

A Tale of Two Revolutions: How the Response to a Revolutionary Medical Breakthrough Saved the American Revolution

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Historical Paper

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I am passionate about public health and have spent the past three years conducting original science research developing diagnostics and treatments to improve people's lives. Because of this strong interest, I have been closely following current controversies about vaccination and its impact on public health. I also love history, so I was curious about how our nation has responded to vaccination efforts in the past. I discovered that variolation, the precursor to vaccination, was also controversial when it was introduced in America in the 1700s, and many of the most influential figures in American history weighed in on the topic. Variolation was a revolutionary medical breakthrough used in the fight against smallpox, one of the most devastating diseases of that era.

When I initially selected my topic, I knew it related to the annual theme "Revolution, Reaction, Reform in History" because I could discuss reactions to a revolutionary technology in medicine. However, as I conducted further research, I uncovered deep ties between variolation and the American Revolution, which added another layer of connection to the theme. This multi-faceted thematic connection was compounded when I learned about variolation reform introduced by George Washington. Revolution is explored through both the lens of a revolutionary medical breakthrough and the American Revolution. Reaction from political, military, scientific, and religious leaders as well as the general public influenced the evolution of these revolutions. Reform related to variolation, led by Washington, played a key role in the outcome of the Revolutionary War.

To conduct my research, I reviewed articles, letters, pamphlets, and books containing scientific and historical information related to my topic. Some of the most enjoyable parts of my research involved reading primary sources about the response to variolation in the actual words

of famous Americans including George Washington, John Adams, Benjamin Franklin, Alexander Hamilton, John Hancock, and Cotton Mather. It was also exciting to discover Connecticut's many connections to my topic by reading original letters from Governor Jonathan Trumbull and secondary sources detailing Benedict Arnold's role in variolation history. My writing process involved creating many drafts through careful revision. One of the most challenging aspects of this project was adhering to the word limit, as there was so much rich history involved. In fact, an early draft contained nearly 600 words on the Norfolk riots, which in the final version was condensed to only two sentences.

My historical argument is that the response to a revolutionary medical breakthrough had a major impact on the Revolutionary War. Ultimately, Washington's reform of mandating variolation helped save the American Revolution by protecting the Continental Army from smallpox, allowing soldiers to battle the British instead of illness. This topic is significant because it involves actions that influenced the very founding of our country. Furthermore, it explores the important dynamic of how response to science shapes history. This is very relevant in the modern world as today's leaders, scientists, and the public have been actively engaged in policy debates in response to recent medical breakthroughs.

Historical Paper

Introduction

At the height of the American Revolution, smallpox was a crippling problem. An estimated 90 percent of casualties in the Continental Army were from infectious disease, primarily due to smallpox.¹ As Connecticut Governor Jonathan Trumbull wrote to George Washington on July 6, 1776, smallpox “strikes a greater dread on our Men who have not had it, then the British Troops.”² Variolation, a revolutionary medical breakthrough introduced in America in the early 1700s, had the potential to dramatically reduce infection rates. However, it was controversial from the start, and a battle over variolation lasted more than 50 years, involving some of our nation’s most famous leaders. It took reform led by George Washington, who mandated variolation (also called inoculation)³ for soldiers in 1777, to suppress the anti-variolation movement and restore the health of his soldiers. Winning the battle for variolation became a key factor in winning the Revolutionary War.

Chapter 1: Smallpox and the Introduction of Variolation in America

Smallpox was a highly contagious and devastating disease: it had a 30 percent overall fatality rate, and survivors were often covered in permanent disfiguring scars.⁴ From the time of its settlement, America experienced many significant outbreaks with terrible consequences. According to the Massachusetts Medical Society, “For 180 years smallpox was responsible for more death than any other one cause.”⁵ Boston experienced smallpox deaths as early as 1630 and continued to face many subsequent fatal outbreaks.

In 1706, Cotton Mather learned of a possible procedure to prevent smallpox through conversations with an enslaved man named Onesimus. Mather asked Onesimus whether he had ever contracted smallpox; Onesimus answered “yes and no.”⁶ Onesimus explained, in Mather’s words, “he had undergone an Operation, which had given him something of ye Small-Pox, and would forever preserve him from it.”⁷ Onesimus was describing variolation, the procedure of exposing healthy people to smallpox material so that they develop immunity to the disease. Unlike modern vaccination, people undergoing variolation usually developed mild symptoms associated with the disease. Thus, quarantine was a critical component of variolation to prevent smallpox spread. Variolation carried a small risk of death, but it was dramatically less likely than if smallpox was acquired naturally.⁸ Mather was further intrigued after finding case reports from England of variolation’s success.⁹

By 1716, Mather sent letters encouraging the use of variolation to prevent smallpox but was ignored until the Boston outbreak in 1721 which infected over half of the city’s population.¹⁰ Mather proposed variolation to the fourteen physicians of Boston and persuaded just one: Dr. Zabdiel Boylston. Boylston immediately began to test the procedure and was so confident in it that his first test subject was his own son.¹¹ Eventually, Boylston inoculated over 240 people during the 1721 outbreak.¹²

