagionists also took aim at a particular philosophical weakness in the localist argument. If yellow fever sprang from the environment, contagionists asked, then why did it not occur wherever those environmental conditions were present, and why did it not remain in some level of endemicity?85 Here, the contagionist critique centered on the causal inconsistency implicit in the localist argument. Natural laws, after all, were supposed to operate uniformly, and causes were supposed to produce predictable effects. Isaac Briggs, a correspondent to the Medical Repository, summarized the point, “If a something, proceeding from the putrefaction of animal and vegetable substances, be the parent of malignant fever, and if the same cause uniformly produce the same effect, why are our cities sometimes desolated by yellow fever, and not always so, when they contain masses of putrefying substances equally great and numerous?”86 In the habits of yellow fever, its causal inconsistency, the contagionists found compelling reason to doubt its local origins.

The localists, to the contrary, took issue with the contagionists’ chief factual argument—the arrival of disease-laden vessels. Localists acknowledged the arrival of disease-laden vessels before outbreaks, but denied that the ships had causal relationships with the subsequent epidemics. The contagionists, they countered, had fallen into a popular mistake—the post hoc ergo propter hoc (“after this therefore because of this”) fallacy. The arrival of infected ships and the outbreak of pestilence were, as Hume would have put it, merely events conjoined in space and time, utterly lacking in “connexion.” Rush used the contagionists’ fallacy to lecture about proper philosophy. “Accidental

85 Yellow fever certainly existed in endemic form in West Africa and West Indies ports, but not in the United States. Even the environmentalists knew it mostly as an epidemic disease. Warren, A Treatise Concerning the Malignant Fever in Barbados, 6, 1-9; Lining, A Description of the American Yellow Fever, 6, 4-7.

86 Isaac Briggs, The Medical Repository 6, no. 2 (April 1803), 170-171.
Coincidence,” he wrote, “is a frequent source of error.” As an example, Rush noted, “A pestilential fever which accidentally succeeded the introduction of the potatoe into France, produced an edict against the cultivation and use of that wholesome root by the French court.” Rush then groped somewhat awkwardly to the expected conclusion, “In like manner, the arrival of a ship from the West Indies, and the sickness or death of a sailor induced by the putrid exhalation of our docks and wharves, occurring in the months of July or August . . . has unfortunately connected them together as cause and effect.” Rush asked his readers, philosophers and laypeople alike, to disregard an undeniable, and indeed provocative, coincidence as a simple conjunction of events, mistakenly interpreted as cause and effect.

The localists, meanwhile, had also located another flaw in the contagionist argument, one whose full implications would only be realized later in the epidemic period. If yellow fever in the United States were caused by an imported contagion from the West Indies, and if, presumably, yellow fever in the West Indies were caused by the same contagion imported from some other place, then where and when did the contagion originate? “It requires no uncommon depth of logic to prove,” Charles Caldwell said to an audience of his peers at the Academy of Medicine of Philadelphia in 1798, “that pestilential diseases, having an existence, must have also a place of origin.” Yet, the contagionists could not find one. Taken to its logical limits, contagionism degenerated into an infinite regress, in which disease had no cause, but cycled continuously around the world, striking its victims again and again.

We may never know what combination of personal and historical factors initially made one set of facts, one mode of reasoning, more common sensical than the other, but we can reach general conclusions about the early influence of scientific epistemology and common-sense philosophy. The facts supplied

87 Benjamin Rush, A Second Address to the Citizens of Philadelphia, Containing Additional Proofs of the Domestic Origin of the Malignant Bilious, or Yellow Fever (Philadelphia: Budd and Bartram, 1799), 16-17.
88 Charles Caldwell, A Semi-annual Oration, on the Origin of Pestilential Diseases (Philadelphia: Thomas and Samuel Bradford, 1799), 18. The speech was given on December 17, 1798.
investigators with crucial bits of scientific evidence, which when combined together (in proper inductive fashion) resulted in two coherent pictures of yellow fever’s origins. Common sense ultimately could not tip the balance in favor one theory or the other, but it hardened opinions around these rival theories, and it suggested the solution would rest on the argument’s superior plausibility, not the facts alone.

More to the point, common sense philosophy raised the stakes in the matter of determining the cause of yellow fever. For the contagionists, the localists’ problem of causal inconsistency had more sinister implications. If the certain features of the environment were capable of producing yellow fever some of the time, then they should do so all of the time—indeed, common sense mandated that they must do so always, lest the investigators fall into the epistemological void about which Hume had warned. By failing to satisfy a fundamental demand of natural philosophy, localism threatened much more than the truth about the cause of yellow; it also imperiled the integrity of natural philosophy and the human ability to understand nature, as the pious investigators imagined it. The localists, on the other hand, alleged that contagionists posited an unwarranted, unsubstantiated causal connection, which, likewise, reduced natural philosophy to an epistemological morass—with mere conjunctions of events being passed off as scientific truths, and with actual causal relations being pushed further and further back into infinite regresses—just as Hume had depicted it. As the epidemic period proceeded, investigators found themselves enmeshed in a vexing riddle, whose solution held consequences for the health of their cities, as well as the sanctity of their natural philosophy. Something would have to give.
Chapter 2: “Declare the Past”

*These records of wars, intrigues, factions, and revolutions, are so many collections of experiments, by which the politician or moral philosopher fixes the principles of his science, in the same manner as the physician or natural philosopher becomes acquainted with the nature of plants, minerals, and other external objects, by the experiments which he forms concerning them.*

--David Hume, 1748

In August 1797, a trio of medical thinkers from New York—Samuel Latham Mitchill, Edward Miller, and Elihu Hubbard Smith—released the very first issue of the *Medical Repository*. As the nation’s first medical or scientific journal of any kind, the *Medical Repository* was a highly anticipated undertaking. In less than a year, the editors drummed up a subscriber list that included 266 people from 14 different states, and booksellers from the major cities ordered dozens more copies for resale.¹ For the very first article of that inaugural issue, one of its founders and editors, E. H. Smith, penned a curious little essay, which he titled simply “The Plague of Athens.” Only twenty-five years old at the time of publication, the native of Litchfield, Connecticut and graduate of Yale College had dedicated himself wholeheartedly to the essay. According to his diary, which he maintained on a daily basis until his tragic death from yellow fever in September 1798, Smith’s interest in the subject sparked shortly after reading Thucydides in July 1796.² By November of the same year, he had already begun work on what he called “my plan of medical Inquiry with the Plague of Athens.”³ For Smith, the article struck at much wider preoccupation with histories of diseases, a product of his own experiences with yellow fever in New York. In fact, in 1796, Smith had even started a much larger work on the “History of Epidemics,” but

³ Ibid., Saturday, November 3, 1796, 212.
abandoned the project because of the lack of appropriate sources and the impracticality of single-handedly tackling a topic so large.

True to its title, “The Plague of Athens” recounted the terrifying events of the pestilence that befell Athens in the fifth-century BC, famously memorialized by Thucydides in his History of the Peloponnesian War. The article made for good reading, but it was not principally amusement that Smith had in mind when he crafted the essay. Spurred into action by the devastating epidemics of yellow fever that had only recently afflicted the United States’ port cities, Smith, rather, sought to use the past to make a natural philosophical argument about the cause of disease. As such, his attention turned especially to the circumstances attending the plague—the “facts” of the epidemic. He quickly realized, however, that his study suffered from a crucial lack of proper documentation. Though Hippocrates and, much later, the Roman poet Lucretius had written about it, only Thucydides had offered an eyewitness account of the epidemic, and he never decisively stated what had caused it. Noting only that some Athenians thought it had originated from Ethiopia and others from a poisoned well, Thucydides left it to the Athenian citizens “whether physician or not” to decide for themselves. Besides, Smith found good reason to doubt the testimony of his sources—as he wrote, “Though no person will venture to question the sagacity of the Athenians, and the peculiar talents of Thucydides for observation, neither his countrymen, nor himself, can fairly be supposed to have examined this subject with philosophical precision.”

Documentary obstacles notwithstanding, Smith carried on with his study, supplementing his reading of Thucydides with a generous sampling of the Philosophic Dissertations on the Greeks (1793) by the Dutchman Cornelius de Pauw, “in the fidelity of whose quotations,” he confessed, “it has been necessary to confide more than was to be desired.” After examining the conditions of Athens during the

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4 The plague narrative comes in Thucydides, The History of the Peloponnesian War, 2.47-55.
5 Thucydides, 2.48.
epidemic, especially its deplorable sanitation—a result of the tens of thousands of people who sought refuge behind Athens’ “long walls” to escape the violence of roaming Spartan armies—Smith concluded that the Athenian plague arose from local sources. Smith realized that the circumstances attending the Athenian plague bore striking resemblances to the situations in the American port cities during the yellow fever epidemics. He found, for example, that Athens during times of peace had approximately the same population as New York and Philadelphia, about 50,000 permanent inhabitants, and that the sanitary conditions of the ancient polis mirrored those of the contemporary American cities. Both featured narrow, crowded streets, and cramped housing, with numerous sources of filth and putrefying matter. Athens and the afflicted areas in the United States also shared nearly the same latitudes and thus, Smith thought, the same climates. Even the symptoms of the diseases in Athens and the United States appeared similar to him. Since the Athenian plague so clearly resembled the American yellow fever, and since it occurred in nearly the same conditions, he wrote, “We may be justified in declaring it to have been, in all essential particulars, the same disease.”7 With that revelation, Smith easily moved to his conclusion, which he offered in the final passage of the essay: “If local causes originated a pestilence in Athens, local causes may generate a Yellow Fever in Philadelphia and New-York. To these, then, be our attention more scrupulously directed; and let us be more solicitous in the inspection of our houses, yards, streets and docks, than of cottons and woollens, of vessels from the West-Indies, and ships from the Mediterranean.”8

The prominent place of “The Plague of Athens” in the Medical Repository testifies to the high value accorded to history as a tool in the natural philosophic study of diseases, no less than the extent to which yellow fever discourse had changed in the intervening years since the first appearance of the disease. As the epidemics continued, and the controversy between localists and contagionists

7 Ibid., 26.
8 Ibid., 27.
deepened, inquirers such as Smith increasingly turned to the past, to the catalogues of disease history, in order to reach firm conclusions about the cause of yellow fever. History, as a vast storehouse, or repository, of facts and observations, appealed to the investigators’ desire to place the study of nature on a firm empirical footing. In fact, the adherents to the neo-Hippocratic perspective—and, indeed, the Hippocratic perspective—had always emphasized the utility of history. Hippocrates and his followers, for example, encouraged physicians to record everything that they observed about the rise and fall of pestilences, believing that such historical narratives of disease would contain the clues to understanding their causes, cures, and preventions. “Declare the past, diagnose the present, and foretell the future,” Hippocrates had written in the *Epidemics*.\(^9\) The manifest failure of the earliest fever treatises, with their emphases on the “facts” of each yellow fever epidemic, also demanded new approaches. So inquirers simply expanded the range of admissible evidence. Instead of looking at one epidemic, the historians of disease compared many. Instead of looking at the contemporary yellow fever epidemics, they reached out to the accounts of the plagues long since past. In the classic stories of disease, such as Thucydides’ plague narrative, the investigators now found the very data that would put the study of disease on a sound scientific foundation.

Besides flattering their empirical and inductive aspirations, the appeal to past also represented something of a reflexive, habitual way of thinking for the early republicans, as a rich historiography has already established.\(^10\) Simply put, early republican intellectuals thought historically. They constantly compared their own situations and bearings to those of the past. This was particularly true of the

\(^9\) Hippocrates, *Epidemics*, 1.2.5.
tumultuous times before the epidemic of 1793 and after—as the young nation set out on its own, as the French Revolution took an ominous turn for the worse, and as slave rebellion in St. Domingue morphed into full-blown revolution, the question of where the world was going seemed to demand knowledge of where it had been. The early republicans imagined themselves intimately connected to the past, equally subject to its various, and usually unexpected, turns of fortune. History, as they understood it, operated through cycles of prosperity and decline, and growth and decay. These cycles appeared everywhere in the past, as much in the rise and fall of nations as in the relative ebbs and flows of sickness and health. That realization itself resulted in a fair bit of anxiety. Writing about the devastating fevers of 1798, the worst of the epidemic period, Mitchill noted forebodingly, “The experience of the inhabitants of ancient Rome, London, and indeed of most large and populous cities in Europe and Asia, have in the progress of their settlement, suffered excessively from mortal epidemics.” He continued, “New-York, and some other cities and towns of North America, are beginning to suffer what other cities and towns in ancient and modern times have undergone before them.”11 The fever investigators, however, also believed that by studying history, by using it, they could escape from the cycles that doomed people and nations to chaos and disease, and avoid the fates that had befallen the less enlightened.

The present chapter examines the fever investigators’ uses of history in the search for the cause of yellow fever. The bulk of the chapter follows the efforts of Noah Webster, his friends in New York—Samuel Latham Mitchill, E.H. Smith, and Edward Miller—and a stranger to American shores, James Tytler. Disturbed by the repeated appearances of yellow fever, and troubled by the stalemate that settled over inquiry, they each turned to history to break through the impasse. For Mitchill, Smith, and Miller, the effort ultimately gave rise to the Medical Repository, originally conceived as a “repository” of disease history, and only later expanded to include scientific news of all sorts. The chapter concludes

with a lengthy comparison of the two major historical books of the epidemic period—*The Brief History of Epidemic and Pestilential Diseases*, by the localist Webster, and the *Treatise on the Plague and Yellow Fever*, by the contagionist Tytler. Though both were directed at resolving the outstanding philosophical problems left by the initial wave of disease thought—the localists’ problem of causal consistency and the contagionists’ problem of the infinite regress—Webster’s work enjoyed wide popularity, while Tytler’s met with censure from his philosophical contemporaries. History, it would seem, worked distinctively to the advantage of the localists.

The victory for the localists, however, never went uncontested, nor did it come without a price. Even as the investigators interrogated the records of the past, they simultaneously uncovered the very weaknesses—gaping holes in the evidence, inaccuracies, contradictions, and outright lies—that would ultimately undermine history’s ability to serve as the empirical foundation for the scientific study of diseases. In Smith’s "Plague of Athens" we can already see signs of trouble. His lack of first-hand evidence, his mistrust of Thucydides, the only person who left an eyewitness narrative of the epidemic, and his reliance on the contemporary historian and travel-writer, Cornelius de Pauw, did not reflect well on the epistemic standing of history. The knowledge of history rested on slim and often flawed evidence, the inquirers would come to learn. Indeed, it all along rested on that defining feature of the early republican disease investigators—the pervasive and influential common-sense epistemology, which held that simple conjunctions of facts and observations would reveal the causal relationships among natural phenomena.

From the very first appearance of yellow fever Philadelphia in 1793, early republican intellectuals instinctively compared their calamity to those of the past. In his popular *A Short Account of the Pestilential Fever*, Mathew Carey explicitly likened the circumstances of late outbreak, with all of its
harrowing scenes of terror and moral breakdown—“a husband deserting his wife . . . a wife unfeelingly abandoning her husband on his death bed —parents forsaking their only children—children ungratefully flying from their parents”—to the best-known epidemic in recent European history, the plague of London in 1665-1666. 12 “It is not probable,” Carey wrote, “that London at the last stage of the plague, exhibited stronger marks of terror, than were to be seen in Philadelphia, from the 25th or 26th of August, till pretty late in September.” Likewise, in emphasizing the extreme mortality of the epidemic, Carey claimed, “The plague of London was, according to rumour, hardly more fatal than our yellow fever.” 13 In his fourth and final edition of the Short Account, he even appended short descriptions of the plagues in London and in Marseilles in 1720, which he borrowed from a single source, The History of the Great Plague in London, in the Year 1665 . . . By a Citizen, Who Lived the Whole Time in London, printed in London in 1754. Though Carey did not know it at the time, the true author of that account was Daniel Defoe, and The History of the Great Plague in London was actually A Journal of the Plague Year, the fictional account of London epidemic and a classic of plague literature. 14

Carey’s allusions to the plague of London actually reflected a much more general public interest in historic epidemics, especially those memorialized in The History of the Great Plague in London. Carey himself gave some indication of the public’s fascination with these outbreaks. His decision to add descriptions of them alone indicates that Carey believed his readers desired such information. More tellingly, when he claimed that the London and Philadelphia epidemics produced comparable morality rates, Carey noted that this was true “according to rumour.” Close examination of the sources shows that people, in fact, were talking, or at least thinking, about the history of disease and Philadelphia’s position in it. In a letter of August 25, Benjamin Rush informed his wife, “This morning I witnessed a

13 Ibid., 22, 45.
14 There is a wealth of scholarship on the strange and influential history of Defoe and the plague narrative genre. See, for example, Margaret Healy, “Defoe’s Journal and the English Plague Writing Tradition,” Literature and Medicine 22, no. 1 (Spring 2003) 25–44.
scene . . . which reminded me of the histories I had read of the plague.”¹⁵ Weeks later, the *Federal Gazette*, the only newspaper to maintain a continuous circulation throughout the epidemic, carried a piece of advice from an anonymous writer, identified only as a “friend to the public,” who recommended burning tobacco as a preventative against the fever. As evidence of its possible efficacy, he noted that “when the great plague raged in London, in 1666, it was found that the street where the tobacconists lived was exempt from the general calamity.” The anonymous writer continued speculatively, “Would not burning Tobacco in the rooms where the infected die, and in the streets of the City, be a means of purifying the air, and prevent the spreading of the Infection?”¹⁶

Pharmacists, druggists, and chemists also used references to historic plagues to highlight the effectiveness of their yellow-fever nostrums. Numerous vendors of medicine, for example, hawked an elixir called the “Vinegar of the Four Thieves,” which was supposed to have been particularly effective during the epidemic of bubonic plague in Marseilles in 1720. In a regular advertisement, the shopkeepers, Goldthwait and Baldwin, and the “druggist and chemist,” John White, touted the historical lineage of the magical substance. “It is said,” they claimed in their advertisement, “that during the dreadful plague at Marseilles, four persons, by the use of this essence or salt, as a preservative, attended, unhurt, multitudes of those who were infected; that under the colour of those services, they robbed the sick and the dead; and that one of them, being afterwards apprehended, saved himself from the gallows by discovering the secret:—The preparation was hence called, VINAIGRE DES QUATRE VOLEURS—or, the VINEGAR OF THE FOUR THIEVES.”¹⁷ With a comforting legend and proven track

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¹⁷ The same advertisement appeared frequently. See, *Federal Gazette*, September 2, 1793.
record, the vinegar became the most commonly advertised yellow fever product, judging from any perusal of the city’s newspapers.¹⁸

The frequency of the references to the London and Marseilles outbreaks in plague-stricken Philadelphia indicates that common Philadelphians knew about, thought about, and cared about historical epidemics. Despite the fact that yellow fever was a much different disease from bubonic plague, as the doctors of the time well understood, writers such as Carey and merchants such as Goldthwait and Baldwin knew that the public craved useful information about disease outbreaks. The experiences of those who had lived through epidemics provided a kind of index of what to expect, and, more importantly, how to survive. The London and Marseilles epidemics reminded Philadelphians that others had endured similar hardships, that one could defend oneself against disease, and that the epidemic would come to an end. History provided people with the only real stock of examples about what was happening to them. It gave perspective to those suffering the moral and physical effects of disease.

From the start, the fever investigators also used the history of diseases in their treatises, though principally as a tool in the search for the causes of diseases. We have already seen that the fever writers almost universally borrowed from accounts of yellow fever in the Atlantic world. Their treatises are full of citations from the writings of Dr. Lining from Charleston, Dr. Mitchill from Virginia, Dr. Jackson of Jamaica, and the hosts of other authors in the West Indies, who treated yellow fever and speculated over its causes. But, they also rather quickly moved beyond the most immediate historical examples of yellow fever, appealing to the occurrences of different types of disease, in different parts of the world, and from different periods of time.

¹⁸ The *Federal Gazette* appeared every day for the duration of the epidemic. For an interesting take on the motivations of its editor, Andrew Brown, see, Mark A. Smith, “Andrew Brown’s ‘Earnest Endeavor’: The *Federal Gazette’s* Role in Philadelphia’s Yellow Fever Epidemic of 1793,” *The Pennsylvania Magazine of History and Biography* CX, no. 4 (October 1996), 321-342. The other newspaper to continue publication, though only sporadically, was *Dunlap’s American Daily Advertiser.*
The localists seized upon history as a means of understanding the circumstances under which past epidemics occurred. Localists, recall, believed that yellow fever belonged to a class of diseases, called “fevers,” which were caused by the putrid miasmas that emanated from decaying substances. If they could show that other types of “fevers” arose from similar environmental circumstances, particularly decaying matter, then they could argue that yellow fever, by analogy, must also arise from those circumstances. After all, the unchanging laws of nature, established by God, operated heedless of time and place. “If we carefully peruse the history of diseases,” Richard Bayley, a doctor and future Health Officer to the port of New York City, wrote, “we shall find, that those which have proved most fatal to the human race, have proceeded, either directly or indirectly, from some acknowledged peculiarities of the state of the air.” Such peculiarities included, notably, exhalations from marshy grounds. Did this suggest that yellow fever must too arise from “peculiarities” of the air? Drawing from his own careful historical research, Benjamin Rush claimed that it did. In his Enquiry into the Origin of the Late Epidemic Fever in Philadelphia, published in December of 1793, Rush compared the rise of yellow fever from putrefying coffee to the rise of a fever in Rome from rotting hemp, as described by Giovanni Lancisi, the great Italian doctor and an early apostle of Hippocratic environmentalism. Rush, in fact, searched history for many other examples of fevers emitting from the putrid fermentation of vegetable matter and producing similar symptoms as yellow fever. An epidemic in Switzerland, described by Albrecht von Haller in his Physiological Elements of the Human Body (1757-1760), occurred under similar conditions and produced similar symptoms as the recent yellow fever outbreak in Philadelphia. At an unspecified time, another “malignant fever” at Oxford College was exhaled from a “vast quantity of Cabbages,” killing many of the students; and putrefying “radishes, turnips, garlic and

sundry other vegetables” produced similar effects in other instances.\(^{20}\) For Rush, at least, the similarities between yellow fever and the diseases in question seemed sure evidence of their common origin from the effluvia of decaying matter.

As the examples of Rush suggest, the historical view disguised the differences amongst diseases, weakening the already permeable barriers that that separated one disease, one fever, from the others. With all of their variations in terminology, scope, and emphasis, the descriptions of past could thus very easily be misinterpreted, though often in constructive ways. E. H. Smith, for instance, mistook the plague of Athens, an unknown disease, for yellow fever, which it certainly was not. On the basis of their presumed sameness, or at least very close similarity, Smith also concluded that they were produced from the same causes. Indeed, when viewed from a certain perspective, most any disease could appear to be yellow fever. So, for example, in his dissertation at the University of Pennsylvania in 1804, Stubbins Ffirth contended that yellow fever in North America preceded European contact with the Native Americans. He maintained that James Cartier described yellow fever amongst the Indians in Canada at the time of French arrival, and that John Winthrop wrote about the same disease amongst another group of Indians in 1635. Having examined the first-hand testimony of Native Americans from Dan Gookin’s *Historical Collections of the Indians in New England* (1792), Ffirth also discovered evidence of yellow fever afflicting the “Pawkunnawhutt” Indians, who claimed to have exhibited generalized yellowness as a symptom of one of their diseases.\(^{21}\) Since yellow fever was native to North America, he concluded that it originated from local sources, not foreign importation.

Contagionists, too, buttressed their arguments with the evidence of history. Like the localists, contagionists constructed their earliest historical arguments from analogy. If they could show that past

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diseases such as yellow fever (perhaps even yellow fever itself) arose from contagion, they could make an argument in favor of its contagiousness in the United States. John Beale Bordley, for example, claimed that the yellow fever epidemic in Baltimore in 1794 resembled the “Natolian plague” of Constantinople, Egypt, and the Barbary coast, which, according to M. Savary, usually arose from importation. Since the plague, a close relative of yellow fever, originated from importation, so too must yellow fever. William Currie, likewise, asserted that the “plague of Athens, described by Thucidides,” was “exactly the same distemper” as the yellow fever of the United States. Since the Athenians themselves believed their plague to have been imported from Ethiopia, Currie concluded that the Americans had also imported their disease.

Using history, the localists and contagionists once again went back and forth, marshaling the same arguments and deepening the controversy. Taken in isolated examples, the evidence gleaned from historical disease outbreaks would never turn the tide in favor of one causal explanation or another. Nor could the appeals to history answer the philosophical problems left by the earliest treatises—in fact, they only contributed to them. History, an undeniably intriguing repository of information, was also a shifting one, as the investigators were beginning to learn. In order to produce persuasive results, historians of disease would have to look deeper at the past.

The turning point came with the epidemic that struck New York in 1795. “The disorder first made its appearance in July,” Matthew Livingstone Davis wrote in his Brief Account of the Epidemical Fever, a small pamphlet published in the immediate aftermath of the outbreak. By the time it petered out at the end of October, the fever had killed at least 800 people, judging from the tabulations of the deceased in the city’s churches, and probably many more if we consider the uncounted dead who were deposited in the Potter’s Field, a space devoted to the burial of strangers and the poor. Commenting on the fates of
these unfortunate, unaccounted for victims, Davis recalled the unceremonious disposal that awaited—
“For the speedy removal of the dead, a hearse was provided, drawn by an horse, and attended by two
men. As soon as the breath was out of the body, these men were sent for; they usually brought a coffin
and tarred sheet with them, in which the corpse was wrapped, put into the coffin, and drove off to
Potter’s Field . . . and entered without the attendance of a single connexion or friend to bemoan their
loss.” Writing in a treatise about the cause of the disease, Richard Bayley noted that the epidemic had
“occasioned a degree of mortality among the people never experienced in so short a space.” Not
surprisingly, he continued, it also “afforded matter of much serious conversation, and gave rise to a
great diversity of opinion.” Indeed, as E. H. Smith recorded in his diary on September 20, 1795, at the
height of the fever’s destructiveness, “Wherever you go, the Fever is the invariable & unceasing topic of
conversation. When two persons meet, the Fever is the subject of the first inquiries. . . . In one shape,
or other, the fever is constantly brought into view.”

The natural uneasiness of the New Yorkers during the summer and fall of 1795 was only
exacerbated by their recollections of the fevers that had already attacked Philadelphia in 1793 and
Baltimore in 1794. Davis, for example, claimed that “the recent sufferings of Philadelphia and
Baltimore, occasioned a greater fear of infectious fevers than would otherwise. . . . have existed.” New
Yorkers knew what to expect and dreaded what it would bring. Furthermore, by reflecting on the
consecutive epidemics in 1793, 1794, and 1795, inquirers in New York and elsewhere began to lose hope
that yellow fever might disappear as suddenly as it had come. Already on September 7, 1795, just after
the fever began, Dr. Amasa Dingley, a physician in New York and a friend of Smith, concluded that the
prevailing fever was the same one that had devastating the country for the last three seasons, and that

22 Matthew Livingstone Davis, A Brief Account of the Epidemical Fever which lately Prevailed in the City of New York
(New York: M. L. Davis, 1795), 15.
24 Elihu Hubbard Smith, The Diary of Elihu Hubbard Smith, ed. James Cronin (Philadelphia: American Philosophical
Society, 1973), September 20, 1795, 60.
25 Davis, A Brief Account of the Epidemical Fever, 15.
the disease would likely recur again and again. The New York epidemic of 1795 began to change the way that inquirers reflected on the problem of yellow fever.

The fever particularly troubled Noah Webster, whose thoughts in the fall of 1795 turned to the dire consequences of recurring epidemics and continuing medical disagreements. In a circular published in October 1795 and addressed to physicians all over the United States, Webster aptly depicted the crisis dawning over the United States. “As a malignant fever, has, for three summers past raged in different parts of the United States, and proved fatal to great numbers of our fellow-citizens, and extremely prejudicial to the Commerce of the Country, it becomes highly important to take such efficacious steps as human wisdom can devise to prevent the introduction, arrest the progress, or mitigate the severity of such a serious calamity.” The very “happiness of families and the general prosperity of the country” hung in the balance. Webster, however, regretted that the “warm controversy” that developed between localists and contagionists only hindered the prevention of yellow fever. “While a difference of opinion exists as to the origin and nature of the disease, no legislative remedies; no effectual police-regulations can be expected for the prevention of this calamity.”

Webster’s interest in yellow fever exposes an unfamiliar side of the patriotic New Englander, known principally for his composition of the first American dictionary, published in 1828. Born in 1758 in the small Connecticut town of West Hartford, Webster attended Yale College under the presidency of Ezra Stiles. While at Yale, Webster took in many of the precepts of Scottish Enlightenment philosophy, including the commitments to empirical study and common sense reasoning. Webster, for instance, regularly attended the lectures of Stiles. After graduating in 1778, Webster studied law for a time,

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26 This is told by Smith, Diary, September 7, 1795, 48.
passed the bar in 1781, but then abruptly abandoned the career in order to follow other pursuits. In the 1780s, he made a name for himself as a writer on various educational subjects, including the much-celebrated American Spelling Book (1783), an early indication of his eventual fame as a lexicographer, and an equally popular work, called The Prompter (1791), a collection a pithy, moralistic sayings, which bore the interesting subtitle, A Commentary on Common Sayings and Subjects, which are Full of Common Sense, the Best Sense in the World. In 1791, Webster moved to New York, where, at the behest of Alexander Hamilton and other Federalist leaders, he began to publish the American Minerva, a newspaper organ of the Federalist creed, which he edited until 1797.

By the time that yellow fever struck the city in August of 1795, Webster had pretty well internalized an approach to knowledge-making that told him how and why to approach the problem of yellow fever. He had also come to appreciate the unique problems created by the repeated occurrences of the disease. The ostensible failure of the treatises that detailed the facts of each disease occurrence demanded new approaches. Yet, far from turning away from the Hippocratic emphasis on disease observation, Webster expanded it. His “Circular” address of August 1796 was simply a call for information from physicians all over the United States. In it, Webster urged his colleagues to send him the appropriate “facts” of each occurrence, especially such information about “how far the fever has been attended with specific contagion, and the proofs of this,” as well information about “what situations as to free air, water, streets and buildings, this disease has been most fatal.” If collected together and published, Webster thought, such information would produce “universal conviction” of the fever’s cause. Only then could the cities erect the appropriate public health systems to prevent the return of yellow fever. Already at this early stage, we can detect the two main ideas that undergirded

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30 Ibid., 50; 129-131; 151-154.
31 Noah Webster, “Circular.”
and guided Webster’s inquiry into the causes of disease: first, the emphasis on facts as the empirical data of natural philosophic study; and, second, the confidence, born of common-sense epistemology, that such facts would establish the cause of yellow fever with “universal conviction.”

With the help of his friends in New York, Webster’s effort bore some fruit. Published in its final form in late 1796, only months after the initial Circular, the Collection of Papers on the Subject of Bilious Fevers contained eight papers from observers in the five major seaports towns that yellow fever had struck—Philadelphia, New York, Baltimore, New Haven, and Norfolk—including selections from Smith and Mitchell. In true Hippocratic fashion, the essays featured historical narratives of rise and fall of yellow fever in each location where it occurred, as well detailed observations of the weather, the conditions of the cities, and the diseases that had preceded yellow fever in prior seasons. The entire effort amounted to no less than a complete history of yellow fever in the United States up to its publication. At just under 250 pages, the Collection was just the type of repository that a history of its nature ought to have been. As one of the writers in the anthology declared, “By thus placing within so small a compass, the practical experience of those who have had an opportunity of treating and being acquainted with that disease, much useful knowledge of the subject may be disseminated, and the general good of mankind promoted.”

By anyone’s estimation, Webster had delivered a success.

The Collection might have been considered a resounding success except for one particularly bedeviling fact—Webster’s hope for a “universal conviction” about the cause of yellow fever never materialized. Despite the preponderance of papers that attributed the sickness to local sources, one correspondent, Dr. Eneas Monson, marshaled compelling evidence that the fever that struck New Haven in 1794 originated from contagion. On June 15, 1794, Monson visited a patient, the daughter of Elias Gorham, young girl of eight years, who was exhibiting signs of a fever. The girl had been sick for three

days before Monson attended to her, so her symptoms had already progressed dramatically. Upon arriving, Monson reported observing “her countenance flushed with a deep red colour; her eyes were dull, and highly inflamed; she had violent pain in her head, back, and limbs; nausea, and frequent vomiting; obstinate costiveness; a quick, full, hard, throbbing pulse; her skin was hot and dry; and her tongue covered with a thick white fur.” On the sixteenth, the girl’s symptoms ceased—“her pain and distress suddenly abated,” Monson declared. But, then just as suddenly, she relapsed, vomiting “up matter resembling coffee-grounds.” The next day, the daughter of Elias Gorham died.33

Having realized by the latter stages of the illness that the child had contracted yellow fever, Dr. Monson inquired into the girl’s activities leading up to her illness. The girl’s mother told Monson that she had been visiting with her aunt, the wife of Isaac Gorham, who lived near the “Long-Wharf” in New Haven, about three quarters of a mile from Elias Gorham’s house. The deceased girl’s aunt, named Polly Gorham, had also taken the fever and died, succumbing on the fifteenth. Further investigation revealed that an infected vessel from “Martinico,” piloted by a Captain Truman, had arrived in New Haven near the beginning of June and then docked at the wharf “within a few rods of Isaac Gorham’s house.”34 Captain Truman then unloaded a “chest of clothes” that belonged to a sailor who had died of yellow fever, and took it to Mr. Austin’s store, apparently in order to sell the contents. He opened the chest in the presence of Mr. Austin, the owner; Henry Hubbard, the clerk of the store; and Polly Gorham. All three, Monson soon realized, had contracted yellow fever and died. Meanwhile, by the time when Monson began to put the pieces together, Elias Gorham’s wife, as well as Isaac Gorham’s three children, had also contracted yellow fever. Isaac Gorham lost his infant and young son.35

34 175; A rod was a unit of measurement commonly in use in the eighteenth century, which denotes a length of about 5.5 yards.
35 Monson, 176
city of New Haven as a whole, sixty-four people died of yellow fever during the summer and fall of 1794.\textsuperscript{36}

For his own part, Webster was torn between localism and contagionism. Though he would later denounce the “common” theory of contagion as “ill-founded,” at the time of the publication of the \textit{Collection}, Webster would not go quite so far. In his conclusion to the compendium of documents, Webster specifically claimed that he would not rule definitively on either theory. Equally impressed by the evidence of both theories, Webster staked out a ground somewhere in between. “One thing may safely be averred,” he began, “whether imported, or generated by local causes in our own country, the epidemic influence and destructive effects of this malignant bilious fever, are greatly increased by local causes, which are wholly within the command of human power.”\textsuperscript{37} As Webster saw it, though the disease might originate from contagion—many facts certainly indicated that this might be the case—it nevertheless took its power, or its “epidemic influence,” from particular features of the environment, especially the conditions of the city, which were rife with noxious, disease-causing substances, such as putrefying animal and vegetable remains. To Webster, the matter that caused the disease—the remote cause, in the parlance of the time—was only the spark that ignited the general conflagration; the epidemic influence, on the other hand, was the powder.

Webster gave no indication that he knew of it at the time, but the so-called “epidemic influence” of the air was a highly-sought-after mystery in the history of medicine. Ever since Hippocrates, medical thinkers had pondered over the hidden qualities of the air and environment that enabled diseases to become epidemic in proportion. Why, indeed, did the same disease sometimes strike as an epidemic and sometimes not? The question had also occupied the mind of Thomas Sydenham in seventeenth-century England. In fact, Sydenham turned toward environmentalism out of

\textsuperscript{36} Ibid., 178.
\textsuperscript{37} Webster, \textit{Collection}, 201.
the desire to compile empirical evidence that would cast light, not merely on individual epidemics and their causes, but on the phenomena of epidemics as a whole. What was it that imparted to the air its pestilential quality, its ability to turn diseases into epidemics? Sydenham called this elusive state the “epidemic constitution,” a term that Webster would soon borrow in his own writings. 

Interestingly, too, Sydenham had argued that an epidemic would only occur in the presence of the mysterious epidemic constitution, regardless of whether or not the remote cause, or seminium of the infection, came from a human (i.e., from contagion) or from the environment (i.e. from local causes).

