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**“Water, earth, and air infected”<sup>1</sup>: How Movement, Quarantines, and Geographical Limitations Shaped the Movement of Yellow Fever in 1793**  
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In 1793, Philadelphia was the capital of the newly formed United States and a fast growing city full of immigrants, merchants, laborers and free blacks. Late in the summer of that same year, one of the greatest outbreaks of yellow fever in history swept through the city. People at the time, including doctors, understood little about how disease came to be or how it spread. Many believed that infected people and inanimate objects spread diseases. Their first natural reaction was to quarantine themselves and their city. Yellow fever, spread by mosquitos, was, as many contemporaries suspected, transported to Philadelphia. The most likely means by which the disease came into the capital city was in water caskets contaminated with mosquito larva. Once the disease became entrenched in the city Philadelphians’ focus turned outward toward the prevention of “infected” people and freight from entering. Surrounding cities and towns also instinctively employed quarantines over both land and water, stopping and often refusing entry to anyone coming from the capital. These quarantines had no effect on the spread of the disease. Instead, environmental conditions as well as the biological limitations of the disease and mosquitos kept the disease from spreading to other localities. Although historians have known this, to date, no one had detailed the spread as well as the natural restrictions of the 1793 yellow fever outbreak as this paper does. Ultimately, it was these environmental and biological limits, and not the regulation of the movement of people (mainly by quarantine orders) that stopped the spread outward during the 1793 outbreak.

This paper will look at the spread of yellow fever from the first cases in late July and early August to the end of the outbreak near the end of October. In this paper I will show that the movement of people played a large role in the dispersion of disease to Philadelphia and within the city itself. However, because of the nature of the disease and its vector, there were also ecological and biological limits that could not be overcome, thereby keeping the disease within Philadelphia. It is these limits that stopped the spread of yellow fever, and any quarantine put into place by either Philadelphia or any surrounding town was a futile and fearful attempt to stop a disease they knew nothing about. The outbreak also led to changes in public health in the city, despite continued ignorance of the disease itself.

There has been much written on the yellow fever outbreak in 1793. There are multiple first-hand accounts written during or shortly after the event. There have also been many secondary sources that have focused on different aspects of the outbreak, including studies on population changes, effects on the poor, and even how the disease itself was transmitted to the city.<sup>2</sup> There has

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<sup>1</sup> J. H. Powell, *Bring out Your Dead: The Great Plague of Yellow Fever in Philadelphia in 1793* (New York: Arno Press, 1970).

<sup>2</sup> Susan Klepp, “How Many Precious Souls Are Fled?: The Magnitude of the 1793 Yellow Fever Epidemic,” in *A Melancholy Scene of Devastation: The Public Response to the 1793 Philadelphia Yellow Fever Epidemic* (Philadelphia: College of Physicians of Philadelphia and the Library Company of Philadelphia, 1997), 163–82; Billy G. Smith, *The “Lower Sort”: Philadelphia’s Laboring People, 1750-1800* (Ithaca, N.Y.:

been a lack of study, however, on the surrounding cities during the epidemic and their citizens' reactions during the outbreak. It is possible to piece together some of this information from letters, newspapers, and proclamations, but this seems to be an area in which more study could be done. From the sources available, especially secondary sources, I was able to follow the spread of the disease through the city. However, none of the scholars addressed why the disease was fixed in Philadelphia and did not spread to surrounding areas. I hope to answer that question here.

### Section I: What Yellow Fever Is and Eighteenth Century Views of the Disease

Yellow fever is a member of the group of viruses known as flavivirus, which also includes West Nile, dengue and Japanese encephalitis.<sup>3</sup> After one becomes infected with yellow fever, it can take three to six days for symptoms to appear.<sup>4</sup> These symptoms begin as chills, a headache, and high fever. Many recover after three days, but if they do not, symptoms more traditionally associated with the disease appear. The liver and kidney begin to shut down, producing pronounced jaundice, hemorrhaging of internal organs and vomiting up coagulated blood, the most recognized sign of yellow fever. After two to three days, the patient dies from organ failure or a secondary infection due to bone marrow failure.<sup>5</sup> The strain that caused the epidemic in 1793 seemed to be especially virulent, as it was often noted that many patients died on the second or third day of the disease.<sup>6</sup>

The disease is carried and spread through mosquitos. One breed of mosquito in particular, the *Aedes aegypti*, flourished in Philadelphia's climate and boggy areas to the south of the city. We now know that thirteen different species of mosquitos are capable of carrying yellow fever, some of which were found in the city at that time.<sup>7</sup> Their eggs are normally laid on the damp sides of containers or in other wet, calm areas, like stagnant mud puddles, water barrels and drinking troughs. The window for a mosquito to pick up the disease from an infected individual only occurs if it bites during the first three days of the infection. Even then, only between 5 to 20 percent of infected mosquitos transmit the disease to other people.<sup>8</sup> The idea that the mosquito, or any insect, could carry or transmit a disease was not considered until the late eighteenth century. Only in 1901, more than a century after the epidemic that hit Philadelphia, did Dr. Walter Reed conclusively prove that people's "things" (i.e. clothing, bedding, suitcases) were not contagious and could not spread the disease.<sup>9</sup>

Yellow fever itself was not new to North America, or even the Philadelphia region. The first epidemic in the city began in 1682. One of the worst outbreaks occurred in 1699, when at least a third of the white residents and an unknown numbers of slaves fell victim, but very little is known about the event. After that date, the slave trade increased fivefold to the West Indies.<sup>10</sup> Slaves that could not be sold in the islands were sent to the colonies in North America and this new influx of slaves more than likely brought both infected men and mosquito larva from Africa to the colonies, resulting in an increase in epidemics. By 1702, the disease would intermittently visit the city at least 5

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Cornell University Press, 1990); Billy G. Smith, *Ship of Death: A Voyage That Changed the Atlantic World* (New Haven: Yale University Press, 2013).

<sup>3</sup> Molly Caldwell Crosby, *The American Plague: The Untold Story of Yellow Fever, the Epidemic That Shaped Our History*, (New York: Berkley Books, 2006), 9.

<sup>4</sup> "Yellow Fever: Symptoms and Treatments," *Center for Disease Control and Prevention*, December 13, 2011, <http://www.cdc.gov/yellowfever/symptoms/index.html>.

<sup>5</sup> J. Worth Estes, "Introduction: The Yellow Fever Syndrome and Its Treatment in Philadelphia, 1793," in *A Melancholy Scene of Devastation: The Public Response to the 1793 Philadelphia Yellow Fever Epidemic* (Philadelphia: College of Physicians of Philadelphia and the Library Company of Philadelphia, 1997), 5; Powell, *Bring Out Your Dead*, viii.

<sup>6</sup> L.H. Butterfield, ed., *Letters of Benjamin Rush: Volume II: 1793-1813*, vol. II (Princeton, N.J: Princeton University Press, 1951), 664.

<sup>7</sup> S. J. Watts, *Epidemics and History: Disease, Power, and Imperialism* (New Haven: Yale University Press, 1997), 216.

<sup>8</sup> Smith, *Ship of Death*, 166-168.

<sup>9</sup> Crosby, *The American Plague*, 191-192.

