IMPORTED OR LOCALLY SOURCED: PHILADELPHIA'S 1793 YELLOW FEVER EPIDEMIC AND THE MEDICAL MEN WHO FOUGHT TO UNDERSTAND IT.

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Preface

The inspiration for this work originated from an interest in the history of medicine and the introduction to the history of Philadelphia's Lazaretto. Delving into the works written on Philadelphia and yellow fever something seemed to be missing from the doctor's arguments both during and after the 1793 epidemic. This thesis was researched so as to understand the manner in which the doctors of Philadelphia used their knowledge and published evidence to support or disabuse theories that were presented during the time period.

ABSTRACT OF THE THESIS

IMPORTED OR LOCALLY SOURCED: PHILADELPHIA'S 1793 YELLOW FEVER EPIDEMIC AND THE MEDICAL MEN WHO FOUGHT TO UNDERSTAND IT.

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In 1793, Philadelphia experienced a deadly attack brought on by an invisible enemy, yellow fever. The epidemic pushed the medical community to the breaking point trying to understand the disease's origin. Leading members of the College of Physicians believed that the contagion was passed from person to person spreading throughout the city. On the other side of the argument, a small group of medical men believed that the contagion was produced by the foul smells that were emitted by putrefied vegetable matters.

Using medical pamphlets published during and after the 1793 yellow fever epidemic, this work demonstrates that both observation and source materials were key to defending both theories. This production of materials proved that a questioning nature as well as adequate skills existed in the fledgling United States, promoting its own take on medical theory and practice for the benefit of future students in the field of medicine.

Keywords:
Philadelphia, Yellow Fever, William Currie, Benjamin Rush, Jean Deveze, germ theory, localism, contagionism,

Name of Investigator: Elizabeth Root Date: 4/25/2018

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Introduction:

The study of disease, as well as the history of medicine, requires questions and answers. Without one you could not have the other. Questions and answers push the boundaries of what mankind knows about the physical world surrounding all people. In the case of the yellow fever epidemic in 1793 Philadelphia, such a pattern of inquiry and response pushed the limits of germ theory from within the United States, rather than waiting on the medical minds seated in the universities of the British Isles. Floating amongst these queries was the already established understanding that yellow fever hailed from a much warmer and humid environment, such as was present in the islands of the West Indies. In what way did a tropical fever manage to make its way northward before settling on the nation's capital? Not only how, but why was a tropical disease able to decimate a northern port with such ferocity as was the case in 1793? With questions, with hypotheses, and with the use of properly documented sources, medical practice and theory in early America moved forward. Without understanding how Philadelphia's men of science and medicine developed their theories about the scourge, truly understanding the argument on how a disease propagates throughout cities would continue to be mired in simple sentences that condenses detailed arguments down to one or two lines. While true that all doctors cannot agree, this adage leaves much to be desired as to how these learned men interpreted what they were seeing, what they were reading, and answer the question: What causes yellow fever?

Peer reviewed articles allow for the medical professionals of the time, along with modern historians, a chance to compare arguments, means of interpretation of evidence, and finally the validity of the authors argument. This important step called for the researcher to, not only develop their theories, but also to subject them to scrutiny from their fellow peers.

The debate about yellow fever's cause and origin is one example of early peer review within the American medical institutions. Relying mainly on observation from sick patients, condition of the environment, as well as previously published material provided by fellow medical peers, doctors residing in Philadelphia during the 1793 epidemic worked to alleviate the suffering of their fellow man while at the same time questioning the reigning germ and miasma theories of the period. This war of words based on observation and printed documents demonstrated how variations of medical theory were formed, but it also portrays an episode of American history that encouraged the American medical community to break away from European medical institutions and develop their own ideas about germs, fevers, and other aspects of the medical world.[1]

Context:

The city of Philadelphia, by 1793, was the result of staggered structural planning and uneven growth into the Pennsylvania environs. Historian Simon Finger describes this sudden growth of a city out of the rural environment as "a self-perpetuating pattern of haphazard and uneven growth that defied Penn's plan for orderly settlement." Commerce at the waterfront afforded merchants and private citizens the chance to inhabit an area within walking distance

1 A Note on Sources:

Both Dr. Benjamin Rush, localism theorist, and Dr. William Currie, contagionism supporter, used a vast array of sources when researching and presenting their theories on yellow fever. In some cases, citation material has been provided for the benefit of the modern reader, while at other times these particular doctors only referenced their sources on a last name basis. No other information besides the doctor's name and supposed input on the question at hand was provided has caused the contribution of these men to be withheld in this work. At other times, sources are letters written to Rush and Currie; these have been included in their published works, respectively, or were made available to their fellow doctors at the time of the publication of their research. Actual spelling and capitalization has been used for all direct quotes, no changes have been made to correct spelling or grammar.

of many shops and markets, while at the same time sections of Philadelphia still remained rough and uncut. This uneven growth between a newly constructed port and the wilds of the Pennsylvania woods was made all the worse by a general lack of sanitation. Citizens were just as likely to dump their garbage into the street, same as the butchers who lived down the way. This uneven growth around the burgeoning port in combination with the general dirtiness of the local citizenry created the perfect environment for the spread of disease amongst the people of Philadelphia.[2]

Similar situations had occurred in port cities of the West Indies as well as along the southern coast of the United States. According to J.R. McNeill, the colonial New World's "quest for wealth and power changed ecologies…ecological changes in turn shaped the fortunes of empire, war, and revolution."[3] In Philadelphia's case, the quest for wealth came from the desire of enhancing its port system at the detriment of leaving the outskirts of the town in a poorer state. Rapid construction of docks, shipyards, and market places did not take into account what might result were water and filth accumulation allowed to occur. Just as had happened in the West Indies, this lack of understanding resulted in various assaults upon the city by fevers that seemed to attack after the arrival of various ships to its ports.[4] But the arrival of foreign ships was not the only part of the equation needed to create the perfect environment for fever to spread amongst the people.

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[2] Simon Finger, *The Contagious City: The Politics of Public Health in Early Philadelphia* (Ithaca: Cornell University Press, 2012) 29 - 32.

[3] J.R. McNeill, *Mosquito Empires: Ecology and War In the Greater Caribbean, 1620 - 1914* (New York: Cambridge University Press, 2010) 2.

[4] Finger, *The Contagious City,* 34 - 38.

Environmental changes to the city of Philadelphia, and its surrounding environs, lead to the propagation and spread of the yellow fever virus. During the spring of 1793, heavy rains had swollen Dock Creek and the Delaware River causing them to spill over their respective banks. This period of heavy rain was followed by an unusually long period, during the summer, in which the climate became very hot and dry. As a result of this swift climate change, the banks of the Delaware River, along with Dock Creek, quickly became a morass of bogs and marshes. This extreme heat also led to the drying up of Philadelphia's water pumps, causing citizens to travel to these marshy creeks and rivers to fill up buckets with water for use at home. This boggy marsh along with standing water throughout the city was the perfect environment for vectors of yellow fever to live and thrive.[5]

In congruence with the rapid climate changes to the area, an influx of fleeing refugees from the island of Saint Domingue arrived at Philadelphia's ports, supposedly, discharging sickened persons into the city. Prior to 1793, Saint Domingue was a thriving plantation community in the West Indies complete with multiple port cities in which goods were loaded onto ships and sailed to ports throughout the Atlantic Ocean including Philadelphia. And while the native inhabitants, along with the permanent residents, of Saint Domingue developed some immunity to the local diseases, incoming persons from outside the West Indies were less likely to escape unscathed by the tropical diseases. Epidemics broke out on numerous occasions, but died down as many a person who survived became less likely to contract the disease a second time. Incoming sailors, soldiers, fresh slaves, and European travelers were the perfect hosts to contract and spread yellow fever past the islands borders.

[5] Billy G. Smith, *Ship of Death: A Voyage That Changed the Atlantic* World (New Haven: Yale University Press, 2013), 191.

By the 1790s, due to the Haitian Revolution, a massive influx of French soldiers arrived on Saint Domingue and quickly succumbed to the local tropical diseases, including yellow fever.[6]

The violence and destruction wrought by the Haitian Revolution led many a French citizen to flee the shores of Saint Domingue. For these people the loss of property compounded with being crammed into ship holds with French soldiers sick with yellow fever, was one of the many trials they were going to have to suffer through.[7] Brought on board of ships such as the *Hankey,* these refugees sailed throughout the Atlantic world seeking out ports that were willing to take in these wretched creatures of circumstance. One port of calling that had become more popular amongst the French was Philadelphia. Ships carrying the refugees docked at this port discharging numerous travelers to recoup within the city limits.[8]

Not long after the arrival of the refugees from Saint Domingue in early August, 1793, yellow fever began to make its presence known to the Philadelphia community. Amongst the citizens residing on Water Street in Philadelphia, symptoms of weakness, chills and a dull pain were first reported in early August. Members of the medical community, including College of Physicians co-founder Dr. Benjamin Rush, were soon on the move throughout the city, visiting patients and struggling to treat the diseased. As the days passed, symptoms began to worsen. "Frequent vomiting of matter resembling coffee grounds in colour and

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[6] McNeill, *Mosquito Empires,* 1.

[7] McNeill, *Mosquito Empire,* 242 - 243.