Thus, while the Collection may have failed to produce unanimous opinion about the proximate cause, or the spark of yellow fever, it did change the course of the debate in another way. Rather than examining a single epidemic and marshaling facts to support its origin from contagion or local sources, Webster began to look at the phenomenon of disease through a much broader lens—he began to think more historically, as it were. The question as he asked it was not “what caused yellow fever,” per se, but “why did yellow fever suddenly arrive in the United States and afflict its seaports for three consecutive years, when it had been almost entirely absent before?” Webster took the contagionist perspective seriously. From the start, importationists claimed that if heat, humidity, and putrefying matter produced yellow fever in 1793, 1794, or 1795, then they must do so all the time. Yellow fever, however, had only occurred a few times in the entire history of North America. Webster’s epidemic constitution was one way of explaining why that was the case.

Impressed by Webster’s Collection, but dismayed by its apparent failure to settle the controversy over the fever’s origins, S.L. Mitchill, Edward Miller, and E. H. Smith followed up with an effort of their own. Thrust together in New York’s burgeoning, yet intimate intellectual scene, the

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39 Ibid., 166.
unlikely threesome made a motley group from the start. Only Mitchill was a native New Yorker; he had been born in North Hempstead, Long Island in 1764. Mitchill apprenticed for five years under the tutelage of his uncle, Dr. Samuel Latham, then with Dr. Samuel Bard, before traveling to the University of Edinburgh, where he studied with the aging William Cullen (who would die in 1790), graduating with a medical degree. When Mitchill returned from Edinburgh in 1787, instead of practicing medicine, he immediately took a post the Professor of Chemistry at Columbia College. Sometime after 1793, he met Smith, the eager young poet and budding physician (though without university education). It was probably Smith who introduced Mitchill to Miller, a doctor originally from Dover, Delaware. Like Mitchill, Miller apprenticed for several years in his home town before moving to Philadelphia, where he earned his medical degree from the University of Pennsylvania in 1785. Thereafter, Miller built and abandoned medical practices in Frederica, Delaware, then in Somerset County, Maryland, before leaving for New York in 1796. After arriving, Miller began to pay regular visits to Friendly Club, of which Smith was a member. The three soon collaborated on one of the more lasting intellectual achievements of the early republican period.

Smith seems to have hatched the idea in the summer of 1796. In a diary entry of August 11, 1796, having learned that Webster would no longer collect evidence about yellow fever, Smith mused over “taking it up myself . . . and publishing an annual volume; the principal object of which will be the preserving & collecting of the materials for a History of the Diseases of America.” In the early part of 1797, Smith and his colleagues drafted a proposal for a vast, collaborative, fact-gathering enterprise, which, they hoped, would eventually result in a history of disease in the United States. Addressed to physicians all over the country, the proposal called for descriptive information regarding the

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41 William Huffington, The Delaware Register (Dover: S. Kimmey, 1839), 114-115.
43 Smith, The Diary of Elihu Hubbard Smith, 201.
occurrences of disease. The writers asked for five types of information: “Histories of such diseases as reign in your particular places of residence,” “Histories of such diseases as appear among Domestic Animals,” “Accounts of Insects,” “Histories of the progress and condition of Vegetation,” and “The state of the Atmosphere.” Believing that such observations and histories contained valuable clues as to the causes of disease, the authors hoped that by providing an outlet for them, they might rescue many useful facts from “oblivion.” “For there are few men,” they acknowledged, “who find leisure and inclination . . . to become authors, and still fewer whose observations are so numerous and important as to demand a labored treatise.”

As the authors saw it, the proposed historical enterprise seemed especially well suited to the unique circumstances of the United States. Unlike European countries, the United States possessed “extensive territory” and a great variety of soils, climates, and peoples. The nation’s diversity—climatic, environmental, as well as human—afforded countless opportunities for observing the operations of diseases in different situations. The authors hoped, for example, that the collection might help them to discern the effects of “gradual and rapid changes in the face of a country,” and the influence of the “savage, civilized, and intermediate states of society.” Once published, the authors confidently predicted, the collection “could scarcely fail, even in a few years, of leading us to a near view of the origin and causes of general, febrile diseases” and to “the discovery of what situations, climates, and seasons, most favoured their production.”

In its most essential details, the proposal conformed to the latest, most sophisticated and scientific way of making natural knowledge about disease, at least as its authors understood it. In the proposal, Miller, Mitchill, and Smith specifically linked their plans to broad changes in natural philosophy.

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45 Ibid., 2.
46 Ibid., 2.
47 Ibid., 5.
that extended all the back to the Scientific Revolution of the preceding century. The very first lines of the “Address” read:

After a continued struggle of many centuries against the absurd systems of ancient physicians, and amid the difficulties repeatedly opposed to the progress of Medicine by modern hypotheses scarcely less preposterous, it has length become established as a fundamental truth, that experiment must precede conjecture, and that facts are the only rational basis of theory. Philosophers are no longer permitted to descend from generals to particulars, shaping them according to preconceived notions of their intimate relations; but are expected to proceed by a rigid examination and cautious assemblage of particulars to every general inference.48

As scientific ideas gained ascendancy, the authors continued, “Collections of Histories and Observations . . . have gradually obtained a high consideration and authority in the schools of medicine, as well as in the closets of practitioners.” History—even contemporary environmental histories, of the sort the trio of writers solicited—supplied the core evidence for empirical research; history furnished investigators with the materials for “rigid examination” and the “cautious assemblage of particulars.” History would lead the way forward in the scientific understanding of disease.

Like other expansive, classificatory thinkers of the Enlightenment, moreover, the authors built their idea on the outright admission that they simply did not know very much.49 “Our knowledge of nature is too limited, our collection of materials too scanty,” they admitted, “to enable even the most diligent and ingenious to frame a correct theory.”50 After more than a hundred years since the world-changing research of the Scientific Revolution, medical thinkers had to admit that the study of disease had not advanced like the study of mechanics, or chemistry, as we will see. The yellow fever inquirers certainly knew that many mysteries still surrounded the phenomenon of disease. Indeed, the compilers asked for such a broad range of observations precisely because they did not truly know what they were

48 Ibid., 1.
49 Works like the Comte du Buffon’s *Histoire Naturelle* (volumes were published from 1749 to Buffon’s death in 1788) and Linnaeus’ *Systema Naturae* (1735) were designed and offered as starting points for further investigations.
looking for; they did not fully understand the relationship between environment and disease, even if they did know that there was one. They had only suspicions and an overriding confidence in the soundness of their methodology.

The authors of the “Address” never did publish the compilation they intended, at least not in any single history. Instead, the trio diverted their energies to a new project, a periodical publication that would regularly feature news of disease in the United States as well as intelligence from scientific circles in Europe. In November 1796, Smith, along with Mitchill and Miller, finalized their plans for the Medical Repository, as the journal would be called.\(^{51}\) The journal filled the more overarching need for scientific intelligence. In his diary entry of October 22, 1795, Smith bemoaned the lack of journals in the United States. “Great & important discoveries, it is tho’t, are often lost, for want of some cheap & convenient vehicle of information,” he scrawled out in a lengthy diatribe against the obstacles to scholarly communication in the United States.\(^{52}\) By uniting distant peoples in the United States and by putting them in touch with the latest scientific and medical happenings in Europe, the Medical Repository would remedy fundamental problems in the transmission of knowledge in the early republic.\(^{53}\) The editors, however, did not forget the commitment to the study of diseases that initially had set them on the path to the Medical Repository. The very first article in the journal was Smith’s “The Plague of Athens,” which he intended to be the first in a series of similar essays about past plagues. Though he did not follow through on that early promise, the journal did regularly feature narrative descriptions of diseases from all over the United States. In fact, the editors, all of whom were localists, regularly requested information about the circumstances—time of year, temperature, rainfall—that accompanied disease outbreaks.

\(^{51}\) Smith, Diary, Monday, November 14, 1796, 246.
\(^{52}\) Smith, Diary, Thursday, October 22, 1795, 78.
Meanwhile, in the summer of 1797, as the editors of the Medical Repository savored their newfound success, the return of yellow fever to Philadelphia set off another round of commentary. As the fever raged, William Currie wrote a bold letter addressed "to the citizens of Philadelphia," and then published on August 21 in Claypoole's American Daily Advertiser, in which he argued that a ship called the Arethusa had introduced yellow fever to Philadelphia. The Arethusa, a slave vessel, had arrived in port on July 18 or 19, 1797, with eleven people on board, none of whom were sick. Soon after arriving, the "pilot" of the vessel took ill with what Currie deemed to be yellow fever. Only five days later, five more sailors who had been lodging aboard the Iris, a ship docked next to the Arethusa, also came down with symptoms of yellow fever. Currie's suggestions incited a skirmish of sorts in Philadelphia's newspapers, with Benjamin Wynkoop, a printer, taking the side of localists and Currie defending his own theory. Eager for news of the fever in Philadelphia, journalists in New York also began to run the Currie-Wynkoop debate.

The public debates between Currie and Wynkoop attracted the attention of Webster, who once again entered into the yellow fever controversy, presenting himself to the public as an impartial arbiter of opinions. In a series of twenty-five letters addressed to Dr. Currie, which appeared in his own newspaper, the New York Commercial Advertiser, from October 26 to December 20, 1797, Webster presented trenchant analyses of Currie's argument. In the first letters, Webster reiterated much of what he had already claimed about the cause of yellow fever. Without specifically denying the contagiousness of yellow fever, Webster claimed that it would not activate into epidemic form without the aid of local atmospheric conditions. "Whatever be the truth as to the first introduction of the plague, the communication and prevalence of it as an epidemic disease, depend wholly on the constitution of our own atmosphere," he claimed in the second letter of October 28, 1797. In

54 Webster's communications to Currie were collected and published by the editorial staff at the Bulletin of the History of Medicine. See Noah Webster, Letters on Yellow Fever Addressed to Dr. William Currie, Issue number 9 of
characteristic manner, Webster lamented that the confusion about the nature of contagions arose from the careless use of language. “It is to be wished, Sir, that words infection and contagion, had each a definite technical meaning. In ordinary language they are used as synonymous, and so are they explained in dictionaries.” After tracing the confusion from their Latin roots through their various permutations over the centuries, Webster urged his readers to accept Dr. Richard Bayley’s earlier definition of contagious disease—“one which may be and usually is communicated from person to person, by the touch or near approach, independent of season or accidental circumstances; as the small pox, measles and hooping-cough.” On the other hand, “An infectious disease I consider as one capable of being received from diseased persons only under certain circumstances.” Such was the case with yellow fever, which required what he now referred to as an “epidemical constitution” of the atmosphere.55

As Webster investigated Currie’s arguments, digging deeper into the various stories of importation and infection, he unexpectedly encountered evidence that began to cast doubt on the contagionists’ entire perspective. By the time of the publication of his Brief History of Epidemic and Pestilential Diseases (1799), he had completely abandoned the theory. For Webster, contagionism did not fail because of any inherent flaw in the doctrine; many diseases were contagious, as he knew. Rather, contagionism faltered on the inaccuracy of testimony. In the introduction to the Brief History, Webster wrote, “I found repeatedly that the reports of persons taken ill, in consequence with vessels from the West-Indies, or with diseased seamen, infected cotton or clothing, or the like causes, were mere idle tales, raised by the ignorant or interested, and wholly unsupported by evidence. Scarcely an

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instance could be found, in which the evidence of the propagation of disease, from imported infection, was sufficient to render the fact even probable."\textsuperscript{56}

Having decided that remote cause of yellow fever arose from domestic sources, Webster turned his attention to deciphering the epidemic constitution of the air, the key to his emerging picture of disease causation. In keeping with dominant trends in natural philosophy, Webster focused on the facts, and the facts led him further into the past. The \textit{Brief History} is above all things a comparative history of diseases, based on minute historical research from primary and secondary sources. In it, Webster examined the circumstances surrounding all of the well-known plague outbreaks in recorded history—biblical plagues, the Athenian plague, the great plague that assailed the Roman empire during the late-second and third centuries AD, the plague during the reign of Justinian in the sixth century AD, the Black Death, and many others. His sources ranged from first-hand accounts, such as Thucydides’ brief description of the Athenian plague and Procopius’ narrative of the disease in Constantinople during the sixth century, to secondary accounts, including such noteworthy titles as Edward Gibbon’s \textit{The Decline and Fall of the Roman Empire} and Charles Rollin’s \textit{Ancient History}, as well as numerous travel accounts, such as those by Volney, the Baron de Tott, Cornelius de Pauw, and Dr. Alexander Russel, among many others.\textsuperscript{57} Webster hoped that by comparing the conditions during which past and present diseases struck he might be able to discern the patterns that he hoped would reveal the cause of the epidemic constitution. Webster particularly focused on the major climatic and environmental happenings. "I shall note, as I proceed," he began, "any extraordinary occurrence or phenomena in the physical world, as earthquakes, eruptions of volcanoes, appearance of comets, violent tempests,

\textsuperscript{56} Noah Webster, \textit{Brief History}, vii-viii.

unusual seasons, and other singular events and circumstances, which may appear to be connected with pestilence, either as a cause or effect, or as the effect of a common cause.”

Though novel in its subject matter, Webster’s Brief History does share themes in common with typical Enlightenment histories, particularly its universalizing emphasis. As the students of eighteenth-century historiography have argued, Enlightenment historians strove in their works to unite disparate peoples of the Western world around a single story, usually one that focused on the progress of civilization and enlightenment. Even the American historian, David Ramsay, took part in the effort. In his works, Ramsay tried consciously to place the United States within the unfolding of a larger Western history. Like his contemporary historians, Webster too wanted to place the United States and Europe into a single narrative—that is, a narrative of disease, which privileged the miasmatic theory, and united all peoples and regions through their common victimization at the hands of the occult epidemic constitution.

Yet, Webster’s intellectual endeavor was fraught with difficulties. Webster, for example, encountered numerous obstacles to attaining the copious numbers of books he required. The problem in many struck at the unique deficiencies of the United States, a country still in its developmental stages and lacking in many of the resources so common to European centers of intellectual activity. “No man can find in this country all the books necessary for a complete examination of a historical or scientific subject,” he lamented in the Brief History. Not even the vaunted collection at the Library Company of Philadelphia or the private collection at Harvard could satisfy Webster’s desire for books. “The public libraries of New-York and New-Haven, tho very valuable, are deficient. Those of Harvard College and

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58 Webster, Brief History, I: 21-22.
60 O’Brien, Narratives of Enlightenment, 204-233.
Philadelphia, are more extensive, but incomplete.” The lack of works in foreign languages particularly troubled Webster. Though he easily found the writings of the Romans and the Greeks, he could not find those from modern writers in Italy, Germany, Spain, and “the Baltic nations,” leaving gaping holes in his research.  

Webster also complained about the books that he did obtain. In a complaint echoed by modern historians, Webster criticized the narrow, biased foci of the historians of his own age. “Most modern writers appear to think every thing beneath their notice, except war and political intrigues.” Even the most celebrated historians of his time—“Hume, Robertson, Smollet, Rapin and Gibbon”—virtually ignored the plagues that desolated mankind, making the retrospective identification of their causes extremely difficult. As Webster saw it, the deficiency sprang not from any methodological error or absence of appropriate source material, but from deep-seated flaws in the characters of modern historians and the purposes of modern histories:

In respect to useful history, the ancient authors have the preference over the modern. Modern compilers appear to have written for fame or for money, rather than for the sake of unfolding or diffusing truth. Hence they have principally attended to those animated periods of the world, which were distinguished for great achievements; or those prominent events, a description of which would interest the passions of their readers: Or they have selected for description such parts of the history of nations as would enable them to adorn their works with an elevated style; omitting a multitude of subordinate facts, as below the dignity of history. Others appear to have undertaken historical compilation, solely or principally to support some preconceived system of government or religion; and have studied to bend the evidence of facts, to the accomplishment of that purpose.  

Travel writers attracted much the same censure from Webster. As Webster depicted the composers of travel narratives, “They pass from country to country; examine and describe a few external objects, such as cities, buildings, paintings and statues, but leave more useful subjects unexamined, and return home

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61 Webster, Brief History, I:22.
62 Ibid., I:23.
with a book of vulgar tales and errors.”63 While such tales might amuse a general audience, they did not meet with Webster’s standards of useful reading.

Furthermore, though Webster generally valued the testimony of past writers more than moderns, he also discovered flaws with first-hand accounts, especially those from the ancient world. In a very early section of the Brief History, Webster encountered difficulties in trying to reconstruct the history of the fifth-century BC, an eventful and calamitous time in the history of the Western civilization. Drawing from a panoply of classical writers, including Livy, Thucydides, Herodotus, and Dionysus of Halicarnassus, Webster narrated the events of the century, focusing, of course, on the various pestilences that occurred as well as the natural phenomena that accompanied them. But he soon realized that historians seldom agreed, even on the most essential details, such as the chronology of events. Livy, for instance, wrote that a pestilence in Rome in 464 BC was followed shortly after by an earthquake in 462 BC. Another source, however, claimed that the earthquake had come from an eruption of Mt. Etna on Sicily in 466 BC.64 Webster naturally chose the latter date since it could be placed into a chain of causation that led to the outbreak of disease in 464. Similar inexactitudes littered Webster’s great account of diseases in world history. Webster wrote abashedly, “We are sometimes embarrassed with the differences in the chronology of different authors.”65 The problem proved particularly vexing to Webster, whose argument about the cause of the epidemic constitution depended on the precise knowledge of the relationships between plagues and other natural occurrences.

Despite the numerous problems he encountered in his research, by the end Webster willingly offered a firm, even striking conclusion. Based on his exhaustive survey of the sources, Webster found that the yellow fever epidemics of the United States, as well as all other plagues in the history of

63 Ibid., I:23.
64 Ibid., I:35-36.
65 Ibid., I:38.
mankind, had been preceded by “violent agitations of the elements.” Such agitations included principally earthquakes, and volcanic eruptions, as well as droughts, severe winters, and epizootic diseases. As he moved through history, time and again Webster discovered that major environmental occurrences always preceded the appearances of pestilence. In his investigation of history from the time of Christ, Webster studied forty-seven separate occurrences of plague and for each one he found corresponding evidence of some remarkable natural phenomena, such as earthquakes or volcanic eruptions. Tellingly, the plagues and natural phenomena did not have to be confined to the same geographic area, nor did they have to be aligned in a precise chronological sequence. For Webster, it was enough that an earthquake or eruption had occurred somewhere on the globe, and that perhaps a few years or even a decade had separated the two events. He expressed no concern that the last major earthquake in the United States occurred in 1783, ten years before yellow fever began to afflict the seaports, or that earliest preceding volcanic eruption took place on Mt. Vesuvius in 1789.

To be sure, Webster never claimed that the events preceding the appearances of diseases actually caused them. Rather, he argued that the two phenomena were both effects of another cause, the elusive epidemic constitution. “The evidence I have collected,” Webster delightedly wrote to Benjamin Rush in February, 1799, “will demonstrate that the great primary cause of epidemics, is a quality of the atmosphere, extending usually over one hemisphere, sometimes over the globe.” Unfortunately, Webster did not know what produced the primary cause, the epidemic constitution, though he speculated that it might be the “invisible operations of the electrical fluid,” which he thought surrounded the earth at all times. Confiding to Rush in a letter dated November 26, 1799, Webster admitted, “I more and more see the difficulty of reaching the cause. That the electrical principle is the

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66 Ibid., II:10.
67 Ibid., I:65-283.
68 Ibid., II:9, 11.
69 Webster to Benjamin Rush, February 27, 1799, in Letters on Yellow Fever, 17.
70 Webster, Brief History, II: 15.
agent, I am inclined to believe; indeed, I have not the power to resist the evidence of it; but by what combination with aerial substances, I am ignorant.”

Even more remarkably, Webster tried to correlate the perturbations in the electrical fluid, and thus the rise of the epidemic constitution, with observable astronomical phenomena. In fact, he devoted large sections of the Brief History to discussing the positions of the moon and planets, as well as the appearances of comets during times of pestilence.

Webster believed that the proximity of heavenly bodies exerted force on the earth, altering its proportions of “electrical fluid” and thus preparing it for epidemic disease. The same force also, in some fashion, produced the major natural disasters that accompanied epidemics. “It is not indeed unphilosophical to suppose,” Webster claimed, “the several immense orbs that compose the solar system, to have an influence on each other by means of the great laws of attraction and repulsion.” As an example, Webster cited the great influence of the moon and comets upon the earth’s seasons and the oceans’ tides, which philosophers had understood “as long ago as the days of Aristotle.”

Webster’s theory of disease causation, with all of its intricacies, bold claims, and deductive leaps, rested on simple assumptions about the makeup of the world and the human ability to understand it. God had created a magnificent world filled with wonder, but he had also endowed humans with the rational capacity to examine it, to reach firm conclusions about it, and thereby to better their own conditions. This shared capacity, the common sense, enabled inquirers to sift through the scattered phenomena of nature and to find truth amongst the repeated concurrences of events. The common-sense epistemology had lured Webster into the historical study of disease in the first place—indeed, it undergirded the entire effort amongst the fever investigators—and it sustained his conclusions once he had finished. Webster had shown that certain facts accompanied each and every

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72 Webster, Brief History, Vol.II: 78-134.
73 Ibid., II: 78.
74 Ibid., II: 79.
occurrence of disease in human history, and, he believed, those facts would not deceive. Thus, even
though Webster could not pinpoint the precise causal relationship amongst the facts, he nevertheless
asserted that there was one.

Webster’s particular views of creation and human intellect also prepared him to accept some
rather fanciful ideas about the inherent powers of the natural world. Common sense allowed humans
to understand nature, but it did not in any way limit what was possible in the world. In fact, it opened
up numerous possibilities by lowering the standards of proof. Webster’s implication of “electrical fluid”
as a causative agent, for example, underscored the widespread fascination with electricity, the little-
understood form of energy whose mysterious properties and nature captivated participants in the
American Enlightenment. As James Delbourgo has shown in his studies, the combination of a strange
and powerful force with common sense resulted in a number of wild theories about electricity’s
influence and applicability.  

Webster’s belief in the agency of the planets and stars, likewise, showed that even marginalized fields and practices such as astrology could explain some natural phenomena, if one embraced a permissive enough epistemology.

Webster’s contemporaries evidently held many of the same opinions, at least judging from their
overwhelmingly positive reactions to the Brief History. Benjamin Rush gushed over some of the early
drafts of the arguments that Webster would feature in the Brief History. “You have opened a mine of
precious metals to the lovers of science and friends of humanity,” Rush began in letter of March 1798.
“I have for some time past suspected that the malignant constitution of the atmosphere taken notice of
by Hippocrates and Dr. Sydenham pervaded our whole globe, at the same time and that it was somehow

75 See James Delbourgo, A Most Amazing Scene of Wonders: Electricity and Enlightenment in Early America
in the Late Enlightenment: The Transatlantic Career of Perkins’s Tractors,” William and Mary Quarterly 61, no. 4
(October 2004), 643-684.
76 Patricia Fara, “Marginalized Practices,” in the Cambridge History of Science, vol. 4 Eighteenth-Century Science,
486-507.
produced by the influence of some part, or parts of the solar system upon our planet. But you have demonstrated that to be true which was only a floating idea in my mind.”

According to Rush, Webster’s historical work had actually illuminated a facet of a great mystery in the history of medicine. The epidemic constitution hovered over large parts of the earth, sometimes the whole planet, and it was intimately tied to the movements and positions of the heavenly bodies.

In their review of the *Brief History*, the editors of the *Medical Repository* added to the praise of Webster’s work. “Whether we consider the extent and novelty of the design, the diligence, acuteness, and erudition displayed in the investigations, the ingeniousness and sagacity of the combinations, or the importance of the results; whether we consider the revolution of opinions which it tends to effect, or the range of inquiries which it is adapted to awaken.” However one considered it, “In our judgment Mr. Webster has performed a great work.” The editors seemed particularly pleased with the methodology that Webster adopted. Having assumed the “station of an historian,” Webster gathered information from disparate sources, examined those sources critically, and then reached conclusions from the solid empirical basis of his research—the countless examples of the correlation between diseases and other natural phenomena. Consequently, Webster had produced “luminous and incontrovertible proof” of the epidemic constitution. The editors also tempered their praise with some cautionary advice about the true meaning of Webster’s conclusions. “It is requisite to know much more of nature,” they admonished their readers, “Before we can hope to ascertain the precise degree of connection or dependence of these occurrences upon one another.” Webster, after all, had not demonstrated causality; he had only shown that a broad range of coincidences indicated—and, as he and others saw it, quite forcefully—that disease and other observable phenomena shared a relationship of some sort. Whether the phenomena caused the diseases, or whether they were only produced from another

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77 See Henry Sigerist, ed. *The Letters of Noah Webster*, 14?
78 “Review,” in *The Medical Repository* 3, no. 3 (February 1800), 278.
79 Ibid., 279.
common cause, however, they did not know. In order to clarify these outstanding questions, the editors urged philosophers to gather “more numerous and more minute observations.”

At the nearly same time as Webster published his Brief History, another inquirer, James Tytler, published his own history of disease, titled A Treatise on the Plague and Yellow Fever. Published by an obscure press in Salem, Massachusetts, the Treatise evidently took its contemporaries by surprise, unlike the highly-anticipated work of Webster. The editors at the Medical Repository complained that they only received the volume months after its initial release. Mystery also enshrouded its author, James Tytler who had not written anything on yellow fever before the Treatise. In fact, he had only recently escaped from Scotland in 1793, where authorities brought him up on charges of sedition. While still in Scotland, Tytler had practiced medicine and surgery. He had even achieved some renown as the author of the medical portions of the Encyclopedia Britannica and the System of Surgery (1792), a practical guide for surgeons. Famously, he had also been the first Briton to pilot a hot air balloon, a feat that earned him the nickname, James “Balloon” Tytler. After the release of the Treatise, he lived the rest of his life in obscurity in Salem, until his death in 1803.

Like the work of Webster, Tytler’s Treatise drew from numerous sources, old and new, in order to reconstruct the history of epidemic diseases and ascertain their causes. In the first section, Tytler followed the history of the true plague, the bubonic plague, from its first supposed appearance in the Bible, to the much more recent accounts of its activities in the “Turkish dominions,” especially Constantinople and Egypt. Along the way, Tytler described the plagues that struck the Greek world during the Trojan and Peloponnesian Wars, as told by Homer and Thucydides, respectively. He

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80 Ibíd., 288.
81 Medical Repository 3, no. 4 (May, 1800), 373.
82 Biographical information about Tytler can be found in James Ferguson, Balloon Tytler (Faber, 1972), passim.
discussed the plagues that beset the Roman Empire in the tumultuous third century AD, and the harrowing epidemic of Constantinople under reign of Justinian. Tytler also covered the famous epidemics in London in 1665 and Marseilles in 1720, and, at the end of the book, he even appended short excerpts from some of the more famous plague narratives in history.

Tytler’s analysis offered strikingly different conclusions from the work of Webster. Upon examining the conditions that accompanied plagues in history, Tytler found no evidence to suggest that disease and the environment shared any relationship whatsoever. To the contrary, he discovered that similar diseases frequent arose from contrary conditions, and that similar conditions did not always produce diseases. Casual inconsistency, combined with the observations of others, convinced him that diseases, yellow fever included, arose from imported contagions, or particles of invisible matter that imparted sickness to people.\(^8^3\)

But rather than stopping at that conclusion—a rather unsatisfying one, because it did not posit a first cause—Tytler proposed a new way of accounting for the advent of contagions. Actually, Tytler’s theory was not new at all, but very old, perhaps the oldest theory about the advent of disease in human history. In short, Tytler simply asserted that God had sent diseases to humans as punishments for their sins. As he saw it, God had created each separate disease in order to punish specific acts of disobedience.\(^8^4\) One could even trace these creations through history in some cases, provided that one possessed adequate evidence. In fact, according to Tytler, the Bible preserves a record of the very first outbreak of epidemic disease in human history, which occurred when David committed the sin of “numbering the people,” or imposing a census on the kingdom of Israel. David’s oversight implicated his pride and thus provoked the ire of God, who offered David three choices of punishment, of which David


\(^{84}\) Ibid., 40-41, 47, 71.
chose the plague.\textsuperscript{85} Having come into being, the plague particles simply traveled around the world from that point forward. Tytler even pursued the contagion to its next destination, the camp of the Greek warriors outside Troy during the Trojan War. As he informed his readers, “David was nearly contemporary with the Trojan war.” The accounts of two outbreaks from the Bible and the \textit{Iliad} also shared many similarities:

Both plagues were inflicted on the people for the sins of their kings; both were miraculous; the one continued three days the other nine. In both the Deity himself appeared: an angel brandished a drawn sword over Jerusalem; and Homer says, that, from the top of Olympus, Apollo shot his arrows into the Grecian camp. Lastly, both were stopped in a similar manner: David offered sacrifices to the true God; and Agamemnon returned Chryseis, to her father, the priest of Apollo, by whose prayers and sacrifices the plague was stopped.\textsuperscript{86}

From the site of the Trojan War, the plague had simply migrated to the other places it eventually would afflict. All other diseases had similar lineages.\textsuperscript{87}

Tytler’s appeal to divine intervention provided an explanation for the major problem in the contagionist argument—the error of infinite regress. One could not trace diseases backwards infinitely, as his analysis of the historical record showed. Diseases came into being at specific moments in time, as punishments for specific acts of wrongdoing. Tytler, however, could only supply a terminus to the regress by positing an explanation that most natural philosophers at the end of the eighteenth century

\textsuperscript{85} This story is told in two places in the Bible: 2 Samuel 24; 1 Chronicles 21.
\textsuperscript{86} Tytler, \textit{Treatise on the Plague and Yellow Fever}, 9. The story of Chryseis’ abduction and the wrath of Apollo can be found in \textit{Iliad}, Book I.
\textsuperscript{87} Compared with Webster’s, Tytler’s history nicely illustrates an essential tension in eighteenth-century historiography. Like Webster’s work and the dominant works of time, it universalized historical events—in this case, through the story of disease. Crucially, Webster recognized that diseases operated in cycles that appeared throughout history, and that they could be stopped or at least mitigated by the progress of human enlightenment and the exercise of common sense. Tytler, rather, subordinated the world of humans and their decisions to a sacred history, with its more linear plotline, which placed God at both the beginning and the end. Carl Becker writes about this agreement and tension between the sacred and temporal, or enlightened, views of history in \textit{The Heavenly City of Eighteenth-Century Philosophers} (New Haven: Yale University Press, 2003 [1932]). Tytler and Webster (as well as the \textit{philosophes} and theologians in Becker) wanted to get to the same end; only Tytler saw that end outside of history, whereas Webster saw it within history.
considered invalid. Claiming that God did it was no way to account for natural phenomena. As a result, Tytler’s peers censured his Treatise and the arguments it contained. In the Medical Repository, for example, the localist editors dismissed Tytler’s contention about the divine origin of disease, though they otherwise applauded his efforts at compilation.

In a very real sense, Tytler’s contention only represented a logical end of the contagionist way of thinking. Contagionists had always claimed that yellow fever came from the West Indies, but they could not necessarily account for how it got there. So they borrowed from early accounts of the disease—such as those from Henry Warren and Pouppe Desportes—which claimed that it had come from some other place, perhaps Siam. They were still left with an unanswered question—if diseases did not originate from environmental conditions—heat, moisture, and putrefying matter—then how did they come into being? Tytler answered that it came from God, but by doing so, he only highlighted the untenability of contagionism.

Historical inquiry, then, worked decisively in the favor of the environmentalists. From 1799 onwards, inquirers more and more seized upon the epidemic constitution as the linchpin in their arguments for local origins. In his dissertation for the medical degree at the University of Pennsylvania in 1799, William Chalwill used the epidemic constitution as way of explaining why yellow fever prevailed over both the West Indies and the United States at the same time. Like his contemporaries, moreover, Chalwill searched history for examples of similar circumstances. “Thucydides tells us in his account of the plague at Athens, that it prevailed at the same time in part of Ethiopia, in Egypt, in Libya, and over a considerable extent of the Persian dominions. Procopius and Evagrius tell us that the plague which broke out at Constantinople, during the reign of the Emperor Justinian, lasted fifty-two years, and spread its influence over the whole earth.”

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88 Medical Repository 3, no. 4 (May 1800), 373-379.
89 William Chalwill, A Dissertation on the Sources of Malignant Bilious, or Yellow Fever, and Means of Preventing It (Philadelphia: Way and Groff, 1799), 8.
Similarly, in an oration delivered before the Academy of Medicine of Philadelphia on December 17, 1798, the young physician, Charles Caldwell, spoke at great length about the high value of the epidemic constitution. “Pestilence can become epidemic only, when aided by a concurrent constitution of Atmosphere,” he declared. “The nature of that peculiar state of atmosphere, favourable to the propogation of pestilential diseases, has hitherto eluded the researches of philosophers.” Still, Caldwell continued, “Reason and observation still declare it to be a quality resting, for the certainty of its existence, on evidence as substantial, as that which supports the great Newtonian principle, the gravitation of all terrestrial bodies.” Caldwell’s philosophical gaze moved to history and the events and phenomena surrounding the occurrences of disease. Borrowing from Webster’s letters to Currie, for example, Caldwell wrote, “The records of medicine afford ample proof . . . of the frequent and striking coincidence . . . of pestilence and the occurrence of earth-quakes and eruptions from volcanoes.”

Caldwell also found proof of the epidemic constitution in the fact that certain insects abounded during times of disease. Speaking about the latest occurrence of yellow fever in Philadelphia—a terrible epidemic, which carried off more 3,500 hundred people—Caldwell connected the presence of “muskitos,” which “were more than usually abundant,” to the existence of the epidemic constitution. “From the well known circumstance, that muskitos uniformly abound at the same time, and in the same places, with epidemic bilious fevers, we are very fairly authorized to conclude, that these noxious insects depend, for their existence, on an insalubrious state and constitution of atmosphere.”

In certain cases, historical arguments tipped the balance in favor of localism. In his dissertation for the medical degree at the University of Pennsylvania in 1804, a student named Phineas Jenks explored the similarities between the Asiatic and African plagues (bubonic plague) and the American yellow fever. Though Jenks ultimately concluded that they were all the same disease, produced from

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local sources and varying only according to the environments from which they came, he arrived at his conclusion only after a careful consideration of disease occurrences over space and time. According to his own testimony, Jenks once believed or assumed the truth of the contagionist doctrine, “But,” he elaborated, “my researches, and the mass of facts I have collected have convinced me that my opinions were erroneous, and that I had fallen into a popular mistake.”\(^1\) Having converted to environmentalist camp, he wrote with incredulity about the people who still attributed plague to “an obscure, and . . . distant origin, and sanguinely presumed to say, that it has had an existence ever since, being constantly kept up by contagion.” Jenks even compared the belief in the divine origin of disease to an ancient Egyptian belief, which held that disease arose from “flying serpents.”\(^2\) On the other hand, Jenks discovered decisive proof of the epidemic constitution, and thus the local origins of disease, in the very circumstances that had once constituted the major weakness in the environmentalist argument—causal inconsistency. In enumerating the proofs of the epidemic constitution, Jenks listed one reason as follows, “From epidemics not occurring, when their causes obviously exist.”\(^3\) The historical demonstrations of Webster transformed a weakness into a strength. To the contrary, as Jenks’ dissertation shows, history showcased the absurdity of contagionism.

By contrast, the contagionists did not make use of the epidemic constitution. This was not because it was incompatible with contagionism—a contagion could theoretically activate in appropriate environmental conditions just as much as a miasmatic particle—but, rather, because they did not need it. The mode of yellow fever’s introduction and transmission never troubled the contagionists, who knew that contagious particles could spread quickly and easily, so long as foreign vessels introduced them into affected cities. The epidemic constitution, being an unnecessary philosophical contrivance,

\(^2\) Ibid., 13.
\(^3\) Ibid., 28.
threatened the contagionists, and so they tried to destroy it. In his treatise on the 1799 epidemic in Philadelphia, the most prolific of the contagionists, William Currie, took aim at the localists’ bothersome new tactic. Writing of Webster’s view of the epidemic constitution, Currie claimed, “The doctrine of Mr. Webster on this subject, notwithstanding his elaborate researches, appears . . . to be as much the creature of imagination as the tales of the fairies.” For Currie, the frailty of Webster’s argument and the notion of the epidemic constitution as whole came from the absence of experimental evidence. “Till those gentlemen [localists] subject the atmosphere to eudiometrical experiments, and demonstrate that such a constitution does exist, or that some material change has taken place, it cannot with justice or safety be considered as any thing more than the mere suggestions of fancy, and deserves no more respect that the visionary opinions which prevailed in the dark ages of Gothic ignorance, when the conjunction or opposition of certain planets were believed to be the cause of the plague.” As Currie saw it, the repeated concurrence of events—volcanic eruptions, earthquakes, or meteors followed by plagues—did not even qualify as legitimate scientific evidence, much less prove the existence of an epidemic constitution.