<sup>10</sup> *Ibid.*, 11.

more times, including 1741 and 1762.<sup>11</sup> By the time the fever struck in 1793, however, Philadelphia had not seen an outbreak since 1762, and in that thirty year period of time few had gained immunity to it. Instead the fever “found fertile ground, creating one of the highest mortality levels ever recorded in an American city.”<sup>12</sup>

### Section II: Background on Medicine and Medical Theory

In the 1790s medical theory was limited. What was understood about sickness and the body had not changed much from the time of the ancient Greeks. At the time, it was believed that the body had four different “humors” similar to that of the four elements: yellow bile (fire), black bile (earth), phlegm (water), and blood (air). When these humors were out of balance, sickness resulted. Many things could change the balance, including the weather, temperature, and surroundings. Many doctors believed that sickness could be started by a miasma, or “bad air.” Decaying animals or trash were often pointed to as the causes of “bad air.”<sup>13</sup> Should a patient come down with a fever or sickness, the doctors were trained to “rebalance” the humors through purges, bleedings, baths and either limiting the intake of food or prescribing specific foods. What they were not trained to do was accurately treat disease.<sup>14</sup> This lack of knowledge affected the understanding of yellow fever and treatments given during the 1793 Philadelphia outbreak.

### Section III: Yellow Fever Outbreak 1793

Philadelphia was originally designed by William Penn to be a “green country towne,” the complete opposite of the crowded and sickly London he knew. Instead, people flocking to the city wanted to live close to employment and amenities, turning Philadelphia into a “city crowded next to the shore.” Eventually by 1700, the majority of the town lived within three or four blocks of the river, living on “much smaller, narrower, and more congested lots” than originally planned.<sup>15</sup>

Yellow fever began to infect Philadelphia late in the summer of 1793. There were two competing theories as to how the disease started, both of them playing a role in the reactions by the city and its residents. Benjamin Rush, a prominent physician during the fever, was convinced that the disease was of local origin: “It is supposed to have been produced by some damaged coffee which had putrefied on one of the wharves near the middle of [Ball’s Wharf].”<sup>16</sup> The coffee was in the same neighborhood where Rush saw his first yellow fever victims and he saw their illness as therefore connected to it.<sup>17</sup> He also believed that the climate in Philadelphia had changed, making it “more vulnerable to ailments spread by bad air.”<sup>18</sup> He argued against the disease having been brought to Philadelphia by noting that something common to the West Indies does not necessarily mean it was introduced from there: “To suppose, because the yellow fever is an epidemic of the West-Indies and because it seldom occurs in North-America, that it can exist among us only by importation, is absurd as to suppose that the hurricanes which are so common in the West-Indies, and which occur here only once in twenty or thirty years, are all imported from that country.”<sup>19</sup>

There were many who disagreed with Rush and believed the disease to have come from outside Philadelphia. Most Philadelphians “hated to think of disease arising from their own

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<sup>11</sup> J. Worth Estes and Billy G. Smith, eds., *A Melancholy Scene of Devastation: The Public Response to the 1793 Philadelphia Yellow Fever Epidemic* (Philadelphia: College of Physicians of Philadelphia and the Library Company of Philadelphia, 1997), 148.

<sup>12</sup> Smith, *The “Lower Sort,”* 51.

<sup>13</sup> Watts, *Epidemics and History.*

<sup>14</sup> Powell, *Bring Out Your Dead,* ix.

<sup>15</sup> Simon Finger, *The Contagious City: The Politics of Public Health in Early Philadelphia* (Ithaca: Cornell University Press, 2012), 17–29.

<sup>16</sup> Butterfield, *Letters of Benjamin Rush,* II:637.

<sup>17</sup> Powell, *Bring Out Your Dead,* 12.

<sup>18</sup> Smith, *Ship of Death,* 201.

<sup>19</sup> Butterfield, *Letters of Benjamin Rush,* II, 694.

‘salutiferous’ air. They insisted it came from abroad.”<sup>20</sup> Just prior to the outbreak, over two thousand French refugees arrived after fleeing the slave revolt in San Domingue.<sup>21</sup> Many pointed to these refugees, as well as the ships themselves, as the reason for the outbreak. Mathew Carey, the prominent Philadelphian printer, pointed to these ships as the cause of the yellow fever outbreak:

A respectable citizen of Philadelphia, super-cargo of one of our vessels, saw, in July, six or seven people sick of this fever on board a brig at Cape Francois bound for our port...A vessel from Cape Francois, which arrived here in July, lost several of her people with this fever, on her passage...The vessels in which those persons arrived, and which were infected with the effluvia of the sick and dead, came freely to our wharves, and particularly to that very one where the disorder made its first appearance...Persons sick of the yellow fever have been landed in our city from vessels arrived from the West Indies.<sup>22</sup>

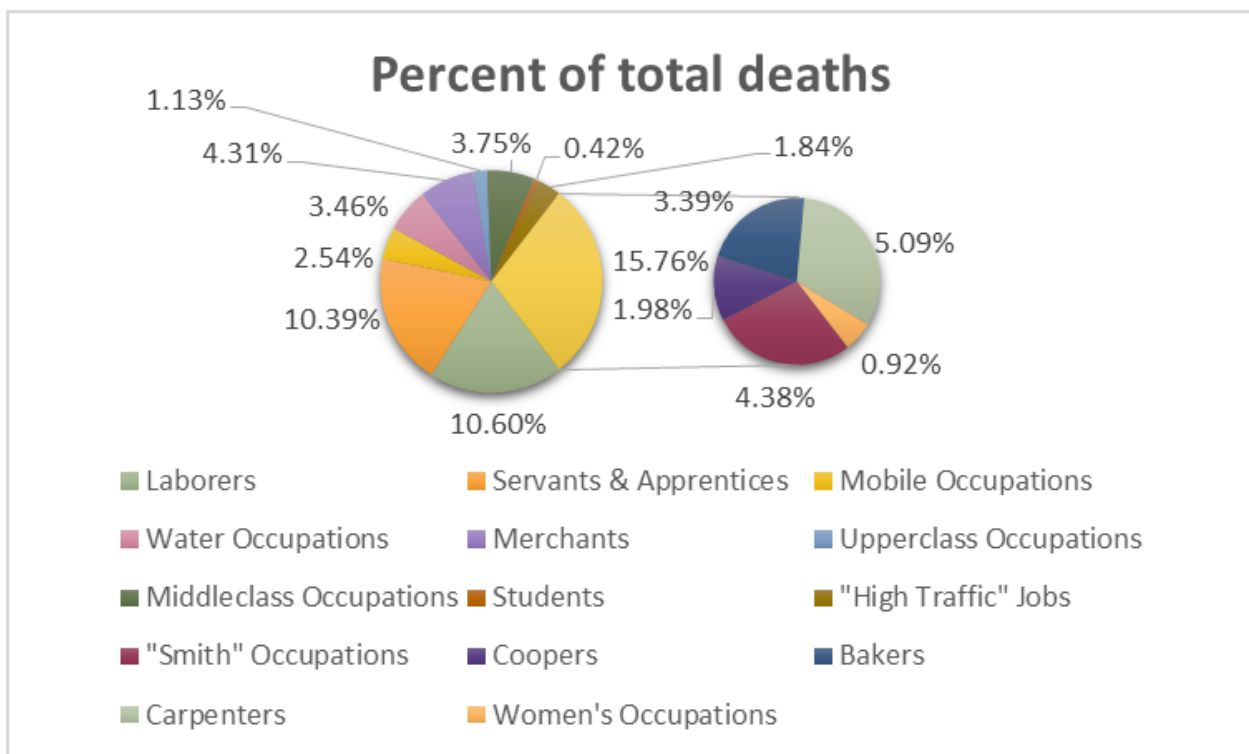


Table 1. The percent of deaths by occupation according to Carey’s list in his *A Short Account*. These numbers were taken from those that included an occupation. Those listed without an occupation have not been included. Carey, *A Short Account of the Malignant Fever, 4th Ed.* Graph by Alyssa Peterson.