Chapter 2: Reaction to Variolation

However, variolation was firmly opposed by many. One common anti-variolation argument was that it interfered with religion because “diseases were divine retribution and punishment from God.”¹³ A 1722 sermon titled “The Dangerous and Sinful Practice of Inoculation” called variolation a “diabolical operation,” and other clergymen labeled variolation

as "an unjustifiable act, an affliction of evil, and a distrust of God's overruling care."¹⁴ Some even claimed Mather and Boylston had "breach[ed] the Moral and the evangelical law of God."¹⁵ Believers found it "immoral to tamper with God's judgement," and thus, any medical procedure defending against disease was not accepted.¹⁶ However, Mather, a minister himself, strongly disagreed and argued that scientific aid was acceptable under Christianity.¹⁷ His father, also a clergyman, defended variolation with the religious justification that it was a gift from God to help the sinners with smallpox.¹⁸

Another concern about variolation was that the procedure itself would spread smallpox rather than reduce severity of the disease. Dr. William Douglass, one of the few physicians in Boston, accused Boylston of "propagating the Infection."¹⁹ Douglass formed the first colonial medical society to protest variolation, publishing articles in the *New-England Courant* run by James Franklin.²⁰ Notably, Douglass did have some cause for concern since if variolated individuals did not follow proper quarantine procedures, they could spread the smallpox to others. Douglass also pointed out Mather's lack of medical expertise, which "represented the earliest calls for medical professionalism heard in the colonies."²¹

Unfortunately, the anti-variolation movement escalated from words to violence. Boylston was "assaulted in the streets, his house was attacked, and he was execrated as a murderer."²² A variolation opponent went as far to throw a bomb into Mather's window reading "Cotton Mather, You Dog, Damn You, I'll inoculate you with this, with a Pox to you."²³ There was also racism underlying some anti-variolation remarks. One physician opposing variolation attacked Mather for "Negroish" thinking.²⁴ Later, another opponent called variolation a "filthy, useless and dangerous rite" akin to the "charms and incantations of an African savage."²⁵

Nevertheless, evidence began to emerge which convinced those who trusted science to support variolation. Mather and Boylston kept detailed records of their variolation efforts during the 1721 outbreak which served as a natural experiment. They compared the rates of death from smallpox between variolated and non-variolated populations, and in 1726, Boylston published findings showing the fatality rate in non-variolated individuals in his sample was 14 percent but only 2 percent in variolated individuals.²⁶ These statistics, being one of the first comparative analyses used to evaluate a medicinal procedure, combined with personal experience, became a powerful weapon to support variolation.²⁷

One prominent example of an anti-variolater who changed his ways is Benjamin Franklin. During the 1721 outbreak, Franklin worked as an apprentice for his brother at the New-England Courant which fiercely opposed variolation. Franklin chose not to variolate his children, something he “long regretted bitterly” after his son died of smallpox in 1736.²⁸ Franklin then became one of the largest advocates for variolation, publishing articles encouraging variolation and eventually founding the Society for Inoculating the Poor Gratis to make variolation more accessible.²⁹ Franklin was not alone in this change of heart. Douglass, one of Boylston’s original critics, published an essay in 1749 admitting variolation was safe and effective and encouraging society to variolate.³⁰ By 1764, John Adams, a great nephew of Boylston and a public supporter of variolation expressed shock and dismay about people who rejected variolation, likening it to “deliberate self-Murder.”³¹

However, variolation remained controversial throughout this time period. In 1757, Franklin wrote, “Notwithstanding the now uncontroverted success of Inoculation, it does not seem to make that progress among the common people in America.”³² The acceptance of variolation tended to depend on circumstance, and successful variolation campaigns were often

limited to a response to a local outbreak. For example, during the 1760 epidemic in Charleston, South Carolina, Dr. Alexander Garden variolated more than 2,000 people despite many in the community who viewed variolation “as an interference with nature.”³³

While outbreaks led to temporary increases in the acceptance of variolation, most of the country stood opposed to variolation most of the time. For instance, in Virginia, anti-variolation resurged in 1767 after a few variolated individuals in Yorktown violated strict quarantine rules and caused a major smallpox epidemic. After the epidemic, many Virginians became skeptical of variolation for fear of another smallpox outbreak. Due to these fears, anti-variolation mobs attacked those who performed or tried to perform variolation.³⁴ In 1768, a plantation home was burned down by an anti-variolation mob, and in 1769, anti-variolation riots led to broken windows, pillaged valuables, and threats of physical violence.³⁵ Giving into the pressure of the anti-variolation movement, variolation was officially banned in 1770 by the Virginia legislature.³⁶ Thomas Jefferson, a supporter of variolation who had represented some of the victims in lawsuits against the rioters, was later a part of the Virginia legislative committee that relaxed the ban in 1777.³⁷

Many other jurisdictions restricted variolation or had anti-variolation mob violence. For example, two years before the Virginia ban, the Georgia General Assembly passed a law prohibiting variolation “for fear of spreading disease to the people not receiving vaccinations.”³⁸ After the 1773 smallpox outbreak in Marblehead, Massachusetts, a private variolation hospital was created to help the population, but a series of anti-variolation riots broke out attacking the hospital. A supply boat was burned, rioters threatened to lynch the hospital proprietors and broke the windows of their homes, and eventually the hospital was burned down. Although two perpetrators were arrested, a large group stormed the jail and freed the prisoners. The sheriff

organized 500 citizens to recapture them, and anti-variolators assembled their own equally large group. The situation was only diffused when hospital owners agreed to drop prosecution.³⁹

Chapter 3: Variolation Reform Saves the Revolution

By 1775, only about 25 percent of the Continental Army was immune to smallpox.⁴⁰ This was in direct contrast to British troops who generally were immune either through natural exposure or variolation. Variolation was widespread in Great Britain, largely due to evidence from trials run by and anecdotes from Lady Mary Montagu.⁴¹ This gave the British a powerful advantage, one that would debilitate the Continental Army.