Currie’s objections did not garner much attention, nor could they reverse the tide of opinion moving steadily in favor of localism, but they did effectively identify problems with the epidemic constitution and the historical arguments that undergirded it. Though the localists had tried to elevate history to the status of a science, their appeals to history, their obsessions with observations and facts, had all along come from the belief, grounded in common-sense epistemology, that such facts and observations could and would illuminate the causes of diseases. But they also quickly realized historical arguments of the localists fell far short of establishing causality. Smith’s “Plague of Athens,” for instance, had demonstrated that similar urban conditions accompanied pestilences in Athens in the

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95 Ibid., 68.
fifth-century BC and in the American port cities in the 1790s, but he could not tie them together as cause and effect. Webster’s *Brief History*, likewise, had shown that certain phenomena occurred within the span of a few years and in the same part of the earth as major epidemics, yet both he and those who praised him knew that he had not demonstrated cause and effect. Nevertheless, the localists did not sway from the conviction that it would work, that it would convince everyone if only they could gather more evidence, take more notes, and record more observations. Convinced that observations alone would disclose the patterns of diseases and then enable interpreters to respond to them appropriately, they marched forward confidently. In their review of the *Brief History*, Mitchill and Miller (by this time, Smith was dead), having already acknowledged Webster’s inability to establish causation, simply urged readers to continue with the same methodology, even going so far as to compare it favorably to experimental practices:

> There is reason to believe, that too much time and talent have been spent, within the last twenty years, in making experiments, devised, and often very badly, by the human head. Nature is the best experimenter; but the experiments which she makes want OBSERVERS and INTERPRETERS. To observe and interpret nature is the way to be truly wise and scientific. For these purposes facts must be collected, and from different parts of the earth. With a due portion of the spirit which actuated Aristotle, Pliny, and Bacon, a vast deal might be done in America, at this eventful time, in a few years.\(^{96}\)

The localists, then, were beginning to fall into another kind of regress, one in which more facts and more observations continually held out, but never fulfilled, the promise of solving the mystery of yellow fever.

The epistemological integrity of history as tool in the study of disease also suffered from the practices of its own users. Webster’s scorched-earth research program, for example, had left little in its wake of any value or reliability. In the course of investigating the causes of yellow fever, Webster had completely rejected the testimonies of all contagionists, impeached the integrity of modern history

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\(^{96}\) *The Medical Repository* 3, no. 3 (February 1800), 299-300.
writers, and questioned the purport of modern history. Even the much-esteemed ancient historians, Livy and Thucydides among others, had provided sloppy, inaccurate chronologies, and left gaping holes over large swaths of time in the historical record. More than that, Webster’s investigation had shown that the knowledge of history, whatever its level of detail or documentary basis, depended ultimately on the testimony, and therefore the honesty, of historians. The “facts” of history never did speak for themselves, as the investigators believed. To the contrary, history demanded that its interpreters decide what was reliable and what was not.

History did not last long as a tool in the investigation of disease, nor was the epidemic constitution vindicated by future scientific advances in the study of diseases. The main problem that the epidemic constitution was supposed to solve—the randomness or inconsistency of disease occurrences—once again emerged as a point of contention for those who argued for the local origins of diseases and it remained so until the microbiological breakthroughs of the nineteenth century.97 Nevertheless, for the time, history and the product of historical study, the epidemic constitution, enjoyed wide popularity, and thus by looking at them closely we can begin to see why it was that localism commanded such respect amongst increasing numbers of people. History allowed the inquirers to imagine their own yellow fever epidemics as part of sweeping changes taking place over the entire surface of the Earth; changes that certainly had some relationship with the "violent agitations of the earth" and the movements of the planets, though the localists knew not what; and changes, furthermore, which one could follow around in the historical record and detect in famous periods of

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97 Bruno Latour gives a compelling description of the problem in The Pasteurization of France, trans. Alan Sheridan and John Law (Cambridge: Harvard University Press, 1988), 20-21 and 32-33. As Latour casts it, the victory of Pasteurians depended on a group he called the hygienists, who were essentially localists who encouraged people to adopt hygienic habits as ways of avoiding disease. The hygienists could never quite convince everyone, because the sources of disease who were so many and the inconsistency of their occurrences so patent. Ultimately the microbiology of Pasteur (or, more accurately, the Pasteurians, for it was more their work than his) offered a way to explain the same causal inconsistency that the fever investigators encountered. Through the avid patronage of the hygienists, the “self-evident” demonstrations of Pasteur and his microbiological followers gained the support that they needed. Like microbiology of Pasteur and the Pasteurians, the epidemic constitution gained its popularity from its ability to satisfy a philosophical demand more than its self-evident correctness.
epidemic disease. Perhaps, then, yellow fever only reminded them of what they probably already knew, but did not want to admit, as the nineteenth century dawned over the United States—that the world was in a period of tumult, and that their own places in it might only be marginally more secure than before. If that.
Men who have been much taught, are apt to be deficient in the sense of the present fact; they do not see, in the facts which they are called upon to deal with, what is really there, but what they have been taught to expect.

--John Stuart Mill, 1869

In his *Nomenclature of the New Chemistry*, a book published in New York in 1794, Samuel Latham Mitchill reflected favorably on the history of chemistry, the field of inquiry devoted to the study of the compositions and combinations of substances. “Until quite a modern period,” he wrote, “Chemistry consisted of little more than scattered facts, imperfectly understood, and badly arranged.” The field, as Mitchill understood it, had long suffered under the defective guidance of the alchemists and their illusory quest for the secrets that would enable them to turn base metals into gold or produce elixirs of everlasting youth and beauty. “Cultivated for a long time by vain and visionary searchers for the philosopher’s stone and the universal medicine, it partook, as might be expected, in no small degree of the uncouthness and barbarism of its patrons.” Happily, change was afoot. Due largely to the work of “Lavoisier and some other French gentlemen,” the field had only recently undergone a kind of transformation. These chemists had produced results that were “of a kind so novel and unheard-of, that it became necessary to invent original names to express them.” In fact, as Mitchill opined in his paean to chemistry, “So many alterations, additions and improvements have been made, that it may almost be said to have undergone a transmutation.”

Hence, Mitchill’s work on the nomenclature of this new chemistry, a book intended to disseminate and explain the new concepts emerging from chemical research.

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The “transmutation” to which Mitchill referred constituted the breakthrough for which Marcellin Berthelot invented the more lasting term, “la révolution chimique,” or the Chemical Revolution.² In the parlance of Thomas Kuhn, the Chemical Revolution produced a paradigm shift, a fundamental conceptual reorientation toward the natural world. Kuhn likened a paradigm to a type of vision or lens that refracts what the scientist sees in his or her world. “When paradigms change, the world itself changes with them,” he wrote.³ After the Chemical Revolution, natural philosophers quite literally visualized the world in a whole new manner. It fostered an entirely new way of conceptualizing the elemental construction of nature—the very components of matter that made up the physical world, from the geological formations of the visible world, to the smallest aëriform particles that composed the invisible world of airs and gases. Perhaps not surprisingly, therefore, it had ramifications for all natural philosophic pursuits, including the study of disease.

As the epidemics progressed, the fever investigators increasingly turned to the new chemistry for concrete, empirically-based answers to their questions about the cause, nature, and transmission of yellow fever. The Chemical Revolution, after all, had emerged directly from experimental observations; thus, it satisfied the epistemology that demanded facts and observations. Chemistry, with its emphasis on the composition of air, the heretofore little-understood element of nature, offered a particularly powerful way to visualize the invisible disease-causing agent; to see, as it were, the particles floating about in an invisible aëriform state. More importantly, it allowed the investigators to locate the creation of the disease matter from the various interactions, mixtures, and exchanges that characterized normal chemical reactions. It enabled them to place the creation of the disease-causing matter in nature, to discern its emergence from the cycles of life and death that defined all natural operations.

² Marcellin Berthelot, La Révolution Chimique: Lavoisier (Paris, 1890).
³ Thomas Kuhn, The Structure of Scientific Revolutions (Chicago: University of Chicago Press, 1996), 111. Kuhn’s picture of the nature of paradigms—their impact on human perception of nature—was partially drawn from research on cognition, behavior, and perception in the 1950s and 60s. See Ibid., 111-135.
The new chemistry, in short, filled the investigators with the hope that they might finally solve the mystery of yellow fever and of diseases more generally.

As a leading champion and practitioner of the new chemistry, Mitchill’s own career offers an excellent vantage on the influence and impact of the Chemical Revolution on the American yellow fever investigators. The Long Islander’s experience with chemistry went back to his days as a student at the University of Edinburgh, where he studied under Joseph Black, before graduating with a medical degree in 1786. Mitchill also spent time in Paris in the mid-1780s at a crucial period in the formation of the Chemical Revolution. By the time that he returned to New York, Mitchill had gathered many of the perspectives that influenced his later career. When Mitchill took up the position as the professor of chemistry and natural history at Columbia College in 1792, he immediately instituted Lavoisier’s system of chemistry as part of the curriculum. Two years later, he published the Nomenclature of the New Chemistry, which he intended for use as a textbook. Beyond that, under his stewardship, the Medical Repository carried numerous articles, reviews, and news pieces about the chemical breakthroughs in Europe and the United States. Mitchill matched his efforts to disseminate chemical knowledge with an attempt to apply it in a 1795 treatise on chemical origins of yellow fever, the Remarks on the Gaseous Oxyd of Azote, in which he tried to demonstrate that material cause of the disease was actually a gas called septon, which emerged from putrefaction. The work earned him the plaudits of his contemporaries.

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Though hailed as a groundbreaking inquiry into the causes of disease, Mitchill’s *Remarks* and its speculative conclusions also point out a problem raised by the investigators’ uses of chemistry—they did not accept it quite as advertised. Historians of chemistry in the United States have certainly noticed that American chemists lacked the same record of success as their European counterparts. As John C. Greene commented, “At the practical level there was more lip service than actual achievement in the application of chemistry.”7 They have usually chalked these shortcomings up to institutional deficiencies, as though chemistry were simply a commodity that could be imported and applied to scientific problems, provided that the basic material requirements were present.8 I will argue that the history of chemistry in the United States has more to do with Americans’ epistemology. The chemistry of Lavoisier was supposed to represent the most rigidly empirical form of natural inquiry, based solely on the facts that emerged from experimental observation. Indeed, the American yellow fever investigators celebrated it and embraced it for just this reason. With very few exceptions, however, the chemical investigators did not perform experiments in order to reach conclusions. Instead they relied on various rationalizations, imaginative leaps, and syntheses of past research. Believing that with common sense they could grasp the simple answers to natural philosophic questions without the demonstrative proofs of experiments, the inquirers confidently assembled theories of the chemical origins and nature of yellow fever from disparate facts, observations, and reasonings. Excitement, passion, and hope more than experimental caution and rigor defined the unique American experience with chemistry. Common sense again exerted its formative influence over the intellectual ferment of the yellow fever years.

Whatever its epistemological foundation, the new chemistry undoubtedly benefited the localists, such as Mitchill, who could depict the material cause of the yellow fever as small aerial

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particles, produced from local conditions. The story of chemistry during the epidemic period thus also helps us understand the ultimate triumph of the miasmatic theory in the early republic. That story will be the topic of the present chapter. First, a bit of background is needed. We will turn, then, to the decades leading up to the epidemic period, when new perspectives on airs and other invisible substances prepared the way for a great “transmutation” in chemistry.

Historians once depicted the Chemical Revolution as the late-eighteenth century breakthrough of the inspired genius, Antoine Laurent Lavoisier, whose oxygen theory of respiration, calcination, and combustion replaced the outdated phlogiston theory.\(^9\) The story kept with dominant trends in the history of science, a field dominated by triumphal accounts of scientific advances, and hagiographies of those responsible for them. Newer perspectives have shifted attention away from Lavoisier’s rejection of the phlogiston and focused it on the various research traditions that culminated in the systematic reorganization of the field. The revolution did not simply overturn the arcane theory of phlogiston, one of those relics of eighteenth-century natural philosophy; it completely altered the human understanding of the physical and chemical makeup of the world.\(^10\)

Since the time of Aristotle, philosophers understood the world to be composed of four elements—earth, water, air, and fire. Any one of the elements might appear in a different form, but they were fundamentally and always the same elements, whose origins went all the back to the creation of the world. In theory, one could reduce anything in the world to its essential elemental construction. Chemists, of course, encountered numerous difficulties trying to explain the various chemical

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phenomena they observed. Why, for example, did certain substances combine in certain ways? At the most basic level, chemists sought to simplify chemical combinations by organizing them into tables of affinity—charts that arranged substances in terms of their relative force of attraction for the other substances. The tables of affinity served a useful didactic purpose, but had limited explanatory value.\textsuperscript{11}

Pressing questions remained. Some of the most pressing related to the way substances lost or gained weight in chemical reactions. In order to explain these chemical reactions, chemists added to the list of elements different principles, which conferred properties on substances. So, for example, a combustible substance lost weight in combustion because it lost its principle of inflammability—the same mysterious aspect of that substance that allowed it to burn in the first place. Similarly, chemists thought that a metal lost weight when heated in the process of calcination, because it had lost its metallic principle—the very principle that imparted the metal-ness to the metal.\textsuperscript{12} For a time at least, the invention of principles seemed a good enough way to maintain the integrity of the four-element theory, while explaining the obvious physical and behavioral differences of different materials.

In the early eighteenth century, Georg Ernst Stahl, professor of medicine and chemistry at the University of Halle, entered the confusing world of chemical principles and elements with a novel and influential theory. Stahl unified the inflammable and metallic principles, showing that they were in fact one earthy substance called phlogiston. Stahl’s experimental work focused on combustion and calcination, both processes involving heat applied to bodies. Rather than seeing two separate principles in these processes, Stahl realized that there was only one, a substance he would call phlogiston, after the Greek word for “burning.” He proved his theory by adding burning charcoal to different types of calx, the product left after metal had been reduced to its basic elemental state through calcination, or


\textsuperscript{12} C.E. Perrin, “Research Traditions, Lavoisier, and the Chemical Revolution,” 55-57. Calcination is the process through which metal is burned in air, leaving a residue called calx.
the application of high degrees of heat over time. When he did this, Stahl noticed that he could “revive” the metal—that is, reverse the process and recreate the metal. He reasoned that the burning charcoal had imparted its phlogiston back to the metal, which had lost it during calcination. Thus, the principle of inflammability and the metallic principle were the same. Stahl also demonstrated that he could reconstitute burnt substances in the same way. In one instance, for example, Stahl combined the combustion product of sulfur—the leftovers of burnt sulfur—with burning charcoal. Once again, the charcoal seemingly gave its phlogiston back to the combustion product, restoring the sulfur to its original state. For a time in the eighteenth century, Stahl’s theory of phlogiston served as the paradigm that could unify diverse chemical phenomena and impose order on the chaotic interactions amongst the elements.

Meanwhile, as chemists such as Stahl examined the processes involving earth and fire, a new group of natural philosophers, many of them British, had begun to investigate the strange behaviors of air. Philosophers had always overlooked air, the invisible and pervasive element that seemed to have no discernible role in chemical reactions. Even Stahl’s phlogiston theory left no place for air, as he believed that chemical relations involved earth and fire. Robert Boyle’s experiments with the air-pump in the 1660s had sparked some interest in the subject. He had shown that animals placed in the sealed jar died, just as candles in the same environment burnt out. Did this suggest that combustion and respiration were the same processes? For a time after Boyle, natural philosophers forgot about the air, until another British natural philosopher named Stephen Hales renewed the fascination. In an important book called Vegetable Staticks (1727), Hales claimed that air could be fixed, or hidden somehow, in solid and liquid substances and then released through distillation. Hales’ work suggested that air had more important functions and properties than others had thought. In the half century or so after Hales, numerous British chemists engaged in the study of air. In the process, they learned that air

13 Ibid., 57-58.
itself appeared in several different manifestations, just as earths did, each with their own strange effects. Joseph Black, of the University of Edinburgh, isolated Hales’ “fixed air,” which would later be identified as carbon dioxide. In 1766, Henry Cavendish isolated “inflammable air,” or hydrogen. Between 1772 and 1774, Joseph Priestley found several more airs, including “phlogisticated nitrous air,” or nitrous oxide, and “dephlogisticated air,” which would come to be known as oxygen.\textsuperscript{14} Still, the pneumatic chemists could not truly understand what they had discovered. Adherence to the phlogistic, four-element conceptualization of chemistry predisposed them to differentiate airs based on their amounts phlogiston, as the terms used to designate different airs indicate.

Research on chemical reactions and airs prepared the way for the revolutionary work of Lavoisier, who began his independent studies in the 1770s. In the period 1772-1773, Lavoisier performed the major experiments that would undergird his new vision of chemistry. These experiments focused on the similar processes of combustion, calcination, and respiration. Lavoisier had by this time realized that air exercised a decisive agency in each of these chemical processes.\textsuperscript{15} A meticulous organizer and an astute instrumentalist, Lavoisier took painstaking measurements of everything he observed. His precise notes on weight gain and loss allowed him to formulate a new theory—that air was added to earthy substances during certain reactions, just as something else was lost.\textsuperscript{16} In the intervening years between 1773, when he completed his formative experimental work, and 1789, when he released his seminal text, \textit{Traité Élémentaire de Chimie}, Lavoisier refined and restructured his thinking. In the end, he concluded that both phlogiston and the four-element theory were wrong. Instead, he proposed that oxygen was the critical agent in combustion, calcination, and respiration, and

\textsuperscript{14} For the study of airs, see Thomas Hankins, \textit{Science and the Enlightenment} (New York: Cambridge University Press, 1985), 85-93.
\textsuperscript{16} Berthelot, \textit{La Revolution Chimique}, 41, notes that one of the revolutionary features of Lavoisier’s chemistry was his unparalleled precision.
that simple substances, incapable of being reduced, composed all of nature. His predecessors had already identified many of these simple substances—they were the “airs” over which the English pneumatic chemists had pondered. Lavoisier showed that any of these simple substances, as well as many of the various compounds they formed, could exist as gas, liquid, or solid (depending on temperature), for they represented states of matter, not fundamental elements. In a public demonstration in Paris, Lavoisier showed that he could synthesize water from pure hydrogen and oxygen gases, demonstrating that even water was a compound of simple substances. Finally, Lavoisier reconfigured the nomenclature all of these substances and their compounds, giving them the names—oxygen, hydrogen, nitrogen, etc.—they still bear today.

News of the great breakthrough spread quickly. Despite determined, though ill-fated, resistance from Priestley, who would move to the United States in 1794, the new chemistry steadily won over the erstwhile supporters of phlogiston. Already in the 1780s, Lavoisier converted a number of his French colleagues—Louis-Bernard Guyton de Morveau, Claude Berthollet, and Antoine Fourcroy, with whom he published *Méthode de Nomenclature Chimique* (1787), the first text to propose a comprehensive naming system for all of the irreducible substances and their compounds. Lavoisier’s works were translated into numerous languages. In the meantime, the famous Scottish chemist, Joseph Black, introduced Lavoisian concepts into the curricula of the University of Edinburgh. In Scandinavia and Germany, philosophers quickly embraced the new chemistry for its revelations about mineralogy and

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17 The seeming obsession with nomenclature simply reflected the confused state of chemistry prior to the Chemical Revolution. As Thomas P. Smith complained in an oration before the Chemical Society of Philadelphia in 1798, “The almost innumerable technical terms which had been introduced into chemistry, before the formation of the new nomenclature, had for a long time been a cause of general complaint amongst chemists. The same substance had often eight or ten different names applied to it, most of which either conveyed no idea of its properties, or what is still worse indicated very opposite ones to those it possessed.” See Thomas P. Smith, *A Sketch of the Revolutions in Chemistry* (Philadelphia: Samuel H. Smith, 1798).
metallurgy, long-established fields of inquiry in lands rich with ore deposits, mines, and mineral wells. Dutch chemists, led by Martinus van Marum, adopted the Lavoisian brand of chemistry by the end of 1790s. And, in Spain, the new chemistry inspired the state to revamp its languishing educational institutions with a new emphasis on “useful” pursuits.

American intellectuals also eagerly took in new chemistry. Mitchill and other followers of Lavoisier soon came to occupy the chairs of chemistry at the nation’s most prestigious universities of natural philosophy. In 1795, John Maclean, a native of Glasgow and an ardent follower of the new chemistry, became the professor of chemistry at Princeton University. In the same year, the young Philadelphian, James Woodhouse, born in 1770, took over the professorship of chemistry at the University of Pennsylvania. From that post, Woodhouse taught the principles of the new chemistry to college’s numerous medical students, even mentoring a few who composed their dissertations about yellow fever. Woodhouse labored hard to popularize and disseminate chemical knowledge beyond the university grounds. In 1792, having just graduated from the University of Pennsylvania, Woodhouse founded the Chemical Society of Philadelphia, the only voluntary association in the United States devoted expressly to study of chemistry. Composed principally of Lavoisian chemists, in its seventeen-year existence, the Chemical Society nurtured such notable chemists as Adam Seybert and Robert Hare, as well as Benjamin Silliman, an early professor of natural philosophy at Yale and the founder of the American Journal of Science. Woodhouse went on to author The Young Chemist’s Pocket Companion (1797), a moderately popular book full of simple experiments for aspiring chemists. By the time of the epidemics, the new chemistry dominated the curricula at the United States’ most productive centers of

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21 Ibid., 147.
22 The American Journal of Science has been continually published since 1818.
23 Edgar F. Smith, Chemistry in America, 12, 76.
natural philosophical research, it had gained an enthusiastic following of amateur chemists, such as those who belonged to the Chemical Society, and it appeared prominently in print, in works such as Mitchill’s *Nomenclature of the New Chemistry*, Robert Kerr’s prominent 1790 translation of the *Traité Élémentaire de Chimie*, and on the pages of the *Medical Repository*.

The new chemistry appealed to its American adherents especially for its potential usefulness, the *sine qua non* of any philosophic enterprise. Chemistry, they thought, could be applied to many useful improvements, from agriculture to manufacturing. Even Thomas Jefferson, who otherwise disagreed with the introduction of a new system of nomenclature, confessed as early as 1788 that the new chemistry had produced results. While in Paris, he noted approvingly to his friend, James Currie, that the followers of Lavoisier and Fourcroi had already produced improvements in the process of bleaching paper and linen, as well as in the production of gunpowder. Their works, he added, would require translations into the old nomenclature before they could truly achieve their full usefulness.24 Years later, writing to Thomas Cooper, the professor of chemistry at Carlisle College, Jefferson once more expressed his desire to see chemistry applied to useful ends—“to domestic objects, to malting, for instance, brewing, making cider, to fermentation and distillation generally, to the making of bread, butter, cheese, soap, to the incubation of eggs, &c.”25

The investigators of yellow fever, however, had a different kind of usefulness in mind when they applied the new chemistry to their works on disease. They believed that the perspectives pioneered by Lavoisier would deliver a long-awaited breakthrough in medicine that might rescue their port cities from the evils of yellow fever. The hope sprang from the new chemistry’s revelations about the structure of matter, especially the makeup of air. It struck them with the realization that there was a hidden layer of

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25 Thomas Jefferson to Thomas Cooper, July 10, 1812 in Ibid., Vol. 5 of the Retirement Series, 223. Cooper took over as the professor of chemistry at the University of Pennsylvania in 1815.
nature, long concealed from view, in which the smallest and most elementary particles of matter interacted with enormous consequences. It also showed that people, through observation and experiment, could understand these operations. The irreducible substances of Lavoisier joined together, dissolved, and joined again in different forms and combinations, but always according to natural laws. In certain forms, they comprised the poisons and diseases so deadly to mankind; in others, their antidotes and cures. Chemistry exposed the world and everything in it for what they were—combinations of the same elementary substances. Those who searched for the cause of yellow fever, therefore, believed that the revolution in the conceptualization of matter would disclose the chemical makeup of the matter that caused the disease.

The application of the new chemistry to the problems of disease also reflected a longstanding, intimate relationship between the fields of medicine and chemistry. At least since the time of Paracelsus in the sixteenth century, doctors had sought to bring chemicals to the service of the healing craft by composing medicines that supposedly restored the body to a state of health. The link between the two studies persisted well after. For most of the eighteenth century, in fact, chemistry survived in the curricula of universities through its cultivation by doctors and its didactic role in medical education. The leading doctors of the period—Hermann Boerhaave (University of Leyden), Georg Ernst Stahl (Halle), Joseph Black (Edinburgh), and William Cullen (Edinburgh)—were also some of the century’s most eminent chemists. In the United States, too, the earliest chemists were originally trained as doctors. As a young student at the University of Edinburgh, Rush wrote of his great excitement at listening to the “ingenious” chemical lectures of Joseph Black, his teacher for two years and friend.


27 Roy Porter, Greatest Benefit to Mankind, 201-205.
Chemistry actually became Rush’s favorite subject in Scotland.\textsuperscript{28} Upon his return from Edinburgh in 1769, Rush immediately took up a position at the College of Philadelphia as the professor of chemistry, which he kept until 1789. From that post, he published \textit{A Syllabus of a Course of Lectures on Chemistry}, the first textbook on chemistry that appeared in the thirteen colonies.

Medicine and chemistry shared this close relationship not merely because doctors could use chemistry to prepare medicines, but because they shared similar philosophical problems.\textsuperscript{29} Both dealt with the forces that held complex bodies together. The chemists knew, it was an undeniable fact, that certain chemicals did not merely mix together, as salt added to pepper results in a mixture of salt \textit{and} pepper. They knew that certain chemicals, when combined, caused predictable reactions that resulted in the creation of something new—a compound that could have properties unlike those of its constituent parts, and which could not always be reversed. What force caused matter to interact in such precise ways? Physiologists confronted similar problems raised by the structure of living organisms, most significantly the human body. How did living things differ from non-living things? What force held matter together in such a way as to constitute life, and why upon the death of an organism did that matter decompose, or break down into simple, formless parts? By the epidemic period, doctors and chemists had grown accustomed to thinking about things in a similar manner.

This confidence in the power of chemistry comes out clearly in the works of Felix Pascalis Ouvière, a prolific writer of the epidemic period, about whom frustratingly little is known. If not for his works on yellow fever, we would know nothing about him. Ouvière was born in France, and then educated as a doctor at the University of Montpelier. At some point, he moved to the French colony of St. Domingue, where he remained until forced to flee in 1793. During the summer, he arrived in Philadelphia along with thousands of French-speaking refugees, escaping the terrors of the Haitian and

\textsuperscript{28} Benjamin Rush, \textit{The Letters of Benjamin Rush}, 28, 41.
\textsuperscript{29} See, for example, Ibid., 207-208.
French Revolutions. The very events that pushed him from St. Domingue also made him part of the cause of the yellow fever epidemic in 1793. One may also assume that Ouvière gathered considerable experience with the disease in question during the turbulent, fever-ridden times leading up to his departure. His initial foray into chemical analysis came with the publication of his Medico-Chymical Dissertations on the Causes of the Epidemic Called Yellow Fever, a treatise that originated as a response to an essay contest from the Medical Society of Connecticut on the question: “What are the chymical properties of the effluvia of contagion of the epidemic of New-York, in the year 1795; what its mode of operation on the human body; and does said epidemic differ from the usual fevers of this country except in degree?” He composed another full-length treatise about the yellow fever epidemic in Philadelphia in 1797, contributed minor essays to the compendia of Noah Webster and Thomas Condie, and was featured regularly in the Medical Repository. We also know that Ouvière served for a time as the Vice-President of the Chemical Society of Philadelphia, before moving to New York to finish out his life and career in relative obscurity.

Though the precise origins of his interest in chemistry remain unknown, Ouvière had evidently imbibed its precepts and grasped its awesome power by the time he arrived in Philadelphia. In an annual oration delivered before the Chemical Society in 1795, Ouvière spoke unabashedly about his admiration for chemistry: “Happy is our age, in which at last, we are acquainted with the elementary laws of existing bodies! Those laws which extend to all material objects, visible or invisible known or still concealed from our observation; those laws, the limits of which, we do not know, because we cannot trace where the limits of nature are to be marked; those laws form and constitute the science of Chemistry.” The appeal of chemistry grew from its comprehensiveness, its ability to disclose the

30 See Chapter One.
31 Felix Pascal Ouvière, Annual Oration delivered before the Chemical Society, January 31, 1801 (Philadelphia: John Bioren, 1802), 5-6, found in the Malloch Rare Book Room, New York Academy of Medicine.
fundamental laws that governed everything. In the same speech, Ouvière likened chemistry to the very root of the tree of knowledge. “You know, Gentlemen, how numerous are the branches of universal Philosophy!,” he began. “When all these branches have been severally examined and studied, they appear so well connected and so much depending on the same laws, that they compose but one science, the mysteries of which cannot be disclosed, unless we enter the laboratory of the chemist, and there we explore its processes.”33 For the remainder of the oration, Ouvière elaborated on the applicability of the new chemistry, hoping to demonstrate its relevance to each and every natural philosophical field.

The new chemistry particularly struck the chemical literati for its revelations about the air, the most mysterious state of matter, which had only recently been considered an element. Here again, the fever writers emphasized the air’s centrality in natural phenomena as well as its potential applicability. In an essay titled simply Treatise on Yellow Fever, for example, a young chemist from New York named Joseph Browne commented on the new perspectives offered up by chemical research—“We are now able to analyze the atmospheric air,” Browne proudly declared, “Which instead of being a simple element, is found to be a chemical compound, a knowledge of whose principles becomes the more interesting, as nature has made them her principal agents in most of her operations.” The recent advances in chemistry, he continued, “Form a new era in that science, which will most extensively influence the practice of medicine.”34 Benjamin De Witt, a doctor from New York, wrote similarly of the air: “Philosophers formerly imagined it to be a pure, simple, elementary fluid. . . . Modern discoveries, however, evince that it is by no means an elementary substance; but composed of different constituent parts, possessing chemical qualities, and having a very extensive and wonderful agency, in a great

33 Felix Pascalis Ouvière, Annual Oration, 6.
variety of the operations, both of nature and of art.” David Ramsay also grasped the import of the new chemistry and its revelations about air—the constituent parts of air, he wrote in his review of medical improvements of the eighteenth century, “when detached, are among the most powerful agents in nature.”

Confidence and enthusiasm characterized the investigators’ unique reception of Lavoisian chemistry. They fully expected it to deliver a breakthrough in the understanding of disease. In the *Nomenclature of the New Chemistry*, for example, Mitchill wrote glowingly of what he viewed as chemistry’s inevitable benefits to the study of pestilences. Mitchill acknowledged some of the unanswered questions that remained in chemistry, most of which related to forces that bound compounds together. But, he bluntly and self-assuredly asserted, “When these matters shall be cleared up, the doctrines of poisons and contagions will be as intelligible as those of digestion and respiration.” Mitchill’s certainty was emblematic of his era.

Using the new chemistry, investigators reconceptualized the operations of the agent that caused yellow fever, focusing particularly on its presence in the air—or, more accurately, as air. Philosophers since the time of Hippocrates had known that disease had some special relationship with air, but they did know how. Contagionists before and after the epidemic period, for example, believed that the contagious particle of disease floated in the air, just as dust, pollen, and other substances hover in the air. The Chemical Revolution had revealed, however, that air was a state of matter and that anything could turn into gas. This revelation played tricks on the imaginations of the chemists. Since air represented a state


of matter and not an elemental substance, they naturally reasoned that any deleterious material could
turn into a gas and cause harm to people, just as the “airs” of the pneumatic chemists had destroyed the
lives of the animals in their apparatus. With its inherent expansibilité—one of the recognized qualities
of the gaseous state—the harmful gas could easily expand to fill the space of room, or even more
ominously, the atmosphere of a city.\textsuperscript{38} Or, perhaps, the source of the disease lay with some disruption
of the proper balance of the constitutive components of atmospheric air—the composite of gases that
surrounded people everywhere and sustained life. The new chemistry presented numerous
possibilities.\textsuperscript{39}

With the suggestive ideas of the Chemical Revolution in minds of the investigators, theories
about the cause of yellow fever abounded. Early on, Benjamin Rush speculated that an excess of oxygen
might bring about a chain reaction in the body that culminated in yellow fever. Though seemingly
contrary to reason, since oxygen was known to be the principal agent in respiration and thus the giver of
life, Rush as always had an explanation. According to his medical system, all fevers arose as a result of
the overstimulation of the blood vessels. Since oxygen qualified as a substance that could produce such
an overstimulation, Rush concluded that it could cause yellow fever. The theory fit well into his
conception of the life. Not only did it account for the cause of disease, it also explained why it would
make people sick. Rush, however, encountered some difficulties reconciling his theory with the
observations of others. The experimental work of Henry Cavendish—one of the famed English
pneumatic chemists and the discoverer of hydrogen—had demonstrated that the proportions of oxygen
and nitrogen in the atmospheric air were everywhere the same. Nevertheless, Rush insisted that if

\textsuperscript{38} Even as early as the 1660s, Robert Boyle recognized that air possessed “springiness,” the ability to form to the
dimensions of its container. The term expansibilité was invented by the French bureaucrat turned natural
philosopher, Anne Robert Jacques Turgot, as a means of explaining the properties of vapors. See Hankins, Science
and the Enlightenment, 85-93.

\textsuperscript{39} Alain Corbin, The Foul and the Fragrant: Odor and the French Social Imagination, translated by Aubier Montaigne
(Cambridge: Harvard University Press, 1988). Corbin discusses the impact of the pneumatic chemistry on how the
French imagined disease in the late-eighteenth century.
someone were to take similar measurements during an epidemic, they would surely find a surfeit of oxygen. Rush, evidently, would not be the one to perform those experiments.

A few years later, Joseph Browne of New York proposed the exact opposite of Rush’s theory. He claimed that a lack of oxygen, or “animal vital air,” caused yellow fever. Unlike Rush, Browne had a compelling logic to support his claim—since “animal vital air” animated the living organism, then the lack of it must unravel the organization of animal life, sinking the body into deadly fever. Like Rush, however, Browne fit his argument into a thorough picture of how life worked. According to Browne, all life and all nature operated in cycles of death and rebirth, which recycled all of the parts of living organisms. “All and every part of creation, as well animate as inanimate,” he claimed, “should be in a constant state of renovation, thro’ a continual circulation of decompositions, and successive generations.” Moreover, at all times, organisms inclined toward putrefaction, or the breakdown of their organization, but were sustained by a principle he called “electric attraction, or affinity of composition.” In its turn, the “affinity of composition,” the very principle that held bodies together, took its power from the dynamic interactions among living bodies and the air. Animals took in “animal vital air” and gave off “vegetable vital air,” while vegetable life took in “vegetable vital air” and gave off “animal vital air.” The intake of these airs preserved bodies against the continual inclination towards putrefaction. The occurrence of disease, such as yellow fever, merely represented a disruption of this normal balance. It started with the diminution of the animal vital air, which he thought occurred during the hot seasons, but then culminated in a vicious epidemiological cycle. The absence of animal vital air

40 Benjamin Rush, Medical Inquiries and Observations, Containing an Account of the Bilious and Remitting and Intermittent Yellow Fever, As It Appeared in Philadelphia in the Year 1794; Together with an Inquiry into the Proximate Cause of Fever (Philadelphia; Printed by Thomas Dobson, 1796), 75-77.
41 Browne, Treatise on the Yellow Fever, 10-12.
42 Ibid., 8, 9.
43 Curiously, Browne thought that “vegetable vital air” was nitrogen, when in fact it was carbon-dioxide, the compound then recognized as “fixed air,” the gas that Stephen Hales in the early-eighteenth century had shown to be fixed in the bodies of plants. Ibid., 7-8.
incited yellow fever among people, who putrefied more quickly and emitted greater quantities of vegetable air, which in turn made it easier for others to develop yellow fever. 44

Though the balances between life and decomposition, vegetable and animal, could spiral out of proportion, they nonetheless testified to the majesty of God’s design. In Browne’s mind, the new chemistry illuminated the great wisdom that pervaded creation, ensuring the equilibrium among the parts of nature. The precise realizations about the cause of yellow fever figured only as an ancillary link in the chain of knowledge that descended from the Chemical Revolution, which had exposed an infinitely more important and meaningful truth about the plan of life. Yellow fever only arose accidentally from the occasional perturbations in an otherwise perfect system of balances. Even life and death emerged from the new chemistry as relative states of composition among substances. These revelations inspired in Browne a sort of contentment with and resignation to the inevitable successions of combination and decomposition. For upon death, Browne ruminated, the particles that once composed the living being would more quickly form new combinations—“they will quit the solitary abode of the dead, and will again be immediately brought into an active state of existence; their first combinations will be to form vegetables, probably odorant plants and sweet scented flowers will owe their sweetness and beauty to the identical corpuscles that once animated our dearest friends and nearest relations, from whence through the medium of the atmosphere they will probably again constitute the rosy health and lively bloom of toasted beauty.” 45 The chemical design of the world would replenish all things with time.