It can be seen, however, that while Carey points to a theory of importation, the actual causes of the disease, even immediately following the epidemic, were not well understood. Not only were people

<sup>20</sup> Powell, *Bring Out Your Dead*, 13.

<sup>21</sup> Alan M. Kraut, *Silent Travelers: Germs, Genes, and the “Immigrant Menace”* (New York, NY: BasicBooks, 1994), 26.

<sup>22</sup> Matthew Carey, *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 ed. (Philadelphia, 1794), 68–69, <https://archive.org/stream/shortaccountofma00care#page/n3/mode/2up>.

blamed for the spread of the fever, but their dirty beds, linens, and “effluvia” were also seen as sources of the disease.<sup>23</sup> Today, many historians believe that the disease was brought to Philadelphia from the West Indies by ship. Some, like Billy G. Smith, point to a specific ship (Smith believed the *Hankey*) for carrying infected mosquitos (and people) across the ocean to the city.<sup>24</sup>

The disease first manifested itself in a boardinghouse down by Philadelphia’s wharves, which housed numerous boarders from different backgrounds. First, a seaman died. Then an Englishman. Then an Irish boarder and the managers of the boardinghouse expired, followed closely by a French sailor.<sup>25</sup> Doctors were called, but could find no cure and residents continued to die. One doctor finally consulted Rush, who declared the disease to be yellow fever.<sup>26</sup> As soon it was named, those who could leave the city did. Almost a third to a half of the city’s population left, with the number of residents dropping from roughly 51,200 before the outbreak to 31,600 during.<sup>27</sup>

The lower classes were hit the hardest. Most could not afford to leave the city, and had nowhere to go if they could. They lived in the dirtier and crowded parts of town, where most of the streets were unpaved and full of muddy holes, perfect breeding grounds for mosquitos.<sup>28</sup> The city’s working class were also more likely to become infected because their jobs caused them to travel to the wharves and pothole-ridden side streets that supported mosquitos. Of all the recorded deaths in Carey’s *A Short Account of Malignant Fever*, twenty-seven percent were those of lower class job status, like laborers, apprentices, servants, watermen, carters, and all the men who worked on ships at the wharves (Table 1).<sup>29</sup> Compared to the overall makeup of the job market in Philadelphia at the time, yellow fever hit these groups in disproportionate numbers. For instance, between 1789 and 1798, laborers made up less than seven percent of the occupational organization of the city, yet they accounted for more than ten percent of the deaths in Carey’s account.<sup>30</sup> Carey however only lists the names of 1,415 who died. Other estimates of total deaths vary from 3,293 to 5,019. If we believe Carey’s list is a reasonable representation of those who died, then it is possible that 889 to 1,355 people who died during the epidemic, or twenty-seven percent of the dead, were from the lower class and who had more “mobile” vocations.<sup>31</sup> These are more than likely low numbers, based on the lack of information and reporting of those in the poorer areas and classes, which would be the same group who would have more “mobile” jobs. Thus, it is apparent that those in the lower classes suffered much more than the upper classes of Philadelphia.

During the epidemic, business and commerce in the city came to a standstill. There were too few merchants and workers either in the city or willing to work, and the majority of traders stayed away for fear of the infection.<sup>32</sup> The lack of business not only meant a paucity of jobs for many lower class men, but also a shortage of common needs. As Rush wrote to his wife during the outbreak: “the sick suffer from the want not only of physicians, bleeders, nurses, and friends, but from the want of the common necessaries of life.”<sup>33</sup>

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<sup>23</sup> Ibid.

<sup>24</sup> Smith, *Ship of Death*, 167.

<sup>25</sup> Ibid., 188.

<sup>26</sup> Powell, *Bring Out Your Dead*, 8–9.

<sup>27</sup> Jacquelyn Miller, “The Wages of Blackness: African American Workers and the Meanings of Race during Philadelphia’s 1793 Yellow Fever Epidemic,” *The Pennsylvania Magazine of History and Biography* 129, no. 2 (April 2005): 171.

<sup>28</sup> Powell, *Bring Out Your Dead*, vi; Finger, *The Contagious City*, 72.

<sup>29</sup> Carey, *A Short Account of the Malignant Fever*, 4th Ed., 121–163.

<sup>30</sup> Smith, *The “Lower Sort,”* 214.

<sup>31</sup> From Carey’s death list I have classified the following occupations as “mobile” are: laborer, servant, apprentice, carters, ferrymen, coachmen, watermen, curriers, seamen, ships carpenters, ships joiners, anchorsmiths, sailmakers, fishermen, shipwrights, naval officers, and sea captains.. Carey, *A Short Account of the Malignant Fever*, 4th Ed., 121–163.

<sup>32</sup> Russell Frank Weigley, Nicholas B. Wainwright, and Edwin Wolf, eds., *Philadelphia: A 300 Year History*, 1st ed (New York: W.W. Norton, 1982), 185.

<sup>33</sup> Butterfield, *Letters of Benjamin Rush*, II:681.

City operations also came to a halt for a time. Those in charge of the business of the city, such as magistrates, councilmen, and judges, fled or fell ill. Constables and night watchmen failed to show up for work. Street cleaning stopped and those carting the dead started to dwindle in number. Even most of the men in charge of the city's poor relief, the Guardians of the Poor, fled the city.<sup>34</sup> The federal government also halted many operations, with men from departments like the Treasury and the Customs Service either falling ill or fleeing. Mail delivery stopped and was only available for daily pick-up during much shortened hours.<sup>35</sup> As a response to this shut down, the mayor of Philadelphia issued an address to the public requesting help in running the city and caring for those affected by yellow fever. The men who volunteered formed the Committee on Malignant Fever, who took charge of city safety, creating a hospital for the poor, forming an orphanage to care for children left behind by the death of their parents, and handing out relief to those in need.<sup>36</sup> This committee helped Philadelphia through the end of the epidemic and restored a sense of order during a time of chaos.

The deaths due to yellow fever began to decline as fall arrived. In the first week of November, the city saw its first night of frost, which would have killed any remaining mosquitos and put the larva into hibernation. Yellow fever proved no exception to the general understanding of the time that autumnal fevers slowly disappeared when it turned cold.<sup>37</sup> The majority of deaths after the last week of October were of those who had earlier caught the fever and “were mostly of those long sick.”<sup>38</sup> Shortly after the first frost those who had fled the city at the beginning of the outbreak began to return.

Despite everything that was done by doctors, nurses, or committees during the epidemic, deaths continued throughout the summer and fall, until the first frost. There has been a large range of death tolls. Record keeping broke down during the epidemic, and a combination of underreporting, numbers that include non-yellow fever deaths, and those who died after leaving the city make precise numbers hard to obtain from available records. Contemporary counts from the time range from the Committee on Malignant Fever's total of 3,293 to 5,019 recorded by the Christ Church.<sup>39</sup> Some crude death rates range between 64 and 98 per thousand people (or six to ten percent) to one in ten of the population.<sup>40</sup> These deaths, however, were confined to Philadelphia and those who had been in the city during the outbreak.

#### Section IV: Movement, Quarantines, and Geographical Limitations

Yellow fever was spread through the movement of people. During the summer of 1793 French refugees flooded into Philadelphia. Those who arrived mentioned that the fever “ravaged” the West Indies.<sup>41</sup> Even so, contemporaries who believed the disease to be imported still disagreed as to its origin. Benjamin Franklin Bache, owner of the *General Advertiser*, believed that it came from the Caribbean. Others, like Mathew Carey, in the beginning believed that the disease came from other regions, like Ireland.<sup>42</sup> Today, it is believed that ships from the West Indies did indeed bring yellow fever to Philadelphia.