[8] J. M. Powell, *Bring Out Your Dead: The Great Plague of Yellow Fever in Philadelphia in 1793* (Philadelphia: University of Pennsylvania Press, 1993) 4.

consistence…together with cadaverous appearance of the countenance…deep yellow or leaden colour of the skin and nails,"[9] were signs that the fever was progressing and the prognosis was grim. Not long after these particular symptoms would the patient pass away from the fever.[10]

As yellow fever continued to grow and spread throughout the city of Philadelphia, the activities of the city ground to a halt. In late August "began the removals from the city…that almost every hour in the day, carts, waggons, coachees, and chairs, were to be seen transporting families and furniture to the country in every direction," noted Philadelphia printer Mathew Carey.[11] Houses were closed up or left in the hands of servants to care for until such time as the owners of the property could return. Word of Philadelphia's Yellow Fever epidemic was carried into the countryside with the fleeing families of Philadelphia, where they may have been "hunted up like felons in some — and debarred admittance and turned back in others, whether sound or infected."[12] Many in the federal government, including George Washington, withdrew from the city due to the rapid spread of yellow fever, leaving behind a small amount of staff to keep the fledgling government apprised of the situation. Those in the government who remained in the city turned to the medical

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[9] William Currie, *A description of the malignant, infectious fever prevailing at present in Philadelphia; with an account of the means to prevent infection, and the remedies and method of treatment, which have been found most successful* (Philadelphia: Thomas Dobson, 1793) 5.

[10] Powell, *Bring Out Your Dead,* 9 - 11.

[11] Mathew 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* (Philadelphia: Mathew Carey) 21.

[12] Mathew Carey, *A short account of the malignant fever,* 54.

community for answers: What was this deadly plague? How could it be prevented from returning to Philadelphia?[13]

Yellow fever began to die down in mid-October, thanks in part to the cold snap that affected the area. By November and December, several thousand people had perished from yellow fever before the frost put a stop to new cases by the new year.[14]

A consequence of this epidemic, Philadelphia struggled to reestablish itself as a major port along the Atlantic Ocean. "Business then became extremely dull…the streets wore the appearance of gloom and melancholy," Carey described.[15] Ships from foreign ports, upon learning of the outbreak, refused to stop at Philadelphia, instead traveling to New York or Baltimore. Fear of yellow fever forced many ports to prohibit ships arriving from Philadelphia to enter their docks. In areas such as Alexandria and Baltimore, incoming ships were quarantined their cargos and crews inspected for signs of yellow fever.[16] The city of Philadelphia needed to prevent such an outbreak from reoccurring in the future.

However, discussions about the cause of the epidemic resulted in a fracturing of this group of medical professionals into factions. Both sides disagreed about what they thought the fever was, where it came from, and how to stop it from coming back. This debate challenged the accepted theory of the medical community and led to the formation of the Academy of Science in the city of Philadelphia. Taking up the contagion argument, co-founder of the College of Physicians Dr. William Currie of Philadelphia became a figurehead

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[13] Mulford Stough, "The Yellow Fever in Philadelphia 1793," *Pennsylvania History: A Journal of Mid-Atlantic Studies* 6, no. 1 (1939): 6 - 7.

[14] Stough, "The Yellow Fever in Philadelphia," 12 - 13.

[15] Mathew Carey, *A short account of the malignant fever,* 21.

[16] Powell, *Bring Out Your Dead,* 223.

for the "contagionist" group[17]. Dr. Currie, who was born in Pennsylvania, was the son of an Episcopal clergyman. Currie earned his medical knowledge through an apprenticeship with Dr. Kearsley, before accepting a tenure during the Revolutionary War as an army surgeon.[18] A firm believer in University of Edinburgh's professor Dr. Cullen and his classification system on fever, Currie believed that all fevers were not the same and that they were divided based on symptoms presented by the patient. By the time of the 1793 epidemic, Dr. Currie was a practicing medical doctor in Philadelphia. Dr. Currie was not a teacher or professor at the local medical school nor did he involve himself in matters of politics, his only asset was that he proved quite capable of researching and presenting his findings in a structured and cogent matter. He did not have a support system made up of students and fellow doctors, but in some way Dr. Currie's work held up the practice of contagion theory while at the same time venturing to posit a change that demonstrated that there was more to the question than originally asked. [19]

Not every member of the College of Physicians believed as did Dr. Currie — one particular Doctor felt that Dr. Cullen's classification was flawed. This rebellious Doctor was Benjamin Rush. Born the son of a gunsmith near Philadelphia, Rush was formally educated in boarding schools, attending Princeton University before apprenticing himself to Dr. John Redman of Philadelphia. While studying medicine under Dr. Redman in Philadelphia,

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[17] For this work I define these terms as: Contagionist - a person who believed that a particular disease, i.e., yellow fever, was spread from person to person; Localist / Miasmatist - a person who believed that disease was propagated by local sources of rotting materials, i.e., rotting coffee. Miasma - a vaporous exhalation formerly believed to cause disease; Contagion - the transmission of a disease by direct or indirect contact

[18] Thomas Apel, *Feverish Bodies, Enlightened Minds: Science and the Yellow Fever Controversy in the Early American Republic* (Stanford: Stanford University Press, 2016) 13.

[19] Powell, *Bring Out Your Dead,* 37.

Benjamin Rush met William Shippen and John Morgan through a lecture series. These gentlemen of medicine encouraged Rush to continue his studies abroad in Edinburgh. It is at Edinburgh that Rush studied under the prominent Dr. William Cullen, which resulted in Rush receiving his medical degree. His time spent abroad opened Rush's mind "and subsequently came to suspect 'error in every thing I had been taught.'"[20] Returning to Philadelphia, Rush accepted a position as Professor of Chemistry at the College of Philadelphia. It was from this position that Dr. Rush began to create his own system of classification for disease, one that influenced his understanding on the origination of fevers.

Dr. Benjamin Rush desired to rewrite the Cullenian theory on fevers and create his own classification system for disease and fever: in his view all fevers were one and the same, and came from one cause. Everyone breathed the same air which, ergo, meant that the causative factor for fever had to reside somewhere in the atmosphere. Philadelphia's air and atmosphere had been changing lately. Although he could not scientifically prove how, he nonetheless attributed that change to a shift in the landscape in and around Philadelphia. Rush linked the clearing of Pennsylvania's forests with the increased filth accumulating throughout Philadelphia and it was this, he argued, that was causing the occurrence of fever to increase, threatening the local population.[21] Rush was firmly convinced that the fever was locally caused and in the case of the 1793 epidemic, it was caused by "a quantity of damaged coffee…exposed at a time and in a situation which favoured its putrefaction…should

[20] William L. Hedges, "Benjamin Rush, Charles Brockden Brown, and the American Plague Year," *Early American Literature* 7, no. 3 (1973), 300.

[21] Powell, *Bring Out Your Dead,* 38 - 39.

produce…a violent fever."[22] His radical theory flew in the face of the contagionists who believed that the 1793 fever epidemic had been imported from foreign ports.

But it is how Dr. William Currie and Dr. Benjamin Rush came to their understandings about the nature of fever, including yellow fever, that has been overlooked by modern historians. Delving into the collected published works of both Dr. Rush and Dr. Currie, one can see the means by which these medical professionals combined several elements in order to answer questions in regard to yellow fever's spread through Philadelphia. Combining the classification system developed by Dr. William Cullen of Edinburgh with the detailed accounts of medical men in the West Indies and the Southern United States, along with their own firsthand experiences during the 1793 yellow fever outbreak, these doctors strove to understand just how a tropical epidemic made its way into the northern ports of the United States. Medical theory on germs and fevers would have stopped with Dr. Cullen's classification system had someone not questioned whether some aspect of the argument had been overlooked. The use of observation and published materials by medical researchers evolved medical theories and practice from those of European institutions, like the University of Edinburgh, into a theory that was questioned and answered by a burgeoning medical community in the new republic of America.

An Evolving Argument: Origination and Causation of Yellow Fever:

For an argument to evolve, an original theory must be established which has been firmly researched and accepted by the medical community. A "germ theory" had been

[22] Benjamin Rush, *An account of the bilious remitting yellow fever, as it appeared in the city of Philadelphia, in the year 1793* (Philadelphia: Thomas Dobson, 1794) 153 - 154.

established by European medical professionals in such institutions as the University of Edinburgh so that by the eighteenth century, Dr. William Cullen's theory on germs and fevers had articulated a classification system that separated the various diseases and fevers into appropriate categories based on "different appearances in the number and diversity of their symptoms," much like that which is still utilized today.[23] Cullen's taxonomy of ills gave a clear demarcation of the various diseases and allowed for their sorting into neat groups; these helped the medical practitioner, or researcher, to differentiate between diseases during outbreaks. Dr. Cullen, however, was not entirely uncompromising when it came to the understanding of disease, arguing that "there are certain circumstances common to all the diseases comprehended under this order…to investigate these especially, it is our business." In essence, Cullen admitted the possibility of reclassifying diseases into different groups as research was continued by members of the medical community.[24] Cullen's theory, while a well researched work at the time, was left vague for the medical community so new theories could be developed to furthering the understanding of disease by the medical profession.

Such a development came by way of Doctor Currie's first published work on the yellow fever epidemic in Philadelphia, along with its point of origin and possible treatments, circulated out of a local print shop a few weeks after the first reported case of yellow fever. His *Description of the Malignant, Infectious Fever Prevailing At Present in Philadelphia,* sought to enlighten the frightened people of Philadelphia with a quick and accurate portrayal of the epidemic, possible methods of treatment, and a basic understanding of how the fever spread. At the time this "Malignant, Infectious Fever" had not yet been diagnosed as yellow

[23] William Cullen, *First Lines of the Practice of Physic* (Philadelphia: Steiner and Cist, 1781) 6.