Chemistry exposed the awesome power of the substances of the world, as well as the forces that held them together or tore them apart. As a consequence, chemical analyses easily strayed into the fanciful and reverential. Felix Ouvière proposed one such explanation in his 1796 treatise, Medico-

44 Ibid., 15.
Chymical Dissertations on the Causes of the Epidemic Called Yellow Fever. As an avowed Lavoisian chemist, Ouvière found an answer to the question of the cause of yellow fever in one of Lavoisier’s irreducible substances—caloric, the principle of heat. Though Lavoisier had overhauled chemistry as people knew it, discarding the fictional substance called phlogiston, he still had difficulty explaining certain phenomena, such as heat. To do so, he invented the substance called caloric. Caloric was heat imagined as a nearly-weightless fluid that moved from bodies of higher temperatures to those of a lower temperatures. Naturally, it figured prominently in a wide range of chemical reactions, especially those that involved the transition of matter from one state to another, which always depended on temperature, and thus caloric. According to the Lavoisian conceptualization, during the transition from solid or liquid to gas, caloric attached itself to the pieces of the substances and carried them away as gas.

Caloric enchanted Ouvière with its functions in diverse natural phenomena. “Caloric!,” he exclaimed in a speech before the chemical society, “Astonishing principle of destruction and life!” To appreciate its overwhelming might, he claimed, “It would be necessary to advert to mountains which it undermines, to the frightful craters it opens on their most elevated regions, and to the immense torrents of lava with which it inundates afterwards cities and empires.” One could then follow the path of this “indestructible agent” as it “divides itself in various scintillating meteors, or by its sudden combination with air, forms the lightning, and by tremendous electrical detonations, spreads terror and devastation among mankind.” Caloric mediated that narrow barrier between the tangible fluids and solids, and the invisible gases of the world. It could “create as it were aerial and invisible bodies, among all the known substances you can enumerate and those that can be suspended in a gaseous state.”

46 Felix Pascalis Ouvière, Annual Oration Delivered Before the Chemical Society of Philadelphia, January 31st, 1801 (Philadelphia: John Bioren, 1802),
Keeping with its purported centrality in natural operations, Ouvière proposed that caloric caused yellow fever and other similar diseases. If present in sufficient quantities, the caloric would precipitate the decomposition of the blood, raising its temperature to such a degree that it evaporated in its vessels and then spread through body, causing the harmful disease that his contemporaries had labeled yellow fever. In different circumstances, the same produce would have slightly different effects, producing the other locally-generated diseases with which Europeans and Americans had grown familiar.\(^47\) If Ouvière’s theory seemed imaginative, it also accorded well with the circumstances of yellow fever’s incidence. The disease did occur in the hot months of summer and fall, when caloric abounded. Might this caloric actually cause the disease? Ouvière’s theory also fit into the Lavoisian conceptualization of matter. Not only did he use the concept of caloric, he showed that its effects included the transition of matter from one state to another, one of the key realizations of the new chemistry.

Loose claims to plausibility notwithstanding, Ouvière’s particular theory of the cause of yellow fever never quite caught on. In fact, in the Medical Repository, that great disseminator of information, Mitchill wrote a critical review article about Ouvière’s treatise. He struck right at the heart of Ouvière’s argument—the preposterous notion that blood could evaporate into a gas. Has a liquid, Mitchill asked, ever been known to turn into a gas at a lower temperature than the “80\(^{th}\) degree of Reaumur’s scale?”\(^48\) Posed for its rhetorical effect, the question did not require a response. Mitchill had exposed a glaring flaw that undermined Ouvière’s entire argument. Apparently, the critique worked, for Ouvière would quickly abandon his own theory only months after its publication in favor of the rival theory proposed by Mitchill.


\(^48\) 80° Reaumur marked the boiling point of water, the equivalent of 212° Fahrenheit or 100° Celsius.
Mitchell published his view of the cause of yellow fever in a treatise called *Remarks on the Gaseous Oxyd of Azote or of Nitrogene*, in which he argued that a certain compound of nitrogen and oxygen was responsible for yellow and other fevers. Mitchell certainly came to the study with all the appropriate credentials. As a trained doctor and professor of chemistry, Mitchell, like many of his contemporaries and predecessors, had long been particularly attuned to the intersections of the two fields. He had also spent most of his time after joining the faculty at Columbia investigating the various properties of gases. Yet Mitchell also began his inquiries with the same preconceptions as his contemporaries, especially the profound faith that the new chemistry not only could, but positively would bring about a revolution in the study of disease. As he admitted in the preface to the *Remarks*, “It has a long time appeared to me highly probable, that contagion was an äeriform fluid, produced occasionally, and exercising for a season its destructive effects.” Inevitably, he found what he was looking for. He wrote, “In the course of my experiments and inquiries, I have become satisfied my original conjecture was right; and I have to acknowledge the pneumatic philosophy has led the way to an elucidation of this hitherto dark and intricate subject.”

By Mitchell’s time, chemists had realized that nitrogen, or azote, and oxygen combined in “four distinct proportions,” distinguished by their relative degrees of oxygenation, or the amount of oxygen each compound contained. Azote with highest degree of oxygenation formed nitric acid, followed by nitrous acid, then nitrous gas, then finally the so-called gaseous oxyd of azote, the principal agent in the spread of yellow fever, according to Mitchell. The first indication that the so-called “gaseous oxyd of azote” produced deleterious effects on animal life came from observations that Joseph Priestley had made in his compendium of chemical experiments, *Experiments and Observations*. Priestley had been performing that classical experiment of pneumatic science—putting animals into sealed containers filled

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49 Samuel Latham Mitchell, *Remarks on the Gaseous Oxyd or Azote or of Nitrogene* (New-York: T. and J. Swords, Printers of the Faculty of Physic of Columbia College, 1795), Preface.
with different gases to see what happens, a technique that went back to Robert Boyle in the 1660s. In doing so, Priestley noticed that the gaseous oxyd of azote, one of the “airs” that he had isolated, possessed a singular quality—animals died in it almost immediately, but flames continued to burn as normal.\textsuperscript{50} Years later, Lavoisier noticed the same strange quality of this particular compound.\textsuperscript{51} Though some difficulties of terminology and conceptualization complicate retrospective identification of compounds, it seems almost certain that Mitchill, Priestley, and Lavoisier all referred to what modern chemists recognize as nitric oxide (NO), a simple molecule that forms a colorless, odorless gas at room temperature, proves remarkably harmful to animal life, and which is itself not flammable, but “will accelerate burning of combustible materials.”\textsuperscript{52}

With the knowledge of a gas that could cause such harm to humans yet remain discretely hidden away from their detection, Mitchill proceeded to investigate the links between gaseous oxyd of azote and the incidence of yellow fever. First, he had to establish that the gaseous oxyd of azote—for which he proposed the alternate term “septon”—could be produced through natural processes, not merely artificial ones. This he did, not through experimental research, revealingly, but through a kind of deductive or analogical reasoning. On the authority of several noted chemists, including Lavoisier, Pierre Macquer, and Antoine Fourcroi, Mitchill noted that nitrous acid, a close relative of septon, derived commonly from animal putrefaction. He claimed too that nitrous acid had been detected at “the bottoms of graves where human bodies have putrefied.”\textsuperscript{53} Since nitrous acid only “barely” differed from septon in their respective degrees of oxygenation, he concluded “\textit{a fortiori}” that natural processes

\textsuperscript{50} Priestley, \textit{Experiments and Observations on Different Kinds of Air} (Birmingham: Thomas Pearson, 1790), II: 54-55. Priestley claimed of it that it was an “air in which a candle burns quite naturally and freely, and which is yet in the highest degree noxious to animals, insomuch as they did the moment they are put into it.” 55.

\textsuperscript{51} Lavoisier, \textit{Traité Élémentaire de Chimie} (Paris: Cuchet, 1789), 82.

\textsuperscript{52} See the Department of Health and Human Services website at www.atsdr.cdc.gov/MHMI/mmg175.html, accessed on September 20, 2010. The other potential candidate for the gaseous oxyd of azote is the compound nitrogen dioxide (NO\textsubscript{2}). This appears unlikely, however, because nitrogen dioxide exists as a fluid at any temperature above 70° F, and Mitchill, Lavoisier, and Priestley all knew it only as a gas only.

\textsuperscript{53} Mitchill, \textit{Remarks on the Gaseous Oxyd of Azote}, 9-11.
must also be capable of producing septon. In order to bolster his argument, Mitchill marshaled
evidence that linked the putrefaction of bodies with the appearances of diseases that appeared
strikingly similar to yellow fever. Fourcroi had mentioned that the exhumation of the bodies at the
Cimetière des Innocents in Paris in 1786 resulted in a “deleterious production”—“a gas of precisely the
same origin and qualities” as septon, according to Mitchill—that afflicted many Parisians. Mitchill also
mentioned the “most active and dreadful poison” that emitted from older corpses upon dissection,
which he considered septon.  

To cinch his argument, Mitchill noted that yellow fever occurred in same places that favored the
production of septon—that is, in local settings, especially “in large cities [where] it is generally most
abundant, by reason of the greater collection, along some of their streets, sewers, wharfs, docks, &c. of
those materials, which afford it, and on account of the difficulty of ventilation, in certain lanes, yards
and alleys, which allows the noxious vapours to settle there.” In other words, cities made ideal
breeding grounds for septon, because they contained many sources of animal putrefaction and many
enclosed spaces that could trap the poison in its gaseous state. Furthermore, Mitchill added, septon
usually only prevailed when the temperature hovered between 75 and 85 degrees Fahrenheit, the very
same circumstances in which yellow fever prevailed. 

Mitchill’s argument came readymade with a corresponding public health remedy designed to
counteract the dangerous accumulation of septon. Since septon was of an acidic quality, Mitchill simply
recommended cleaning the city with water and alkaline substances, such as lime, magnesia, and potash,

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54 Ibid, 13-14.
55 Ibid, 14.
56 Aedes aegypti are most active when the temperatures are around 82-83 degrees Fahrenheit. They will not bite
when the temperature is below 77 degrees or over 105. Rickard Christophers, Aedes Aegypti (L.), The Yellow Fever
which would counteract the pestilential qualities of the “gaseous oxyd of azote.”\textsuperscript{57} Besides encouraging greater environmental vigilance amongst citizens and advocating stern governmental regulations in regards to cleanliness, Mitchill also called for a new water supply system. The proper application of alkaline anti-septics did require a means of conveyance. “The great means of cleanliness, if properly applied, is WATER,” he wrote in his \textit{Hints toward Promoting the Health and Cleanliness of New York City}, released in 1801. Furthermore, Mitchill stipulated, “The most certain means of giving to water its natural effect, is, after the application, to get rid of it as soon as possible.” To do so, he recommended building an intricate system of aqueducts and sewers that would carry water from the rivers that surrounded Manhattan to the city, and then “through that medium, to convey away also those impurities, which otherwise, by floating in the air, would probably be inhaled by the lungs, and so enter into the system, and appear in a variety of shapes to baffle the skill of the physician.”\textsuperscript{58} The war against septon was to be fought with water, alkalines, and civic ingenuity.

Unlike the work of Ouvière, Mitchill’s doctrine of septon enjoyed wide popularity during the epidemic period. Many of his contemporaries believed that he had actually identified the chemical agent responsible for yellow fever. In the minds of a few commentators, Mitchill’s demonstration obviated the need for the future inquiry into the chemical nature and origins of the disease. In one of his essays, Edward Miller, one of the founders and co-editors of the \textit{Medical Repository}, informed his readers that he would not discuss the chemical constitution of the “morbid cause” of yellow fever, as that subject had already been treated convincingly.\textsuperscript{59} Mitchill’s contemporaries, from the common country doctors to the scientific luminaries of his age, heaped praise on him. Ouvière, for example, adopted the theory of septon, despite his own rough treatment from Mitchill and the staff at the

\textsuperscript{57} Mitchill endorses the use of lime and other alkalines in a number of essays. See, Mitchill, “Concerning the Use of Alkaline Remedies in Fevers, and the Analogy between Septic Acids and Other Poisons,” \textit{The New York Magazine, or Literary Repository} (April 1797); and the \textit{Medical Repository} 4, no. 3 (January, 1801), 297-326.

\textsuperscript{58} Samuel L. Mitchill, \textit{Hints toward Promoting the Health and Cleanliness of New York City} (New York: T. and J. Swords, 1802), 5.

\textsuperscript{59} Edward Miller, \textit{The Medical Repository} 2, no. 4 (May 1799), 409.
Medical Repository. “Professor Mitchill has proved to the world what are the sources, combinations, and venomous effects, of septon,” Ouvière announced. “The identical nature of our epidemic, in different years and places,” he continued, “Proclaims the truth of the discovery, and I adhere to the doctrine.”60 Joseph Priestley added his own praise to Mitchill’s efforts. In a letter that the Englishman had written to Mitchill, a portion of which Mitchill reproduced in the Medical Repository, Priestley declared the high value of the theory—Mitchill had “made a most important discovery, which ranks with the most brilliant that this age, fertile in discoveries, can boast, that the cause of contagious fever is of an acid nature, and some modification of the nitrous, which may, properly enough, be called septon.” As the closest the thing the United States had to a scientific celebrity, Priestley’s testimony surely struck the readers of the Medical Repository as proof of the doctrine’s correctness. As it was, in the years following the publication of the Remarks, numerous inquirers came forward with analyses of the qualities and peculiarities of septon, proving that many had incorporated Mitchill’s idea into their intellectual repertoires.61

In retrospect, one may legitimately wonder why Mitchill’s argument convinced anyone. Not because, in looking back, we know that he was wrong, but because it so clearly fell short of the demands of scientific proof based on empirical evidence and inductive reasoning. It also contradicted his own epistemology. In a dramatic exhortation to his fellow physicians, Mitchill wrote, “Philosophers are no longer permitted to descend from generals to particulars, shaping them according to preconceived notions of their intimate relations.”62 Yet, this is exactly what he did in the Remarks. Mitchill’s entire argument rested on a logical demonstration, which might be restated as follows: “septon is a chemical compound that is very similar to another compound that occurs commonly in the decomposition of

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60 Felix Pascalis Ouvière, The Medical Repository 3, no. 4 (May 1800), 346.
61 See, for example, J.E.R. Birch Medical Repository 3, no. 3, (February 1800), 308; Jeremiah Barker 6, no. 1 (January 1803), 18-24.; Isaac Briggs 6, no. 2 (April 1803), 168-172.
animals; the decomposition of animals and the appearance of diseases such as yellow fever have been observed to be conjoined in time and place; therefore, septon causes diseases such as yellow fever.” At a time when the demands of empirical evidence and inductive reasoning exerted a powerful influence over intellectuals, Mitchill’s argument fell short. At least, it should have.

The speculative nature of Mitchill’s argument and its positive reception point to a much wider problem with the chemical explanations for the material cause of yellow fever—with only a few exceptions, chemical investigators did not perform experiments, the only accepted way to produce knowledge in chemistry. Indeed, neither Rush, Browne, nor Ouvrière had conducted experiments to test their hypotheses. That is, they had never seen or otherwise measured the chemical phenomena that supposedly produced yellow fever. Rather, they synthesized past research into a priori conclusions. Lavoisier had expressly forbidden this type of behavior. Chemical inquiry was supposed to represent the most radically empirical of all studies. “We must trust to nothing but facts,” he exhorted his readers in the Traité Élémentaire—“These are presented to us by Nature, and cannot deceive. We ought in every instance, to submit our reasoning to the test of experiment, and never to search for truth but by the natural road of experiment and observation.” Unaided by experiment, the imagination misled and deceived, as it “is ever wandering beyond the bounds of truth.”

Enthralled by his findings, the American chemists for some reason seemed reluctant to accept Lavoisier’s radical experimental epistemology. Why?

To be sure, experimental chemistry did present numerous functional problems. Edgar Fays Smith and John C. Greene both explained the early republican chemists’ lack of productivity by pointing to the institutional limitations of the United States—its lack of societies, publications, and instrument makers. Besides, they pointed out, the country did not have an established tradition of patronage, a key

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63 Lavoisier, Traité Élémentaire de Chimie, xviii.
avenue of funding for eighteenth-century natural philosophers. The prices for chemical apparatus could be astronomical, especially because devices had to be imported from Europe. After moving to the United States in 1794, for example, Priestley was still forced to depend on his patrons, Samuel Parker and Josiah Wedgwood, for the procurement of his chemical apparatus.

And yet, though they faced difficulties, the early republican chemists seem to have overcome the material obstacles to performing chemical experiments. Priestley certainly did. After a period of transition, the exiled chemist established a productive experimental program in the woods of Northumberland, Pennsylvania. Furthermore, none of the chemists who investigated yellow fever complained about a lack of experimental apparatus, nor did any of the eminent university chemists such as James Woodhouse and John Maclean. Mitchill, representative of both types, actually boasted of having a “handsome apparatus,” provided by Columbia College. He even generously invited “any gentleman who wishes to study Chemistry” to attend his class free of charge and learn how to use his devices. Americans of the early republic also pioneered experimental instruments and methods. In 1801, the twenty-year-old chemist Robert Hare, the son of a brewmaster as well as a graduate of the University of Pennsylvania and a junior member of the Chemical Society of Philadelphia, even gained some renown among his European and American peers for his invention of the “hydrostatic blow-pipe”—a cheap, efficient device he improvised from one of his father’s beer barrels, which funneled pure hydrogen and oxygen into a flame, producing tremendous amounts of sustainable heat. Beyond that, the pages of the Medical Repository teem with discussions of experiments, methods, and

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66 Ibid., 276-331.
apparatus. Whatever their limitations, the practical and institutional barriers to doing chemistry in the early republic certainly did not inhibit a lively discourse about the subject, nor did they prevent experimental practice.

To better understand what investigators’ speculative brand of chemistry did for them, we would do well to examine what experimental chemistry could not. Despite their curious lack of prominence, at least two investigators composed treatises that detailed the experimental analyses of the measurable products of the disease—the various ejections and secretions from the yellow fever victims. In June 1800, for example, Isaac Cathrall read a paper before the American Philosophical Society, in which he discussed a series of experiments that he had conducted on black vomit. By this point, Cathrall had already published an essay on the cause of yellow fever, which he deemed to have been imported, based on the greater number of facts. Cathrall gave no clear indication of why he had decided to study the black vomit or what he expected to find. One might infer that he did not know what he might learn, but that its potential justified the effort. His works reveals the extent to which he had absorbed the spirit of experimentation, with its acceptance of trial and error and its commitment to the slow, incremental accretion of knowledge. Great results might come from mundane observations, just as the experiences of the European chemists and their relatively simple experiments with airs had shown. With just a few accoutrements in the confined laboratory setting, they had revolutionized the understanding of the physical makeup of the world.

Consistent with his lack of clear purpose, Cathrall began haphazardly by investigating the properties and nature of the vomit. He mixed it with a variety of substances—lime water, sulphate of

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70 Isaac Cathrall, A Medical Sketch of the Synochus Maligna, or Malignant Contagious Fever, (Philadelphia: Thomas Dobson, 1794).
iron, muriated barites, nitrated silver, fixed alkalis, oxalic acid, and others. He heated the vomit over
fire, boiled it in water, and froze it. He strained the liquid, separating it into its components, and then
subjected each part to tests of their own. In short, Cathrall did everything to the vomit that a good
chemist ought to do. The experiments came with a certain degree of perceived risk. Writers on yellow
fever since Pouppé Desportes in mid-eighteenth century believed that the black vomit had some kind of
corrosive effect. The vomit did occur at the very last stage of the illness, and it almost always either
preceded or succeeded the death of the patient. Thus, observers reasoned that the vomit may have
caused death. Cathrall himself admitted to being fearful of the foul excrement and avoiding it for the
first several years of the epidemic period. His initial experiments, on the other hand, indicated that the
black vomit was a slightly acidic substance, composed mostly of water and non-reactive with Cathrall’s
array of chemical mixtures.

Having decided that black vomit did not possess the corrosive qualities imputed to it, Cathrall
proceeded to test its effects on the living system. To do so, he enlisted the aid of Mr. Joseph Parker, an
“active and intrepid” member of the board of health of Philadelphia. Together, the two men actually
tasted the black vomit and applied it to various places on their skins, but without any effect. Next,
Cathrall and Parker placed three cats in a room and fed them a mixture of beef and black vomit. The
cats, confined in such a way for sixteen days, elicited no ill effects and were released in good health.
Cathrall repeated the same experiment with a dog. As he described the scene to the audience at the
American Philosophical Society, “A large dog was confined in a room, and, by an assistant, his jaws were
forced asunder, and he was compelled to swallow an half-pint of black vomit.” Aside from a short bout
of diarrhea, the dog escaped injury. Finally, Cathrall devised a way of testing the effects of the black

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Desportes, Histoire des Maladies de Saint-Domingue (Paris: Chez Lejay, 1770), 202-203. The work was based on
Desportes’ experience in St. Domingue during the first half of the eighteenth century. He died in 1748.
72 Ibid., 17-18.
vomit in its aëriform state. To do this, he evaporated some recently-obtained black vomit in a container over a medium heat while Mr. Parker “held his head over the vessel for some minutes, so as to inhale the steam of black vomit.” The intrepid Mr. Parker experienced no ill effects. Cathrall himself repeated the experiment in a modified form. He enclosed himself in a small room saturated with the steam of the evaporated black vomit, where he remained for one hour. He left the room thoroughly disgusted, but otherwise unharmed.73

In the end, Cathrall had shown that the black vomit could not impart sickness in its fluid or gaseous state, but he did not know what it meant. Did his experiments suggest that the disease was not contagious, since the substances emitted from patients could not infect others? Or did they demonstrate that the fever could not spread through the air, because the gaseous form of the black vomit did not infect his subjects either? Perhaps the black vomit was something entirely different from the original cause, or perhaps Cathrall’s adherence to the theory of contagion prevented him from reaching conclusions.

If Cathrall’s experiments had raised more questions than they answered, they also spurred further inquiry. Not long after Cathrall published his analyses of the black vomit, an anonymous author came forward with a similar treatise, which featured decidedly more definite conclusions. The experimenter began with the goal of determining whether or not black vomit could spread yellow fever. Like Cathrall, he began by testing the black vomit in every conceivable way. He then proceeded to apply the vomit to his subjects. Again like Cathrall, the unknown investigator used cats and dogs in these studies, but with an interesting twist. Rather than forcing the animals to eat the black vomit, he inserted the substance subcutaneously. His description of the experiment offers a vivid account of scene. Under the heading “Experiment III,” he recorded the following: “Having made a large incision

73 Ibid., 19-22.
into the back of a dog, and dissected the skin off from the cellular membrane and muscles, thereby forming a cavity, into which I poured one dram of fresh black vomit, (obtained from a patient in the city hospital, who was in the last agonies which precede dissolution) and drawing the skin together, kept it in that situation by means of the dry suture; a pledget of lint was applied over this, and a bandage passed round the abdomen and over the part. The dog was confined, and prevented from irritating his back by rubbing it.”74 After a while, the dog recovered in perfect health.

Not content with this demonstration, the investigator continued with his experiments, some of a particularly cruel and macabre nature. In his fourth experiment, he described a disturbing scene, made worse from the detached manner in which he depicted the experiment—“the jugular vein of a dog was opened, and one ounce of black vomit injected into it; he immediately shewed signs of great uneasiness, puked and purged violently, became convulsed, and expired in ten minutes in great agony.” As if that were not enough, he repeated the same experiment with water and produced the same result.75 Two dogs later, he could at least conclude that the jugular veins of animals do not kindly accept foreign liquids.

The anonymous investigator also pursued experiments on some of the other bodily fluids of yellow fever victims. In one, he took the blood from a patient who was in the first stage of yellow fever and then inserted four drops of it into a wound on his leg. He repeated the same test several times and he drank “considerable quantities” of the blood, but without effect. Next, he enclosed quantities of saliva from a yellow fever patient in several incisions on different parts of his body. Nothing happened. He repeated the experiment with the perspiration and bile of another victim, but remained in good

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75 Ibid., 54.
health. In the final experiment, the urine he inserted into his wounds produced a slight inflammation, but it quickly subsided, leaving the experimenter healthy and happy.  

The results of his experiments struck the anonymous investigator as convincing proof that yellow fever was not a contagious disease. The facts, in the mind of this experimenter, led to but one “natural” conclusion. If a victim’s secretions or excretions could not produce yellow, then “it is at least very doubtful whether it is ever communicated from one person to another, and certainly never by means of contagion.” He certainly had a compelling logic to support his conclusion. Long experience with contagious diseases such as smallpox had shown that excretions and secretions could transmit the original illness. Undoubtedly, the investigator was thinking about smallpox when he devised his trials. His standard subcutaneous test, for example, bore remarkable resemblance to the practice of variolation—the incision, the insertion of the matter from a diseased victim, and then the suturing of the wound. However, variolation produced an attenuated form of smallpox, whereas these experiments did not.

And yet, neither the firm conclusion of the anonymous chemist nor the decidedly less certain conclusions of Cathrall seemed to have any discernible effect on the course of the yellow fever debate. In fact, of all the documents I consulted, I could not find a single reference to either of their works. Compared to the sometimes popular, sometimes controversial, always provocative works of the chemists such as Rush, Ouière, and especially Mitchill, the experiments of Cathrall and the anonymous investigator went unacknowledged by their contemporaries, as far as evidence suggests anyway. But, it is precisely for this reason that they have so much to say about the strange history of chemistry in the early republic. The investigators never shared the hard-edged empirical rigor of Lavoisier. Captivated by his findings, they could not bring themselves to embrace his methods. In fact, they consciously avoided

76 Ibid., 56-57.
them. Lavoisier, after all, premised his radical empirical epistemology on a correspondingly empirical view of the mind, not at all dissimilar from the philosophies of Hume and, more pertinently to Lavoisier, the Abbé de Condillac.\textsuperscript{77} In a passage from the \textit{Traité Élémentaire} that must have irked his American readers, Lavoisier likened natural philosophers to mere children:

> When we begin the study of any science, we are in a situation, respecting that science, similar to that of children; and the course by which we have to advance is precisely the same which Nature follows in the formation of their ideas. In a child, the idea is merely an effect produced by a sensation; and, in the same manner, in commencing the study of physical science, we ought to form no idea but what is a necessary consequence, and immediate effect, of an experiment or observation.\textsuperscript{78}

Lavoisier’s severe scientific epistemology simply reflected his deeper understanding of the human mind and its functional limitations.

For the investigators, we know, reason was not some faulty mechanism that required the type of discipline that Lavoisier imposed on it, but, rather, the gift of God. Furthermore, they saw pure empiricism in a negative light, as it betokened a kind of mindless recording. As Ouvrière wrote of the subject, “The ancient history of Chemistry offers such a lamentable view of ignorance, superstition and empiricism, that its pages seem no more useful but to prove how laborious, slow and uncertain is the advancement of human understanding, unless it is aided by the correct results of observation and by an unprejudiced love of truth.”\textsuperscript{79} The way to the knowledge of chemistry, and consequently to that of yellow fever, required both facts and reason. Benjamin De Witt of New York also endorsed this combination of methods. In a dramatic exclamation directed to his fellow investigators in the fields of medicine and chemistry, he urged: “Led by the faithful hand of experiment, and illuminated by the torch

\textsuperscript{78} Lavoisier, \textit{Traité Élémentaire}, xvi.
\textsuperscript{79} Felix Pascalis Ouvrière, \textit{Annual Oration} (Philadelphia: John Bioren, 1802), 5.
of reason; draw aside that veil of nature which hides from our eyes so many of her sublime operations!"\(^80\)

Rather than depending solely on experiments, Ouvière and De Witt, as well as Rush, Browne, and Mitchell believed that common sense could account for the phenomena of nature, such as the cause of yellow fever. The very makeup of the world showcased the accuracy of this belief, for all true things had simple and explainable natures. In his conclusion to the *Remarks on the Gaseous Oxyd of Azote*, Mitchell elaborated on the basic, uncomplicated, and thoroughly understandable makeup of the natural world:

> The business of science is to generalize facts, to class phenomena under distinct heads, and show their dependence upon a common principle or cause. Accordingly, in the progress of human reason, polytheism has yielded to the conviction of the existence of one God; the intricate and seemingly opposite phenomena of matter and motion have been referred to one general law of gravitation; the puzzling and diversified appearances of electricity have been reduced to a few plain rules; the multitude of facts concerning light and colours have been in like manner arranged into scientific form; and both the rainbow and telescope bear witness to the simplicity of optics. The fluids composing our atmosphere have been analyzed, and the influence of these, and of many occasional combinations of other substances into gases, upon life and health, been investigated to their principles. Contagion alone has remained a subject for doubting and guessing; a dismal somewhat, whose exact origin was unknown, and whose operation seemed capricious or unaccountable. This, I trust, will now, like other agents in creation, be found to have its laws of production, diffusion and action, which are steady and unvaried in their nature, as well as simple and easy to be comprehended.\(^81\)

As he saw it, science had revealed the simplicity inherent in all nature. It had shown with great clarity that problems must have simple answers, which could be grasped with the common faculties of the human mind; indeed, it suggested that simplicity was a prerequisite of any true idea. Why would the

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\(^{81}\) Mitchell, *Remarks on the Gaseous Oxyd or Azote*, 42-43.
cause of disease be any different? Once again, common sense silently exerted its formative influence over the intellectual ferment of the yellow fever years.

The application of the new chemistry constituted a decisive weapon for the localists in the evolving struggle to determine the cause of yellow fever. The very nature of the causative principles demanded this. Caloric, after all, could hardly be transported effectively, and neither could air. As the editors of the *Medical Repository* rather slyly asked of their contagionist readers in one issue, if a gas caused yellow fever, then how could a ship possibly transmit it, unless that vessel were airtight? For the contagionists, chemistry offered no substantial benefits. To be sure, they did believe that the material cause of yellow fever was a particle of some sort, and thus, at least theoretically, subject to chemical analysis, as the ill-fated experimentalists tried to show. But the contagionists’ particle was still something in the air, not a part of it, and therefore beyond the suggestive power of the pneumatic chemistry.

The new chemistry also suited the localist perspective on a deeper level, for it allowed them to imagine the production of disease from the regular cycles of regeneration and decay, combination and decomposition, and life and death. Commentators on yellow fever and the other local diseases—usually denominated “fevers”—had always suspected that such diseases shared a relationship with putrefaction and decay. Virtually every single localist writer of the epidemic period argued that decay produced the miasma, effluvia, or exhalation that produced yellow fever. West Indian writers, from Robert Jackson to Joseph Lind, argued the same. Yellow fever and the closely-related bilious, camp, and jail fevers all abounded in areas where putrefactive processes seemed to take place—in the dank, disgusting areas around swamps where foulness lurked, and in the offal-ridden, rodent-infested cities. Not surprisingly,  

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82 “Medical and Philosophical News.” *Medical Repository* 3, no. 2 (November 1799), 197-215.
yellow fever also occurred at the hottest and wettest times of the year; the same circumstances that most favored putrefactive processes. The initial inquirers could hypothesize a causal link between disease and decay, but they could not prove it. But with the perspectives of the new chemistry, they could. The Chemical Revolution suggested numerous ways to demonstrate how putrefaction would produce yellow fever. In some sense, then, the theories of the chemical investigators only substituted definite, knowable gases for the vaguely defined miasmas, exhalations, and effluvia of their predecessors.

The chemists and doctors, we know, believed that a mysterious vital energy or force held the body together in life. As they understood it, decay or putrefaction marked the opposite—the decomposition of the various affinities that had once characterized the living organism. Ouvière described the process as the breakdown of the “constituent elements of a body from the equilibrium of their own affinities.” As soon as living beings lose their vital energy—that is, when they die—“they necessarily fall into a complete state of putrefaction.” Putrefaction released the principle of death, the force that unmade life, just as the vital energy held it together. “Life is opposed to the putrid fermentation of animal and vegetable substances,” Ouvière stated. Putrefaction, he continued, “Suddenly destroys or suspends the phenomenon of life.” In a series of poetic verses featuring a personified septon, Mitchill rendered this unsettling truth dramatically—“You saw . . . the peccant principle of death;/Grim SEPTON, arm’d with the power to intervene,/ And disconnect the animal machine . . . Within the great DISORGANIZER lurks,/ And plans, unseen, his undermining works.” Disease engaged mankind in a conflict that mirrored the more elemental struggle between life and

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85 Mitchill, “Doctrine of Septon,” in *Medical Repository* 1, no. 2 (November 1797), 189-190.
death. Mitchill’s lines make for a fitting conclusion, as there always was a bit of poetry in the science of these early republicans.
Chapter 4: “Let Not God Intervene”

“With reverence and resignation we contemplate the dispensations of Divine Providence in the alarming and destructive pestilence with which several of our cities and towns have been visited . . . .”

- John Adams, State of the Union Address, December 18, 1798

On the Fourth of July, 1799, a crowd gathered in the Brick Presbyterian Church in New York City to hear a speech from Samuel Latham Mitchill. The citizens who congregated in the church’s pews knew Mitchill chiefly for his natural philosophical prowess. The charismatic professor was even gaining something of a reputation among the public for his polymath interests and eccentricities.\(^1\) This particular occasion, however, called on another aspect of Mitchill’s intellectual repertoire. The Fourth of July celebration had become one of the most important public festivities in the early United States—a “rite of nationalism,” according to historian Len Travers, which bound Americans together around a shared cultural mythology and reinforced national mores and values.\(^2\) In July 1799, though, the normally joyous day had taken on an unmistakably somber tone. As Americans approached the start of the fever season, most recognized that just as there was much to celebrate, there was also much to lament. Yellow fever had only recently devastated the American port cities, killing more than 2,000 in New York and over 3,500 in Philadelphia, as well as striking in Boston, Baltimore, Wilmington, Portsmouth, and Norfolk. Besides that, for reasons that Mitchill and his investigator colleagues would discuss, the virtue of Americans seemed to be slipping, and often with very alarming results.

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\(^1\) Mitchill’s public reputation would be fixed and widely-known by at least 1818. See Graham Burnett, *Trying Leviathan: The Nineteenth-Century Court Case that Put the Whale on Trial and Challenged the Order of Nature* (Princeton: Princeton University Press, 2007), 44-52.

In this atmosphere, Mitchill chose to remind his listeners that, even though they might justly celebrate the anniversary of their political independence, they still depended on a great deal. Always the natural philosopher, Mitchill stressed the dominion of natural law, “As to the general influence of light, heat, and the physical elements, which compose and actuate the universe and every part of it, these citizens are as dependent on them, as any other denomination of mortal men.” Then, in a surprising admission, he continued, “In like manner are they dependent upon the intellectual, designing and organizing power, which gave law to the atoms of which natural beings are composed, and assigned each its sphere of action, its relations and affinities.” Mitchill then continued, “This power they ought always to acknowledge, and not affect in the wantonness or the folly of their limited intellects, to doubt of its superintending providence, or to deny, with modern epicureans, the existence of its influence. It is a sign of great weakness, and I suspect of depravity, for a people to declare themselves independent of the great governing principle in nature.”

Mitchill’s pious admonitions to the assembly of the Brick Presbyterian Church remind us that clear-cut distinctions between science and religion did not apply to the fever investigators, who were almost all devout Christians as well as natural philosophers. For them, science and religion melded seamlessly in a worldview that saw in nature the very evidence of God’s design. As the supreme Author, God not only created the world, he also imbued everything in it with his will and purpose. It followed, then, that the purpose of a thing constituted a key reason for that thing’s existence (and thus an element of its cause). For most of the history of Western philosophy, in fact, the pursuit of purpose constituted a legitimate means of natural philosophical inquiry. Aristotle, for example, had enshrined the notion of purpose into his theory of causation as the final cause, the reason for which the thing was made, its telos. Aristotelian notions of cause and effect, including the final cause, survived well into the

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modern period. Mitchill, in fact, consciously channeled Aristotle and the Greeks in his Independence Day oration. His choice of the term “atoms,” from the Greek word for “indivisible,” signaled his debt to his Hellenic scientific forebears for providing, if only roughly, the conceptual basis of the new chemistry and its irreducible substances. His aspersions toward the “modern epicureans”—an oblique reference to the atheists and deists of his own time—showcased his alliance with the Aristotelians against the supporters of the philosophy of Epicurus, a contemporary and opponent of Aristotle, who believed that atoms came together randomly without any purpose.