Once in Philadelphia, yellow fever quickly spread throughout the city. A key element to the fever's spread was the movement of people, especially water carriers. Obtaining and maintaining sufficient

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<sup>34</sup> Smith, *Ship of Death*, 203.

<sup>35</sup> Ibid., 209.

<sup>36</sup> Powell, *Bring Out Your Dead*, 151–153, 194–197.

<sup>37</sup> Carey, *A Short Account of the Malignant Fever*, 4th Ed., 64–65.

<sup>38</sup> Ibid., 64.

<sup>39</sup> Klepp, “The Magnitude of the 1793 Yellow Fever Epidemic,” 166.

<sup>40</sup> Ibid.; Smith, *Ship of Death*, 212.

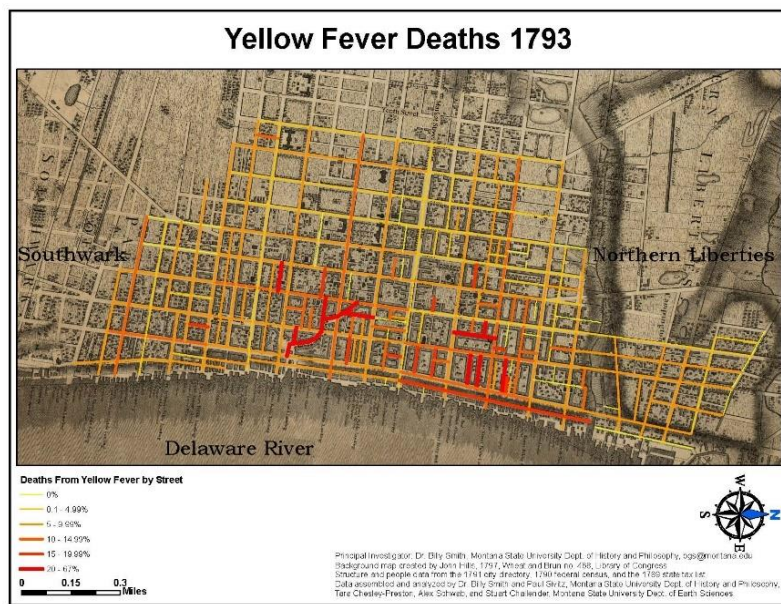
<sup>41</sup> Powell, *Bring Out Your Dead*, 4.

<sup>42</sup> Kraut, *Silent Travelers*, 27.

supplies of fresh water was a challenge for the residents of many North American colonial cities. Whether located along brackish waters, such as the James and Hudson Rivers, or being set aside fresh water rivers, during the eighteenth-century many North American cities had difficulty providing sufficient drinking water to their ever-increasing populace. Often merchants employed slaves or servants to fetch drinking water from springs. The result was that the sight of men carrying barrels of fresh water was a common sight on North American city streets in the eighteenth-century.

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Philadelphia was normally well known for having multiple water sources, including fountains and wells, around the city.<sup>44</sup> However, the summer of 1793 was unusually hot and dry and “[t]he city’s...wells fell below pump level. Residents carted water from the river to fill barrels and cisterns next to their homes.”<sup>45</sup> People collected water from the river (where the ships carrying infected mosquitos were docked) in barrels, ideal breeding homes for mosquitos. They then carried these barrels throughout the city to deposit into other barrels and cisterns. Those who transported the



Map 1. Movement of yellow fever through Philadelphia, with darker colors equating to higher death rates. Map produced by Billy G. Smith and Paul Sivitz, Montana State University.

<http://philadelphiaencyclopedia.org/archive/yellow-fever/>.

epidemic was the implementation of quarantines. Quarantines can positively affect public health. However, depending on how a disease is spread quarantines can also be ineffective and costly with the significant loss of commercial trade and a resulting loss of public confidence in health officials. Because medicine, the science of disease, and understanding how diseases were spread were still in their infancy in 1793, the quarantine was the only measure contemporaries knew to use, despite its often complete ineffectiveness.

water literally carried the disease throughout the city. Once in a single barrel, the mosquitoes have a flight radius of roughly no further than 400 meters, which is more than enough distance to fly to and lay eggs in neighboring cisterns that would have been around that summer.<sup>46</sup> Because the *Aedes aegypti* has a short flying range, the mosquitoes did not spread through the city on their own. They were carried about Philadelphia by people. By keeping containers of stagnant water and carrying these barrels throughout the city residents unwittingly fostered and spread the disease.

The primary action taken by both Philadelphia and surrounding cities to attempt to halt the spread of the yellow fever

<sup>43</sup> Jill LePore, *New York Burning: Liberty, Slavery, and Conspiracy in Eighteenth-Century Manhattan* (New York: Random House, 2005), 133-147.

<sup>44</sup> Gerard T. Koeppl, *Water for Gotham: A History* (Princeton, N.J: Princeton University Press, 2000), 27.

<sup>45</sup> Smith, *Ship of Death*, 191.

<sup>46</sup> John Robert McNeill, *Mosquito Empires: Ecology and War in the Greater Caribbean, 1620 - 1914* (New York: Cambridge University Press, 2010).

The idea of quarantines in 1793 were not new. New England had used them for nearly a century. Boston started using inspections and quarantines of ships in 1700. Charles Town, Maryland, New York, New York, and Halifax, Nova Scotia began using the same tools in 1712.<sup>47</sup> In 1784, New York reenacted their quarantine laws and founded Bedloe’s Island, an isolated island in New York harbor, as a quarantine station.<sup>48</sup> Philadelphia had experience with quarantines as well, although their history in the city ebbed and flowed depending on the circumstances at the time. In 1700, after a yellow fever outbreak, Pennsylvania was the first colony to require ships with immigrants to be inspected.<sup>49</sup> Then, twenty years later, additional laws were passed to “more effectively prevent ‘sickly vessels...from discharging their goods or passengers.’”<sup>50</sup> Two decades later, in 1741, following another yellow fever outbreak, the suggestion for a lazaretto (a quarantine station) was put forward.<sup>51</sup> Despite having quarantine laws on the books, Philadelphia seemed to ignore them after some time had passed, only to be reminded again why such laws were first put in place.

During the epidemic in 1793, Philadelphia once again imposed a quarantine. The state legislature, in a hurry to leave the city at the beginning of the outbreak, did not even stop to correct old language from previous laws. Instead, “Someone unearthed the old quarantine act, copied most of it, and introduced it as a bill ‘to prevent infectious disease being brought into the province.’” The process was done in such a hurry that the measure failed to reflect the change of Pennsylvania from a ‘province’ to a ‘commonwealth.’ Rushed through, the measure was quickly sent to Governor