[24] Cullen, *First Lines of the Practice of Physic,* 6.

fever, instead being labeled as a malignant fever. At this time, most malignant fevers were classified as autumnal intermittent fevers, but this particular outbreak presented symptoms different from the annual arrival of fever in the fall. For the moment, Currie's only goal was to distinguish this particular fever from other "species or form of fever."[25] It was within this work that Currie, not only, reiterated the theory of contagion when concerning fevers, but also began to posit new theories on an outside influence that seemed to assist the deadly disease.

For contagionist Dr.William Currie, this malignant, infectious fever laid out the question of not only how the disease was spread, but in what ways the surrounding atmosphere of the city of Philadelphia affected the lethality of the disease. He never truly questioned the infectious nature of the fever, arguing that it "arises from, and is produced by specific contagion, and may be communicated from those laboring under the disease, to persons in the most perfect state of health."[26] Such communication typically occurred by enclosing the sick in small, stuffy apartments with their caretakers, along with physical contact with the sick person, their clothes, and even coming into contact with the nurses who cared for the afflicted. Comparing the enclosed apartments of the sick with that of sealed tombs, Dr. Currie noted that, "the putrid noxious effluvia confined in tombs and vaults (than which few things are more suddenly fatal to life) has been rendered perfectly innocent by the copious admixture of vital air."[27] Thus Currie posited that clean air was needed to purify the noxious vapors of Philadelphia and render certain diseases harmless to its people. Currie put

[25] William Currie, *A description of the malignant, infectious fever,* 3.

[26] Currie, *A description of the malignant, infectious fever*, 6.

[27] Currie, *A description of the malignant, infectious fever,* 13.

forward for consideration the role of clean air and the condition of the atmosphere with regard to an epidemic's contagious qualities, though Currie, in this particular work, stopped short of discussing at length the role of importation regarding the malignant fever. Instead he chose to discuss previous fever epidemics that struck Philadelphia, creating a foundation upon which he could continue building his arguments on the specifics of yellow fever.[28] Dr. Currie's later publications would discuss, in greater detail, importation's role with regard to the yellow fever epidemic.

Despite the lack of time to conduct research during this period — Currie later claimed he saw a hundred patients a day — Currie did make it known that he, in fact, had on hand authentic documents from two previous periods of Philadelphia history, in which it was asserted the malignant fever had been imported into the city rather than created in its streets. Currie stated that a malignant fever was brought into the city in 1740, the origin of the contagion "was supposed to be introduced by means of a quantity of clothing brought in a trunk from Barbadoes," the left over goods from a gentleman who had died upon the island.[29] Using the current President of the College of Physicians, Dr. John Redman's research notes, Currie noted that the 1762 malignant fever epidemic was to have been brought into the city by an afflicted mariner. Said mariner had arrived to the Ports in a sickened state, after his arrival from Havana, from which the illness spread to tenants of the lodging-house where he resided before continuing on to the Philadelphia community. Using documents from more current epidemics rather than referencing past epidemics from hundreds of years ago, Currie's argument had a better chance stand up to the scrutiny of his medical peers, some of

[28] Currie, *A description of the malignant, infectious fever,* 6-7.

[29] Currie, *A description of the malignant, infectious fever,* 31.

whom might have been present during the previous epidemics. Currie's first pamphlet regarding the malignant fever thus featured three important theories on the 1793 fever: (1) that the fever was spread from person to person; (2) that the condition of the surrounding atmosphere had a role in assisting the disease; (3) and that similar past epidemics seemingly occurred after the arrival of sick people or goods from the West Indies.[30] This series of fever theories that Currie published, made up the foundational beliefs for those medical professionals that modern historians know as contagionists.

It was not until Dr. William Currie's third publication that he advanced his well-researched, and deeply sourced, arguments on the atmosphere's role in the epidemic of 1793. Published in 1794, Currie's "A Treatise on the Synochus Icteroides, or yellow fever," was in many ways an improvement over his previous work on the malignant fever: in it he included more sources and comments on modes of treatment, along with recognizing that the epidemic was caused by yellow fever. It was in this work that Currie advanced his evidence with regard to the atmosphere's influence over the spread of yellow fever. For "there is no disease on which the influence of climate and season is so conspicuous as on Yellow Fever," Dr. Currie stated. Currie realized that yellow fever was a disease common to the West Indies, and that by researching the works of medical professionals in this area, he might get a better understanding as to why yellow fever appeared in Philadelphia. Discussing Dr. Lind's work in the West Indies, Dr. Lining's work in Charleston, Matthew Carey's observations of Philadelphia, as well as including Dr. Russel's and Dr. Sydenham's observations on plague, Currie questioned why yellow fever only seemed to affect the people and mariners of the port

[30] Currie, *A description of the malignant, infectious fever,* 31 - 32.

cities, hospitals, and waiting ships in the West Indies, but the native inhabitants in the countryside managed to escape the fever epidemic. He also sought to understand how a tropical disease managed to propagate within a northern port city in the United States. His foray into the published works of these medical professionals living in the tropics was to determine the nature of yellow fever in their respective areas. It was in this line of questioning that Currie identified an anomaly in the nature of the fever that allowed the disease to survive and flourish in the European and American ports.[31]

For an understanding of the atmosphere's role in assisting a contagious epidemic, Currie relied on several doctor's published works. These authorities of fever argued that atmospheric conditions needed to contain different variables in order to create a perfect situation for a fever, like yellow fever, to invade and flourish; these variables included the level of heat produced in the environment and its role in causing fatigue of the human body. But the heat produced in the tropics was rarely felt in the cities of the northern United States and as such, could not cause a human body to weaken enough for the fever to take hold. To account for this inconsistency, Currie argued that the design of American cities, "with close built streets, when the heat of the weather is equal to, or exceeds that of, tropical climates," helped to recreate the atmospheric conditions needed to propagate yellow fever. This excess of heat worked to weaken the human body by preventing the clean, pure air needed from entering the body. According to Currie and his sources, clean air needed by the human body was further tainted by the putrefaction of dead animals and rotten vegetables, the presence of

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[31] William Currie, *A treatise on the synochus icteroides, or yellow fever; as it lately appeared in the city of Philadelphia. Exhibiting a concise view of its rise, progress and symptoms, together with the method of treatment found most successful; also remarks on the nature of its contagion, and directions for preventing the introduction of the same malady, in future* (Philadelphia: Thomas Dobson, 1794) 61 - 66.

moist soil along the rivers and creeks, exhaust produced by burning fuel, and the exhalations of individuals closeted away in small apartments.[32] Add in the arriving French ships from the West Indies, who carried sick and dying refugees, and a perfect environment was created for the spread of yellow fever amongst the people of American cities, Philadelphia included.

William Currie's argument that a specific type of atmosphere was needed in order to weaken the body and promote an infectious contagion was well founded upon the writings of several doctors who had witnessed first hand the horrors that an epidemic could bring down upon the people of a large city or port. His use of Dr. Lind from the West Indies, Dr. Lining of Charlestown, and Dr. Sydenham in Aleppo, along with other published material, demonstrated for his readers that his theories were based on first hand accounts, interpreted in such a way as to support the well accepted theory that certain diseases were not only passed from person to person, but also that such a disease was assisted by the dank and dirty cities they infested[33]. Enclosed streets, piles of rotting materials, and the exhalations of the sick and dying were the perfect breeding ground for a virulent strain of fever, such as yellow fever, once introduced into the environment. But while Dr. Currie made an interesting foray into the theory of germ causation, he still worked within the accepted taxonomy of Dr. Cullen's classification of diseases and fevers. He did not have to convince all his fellow

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[32] Currie, *A treatise on the synochus icteroides,* 61 - 71.

[33] See Colin Chisholm, *An essay on the malignant pestilential fever introduced into the West Indian Islands from Boulam* (Philadelphia: Thomas Dobson, 1799); George Cleghorn, *Observations of the Epidemical Diseases of Minorca From the Year 1744 to 1749* (Philadelphia: Fry and Kammerer, 1809); James Lind *An essay on diseases incidental to Europeans in hot climates* (London: J. Murray, 1768); Charles Lining, *A Description of the American Yellow Fever, Which Prevailed At Charleston, in South Carolina, in the Year 1748* (Philadelphia: Thomas Dobson, 1799); John Pringle, *Observations on the diseases of the army, in camp and garrison* (London: A. Millar, 1752); Alexander Russell, *The Natural History of Aleppo, Containing a Description of the City…Together with an Account of the Climate, Inhabitants, and Diseases* (London: G.G.J. and J. Robinson, 1794); John Swan, *Dr. Thomas Sydenham, Newly Made English from the Originals: History of Acute and Chronic Diseases* (London: F. Newbery, 1769).

medical professionals of much more than the role clean air had upon the human constitution. His fellow member of the College of Physicians and germ theory opponent, Dr. Benjamin Rush, needed his research to prove two different aspects of his theory in regard to the yellow fever epidemic.