The belief in the ubiquity of divine will, however, led to a rather unsettling conclusion—if everything had been created for a purpose, then yellow fever, too, must have a purpose, for omniscient and omnipotent God would not allow something to come into existence by mere chance. What, then, was the divine purpose of yellow fever? Why would God, an absolutely benevolent being, create such an evil? Invariably, doctors, clerics, and laypeople alike agreed that sin was responsible, but how? Furthermore, how exactly did God implement his will? This chapter examines the investigators’ search for the final cause, the telos, of yellow fever. As both Christians and natural philosophers, however, they faced numerous challenges. On the one hand, they believed in the rule of natural law and they opposed those who claimed that God directly intervened in human affairs. On the other hand, they risked straying too close to the heretical doctrines of the deists, intellectuals in the United States and especially Europe, who believed that the evidence of design signified the existence of a creator, but who dismissed the scriptural bases of all revealed religions and denied the specific attributes of the Christian God.

Eager to prove that yellow fever adhered to the rule of natural law and demonstrate its conformity with

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4 Daniel Dennett has argued that this last trace of Aristotelianism encountered its first real philosophical challenge from the work of Charles Darwin, who demonstrated that a thing, a living thing especially, might exist for no apparent purpose at all, but only because it had survived through natural selection. Daniel Dennett, Darwin’s Dangerous Idea: Evolution and the Meanings of Life (New York: Simon and Schuster, 1996). Darwin had not disproved the Creator, nor even tried, but he had demonstrated that the cause of a thing, such as, say, the cause of the specific qualities of a cat, could not always be grasped through a consideration of the purpose of its creator, since the cat did not gain its qualities from a creator, but from the accumulation of the variations and mutations that resulted in the survival of the cat and its evolutionary ancestors.
the principles of true religion, the fever investigators turned to natural theology, a type of inquiry devoted to proving the existence of the Christian God and the accuracy of the scriptures through the evidence of design.\(^5\)

Not surprisingly, the contagionists failed to propose an effective explanation for the purpose of yellow fever. They had always pointed to commerce as the source of yellow fever. In order to remedy the problem, they proposed limiting ship traffic in affected cities, and they advocated for strict quarantine measures that would hopefully prevent infected vessels from entering their ports. Mitchill, Rush, and Webster, among others, quickly seized on the irreligious implications of the contagionist argument. For one, contagionism impugned the goodness of God, for it suggested that He had allowed the yellow fever particles to move around and infect people at random. Furthermore, it suggested that God did not want people to engage in commerce, a notion which struck the commercially-oriented localists—and, indeed, the commercially-oriented communities of the early republican cities—as absurd. By the 1790s, most Americans, regardless of their precise political persuasions, had accepted that some amount of commerce was necessary to ensure the wellbeing of the republic.\(^6\) By the end of the epidemic period, the localist critique of contagionism had come to involve not only an evaluation of its scientific incorrectness, but also a judgment about its unlikelihood in God’s creation, evidenced by its inability to satisfy basic theological necessities.

To the contrary, the localists, led by Mitchill, Rush, and Webster found an elegant compromise among the various theological and philosophical demands of their Christian-scientific perspectives. As

\(^5\) Admittedly, natural theology means different things to different people. At its core, it is a way of investigating God through nature, without the aid of scripture (it is also sometimes called rational theology). The term itself only goes back to 1801, with William Paley’s *Natural Theology*. Paley, however, used the evidence of nature to argue for the existence of the Christian God and to confirm the scriptures. The investigators used the evidence of design for the same purpose, though they never used the term “natural theology.” Thus my own use of the term is meant to reflect their understanding of a type of evidence and its applications.

\(^6\) My own picture of the commercial orientation of the localists as well as most others owes much to the argument pioneered by Drew McCoy, *The Elusive Republic: Political Economy in Jeffersonian America* (Chapel Hill: University of North Carolina Press, 1980).
they cast it, by negligently and carelessly allowing dirt and filth to accumulate, the city-dwellers violated both scriptural and common-sense prohibitions against uncleanliness, setting in motion a chain of events that, consistent with God’s design, naturally produced yellow fever. Their natural theological explanation also exculpated the commerce of the early United States from the charges of the contagionists. But, while the localist explanation may have vindicated the economic bearing of the republic, it nevertheless raised fears about the virtues of its citizens. After all, their sins repeatedly resulted in occurrences of yellow fever. To remedy the situation, the localists embarked on a vigorous public health campaign, through which they stressed the duties of all Americans, as citizens of the republic and subjects of God, to abide by sanitary regulations. What they proposed was no less than a union of science with proper religion and proper republican principles. It was a powerful argument.

Since the beginning of the Judeo-Christian tradition, adherents faced a singular problem—if the one true God created the world and everything in it, then why did evil exist? Why, for example, did pestilence sometimes befall the followers of God? Some may have found some level of satisfaction in the story of the Fall—God created a world free from evil, but curious human beings (to be more precise, one curious human woman) violated God’s one command, and so consigned humankind to a world of

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7 As far as I know, this reconciliation of divine and natural causes has gone unacknowledged by historians, though Charles Rosenberg was close. He showed that Americans of the 1830s saw cholera as a divine retribution for sin. The means through which God operated, however, were predisposing causes, especially intemperance, which prepared the body to accept disease. “In this doctrine of predisposing causes, the needs and attitudes of an awakening science found practical reconciliation with the ancient, and reassuring, idea of sin as a cause of disease.” See Cholera Years (Chicago: University of Chicago Press, 1962), 40, 40-54. The fever investigators, though, believed that the very material cause of yellow fever emerged from sinful behavior, consistent with God’s will, of course. Though seemingly minute a difference, it did have drastic theological meanings. Rosenberg’s realization explains why some people got disease and some did not, but it could not grasp the purpose for the material cause of the disease (i.e. why it even existed in the created world).

impermanence and pain. Others may have held with Gottfried Wilhelm Leibniz that the world as it was constituted the best of all possible worlds, and that evil was a necessary component of a good world.⁹

Leaving aside such overarching justifications, most have accounted for specific instances of evil by claiming that the sins of men provoked divine wrath, and that God directly intervened in human affairs to punish the wicked. The Old Testament of the Bible brims with stories of God’s retributive justice, which often featured visitations of pestilence, among other penalties. In the earliest books of the Bible, for example, we read of God sending plagues to the enemies of the Israelites. Famously, in the book of Exodus, God afflicts the Pharaoh and the Egyptians for their enslavement of the Hebrews, and in Samuel God sends plague upon the Philistines for stealing the ark.¹⁰ Just as frequently, God visited pestilence on his own people for transgressing his divine will, usually because they had worshipped other gods or committed some other heresy. Much of the Old Testament, in fact, reads as an extended justification for the evils that befell God’s people, in which all the plagues, famines, and wars figure as due punishments for disloyalty and irreverence.¹¹

With time, such ideas gradually faded from the minds of Western commentators as they turned instead to natural explanations for the occurrence of disease. The transition came not with the Scientific Revolution of the seventeenth century, but with the much earlier innovations of the ancient Greeks of the classical age, the fourth and fifth centuries BC. The Hippocratic Corpus does, in fact, contain the first fully-articulated views of the natural causes of disease and their effects on the human body. With the rise of Christianity in the Roman West, however, Greek thought fell out of favor. Then, after centuries of wallowing about in the Dark Ages of Christianity, learned disease investigators sometime around the twelfth century AD rediscovered the wonders of Greco-Roman learning, threw off

⁹ Leibniz gives this argument, famously ridiculed in Voltaire’s Candide, in his Theodicy (1709).
¹¹ Leviticus 26: 14-46; Jeremiah 14: 11; and for a more general overview see Kings I and II, and Samuel I and II.
superstitious adherence to divine explanations, and once again looked for the causes of disease in nature. So the story goes, at least.\(^\text{12}\) In reality, we find that before and after the renaissance of Greek thought, disease inquirers regularly appealed to natural and divine explanations, sometimes in complementary, sometimes in seemingly contradictory fashions.\(^\text{13}\) Writing of the Black Death in Florence in 1348, Boccaccio provided ample testimony to the confusion of causes, claiming that it came about “either because of the operations of the heavenly bodies, or because of the just wrath of God mandating punishment for our iniquitous ways.”\(^\text{14}\)

Similar causal confusion existed in the United States in the 1790s, a time of ferment in religion as much as in natural philosophy. The period witnessed the intensification of what would come to be known as the Second Great Awakening, a spectacular expansion of evangelical religious devotion among Americans of all sorts. Inspired by the example of the American Revolution and its rejection of the old hierarchical, deferential social order, early republicans moved away from established churches and sought to cultivate their relationships with God through their personal experiences with His grace, the Bible, or else by selecting their own denominational affiliations in what was increasingly a competitive marketplace of religious practices and beliefs.\(^\text{15}\) The evangelical upsurge, while never a unified movement with a fixed body of doctrine, nevertheless did center on a few essential tenets. As Mark Noll writes, “Evangelicals called people to acknowledge their sin before God, to look upon Jesus Christ (crucified—dead—resurrected) as God’s means of redemption, and to exercise faith in this Redeemer as

\(^{12}\) See, for example, J. N. Hays, *The Burdens of Disease: Epidemics and Human Response in Western History* (Rutgers University Press, 2010), 9-36.


the way of reconciliation with God and orientation for life in the world.” Sin, redemption, and indeed punishment lay at heart of American religious convictions during the epidemic period.

Therefore, not surprisingly, when yellow fever struck Philadelphia in 1793, numerous writers, speechmakers, and sermonizers ascribed the pestilence to divine wrath. In one pamphlet, titled An Earnest Call, the anonymous author urged his readers to reform their ways, as the “wrath of the Almighty seems inflamed against this City.” He continued in a torrent, enumerating the crimes of the people in vague though powerful language, “His long suffering patience is at length exhausted—his mercies slighted—his gospel despised!” “At length the sword of his indignation, the sharp two edged sword of wrath is unsheathed.” The unknown author even specifically set his own depiction of the cause of the yellow fever epidemic against those of the naturalists: “I know there are many who attribute this awful Contagion to natural causes, and ridicule the idea of a supernatural agent: but I conceive, we may clearly trace the finger of God in our chastisement.” The community as a whole had sinned, though he does say exactly how, and it would suffer as a result. In order to protect oneself, one needed only to turn to God, not search for the cause in nature.

Appeals to divine authority persisted well beyond the epidemic of 1793, even among prominent clerics and intellectuals such as Ashbel Green, the Presbyterian minister and later President of Princeton University (where he preserved the university’s patronage of science and its empirical and inductive approach). In The Pastoral Letter, the transcript of a sermon he delivered before his congregation in Philadelphia during the epidemic of 1798, Green baldly stated that God had sent yellow fever as a punishment for the sins of Americans. “It has pleased a wise and holy God to lay his chastising hand

16 Noll, America’s God, 171.
17 Anonymous, An Earnest Call, Occasioned by the Alarming Pestilential Contagion (Philadelphia: Jones, Hoff, and Derrick, 1793), 7.
more heavily on our happy city for two months past, than perhaps at any former period,” Green lamented. “It would really seem as if the God of Heaven had set himself to punish the cities and towns of the United States, and was determined to inflict one stroke after another, till they were either reformed or utterly destroyed.” Unfortunately, the citizens of the major port cities had not taken the lessons to heart, but had sunk even deeper into their iniquities as the epidemic period proceeded, according to Green. Their depravity held in store the severest of consequences. “It is predicted that ‘in the last days perilous times shall come.’ Those days it is our lot to behold,” Green intoned to his frightened audience. The message was clear—not only did yellow fever appear as a chastisement for sin, but it promised to fulfill the biblical prophesies of the end of the world, a time when chaos, destruction, and death would reign. Green reassuringly urged his listeners to remain steadfast in their faith and honest in their ways, for God had “infinite grace in him for the preservation of humans if they should seek it.”

Scholars of yellow fever in the early United States certainly have not overlooked the persistence of divine causal explanations, but they have mistaken its true extent. Most simply attribute such beliefs to backwards elements in society—the people far outside of medical and scientific circles. According to Martin Pernick, certain unidentified voices spoke about the “wrath of Deity” and its influence in the origin of yellow fever. Pernick dismisses such notions as the surviving relics from an older time. In the Philadelphia of 1793, he rather confidently informs, “The division between medicine and theology was still young.” Billy G. Smith also asserts, again somewhat vaguely, that religion helped Philadelphians

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19 Ashbel Green, A Pastoral Letter from a Minister in the Country, to Those of His Flock who Remained in Philadelphia during the Pestilence of 1798 (Philadelphia: John Ormand, 1799), 5.
20 Ibid., 8.
21 Ibid., 9.
understand the epidemic.\textsuperscript{23} And in a different type of study altogether, Gary Nash claims that leaders of Philadelphia’s free black community, Absalom Jones and Richard Allen, viewed the plague as a visitation from God, though not as a punishment, but as an opportunity to advertise blacks’ civic virtues by assisting the fever-stricken.\textsuperscript{24}

In actuality, we find natural and divine explanations promiscuously jumbled together in the writings of single commentators. In his bestselling pamphlet, the \textit{Short Account of the Malignant Fever}, Mathew Carey alluded to the pestilence of 1793 as a providential retaliation for sins. In their newfound prosperity, many Philadelphians, Carey deemed, had sunk into luxury and extravagance. Their excesses provoked the divine wrath—“Although it were presumption to attempt to scan the decrees of heaven, yet few, I believe, will pretend to deny, that something was wanting to humble the pride of a city, which was running on in full career, to the goal of prodigality and dissipation.”\textsuperscript{25} Yet, later in the \textit{Short Account}, Carey easily transitioned into a discussion of the natural causes of the fever, noting the nascent controversy between importationists and localists. Carey also published a short pamphlet on the cause of the fever, \textit{Observations on Dr. Rush’s Enquiry into the Origin of the Late Epidemic Fever in Philadelphia}, in which he attempted to refute to Rush’s theory of local generation in favor of his own conviction of the fever’s importation.\textsuperscript{26}

The same curious combination of the natural and divine appears even more distinctly in the letters of Benjamin Rush. Well known for his numerous published writings about the natural causes of yellow fever and his strenuous defense of localism, Rush’s letters to his wife, Julia, preserve an entirely different conception of the pestilence, its cause, and its meaning. In his almost daily correspondence

\textsuperscript{23} Ibid., 126.
\textsuperscript{25} Mathew Carey, \textit{A Short Account of the Malignant Fever Lately Prevalent in Philadelphia} (Philadelphia: Mathew Carey, 1793), 11-12.
\textsuperscript{26} Mathew Carey, \textit{Observations on Dr. Rush’s Enquiry into the Origin of the Late Epidemic Fever in Philadelphia} (Philadelphia: Mathew Carey, 1793).
during the epidemic of 1793, Rush repeatedly thanked God for preserving him against the plague. "I continue to enjoy good health. Help me to thank the divine Preserver of Men for it," he wrote to Julia as early as August 26. Week later, in early September, Rush again praised God for the deliverance from the evil, this time by quoting from Psalm 57—"'Be merciful unto me, O God! be merciful unto me, for my soul trusteth in thee, yea in the shadow of thy wings do I make my refuge, until these calamities be overpast.'" In another biblical reference, Rush compared himself to the three young men whom God preserved from the furnaces of Nebuchadnezzar for their refusal to worship a graven image of the Babylonian king—"Hereafter my name should be Shadrach, Meshach, or Abednego, for I am sure the preservation of those men from death by fire was not a greater miracle than my preservation from the infection of the prevailing disorder." Once again, on September ?, "Alive!," he exclaimed at the beginning of the letter, "And . . . still through divine goodness in perfect health." Clearly, Rush thought that God had somehow saved him from the pestilence amongst which he lived and walked for months.

Indeed, according to Rush, not only had God delivered him from yellow fever, he had also caused the disease in the first place. Though in all of his publications Rush posited natural causes for the origin of yellow fever, throughout his correspondence he very clearly and repeatedly highlighted its divine origin. In more than one instance, for example, Rush referred to the epidemic as the "judgment of God upon our city." Like his contemporaries and predecessors, Rush believed that God had sent yellow fever as a punishment for sin. "What a bitter thing must sin be to deserve even such a punishment as a destroying pestilence," he wrote to Julia on September 30, near the peak of the epidemic.

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28 Rush to Julia, September 9 in Ibid., II: 656.
30 September 13, 1793, Ibid., II: 663.
31 Rush uses this phrase at least twice, Ibid., II: 727, 733.
epidemic’s destruction. Rush even gave an indication of the types of sins that had brought about God’s wrath. In one letter, he claimed, “I wish landlords would consider the wickedness of rack rents. They have been one of the procuring causes in my opinion of the late judgment of God upon our city.”

How did Rush reconcile his seemingly contradictory mixture of natural and divine explanations for the advent of yellow fever? For him, the answer came from a particular view of the providential makeup of the world. Once again, Rush’s correspondence from the 1793 epidemic proves illustrative.

In writing to his wife, Rush discussed the various people and events that indicated the agency of the divine plan. His own “miraculous” survival through the epidemic, when so many of his fellow doctors died, seemed one sure sign. Again and again, Rush marveled at the unlikely decisions that led to some mitigation or exacerbation of the pestilence. Surely, such decisions reflected God’s providence. When Rush’s mother and sister’s refusal to abandon him and leave the city, for example, it struck him as another sign of God’s favor. In his mind, they had stayed to give their beloved son and brother solace enough to continue his good works and to fortify his body against the predisposing cause of fear. As he wrote to Julia, “My mother and sister are part of the means that providence employs to preserve me from the infection.”

God operated through other agents, too, and not always for the health and wellbeing of his subjects. God, after all, had sent the disease as a punishment. In Rush’s interpretation, the various physicians with their false cures, as well as all the quacks and imbeciles so prevalent in Philadelphia, figured as the villains in a divine drama. Their misinformation and their lies deluded the people and exacerbated the plague, consistent with God’s plan. “God’s will is done on earth as much by pestilential

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32 Rush to Julia, September 30, Ibid., II: 689.
33 Rush to Julia, October 27, 1793, Ibid., II: 727. By “rack” rents, Rush means excessive, unfair rents.
34 Rush’s escape from harm was somewhat improbable. Mathew Carey, for example, later discussed the frequency of sickness and death amongst the doctors of Philadelphia. At least ten died and “hardly one” escaped infection, according to Carey. See Carey, A Short Account, 72.
35 Rush to Julia, August 29, 1793, The Letters of Benjamin Rush, II: 645

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contagion and ignorant physicians as it is by the songs and praises of saints and angels in heaven,” he wrote. And, elsewhere, after carping about the stupidity of some physicians, he wrote to Elias Boudinot, “But why complain of the ignorance or malice of my brethren? They are a part of the instruments of the divine displeasure against our wicked city.”

Though Rush’s interpretation of providence clarifies to a certain extent the contradictory combination of causal ideas, it still leaves many questions unanswered. The most pressing of these relate to the nature of God’s interactions with the events in Philadelphia during the yellow fever epidemic of 1793. Did God directly intervene in human affairs to inspire or bewitch his agents? Or had he somehow preordained what was to happen, planning the people and events that would help or hinder the progress of the disease and then letting them play out accordingly? At the fundamental level, did natural or divine causes account for the epidemic of 1793? Or did he believe that it was some mixture of the two? If not for subsequent developments, these outstanding questions might have gone unanswered. As it was, the issue erupted into a debate that divided the investigators, exposing a widening fissure in the natural philosophical community in the United States, which ran deeper than the one that separated the localists from the contagionists.

The furor arose as a result of conclusions reached by Webster and Tytler in their historical works on epidemic diseases. In *The Treatise on the Plague and Yellow Fever*, Tytler argued that yellow fever had been caused by a contagion that had been in continual existence since the time of the Jews of the Old Testament. Originally, God had sent the disease upon them for their sins, and it had survived ever since, circulating among the various peoples who moved about the Old World and the New, and occasionally blossoming into full-blown epidemics when the circumstances suited it. *The Treatise*, I have argued,

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36 Rush to Julia, September 25, 1793, Ibid., II: 679.
37 Rush to Elias Boudinot, September 25, 1793, Ibid., II: 681.
provided an answer to one of the glaring weaknesses of the contagionist argument—the reliance on an infinite regress, the notion implicit in the contagionist argument, which held that since disease always came from some other source through importation, it had no original cause. Not only did Tytler’s argument posit a starting point from which yellow fever originated, it also explained why the disease did not generate over and over again. Tytler satisfied both of the outstanding philosophical problems of the two schools of thought regarding the cause and transmission of disease. But, in order to do so, he had to appeal to divine intervention, which only earned him the censure of his philosophical peers.

In their review of *The Treatise*, the editorial staff of the *Medical Repository* began cautiously, praising Tytler’s efforts and intentions, but moved quickly to a stern rebuke of the philosopher, focusing especially on his position regarding the origin of earthly disease through direct intervention. “Mr. T appears before us as a compiler,” they wrote of the author, though not in a negative light, since “materials of every copious subject require to be digested.” The editors even compared Tytler to Euclid and Lavoisier, fellow compilers who had assembled and arranged the knowledge of their respective subjects, geometry and chemistry. They also praised Tytler’s honesty for admitting that he had not lived through any of the epidemics and that he had drawn his data from books alone. Though they might praise his efforts, they could not condone his conclusions. “Our readers will be disappointed, and, we fear, mortified,” the editors wrote, “at the inferences which Mr. T. draws from the historical records.” Their criticism, of course, centered on Tytler’s attribution of yellow fever to God’s intervention, an idea that betokened a backwards state of philosophy, they deemed. As a corrective, they admonished him with a Latin quote from Horace: *Nec deus intersit, nisi dignus vindice nodus*, a

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38 “Review,” *Medical Repository* 3, no. 4 (December 1800), 374.
39 Ibid., 374.
passage that translates into “let not God intervene, unless the connection is truly worthy of such an intervention.”  

Webster elicited a similar type of response with one of his conclusions in the Brief History of Epidemic and Pestilential Diseases. Unlike Tytler, Webster did not directly impute the cause of yellow fever to God, but he did promote an idea commonly known as “equivocal generation.” The theory of equivocal generation held that living beings originated without a discernible cause. In the nineteenth century, it took the name spontaneous generation and became one of the most controversial issues of the time. The theory died a slow death, expiring for all intents and purposes sometime in the 1860s or 1870s with the rise of microbiology and related fields. Webster, to be sure, did not claim that disease spontaneously arose. In order to do so, he would have to conceive of the disease-causing matter as a life form, which he did not. In fact, Webster only claimed that the insects, including the mosquitoes, which appeared in large numbers during epidemics in all parts of the world, arose “equivocally” in response to the epidemic constitution of the atmosphere. Ironically, Webster was suggesting that the disease had produced the insects, when in fact the insects had transmitted the disease.

Despite the overall positive response to the Brief History, Webster’s contemporaries roundly criticized his advocacy of equivocal generation. In a review in the Medical Repository, for example, the authors expressed their “surprise” at Webster’s endorsement of the doctrine. According to them, all of the most eminent contemporary naturalists had “exploded” the doctrine, meaning that they had convincingly disproved it. As with all natural philosophical knowledge, proof descended from

40 Ibid., 376.
observation. In this case, the microscope had revealed that even plants grew from seeds. Though the editors admitted that philosophers still debated the means through which other animalcula generated, they nevertheless confidently asserted that they would one day identify it with as much accuracy as they had discovered the causes of other natural phenomena. Science demanded patience, as observers accumulated facts, which could then be composed into theories and tested. Science would be impossible, they chided Webster, if natural philosophers attributed everything that they did not know to workings of supernatural phenomena.

Joseph Priestley, likewise, highlighted the absurdity of Webster’s belief in equivocal generation. In a letter to his friend, Benjamin Rush, Priestley wrote of his great dismay after reading The Brief History and finding that an astute gentleman such as Webster “should advance opinions so wild and unphilosophical . . . and especially that he should be an advocate for what I thought to have been the long exploded doctrine of equivocal generation.” For Priestley, a Unitarian minister, the problem rested not so much with the evidence for equivocal generation or its absence, as it did for the editors of the Medical Repository, but with the theological implications of the idea itself. If taken to its logical extreme, the doctrine of equivocal generation necessarily devolved into atheism or even outright nihilism. For how was it, Priestley asked, that the “various animals, the structure of whose bodies is as exquisite as that of man, all bearing marks of infinite wisdom, should arise spontaneously from the natural elements . . . which are void of all intelligence?” Priestley then moved quickly to his powerful indictment of equivocal generation: “If any one of these plants or animals, even the smallest and to appearance the most insignificant, could be formed without intelligence, from unconscious elements—[then] oaks, elms and cedars—horses, elephants and men, might have originally come into existence in the same way, and the whole universe have had no intelligent author. And yet Mr. Webster appears not

42 Medical Repository 3, no. 4 (May 1800), 393.
only to be a believer in a supreme intelligent author of nature, but in revelation too. I am confounded when I reflect on such inconsistencies.”

Priestley’s critique of Webster reflected a fundamental religious anxiety about natural philosophy that stretched back to the beginnings of the Scientific Revolution. For as soon as any one inquirer proposed that a natural law determined a natural phenomenon, the consistency of Christian theology demanded that natural law determine all natural phenomena. To believe otherwise was to deny the all-embracing power of the divine design. According to Simon Schaffer and Steven Shapin, the same logical problem figured prominently in the philosophical battles between Robert Boyle and Thomas Hobbes in post-Restoration England. Hobbes, for example, countered Boyle’s argument about the “springiness” of the air—which he used to explain its elasticity and ability to fill in spaces—by claiming that the air had self-moving properties, which allowed it to expand inside a device. Boyle’s retort “invited natural philosophers to reject Hobbes’ view because they were dangerous to good religion and to the conception of nature that was required of proper Christianity.” Matter could not move itself, Boyle contended, because only God was capable of self-movement. At the nearly the same time, Isaac Newton used the same argument to impugn the supposed “atheists” of his day. In an unpublished writing, Newton claimed, “We find almost no other reason for atheism than this notion of bodies having, as it were, a complete, absolute and independent reality in themselves.” Even in the twentieth century, no less of a figure than Albert Einstein famously said that “God does not play dice” to deny the principle of uncertainty in physics and to stress the absolute necessity of deterministic natural law. Priestley’s refutation of Webster thus placed him in a long line of natural philosophical thinkers,

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whose belief in the unchallenged rule of natural laws corresponded to the necessities of a monotheistic worldview.

The chastisements from Priestley and the editors at the Medical Repository provoked an indignant response from Webster, who rushed to the defense of his doctrine. He began by scolding the presumptuousness of his fellow investigators, whose arrogance veiled the actual limitations of their knowledge. The outright rejection of the doctrine of equivocal generation went too far—in fact, it struck him as “a strong proof of the pride of modern philosophers.” As he continued in his own sort of lecture to his opponents, “I think it more becoming the limited knowledge of man to acknowledge his ignorance, than to be positive on such doubtful subjects.” Like Priestley, Webster detected the irreligious implications of his opponents’ perspectives. The rejection of equivocal generation led naturally, in his mind, to the denial of God’s superintending agency in earthly happenings. If life could never generate ex nihilo, then could nothing else occur but through the workings of natural law? If so, then how could philosophers account for acts of God, which necessarily involved the contravention of natural laws? Through the reductive logic of Webster, the matter called into question the very nature of the forces that governed the world, pitting science against religion. In a long passage, Webster elucidated his ideas:

That matter can be endowed with laws, which shall operate uniformly and perpetually, independent of divine agency, may be possible, but appears to me unphilosophical. I can have no belief in permanency of duration in any being but God, and the operations of his power. The opinion that natural effects proceed from laws impressed on matter, without any direct exertion of divine power—and that supernatural effects are produced by the immediate agency of the Supreme Being—appears to me at least unfounded, and even unscriptural. The scripture generally ascribes every event directly to the first cause. . . . This view of the question is not only more pious, but more philosophical; for I no more comprehend the growth and expansion of the rose in my garden, than the creation of the earth, or the resurrection of Lazarus. The result of my philosophy is to resolve every event and operation in the universe into the direct exertion of omnipotence. And I cannot but think that the modern doctrine of nature

Noah Webster, Medical Repository 5, no. 1 (Jan 1802), 30.
and natural laws, which seems to exclude the divine agency from most of the operations in the universe, has furnished the most tenable ground occupied by the materialists.  

The battle that played out on the pages of the *Medical Repository* exposed the growing divide between philosophers over the issue of God’s miraculous intervention in nature. On the one side, philosophers with scientific edges such as Joseph Priestley, Samuel Latham Mitchell, and Edward Miller argued that nature operated according to laws that did not change, and that God either could not or simply did not intervene to suspend them for any purpose. “Nec deus intersit—let not God intervene,” they intoned. These philosophers sought to banish appeals to divine intervention from the realm of legitimate philosophical inquiry. Arguments such as Tytler’s in the *Treatise on the Plague and Yellow Fever* unquestionably represented some kind of explanation, Mitchill and Miller conceded in the *Medical Repository*, “But we should not dignify this with the name either of philosophy, science, or even of history.” Science and natural law, they argued, obviated the need for divine intervention.

On the other side of the argument, philosophers with more orthodox religious beliefs maintained that God could and, in fact, did intervene in human affairs. Tytler, for example, argued that diseases originated from God’s punishment of the wicked deeds of the ancient Jews. Like the contents of Pandora’s Box, they had remained ever since. Webster offered no such similar examples, but he affirmed that divine intervention happened, and that equivocal generation was a valid, even superior, philosophical principle. Webster believed that natural causation and intervention worked together in an overlapping fashion, but he also maintained that nothing could overcome the overwhelming might and authority of God, not even the laws that he had established.

The dispute over divine intervention showcased different reactions to the critical perspectives of science and the Enlightenment, and those who used them to challenge traditional religious beliefs. The

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48 *The Medical Repository* 3, no. 4 (Dec 1800), 376.
advent and popularization of deism, in particular, frightened American intellectuals for its perceived threats to Christianity.\textsuperscript{49} Deism was never a unified creed with commonly-held principles, but most deists nevertheless agreed on a few particulars. Essentially, deists held that a supreme being had created the world, but rejected the validity of any specific tradition, including, of course, God’s revelations in the Bible. To the contrary, deists contended that the only evidence of God came from the design of the world. Deists in the United States, never a strong contingent, ranged from the moderate, such as Jefferson and Franklin, to the more radical, such as Ethan Allen, Elihu Palmer, and Tom Paine. Moderates, at least, maintained a reverence for Christianity without compromising their own principles—Jefferson and Franklin rejected the divinity of Jesus, for example, but nevertheless acknowledged that he served as an exemplar of human conduct. The radicals, however, abandoned all inhibitions in their desire to expose the contradictions and hypocrisies of Christianity, a religion built on lies and manipulations. In works such as Allen’s \textit{Reason the Only Oracle of Man} (1784), Paine’s \textit{Age of Reason} (1794), and Palmer’s \textit{The Principles of Nature} (1801), deists sought to substitute a religion of nature and reason for the misplaced faith in the scriptures.\textsuperscript{50}

The deist critique of Christian revelation focused particularly on the issue of God’s interactions with humans. In a section of Hume’s \textit{Enquiry concerning Human Understanding} called “On Miracles,” Hume defined a miracle as a “violation of the laws of nature” caused by an act “of volition of the Deity.”\textsuperscript{51} Since the truth of any miracle depended the credibility of the witness, Hume claimed that it was more reasonable to discredit the veracity of the testimony, since inaccurate reporting happened often, than the fact of the miracle, of which very few people claimed to have any experience. Others leveled their attacks against the temporal inconsistency of God’s interactions with people. In the Bible,

\textsuperscript{49} E. Brooks Holifield, \textit{Theology in America: Christian Thought from the Age of the Puritans to the Civil War} (New Haven: Yale University Press, 2003), 159-196, discusses the threat of deism and the theological responses. Jon Butler also discusses the problem of deism in \textit{Awash in A Sea of Faith: Christianizing the American People} (Cambridge: Harvard University Press, 1992), 212-220.

\textsuperscript{50} Herbert M. Morais, \textit{Deism in Eighteenth-Century America} (New York: Russell and Russell, 1960), 120.

\textsuperscript{51} David Hume, \textit{An Enquiry Concerning Human Understanding}, Section X.
God constantly intervened in earthly happenings—he appeared to people in bushes, in dreams, in visions; he spoke to them; he caused disease and famine to happen; and he even manifested himself to them in the flesh. Yet, in the almost two thousand years after Christ, no one had experienced a miracle in which God himself interceded. Or, at the very least, no such miracle had been memorialized in an authoritative religious text or accepted into the canon of religious belief. The temporal discrepancy in God’s behavior undermined his perfection, as Allen and Palmer argued in their works, for if God had to change, then he could not be perfect.\(^{52}\) Therefore, since God must be perfect, the revelations must be wrong.

The fear of deism grew in response to contemporary events, particularly the French Revolution. Initially supportive of the French cause, most Americans watched in horror as the high-minded principles of the revolution succumbed to deism, and perhaps even outright atheism. It began with the confiscation of Church property, the removal of Christian iconography from public places, and the corresponding creation of the Cult of Reason as a substitute for Catholicism. Irreligious measures quickly degenerated into chaos and mass murder, as atrocities such as the Reign of Terror and war in the Vendée soaked France in blood. By the end of the 1790s, the revolution lay in tatters. The cause was clear to Americans. Deists, they believed, had insinuated themselves into the positions of power, only to sabotage the revolutionary effort for some evil end. The threat of a similar infiltration in the United States only deepened American anxieties.\(^{53}\)

The perceived excesses of deism provoked a cross-denominational backlash among the Christian adherents to scriptural truth. In their own ways, each of the participants in the debate about divine


\(^{53}\) I am alluding here to the Bavarian Illuminati scare, a topic of further consideration in chapter 5. For the American take on the French Revolution, see David Brion Davis, *Revolutions: Reflections on American Equality and Foreign Liberations* (Cambridge: Harvard University Press, 1990), 27-54.
intervention formulated their perspectives in response to the perceived threat from deism. Webster mobilized the most extreme counterattack. His denial of the supremacy of natural laws and his affirmation of divine intervention constituted a defense of revealed truth based solely on the superiority of God over human reason. Webster’s appeal to authority placed him squarely in the fold of the conservative, orthodox Congregationalist, New English milieu from which he came. Webster, who maintained close friendships with leading New English intellectuals, such as Timothy Dwight (another Congregationalist minister and the president of Yale from 1795 to his death in 1817), could never quite escape the irresistible gravity of his own origins. In fact, as one of his biographers has noted, over time his views grew increasingly authoritarian, as he sought to restrict dangerous innovations of all sorts, in politics as well as religion.54

The other participants in the dispute faced the much more difficult task of negotiating a middle ground between outright deism and total reliance on the scripture, but without compromising their Christian faiths. These were men schooled in natural philosophy—they believed in human reason and the rule of natural law, and they specifically denied the necessity of divine intervention—but they were also devout Christians. Moreover, despite their rejection of divine intervention, they continued to believe that God participated somehow in the cause of yellow fever. Rush’s mixture of natural and divine causation in his correspondence from the 1793 epidemic proved not at all unique. In their review of Tytler’s Treatise in the Medical Repository, the same editors who lambasted his take on the divine origin of yellow fever also wrote, “We fully agree with the writer, that the plague, and, we add, all the other phenomena of this world, and of the universe, are to be resolved ultimately into the power and

54 K. Alan Snyder, Defining Noah Webster: Mind and Morals in the Early Republic (University Press of America, 1990)
agency of the Supreme Ruler, or Primary Cause." The same curious mixture of causes appears regularly throughout the writings of the inquirers, especially the localists.

They found their compromise in natural theology, the field of inquiry devoted to proving God’s existence and nature through the study of the design of the world. Deists too looked for signs of the creator in creation, but they maintained that only nature could disclose the attributes of the supreme deity. Natural theologians, on the other hand, reconciled the design of the world with scripture in order to prove the existence of the Christian God, not merely a god. In the 1790s and early 1800s, natural theological writings poured from the presses of Europe and the United States. Works such as William Paley’s A View of the Evidences of Christianity (1794) and Natural Theology; or, Evidences of the Existence and Attributes of the Deity (1802) showed that the evidence of design in nature was perfectly consistent with revealed truth. Natural theology mixed science and religion without contradiction. It enabled inquirers to believe that the world operated according to natural laws that reflected God’s superintending providence. The world could be both natural and divine. Natural theology, therefore, perfectly suited the particular religious and philosophical persuasions of the early national intellectuals.