The Continental Army first encountered smallpox in the siege of British-occupied Boston in 1775.⁴² A major outbreak was occurring in Boston, but due to variolation and proper quarantine, the British army remained strong and able to defend the city.⁴³ The Continental Army was also able to avoid major losses due to strategic limited combat and proper sanitation.⁴⁴ This is impressive, especially considering that the British were using a biological warfare tactic of sending infected townspeople out of Boston to spread the disease to the Continental Army. In Washington's words, "a number of these Comeing out have been inoculated, with design of Spreading the Smallpox thro' this Country & Camp."⁴⁵ Washington counteracted the biological warfare by forbidding refugees to come near the Continental Army's camp, preventing a major smallpox outbreak within the ranks.⁴⁶ While smallpox did little damage to either side of the siege, the threat of a smallpox outbreak in the Continental Army began to concern Washington – concerns that quickly proved true when attempting to invade Canada.

During an invasion attempt in Quebec, Canada led by Colonel Benedict Arnold and General Richard Montgomery at the end of 1775, smallpox infected and ravaged the Continental

Army – almost half of the entire invasion force contracted the disease.⁴⁷ However, British troops remained healthy and were able to capture hundreds, wound Arnold, and kill Montgomery.⁴⁸ Arnold had hoped to attempt a second attack, but a lack of healthy soldiers forced retreat. As the American Revolution Institute reports, “everyone knew – the British, Congress, even deserters – that sickness had been the invading army’s downfall.”⁴⁹ This caused American soldiers in Canada to become so fearful of contracting smallpox that they began trying to variolate themselves without a doctor’s assistance. Unfortunately, they did not maintain quarantine which served to spread the illness even further. Due to this, Arnold attempted to ban variolation under penalty of death, but variolations still continued in secret because soldiers were more afraid of smallpox than Arnold’s ban. In March 1776, a new commander, Major General John Thomas, arrived to take control of the American troops in Canada. He also banned variolation, but he did organize a smallpox hospital in Montreal to help prevent further spread of the disease. Thomas, standing in solidarity with his men, refused to get variolated even when urged by his staffers to do so. This decision proved unwise as Thomas contracted smallpox shortly after arriving in Canada and died from the disease.⁵⁰ As John Adams wrote in June 1776, Smallpox “was the Cause of our precipitate Retreat from Quebec” and “is ten times more terrible than Britons, Canadians and Indians together.”⁵¹ Smallpox was not only damaging military capabilities but also discouraging recruitment. On July 4, 1776, Governor Trumbull wrote that “fear of the infection operates strongly to prevent soldiers from engaging in the Service.”⁵² Other leaders, such as General Philip Schuyler of New York, noted similar fears of smallpox deterring recruitment.⁵³

It took the actions of the most famous figure in American history, George Washington, to bring order to the chaos of smallpox and variolation.⁵⁴ Trusting scientific evidence, Washington

personally supported variolation and persuaded his wife to be variolated in May 1776.⁵⁵

However, Washington forbade variolation for his soldiers in the same month for fear that, as he later explained to one of his generals, “the Enemy, knowing it, will certainly take Advantage of our Situation.”⁵⁶ Washington was concerned the Continental Army would be incapacitated and vulnerable to attack while the soldiers were recovering from the mild case of smallpox that variolation often causes.⁵⁷ Eventually, the toll caused by smallpox was too great and Washington felt that he needed to take action to end smallpox’s destruction of his army. To prevent his earlier fears from coming true, Washington planned a system of mandatory secretive variolation for current soldiers and required variolation for new soldiers. This plan came to fruition on February 5, 1777, when Washington issued an order in a letter to John Hancock, the president of the Second Continental Congress, mandating smallpox variolation for all new soldiers in the army.⁵⁸ This was followed with a similar letter to Dr. William Shippen Jr, the Continental Army’s Medical Director, planning a variolation campaign for his soldiers. In this letter Washington wrote that “necessity not only authorizes but seems to require the measure, for should the disorder infect the Army in the natural way and rage with its usual virulence we should have more to dread from it than from the Sword of the Enemy.”⁵⁹

Despite Washington’s order for mandatory variolation, some generals and governors remained hesitant to variolate their forces. In response, Alexander Hamilton wrote on behalf of Washington in March 1777 to General Adam Steven demanding that the general’s “objection made against innoculating his regiment ... should cease.”⁶⁰ Similarly, Washington wrote to Virginia Governor Patrick Henry arguing Henry should remove his state’s ban on variolation because smallpox “is more destructive to an Army in the Natural Way, than the Enemy’s Sword.”⁶¹ A combination of wartime urgency to combat smallpox, respect for Washington, and

persuasive arguments found in the letters led to the success of these efforts: Henry repealed the variolation ban, and the generals allowed for variolation to occur.⁶²

In just 1777, over 40,000 soldiers were variolated and infection rates dropped from 20 percent to under 1 percent.⁶³ Smallpox no longer had a stranglehold on the Continental Army, and American troops could focus on fighting the British rather than illness. Washington's response to a revolutionary medical breakthrough – mandating variolation – saved the American Revolution. This was historically significant to the founding of America, and it demonstrates the importance of understanding and respecting science, even when there is public opposition. After Washington's decree, variolation became widely accepted and paved the way for the development of the smallpox vaccine and the eventual eradication of the disease. As we celebrate America's semiquincentennial, facing heated policy debates and public skepticism about medical breakthroughs, it is essential to remember how our founding fathers faced similar challenges, embraced science, and emerged victorious.