Dr. Benjamin Rush has been described as curious and questioning by nature, but biographer Alyn Brodsky stated that Dr. William Cullen encouraged his students to question everything, in a lecture he stated that, "if a student can think for himself, and every one believes that he can, he will no sooner have learned a particular system than he will be disposed to differ from it;…He will, therefore, wish to view matters in different lights."[34] It is quite possible that Rush had been inspired by his mentor's words to deviate from the standard classification system of fever. By delving into Dr. Cullens, *First Lines*, modern historians can see that there is a section in which Cullen discussed the possibility that two different types of continued fevers might in fact be of the same class. "We are disposed to believe, that the Synochus arises from the same causes as the Typhus, and is therefore only a variety of it," he admitted.[35] Cullen, in this short section, left the door wide open for his students to formulate the idea that all fevers are one and the same. The idea of Dr. Cullen having outright stated that it was the free-thinker who was to continue the process of developing new theories on germs is quite different then has been specified by other historians of this time period. The possibility of a radical new theory, vehemently challenged what had already been widely accepted by most of the medical community and it had been started by Dr. Cullen himself.

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[34] Alyn Brodsky, *Benjamin Rush: Patriot and Physician* (New York: Truman Talley Books, 2004) 49.

[35] Cullen, *First Lines of the Practice of Physick,* 30.

With his new theory of an individual fever, Dr. Rush, who read many of the same sources that Dr. William Currie used in his work, re-interpreted them in such a way as to support his theories and arguments on the origination of Yellow Fever in Philadelphia. Both during and after the yellow fever epidemic of 1793, Dr. Benjamin Rush published two different pamphlets where he discussed his theories on the origin and causation of the epidemic. His 1793 work, *An enquiry into the origin of the late epidemic fever in Philadelphia,* along with his 1794 work, *An account of the bilious yellow fever,* were his attempts to use his research in order to support the theory of local causes influence on yellow fever. The first pamphlet was more of a published letter to Dr. Redman of the College of Physicians, where he listed his reasons as to the cause of yellow fever. While Rush's second work continued his from his discussion with Dr. Redman and included newer sections based on his work with patients, including his preferred treatment of the patient along with specific details of the fevers effects upon different parts of the human system. By far, these works are much more detailed and a detailed look at the role that putrid exhalations, or miasma, had in facilitating the late yellow fever epidemic[36].

Dr. Benjamin Rush, by the time of the 1793 yellow fever epidemic, was committed to his theory about a singular fever that was responsible for most epidemics, but the strength of the fever depended on outside forces, created by living in filthy cities, upon a person's constitution. This radical theory regarding the classification of fever allowed for Dr. Rush to include sources within his work that would not have been used by other members of the medical community, especially those works that discussed epidemics during ancient periods

[36] See Benjamin Rush, *An account of the bilious remitting yellow fever, as it appeared in the city of Philadelphia, in the year 1793* (Philadelphia: Thomas Dobson, 1794); Benjamin Rush, *An enquiry into the origin of the late epidemic fever in Philadelphia: in a letter to Dr. John Redman, president of the College of Physicians, from Doctor Benjamin Rush* (Philadelphia: Matthew Carey, 1793)

of time. It also allows for the modern reader to understand why, in certain cases, Dr. Rush chose to include written works that dealt with epidemics including plague, bilious colic, and other like diseases when making arguments in his pamphlets.

It was in his work *An account of the bilious yellow fever,* that Dr. Rush discussed his theory on a single fever class, as well as the outside conditions that caused a fever to become activated within the human body. "I have long considered with Mr. Senac, a *tertian* as the only original type of all fevers. The bilious yellow fever indicated its descent from this parent disorder," Dr. Rush wrote.[37] With this statement, Dr. Rush referred back to Dr. Cullen's training that he had attended at the University of Edinburgh, thus tying his theory to that of his mentor's classification system. Dr. William Cullen explained, in his *First Lines of Physic,* that a tertian fever is a fever that experiences an interval of symptoms for about 48 hours. During this time, all symptoms subsided or disappeared completely leaving the patient feeling like they were well enough to get up and travel. However, after the 48 hours, the patient experienced the same sequence of symptoms as had previously occurred 2 days ago.[38] Dr. Rush demonstrated his experience with such a remission of symptoms by discussing the cases of several patients including the minister to the United Netherlends, Mr. Van Berkel. But he cautioned that, "many died who neglected it as a trifling disorder."[39] Exhausting the body, led to deadly consequences should the patient try to return to a regular life before the fever had entirely left the body.

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[37] Rush, *An account of the bilious remitting yellow fever,* 78.

[38] Cullen, *First Lines of the Practice of Physick,* 12.

[39] Rush, *An account of the bilious remitting yellow fever,* 78 - 79.

But where did this tertian fever arise and in what manner did it tend to activate within the body of the infected citizen? Chief among the reasons for the late epidemic spreading throughout the city of Philadelphia, Rush argued that putrid coffee was left to rot on the wharf by the ship *Amelia,* this pile of "putrefaction, and exhalation," was the point of origin for the yellow fever disease in Philadelphia.[40] Calling it foul and offensive, "the inhabitants of the houses of Water and Front Streets…were obliged in the hottest weather to exclude it, by shutting the doors and windows."[41] Such foul emanations as the sole cause of the yellow fever epidemic did not surprise the good doctor, who observed that "the records of medicine furnish instances of similar fevers being produced, by the putrefaction of many other vegetable substances."[42] The noted records included areas of the world such as Tortola, putrified potatoes, Wadham College in Oxford, disease of Cork, and even so far back as to the city of Rome, putrified Cabbage.[43] While Rush considered rotting coffee to be the main source during the 1793 epidemic, this was by no means the entirety of his argument.

Historians have speculated as to why Rush was so keen to blame fever upon the work of putrid exhalations from desiccated vegetables within the city of Philadelphia.[44] One

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[40] Powell, *Bring Out Your Dead,* 11 - 12.

[41] Benjamin Rush, *An enquiry into the origin of the late epidemic fever in Philadelphia: in a letter to Dr. John Redman, president of the College of Physicians, from Doctor Benjamin Rush* (Philadelphia: Matthew Carey, 1793) 6.

[42] Rush, *An enquiry into the origin of the late epidemic fever,* 6.

[43] Rush, *An enquiry into the origin of the late epidemic fever,* 6-7.

[44] See Thomas Apel *Feverish Bodes, Enlightened Minds: Science and the Yellow Fever* (Stanford: Stanford University Press, 2016); J.M. Powell *Bring Out Your Dead: The Great Plague of Yellow Fever in Philadelphia in 1793* (Philadelphia: University of Pennsylvania Press, 1949); Donald J. D'Elia, "Dr. Benjamin Rush and the American Medical Revolution," *Proceedings of the American Philosophical Society* 110 (1966): 227 - 234; William Hedges, "Benjamin Rush, Charles Brocken Brown, and the American Plague Year," *Early American Literature* 7 (1973): 295 - 311; Martin S. Pernick, "Politics, Parties, and Pestilence: Epidemic Yellow Fever in

historian, Simon Finger, stated that it was due to Dr. Rush's dislike of congested cities. For men such as Benjamin Rush and Thomas Jefferson, cities such as Philadelphia were considered "great cities as pestilential to the morals, the health and the liberties of man," and which would result in the increasing likelihood of deadly epidemics spreading throughout the urban areas of the United States.[45] Instead young men and women were less likely to succumb to disease from pestilence, leading healthier lives due to the cleaner air if they removed themselves from the city and cultivated the lands out west of Philadelphia.[46] Besides his discourse on urban living, letters written by Dr. Rush also discussed how his time as an army surgeon allowed him the opportunity to observe camp life during the Revolutionary War. According to a letter to his mentor Dr. Cullen, Rush detailed that, "while the British army lay in Philadelphia, they cut down the whole of that wood for fuel, in consequence of which bilious, remitting, and intermitting fevers have increased in our city in the ration of five to one compared with years before the war."[47] To Dr. Rush, here was observable proof that fever was tied to the condition of the atmosphere, rather than by the close proximity of the soldiers in the army.

According to Dr. Rush, the pile of rotten coffee was not the sole reason that yellow fever appeared to spread throughout the city with such vigor; a predisposing or exciting stimulus had to occur in order for the disease to activate. It is here where Dr. Rush's

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Philadelphia and the Rise of the First Party System," *The William and Mary Quarterly* 29 (1972): 559 - 586; Charles B. Strozier, "Medicine: Benjamin Rush, Revolutionary Doctor," *The American Scholar* 64 (1995) 415 - 421.

[45] Finger, *The Contagious City, 159.*
[46] Finger, *The Contagious City,* 159 - 160.

[47] Benjamin Rush to William Cullen, Philadelphia, December 22, 1784, in *Letters of Benjamin Rush, Vol. 1,* ed. L.H. Butterfield (Philadelphia: American Philosophical Society, 1951) 346 - 348.

deductive work comes to the fore for the readers of his book, Rush argued that when a stimulus, "was more active, it induced that species of debility which has been happily called indirect," that could be caused by, amongst other things, fatigue that occurred after a hard ride, a long walk, a fall, or in one case being stroked on the head. Other forms of excitement that triggered a contagion into action included exposure to heat or cold from the surrounding environment, intemperance of alcohol or food. In one case, Dr. Rush visited a patient who had fallen ill after eating 12 oysters for his dinner, another had succumbed after eating only 3 oysters.[48] , The various emotions that a human being experienced, including grief or fear, caused "the reverse of direct debility, which is produced by the abstraction of natural, and usual stimuli from the body," the contagion was then shocked into action against its host.[49] His deductive work allowed Dr. Rush to amass quite a list of excitable causes that triggered yellow fever which he used to caution his other patients to avoid in the future.[50] However, this list of vagaries leaves much to be desired when it comes to preventing yellow fever. How was a person to avoid these stimuli, some occurring from no more than a light touch on the head? Yet, Dr. Rush felt that by avoiding these stimuli, his patients could avoid exciting the tertian fever and live happy, healthy lives.