As a result, natural theology flourished among the philosophers and in the universities of the United States. In the aftermath of the burning of Nassau Hall at Princeton in 1802—an event widely attributed to students drunk on deism—the interim president, Ashbel Green, instituted a course of lectures on the evidences of Christianity, featuring readings from Paley and George Campbell’s Dissertation on Miracles. Green himself specifically refuted the “natural religion” of the deists, arguing that the evidence of design convincingly proved the existence of the Christian God. Writing to the Green in December 1802, Rush congratulated the new president for his boldness. “It is high time to chase the Deists from that ground,” he encouraged. The study of the divine belonged “exclusively to the

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55 The Medical Repository 3, no. 4 (May 1800), 376.
56 The full title of Campbell’s book is Dissertation on Miracles: Containing an Examination of the Principles Advanced by David Hume, identifying it as a direct refutation of Hume’s “On Miracles.”
Christians,” he continued, “For everything good in man, and all his knowledge of God and a future state, are derived wholly from scattered and traditional rays of the successive revelations recorded in the Bible.”\(^{57}\) The Bible already contained all truth; natural philosophers had only to follow those truths into nature to discover the divine purpose of all things.

In its application, natural theology amounted to a kind of calculus whereby inquirers could weigh the evidence of scripture against the apparent design of the world in order to reach conclusions about the purpose of a thing, or perhaps the morality of a certain behavior. In one of his publications, for instance, Mitchill considered a moral question, raised by “by considerate and humane persons,” as whether or not “man was justifiable in preying upon his fellow animals.” Mitchill concluded that man was justified in eating his fellow animals, not merely because of “the authority of revelation,” but also because of “the make of his teeth.” Since human teeth could gnash animal meat from bone, they must have been intended to be used for that purpose. “But,” Mitchill continued, “how far this indulgence, or luxury, for animal food can scarcely be called a necessary of life, may be gratified, is left wholly undetermined. Our own experience alone, of the wholesomeness or pernicious effects resulting from its use, must guide us.”\(^{58}\) Questions of natural theology demanded common sense reflection on the makeup of the world and perhaps also the nature of human beings.

The fever investigators seized on natural theology as a way of understanding the \textit{telos} of yellow fever without referring to divine intervention. As with the other areas of disease inquiry, history and chemistry (in the realm of natural theology), the localists mobilized the most effective arguments. In fact, in their review of Tytler, the localists, Mitchill and Miller, articulated the precise manner in which investigators should undertake natural theological inquiry. Commenting on the nature of God’s influence in the origin of yellow fever, they wrote, “It seems to us also, that in accomplishing \textit{ends} he

\(^{57}\) Benjamin Rush to Ashbel Green, December 9, 1802, in \textit{The Letters of Benjamin Rush}, II: 853.

\(^{58}\) Mitchill, \textit{Remarks on the Gaseous Oxyd or Azote or of Nitrogene} (New York: T. and J. Swords, 1795), 21.
makes use of means; and these means, in the case before us, are what are termed secondary causes.” Secondary causes fell eminently under the domain of science, for they were bound by natural laws, which did not change. “The true business of philosophy is the tracing of secondary and subordinate to their effects, and, vice versa, of effects or events to their causes, as far as our capacities extend.” In doing so, “It is neither instructive nor necessary to overlook the whole catenation of intervening causes, and refer every thing at once, en masse, to the immediate will or direct operation, of the CAUSA CAUSARUM”—the “cause of causes.”

The editors, however, could not resist elucidating how the cause of disease fit with God’s plan. Here again, they agreed with Tytler, along with almost everybody else, that sin caused disease. They only disagreed with how. Consistent with their own picture of the manner in which God accomplished his ends, the editors turned their attentions to the means by which he fulfilled them—that is, through natural law. They wrote, “As the moral conduct of man is considered instrumental in stirring up plagues, this, we conceive, may happen through a neglect of cleanliness, or by suffering pestilential filth to form and accumulate in and around their persons and habitations.” Later in the same document, they stated the matter even more bluntly, “We consider it a part of the moral law, to be clean and free from defilement. The breach of this law is a vice or evil, for which the offender must expect some kind and degree of punishment.” On a somewhat larger scale, the steady accretion of many such sins resulted in the full-fledged epidemics that afflicted the port cities:

Noxious or pestilential vapours are the natural offspring of perspired and excreted substances undergoing corruption, and added to the incalculable mass of animal matter afforded by the bodies of beasts, birds, fishes, and other creatures killed for the purpose of food and manufacture, and collected into cities by the industry of man. When, from a long-continued and excessive accumulation of such materials, and a neglect of the means of preserving public as well as private cleanliness, sickness

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59 The Medical Repository 3, no. 4 (May 1800), 376.
60 Ibid., 377.
arises, it may be properly enough considered a visitation upon the inhabitants of a town or place, for their contempt of a high moral obligation.\textsuperscript{61}

With this natural theological picture of the purpose of disease, the localists effectively bridged the gap between divine and natural causation. In their view, God had written disease into existence in order to punish sin. He had constructed the world so that the sins of dirtiness and decay produced diseases. As Mitchill claimed in a separate publication, “I consider cleanliness in our person, clothing and habitations, to be a matter of moral obligation; and the punishment which providence has wisely thought proper to inflict upon those who violate this law is sickness, not unfrequently terminating in yellow-fever, pestilence and plague.”\textsuperscript{62} The localist explanation ably navigated the various philosophical and theological pitfalls of the early national intellectuals—it upheld the rule of natural law, it acknowledged the overarching providence of God and his purpose, and it did not in any way deny the goodness of God.

As a way of confirming their natural theological view of the cause of yellow fever, localists pointed to the manner in which common sense itself militated against the accumulation of wastes. God had given human beings all of their emotions, inclinations, and tendencies with purpose. Humans naturally abhorred dirt and filth; they were naturally repelled by decaying animal and vegetable matter and the odors they emitted; therefore, they reasoned, these things must be evils. God had engrafted this inherent disgust onto people as a means to prevent them from harm. Rush spelled out this rationale quite clearly. Commenting on the awful smell that wafted from putrid material, he hypothesized, “This fact, like the rattle of the snake, seems to have been intended to give us notice of

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\textsuperscript{61} Ibid., 377-378.
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danger, and to remove, or fly from the filth which emits it."\textsuperscript{63} The conclusion followed easily. Since humans naturally hated noxious materials, they would only tolerate them because of some kind of sinful behavior—vices such as greed, laziness, outright malice, or perhaps simple carelessness. Localists often pointed to the accumulation of thoughtless acts that resulted in the corresponding accumulation of wastes. Whether it was the inconsiderate merchant who dumped putrid coffee on one of the wharves of Philadelphia’s harbor, or the citizen who threw the remains of an animal into the streets, some sin accounted for each and every piece of offal left in the city, for every carcass that was allowed to putrefy. In assigning the causes of yellow fever, for instance, Charles Caldwell summoned the orthodox localist belief that dirt and putrefaction of all kinds produced the pestilential constitution. But, Caldwell stipulated, ultimately the “evil,” as he termed it, “May be said to owe its origin, in general, to that indolence and inattention, which unfortunately, constitute such predominant traits in the character of the human race.”\textsuperscript{64} Though natural processes produced the disease, human behavior lay at the root of yellow fever.

To clinch their natural theological argument, localists found ample proof of the sinfulness of filth in the scriptures. Cleanliness constituted one of the fundamental imperatives of the Judeo-Christian religious tradition. “Wash yourselves and make yourselves clean,” exhorts the author of Isaiah 1:16. Cleanliness laws figure particularly prominently in the earliest books of the Bible, such as Deuteronomy and Leviticus, putatively written by Moses, who enjoins his followers, in the name of God, to avoid impurities in food, in people, and in animals. The Mosaic Law, as it has come to be known, prescribed a comprehensive dietary regimen (the kashrut, the basis of modern kosher law); it ordered the followers of God to avoid dead bodies, excrements, and women who were or had been menstruating, among other things; and it also prescribed purification rites for those who violated the rules, many of which

\textsuperscript{63} Ibid., 10-11.
\textsuperscript{64} Charles Caldwell, \textit{A Semi-Annual Oration, on the Origin of Pestilential Diseases, Delivered before the Academy of Medicine of Philadelphia} (Philadelphia: Thomas and Samuel Bradford, 1799), 36.
involved ritual cleansing in the mikveh, a ceremonial bath house (also a feature of modern, Orthodox Judaism). The early republican Christians who had read their Bibles would have known through dozens of scriptural passages that God viewed uncleanliness as a serious infraction.

Though modern scholars have debated the actual origins and purposes of the scriptural prohibitions against uncleanliness, the investigators left no doubt on the matter. The laws were given to mankind to prevent disease, and they reflected God’s purpose for disease. As Rush opined, “A regard to cleanliness was enjoined upon the Jews by divine authority . . . [and] it would seem as if the neglect of it, was necessarily connected with suffering.” Indeed, he continued, “To prevent diseases among them, was one of the designs of their frequent ablutions, and of many other of their ceremonial institutions.” Rush then cited chapter and verse from Deuteronomy and Amos to bolster his point. In a similar vein, Webster declared, “It was the peculiar climate of Egypt, and the usual prevalence of scorbutic and malignant complaints, in that country, which occasioned all the minute injunctions of Moses, in regard to washing, cleansing, and purifications.” Continuing with his elucidation of divine laws, Webster wrote, “The laws of Moses were the commands of God.” Yet, he stipulated, “Divine commands have rarely introduced a new principle of right and wrong. Most of them are injunctions on man to conform to principles of moral fitness or utility, which existed anterior to the commands. They unfold to human view, and enforce the practice of those principles; but they do not create them. They add the strong

65 Some historians have argued that Biblical injunctions against dirty things reflected basic disease-avoidance behaviors. William McNeill notes, for example, that Jewish and Muslim prohibitions against pork had a salutary effect, because pigs carry many diseases. See Plagues and Peoples (New York: Anchor Books, 1998 [1976]), 64. An alternative viewpoint has been suggested by Mary Douglas, who argues that dirt has more to do with worldview than disease. “In chasing dirt, in papering, decorating, tidying, we are not governed by anxiety to escape disease, but are positively re-ordering our environment, making it conform to an idea.” According to her, the things that we deem dirty are those ambiguous things that fall outside of the conceptual categories about how the world is organized. Pigs were prohibited in the Bible because they were cloven-hooved and yet did chew their own cud, a disorienting anomaly and reason enough for its banishment to the realm of the unclean. Mary Douglas, Purity and Danger: An Analysis of the Concepts of Pollution and Taboo (New York: Routledge, 2002 [1966]), 3, and 51-71 for discussion of biblical cleanliness.

66 Benjamin Rush, Observations upon the Origin of the Malignant Bilious, or Yellow Fever (Philadelphia: Budd and Bartram, 1799), 26.
authority of positive, to the feeblest authority of implied divine will.” Whereas the creation itself had established the natural laws that determined that disease should arise from filth, revealed laws only reinforced the natural order of things, making explicit what before had been implied by common sense. Webster’s exegesis thus showcased the ultimate harmony between revelation and design, as the investigators imagined it.

However beneficial to their causal theory, the localists’ picture of the divine purpose of yellow fever certainly exposed a problem. The inhabitants of the American port cities were dirty and sinful. Something would have to be done. According to Kathleen Brown, the yellow fever epidemics of the 1790s amplified the importance of personal cleanliness, since most city dwellers thought, and medical practice taught, that they could avoid the pestilence by cleansing their bodies. During the 1793 epidemic, for example, Rush described “cleanliness” as the most effective measure against contracting yellow fever. In fact, as Richard and Claudia Bushman have shown, the early republic was already in the throes of a revolution in personal hygiene. “Between 1750 and 1900,” they claimed, “washing went from being an occasional and haphazard routine of a small segment of the population to a regular practice of the large bulk of the people.” They determined that the newfound emphasis on cleanliness had three main causes—the demands of living “properly” in genteel society, the medical theories that prescribed cleanly habits as a way of maintaining health, and, not surprisingly, a renewed emphasis on religious prohibitions against dirtiness. Perhaps, then, yellow fever only refocused early republicans’ vigilance against the foulness of their bodies.

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67 Noah Webster, Brief History of Epidemic and Pestilential Diseases (Hartford: Hudson and Goodwin, 1799), 27.
68 Kathleen M. Brown, Foul Bodies: Cleanliness in Early America (New Haven: Yale University Press, 2009), 195-205. Uncleanliness, recall, constituted one of the direst of the predisposing causes, along with intemperance.
69 Benjamin Rush, Letters, II: 653.
Whatever the case, the urbanites’ deficiencies of personal hygiene did not strike at the cause of yellow fever. The miasma of yellow fever, rather, arose from masses of decaying matter, which could very easily be found in the dirty alleyways, privies, and urban sinks. Thus, while they might encourage private cleanliness as an effective prophylactic, the localists leveled their most damning judgments against the sources of social, not personal, impurities. The sinfulness of dirtiness came from its consequences for others, not necessarily for oneself. The neglect of the body might needlessly endanger the individual, but the neglect of urban filth, the true source of yellow fever, needlessly imperiled everyone. Just as it had for the ancient Jews, regulations against dirtiness reflected the necessities of communal living.

Besides being unholy, the inhabitants of the American port cities were also seemed to be un-republican. The integrity of the republic, after all, depended ultimately on the virtuous selflessness of its citizens. The sins that produced yellow fever, however, showed a wanton disregard for the wellbeing of others. The problem of yellow fever thus raised the specter of urban multitudes run amok, the classic fear of republicanism. In the Medical Repository’s review of Tytler, recall, Mitchill and Miller specifically implicated cities and the necessities of urban living as the culprits in the rise of yellow fever. The main source from which pestilential air emitted was, they wrote, “The incalculable mass of animal matter afforded by the bodies of beasts, birds, fishes, and other creatures killed for the purpose of food and manufacture, and collected into cities by the industry of man.” More than simply acknowledging the dangers of cities, the editors also seemingly incriminated the nation’s commerce—the “industry of man,” (an oblique reference to the nation’s commerce,) through which city-dwellers brought in so many of the products that would ultimately putrefy and produce pestilential miasma. Yellow fever, and the

71 Indeed, by the time of the epidemics, Christian and republican principles had come together for most Americans in what Mark Noll describes as the “republican synthesis”—a term denoting the “fundamental compatibility between orthodox Protestant religion and republican principles of government”—such that to speak of one was necessarily to speak of the other. See Mark Noll, America’s God, the quote is from 54; for the republican synthesis, see 53-92.
sins that produced it, posed dire threats to the fragile ideology of early national republicanism, no less than to the actual health of the nation’s citizens.

The foul habits of the city-dwellers certainly troubled the localists, but they did not ideologically reject the existence of cities or the commerce that sustained them. Indeed, the essential goodness of commerce seemed evident from common sense reflection on the ostensible design of the world. Trade redounded to the benefit of society as a whole, since it encouraged manufacturing and the urban arts, and enlarged wealth; it also facilitated peaceful interactions amongst diverse people, and otherwise spread the blessings of civilization. Commerce, moreover, seemed to accord perfectly with human nature—of course God wanted humankind to engage in commerce, its supporters deemed, for he had created them with the desire to do so. 72 In its most essential aspects, trade and its numerous benefits fit plausibly into God’s world. 73

As metropolitans themselves, the localists looked favorably upon commerce, manufactures, and the urban arts, all of which depended ultimately on the vitality of cities. In both political and private spheres, for example, Mitchill consistently advocated for the expansion of commerce and manufacturing. In 1791, he co-founded the Society for the Promotion of Agriculture, Manufactures, and the Useful Arts. As a Representative for New York beginning in 1801, he served on the Committee on Commerce and Manufactures, where he worked to remove quarantine regulations. Later, he became a

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73 The role of providence and natural theology (the evidence of design) in Adam Smith’s theory of economics as been often discussed. See Jacob Viner, The Role of Providence in the Social Order (Philadelphia: American Philosophical Society, 1972), 55-85, esp. 79-85; Lisa Hill, “The Hidden Theology of Adam Smith,” Journal of Economic Thought, 8.1 (Spring 2001), 1-29. McCoy also discusses the seeming naturalness of commerce in the minds of early republicans, Elusive Republic, passim.
leading spokesperson for the creation of the Erie Canal. Rush, too, believed in the salutary effects of commerce, manufactures, and the urban arts. Writing in his *A Plan for the Establishment of Public Schools and the Diffusion of Knowledge in Pennsylvania* (1786), Rush claimed, “I consider commerce in a much higher light when I recommend the study of it in republican seminaries. I view it as the best security against the influence of hereditary monopolies of land, and, therefore, the surest protection against aristocracy. I consider its effects as next to those of religion in humanizing mankind, and lastly, I view it as the means of uniting the different nations of the world together by the ties of mutual wants and obligations.” As Rush saw it, commerce occupied an unimpeachable position in the young republic. “Commerce can be no more endangered than Religion, by the publication of philosophical truth,” he stated in one of his earliest fever treatises. Noah Webster, the New Englander and Federalist, likewise promoted commercial and manufacturing interests throughout his life.

Instead of turning away from commerce and cities, localists sought remedies for the sins that brought on yellow fever. They advocated stern public health laws that prohibited the buildup of filth, making people responsible for their crimes. They pushed for funds and authority to enable cities to employ scavengers and police to scour the streets for garbage and, hopefully, forestall the dangerous accumulation of noxious materials. Urban public health reformers, such as Mitchill and the indefatigable Richard Bayley of New York, also called for the construction of public waterworks systems that would obviate some of the urbanites’ more disgusting habits, while also serving as a source of water for the purpose of cleaning the streets, gutters, and alleyways. Localist ideas undergirded a

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74 See Alan Aberbach, “Samuel Latham Mitchill: A Physician in the Early Days of the Republic,” *Bulletin of the New York Academy of Medicine* 40, no. 7 (July 1964), 503-509. At the dedication of the canal, Mitchill delivered a speech and ceremoniously poured water into the canal from the Rhine, the Ganges, the Nile, and several of the other major waterways of great and lasting civilizations.


77 See, for example, the very old biography of Horace Elisha Scudder, *Noah Webster* (Boston: Houghton Mifflin, 1885), passim.
massive effort to rejuvenate the public health apparatus in the cities of the early republic. It was a crusade fired by the religious fervor and republican sensibilities of the reformers as much as any specific notion about the natural cause of yellow fever.

Indeed, for his own part, Webster envisioned public health reform as a return to biblical law. “In former ages, and among the celebrated nations of antiquity, personal, as well as general cleanliness, was consecrated by numerous rites, and incorporated into every religion,” he began. “Among a barbarous and ignorant, this was, perhaps, the only means of securing a proper observance of this duty.” Notwithstanding his condescending attitude towards “the barbarous” people of yore, Webster opined, “It were fortunate for the United States if the old dispensation were revived, in this particular.” Webster’s recommendations amounted to a call for the institution of Mosaic Law in the United States: “The laws of Moses, in relation to the virtue of cleanliness, bear impressed on their front, the characters of a wisdom nothing short of divine. . . . Surely, in a matter of such essential importance to the well-being of our country, the care of legislation should be extended to supply the neglect of the moralist.”

What the early republicans lacked in virtue, piety, and perhaps also in proper moral guidance, governors ought to make up with legislation. Webster’s critique blended criticism of an immoral people with an indictment of the country’s institutions, particular its inadequate moral leadership, religious as well as civic.

The infusion of theology into the natural philosophical discussions about the origins of yellow fever fundamentally altered the course of the debate. Increasingly, localists presented themselves to

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79 Noah Webster, Collection of Papers on the Subject of Bilious Fevers (New York: Hopkins, Webb and Co., 1796), 244.
80 Webster’s apparent dissatisfaction jibes well with his biographers’ treatments of his evolving political and religious views.
the public not merely as the purveyors of a more correct scientific perspective, but of an infinitely holier and more republican one as well. Meanwhile, they denigrated contagionism not only as an incorrect theory, but as a misconceived doctrine and a negative influence on the morals of people. The inhabitants of the afflicted cities had only to adhere to localist public health measures and remove the noxious materials to free themselves from yellow fever. By doing so, they would also free themselves from the grievous weight of their own sins. As the epidemic period progressed, localists self-consciously transformed themselves into apostles for the union of religion with science and common sense. As they did, contagionism receded every further into the background.

The role of moral edifier came easily to Rush, a figure well-noted for his vigorous advocacy of moral issues. In the summer of 1799, Rush published another one of his many treatises on the cause and prevention of yellow fever. The *Observations upon the Origin of the Malignant Bilious or Yellow Fever*, however, differed in important respects from his prior works. Written in haste for publication before the fever season and addressed to the “citizens of Philadelphia,” Rush presented the *Observations* as a plea for moral rectification, lest Philadelphians suffer the same devastation as they had during the previous summer, when more than 3,500 people died. In it, he eschewed elaborate scientific descriptions of the cause of the fever. Instead, he expounded on the origins of the fever from the sins of people. The accumulation of various acts of uncleanliness had, in fact, produced the expected natural effects. God had punished sin with his own natural means, just as he always had. Thankfully, as Rush wrote of the subject, “To every natural evil, Heaven has provided an antidote.” Philadelphians could easily avoid future disaster—they simply had to obey the divine injunctions against filth and the natural effects would follow. “It is not more certain, that houses are preserved from the destructive effects of lightning by metal conductors, than that our cities might be preserved, under the

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81 The laundry list of Rush’s reform includes temperance, women’s education, abolitionism, penal reform, and, we must add, civic cleanliness.
usual operations of the laws of nature, from yellow fever by *cleanliness*. Rush mixed scientific explanation and divine purpose in a way that simultaneously highlighted the moral complicity of Philadelphians in the rise of yellow fever and empowered them to prevent it.

But, in order to abolish yellow fever permanently, Rush stressed, Philadelphians had to forsake the misconceived doctrine of contagion. Contagionism only bewitched people with the illusion of their own innocence. It licensed them to continue their immoral acts. In a thinly-veiled indictment of the prized contagionist argument—the contention that if putrefying matter produced disease some of the time, it must produce it all of the time—Rush wrote, “The suspension of sickness from filth, no more proves it to be inoffensive, than the temporary absence of remorse for wicked actions, proves them to be innocent.” Like the impenitent sinner, by refusing to acknowledge his or her sins, the contagionist persisted in wickedness. Eventually, however, all immoral deeds would receive their due punishments. Rush’s admonitory tone in the *Observations* reads more as an attempt a religious conversion than scientific persuasion.

The proselytizing spirit figured prominently in other localist writings as well. When the compiler, James Hardie, asked for Mitchill’s opinion regarding the means of preventing yellow fever, Mitchill responded with a short, yet pointed condemnation of New Yorkers and their sinful negligence. Without specifically castigating the contagionists, Mitchill urged his readers to behave like good Christians and atone for their sins, not to blame others for the evils they had produced. For too long, he lectured, people had deflected the fault onto some exotic land or distant people—Americans accused the West Indies of producing yellow fever, just as Europeans before them had blamed the Levant for the plague. The righteous should confess their sins and reform their errors as part of the conduct befitting

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83 Ibid., 26.
the truly penitent. If not, he speculated, perhaps Americans might suffer from yellow fever for as long the plague had devastated Europe.

In contrast to their own superior piety and civic-mindedness, the localists cast contagionists as an unregenerate element in society—a stubborn multitude, wedded to ancient prejudices, which simply would not listen to good sense. Following contagionism through history, for example, Charles Caldwell deemed that it—and especially its imputation of infinite regress—sprang from timeless flaws of human beings. People had always blamed others for the diseases that afflicted them, and, as a consequence, the scourges persisted. “Pestilence has been, at all times, treated by the world, as an illegitimate child, without an acknowledged parent.” The tendency to disown pestilence reflected an inveterate prejudice; the same prejudice, he continued, that “led the reprobate Jews of old to exclaim, ‘Can any thing good come out of Galilee?’” Caldwell found poetic resonance with this point of view in lines from Alexander Pope’s *Essay on Man*:

> But where th’extreme of vice was ne’er agreed;  
> Ask, Where’s the North? At York ‘tis on the Tweed;  
> In Scotland, at the Orcades, and there,  
> At Greenland, Zembla, or the Lord knows where!

The repudiation of disease originated in the “bosom of self-love,” another reference to the *Essay on Man*, in which Pope presented “self-love”—an agglomeration of passions: desire, conceit, and pride—as the very antithesis of reason. In other words, according to Caldwell, contagionism and its implications of infinite regress arose from the very source of stupidity, error, and irreligiosity—age-old problems that plagued mankind as doggedly as any disease.

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86 Ibid., 18. The quote is from Pope, *Essay on Man*, Epistle II, Section 5.  
87 Ibid., 17. Pope’s commentary on self-love comes from Epistle II, Section 2. He writes, “Two principles in human nature reign,/Self-love to urge, and Reason to restrain.”
Contagionists never articulated an effective counter argument to the localists’ natural theological, theodicean justification of disease. They could never quite reconcile the existence of yellow fever with any divine purpose. The very nature of contagion, in fact, indicated that the disease-causing matter moved around randomly, by the whims of travelers, traders, and settlers. Anyone, at any time, could contract the contagion and then unknowingly transfer it to another place or people, even a just people. Why would God allow such an entity to exist? If all things in the God-created world had purpose, then contagionist doctrine terminated logically in the philosophically- untenable notion that God directly intervened in human affairs, as exemplified by Tytler’s argument about the origin of contagion amongst the ancient Jews for their sins. Even Tytler’s argument had unacceptable theological implications. For if God had initially sent disease to mankind for sins, had he somehow made a mistake in allowing it to persist? “Thus all manner of mischief sallied forth from Pando ra’s box; and one of these fables is about as worthy of credit as the other,” the writers at the Medical Repository scornfully remarked of Tytler’s idea. Contagionism suggested that God was either imperfect or malevolent. The localists, always anxious to explore the extents of philosophical beliefs, realized that the contagionist argument possessed a fatal flaw— the omnipotent, all-benevolent God would never allow a disease to wander the globe and afflict the innocent simply by chance. Contagionism foundered on the rocks of theological necessities.

In a famous passage from a letter to Benjamin Rush in September 1800, Thomas Jefferson ruminated on the providential meaning of yellow fever. “When great evils happen,” Jefferson mused, “I am in the habit of looking out for what good may arise from them as consolations to us, and Providence has in fact so established the order of things, as that most evils are the means of producing some good. The yellow

88 The Medical Repository 3, no. 4 (December 1800), 378.
fever will discourage the growth of great cities in our nation, & I view great cities as pestilential to the morals, the health and the liberties of man."

Jefferson’s interpretation of the divine purpose of yellow fever certainly accorded well with his vision for the republic, a society, he hoped, that would be dominated by industrious yeoman farmers. It also, of course, offered a serviceable alternative to the localists’ natural theological picture of the disease.

Rush’s terse reply came exactly two weeks later: “I agree with you in your opinion of cities,” he wrote. “I consider them in the same light that I do abscesses of the human body, viz., as reservoirs of all the impurities of a community.” Rush then changed subjects, without a word about the divine purpose of yellow fever. Rush, of course, knew that yellow fever had a far different providential purpose, one verified by the evidence of design and the revelations of God. Rush also knew that Jefferson’s point-of-view had unacceptable theological implications. God did not want to punish humans for congregating in cities, and He certainly did not want to discourage commerce. Cities were centers of the arts and manufactures; they produced too many useful things and resulted in too many positive blessings to mankind to be evil.

The exchange between Rush and Jefferson—what was and was not mentioned—aptly summarizes the way that early republicans made sense of yellow fever. At the most prosaic level, it simply shows that most people, even deists such as Jefferson, believed that yellow fever reflected some divine purpose. It also reveals what sorts of arguments were acceptable. Here, silence spoke louder than words. Believing cities were positive goods for society and elements of God’s plan for mankind, localists steadfastly refused to impugn the cities and commerce of the United States. Strikingly, the contagionists, too, declined to seize on the type of argument that Jefferson outlined, even though it would have provided a serviceable alternative to the localists’ natural theological perspective. Their

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90 Benjamin Rush to Thomas Jefferson, October 6, 1800, in Letters of Benjamin Rush, II: 824.
silence shows how far Americans of the early republic had accepted the necessity—indeed, the common sense—of a commercial, urban orientation.

The localist victory came at a cost, however, for it forced them to confront the sinfulness of their fellow citizens. In his reply to Jefferson, for example, Rush had to admit that cities were dens of vice—he could hardly deny it, as the sinful, un-republican behavior of the country’s urbanites repeatedly resulted in yellow fever epidemics. The problem was not commerce, manufactures, or even the cities; it was, rather, the people who inhabited them and their gross lack of Christian and republican values. The problem demanded attention. As the United States entered a new century, and as the society’s leaders struggled to set the republic on a virtuous, sustainable path, it was all too clear that there was still much work to do.
When Benjamin Rush resigned from the College of Physicians of Philadelphia in 1793, an institution he helped form only a few years before, he cited the “persecutions” he suffered at the hands of the fellows of the college as justification. “Besides combating with the yellow fever,” he fulminated to his wife, Julia Rush, on September 13, “I have been obliged to contend with the prejudices, fears, and falsehoods of several of my brethren, all of which retard the progress of truth and daily cost our city many lives.” And, days later, once again to Julia, “They have confederated against me in the most cruel manner and are propagating calumnies against me in every part of the city.” He continued, “If I outlive the present calamity, I know not when I shall be safe from their persecutions. Never did I before witness such a mass of ignorance and wickedness as our profession has exhibited in the course of the present calamities.”

--Elihu Hubbard Smith (1795)

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1 Elihu Hubbard Smith, October 6, 1795 The Diary of Elihu Hubbard Smith (Philadelphia: American Philosophical Society, 1973), 68.
calamity. I almost wish to renounce the name of physician.” The “calumnies” directed against him
focused principally on Rush’s “heroic” treatment for yellow fever—the bloodlettings and purges that left
his patients dazed and depleted. By November 5, when Rush tendered his letter of resignation to John
Morgan, the president of the College of Physicians, the epidemic had all but ended; he might have
expected the abuses from his colleagues to have ended too.

After 1793, the question of cause split the medico-scientific community of the early American
republic and yet galvanized its members, leading to the remarkable outpouring of thought that
characterizes the epidemic period. In test after test, and through multiple areas inquiry, the localists
slowly but surely wore away at the contagionist arguments, while simultaneously gathering more and
more adherents around their point of view. Yet, to Rush’s chagrin, the persecutions continued. As he
saw it, the contagionists had conspired together and were attempting to commandeer the yellow fever
discourse not only by disparaging their opponents, such as poor Rush, but also by disseminating
falsehoods that deceived the people. By 1797, the contagionist “faction,” as he liked to call it, had
grown so bold in its intrusions—and so successful in having its quarantine restrictions enacted—that
Rush and some of his localist friends founded the Academy of Medicine of Philadelphia, an institution
meant to rival the contagionist-controlled College of Physicians. The Academy of Medicine would free
both physicians and the public from the tyranny of the contagionists, thereby rescuing the purity of
unprejudiced medical inquiry. Rush wrote to Noah Webster, explaining the meaning and importance of
the Academy: “All those physicians who believe in the domestic origin of yellow fever . . . have lately
formed themselves into a medical society for the purpose of promoting medical science untrammeled

Philosophical Society, 1954), II: 673.
History of Medicine 78, no. 3 (Fall 2004), 539-574.
by the systems of medicine which now govern the greatest part of the Physicians in our city.”⁵ For the
rest of the epidemic period, both the College and the Academy continued to publish their own
conflicting accounts of the cause of yellow fever.⁶

Rush’s feuds and schisms illustrate how the intellectual community stimulated by the yellow
fever crisis broke down into rival camps. Indeed, it is a remarkable fact of the epidemic period that the
investigators so frequently accused each other, not merely of being wrong or stupid, but of falling prey
to interest and intentionally distorting the truth. The invective focused on their opponents’ unthinking
allegiance to their chosen “faction”—with “faction” indicating a fundamentally unphilosophical,
manipulative group, whose members sought only to defend their theory regardless of its value or
correctness.

Why did the investigators split into camps characterized as factions? Not that it is unusual for
scientific issues to divide people, especially when the issues in question involve the health of cities and
people, and the fate of future generations. The history of natural philosophy in the western world since
the Scientific Revolution provides ample evidence of the divisive tendencies of natural inquiry (and not
merely amongst natural philosophers, but also between them and their opponents in other spheres of
life). The groundbreaking work of Thomas Kuhn has even posited that debate and controversy provide
the required impetus for scientific development and the conceptual reorientations, or “paradigm shifts,”
that enable science to proceed.⁷ Conceding, then, that debate is normal, expected, and probably also
necessary, we still must question why they take the shapes they do. Why, for example, did yellow fever
debates become quite so polarizing and venomous?

⁵ Rush to Webster, December 29, 1797, quoted in Benjamin Spector, “Introduction” to Supplements to the Bulletin
of the History of Medicine, ed. Henry Sigerist, No.9 (Baltimore: Johns Hopkins University Press, 1947), 14.
⁶ See, for instance, College of Physicians, Facts and Observations Relative to the Nature and Origin of the
Pestilential Fever, Which Prevailed in This City, in 1793, 1797, and 1798 (Philadelphia: Thomas Dobson, 1798);
Academy of Medicine, Proofs of the Origin of the Yellow Fever, in Philadelphia & Kensington, in the year 1797, from
The investigators’ uses of the word “faction” provide an important clue. The investigators’ obsession with the behind-the-scenes manipulations of faction mirrored a contemporary strain of thought in early republican political discourse that centered on the intrigues of secret societies. Richard Hofstadter, the first to identify this trend, called it the “paranoid style,” and, as he pointed out in his book on the subject, it has appeared regularly in American political discourse. During the revolutionary and early national periods of American history, though, the paranoid style thrived. Factions lurked everywhere—in the British government and its growing bureaucracy; in France during its momentous struggle to remake society; and even amongst the inhabitants of the United States as they struggled to erect a viable political system in their new republic. As American natural philosophers entered the epidemic period, they did so at a time when sensitivity to factions was at its peak.

The paranoia of the yellow fever debate partook of this larger cultural pattern, but how? Here again, Hofstadter provides some clues. Writing in the Idea of the Party System, Hofstadter contended that the partisan political warfare of the 1790s and early 1800s, and the paranoid style that surrounded both descended from the immaturity of the two-party system, and the unwillingness or inability of early republicans to accept that there could be “legitimate opposition.” The crafters of the republic, after all, never intended for there to be a two-party system of government. By their very natures, parties catered to private interests, and thus contradicted the ideals of disinterested statesmanship and selfless

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The “paranoid style” has also met criticism for psychologizing, even though Hofstadter disavowed the psychological or clinical implications of his term. See Gordon Wood, “Conspiracy and the Paranoid Style: Causality and Deceit in the Eighteenth Century,” William and Mary Quarterly 39, no. 3 (1982), 401-441. Rather than looking at early Americans as being disturbed, Wood explains the paranoid style as a causal explanation, premised on a mechanistic view of society, which held that human agency, not abstract social forces, ultimately determined the paths of society. When outcomes defied expectations, eighteenth-century intellectuals could only reasonably conclude that someone had subverted the proper direction of the society in question. Like Hofstadter, I am not using the term in a clinical sense at all—indeed, my argument has more in common with Wood’s.
devotion to the public good that were supposed to guide the republic. Hence the great paradox of the early national politics, as Hofstadter saw it—that “the creators of the first American party system on both sides, Federalists and Republicans, were men who looked upon parties as sores on the body politic.”9 Ultimately, the acceptance of the two-party system required a parallel recognition of “legitimate opposition,” the very idea that the party of opposition could be “responsible,” “effective,” and “constitutional.” Or, in other words, that its action were not intended merely to sow discord amongst the people, that its policies represented viable alternatives to those of party in power, and that its methods conformed to the laws of the state.10 According to Hofstadter, the vituperative party wars of the early national period signaled the birth of the two-party system, and the fantasies of conspiracy and faction that abounded in the minds of early republicans showed that they had not yet accepted the legitimacy of opposition.

As it did for their counterparts in politics, the suspicions of the fever investigators extended from the belief that in science, as in politics, there was not supposed to be opposition. Just as the republic was supposed to function by the virtue of its citizens, science was supposed to operate through the honest pursuit of truth. More than that, the pillars of natural philosophical investigation—the empirical and inductive bases of facts and observations, common sense, as well as natural theology—should have removed the threat of prolonged disagreement. Sure, natural philosophers might quibble over points, but the tools they used to create natural philosophical knowledge should have resolved disputes before they devolved into heated and divisive controversies. Confidence transformed into hubris. Since there was only one correct answer to natural philosophical questions, as everyone knew, and since everyone who participated in the yellow fever controversy also knew that they had discovered that correct answer based on their own superior evidence and reasoning, they concluded that their

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10 Hofstadter describes the meanings of these terms in Ibid., 4-5.
adversaries were not only wrong, but badly, even dangerously deluded, deceived, or ill-intentioned.