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- ⁵³ René F. Najera, “Washington’s War Against Smallpox: The Revolutionary Inoculation Campaign,” *The History of Vaccines*, 7 Apr. 2025, historyofvaccines.org/blog/washingtons-war-against-smallpox-revolutionary-inoculation-campaign.
- ⁵⁴ “Washington Inoculates an Army,” *American Battlefield Trust*, 26 Jan. 2017, www.battlefields.org/learn/articles/washington-inoculates-army.
- ⁵⁵ Andrew Lawler, “How a Smallpox Epidemic Nearly Derailed the American Revolution,” *History*, 16 Apr. 2020, www.nationalgeographic.com/history/article/george-washington-beat-smallpox-epidemic-with-controversial-inoculations.
- ⁵⁶ George Washington, letter to Major General Horatio Gates, 5–6 February 1777, *Founders Online*, National Archives, <https://founders.archives.gov/documents/Washington/03-08-02-0267>. [Original source: *The Papers of George Washington, Revolutionary War Series*, vol. 8, 6 January 1777–27 March 1777, ed. Frank E. Grizzard, Jr. Charlottesville: University Press of Virginia, 1998, pp. 248–249.]
- ⁵⁷ Najera, “Washington’s War Against Smallpox.”
- ⁵⁸ George Washington, letter to John Hancock, 5 February 1777, *Founders Online*, National Archives, <https://founders.archives.gov/documents/Washington/03-08-02-0268>. [Original source: *The Papers of George Washington, Revolutionary War Series*, vol. 8, 6 January 1777–27 March 1777, ed. Frank E. Grizzard, Jr. Charlottesville: University Press of Virginia, 1998, pp. 249–253.]
- ⁵⁹ George Washington, letter to William Shippen, Jr., 6 February 1777, *Founders Online*, National Archives, <https://founders.archives.gov/documents/Washington/03-08-02-0281>. [Original source: *The Papers of George Washington, Revolutionary War Series*, vol. 8, 6 January 1777–27 March 1777, ed. Frank E. Grizzard, Jr. Charlottesville: University Press of Virginia, 1998, p. 264.]
- ⁶⁰ Alexander Hamilton, letter to Major General Adam Stephen, 13 March 1777, *Founders Online*, National Archives, <https://founders.archives.gov/documents/Hamilton/01-01-02-0103>. [Original source: *The Papers of Alexander Hamilton*, vol. 1, 1768–1778, ed. Harold C. Syrett. New York: Columbia University Press, 1961, pp. 204–205.]
- ⁶¹ George Washington, letter to Patrick Henry, 13 April 1777, *Founders Online*, National Archives, <https://founders.archives.gov/documents/Washington/03-09-02-0142>. [Original source: *The Papers of George Washington, Revolutionary War Series*, vol. 9, 28 March 1777–10 June 1777, ed. Philander D. Chase. Charlottesville: University Press of Virginia, 1999, pp. 146–148.]
- ⁶² Benjamin A. Drew, “George Washington and Smallpox,” *JAMA Dermatology* 151, no. 7 (July 1, 2015): 706, <https://doi.org/10.1001/jamadermatol.2015.1>.

⁶³ Lawler, “How a Smallpox Epidemic Nearly Derailed the American Revolution.”

Annotated Bibliography

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Adams, John. Letter from John Adams to Abigail Smith, 17 Apr. 1764. *Adams Papers Digital Edition*. Massachusetts Historical Society. www.masshist.org/publications/adams-papers/index.php/view/ADMS-04-01-02-0027.

This letter from John Adams to Abigail Smith included Adams' views on variolation. I used this source to quote John Adams' statements on both his personal opinions of and the current state of variolation in Massachusetts.

Adams, John. Letter from John Adams to Abigail Adams, 26 June 1776. *Adams Papers Digital Edition*. Massachusetts Historical Society. <https://www.masshist.org/digitaladams/archive/doc?id=L17760626ja>.

This letter from John Adams to Abigail Adams described his sadness over the failed invasion of Quebec. I used this source to quote Adams on smallpox's effect on the invasion and the Revolutionary War as a whole.

Boylston, Zabdiel. *An Historical Account of the Small-Pox Inoculated in New-England, upon All Sorts of Persons, Whites, Blacks, and of All Ages and Constitutions: With Some Account of the Nature of the Infection in the Natural and Inoculated Way, and Their Different Effects on Human Bodies ; with Some Short Directions to the Unexperienced in This Method of Practice; Humbly Dedicated to Her Royal Highness the Princess of Wales*. 1726. Digital Collections, National Library of Medicine. <http://resource.nlm.nih.gov/2544007R>.