Philadelphia's yellow fever epidemic in 1793 allowed for a re-examination of Dr. Cullen's classification system, in which both Dr. William Currie and Dr. Benjamin Rush used their research to change the understanding of how fever spread from the docks into the city of Philadelphia. Dr. William Currie used recent work from 1740 and 1762 that described

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[48] Rush, *An account of the bilious remitting yellow fever,* 28.
[49] Rush, *An account of the bilious remitting yellow fever,* 28.

[50] Rush, *An account of the bilious remitting yellow fever,* 28 - 33.

the arrival of previous malignant fevers into Philadelphia, through contact with the infested clothing of a deceased individual or through the exhalations of an afflicted sailor. Along with these written works, Dr. Currie used various sources written by doctors who had treated similar cases in the West Indies and the southern states of America. Currie deduced that one common factor between the West Indies, South Carolina, and 1793 Philadelphia was the condition of the atmosphere. Increased heat created by cramped cities was comparable to the heat produced in the West Indies, where cases of yellow fever were common throughout, created the perfect condition needed for the newly introduced fever to gain a foothold and spread amongst the people of this northern city.

On the other hand, Dr. Rush used many of the same sources, but re-interpreted them using his new theory on a single fever being the root cause for all malignant fever epidemics. Instead of focusing solely on the condition of the atmosphere and / or lack of clean air, as Dr. Currie had argued, Rush stated that the atmosphere, which was infested with contagion from rotting vegetable matter, was only part of the equation. The infected atmosphere placed the contagion into a human's body, but it took a stimulus in order to activate the contagion. Now whether that stimulus was caused by damage to the body through fatigue, environmental temperatures, or sudden mood swings, Rush stated that all of his patients had been subjected to some form of stimulus just prior to their debilitation by yellow fever. But it is rare that theories are accepted without some form of counter argument by opposing parties, it is from these debates that the historian is able to understand why one theory may fall while another continues on.

War of Words: A Doctor's Rebuttal

While both Dr. Currie and Dr. Rush documented their findings with first-hand accounts and written sources from other medical practitioners of the West Indies and Europe, to leave this statement of theories would be to stop a story mid-sentence. For it is with rebuttals and defenses that medical theory is able to continue to evolve and move forward. Without these rebuttals, medicine would remain in a state of constant shifting as new ideas might be readily accepted whether they were correct or based on flawed research. A war of words occurred in which a theory continued to evolve resulting in a greater understanding in regard to the origin and cause of yellow fever in the early American republic.

Such a war of words, in the case of the 1793 yellow fever epidemic, occurred the following year in 1794. Dr. Benjamin Rush's pamphlet *An account of the bilious yellow fever,* was the opening salvo to take down the importation / contagion argument of Dr. Currie and his associates' understanding. While the start of the pamphlet gives a detailed look into the effects of the fever upon the various systems of the human body, it is further along in the book that Rush begins to unmask what he believed to be the falsehood behind the popular theory of importation and contagionism. Rush takes careful aim at many aspects of their arguments and attacks without mercy, working to destroy the medical communities belief in the importation of the yellow fever disease.

In much of his work on the bilious yellow fever, we must first remember, that Rush was working under the notion that there was but one fever and that all fevers that occurred around the world stemmed from the same parent tertian fever. In accordance with his belief that all fevers did stem from the same tertian fever, Dr. Rush also noted that in the period of time that a particularly devastating disease such as yellow fever afflicted a certain town, city, or country, all other diseases ceased to exist until the epidemic had run its course. It is his

source work that he utilizes that brings to light what one historian, Thomas Apel, has called a Thucydidean moment. Apel remarks in his book that, "history appealed to the investigator's desire to place the study of nature on a firm empirical footing."[51] To study the cycle of history was to attempt to fix mistakes that had happened to past civilizations, resulting in a disease free future for the enlightened people of the new republic. "The great fault of all our systems and books of medicine is, they prescribe for diseases by certain *names* … vary in different *stages* of the same disease," argued Rush in a letter to his friend Jeremy Belknap in 1791, "the last variation has been too little attended to, and hence the source of many disputes among physicians."[52] This type of idea is what helped Dr. Rush to solidify the foundation of his argument that only one fever could occur at one time. Rush reached back to the work of Thucydides in order to demonstrate that during times of plague, "the plague chased all other diseases from Athens, or obliged them to change their nature, by assuming some of its symptoms."[53] The works of Dr. Sydenham and Dr. Hodges plus the published works regarding the plague in Grand Cairo and Constantinople are added to the section as further proof that no other disease could endure during a stronger epidemic.[54] For Dr. Rush and his supporters of miasma, it seemed that he had sufficiently demonstrated, not only, that there was only one fever but that the stronger strain of fever had chased away all other diseases that had previously inhabited the cities.

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[51] Apel, *Feverish Bodies, Enlightened Minds,* 37.

[52] Benjamin Rush to Jeremy Belknap, Philadelphia, June 6, 1791, in *Letters of Benjamin Rush, Vol. 1*, ed. L.H. Butterfield (Philadelphia: American Philosophical Society, 1951) 582 - 584.

[53] Rush, *An account of the bilious remitting yellow fever,* 85.

[54] Rush, *An account of the bilious remitting yellow fever,* 86.

There is a benefit for modern historians in regard to the use of hindsight. In today's world most people know that there is not one individual fever but many different types and strains of fever. Common sense in today's world also proved that while the rapid epidemics did manage to take quite a few lives, delving into research sources demonstrates that other diseases were still prevalent during the span of a particular epidemic. Modern research published within the past several years by Dr. Suzanne M. Shultz and Dr. A. Hoover, have delved into the task of differentiating the diseases that were still prevalent during the 1793 Yellow Fever epidemic. Comparing the symptoms of Malaria, Yellow Fever, Leptospirosis, Dengue, and Hepatitis, these modern doctors make the logical argument that "the colonials relied chiefly upon observance of symptoms to differentiate among diseases…but many febrile illnesses presented with identical and quite non-specific…symptoms."[55] This alone makes it easier to understand why Dr. Rush believed the theory of one specific fever that chased away all other diseases at the time.

But in the late eighteenth century, the work of analyzing source materials to repute and rework theories into a more cogent system of understanding was one of the ways in which doctors were able to understand what type of disease they might be dealing with. Dr. Currie did not accept the theory that there was only one fever present during the 1793 epidemic, instead investing his time in researching many of the same sources that Dr. Rush utilized to deduce what he believed to be the true nature and cause of the late epidemic. Currie's strongest evidence against the idea of one fever existing at a time was presented in his treatise on the Synochus Icteroides, where he argued that "there is nothing more certain

[55] Suzanne M. Shultz and Arthur E. Crist Jr., "Colonial Conundrum: Diving the Diagnosis of a Mysterious Fever," *Pennsylvania History: A Journal of Mid-Atlantic Studies* 78 (2011) 274 - 277.

than that a contagious disease, and a disease depending on climate,…may exist at the same time and in the same place."[56] Supported by "several examples in the works of Lind, Russel, &c.," besides his observation that yellow fever was difficult to diagnose when compared to the influenza outbreak that had been spreading at the start of the epidemic. Even the usual bout of remitting fever was difficult to parse from the incoming yellow fever, both had symptoms that were annoyingly similar.[57] Dr. Currie did demonstrate to the reading community that it was quite possible that many who complained of Yellow Fever might have suffered from another type of disease or fever. By assuming that Dr. Rush was correct about the singular fever many patients were most likely mis-diagnosed and administered the wrong treatments as a result. Currie's argument weakened Dr. Rush's theory and medical practices and most likely was another nail in the coffin of his medical career.

In response to the pushback he was receiving from his fellow doctors, Rush tried to enlighten his reader's about why importation of a disease was so popular a theory amongst the medical community. Rush cited such sources as Professor Alpinus' work which regarded the arrival of plague into Egypt from Syria, and Dr. Warren of Barbados, who posited that yellow fever invaded the West Indies by way of transport ships from Siam. His use of these particular sources argued the theory that by blaming foreign countries and ports for the importation of a disease, such as yellow fever, was strictly due to human behavior. "This principle of referring the origin of the evils of life…is universal," Rush stated, "loathsome and dangerous diseases have been considered by all nations as of foreign extraction."[58]

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[56] Currie, *A treatise on synochus icteroides,* 32.

[57] Currie, *A treatise on synochus icteroides,* 31 - 32.

[58] Rush, *An account of the bilious remitting yellow fever*, 147.

Blaming this universal idea of human behavior, Rush might have hoped to spare the egos of the medical community, including Dr. Currie and other members of the College of Physicians. Instead of bluntly stating that the opposing medical professionals were too ignorant to look within the borders of the country to explain the source of fever, Rush suggests that their failure to do so emerges from a universal belief that had been used by other countries to explain away their own deadly epidemics.

This universal belief upon the idea of importation might have been posited by Rush to soothe the egos of his opposition, but his moment of soothing was short lived as he dived into a long list of reasons that the late epidemic was started by the putrid exhalations of rotting coffee. First and foremost of his arguments was that the yellow fever epidemics that occurred in the West Indies, along with other similar climates, was the result of vegetable putrefaction. But it is not just the putrid exhalations of rotting vegetation that lead to the cause of yellow fever, another circumstance has to occur in order to weaken the human body's immune system. Citing Dr. Lind's work "Diseases of Hot Climates," it was necessary for the human body to experience heat, exercise, and or intemperance from drinking in order to leave it exposed to the dangers of the putrid exhalations. Rush backed up this argument with other known cases of fever that occurred in Cadiz, Pensacola, and Minorca, as well as cases that occurred inside the United States, making it seem like the idea of miasma was a much more valid argument to that of importation. "In none of these places was there a suspicion of the disease being imported from abroad," Rush ends his one passage, a fitting statement to the many cases he referenced in the beginning of the section.[59]

[59] Rush, *An account of the bilious remitting yellow fever,* 147 - 151.