William Chalwill, a localist, may have summed it up best in his 1799 dissertation for the University of Pennsylvania. “It is an unfortunate truth, that the generality of mankind are blind to conviction, wherever truth and interest oppose each other,” Chalwill began. “In yellow fever this is particularly the case. Notwithstanding the numerous, decided proofs, brought forward by men and literary bodies, of the first eminence, of the domestic origin of this disease, yet there are not wanting many who believe, it owes its origin to importation.”11 Interest, indeed, opposed truth. To have questioned that, to have allowed that their opponents could be correct, would have been to admit fault in the supposedly infallible methodologies and epistemologies of their natural philosophy—methodologies and epistemologies, furthermore, which were formed from clear-minded reflection on the nature of human beings and the world in God’s creation. Instead, faced with a deadly scourge that threatened thousands of lives annually, the investigators fought fiercely and desperately, and in doing so they undermined the foundations of their natural philosophy, and crippled any chance at compromise. Built up on a combination of empiricism, inductive reasoning, and common sense, the enlightenment of the investigators was fracturing under its own weight.12

12 The argument here bears much in common with the “Counter-Enlightenment” historiography, which may well have received its most definitive statement from Theodor Adorno and Max Horkheimer, Dialectic of Enlightenment, trans. John Cumming (New York: Continuum, 1988 [1947]). They argued that the Enlightenment thinkers were fundamentally intolerant of anything that did not meet with their enlightened views, and that their attempts to control societies on the basis of reason—creating, as it were, a dictatorship of reason—paved the way for the woes of modernity, including, as they wrote at the end of World War II, Nazism and the Holocaust. In reality, though, counter-Enlightenment thought preceded Adorno and Horkheimer, going all the way back to Enlightenment itself and the philosophers who attacked it for its narrow, controlling nature. See Graeme Garrard, Counter-Enlightenments: From the Eighteenth Century to the Present (New York: Routledge, 2006); Darrin McMahon, The Enemies of Enlightenment: The French Counter-Enlightenment and the Making of Modernity (Oxford: Oxford University Press, 2001); also see the works of Isaiah Berlin, perhaps the principal “counter-enlightenment” philosopher, of which an excellent introduction can be found in Joseph Mali and Robert Wokler, eds. “Isaiah Berlin’s Counter-Enlightenment,” The Proceeding of the American Philosophical Society 93, Part 6 (2003), 1-196. Rather than considering the emergence of a “counter-enlightenment” in the United States (a subject I take up briefly in the conclusion), I concern myself here with its undoing, evidenced principally by the emergence of an intolerant, paranoid attitude amongst the investigators towards their opponents.
This chapter explores in more detail the causes and consequences of the investigators’ “paranoid style.” It begins with a brief survey of the fear of factions in the world of investigators, moves into a discussion of the investigators’ personal experiences with faction, and then concludes with a consideration of their conspiratorial views of the yellow fever debate and its consequences for them. Rather than striving after comprehensiveness, the chapter focuses on Benjamin Rush, Samuel Latham Mitchill, Noah Webster, and the contagionist William Currie. They were the most prolific of the investigators, and the individuals whose experiences uniquely highlight the unraveling of the American Enlightenment.

The fear of factions, cabals, and conspiracies loomed large in the minds of Americans of the revolutionary and early national periods. In fact, the “paranoid style” impelled Americans of the 1760s and 1770s to resist and then rise up in arms against their imperial overlords. Weaned on the tradition of the English “country party” writers, which taught them the powerful would always conspire to get more power, the revolutionaries found what they expected to find. When the British imposed new taxes on their North American colonists, Americans quickly concluded that would-be oligarchs hidden within the British government and its sprawling, unwieldy bureaucracy sought to deprive them of their rights in order to secure their own power. In their conspiratorial imaginations, legislative acts only signaled the beginning of a much darker and more intricate plot to subvert colonial society, and to reduce the colonists to a state of virtual slavery.\(^\text{13}\) Suspicions deepened when rumors surfaced alleging that the Church of England planned to install a bishop in the colonies as a way of undermining the religious freedoms enjoyed by most Americans.\(^\text{14}\) The British responded to escalating tensions by sending more

\(^{13}\) For the use of slavery as a metaphor in political ideology of the revolutionary generation, see Bailyn, *The Ideological Origins of the American Revolution*, 233-246.

troops, even blockading Boston harbor after the Tea Party of 1774. The unwise strategy backfired, for it stoked American fears of standing armies, the favorite instrument of oppression for tyrants everywhere, and an evil about which the country party writers had given ample warning.

Besides mobilizing the earliest revolutionary intellectuals, the fear of factions also gave rise to the particular form of national government outlined in the Constitution. Its principal author, James Madison, constructed the Constitution with the intent of limiting the power of faction, which he later defined as “a number of citizens, whether amounting to a majority or a minority of the whole, who are united and actuated by some common impulse of passion, or of interest, adverse to the rights of other citizens, or to the permanent and aggregate interests of the community.” Not only did factions promote un-republican values, they could also commandeer governments and pervert even well-conceived constitutions, as the corruption of the English government illustrated. In the Federalist 10, the most celebrated of the federalist arguments, Madison contended, “AMONG the numerous advantages promised by a well-constructed Union, none deserves to be more accurately developed than its tendency to break and control the violence of faction.”15 According to Madison, the very size of the American republic, its population and area, militated against the power of factions. By uniting under one government so many people, from so many geographic regions, with so many different economic modalities, religious convictions, and local concerns, the Constitution would prevent any single faction from gaining an undue proportion of popular support, and thus political power.

Sharpened by the events of the preceding decades, the conspiratorial imaginations of the early republicans flourished in the tumultuous political, social, and religious climate of the 1790s and early nineteenth century. After the ratification of the Constitution and the creation of the United States, tensions between the nascent political groups quickly fueled suspicions about the true interests of such

“ factions,” as their opponents deemed them. The rise of partisan newspaper conflicts and the proliferation of Democratic-Republican clubs added to the hysteria, until finally the Federalists under Adams administration in 1798 passed the Alien and Sedition Acts as a means of counteracting the disorder and undermining enemy factions.\textsuperscript{16} The slave revolt in St. Domingue in 1791 and the subsequent phases of the Haitian Revolution certainly provoked the paranoia of southern slaveholders, who feared that their own slaves might mimic the example, rise up in a great insurrection, and massacre their owners. The plot led by Gabriel Prosser in Virginia in 1800 only confirmed such suspicions and honed slaveholders’ vigilance against, and suspicion of, rebellion.\textsuperscript{17} In the French Revolution, too, early republicans unmistakably detected the machinations of factions. Some Americans attributed the degeneration of the revolution to the wickedness of atheists and deists. In the late 1790s, allegations of an atheistic conspiracy surfaced in the United States, when Congregationalist ministers from New England spread rumors that the Bavarian Illuminati, a European society noted for its anti-clerical stances, had engineered the undoing of the French republic and sought to do the same in America.\textsuperscript{18}


\textsuperscript{17} Donald Hickey, “America’s Response to the Slave Revolt in Haiti, 1791-1806,” \textit{Journal of the Early Republic} 2, no. 4 (Winter 1982), 364, 368-69. The fear of insurrection in part caused Jefferson to move away from trade with the former French colony of St. Domingue in the early 1800s. For Gabriel’s Rebellion and its links to the Haitian Revolution, see James Sidbury, \textit{Ploughshares into Swords: Race, Rebellion, and Identity in Gabriel’s Virginia} (Cambridge: Cambridge University Press, 1997).

\textsuperscript{18} The Bavarian Illuminati conspiracy actually was started earlier by John Robison, a Scot, in his \textit{Proofs of a Conspiracy against all the Religions and Governments of Europe} (1798), and then adopted by the Federalist, New England clergy. See, David Brion Davis, ed. \textit{The Fear of Conspiracy}, 37-42; Bryan Waterman, “The Bavarian Illuminati, the Early American Novel, and Histories of the Public Sphere,” in \textit{The William and Mary Quarterly} 62, no. 1 (January 2005), 9-30. Waterman’s twist shows that those who attempted to illustrate the falseness of the conspiracy accused the clergy of engaging in a kind of conspiracy to spread rumors of a conspiracy. The Alien Act of 1798 can also be seen as a response to these fears about outside meddlers, as it allowed the President to expel any non-naturalized foreigner immediately and without due process.
Jefferson’s election in 1800 only exacerbated fears of a deistic plot to undermine the pious republicanism of the United States.¹⁹

In the chaotic world of the late-eighteenth century, not even natural philosophers escaped the persecutions of faction. The coming of Joseph Priestley to the United States in 1794 provided American onlookers with one dramatic example of the reality and effects of public persecution. Priestley had quite literally been driven from his native England after years of harassment. In 1791, a riotous mob invaded Priestley’s home in Birmingham, England, torching the house, ruining Priestley’s laboratory equipment and library, and destroying valuable manuscripts in the process.²⁰ Priestley, a practicing chemist, had not attracted this persecution for his scientific views, as unpopular as they were (it would be hard to imagine the Lavoisian chemists inciting a mob to destroy the phlogiston supporter’s house).²¹ The public’s ire, rather, centered on Priestley’s political and religious opinions—his outspoken support of the French cause during the early stages of the Revolution, publicized in a widely-circulated reply to Edmund Burke’s well-known denunciation of the revolution, as well as his prominence as a Unitarian Dissenter and theologian, who frequently wrote on subjects that contradicted Anglican orthodoxy.

When the inhabitants of Birmingham caught wind of Priestley’s and his Dissenting friends’ plans of holding a dinner to commemorate the anniversary of the Bastille Day, they took to the streets, razing several non-Anglican churches in addition to Priestley’s manor.²²

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¹⁹ Jon Butler, *Awash in a Sea of Faith: Christianizing the American People* (Cambridge: Harvard University Press, 1992), 219-220. He claims that the Bavarian Illuminati scare and Jefferson’s election did more than anything else to inflame the “religious paranoia” of early republicans.

²⁰ Priestley gives his account of the scene in Joseph Priestley, *An Appeal to the Public, on the Subject of the Riots in Birmingham* (Dublin: Hillary and Barlow, 1792), 36-38.

²¹ In the United States at least, the debate between Lavoisian chemists and the phlogiston supporters never took on a paranoid tone like the yellow fever debate, but remained quite cordial. After all, there were hardly any phlogiston adherents in the United States (except Priestley after he moved there), and the chemical debate did not hold thousands of lives in the balance.

Shaken though determined to remain in England, Priestley moved to Clapton, outside of London, only to find that the persecutions—at the license and behest of the Court, according to Priestley—continued. For a time, he contemplated moving his family to France, where he had many friends, but ultimately wound up traveling to Northumberland, Pennsylvania, where the appeal of plentiful land and the prospects of starting a Unitarian congregation won him over. Besides, by 1794, when Priestley made the trip across the Atlantic, the Reign of Terror had descended and France had become a very dangerous place. Long before his move, Priestley saw signs of the coming disorder. In a letter of June 2, 1792, addressed to Antoine-Laurent Lavoisier, with whom he maintained amiable relations despite their noted scientific disagreements, Priestley noted ominously, “I shall be glad to take refuge in your country, the liberties of which I hope will be established notwithstanding the present combination against you.” A short time later, these “combinations,” let loose under the Reign of Terror, engineered the trial and execution of the renowned natural philosopher. Despite his well-meaning enthusiasm for the principles of the Revolution, Lavoisier’s years-long partnership in the Farm General, an institution that gathered taxes for the crown as well as the revolutionary governments, aroused suspicions about the fervor of its leaders. When rumors surfaced alleging that the Farm General had defrauded tax payers and the government, Lavoisier and many other were brought before a revolutionary tribunal. Fittingly for the times, he was convicted and then guillotined for crimes that

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23 Priestley to Reverend Abercrombie, August 21, 1793, in The Scientific Correspondence of Joseph Priestley (Philadelphia: Collins Printing House, 1891), 136. The letter reads: “The spirit of bigotry nearly bordering on that of persecution being encouraged by the Court is greatly increased in this country [England], which makes it, tho’ not absolutely unsafe, yet unpleasant to live in it.”


25 Joseph Priestley to Antoine-Laurent Lavoisier, June 2, 1792, Scientific Correspondence of Joseph Priestley, 130.
amounted to conspiracy against the French people.  At the same time, Priestley was onboard a ship, the *Samson*, bound for the United States.

With faction prowling everywhere and imperiling everyone, including natural philosophers, the investigators quite naturally found that force at work in their own lives. Already in the early 1790s, Noah Webster discovered “faction” hounding him for his opinions regarding the French Revolution. Barely thirty years old at the time of the storming of the Bastille, and still with his youthful exuberance and faith in human goodness intact, Webster began as an ardent supporter of the revolution and its promise of transforming the Catholic monarchy into a Protestant republic. But his active advocacy of the revolution and its goals earned Webster the mistrust of his contemporaries, at least as he saw it. Writing to President George Washington in 1790, Webster expressed the desire to conceal his authorship of a “communication” he had written about vegetable manure—“not because,” he wrote, “I doubt the justness of principles advanced, but any doctrines I might advance, under the signature of my name, would not meet with the consideration they might deserve.” “The prejudices of many men are against me,” he continued to Washington. “I have written much more than any other man of my age in favor of the Revolution and my country, and at times my opinions have been unpopular.”

We should be hesitant to accept Webster’s claims of persecution on account of his support of the revolution, because most Americans initially expressed enthusiasm for the French cause. The French fought for the same principles and rights as the Americans did in their war for independence. The French Revolution, therefore, provided a concrete example of the Old World mimicking the New, thus flattering Americans’

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sense of world historical importance. Nevertheless, Webster evidently believed that his support of the French during the early stages of the revolution exposed him to the prejudices of his peers.

By 1794, Webster’s opinions regarding the French Revolution had soured, as its noble principles fell under the influence of faction. In a pamphlet he wrote on the subject, Webster deplored the tyranny of the Jacobins, the usurpers of the revolution, who sunk France into terror and bloodshed. Always the historian, Webster likened the Jacobins to the *decemviri* of fifth-century Rome—the ten magistrates granted with near dictatorial powers to draw up the Twelve Tables, the famous Roman law code, but who refused to relinquish their appointments, committed crimes against the Roman people, and were violently expelled from office. Webster had given up any hope that honest revolutionaries in France would do the same and remove the Jacobins from power. The *philosophes*’ predilections for deism boded ill for the virtue of the French republic and its future prosperity. Webster, therefore, used the latter parts of his pamphlet to urge his American audience to guard against “faction, that enemy of government and freedom.”

Webster’s most heated confrontations with faction evolved from his participation in the vituperative political newspaper wars in New York in the 1790s. As the editor of the federalist-leaning *Minerva*, Webster naturally attracted the ire of leading democratic-republican newspapers, such as the *New York Journal*, which accused him of being a sloppy newspaperman, an elitist—an “utter enemy of the rights and privileges of the people”—as well as a partisan, a mere “scribbler of a British faction.” In the May 2, 1796 issue of the *Minerva*, Webster defended himself in a lengthy passage. “During the time which I have conducted the publication of this paper, the public mind has been much agitated with party

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29 Noah Webster, *The Revolution in France, Considered in Respect to Its Progress and Effects* (New York: George Bunce, 1794), 7.

30 Ibid., 35.
spirit.” As for himself, Webster averred, “In point of facts, my invariable rule has been to state them as I find them, and according to the best evidence obtained, without regard to any party.” Still, though Webster might free himself from blame, he could not totally dismiss the dangers of the faction-led newspapers and their influence over the public spirit. Citing common anxieties about the place of newspapers in the early republic, Webster opined that they “may be instruments of great good or extensive evil.” He continued, “It is obvious that the falsehoods and calumnies propagated by means of public papers have been the direct and principal means of all the civil dissensions which distract this country.” As he entered his studies of yellow fever, faction had already emerged as a perilous source of discord in Webster’s evolving political, social, and philosophical consciousness.

The prevalence of faction, party, and the fears to which they gave rise also troubled Samuel Latham Mitchill. In his Fourth of July oration from 1799, Mitchill lamented the suspicions that appeared amongst Americans following the Declaration of Independence and continuing through the 1790s.

“Sentiments of distrust and malevolence had gone so far as to disfigure society with . . . the ferocious air of barbarism. Had these ideas been carried further, they must have terminated in the lawless and capricious liberty prevalent among savages, or the sullen, worthless and perfect independence enjoyed by hermits in their caves.” The tumultuous years that followed the ratification of the Constitution only further undermined Mitchill’s faith in republican polities, since they disclosed so much of what was negative about people. Quoting Montesquieu’s “sophism or false maxim” that “Virtue was the governing principle of a democratic or popular government,” Mitchill provided the following corrective—

“He had been nearer mark, had he said that the principle of a republic was suspicion or distrust, bottomed upon high notions of personal importance.” He then went on to list the negative effects that proceeded from the self-importance of the republican character, one of which he termed the “strife of

31 Noah Webster, “To the People,” The American Minerva, May 1 and 2, 1796.
32 Ibid. For the place of newspapers in the early republic, see Jeffrey Pasley, The Tyranny of Printers: Newspaper Politics in the Early American Republic (Charlottesville: University of Virginia Press, 2003).
parties.” Like Webster before, Mitchill also pointed to the abundance of “perversion and misrepresentations” that circulated through the free press:

That freedom of speech and of the press so much contended for in republican governments, is employed more than half the time in uttering and disseminating falsehoods of various sorts. Fabrications constantly mislead and perplex the mind. Misstatements beguile and lead astray even those who are serious seekers after truth. The contriving and spreading false news, grows to be a considerable branch of business. . . . What adds to the mass of misrepresentation is, that to defeat the object of one set of lies, there must be an equal quantity of counter-lies put in circulation. The consequence of which is, that when any thing is heard, the first impression it makes is that of falsehood; to be received as true, further proof is required. Thus lying is the rule; and a solitary truth now and then, forms the exception.33

Though Mitchell’s rant focused particularly on political wrangling, his critique indicted the very structures and media of the early national discourse.

Of all the fever investigators, however, Benjamin Rush displayed the most single-minded sensitivity to the supposed machinations of enemy factions. The pattern began early in his life, but we find it blossoming into full view during the revolutionary crisis of the early 1770s. Like many of his contemporaries, Rush interpreted British economic policies as sure evidence of a concerted plot to rob Americans of their rightful freedoms. Addressing himself to the American public in an essay called “On Patriotism,” published in 1773, Rush urged his readers to guard their liberties against the intrusions of the enemy. Calling upon well-worn metaphors of freedom and slavery, he described the invasive British tax measures as “the machinations of the enemies of our country to enslave us by means of the East-India Company.” Rush warned against the impending arrival of a number of vessels that had been “freighted to bring over a quantity of tea taxed with a duty to raise a revenue from America.” His short essay encouraged Americans in the name of liberty and true patriotism to resist the British plans by refusing to purchase that tea. Rush went so far as to encourage Americans to prevent the landing of the

tea, though by what he means he never specified. “The baneful chests contain in them a slow poison in a political as well as physical sense,” he warned. “They contain something worse than death—the seeds of SLAVERY.”

The outbreak of the Revolutionary War, a contest to liberate Americans from the yoke of British misrule, by no means curtailed the prevalence of factional intrigue within the United States, as least as far as Rush was concerned. In fact, the revolution unleashed the forces of faction, and Rush found himself falling victim to numerous plots of malicious intent. As a member of the Assembly of Pennsylvania, Rush came up against the “malice and cunning” of a wicked cabal, including Timothy Matlack, James Cannon, and Thomas Young, the radical arm of the Assembly, which engineered the ratification of the liberal Pennsylvania State Constitution of 1776. With its unicameral legislature, the constitution was intended to reduce “one of the happiest governments in the world” to a mere “mob government,” and its legislators, Rush anticipated in a letter to Anthony Wayne, would soon “become like the 30 Tyrants of Athens.” Likewise, as an inspector of the American army hospitals during the war, Rush spoke against the corruption Director General, Dr. William Shippen, whom Rush believed was pilfering from the hospitals’ supplies for personal gain. As Rush expected, or claimed to have expected, Congress ignored his complaints out of ignorance or interest. Consequently, he resigned from his post, a martyr for a noble cause.

Time and again, in public and private correspondence, Rush decried the intrigues that plagued his own well-being and success. Indeed, no matter what problem or difficulty he encountered, Rush invariably attributed it to the conspiratorial designs of his opponents. Nefarious persons, motivated by obscure, unnamed private interests, tried to block John Witherspoon’s nomination to the presidency of

35 To Anthony Wayne, May 19, 1777, The Letters of Benjamin Rush I: 148. The “Thirty Tyrants” or the “Thirty” was an oligarchy that ruled Athens for a short period of time just after the defeat at the hands of the Spartans.
the College of New Jersey, Rush’s alma mater, and they did the same to Rush when he appeared set to take the professorship of chemistry at the College of Philadelphia in 1768.\textsuperscript{37} Religious bigots led by the “faction” of Joseph Reed, the President of the Pennsylvania Assembly, opposed Rush’s attempts to attain a charter for what would become Dickinson College. “British agents” operating in the United States defamed the country in the 1780s, sowing discord in the body politic. Unscrupulous deists worked behind the scenes to undermine the sanctity of the Christian religion and pervert the wholesomeness of good republicanism. In France, the various factions, particularly the deists, had commandeered the revolution, perpetrated the regicide, and sunk the country into the misery of despotism.\textsuperscript{38}

Rush’s conspiratorial imagination focused particularly on his own medical career and the numberless, and normally faceless, operatives who worked tirelessly to destroy it. Of the many persecutions he suffered in his professional life, the story of his travails during the great epidemic in Philadelphia in 1793 stands out. During the epidemic, a group of the city’s doctors openly criticized Rush’s yellow fever treatment (copious bloodlettings and wholesale purges with the diuretics, mercury and jalap). Led by Dr. Adam Kuhn, the coalition favored a far gentler therapeutic regimen, involving cold baths, moderate doses of wine, and the “bark,”—that is, cinchona bark, an anti-malarial.\textsuperscript{39} Rush, of course, quickly determined that his colleagues, motivated by some perverse desire, had combined against him. In letter after letter to numerous recipients, Rush deplored the intrigues of these

\textsuperscript{37} Benjamin Rush to John Witherspoon, in The Letters of Benjamin Rush, I: 36 and 45. To John Morgan, January 20, 1768, I: 49-50. Hereafter, all references to Rush’s letters come from this source, unless otherwise noted.

\textsuperscript{38} Rush to John Warren, October 12, 1782, I: 288-289; Rush to Richard Price, May 25, 1786, I: 390; Rush to To John Coakley Lettsom, April 26, 1793, II: 635.

\textsuperscript{39} Often called “Jesuit’s bark,” after the people who brought it to Europe in the seventeenth century, it comes from the bark of the cinchona tree, native to the Andes, where healers had used it for some time before the arrival of Europeans. Because of its natural ingredient, quinine, cinchona bark offers both prophylactic and cure for malaria. McNeill, Mosquito Empires: Ecology and War in the Greater Caribbean, 1620-1914 (New York: Cambridge University Press, 2010), 74-75. Fiammetta Rocco, The Miraculous Fever-Tree: Malaria and the Quest for a Cure that Changed the World (New York: Harper Collins, 2003).
treacherous dissenters from his opinion. He was piqued especially at the allegations of murder, which apparently his opponents leveled against him on account of his drastic curative measures.

Meanwhile, as Rush bewailed his victimhood, he simultaneously touted the efficacy of his cure, which he hailed as a virtual panacea. As early as September 5, Rush claimed to Julia that his treatment cured 29 of 30 patients. By September this remarkable success ratio had risen to the more fabulous 99 out of 100. Indeed, he wrote later to Julia, “Could our physicians be persuaded to adopt the new mode of treating the disorder, the contagion might be eradicated from our city in a few weeks.” As he saw it, by ignoring his treatment, dissenting physicians not only showed their ignorance and deceit, they also, in effect, perpetrated murder against their hundreds of patients. To Julia on September 15, “Scores are daily sacrificed to the bark and wine.” On September 21, they “continue to murder by rule.” And only three days later, “The followers of Kuhn still live to administer poison to our citizens.” Similar accusations appeared regularly in Rush’s communications during the fall of 1793. By later October, near the end of the fever’s reign, Rush reckoned that the disciples of Kuhn, in addition to numerous French physicians, had “destroyed at least two-thirds of all who have perished by the disorder.”

The story of Rush’s alleged persecutions during the yellow fever epidemic of 1793, and his heroic perseverance in the face of such difficulties is a familiar one. Historians of the epidemic and biographers of Rush have retold the essential contours of the episode many times, and a few have even called out Rush’s embellishments as the overwrought fantasies that they were. Even the normally uncritical and congratulatory Thomas Flexner—whose title for his 1937 book, Doctors on Horseback, conveys some sense of the way he romanticized his subject matter—wondered if Rush really believed

40 Rush to Julia, September 15, I: 664.
41 Rush to Julia, September 15, I: 664; September 21, I: 673; September 24, I: 678.
42 Rush to Julia, October 25, I: 726. The “French” physicians used hot baths, clysters, and mild purgatives—they were undoubtedly refugees from St. Domingue. McNeill discusses the Afro-Caribbean roots of bathing yellow fever patients in Mosquito Empires, 81-86, especially 82. Undoubtedly the French physicians took this remedy from Afro-Caribbean inhabitants, since it was not a part of the healing repertoires of the Europeans.
that his cure saved as many people as he claimed.\textsuperscript{43} And in \textit{Bring Out Your Dead}, the classic account of the outbreak, J.H. Powell depicted Rush as a domineering intellectual, unwilling to accept that anyone but himself could be correct, or that anyone could possibly deny the self-evident efficacy of his treatments. Powell not only rejected Rush’s grandiose view of his yellow fever cure, he also questioned the basis of his belief in the persecution—“One searches . . . in vain for those accusations of murder Rush insisted the ‘confederacy’ laid against him,” he wrote.\textsuperscript{44} Powell, however, also dismissed Rush’s intolerance as a quirk in the public-spirited, if not sometimes overzealous, doctor, who figured as the hero in \textit{Bring out Your Dead} for his selfless devotion to the public good. When viewed against his lifelong history of paranoia, Rush’s near-delusional obsession with the supposed intrigues of his opponents, as well as his overvaluation of his own perspectives, appears not so much as a quirk, but as a problem that needs to be explained. Once again, Rush’s rich and colorful correspondence provides clues as to the forces that shaped Rush’s perspective of these outsiders and well as himself.

Throughout the epidemic, Rush repeatedly conjured religious imagery to describe his predicament. “My situation for some time past has been in some respects like that of the children of Israel in the wilderness.” Religion informed every aspect from of his experience of yellow fever in 1793, from his views of causation (discussed in the previous chapter), to his interpretation of his personal, divine mission.

Remember, my dear creature, the difference between the law and the gospel. The former only commands us ‘to love our neighbors as ourselves,’ but the latter bids us to love them \textit{better} than ourselves. ‘A new commandment I give unto you, that ye love one another, even as \textit{I have loved you}.’ Had I not believed in the full import of that divine and sublime text of Scripture, I could not have exposed myself with so little concern, nay with so much pleasure, for five weeks past to the contagion of the


prevailing fever. I did not dare to desert my post, and I believed even fear for a moment to be an act of disobedience to the gospel of Jesus Christ.\footnote{Rush to Julia, September 30, II: 688.}

Rush found a particular resonance in the story of David and Goliath. “My method is too simple for them,” Rush wrote of his philosophical adversaries. “They forget that a stone from the sling of David effected what the whole armory of Saul could not do.” On the one hand, the allusion to David and Goliath jibed with Rush’s conception of epistemology, which he shared with many intellectuals of the early republic. Since God was good and wanted humans to be able to understand and prevent the evils that had afflicted them, he had constructed the world with simple laws so that human common sense, a divine faculty, could easily grasp them. Thus, it stood to reason that the simplicity of ideas, like the simplicity of David’s weapon, indicated their effectiveness.\footnote{For an elaboration of this view, see chapter 3.} The story also tended to a view of himself as an embattled, yet righteous underdog. Just as the stone from David’s sling felled the physically- and martially-superior Philistine warrior, so would Rush’s divinely-inspired cure overcome the wickedness and obstinacy of his numerically-superior enemies. With God on his side, Rush could overcome anything. In another letter to Julia, Rush likened his ally, Dr. Griffiths, one of the few doctors who used Rush’s treatment, to Joab, a lieutenant of David’s, who assassinated rival claimants to the throne. Finally, in tendering his resignation from the College of Physicians in a note to John Morgan, Rush once more used the metaphor of David to illustrate his position: “Well might David prefer the scourge of a pestilence to that of the evil dispositions of his fellow men.”\footnote{Rush to Julia, September 23, 678; Rush to John Redman, November 5, II: 741.} Here, his reference alluded to a biblical story, later told by James Tytler, in which David, being faced with his choice of punishment for conducting a census of the Israelites, chose three days plague over three months of persecution and
three years of famine.\textsuperscript{49} Rush, it would seem, preferred the dangers of yellow fever to the persecutions from his fellow doctors.

The romanticization of himself as a David—a humble and godly warrior for truth, fighting the combined treachery of his enemies—spoke to a much wider preoccupation with Rush. Indeed, he had not suffered his various “persecutions” without embracing, even celebrating, his role. Most of the people whom he most admired, for example, had also endured their shares of prejudiced condemnation. During the 1793 epidemic, Rush recalled how Thomas Sydenham, the famous and influential English physician, also sustained vicious criticism on account of his medical opinions.\textsuperscript{49} More importantly, Rush knew that through suffering the torments of persecution, he could identify with Jesus Christ. In writing of Jesus, he explains, “The first sermon we find that ever he [Jesus] preached, he tells his followers that they should be blessed when all manner of evil was spoke against them.”\textsuperscript{50} The examples of Sydenham and especially Jesus taught Rush that persecution was to be expected for doing right. Writing to Noah Webster in 1789, well before the epidemic period, Rush enjoined his friend, “Continue to do all the good you can by enlightening your country. Expect to be persecuted for doing good, and learn to rejoice in persecution.”\textsuperscript{51} So resolutely had Rush accepted the notion that persecution followed right action that he even seemingly courted it. Only months later, in a letter to John Adams, Rush elaborated on this glorified view of persecution. “I learned . . . from you to despise public opinion when set in competition with the dictates of my judgment or conscience,” he began. “So much did I imbibe of this spirit from you that during the whole of my political life I was always disposed

\textsuperscript{48} 2 Samuel: 24; 1 Chronicles: 21
\textsuperscript{49} Rush to John Redman, November 5, 1793, II: 740-741.
\textsuperscript{50} Rush to Ebenezer Hazard, Dec. 23, 1765, I: 22.
\textsuperscript{51} Rush to Noah Webster, December 29, 1790, I: 530.
to suspect my integrity if from any accident I became popular with our citizens for a few weeks or days."^{52}

Ultimately, the persecutions Rush suffered for his yellow fever treatment ended triumphantly. After sustaining attacks from William Cobbett, an English émigré and pro-British political writer, Rush sued the “Porcupine” for libel, sending him back to England.^{53} Nevertheless, the ordeal does show that by the beginning of the epidemic period, Rush had internalized a binary view of the world, born of his particular religious imagination, which filtered its contents in strict terms of right and wrong, and good and evil.^{54} Since Rush, by the Grace of God, was always both right and good, then his opposition must always not only be wrong, but also evil. Hence, his derogation of all medical, as well as political and religious, dissenters to the status of “factions,” whose perspectives ought not to be trusted. The same religious outlook also conveniently excused Rush from any critical self-evaluation. Indeed, rather than question his own points-of-view, Rush found solace for his persecution, or unpopularity, in a depiction of himself as a Christ-like figure, selflessly facing the trials that the righteous had to endure. Though he might suffer now, Rush knew that time and superior wisdom would ultimately vindicate his ideas, just as they had those of his heroes.

Rush’s experiences with persecution, while seemingly a unique result of a very peculiar person, also shed light on the forces that shaped the conspiratorial imaginations of the disease investigators more generally. Religion, after all, had always been a formative ingredient in the natural philosophical

52 Rush to John Adams, February 12, 1790, I: 531.
53 Cobbett wrote under the pseudonym “Peter Porcupine.” The episode has been recounted many times. See David A. Wilson, ed. Peter Porcupine in America: Pamphlets on Republicanism and Revolution (Ithaca: Cornell University Press, 1994), 40-41, 228-230.
54 My depiction of Rush meshes well with that of Michael Meranze in Laboratories of Virtue: Punishment, Revolution, and Authority in Philadelphia, 1760-1835 (Chapel Hill: University of North Carolina Press, 1996); and Meranze, Introduction to Benjamin Rush, Essays: Literary, Moral, and Philosophical, ed. Michael Meranze (Schenectady: Union College Press, 1988). Meranze paints a picture of Rush as a domineering intellectual, who exemplified the darker side of the Enlightenment. In the latter work, for example, Meranze described Rush’s program as a “systematic attempt to overturn custom and replace it with ideas and practices based on Rush’s notion of truth” (ix). For a more sympathetic depiction of Rush’s activism, see
perspectives of the investigators. Religion undergirded the common-sense philosophies of the investigators, and common sense supported the arguments of the investigators. Localists and contagionists alike believed that common sense confirmed their causal theories as certainly as it did the existence of God and even the accuracy of scriptures. Thus, it stood to reason that they would view their philosophical opponents in the same manner as they viewed religious heretics, as wayward souls who had strayed from the path of righteousness. Their perspectives, in other words, admitted of no opposing viewpoints, and not merely because such opposing views were wrong, but because they threatened the delicate intellectual system they had created. If the truth of a philosophical proposition depended on common sense, which by its very nature ought to be self-evident, then everyone had to agree, or else common sense was not so very common at all, and therefore invalid as a philosophical tool.

Unwilling or unable to acknowledge fault in their common-sense natural philosophy, the participants in the yellow fever debate instead concluded that the system was sound, but that their opponents worked treacherously to undermine it and to destroy the reputations of those who supported it. Rush, for instance, found that the persecutions that haunted him his whole life resurfaced once again in response to his opinions about the local origins of yellow fever. Beginning in the aftermath of the first epidemic, the hostility to his opinions grew steadily over the course of the epidemic period. By 1797, the persecutions from his professional colleagues and the public at large had grown so intolerable that he contemplated moving his family to New York, which he believed was more amenable to localism. Philadelphia, his beloved city, had turned against him. “Ever since the year 1793 I have lived in Philadelphia as in a foreign country,” Rush confided to his friend, Dr. John R. B. Rodgers, in October 1797.55 In his published writings and correspondence, Rush repeatedly bemoaned the “calumnies” and “execrations” that his peers heaped upon him for his well-intentioned pursuit of

natural philosophical truth.\textsuperscript{56} The sting of these reproaches stayed with Rush for the rest of his life. Years later, in a letter to John Adams, Rush described his advocacy of localism as one of the six things he did in his life to incur the malice of his fellow man, but it was clearly the most painful. Writing of the “the folly, ignorance, falsehoods and malice” of his “enemies,” Rush claimed, “Were I to detail to you the many acts of unkindness, ingratitude, treachery, malice, and cruelty I have received . . . you would wonder how I have survived them.” He continued dramatically, “It has been the hatred not of men but of beings actuated by a spirit truly demoniacal.”\textsuperscript{57} In 1806, having resigned his position University of Pennsylvania, Rush retired from public life and moved permanently to his house in the country, which he appropriately named “Sydenham.”