This document written by Zabdiel Boylston presented Boylston's findings on variolation to the Princess of Wales. I used this source for its statistics on the fatality rate comparison between variolated and non-variolated individuals during the 1721 smallpox outbreak.

Douglass, William, Alexander Stuart, and James Franklin. *The Abuses and Scandals of Some Late Pamphlets in Favour of Inoculation of the Small Pox, Modestly Obviated, and Inoculation Further Consider'd in a Letter to A- S- M.D. & F.R.S. in London*. Boston: Printed and sold by J. Franklin, at his printing-house in Queen-Street, over against Mr. Sheaf's school. 1722. Digital Collections, National Library of Medicine. <http://resource.nlm.nih.gov/2552019R>.

This document was written by major anti-variolation figures including William Douglass and James Franklin and argued against the use of variolation. I used this source to describe the partnership between Franklin and Douglass and how they used the New-England Courant to publish anti-variolation articles.

Douglass, William, Gamaliel Rogers, and Daniel Fowle. *A Summary, Historical and Political, of the First Planting, Progressive Improvements, and Present State of the British Settlements in North-America*. 1749-1751. Digital Collections, National Library of Medicine. <http://resource.nlm.nih.gov/2552022R>.

This document described American developments and was written by William Douglass, who was originally opposed to variolation. I used this source to show how Douglass changed his mind from opposing variolation to supporting its use and value.

Franklin, Benjamin. *The Complete Works of Benjamin Franklin*. The Knickerbocker Press, 1887.

This source is a collection of writings by Benjamin Franklin which I used to show Franklin's changing opinions on variolation after his son died of smallpox.

Franklin, Benjamin. "Preface written by Benjamin Franklin to Dr. Heberden's Pamphlet on Inoculation." 16 February 1759. *Founders Online*. National Archives. <https://founders.archives.gov/documents/Franklin/01-08-02-0073>. [Original source: *The Papers of Benjamin Franklin*, Vol. 8, April 1, 1758, through December 31, 1759, ed. Leonard W. Labaree. New Haven and London: Yale University Press, 1965, pp. 281–286.]

This preface written by Benjamin Franklin to a pamphlet about variolation provided information and statistics about variolation. I used this source to better understand Franklin's views about variolation and his perception about public attitude toward variolation. I also used this source to quote Franklin's view that variolation was not generally accepted despite its successful outcomes.

Hamilton, Alexander. Letter from Alexander Hamilton to Major General Adam Stephen, 13 March 1777, *Founders Online*, National Archives, <https://founders.archives.gov/documents/Hamilton/01-01-02-0103>. [Original source: *The Papers of Alexander Hamilton*, Vol. 1, 1768–1778, ed. Harold C. Syrett. New York: Columbia University Press, 1961, pp. 204–205.]

This letter from Alexander Hamilton to General Adam Stephen ordered Stephen to allow for the variolation of his troops. I used this source to quote Hamilton's beliefs on

variolation and to describe how some generals were hesitant to accept the variolation mandate.

Mather, Cotton, Zabdiel Boylston, Iakovos Pylarinos, Emanuele Timoni, and Samuel Gerrish. *Some Account of What Is Said of Inoculating or Transplanting the Small Pox*. Boston: Sold by S. Gerrish at his shop in Corn-Hill, 1721. Digital Collections, National Library of Medicine. <http://resource.nlm.nih.gov/2562061R>.

This document by variolation supporters Cotton Mather and Zabdiel Boylston supported the use of variolation in America based on preliminary testing. I used this source to show that Mather and Boylston wanted to go public with variolation and use the procedure in the ongoing smallpox outbreak.

Mather, Cotton. *The Angel of Bethesda*. American Antiquarian Society, 1972, reprinting of Cotton Mather's 1724 book.

This book by Cotton Mather discussed diseases and medicine from a religious perspective. I used this source to show Mather's views on religious objections to variolation and medicine in general.

Mather, Increase. *Several reasons proving that inoculating or transplanting the small pox, is a lawful practice, and that it has been blessed by God for the saving of many a life*. 1721. Evans Early American Imprint Collection, University of Michigan Library Digital Collections. <https://name.umd.umich.edu/N01909.0001.001>.

This pamphlet published by Increase Mather, the father of Cotton Mather, explained why he believed variolation is acceptable under Christianity and should thus be used. I used this source to convey Increase Mather's views on the religious justification for denying variolation.

Trumbull, Jonathan. Letter from Jonathan Trumbull, Sr., to George Washington, 4 July 1776. *Founders Online*. National Archives. <https://founders.archives.gov/documents/Washington/03-05-02-0144>. [Original source: *The Papers of George Washington, Revolutionary War Series*, Vol. 5, 16 June 1776–12 August 1776, ed. Philander D. Chase. Charlottesville: University Press of Virginia, 1993, pp. 208–209.]

This letter from Jonathan Trumbull to George Washington expressed Trumbull's concerns over soldiers being afraid to join and fight in the Continental Army due to smallpox. I used this source to show one way that smallpox damaged the Continental Army during the Revolutionary War.

Trumbull, Jonathan. Letter from Jonathan Trumbull, Sr., to George Washington, 6 July 1776. *Founders Online*. National Archives.
<https://founders.archives.gov/documents/Washington/03-05-02-0159>. [Original source: *The Papers of George Washington, Revolutionary War Series*, Vol. 5, 16 June 1776–12 August 1776, ed. Philander D. Chase. Charlottesville: University Press of Virginia, 1993, pp. 226–228.]