Rush may have thought that his argument was airtight and could not be refuted by his contagion opposition, but Currie's "Impartial Review," was just as detailed as Rush's in source material and observation. While Rush's section on the origin of the Yellow Fever began with the excuse of human behavior, Currie's work began more so with a bold statement in regard to several of Rush's cited works. Putting forth that it was a "waste of time to attempt a formal refutation of their opinions," Currie's statement declared that many of Rush's sources were unqualified and unworthy of a true interpretation by respectful medical professionals.[60] Instead such sources, including Dr. Lind (Jamaica), Dr. Miller, and Sir John Pringle, where "the observations of the generality of the West India writers have been so imperfect and inaccurate, that they did not even suspect the disease of being contagious…they say it is occasioned by some irregularity of the non naturals in conjunction with the heat of the climate."[61] In fact, Currie's reading of Dr. Lind's work led him to declare that there was no specific mention that putrefying vegetables had created the disease. The work "only implies that unwholesome air irritated the symptoms of the disease, which we know to be the case in all other fevers," stated Dr. Currie.[62] With his declaration, Currie argued that Rush lacked an understanding of the published medical works he was using to support his localist theory. Currie's statement revealed that Rush could not find sources that specifically supported his theory. By misinterpreting the authors of these works, Rush's

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[60] William Currie, *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) 6.

[61] Currie, *An Impartial Review,* 3 - 4.

[62] Currie, *An Impartial Review,* 4.

theory could not stand up to the scrutiny from other medical professionals during this period of time. If Rush could not present his sources accurately, what else might be wrong with his arguments and theories?

Misrepresentation of sources was not Rush's only problem, especially in the case of Dr. Miller who was treating bilious colic in Dover. In an extract of a letter composed to Dr. Rush, Dr. Miller argued that the bilious colic he was then treating, "has assumed not only all the essential characters, but likewise all the violence, obstinacy and malignity described by the East and West Indian practitioners."[63] Dr. Miller continued in his letter, that Dover had experienced a season akin to that of a tropical season and, as a result, was not surprised that the bilious colic emerged after such a season had commenced in the area. Dr. Rush's work detailed that the putrefaction of vegetable matter aided from direct sunlight, led to a moist substrate that perpetuated yellow fever in Philadelphia, and was partially supported by this letter.[64] For the Philadelphia reading community, such a statement might have demonstrated to them that yellow fever and bilious colic were one and the same disease, caused by putrefying vegetable matter as stated by Dr. Rush. But just as Dr. Currie disabused Rush's arguments that stemmed from Dr. Linds work, he found another way to demonstrate that Dr. Miller was another source that was not factually checked prior to publishing.

Now whether Dr. Rush did not know of the work of Dr. Sykes, or he chose to overlook such an article of work remains unknown, but Dr. Currie refuted Dr. Miller's claim that bilious colic was caused by the putrefying vegetable matter in Dover with Dr. Sykes letter. Instead, Dr. Millers account "must fall to the ground, when the reader is assured, that

[63] Rush, *An account of the bilious remitting yellow fever,* 149.

[64] Rush, *An account of the bilious remitting yellow fever,* 149 - 150.

the cases of colic…have arisen from the use of bark adulterated with litharge."[65] Now whether this was accurately proven or not through further testing it is difficult to answer at this time, but Dr. Sykes work disproves the origination of the bilious colic in Dover. Blamed on tainted medicines rather than on the putrefaction of material in the area, Dr. Currie strikes another blow to Rush's theory of miasma. Currie even makes the claim that he holds a letter from Dr. Sykes in his possession, no doubt available upon request for scrutinizing, which detailed the mis-informed work of Dr. Miller and his patients of Dover.[66]

Rush's work suffered from this same weakness of problematic sources in an early publication. In his "Inquiry Into The Causes of Bilious and Intermitting Fevers," Rush detailed the effects of changing environment on the spread of fevers. While not really introducing the idea of a unitary fever, this was his first foray into publishing on the increasing cases of fever in the state of Pennsylvania. Rush made a somewhat solid foundation for the idea that moist substrate in direct sunlight would result in an increase of fever in 1785, however, Dr. Rush failed to mention the New Bedford doctor's, who made the observations about the condition of the soil along the Susquehanna, name or time period when making his argument. Instead he continued his writing by discussing the cycle of Egyptian fevers that occurred during wet and dry seasons along the Nile. Using common knowledge in regard to Egyptian fevers as a follow-up to his section based on an unnamed source might make up for this lack of source detail, but it does call into question the veracity

[65] Currie, *An Impartial Review,* 4.

[66] Currie, *An Impartial Review,* 4

of the argument.[67] Was there such a source in New Bedford that had documented this increase in fevers along the Susquehanna? Or did Rush leave this source vague for a reason? Whatever the answer, this particular pamphlet demonstrates that Rush had a problem with utilizing sources prior to the 1793 yellow fever epidemic.

Dr. Currie's pamphlet successfully refuted several of Dr. Rush's sources from *An account of the bilious remitting yellow fever* before he demonstrated that there was more to the argument than had been previously published. At the same time, Currie also introduced evidence that might have removed even more support from Rush's miasma theory of yellow fever. Dr. Rush believed that due to vegetables rotting in the intense heat of summer this led to the creation of bilious yellow fever in Philadelphia. These putrid vegetables were most notably the pile of rotting coffee that had been left from the *Amelia* on the Wharf Street dock. The combination of heat and odor from the rotting coffee supposedly led to many falling ill not long after they had encountered the smell of the rotting coffee. This in concurrence with the now refuted account by Dr. Lind demonstrated for Rush that yellow fever had arisen in this small patch of the wharf right next to the French ships that were unloading their holds.[68]

While it is likely that the odor of rotting coffee certainly did not help the stomach's of those unfortunate enough to live within smelling distance of the putrefaction, Dr. Currie believed that it was more a proximity to the unloading of French refugees from recently arrived ships rather than rotting vegetable matter that was introducing yellow fever into the area. In fact, he used the entries of Lord Kaim and Mr. Townsend, citizens of Spain, to

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[67] Benjamin Rush, "An Inquiry into the Causes of the Increase of Bilious and Intermitting Fevers in Pennsylvania" (lecture, American Philosophical Society, Philadelphia, PA, December 16, 1785),.

[68] Rush, *An account of the bilious remitting yellow fever,* 147 - 152.

demonstrate that just because there were piles of rotting material strewn around, yellow fever was not a natural byproduct of the exhalations. “Heaps of unmolested dirt and putrefaction…the most intolerable stench…so gross as almost to suffocate a stranger upon his first arrival,” was present in Madrid and yet there was no recorded case of yellow fever ever appearing endemically amongst its citizens. The same could be said in Cartagena as well, here massive amounts of smelly putrid exhalations abounded and yet not one reported case of yellow fever darkened the city.[69] This certainly threw a wrench into Dr. Rush’s work, that if all fever was supposed to be one and the same, why did it not appear in these disgusting streets of Spain much like it had in the less putrid streets of Philadelphia? Should not all fever act in the same manner if they are all offspring of the parent tertian fever posited by Dr. Benjamin Rush?

Early on in review of Dr. Rush’s yellow fever pamphlet, Dr. William Currie did a magnificent job of tackling several discrepancies with regard to Dr. Rush’s sources. Discarding many of his supposed sources as not even worthy of his time to refute, along with selecting the specific works of Dr. Lind and Miller for careful scrutiny, Currie carefully refuted Rush’s sources for the reading population of Philadelphia and beyond. Weakening Rush’s supposed rock solid source material that supported his theories on fever and miasma, Currie called into question the nature of Dr. Rush’s arguments based on the yellow fever epidemic. Currie did not stop here, instead taking his scrutiny even further and respectfully questioning the classification system of Dr. William Cullen. Currie claimed that Dr. Cullen formed “his opinion upon the report of others, has mistaken the nature of the disease, and

[69] Currie, *An Impartial Review,* 8

classed it improperly, amongst putrid diseases…every dissection which has been made, demonstrates the disease to be specifically different from both the bilious, and putrid fever."[70] With this statement, Currie, respectfully, tried to reassign yellow fever into a whole other class in the Cullenian classification system. Using recently performed dissections of yellow fever victims, the results appeared to show the true nature of yellow fever to be different from what was documented by Dr. Cullen. Currie advanced this new addition to germ theory and medical theory by demonstrating that, "instead of a redundancy of bile excreted at the beginning, which is one of the pathognomonic signs of a bilious fever, there was a deficiency of that fluid,…the principal affection was an inflammation of the stomach and parts adjacent, requiring a treatment similar to other inflammatory local affections." This type of thinking led Currie to believe that yellow fever was not able to be contracted through putrified vegetables as Dr. Rush posited, but instead was of the contagious variety in the Synochus class of fevers.[71] Calling in to question Dr. Rush's source work and his singular fever theory, Dr. Currie confidently disregarded Rush's work while strengthening his own arguments as to the nature and classification of yellow fever. Dr. Currie advanced medical theory and practice while at the same time demonstrating through observation and a thorough understanding of his sources the veracity of his arguments.