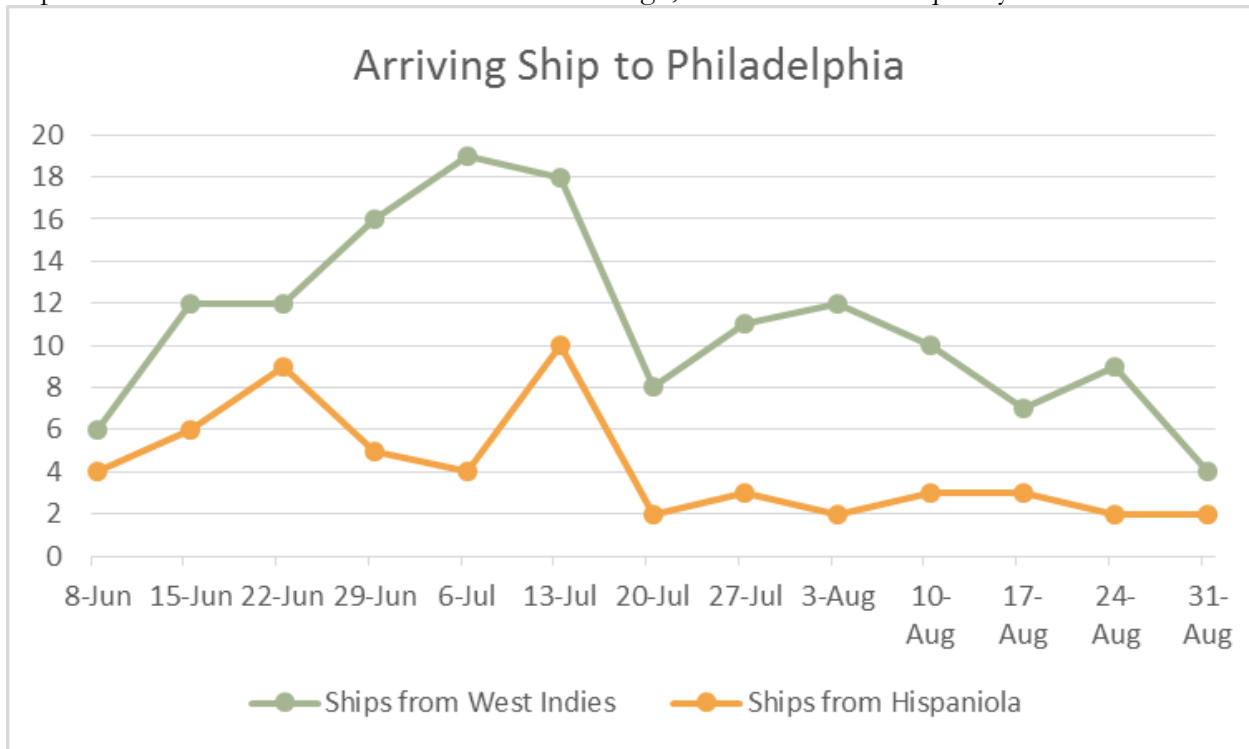


Table 2. Graph showing arrival of ships from the West Indies, as well as those from the island of Hispaniola. With the arrival of numerous ships, it is hard to point to a single ship as the cause of the epidemic. *General Advertiser*, Google Newspaper Archives, <http://news.google.com/newspapers?nid=U073gGq-K-4C>. Graph by Alyssa Peterson.

<sup>47</sup> Finger, *The Contagious City*, 36.

<sup>48</sup> Kraut, *Silent Travelers*, 24.

<sup>49</sup> Estes and Smith, *A Melancholy Scene of Devastation*, 159.

<sup>50</sup> Finger, *The Contagious City*, 37.

<sup>51</sup> Smith, *The “Lower Sort,”* 46.



Mifflin for signature, received back, and implemented immediately.<sup>52</sup> The law required that the Health Officer of the Port inspect any ship arriving from the West Indies. They were to stop at Mud Island, the unofficial lazaretto, until given a clean bill of health.<sup>53</sup> Sick passengers were detained until deemed healthy. Goods and cargo, though, were seen as being just as contagious as a sick person. Often, “healthy” passengers were allowed to disembark while the cargo at Mud Island remained to be disinfected. These passengers could then become ill in the city or could have been bitten by mosquitoes while in Philadelphia and then transmit infection to others. Quarantine, then, became ineffective.

Other cities surrounding Philadelphia also imposed quarantines in 1793. They were imposed as a type of default mechanism when city officials were unsure of what other actions to take. Based on misunderstandings of the disease, quarantines cut Philadelphians off on both land and water. Albany, New York, kept a gunboat on the river to prevent ships from Philadelphia from landing. Authorities in Baltimore, Trenton, and New York forbid communication with the capitol.<sup>54</sup> Maryland imposed a forty day quarantine on ships from Philadelphia, as well as requiring a passing certificate of health if they wanted to stay in the city. Militia was sent from Baltimore to the main road to prevent Philadelphians from entering.<sup>55</sup> A majority of the states imposed a quarantine of some kind: Virginia, Massachusetts, Rhode Island, North Carolina, South Carolina, and Georgia all required a quarantine of two weeks or more.<sup>56</sup>

All the quarantines in 1793 imposed failed to restrain or stop the yellow fever epidemic based on their reason for implementation. They did so because they focused on the movement of people and goods, not on the breeding and movement of *Aedes aegypti*. All cities, including Philadelphia, wanted to prevent the spread of a disease they saw as contagious and spread from person to person. The idea that yellow fever spread by insects was not known until 1900. Scientific knowledge in 1793 lacked the foresight into the true cause. Cities had a limited number of options at the time and a limit to what could be done to protect the public health. Quarantine was the fall back when an illness broke out. There were, however, some preventative measures that were known at the time that could have been effective if used properly. For instance, in 1774, Dr. James Lind of the British Royal Navy published a book instructing Navy seamen in the proper use of fumigation in order to disinfect British ships.<sup>57</sup> Fumigation would have at least killed the adult mosquitoes onboard any incoming vessel, preventing the further laying of eggs.<sup>58</sup> It was also known, to a select few it seemed, how to control the insect population that laid eggs in the water barrels, as an instructional advertisement in a Philadelphia newspaper at the beginning of the summer directed residents to pour a thin layer of oil on top the water in the barrels to prevent insects from breeding.<sup>59</sup> There were, then, other known ways of combating an outbreak of a disease like yellow fever. So why did cities continue to institute quarantines instead of implementing these more effective measures? Scientific thought at this time emphasized miasma and “bad air,” which they believed could be contagious. The idea that a disease could be spread by insects would have seemed outlandish to scientific men at that time, and the enactment of methods to stop the spread of mosquitoes would

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<sup>52</sup> Powell, *Bring Out Your Dead*, 71.

<sup>53</sup> *Ibid.*, 72.

<sup>54</sup> Mulford Stough, “The Yellow Fever in Philadelphia 1793,” *Pennsylvania History* 6, no. 1 (January 1939): 11.

<sup>55</sup> Carey, *A Short Account of the Malignant Fever*, 4th Ed., 52.

<sup>56</sup> *Ibid.*, 50–58.

<sup>57</sup> James Lind, *An Essay on the Most Effectual Means of Preserving the Health of Seamen in the Royal Navy. and A Dissertation on the Fevers and Infection* (London: Strand, 1774).

<sup>58</sup> Samantha Chapman, “Mosquito ‘Fogging’ Will Not Harm You, Reminds WHO and Solomon Islands Ministry of Health,” *World Health Organization: Western Pacific Region*, May 2, 2014, <http://www.wpro.who.int/southpacific/mediacentre/releases/2014/mosquito-fogging/en/>.

<sup>59</sup> Powell, *Bring Out Your Dead*, 71.

have been seen as a waste of resources. Additionally, less than twenty years after the revolutionary war it is possible that a bias against anything British, such as Lind's book on fumigation, continued. As a result, American cities instead continued the tradition of quarantine despite its ineffectiveness.