This letter from Jonathan Trumbull to George Washington expanded upon his prior letter as to how smallpox was harming the enlistment of colonial soldiers. I used this source for a quote on how soldiers were very fearful of contracting smallpox when in the Continental Army.

Washington, George. Letter from George Washington to John Hancock, 4 December 1775. *Founders Online*. National Archives.
<https://founders.archives.gov/documents/Washington/03-02-02-0437>. [Original source: *The Papers of George Washington, Revolutionary War Series*, Vol. 2, 16 September 1775–31 December 1775, ed. Philander D. Chase. Charlottesville: University Press of Virginia, 1987, pp. 483–487.]

This letter from George Washington to John Hancock described the threat of smallpox during the siege of Boston. I used this source for a quote from Washington on how the British were using biological warfare by sending infected townspeople out to infect the Continental Army.

Washington, George. Letter from George Washington to John Hancock, 5 February 1777. *Founders Online*. National Archives.
<https://founders.archives.gov/documents/Washington/03-08-02-0268>. [Original source: *The Papers of George Washington, Revolutionary War Series*, Vol. 8, 6 January 1777–27 March 1777, ed. Frank E. Grizzard, Jr. Charlottesville: University Press of Virginia, 1998, pp. 249–253.]

This letter from George Washington to John Hancock ordered Hancock to mandate smallpox variolation for new soldiers in the Continental Army. I used this source to show how Washington mandated smallpox variolation.

Washington, George. Letter from George Washington to Major General Horatio Gates, 5–6 February 1777. *Founders Online*. National Archives.
<https://founders.archives.gov/documents/Washington/03-08-02-0267>. [Original source: *The Papers of George Washington, Revolutionary War Series*, Vol. 8, 6 January 1777–

27 March 1777, ed. Frank E. Grizzard, Jr. Charlottesville: University Press of Virginia, 1998, pp. 248–249.]

This letter from George Washington to General Horatio Gates discussed Washington's concerns over what to do about smallpox ravaging the Continental Army and why Washington was hesitant to mandate variolation earlier. The letter includes a postscript added by Washington which explained that he eventually decided to mandate variolation as that was the only way to solve the crisis of smallpox. I used this source to quote Washington's reasons for not mandating variolation earlier in the war.

Washington, George. Letter from George Washington to Patrick Henry, 13 April 1777. *Founders Online*. National Archives. <https://founders.archives.gov/documents/Washington/03-09-02-0142>. [Original source: *The Papers of George Washington, Revolutionary War Series*, Vol. 9, 28 March 1777–10 June 1777, ed. Philander D. Chase. Charlottesville: University Press of Virginia, 1999, pp. 146–148.]

This letter from George Washington to Patrick Henry discussed Washington's concerns with the variolation ban in Virginia and Henry's hesitancy to promote variolation. I used this source to show Washington's response to governors who did not follow and agree with his variolation mandate.

Washington, George. Letter from George Washington to William Shippen, Jr., 6 February 1777. *Founders Online*. National Archives. <https://founders.archives.gov/documents/Washington/03-08-02-0281>. [Original source: *The Papers of George Washington, Revolutionary War Series*, Vol. 8, 6 January 1777–27 March 1777, ed. Frank E. Grizzard, Jr. Charlottesville: University Press of Virginia, 1998, p. 264.]

This letter from George Washington to William Shippen discussed the importance of mandating and utilizing smallpox variolation in the Continental Army. I used this source for a quote from Washington on the value of variolation and the damage that smallpox did to the Continental Army before using variolation.

Williams, John and James Franklin. *Several Arguments Proving, That Inoculating the Small Pox Is Not Contained in the Law of Physick, Either Natural or Divine, and Therefore Unlawful: Together with a Reply to Two Short Pieces, One by the Rev. Dr. Increase Mather, and Another by an Anonymous Author, Intituled, Sentiments on the Small Pox Inoculated ; and Also, a Short Answer to a Late Letter in the New England Courant. 1721*. Digital Collections, National Library of Medicine. <http://resource.nlm.nih.gov/2577020R>.

This publication by anti-variolation figures like James Franklin argued that variolation went against religious beliefs and defied God. I used this source for information and a quote on religious justifications to variolation.

Woodward, Samuel Bayard. "The Story of Smallpox in Massachusetts." *New England Journal of Medicine* 206, no. 23 (June 9, 1932): 1181–91, reprinting of Annual Discourse delivered by Samuel Woodward before the Massachusetts Medical Society in 1932. <https://doi.org/10.1056/nejm193206092062301>.

This speech delivered by Samuel Woodward, President of the Massachusetts Medical Society in 1932, described the history of smallpox outbreaks in Massachusetts. I used this source for information to better understand the number and size of outbreaks and for a quote about the smallpox death rate.

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Boston National Historical Park. "Smallpox, Inoculation, and the Revolutionary War." *U.S. National Park Service*. 2020. <https://www.nps.gov/articles/000/smallpox-inoculation-revolutionary-war.htm>.

This article published by the National Park Service described the influence of variolation in the Revolutionary War as a whole. I used this source for information on the damage caused by the failed Canadian invasion and the story of General John Thomas.