Unlike Rush, Mitchill seems to have escaped the worst effects of persecution, judging from his reticence on the subject, though he did discover unmistakable signs of the machinations of the contagionist faction. In 1799, Mitchill, along Drs. James Tillary and John Rodgers, all members of the Medical Society of the State of New York, formed a committee that was charged with determining the cause of the yellow fever epidemic that just devastated New York the preceding fall. Having scrutinized the evidence, even going so far as to interrogate witnesses, they concluded not only that the contagionists were wrong, but that they fabricated evidence and deceived the people. With little more than vague suspicions, the contagionists irresponsibly and maliciously disseminated dangerous, misleading falsehoods. It all began with preconceived notions about the cause of yellow fever. “In a commercial city,” the committee members began, “it was natural to suppose, because it has not been though unreasonable to believe that it might be imported from some foreign place: --Accordingly stories were invented and circulated with great diligence, that the seeds of this dreadful distemper, imported in

\textsuperscript{56} See, for example, Observations Upon the Origin of the Malignant Bilious, or Yellow Fever in Philadelphia (Philadelphia: Budd and Bartram, 1799), 3, 28.

the first instance, from foreign shores, had been landed among us.” The contagionists’ argument specifically centered on the ship Olive and the sloop Iris, which arrived in New York from Martinique in late June and allegedly introduced yellow fever into the city. Upon further investigation, the members of the committee reported that “these stories were founded in misrepresentation, and fostered by prejudice,” and that they sprang from “sources of undiscerning credulity—from motives of self-interest—or, from principles of moral turpitude.”58 To substantiate their accusations, the authors furnished affidavits from the ships’ inspectors, who agreed that nobody onboard the Olive or the Iris had yellow fever, though at least one passenger died from an unidentified disease shortly after arriving.59

Webster also detected the workings of faction in the yellow fever debate. Webster’s case makes for a particularly poignant example of the effects of perceived conspiracy. Initially receptive to contagionism and its compelling evidence of importation, Webster gradually realized, to his shock and dismay, that the doctrine rested on lies. The conversion for Webster came sometime in fall of 1797, when he was preparing his responses to William Currie’s very public pronouncements in favor of contagionism (Currie, recall, had published several letters in Benjamin Wynkoop’s Philadelphia newspaper), and seemed to focus on one episode, which showed the duplicity of the importationists like no other. In Currie’s second letter to Mr. Wynkoop, he argued that the yellow fever of 1793 originated from Boullam, in Africa, and then traveled across the Atlantic to the West Indies and United States. Currie, in fact, had based his argument off of a publication of 1795, An Essay on the Malignant Pestilential Fever Introduced into the West Indian Islands from Boullam, on the coast of Guinea, As It Appeared in 1793 by Colin Chisholm. A doctor who had served with the British armies in Grenada during

59 In their affidavits, the inspectors claimed that the sick passenger suffered from a “consumptive complaint.” Since the inspectors were not doctors, and no firm diagnoses were made, we should not rule out the possibility that they were mistaken and that the patients did, in fact, have yellow fever. Ibid., 28-32.
the Wars of the French Revolution, Chisholm argued that the yellow fever epidemic that struck Grenada, several other islands in the West Indies, and ultimately Philadelphia in 1793 originated from a ship, the *Hanky*, which had sailed into Grenada from Boullam, on the coast of Africa. In his *Essay on the Malignant Pestilential Fever*, Chisholm reconstructed the circuitous path of the *Hanky* as it made its way from England to Grenada. However, since Chisholm had remained the whole time in Grenada, he based his narrative almost entirely on the testimony of J. Paiba, a passenger on the *Hanky*.

According to Chisholm’s rendition of Paiba’s story, the *Hanky* and one other ship sailed from England at the beginning of April 1792. Both had been chartered by the Sierra Leone Company, and were destined for “Boullam,” the island now known as Bolama, off the coast of Guinea-Bissau. Paiba and his fellow “adventurers”—the same term that Thomas Clarkson, one of the founders of the Sierra Leone Company, used for the settlers—apparently intended to settle Boullam as a colony for the ex-slaves rescued from their American enslavers during the American Revolution. Chisholm noted that the crew of the ship were inflamed with “the fanatic enthusiasm for the Abolition of the Slave Trade,” as well as the “delusive prospect of wealth” supposed to be gotten from the cultivation of cotton. Once they arrived near Boullam, unfavorable circumstances forced the passengers to stay on board the *Hanky*. Boullam, they realized, was “destitute of fresh water” and the wells they dug on the shore produced only “brackish” and “unwholesome” water. Moreover, the colonizers met with resistance from some of the native inhabitants—“the negroes of this part of Africa are ferocious in an extraordinary degree,” Chisholm claimed, “And are even said to be cannibals.”

Having remained onboard the *Hanky* in crowded, uncleanly conditions, the passengers consequently stirred up some kind of disease, which promptly spread through the nearly two hundred

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60 Adam Hochschild, *Bury the Chains: Prophets and Rebels in the Fight to Free an Empire’s Slaves* (Boston: Mariner Books, 2005), 204.
61 Colin Chisholm, *An essay on the malignant pestilential fever introduced into the West Indian Islands from Boullam, on the coast of Guinea, as it appeared in 1793* (London: C. Dilly, 1795), 83.
62 Ibid., 85.
people onboard. Pressed by these circumstances, the *Hanky* sailed to the nearby Portuguese settlement of Bissau for supplies. With many people now sick, the ship returned briefly to Boullam, but then headed to St. Jago, the largest of the Cape Verde Islands, now known as Santiago. At St. Jago, the ship of colonizers met with two British warships, the *Charon* and the *Scorpion*, whose benevolent captains sent four men to the *Hanky* so as to help navigate the ship to the West Indies, “A voyage to England being impractical in their wretched state.” Only three days out of port, the new passengers took ill; by this point, too, Chisholm claimed that three-fourths of the crew had been “carried off.” The *Hanky* limped into Grenada on February 19, 1793.63 “From this period,” Chisholm continued, “We are to date the commencement of a disease before, I believe, unknown in this country, and certainly unequalled in its destructive nature.”64 Thereafter, the new disease, yellow fever, rapidly spread through the West Indian islands, making its way to Philadelphia in August of 1793.65

In his second letter of October 28, Webster gently chastised Currie for embracing the story of the *Hanky* and importation of the fever from Boullam. At this early point, Webster focused his critique on the story’s ambiguity. “How and by what means did the disease at Boullam originate among the people?” he asked. It certainly could not have come from contagion, for Boullam was “an uninhabited island, and has no marsh grounds to vitiate the air.”66 If the sickness did not come from the environment or from a specific contagion, then Webster could only reach one conclusion—“the people themselves, to use a vulgar, but expressive phrase, bred the plague among themselves.”67 But, as Webster well knew, human effluvia could only spread disease within a confined radius, as in the camp, jail, and hospital fevers. Chisholm’s story, on the other hand, expressly stated that the contagious particles had originated on Boullam, whence the crew of the *Hanky* carried them elsewhere. Webster’s

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63 Ibid., 85-87.
64 Ibid., 89.
65 Ibid., 98.
67 Ibid., 23.
early critique of Currie, then, struck only at the major weakness of the contagionist perspective—the inability to specify an origin of the specific contagion.

Sometime before November 15, when he published his ninth letter in the Commercial Advertiser, Webster had found a new and exciting source of information that cast doubt on the very integrity of Chisholm’s account. By a stroke of luck, Webster located Mr. Paiba, Chisholm’s main informant, who had taken up residence in New York City with his wife. Webster promptly arranged interviews with the Paibas, which he conducted with “a medical friend, Dr. Smith,” who “made notes of the facts related.”68 Having read Chisholm’s narrative of events, Mr. Paiba offered a significantly different depiction of the voyage. In his ninth letter, Webster enumerated several individual points of disagreement. According to Paiba, the expedition to Boullam, though undertaken by abolitionists, did not take place under the aegis of the Sierra Leone Company. Mr. Paiba himself, it turns out, had been one of the twelve directors of the independent voyage to Boullam. Contrary to Chisholm’s account, the water at Boullam was not brackish, but of a high quality. Nor did the passengers stay onboard the Hanky for fear of the African inhabitants; rather, they settled comfortably on the land—as Webster wrote, they “cleared several acres of land, and built a block house, with four gates, and planted artillery to defend them.”69 Finally and most damningly, the Hanky, though troubled by illness, did not arrive in Grenada on February 19, 1793, but remained at sea until March 18 or 19, well after yellow fever had made its appearance on the island.70 The Hanky, it seems, could not possibly have sparked the yellow fever pandemic of 1793.

Why did Chisholm alter significant elements of the Paiba’s original testimony about the voyage of the Hanky? As Webster saw it, Chisholm’s fabrications took part in a carefully-concerted scheme to paint the coast of Africa as a dangerous and unhealthy place, and thereby discourage colonization.

68 Webster, Letters, Letter IX: 42.
69 Ibid., 43.
70 Ibid., 43.
efforts that threatened the vested interests of West-Indian planters. Planters, after all, had built their fortunes on slaves and the lucrative crops they produced. In their minds, successful colonization would benefit the rising tide of abolitionism in Great Britain. Furthermore, the planters could do without the competition from the freemen growing cotton or any other profitable commodity on the coast of Africa. As a result, the planters and their friends in England, including Chisholm apparently, mustered the full force of their media arsenal in order to cast the Boullam enterprise in a negative light. “I will only observe in general,” Webster proclaimed, “that every species of falsehood and misrepresentation, was resorted to by the enemies of the Boullam enterprise to discourage the prosecution of the settlement, which might result in putting a stop to the nefarious slave trade, and in establishing the culture of cotton by free hands.” By associating the “mischief” of the Boullam group with the Sierra Leone Company, the pro-slavery interests believed that they could effectively discredit the much larger and better organized group. For although the first settlement of the Sierra Leone Company—a place called Granville Town, in honor of one of its antislavery creators, Granville Sharp—had quickly fallen apart, the Company was busily raising new settlements in Sierra Leone. If the Company could be depicted as a raiser of epidemics and bane to the welfare of the people, however, these new efforts might lose their support.

The story of the Hanky, Paiba, and Chisholm, as well as others like it (so he claims), convinced Webster of the extreme duplicity of the contagionists and led to his final, unequivocal rejection of contagionism. In the Brief History of Epidemic and Pestilential Diseases, a work he imagined as an extension of his earlier letters to Currie, Webster himself recounted his reasons for abandoning the “ill-founded” doctrine: “I found repeatedly that the reports of persons taken ill, in consequence with vessels from the West-Indies, or with diseased seamen, infected cotton or clothing, or the like causes, were

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71 Webster, 46.
72 For a bit of background on the Sierra Leone Company and the context in which it operated, see Adam Hochschild, Bury the Chains, 176-180; 199-212.
mere idle tales, raised by the ignorant or interested, and wholly unsupported by evidence.”

Conspiracy, as Webster came to understand, threatened truth in natural philosophy as much as it did in politics and society.

Webster directed his anger not only at the factions themselves, but towards the multitudes who, he deemed, blindly followed. The yellow fever debacle struck him as an object lesson in the capriciousness of human opinion, the faultiness of human intellect, and the waywardness of human morals. The debate, no less than the political strife of the 1790s, shattered his faith in the people and in democratic processes themselves. In a letter to Benjamin Rush of December 15, 1800, Webster specifically connected the lessons of the yellow fever debate to the need for social control. The letter begins with a discussion of the opposition, and then ends with a pointed indictment of American institutions:

As to mankind, I believe the mass of them to be copax rationis. They are ignorant or, what is worse, governed by prejudices and authority—and the authority of men who flatter them instead of boldly telling them the truth. It is so in politics as well as in medicine. It would be better for the people—they would be more free and more happy—if all were deprived of the right of suffrage until they are 45 years of age and if no man was eligible to an important office until he is 50, that is, if all the powers of government were vested in our old men who have lost their ambition chiefly and have learned wisdom by experience; but to tell the people this would be treason. We have grown so wise of late years as to reject the maxims of Moses, Lycurgus, and the patriarchs: we have, by our constitutions of government and the preposterous use made of the doctrines of equality, stripped old men of their dignity and wise men of their influence, and long, long are we to feel the mischievous effects of modern policy.

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73 Noah Webster, Brief History of Epidemic and PESTILENTIAL Diseases (Hartford), vii-viii.
74 Webster’s meaning here is a bit hard to decipher. The Latin term “copax rationis” is undoubtedly misspelled version of “capax rationis,” meaning “capable of reason” (or perhaps the transcriber misspelled the word, since Webster, a lexicographer, would be unlikely to misspell or otherwise errantly decline Latin words). He is probably intoning a phrase from Jonathan Swift, who used the term to describe human beings, who were not fundamentally rational creatures, but only capable of reason. See, Christopher Fox in Jonathan Swift, Gulliver’s Travels (New York: Palgrave MacMillan, 1995), 272.
75 Noah Webster to Benjamin Rush, December 15, 1800
The faction-ridden 1790s, of which the yellow fever controversy comprised a significant part, left
Webster an embittered man, callous toward the very system that he had once championed. In 1798, he
relinquished editorial control of the Minerva, moved to New Haven, and, after a stint in state politics,
commenced his life as a writer and lexicographer. His opinions about the American republic and its citizens
would never be the same.\footnote{Webster's biographers agree that the 1790s were a crucible for the intellectual, which ended with his
disenchantment and retreat into conservatism. See K. Alan Snyder, Defining Noah Webster: Mind and Morals in
the Early Republic (Lanham: University Press of America, 1990), esp. 185-213; Richard Moss, Noah Webster
(Boston: Twayne Publishers, 1984), 48-65. They have not realized the unique impact of the yellow fever debate.}

The contagionists, led as always by William Currie, answered back with accusations of their own.
In 1798, William Currie published his Observations on the causes and cure of remitting or bilious fevers,
another of his many treatises of the subject of fevers. Referring to yellow fever still as the synochus
icteroides—a term he borrowed from his mentor William Cullen's nosology and employed in his earliest
writings—Currie differentiated it from the common bilious and remitting fevers, which indeed emitted
from putrefaction. He also furnished “ample and unequivocal proof” of the contagious origin of
Philadelphia’s yellow fever epidemic. The focal point of Currie’s treatise, however, was a
comprehensive abstract of the “opinions and observations” of physicians who had written on the
subject of fevers, “the object of which, is to furnish those at a distance from public libraries” with the
pure truth, “free from the perversions of salacious and misleading theory, or the misrepresentations of
uncharitable, and distorting party spirit.” Piecing together snippets of yellow fever commentary from
the most illustrious and oft-cited writers on the disease, Currie aimed to correct the malicious
misrepresentations of localists, who intentionally distorted the statements of trusted authorities, or else
misused examples and quotations to benefit their own perspectives. Currie’s abstract exposed the
manipulations of the localists while reclaiming the testimonies of the enlightened philosophers who
wrote about disease causation, and thus in some ways also restored a bit of sanity to the yellow fever debate.

As the epidemic period progressed, Currie’s suspicions grew in proportion to his elevating sense of hopelessness and ineffectuality in the face of localist ascendancy. Collaborating with his long-time friend and ally, Isaac Cathrall, the physician and practicing chemist, Currie offered what would be his last full-length treatise on the cause of yellow fever in the winter of 1802, just after the latest epidemic carried off more than 500 lives. In this final, exasperated plea to his readers, Currie urged them once more to accept the superior factual basis of contagionism, but also to beware of the treachery of localists.\(^77\) An utterly scurrilous lot, as Currie and Cathrall depicted them, the localists grasped the thinnest evidence, spun the most elaborate tales, advanced the wildest and most chimerical doctrines, and all to deceive the people into supporting a theory that they did not even believe, but which catered their overarching private interest—the protection of American commerce. Above all things, the localists desired to end the burdensome quarantine restrictions that halted trade for several months and ruined the country’s reputation in the eyes of current and potential commercial partners. In order to accomplish this end, the localists would stoop to any means; they even relied on “fabricated” evidence, they claimed. But rather than undertaking a point-by-point analysis of localist claims, Currie and Cathrall aimed more broadly to delegitimize localism by reminding their readers of the “abstract speculations”—the assumptions, intuitive leaps, and all-out guesswork—which held it up, and by comparing it unfavorably to the unadorned honesty of contagionism, which all along rested on simple facts.\(^78\)

\(^{77}\) The factual basis of contagious origin of the 1802 epidemic included the arrival of two infected ships, the St. Domingo Packet from Cape Francois and the Esperanza, both of which came to port shortly before the onset of the fever. William Currie and Isaac Cathrall, Facts and Observations, Relative to the Origin, Progress and Nature of the Fever, which Prevailed in Certain Parts of the City and Districts of Philadelphia, in the Summer and Autumn of the Present Year (Philadelphia: William Woodward, 1802), 3

\(^{78}\) Ibid., especially 28-37.
What made all this so unbearable for Currie, Cathrall, and the rest of the contagionists, was not
the localists’ dishonesty necessarily, but their success, and especially their arrogant conduct—the
aggressive the manner in which they commandeered the yellow fever commentary and forced their
opinions onto the people.

Those gentlemen who affect to deplore, what they so dictatorially pronounce, the errors
of those who in the foreign origin of the malignant yellow fever, and who charge that
doctrine with being ‘fatal to the lives and injurious to the property of our citizens,’ do
not seem to be aware that the charge may be retorted with double force upon
themselves. Nor, do they appear to be sensible of the resemblance of their conduct to a
certain usurper, who while he was laying waste all before him, and increasing the misery
of surrounding nations, professed himself the friend of humanity, and declared he was
only contending for the freedom and happiness of mankind. 79

The thinly-veiled allusion to Napoleon Bonaparte proved fitting enough for the times. Napoleon had
only just declared himself Consul for life and then invaded Switzerland, and so the comparison enabled
Currie and Cathrall to depict their enemies as ruthless, lawless conquerors. The analogy, though, would
have had much deeper resonance for people of the United States in late 1802, as its authors well knew.
More than simply being another conqueror, Napoleon, the usurper of France and the terror of Europe,
had come symbolize the end of an age of enlightenment. It was Napoleon who finally and irrevocably
ended the French Revolution, and with it the hopes of establishing a peaceable society ruled by reason.
After a decade of yellow fever, with defeat all but being acknowledged, Currie and Cathrall found their
own situation mirrored in contemporary affairs. They had come to the study of yellow fever—indeed,
they had been drawn to the study of natural philosophy and medicine—believing that reasoned inquiry
would lead to truth; but they, like all those who mourned the loss of France, only found that ignorance,
interest, and bald power upset their high hopes.

79 Ibid., 32.
The comments from Currie and Cathrall bring us full circle, and thus make for an appropriate conclusion. The tone of the yellow fever debate, after all, bore more than a superficial similarity to the tones of contemporary discourses about French Revolution, American politics, and the future of the young republic. They all came about from the same sources—fear, uncertainty, and perhaps above all the inability to accept that others could hold different opinions. Pious Americans did not understand deists, and so they accused them of conspiracies—similarly, localists could not understand contagionists, and vice versa, and so they did the same. The explanation seemed appropriate for the unexplainable. Rather than being any one person’s fault, and rather than being a reaction to actual conspiracy, the “paranoid style” of the investigators owed itself to epistemological beliefs of the time. The Enlightenment created a monster, as many of its critics have pointed out over the years.\(^{80}\) By imbuing everything—every question, every problem, and every field of inquiry—with the status of objectivity, it effectively marginalized anyone and anything that fell outside of one’s definition of correctness. Since disagreements necessarily occur in science, the investigators were doomed to strife. They simply could not view their opponents’ opinions as legitimate.

And, yet, they came so tantalizingly close. Let us turn once again to Elihu Hubbard Smith, whose poem, written during the epidemic in New York in 1795, starts this chapter. During the autumn of 1795—in fact, at the very time that he was composing those verses—E. H. Smith found himself at a crossroads. He had been making something of a living for himself as a writer as well as a medical practitioner, but he was contemplating a transition into a full-time career as a doctor. The dawning controversy over the cause of yellow fever, however, did nothing to ease the change. Surveying the scene before him in the fever-infested New York, Smith could see nothing but the ugly side of medicine, embodied particularly in the contagionist camp. He wrote in his diary, “Do I not see ignorance, pride,

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stupidity, carelessness, & a superstitious veneration for foreign writers, & a mean jealousy of an illustrious writer of our own country [he was writing of Rush], go hand in hand, & as it were, conspire, against the lives of men?”  But, then, in a moment of introspection, Smith turned his critical gaze inward. “Is it a foolish vanity, which deceives me, when I suspect that I am less under the influence of prejudice than many; & that I should venture my reputation freely to do good; & that no bigotry to a peculiar system would prevent my readily yielding any notion, which I had once entertained, if I found it false?” Smith seemed to be edging closer to a recognition of the relativity of yellow fever opinions; to an admission that he was no more free from prejudice than those he accused; and, indeed, to an understanding that the whole matter of prejudice, faction, and conspiracy was nonsense in the first place—just the paranoid expressions of uncertainty and misunderstanding. Instead, he replied tersely to his own question, “I think not.” 81 His answer helps us understand why the yellow fever debate took the form it did.

81 Elihu Hubbard Smith, in The Diary of Elihu Hubbard Smith, October 5, 1795, 67.
In the midst of a yellow fever outbreak in Philadelphia in September 1805, Benjamin Rush set aside a few minutes to compose a letter to his friend, John Adams. The act itself was not an unusual one for the aging doctor (he would turn sixty in a few months)—he was a devoted letter-writer, as the thousands of letters he composed in his life attest, and he had always taken time, even in the midst of epidemics, to correspond with family and friends. But on this particular occasion, something new had come over Rush. Prospects had brightened considerably, and Rush’s letter showed it. Gone were the sleepless nights, the endless house visits to patients, the fervent devotions to God, and even, to Rush’s delight, the worst of the “persecutions.” In short, all of the demons that had haunted him throughout the epidemic period seemed to have vanished. And, so, he wrote exuberantly to Adams of the changes that had come over the United States and its medico-scientific community:

A new era has begun in the science of medicine in our city since the appearance of the yellow fever among us. No channel has as yet been discovered through which it could have been conveyed to us from a foreign country; and what is more against its importation, no one of the persons who have been infected by the foul air emitted by a large bed of putrid oysters in Southwark and who has sickened or died in the city, has propagated the disease. Many of our citizens of the second class have been led by these facts to believe it to be generated in Southwark and that it is not contagious.  

Rush’s enthusiasm betrayed his optimism about the success of localism and the fate of yellow fever in the early American republic. Rush and the localists certainly had not finally and definitively determined the cause of yellow fever (nascent public health bodies in the American cities still warily maintained quarantine procedures, for example) but they had settled the debate among natural philosophers. By 1805, hardly a contagionist could be found who openly advocated for the doctrine,

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and even the “citizens of the second class,” as Rush condescendingly referred to them, had finally embraced the truth. Rush even flattered himself by thinking that William Currie, the bulwark of the opposition, had changed his mind. Of course, Currie had not, but he had more or less retired from the arena of yellow fever commentary with his final, resentful essay of late 1802. More importantly, as Rush also suggested, yellow fever had abated considerably since the devastation of 1798. As the Haitian Revolution intensified, Americans gradually lost contact with the worn-torn colony of Saint-Domingue, their major trading partner for sugar, but also the source of their annual epidemics. By 1805, when the United States under Thomas Jefferson officially severed commercial ties with the independent Haiti, the revolution had already come to an end and, without a regular influx of non-immune Europeans, so too had the yellow fever epidemics. The minor outbreaks in Philadelphia and New York in 1805 were the last of the epidemic period. The disease reemerged with a vengeance in Baltimore in 1819, when it killed more than 2,000, but just as quickly retreated. A final outbreak in Philadelphia in 1820 took 83 lives, and New York’s last epidemic in 1822 claimed 250 more. For the rest of the nineteenth century, yellow fever became a problem of the great southern cities, particularly New Orleans, but it would never again strike the sea port cities of the northeastern United States.

The end of yellow fever also marked the end of the intellectual ferment that accompanied it. A few more treatises issued from the presses following the last outbreak, but then abruptly stopped. As for the investigators, most of them simply abandoned the pursuit of yellow fever as suddenly as they

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83 In a letter to John Syng Dorsey, May 23, 1804, Rush wrote of William Currie, who had recently joined the Board of Health of Philadelphia: “From the moderation he exercises towards vessels from W. India ports, a suspicion might be inferred that he has changed his opinion.” See, Ibid., II: 882-883.


85 Margaret Humphreys, *Yellow Fever and the South* (Baltimore: Johns Hopkins University Press, 1999).
had gotten into it. Neither Rush, Mitchill, or Webster ever wrote about the disease again; nor did Isaac Cathrall, Charles Caldwell, or James Tytler. Indeed, of all the investigators whom I could track down, only one, Felix Pascalis Ouvière, ever produced another work about the disease again, and not until its brief reemergence in 1819.\textsuperscript{86} That was probably fitting though. Yellow fever inquiry never constituted a professional occupation or obligation. It was, rather, a gentlemanly pursuit, undertaken by learned and concerned citizens in order to rid the republic of a severe threat to its integrity and prosperity. Once that threat disappeared, so too did the inquiry that surrounded it.

But to return to Rush’s letter of 1805, there was another matter about which he was quite mistaken—“a new era in the science of medicine” had most certainly not begun, though one was seemingly coming to an end. This was the age of common-sense natural philosophy, when the truth of an idea was determined by simple reflection on its plausibility in the created world (combined, of course, with some empirical facts and a modicum of inductive reasoning). For its time, common sense informed most every aspect of investigators’ natural philosophy, from their inquiries into the cause of yellow fever, to their unique receptions of European ideas. It inspired confidence, even hubris, in the investigators, and it relaxed the standards of epistemological certainty. Through the lens of common sense, for example, even the empirical and experimental orientation of Lavoisian chemistry took on a decidedly speculative character. To a large degree, the yellow fever ferment itself exposed the fragility of common-sense inquiry. By elevating one’s impressions and convictions to the statuses of truths, common sense fostered intolerance towards opposing viewpoints, which became something more like heresies than contrary points-of-views. By the end of the epidemic period, adherents of both theories, utterly convinced of their rightness and righteousness, looked warily on an enemy camp, whose true intentions they could not clearly discern, but nevertheless assumed to be evil. As the investigators

\textsuperscript{86} Felix Pascalis Ouvière, \textit{A Statement of the Occurrences during a Malignant Yellow Fever, in the City of New York, in the Summer and Autumnal Months of 1819} (New York: William A Mercein, 1819).
imagined it, common sense would never sustain scientific debate, which thrives on differences of opinion.

Had he survived to witness it, Rush would have been surprised at just how much would change over the following the decades. Common-sense philosophy never totally disappeared from the American intellectual landscape, but it did lose its luster along with the waning of the American Enlightenment. Moreover, the various strands of natural philosophy that the investigators pulled together during the epidemic period would each go in their own directions. The broad observational empiricism that undergirded the historical study of yellow fever manifested itself more fully in the pursuits of nineteenth-century natural historians, who scoured the American countryside for facts about its plants, animals, and minerals, hoping that they might one day lead to some hidden truth about their environments. In chemistry, the speculative enthusiasm that greeted the appearance of Lavoisian concepts in the 1790s soon died down, and chemists once more returned to their laboratories and instruments. In fact, already by the end of the epidemic period, empirically-minded, experimental chemists such as Robert Hare and Benjamin Silliman had begun to build research programs that set American chemistry on the path that would take into the nineteenth century and beyond. Of all the fields of inquiry brought to bear on the problem of yellow fever, only natural theology survived virtually unchanged to the present in the form of creationism or intelligent design (hardly a reassuring sign of its explanatory power!).

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Change occurred even more dramatically in the areas of medical education and practice, broadly conceived. The University of Edinburgh, with its emphases on rationalistic physiological systems and nosologies, no longer attracted the same numbers of Americans. Especially at the conclusion of the Napoleonic Wars, those traveling overseas for their educations increasingly chose the rigorous clinical settings of the Paris hospitals, which offered training in bedside observation and autopsy. There they would look into the bodies of their patients and trace disease into the very tissues in which they were embedded. French medical ideas soon came to dominate in the upstart medical schools and journals of the antebellum United States.\textsuperscript{90} The debate between localists and contagionists would again flare up when yellow fever settled in the American South, and especially when cholera, the dread disease of the nineteenth-century, began to afflict the American cities, but the subsequent generations of investigators would at least be more inclined to look for answers in the bodies and corpses of their patients as much as in ships and putrid effluvia.\textsuperscript{91}

But for all its impermanence, the epidemic period still marked a period of productivity. By bringing it back into light, by reconstructing the content of the yellow fever ferment, I have tried to resurrect perspectives on nature and epistemology, as well as beliefs about diseases and their causes that have all long since fallen out of favor among doctors and scientists, and which may now only appear strange, even incomprehensible, to the modern eye. In doing so, I hope that I have dispelled some of that strangeness and incomprehensibility, especially in regards to localism, the lesser understood but much more popular disease theory of the time. Looking from the position 1790s and early 1800s, miasmatism would have appeared as vibrant and compelling as any other well-accepted natural philosophical notion. Investigators could certainly reconcile the facts of the yellow fever epidemics with

\textsuperscript{90} John Harley Warner, \textit{Against the Spirit of System: The French Impulse in Nineteenth-Century American Medicine} (Baltimore: Johns Hopkins University Press, 1998),

\textsuperscript{91} For debates about the cause of yellow fever in the South, see Humphreys, \textit{Yellow Fever and the South}, esp., 17-44. For cholera, see Charles Rosenberg, \textit{The Cholera Years: The United States in 1832, 1849, and 1866} (Chicago: Chicago University Press, 1987); for anatomy and autopsy, see Michael Sappol, \textit{A Traffic of Dead Bodies: Anatomy and Embodied Social Identity in Nineteenth-Century America} (Princeton: Princeton University Press, 2001).
the existence of locally-situated miasmas; they could discover evidence of similar disease patterns in records of past epidemics; they could imagine the spread of disease-causing particles from the chemical mixtures and interactions of noxious, fermenting material; and they could explain the natural generation of miasmas from filth as an expression of God’s purpose, written into His creation.

The case of yellow fever in the early republic reminds us that disease inquiry and knowledge form parts of our worldviews. This revelation itself seems odd, because we are accustomed to think about scientific knowledge as something that exists independently. Science is supposed to be objective, after all. In reality, though, what counts as knowledge at any given time is always a part of a constellation of beliefs and assumptions, which are in large part determined by historical contexts. For the localists, the majority of the investigators, the core axiom of their worldviews was the notion that God created the world with purpose, and that as part of that purpose he had given human beings the intellectual capacity to understand his creation. From that simple premise, most all else followed.

We might wonder how far the tentacles of purpose stretched into the following century. Why, for example, did localism enjoy such wide popularity in the United States and Europe in the decades leading up to the microbiological advances that ultimately destroyed it? Historians have not given the clearest answers. Most have found that the prominence localism and its corresponding public health strategies reflected the political, economic, and social concerns of states and the people in them. Some have linked the popularity of localism and its non-obtrusive sanitary public health remedies to the rise of liberal, commercial nations, whose merchant elites and governmental officials disdained disruptive quarantine practices.92 Others have proposed that sanitary reform followed from the attempts of growing states to enhance their authorities and to reform the unhygienic and immoral habits of the

92 The origin of this argument was the essay of Erwin Ackerknecht, “Anticontagionism between 1821 and 1867,” Bulletin of the History of Medicine 22 (1948): 562-593. Ackerknecht’s thesis has held up surprisingly well over the decades. See, for example, Richard J. Evans, Death in Hamburg: Society and Politics in the Cholera Years 1830-1910 (Oxford: Clarendon Press, 1987).
lower classes. Similarly, in Chapter Four, I argued that localism, commercialism, and notions about the proper republican social order shared a very close relationship. The investigators certainly did not embrace localism simply because it benefitted their political and economic interests, nor did their advocacy of sanitation simply extend from their desire to control immoral people. Rather, I showed that they all rested on axioms about God’s purpose as shown through the evidence of design. Was this also true of nineteenth-century disease investigators or did ulterior motives determine their acceptance of localism? To speculate even further, did the decline of localism occur simply as a result of the self-evident correctness of the microbiological “germ” theory? Or was it more than a coincidence that the sudden downfall of localism and the rise of microbiology came right after the path-breaking work of Charles Darwin, whose theory of evolution by natural selection radically altered human perceptions of the purposes of things in existence, including the invisible lifeforms that would, in short time, achieve near-universal recognition as the agents that caused disease?

Whatever their philosophical foundations, the advances of microbiology did lead to a remarkable diminution of infectious diseases. That does not mean that the trouble has passed. The appearance of AIDS and the persistence of malaria, tuberculosis, and even measles in many parts of the world remind us that the scourge of pestilence has not ceased and might one day reemerge. Even where infectious diseases have been effectively controlled, a host of modern diseases, such as cancer and Alzheimer’s, has simply taken their places. Strikingly, as we face down these new threats, each with their own elusive causes, we find ourselves in much the same position as the early republicans who confronted yellow fever. The tools of investigations have changed considerably, of course. But we still hope with Rush that a “new era in the science of medicine” is dawning. Maybe someday it will.

Bibliography:

Manuscript Sources and Published Material Found in Archives:


Published Compendia of Notes and Letters


Newspapers and Periodicals:

Newspapers:

212


Dunlap's American Daily Advertiser, Philadelphia, 1793.

The American Minerva, New York, 1793-1797


Periodicals:

The Medical Repository of Original Essays and Intelligence, Relative to Physic, Surgery, Chemistry, and Natural History. New York, 1797-1824.

The New York Magazine, or Literary Repository, 1797-1798.

Eighteenth- and Nineteenth-Century Published Sources:


Allen, Ethan. Reason the Only Oracle of Man; or, a Compenduous System of Natural Religion. Bennington: Haswell and Russel, 1784.


A short account of the malignant fever, lately prevalent in Philadelphia: with a statement of the proceedings that took place on the subject in different parts of the United States. To which are added, accounts of the plague in London and Marseilles; and a list of the dead, from August 1, to the middle of December, 1793, 4th edition. Philadelphia: Matthew Carey, 1794.


Cathrall, Isaac. A medical sketch of the Synochus maligna, or malignant contagious fever; as it lately appeared in the city of Philadelphia: to which is added, some account of the morbid appearances observed after death, on dissection. Philadelphia: Thomas Dobson, 1794.


Chisholm, Colin. An essay on the malignant pestilential fever introduced into the West Indian Islands from Boullam, on the coast of Guinea, as it appeared in 1793. London: C. Dilly, 1795


An Impartial Review of that part of Dr. Rush’s Late Publication, Entitled “An Account of the Bilious Remitting Yellow Fever, As It Appeared in the City of Philadelphia, in the Year 1793, Which Treats of the Origin of the Disease.” In Which His Opinion Is Shewn to be Erroneous; The Importation of the Disease Established; and the Wholesomeness of the City Vindicated. Philadelphia: Thomas Dobson, 1794.
_______. Observations on the Causes and Cure of Remitting or Bilious Fevers. To which is Annexed, an Abstract of the Opinions and Practice of Different Authors; and an Appendix, Exhibiting Facts and Reflections Relative to the Synochus Icteroides, or Yellow Fever. Philadelphia: William T. Palmer, 1798.


_______. A Treatise on the Synochus Icteroides, or Yellow Fever; As It Lately Appeared in the City of Philadelphia. Philadelphia: Thomas Dobson, 1794.


Devèze, Jean. An enquiry into, and observations upon the causes and effects of the epidemic disease, which raged in Philadelphia from the month of August till towards the middle of December, 1793. Philadelphia: Parent, 1794.

Folwell, Richard. Short history of the yellow fever, that broke out in the city of Philadelphia, in July, 1797: with a list of the dead; of the donations for the relief of the poor, and a variety of other interesting particulars. Philadelphia: Richard Folwell, 1798.


Green, Ashbel. A Pastoral Letter from a Minister in the Country, to Those of His Flock who Remained in Philadelphia during the Pestilence of 1798. Philadelphia: John Ormand, 1799.


Mitchill, Samuel Latham, ed. *Medical Repository of Original Essays and Intelligence, Relative to Physic, Surgery, Chemistry, and Natural Philosophy,* 1797 and on.


______. “Concerning the Use of Alkaline Remedies in Fevers, and the Analogy between Septic Acids and Other Poisons,” *The New York Magazine, or Literary Repository,* April 1797.
_______. Hints toward Promoting the Health and Cleanliness of New York City (New York: T. and J. Swords, 1802)


_______. Annual Oration delivered before the Chemical Society, January 31, 1801. Philadelphia: John Bioren, 1802.


Priestley, Joseph. An Appeal to the Public, on the Subject of the Riots in Birmingham. Dublin: Hillary and Barlow, 1792.


______. *Medical Inquiries and Observations: Containing an Account of the Yellow fever, As it Appeared in Philadelphia in 1797*. Philadelphia: , 1798

______. *Observations upon the Origin of the Malignant Bilious, or Yellow Fever in Philadelphia*. Philadelphia: Budd and Bartram, 1799.

______. *A Plan for the Establishment of Public Schools and the Diffusion of Knowledge in Pennsylvania; To Which are Added Thoughts upon the Mode of Education, Proper in a Republic*. Philadelphia: Thomas Dobson, 1786


Voltaire. Candide.


________. A Collection of Papers on the Subject of Bilious Fevers. New York


________. The Revolution in France, Considered in Respect to Its Progress and Effects. New York: George Bunce, 1794.

Secondary Literature:


_______ M e d i c i n e at t h e P a r i s H o s p i t a l , 1 7 9 4 - 1 8 4 8 . Baltimore: Johns Hopkins University Press, 1967.


Harris, Steven J. “Long-Distance Corporations, Big Sciences, and the Geography of Knowledge.” Configurations 6: 269-304.


______. “Model Empire, Lost City: Ancient Carthage and the Science of Politics in Revolutionary America.” *The William and Mary Quarterly* 67, no. 1: 3-30.