Yellow fever, despite the precautions taken by Philadelphia, was most likely brought to the city by a ship from the West Indies. In *Ship of Death: A Voyage that Changed the Atlantic World*, Billy G. Smith argues that it was a single ship, the *Hankey*, which brought the disease to Philadelphia. In *Ship of Death: A Voyage that Changed the Atlantic World*, he follows the path of the *Hankey* from England to the African island of Boloma, to French Guiana (present day Guyana), to the West Indies and, finally, to Philadelphia, before returning to England and being burned at her moorings. His whole argument rests upon the *Hankey* picking up a strain of yellow fever in Boloma, carrying it to the West Indies (where the *Hankey*'s arrival coincides with the beginning of an outbreak there) and carrying it further on to Philadelphia. Smith contends that the outbreak in 1793 was started because of sick passengers and infected water caskets aboard the *Hankey* alone: "The *Hankey* docked in Philadelphia for only a week – long enough to disembark sick refugees from Saint-Domingue, try to find a cargo, and trade empty water casks and jugs for full ones on the pier. Virus-carrying *Aedes aegypti* and their eggs traveled in or flew alongside the containers."<sup>60</sup>

Smith's assumption may have been well founded since at the time of the Haitian slave revolt, and of the *Hankey*'s landing, there was a major outbreak of yellow fever on the islands. Because British forces were on the island attempting to subdue the revolt, there was a constant supply of non-immune persons, allowing the fever to thrive and spread. From 1793 to 1798, when the British finally withdrew, 15,000 men, or nearly two-thirds of the soldiers who had fought, had died from yellow fever and not battle.<sup>61</sup> Some units lost eighty percent of their troops to the disease alone.<sup>62</sup> With yellow fever rampant among the Caribbean islands, it would be easy for a vessel leaving to pick up infected mosquitoes in the water casks, infected persons, or both. A long voyage on an isolated ship would give mosquitoes ample time to infect the whole crew. The revolt that occurred in 1793 did not break the strong economic ties that existed between Philadelphia and Haiti. Even after violence broke out, American merchants continued to sail to the island. The trade in sugar, molasses, and coffee that existed was worth the sustained relationship amid the violence and ships continued to sail and return to Philadelphia in great numbers.<sup>63</sup> The problem with Smith's theory is not his argument that the disease was brought by ship from the West Indies, but rather his specificity in pointing to the *Hankey* as the single source of the yellow fever epidemic. With the increased traffic from the West Indies shown above (Table 2), it would be impossible to conclude that a single ship was responsible. During the month of July of that year, fifty-nine ships docked in Philadelphia after returning from the West Indies, including ships like the *Betsy*, which made three trips down to the islands that month.<sup>64</sup> Even contemporaries were unable to single out a ship for blame. As Mathew Carey observed, "This disorder has most unquestionably been imported from the West Indies. As yet, however, owing to various obvious reasons, it is difficult to fix, with absolute precision, on the vessel or vessels (for it is very probably it came in several, from the different infected islands) by which it was introduced."<sup>65</sup> It is much more likely that many of the ships leaving from the island around the same time also picked up infected water jugs for their voyages, as well as infected persons. The flurry of transport to and from the West Indies during that time meant that multiple

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<sup>60</sup> Smith, *Ship of Death*, 187.

<sup>61</sup> *Ibid.*, 183.

<sup>62</sup> Thomas O. Ott, *The Haitian Revolution, 1789-1804*, [1st ed (Knoxville): University of Tennessee Press, 1973], 92.

<sup>63</sup> James Alexander Dun, "What Avenues of Commerce, Will You, Americans, Not Explore?: Commercial Philadelphia's Vantage onto the Early Haitian Revolution," *The William and Mary Quarterly* 62, no. 3 (July 2005): 476.

<sup>64</sup> All information from Google Newspaper archives of the *General Advertiser*, June to August 1793 issues. Accessed 20 October 2014. <http://news.google.com/newspapers?nid=U073gGq-K-4C>.

<sup>65</sup> Carey, *A Short Account of the Malignant Fever, 4th Ed.*, 67.

ships brought boatloads of people to Philadelphia and landed at roughly the same time. In July and August of 1793, around the time of the Haitian revolution, nine ships docked multiple times from trips back and forth from the West Indies. The *Betsy* arrived in Philadelphia on July 2<sup>nd</sup> from Cape Francois, and returned five more times before the end of August from varying ports, including Virginia, St. Bartholemew, St. Marks, Martinique, and St. Eustatia. In July alone, the *Eliza* returned from Cape Francois twice and a trip from St. Croix. The frequency with which ships traveled to and from the West Indies and Haiti did not slow down during the unrest. The number of new ships from the same area, however, far outnumbered these regular trading vessels, with sixty-eight ships docking in Philadelphia only once during the summer.<sup>66</sup> Any of these ships, or passengers, could have been the first to bring the disease to shore.

The movement of people brought the disease to Philadelphia. Fear of the illness led to the city issuing a quarantine on incoming ships as a preventative measure. Once on land, however, it was not quarantines that prevented the spread of yellow fever. Instead, there were geographical and ecological limits that prevented the disease from spreading outside of the Philadelphia area.

The availability of water in the city was something normally found in abundance. Most houses had their own wells and public pumps were accessible to passersby.<sup>67</sup> The summer of 1793 was a particularly dry one, which led to most of the wells falling below pump level. The need for water cisterns and water transportation was of sudden importance to the city's residents, and led to ideal conditions for mosquitoes. These dry conditions, however, were only a cause of concern for Philadelphia. Surrounding cities obtained their water from different sources, including the Delaware River and other streams. Because of this lack of dependence, other surrounding towns did not need to transport water from the Philadelphia area, keeping the fever from being spread beyond the capital by movement of contaminated water barrels. With only a small range of flight, the only way mosquitoes (and yellow fever) would have reached neighboring towns like Wilmington, Burlington, Trenton, and Salem would have been to physically transport them. Refugees from Philadelphia flooded into Wilmington at the beginning of the epidemic. Despite the large number of Philadelphians entering Wilmington, the Delaware city did not experience an outbreak of yellow fever. "Philadelphians by the hundreds flocked there, houses were jammed, rents rose to the sky."<sup>68</sup> Despite this incursion of Philadelphians, because only people arrived and not infected water sources, Wilmington remained healthy. In fact, of the eight or ten Philadelphians who died in Wilmington from yellow fever, only one was sent to the hospital. "The others were nursed and attended in the houses where they fell sick."<sup>69</sup> Therefore, geographically the surrounding towns were far enough apart to prevent the spread of the disease. Ecologically, these towns had the ability to obtain their own fresh water, eliminating the need to transport infected water from Philadelphia. These limitations are what prevented yellow fever from running rampant across North America, not the imposed quarantines or restriction of movement.

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<sup>66</sup> *General Advertiser*, Google Newspaper archives. Accessed 20 Oct 2014. <http://news.google.com/newspapers?nid=U073gGq-K-4C>.

<sup>67</sup> Weigley, Wainwright, and Wolf, *Philadelphia*, 69.

<sup>68</sup> Powell, *Bring Out Your Dead*, 244.

<sup>69</sup> Carey, *A Short Account of the Malignant Fever*, 4th Ed., 59.