Dr. Rush Compatriot or Misunderstood French Physician:

Yellow fever in the city of Philadelphia caused opposing sides of the medical community, or factions as some historians have labeled them, to go to great lengths to argue

[70] Currie, *An Impartial Review,* 4.

[71] Currie, *An Impartial Review,* 4 - 5.

over their individual theories on the origin of the epidemic in published medical pamphlets. Amongst the publications that came forth after the epidemic had ceased, one particular pamphlet posited a different theory as to the origin of yellow fever. Dr. Jean Deveze, French physician and head of Bush-Hill hospital during the yellow fever outbreak, posited his own theory in *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,* that yellow fever had been caused by sources from within the city of Philadelphia. Unfortunately, his theory has been lumped in with that of Dr. Rush's arguments per written works by modern historians.[72] But this action has overlooked the significant differences that Dr. Deveze's work contains versus that of Dr. Benjamin Rush. Deveze's published work demonstrated that his first-hand experience with fevers in the West Indies, along with his work in Philadelphia, led him to consider a new variation to an already established theory as to the spread of yellow fever into major cities.

General observation allowed Dr. Deveze to argue two points as to the cause of yellow fever within the city of Philadelphia. His first argument was that there was a change to the atmospheric air, similar to the arguments of Dr. Rush and Dr. Currie within their own published works. Deveze stated that variations in the air such as heat, cold, light, humidity, and miasma particles created atmospheric condition which attacked the human body rendering it unable to prevent contagions from entering. Those "whose moral and physical temperament easiest give way to the morbific cause, will fall sick the first, while those in a situation totally opposite will escape the danger," Dr. Deveze explained. This belief that

[72] Finger, *The Contagious City,* 125.

atmospheric air was promoting the spread of yellow fever was attuned to the arguments of Dr. Currie rather than that of Dr. Rush.[73] .

Atmospheric air conditions that lead to the bodies inability to fight off disease while simultaneously infesting the body with miasmatic contagion was only half of Dr. Deveze's argument about local causes of yellow fever. Deveze posited a variation to the miasma theory, one in which he argued that Philadelphia's burial grounds was one of the biggest causes behind the spread of yellow fever. "These places of interment are injurious from the vapours which exhale from them…and also by the miasmata which the rain-water carries with it, as it filters through the earth and passes into the wells," he argued. He continued that the water system of Philadelphia must be entirely infected by the run off of the burial grounds, along with tan yards, starch manufactories, and quays.[74] Does it not paint a pretty picture in your mind of the child drawing water off a well in the middle of the city, taking it home in order to imbibe the clear liquid only to realize that floating throughout that bucket or cup of water is a tiny microcosm of contagion produced by the offal of the runoff from a nearby cemetery or tan-yard. As miasma was believed to have been released into the air so as to be inhaled by people nearby, Deveze's theory added a different manner of contagion transfer. Instead of inhaling the effluvia that was released in cemeteries, tan yards, etc., Deveze made the argument that the effluvia was instead washed down into Philadelphia's water source before being ingested by the thirsty city-folk. While not an accepted mode of germ transportation by miasmatists in the late 18th century, the idea of miasma and water

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[73] Jean Deveze, *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) 16 - 20.

[74] Deveze, *An enquiry into, and observations upon the causes and effects of the epidemic disease,* 38.

would come to be accepted by medical professionals in 19th century London. During an outbreak of cholera in London, noted doctor, John Snow, took up the task of proving that cholera was not only a microbe, or germ, but that it was most likely transported through the local water pumps. Board of Health officials refused to fully recognize Dr. Snow's work during the outbreak, but did agree that the effluvia produced in the unsanitary neighborhood was being ingested by the inhabitants once it was washed down into the water system.[75] But until such time, Dr. Deveze's argument was to be ignored by the community of American medical professionals, no mention of his published work is mentioned by either Dr. Rush or Dr. Currie. It is difficult to tell why there is no mention of Dr. Deveze's theories in American publications as no source has been found to categorically state why it was not utilized by such physicians as Dr. Rush or Dr. Currie.

The work and observations of Dr. Deveze gives a source that allows for readers to think upon the past epidemic in a different way. He utilized little to no published sources to back up his work, instead relying more upon his own empirical work in Saint Domingue and Bush-Hill to supply plenty of material and evidence to support his theories. Deveze spoke of several instances where the contagion was never passed from patient to his nursing staff, except for one nurse who imbibed in alcohol to an excess, or that his supporter, Mr. Stephen Girard, who worked tirelessly to care for many patients at the hospital, never became ill during his laborious and close contact work with the sick. This work is most likely the only work, written about the 1793 epidemic, in which the bulk of theories and arguments are based solely on general observation and hands-on medical practice. This source is quite

[75] See Steven Johnson, *The Ghost Map: The Story of London's Most Terrifying Epidemic and How It Changed Science, Cities, and the Modern World* (New York: Riverhead Books, 2006).

invaluable as a means to learn how a theory was formed, not so much from studying published sources and schooling, but from a hands on practice of observation and study.

Conclusion:

Until the early twentieth century, the debate between contagion theory and local cause, or miasma, theory continued to be debated in the medical field. In 1901, a doctor studying the disease in Cuba finally distilled its true source, the mosquito. The Yellow Fever Mosquito, A. aegypti, could in itself be considered an immigrant, as it traveled with the incoming French refugees to Philadelphia, but is well known for its penchant of carrying the deadly yellow fever virus. This particular mosquito was first found throughout Africa and it is believed that it made its first crossing to the West Indies via the slave trade. With no direct competition from native mosquitos, especially in Philadelphia, the Yellow Fever Mosquito found an environment that was perfect for its particular life cycle. Unlike other mosquitos, this particular mosquito preferred to lay its eggs not in swamps or puddles but within water vessels which may explain why it was able to spread so quickly from the West Indies to Philadelphia. Once in Philadelphia, the mosquito could continue its lifecycle, laying eggs within the water containers that Philadelphians were using to bring water to their homes. Also, the mosquito rarely ever laid its eggs on the water in the actual containers, instead they laid them along the walls of the containers in question, but just above the water line. Once the water container became filled, and along with the right environmental conditions, the eggs would proceed to hatch and a new swarm of the yellow fever mosquito was free to spread throughout the area in question. Yellow fever died out in Philadelphia once this

discovery was made in 1901.[76] With the benefit of hindsight, one can see that Dr. Currie's theory was closest to the truth with regard to certain environmental conditions needed for the spread of yellow fever.

But since this discovery was still over 100 years away, what was the city to do to combat the resurgence of the Yellow Fever epidemic? The Committee to Attend to the Malignant Fever were "of opinion that a health office, upon a more extensive plan than the present, is of the greatest importance, and that the residence of the officer and physicians should be at a suitable distance below the city…easily accessible by land and water, together with requisite buildings for the accommodation of those who may be attacked by malignant disorders in future…the increasing trade of the city, and the great number of people who are daily arriving from all parts of the world, expose us to every species of infection that prevails in other places."[77] The College of Physicians also had recommendations of their own, a Board of Health was to be established that "they shall have full power to do everything necessary respecting the quarantine to be performed by vessels arriving in this Port…every vessel which arrives from the West Indies,…should perform quarantine of not less than thirty days."[78] Between this recommendation and the answering memorials from the College of Physicians the creation of the Lazaretto on Tinicum Island was approved in 1799.

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[76] McNeill, *Mosquito Empires,* 40 - 41.

[77] Committee to Attend to the Malignant Fever Minutes, 30 October 1793, Historical Society of Pennsylvania (Philadelphia, Penn).

[78] John Redman to Thomas Mifflin, Philadelphia, August 18, 1797, in *Proceedings of the College of Physicians of Philadelphia relative to the Prevention and Spreading of Contagious Diseases* (Philadelphia: Thomas Dobson, 1798) 18, in "Harvard University Library Open Collections Program," http://ocp.hul.harvard.edu/contagion/yellowfever.html.

With solid arguments, supported by well-researched pamphlets that discussed their individual ideas on the origination and causation of the Yellow Fever epidemic, a decision could be had upon the validity of both arguments. Dr. Rush's uphill battle against contagion did not succeed. By having to convince not only his medical peers, but the general community of Philadelphia that yellow fever was the offspring of a tertian parent fever and that it was caused by foul smells emitting from putrefied vegetable matter (in this case coffee) Rush bit off more than he could chew. It certainly could not have helped that Rush's list of debilities to avoid in order to prevent the activation of yellow fever was quite a mishmash of activities and behaviors that would be difficult to regulate by the average citizen in Philadelphia. Had he chosen to focus his attention more so on the role of miasma causing the fever, as well as properly using his sources, rather than his fledgling theory, he most likely would have been able to garner more support from his peers and community members.

Dr. Currie, on the other hand, chose his words and his arguments carefully based on his studies of Cullenian classification, along with published sources regarding epidemics effects in the recent past. Pointing out flaws in Dr. Rush's sources, including mis-interpreted sources, shaky material, and "outright lies," Currie thoroughly denounced Rush's work while using several of those same sources to prove his own theories on contagion. Not bothering to look to the work of Thucydides and other ancient sources, Currie instead made the argument that environmental factors need to be considered within the already well-accepted classification system of fever. Currie's work to posit the role of tainted atmospheric air in the spreading of fever amongst the people of a city, is a much more cohesive, easy to understand, and far more sensible argument about the origination of yellow fever.