Buhr, Shawn. "To Inoculate or Not to Inoculate?: The Debate and the Smallpox Epidemic of Boston in 1721." *Constructing the Past*, 1, no. 1, Article 8 (2000): 61-67. digitalcommons.iwu.edu/constructing/vol1/iss1/8.

This article described the 1721 smallpox outbreak in Boston and reactions to the use of variolation during the smallpox. I used this source to better understand the scope of the outbreak, the local attitude to variolation, and the response to Zabdiel Boylston's variolation campaign including the writing of William Douglass.

Centers for Disease Control and Prevention. "What Is Smallpox?" *Centers for Disease Control and Prevention*. 22 Oct. 2024. www.cdc.gov/smallpox/about/index.html.

This article by the CDC provided an overview of smallpox disease and its human health effects. I used this source for information on the health consequences of smallpox.

Children's Hospital of Philadelphia. "Ben Franklin – Pro-Vaccine before Vaccines Were Invented?" *CHOP.edu*. 2016. www.chop.edu/parents-pack/parents-pack-newsletter/newsletter-archive/ben-franklin-pro-vaccine-vaccines-were-invented.

This article published by the Children's Hospital of Philadelphia described Benjamin Franklin's views on vaccination including excerpts from his letters. I used the source for details on Franklin's experiences with smallpox and variolation in Pennsylvania.

Dewey, Frank L. "Thomas Jefferson's Law Practice: The Norfolk Anti-Inoculation Riots." *The Virginia Magazine of History and Biography* 91, no. 1 (Jan. 1983): 39–53. www.jstor.org/stable/4248609, <https://doi.org/10.2307/4248609>.

This journal article in the Virginia Magazine of History and Biography discussed Thomas Jefferson's role in prosecuting the mob in the Norfolk anti-variolation riots. I used this source to show how Jefferson was connected to the history of variolation and to show the impact of variolation bans on getting justice for pro-variolation figures.

Drew, Benjamin A. "George Washington and Smallpox." *JAMA Dermatology* 151, no. 7 (July 1, 2015): 706. <https://doi.org/10.1001/jamadermatol.2015.1>.

This journal article published in JAMA Dermatology's Notable Notes discusses the result of George Washington's efforts to mandate variolation and control smallpox spread. I used this source to describe the impact of Washington writing to Patrick Henry and the removal of the variolation ban in Virginia.

Ellison, Virginia. "January, 1760: A Smallpox Epidemic Sweeps the Lowcountry." *South Carolina Historical Society*. 7 Jan. 2021. schistory.org/january-1760-a-smallpox-epidemic-sweeps-the-lowcountry/.

This article published by the South Carolina Historical Society described the variolation campaign during the 1760 Charleston smallpox outbreak. I used this source as an example of public response to variolation during an outbreak.

Eichman, Destri and Dana Bichianu. "From Cotton Mather to Dr Fauci: Historical Markers of Vaccine Hesitancy." *NeoReviews* 25, no. 4 (1 Apr. 2024): e187–e192. <https://doi.org/10.1542/neo.25-4-e187>.

This report published by the American Academy of Pediatrics briefly summarized the story of Cotton Mather. I used this source for information on Mather's discussions with Onesimus as well as Mather's requests of Zabdiel Boylston.

“Francis Franklin - Constitutional Law Reporter.” *Constitutional Law Reporter*. 28 Nov. 2018. constitutionallawreporter.com/great-american-biographies/francis-franklin/.

This article in the Constitutional Law Reporter discussed Benjamin Franklin’s changing views on inoculation. I used this source for information on Franklin’s actions to promote and spread the practice of variolation throughout the colonies.

Geppert, Cynthia MA, and Reid A Paul. “The Shot That Won the Revolutionary War and Is Still Reverberating.” *Federal Practitioner* 36, no. 7 (July 2019): 298-9. pmc.ncbi.nlm.nih.gov/articles/PMC6654165/.

This journal article published in Federal Practitioner discussed the value of variolation in the Revolutionary War. I used this source for details as to the impact of smallpox on the Continental Army before the implementation of mandatory variolation.

Grimes, David Robert. “The Strange History of the Anti-Vaccine Movement.” *BBC Future*. 7 Sept. 2025. www.bbc.com/future/article/20250905-the-strange-history-of-the-anti-vaccine-movement.

This article from the BBC detailed the history of the anti-vaccination movement from the 1720s to the modern day. I used this source for information on religious justifications for denying variolation, specifically those from Edmund Massey.

Hager, Thomas. “How One Daring Woman Introduced the Idea of Smallpox Inoculation to England.” *Time*. March 5, 2019. <https://time.com/5542895/mary-montagu-smallpox/>.

This article from Time discussed Lady Mary Montagu’s efforts to introduce variolation in England. I used this source to briefly explain how variolation came to England, which works to establish why the British soldiers were more immune to smallpox when the Revolutionary War began.

Haelle, Tara. “Vaccine Hesitancy Is Nothing New. Here’s the Damage It’s Done over Centuries.” *Science News*. 11 May 2021. www.sciencenews.org/article/vaccine-hesitancy-history-damage-anti-vaccination.

This article from Science News discussed the broader history of vaccine and variolation hesitancy. I used this source for background on general justifications of the anti-variolation movement.