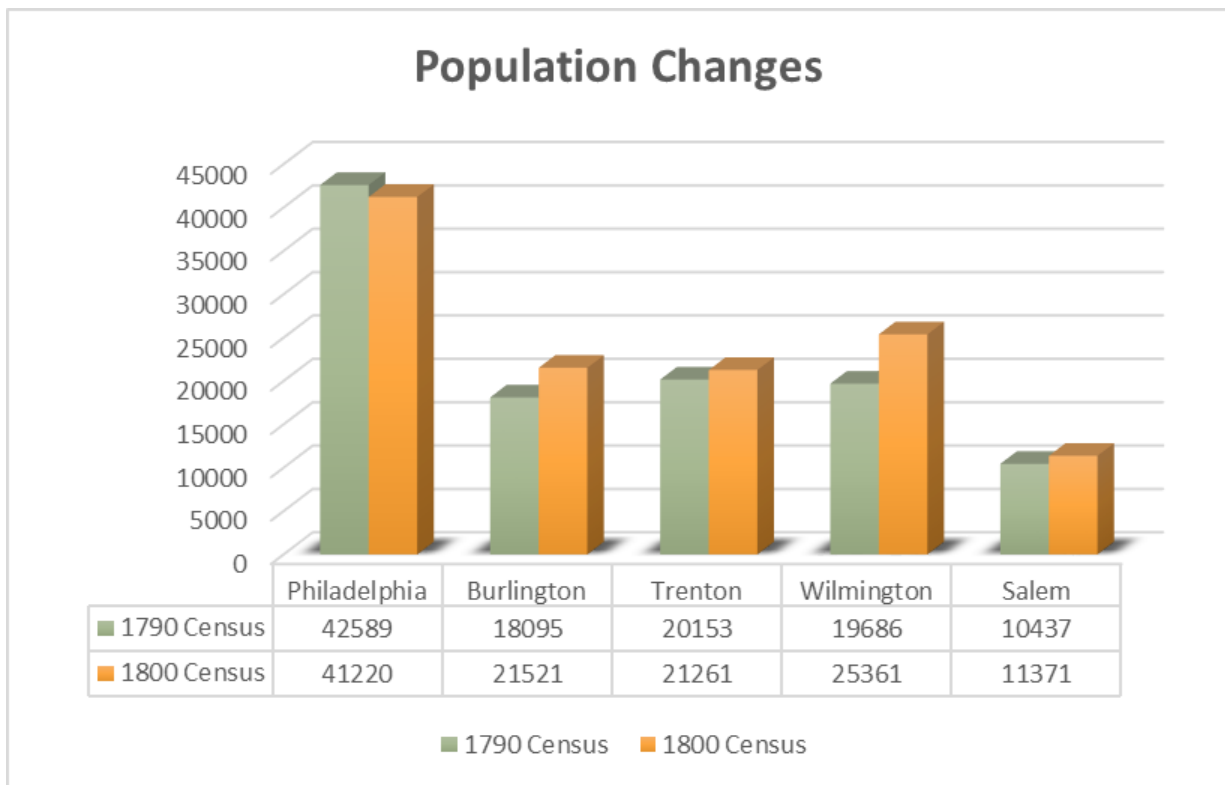


Table 3. Graph of population change between federal censuses. The population in Philadelphia dropped by 3.21%, while the other towns increased by at least 5.5%, some as much as 28.8% as seen in Wilmington. “Census of Population and Housing,” *United States Census Bureau*, <http://www.census.gov/prod/www/decennial.html>. Graph by Alyssa Peterson.

Such a large epidemic led to the movement of people as well. Despite the constant influx of immigrants, the population of Philadelphia declined in the 1790s. In 1790, the first federal census showed Philadelphia to be United States’ largest city with 42,500 people. The surrounding towns of Burlington, Trenton, and Salem, and Wilmington were used for comparison. These towns were close to Philadelphia while still being outside the metropolis and having similar conveniences. Between the 1790 and 1800 federal censuses, the populations of the surrounding towns increased (Table 3). Philadelphia’s population, however, decreased during this time. Philadelphia around this time was one of the greatest trading ports in America. Due to its location both on the water and within the country, it became a popular port for agricultural goods. And because of its system of ranking imported flour, Philadelphia became known as the “Mart of America,” only surpassed by London and Liverpool in terms of the amount of trade flowing through the port.<sup>70</sup> With such a lively port and a constant flow of immigrants, why then would Philadelphia’s population decrease in the ten years between the censuses? One reason could be that these surrounding towns were less swampy than Philadelphia and had access to their own water supply, keeping them healthier than the capitol city. Between 1790 and 1800, yellow fever broke out five different times, along with normal seasonal

<sup>70</sup> Arthur L. Jensen, “The Inspection of Exports in Colonial Pennsylvania,” *PMB&H*, 78:3 (July 1954), 275-297; Thomas M. Doerflinger, *A Vigorous Spirit of Enterprise: Merchants and Economic Development in Revolutionary Philadelphia* (New York, 1986), 70-135; Louis Jensen, *The Maritime Commerce of Colonial Philadelphia* (Madison, WI, 1963), 5; James G. Lydon, “Fish and Flour for Gold: Southern Europe and the Colonial American Balance of Payments,” *The Business Review* 39:2 (Summer 1965), 171-183; Answers of Lt. Gov. to Board of Trade’s Queries, Mar. 15, 1731, TNA CO 5/1268, ff. 99, 100-102; James Read to Edward Shippen, 1771, quoted in John Flexer Walzer, “Transportation in the Philadelphia Trading Area, 1740-1775” (Ph. D. diss., University of Wisconsin, 1968), front piece.

diseases like malaria.<sup>71</sup> The lack of stagnant water, like the swamps and dirty streets around Philadelphia, meant that other cities did not have a natural mosquito habitat that would support diseases like yellow fever and malaria. It would not be hard to imagine families moving to surrounding towns to escape the yearly onslaught of disease. An illness brought by the movement of people ultimately led to more movement.

In the years immediately prior to 1793, yellow fever outbreaks were limited in New England, with roughly only one or two deaths per year. In 1790, Massachusetts saw one death, New York had one death in 1791, and New Jersey saw two in 1792.<sup>72</sup> After the outbreak in Philadelphia, yellow fever became embedded in the local mosquito population and was much more frequent, especially among coastal trading towns. It would also have been easy for an infected person to move throughout the area during a year that did not see a large epidemic and therefore did not have quarantine measures in effect. The continual cycle of mosquito to human to mosquito is what allowed the disease to eventually spread around the area, despite the natural limitations discussed above. In 1794, New Haven, Connecticut, saw a large outbreak, with at least forty-seven recorded deaths. Similar smaller outbreaks occurred in Newtown, Connecticut and Manchester, Massachusetts that same year. The year 1795 saw a small reappearance in Philadelphia and New York, but with very few deaths. Newburyport, Massachusetts, had a small outbreak in 1796, along with another resurgence of the disease occurring in Philadelphia.<sup>73</sup> The movement of people, especially to these towns either centered on trade or on a trade route, spread the disease further through New England after 1793.

#### Section V: Yellow Fever's Impact upon Government and Public Health

During the outbreak the government shut down. The shutdown affected both the local and federal government, and resulted in confusion and a lack of services.<sup>74</sup> During the epidemic, the lack of communication and misunderstanding about the disease caused everything from delayed supplies for the army to missed correspondence and accounts by the federal government. Secretary of War Henry Knox delayed the shipment of uniforms for the US Army because they had been stored in Philadelphia. Only after some time and consultation with a physician was it determined that the uniforms were likely unaffected, but were aired out, just in case.<sup>75</sup> The outbreak not only affected those within the city and surrounding areas, but those who had any possible connection to the city.

When men fled at the beginning of the summer, many government workers and officials left as well. President Washington “had no one to inform him or bring him reports, none to advise or confer with him.”<sup>76</sup> Along with this lack of personnel to assist President Washington, the paucity of federal officials resulted in “ridiculous confusion, with clerks and secretaries scattered all over the country; the President was receiving letters that should have gone to underlings. And no one seemed

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<sup>71</sup> Powell, *Bring Out Your Dead*, 302–303.

<sup>72</sup> Information from newspaper articles at the New York Family History's Early American Newspaper Database (<http://newyorkfamilyhistory.org/research-discover/elibrary/early-american-newspapers-series-i>). Yellow fever at this time was commonly called the “putrid fever,” and death notices listing this as the cause were taken to mean yellow fever.