Timing also played a factor in the acceptance of Currie's work over Rush, for one could not help but notice that the fever did not begin to affect their city until after the arrival of the French refugees fleeing from the West Indies, where reports were received detailing the constant epidemics of yellow fever and malaria. This influx of French refugees also encouraged the practical Dr. Currie to side with the notion of quarantine. Short of tearing the entire city down and then rebuilding with more open streets and proper ventilation, Dr. Currie recommended the far more practical solution of quarantine. Prevent the epidemic by keeping the contagion from an environment that would help it grow and spread throughout the people of the city. A great amount of sound information and sources, along with general observations made during the 1793 epidemic laid the foundation for Philadelphia's participation in quarantine practices towards the final years of the 18th century.

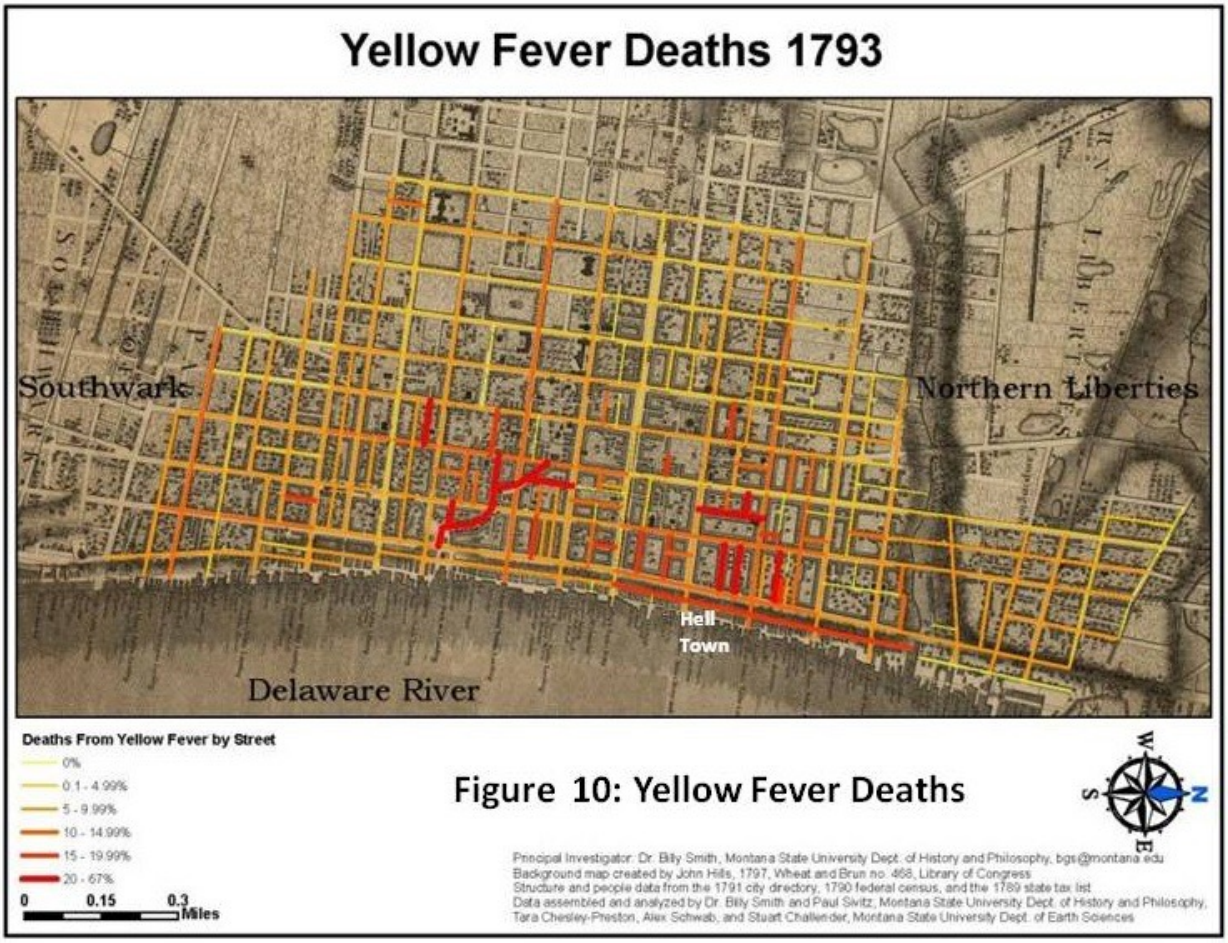
Both Dr. William Currie and Dr. Benjamin Rush had a profound impact upon the theory of germs, especially in regard to the conditions needed for a tropical disease to propagate and spread through a northern port system. This change in understanding occurred from within the borders of the United States, not from the halls of medicine across the Atlantic in the British Isles. These men chose to do their own research to improve upon germ theory and in the end their research could not but help to push the American medical system forward and away from the European institutions. With their publications made available, local students and other learned men across the fledgling country could look to the College of Physicians and the University of Pennsylvania as a place where learning and research occurred within the United States. Potential students and medical professionals had these enlightened men to learn from and began to spread the ideas they had queried and researched without having to travel beyond the borders of America.

Timeline of Events:

- July 1790: Haitian Revolution begins on Saint Domingue
- July 1793: French Ships arrive in Philadelphia's port bringing refugees fleeing Saint Domingue
- August 3, 1793: Dr. Cathrall visited Mrs. Parkinson - sick with fever
- August 4, 1793: Dr. Physick visited unnamed Englishman who perished from fever on the same day
- August 7, 1793: Mrs. Parkinson dies from fever
- August 19th, 1793: First reported fever patient death - Peter Aston
- August 20th, 1793: Mrs. Lemaigre dies due to fever
- August 22nd, 1793: Philadelphia Mayor Matthew Clarkson calls for streets of Philadelphia to be thoroughly cleaned
- August 25th — 26th, 1793: mass evacuation of citizens from Philadelphia
- August 25th, 1793: College of Physicians meet to determine origin of fever
- August 26th, 1793: College of Physicians publishes guidelines to stop the spread of fever, in the Federal Gazette newspaper
- August 29th, 1793: Pennsylvania Governor Thomas Mifflin sends word to Mayor Clarkson calling for enforcement of street cleaning
- August 31st, 1793: Building on Bush-Hill is commandeered to be used as hospital for fever patients by committee for the poor
- September 5th, 1793: House of Representatives and Senate are adjourned till fever epidemic ends
- September 10th, 1793: George Washington and Thomas Jefferson leave Philadelphia (Washington will not return until 6 weeks later)
- September 11th, 1793: Dr. Benjamin Rush publishes treatment protocols as a means for the poor to treat themselves
- September 12th, 1793: Committee to Attend to the Malignant Fever is formed by 10 members of the local citizenry as a means to care for the poor and sick
- October 12th, 1793: Heavy rains noted, believed will drive away the fever by local citizens and doctors
- October 21st, 1793: Citizens begin to return to the city; small surge in new fever patients
- October 25th, 1793: Ships once more enter Philadelphia's ports
- October 26th, 1793: Philadelphia's markets reopen
- October 30th, 1793: Committee to Attend to the Malignant Fever submits recommendations upon Governor Mifflin's request about prevention of future epidemics: it is highly recommended that a quarantine station be established
- November 5th, 1793: Doctor Benjamin Rush resigns from College of Physicians
- 1793: Dr. William Currie publishes *A description of the malignant, infectious fever prevailing at present in Philadelphia; with an account of the means to prevent infection, and the remedies and method of treatment, which have been found most successful*
    - Dr. Benjamin Rush publishes *An enquiry into the origin of the late epidemic fever in Philadelphia: in a letter to Dr. John Redman, president of the College of Physicians, from Doctor Benjamin Rush*

- 1794: Yellow Fever strikes Philadelphia
    - Dr. Benjamin Rush publishes *An account of the bilious remitting yellow fever, as it appeared in the city of Philadelphia, in the year 1793*.
    - Dr. William Currie publishes *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;* and *A treatise on the synochus icteroides, or yellow fever; as it lately appeared in the city of Philadelphia. Exhibiting a concise view of its rise, progress and symptoms, together with the method of treatment found most successful; also remarks on the nature of its contagion, and directions for preventing the introduction of the same malady, in future*
- 1794: Board of Health is created; several members come from the College of Physicians
- 1796: Yellow Fever again strikes Philadelphia
- 1797: Yellow Fever strikes Philadelphia
- 1798: Yellow Fever strikes Philadelphia
    - Philadelphia establishes public waterworks to cleanse city of waste
- 1799: Mayor Clarkson approves commissions request to establish Lazaretto on Tinicum Island
- 1801: Lazaretto on Tinicum Island is opened; begins process of investigating all incoming ships for signs of illness

Philadelphia Yellow Fever of 1793 Map:



Source: The Encyclopedia of Greater Philadelphia: http://philadelphiaencyclopedia.org/archive/yellow-fever/#3086

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Abbreviations

HSP Historical Society of Pennsylvania
Philadelphia, Pennsylvania

LCP Library Company of Philadelphia
Philadelphia, Pennsylvania

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THESIS EXAMINATION REPORT

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Title of Thesis Evolution of an Argument: How Observation and Professional Disagreement During Philadelphia's 1793 Yellow Fever Epidemic Encouraged the United States' Understanding of Medical Theory and Practice

Action taken on Thesis:

_____Approved

_____Approved with revisions suggested by committee and to be checked by chair

_____Schedule a re-exam after corrections or revisions have been made

_____Not Approved (Specific reasons in writing should be attached)

_____Other (Please explain)

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Chair of Committee Signature