<sup>73</sup> All information from New York Family History's Early American Newspapers database (<http://newyorkfamilyhistory.org/research-discover/elibrary/early-american-newspapers-series-i>).

<sup>74</sup> The local government came to a standstill after men fled or fell ill and the mayor was forced to call on citizens to form a committee, as discussed above. The committee continued to function as a form of government until November, when enough men had returned to the city and to their previous jobs, although the transition was not a completely smooth one. While the local government was adversely affected during and shortly after the epidemic, there are more examples and sources of problems within the federal government at this time due to its importance to the country as a whole.

<sup>75</sup> Henry Knox, “Henry Knox to Isaac Craig,” August 30, 1793, Papers of the War Department: 1784 to 1800, <http://wardepartmentpapers.org/docimage.php?id=9123&docCollID=46562&page=2>; Samuel Hodgdon, “Samuel Hodgdon to Henry Knox,” August 31, 1793, Papers of the War Department: 1784 to 1800, <http://wardepartmentpapers.org/docimage.php?id=9143&docCollID=10034&page=2>.

<sup>76</sup> Powell, *Bring Out Your Dead*, 116.

to know where the official papers and records were.”<sup>77</sup> And until all those who fled returned to the city, the confusion would remain. As late as mid-November, Secretary Knox still had no personnel to inform him as to the happenings in the War Department. This placed him in the embarrassing circumstances of having to write to the Governor of Virginia, Henry Lee, and apologize for the unknown status of accounts in his department, stating “As the Accountant of the War department has not yet joined the department, owing to the malady in Philadelphia, I am uninformed on what account these advances have been made.”<sup>78</sup> Indeed, many federal workers who fled were dragged back to the city, as Alexander Hamilton was forced to do with several Treasury clerks in mid-October who had refused to return from New York.<sup>79</sup> The yellow fever outbreak completely disrupted the fledgling federal government.

The epidemic also impacted public health and its infrastructure after the outbreak had ended. Despite what seemed to have occurred during the summer of 1793, public health laws had been in place since at least 1789, when the city’s charter gave the council the ability “to enact ‘such and so many laws, ordinances, regulations and constitutions...as shall be necessary and convenient for the government and welfare of the city.’”<sup>80</sup> But, similar with quarantines, the laws and ordinances only seemed to have been enacted during or immediately after an epidemic, and were otherwise ignored by the general population.

Following the 1793 epidemic Philadelphia continued to rely on quarantine as their primary means of defense. However, instead of implementing a quarantine after an outbreak occurred, the city decided to take preventative measures and require, from May to October, all ships coming from the West Indies undergo a thirty day quarantine (minus the time spent at sea).<sup>81</sup> The city also began work on a permanent lazaretto on State Island, ten miles south of the city on the Delaware River. It occupied 10 acres and included living quarters, kitchens, stables, and a large hospital.<sup>82</sup> The complex, which officially opened in 1801, became a required stopping point for all ships planning to dock in Philadelphia.<sup>83</sup> While possibly a good strategy against communicable diseases like smallpox or consumption (tuberculosis), quarantines like this were still ineffective when guarding against yellow fever. Despite what the city had just experienced, little scientific knowledge was gained as a result of the 1793 epidemic and quarantines still remained most American cities’ primary defense mechanism against yellow fever.

There were, however, some positive changes to the public health infrastructure following the 1793 epidemic. Cleanliness of the city began to be taken into account. Many believed that epidemics were “somehow related to the poor physical state of the city” and in 1794 the city council “devised a long-term plan for ‘better cleaning the streets.’”<sup>84</sup> On this subject, the city council was partly right. While they believed more in the sickening miasma and effluvia due to poor conditions, the poor condition of many of the streets did help support the epidemic: potholes and pools of stagnant water in the poorly kept streets made ideal breeding areas for mosquitoes. By cleaning and improving the streets, the city could help cut back on the number of future insects and possibly reduce the number infected during a later epidemic.

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<sup>77</sup> Ibid., 278.

<sup>78</sup> Henry Knox, “Henry Knox to Henry Lee,” November 9, 1793, Papers of the War Department: 1784 to 1800, <http://wardepartmentpapers.org/docimage.php?id=9366&docCollID=10314&page=3>.

<sup>79</sup> Ron Chernow, *Alexander Hamilton* (New York: Penguin Press, 2004), 452.

<sup>80</sup> Finger, *The Contagious City*, 109.

<sup>81</sup> Ibid., 142.

<sup>82</sup> Kraut, *Silent Travelers*, 30.

<sup>83</sup> Lance Eisenhower, “Lazaretto,” *The Encyclopedia of Greater Philadelphia*, 2009, <http://philadelphiaencyclopedia.org/archive/lazaretto/>.

<sup>84</sup> Michal McMahon, “Beyond Therapeutics: Technology and the Question of Public Health in Late-Eighteenth-Century Philadelphia,” in *A Melancholy Scene of Devastation: The Public Response to the 1793 Philadelphia Yellow Fever Epidemic* (Philadelphia: College of Physicians of Philadelphia and the Library Company of Philadelphia, 1997), 101.

The city also employed a more active approach to public health. At first, the Committee on Malignant Fever that had helped Philadelphia through the epidemic was converted into the Committee of Health. It was their job, until March of 1794, to adopt “measures [that would] totally...destroy any such infection Matter.”<sup>85</sup> Shortly thereafter, the city’s medical and political leaders formed a Board of Health, who was “responsible for coordinating emergency responses as well as a long-term strategy for preventing future outbreaks.” It was the Board’s job to collect reports on the state of the health of their own port, as well as other trading ports Philadelphia ships might come into contact with. They also enacted new sanitary regulations.<sup>86</sup> The Board took a proactive role in identifying possible outbreaks. Board members talked to colleges and monitored conditions at jailhouses, almshouses, and dispensaries. They paid informers and talked to ship captains. They ordered boardinghouses to report any illness. If illness was found, they traced the traveler’s route to determine the illness’ origin.<sup>87</sup> In these ways, the city did improve its response to illness despite its dependence on antiquated measures like quarantines.

The history of the 1793 yellow fever outbreak is a history of public health and its failures. It also demonstrates how much the movement of people can affect a disease. Had people not been moving and traveling, either between the West Indies and Philadelphia or between different parts of the city itself, the disease would have had a very small range on a very small island or in a section of the city. But people do move, as do the diseases they carry. And while yellow fever was certainly a horrible and deadly disease for the city and a great public health concern, the natural limitations of the disease prevented it from become a regional or even nation-wide epidemic. The movement of men can only do so much. The transport of mosquitoes was closely connected to the transportation of water. The transportation of water, in this case, was limited to the Philadelphia area. Consequently, the limit of the natural infrastructure, not quarantines, stopped the spread and limited the disease to a finite area. With the current debate on quarantines and its link to modern diseases like Ebola, it is important to remember that quarantines should be based on scientific facts and evidence, not used as a defense mechanism out of fear. Quarantines used out of fear, as we have seen, are normally ineffective. One needs to understand the science behind the disease to fully recognize protective measures that should be put in place. Ebola, like yellow fever, is also limited by the infrastructure surrounding it, namely present day hospital sanitation methods, the immediacy of communication, and scientific understanding. These structures make a mass outbreak unlikely. Even today, the movement of people continue to spread disease but, like yellow fever in 1793, structural limitations, not the restriction of movement, are what prevent any further dispersion.

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<sup>85</sup> Ibid.

<sup>86</sup> Finger, *The Contagious City*, 127.

<sup>87</sup> Ibid., 128.