Henderson, Patrick. “Smallpox and Patriotism: The Norfolk Riots, 1768-1769.” *The Virginia Magazine of History and Biography* 73, no. 4 (Oct. 1965): 413–424. www.jstor.org/stable/4247156.

This journal article described the events of the Norfolk Riots. I used this source for information on what the anti-variolation mob did during the riots and the impact of these actions.

Housman, Talya. "Variolation vs. Vaccination: 18th Century Developments in Smallpox Inoculation." *The Beehive* (Massachusetts Historical Society). 12 May 2020. www.masshist.org/bee hiveblog/2020/05/variolation-vs-vaccination-18th-century-developments-in-smallpox-inoculation/.

This article by Talya Housman published by the Massachusetts Historical Society briefly discussed the history of variolation from Zabdiel Boylston's perspective with specific details on William Douglass' pamphlet admitting the benefits of variolation. I used this source to gain unique insight into the views of both variolation supporter Boylston and variolation opponent Douglass.

Institute of Medicine (US) Board on Health Promotion and Disease Prevention. "Scientific Background on Smallpox and Smallpox Vaccination." In *Scientific and Policy Considerations in Developing Smallpox Vaccination Options: A Workshop Report*. National Academies Press, 2002. www.ncbi.nlm.nih.gov/books/NBK221063/.

This report from the Institute of Medicine reviewed smallpox disease and smallpox vaccination. I used this source for the case-fatality rate of smallpox in colonial America.

Landrigan, Leslie. "The 1730 and 1774 Marblehead Riots against Smallpox Inoculation." New England Historical Society. 4 Feb. 2015. newenglandhistoricalsociety.com/1730-1774-marblehead-riots-smallpox-inoculation/.

This article published by the New England Historical Society describes the response to variolation in Marblehead, Massachusetts. I used this source to provide an example of a local jurisdiction with a violent response to variolation.

Larsson, Paula. "The Inherent Racism of Anti-Vaxx Movements." *Alliance for Science*. 19 July 2021. allianceforscience.org/blog/2021/07/the-inherent-racism-of-anti-vaxx-movements/.

This article by the Alliance for Science analyzed the racial justifications for denying vaccination/variolation from the 1700s to today. I used this source for information on the racial component of the anti-variolation movement.

Lawler, Andrew. "How a Smallpox Epidemic Nearly Derailed the American Revolution." *History*. 16 Apr. 2020. www.nationalgeographic.com/history/article/george-washington-beat-smallpox-epidemic-with-controversial-inoculations.

This article in National Geographic discussed the impact of smallpox on the American Revolution. I used this source for details on the impact of George Washington mandating smallpox variolation on the rates of smallpox in the Continental Army and insight on Washington's personal beliefs about variolation.

"Lessons from a Revolutionary Epidemic." *The American Revolution Institute*. 1 Apr. 2020. www.americanrevolutioninstitute.org/lessons-from-a-revolutionary-epidemic/.

This article by the American Revolution Institute discussed the smallpox epidemic going on during the Revolutionary War. I used this source for details on smallpox's military and strategic effects, specifically related to the attempted invasion of Canada.

Minardi, Margot. "The Boston Inoculation Controversy of 1721-1722: An Incident in the History of Race." *William and Mary Quarterly* 61, no. 1 (1 Jan. 2004): 47. <https://doi.org/10.2307/3491675>.

This scientific article by Margot Minardi and published in the William and Mary Quarterly reviewed the impact of Onesimus on variolation practice through Cotton Mather. I used this source for details on the interactions between Mather and Onesimus.

The Mount Vernon Ladies' Association. "Smallpox." *George Washington's Mount Vernon*. Accessed February 2, 2026. <https://www.mountvernon.org/library/digitalhistory/digital-encyclopedia/article/smallpox>.

This article published by The Mount Vernon Ladies' Association discussed Washington's efforts to contain smallpox during the siege of Boston. I used this source for details about how Washington worked against the spread of smallpox before mandating variolation and how he prevented the Continental Army from a smallpox outbreak even as the British used purposefully tried to infect the Continental Army.

Najera, René F. "American Presidents and Vaccines: Thomas Jefferson and the Virginia Inoculation Riots." *The History of Vaccines*. 19 June 2021. historyofvaccines.org/blog/american-presidents-and-vaccines-thomas-jefferson-and-the-virginia-inoculation-riots.

This article by an epidemiologist at the Philadelphia College of Physicians discussed the Norfolk Riots over variolation in Virginia. I used this source to detail the physical damage caused by the Norfolk Riots.

Najera, René F. “Black History Month: Onesimus Spreads Wisdom That Saves Lives of Bostonians during a Smallpox Epidemic.” *The History of Vaccines*. 7 Feb. 2020. historyofvaccines.org/blog/black-history-month-onesimus-spreads-wisdom-that-saves-lives-of-bostonians-during-a-smallpox-epidemic-2.

This article by an epidemiologist at the Philadelphia College of Physicians discussed the story of Onesimus and the controversy that arose due to variolation’s origins being from an enslaved African. I used this source for background on Onesimus as well as the racial opposition to variolation.

Najera, René F. “The History of Variolation.” *The History of Vaccines*. 5 June 2021. historyofvaccines.org/blog/the-history-of-variolation.

This article by an epidemiologist at the Philadelphia College of Physicians discusses the overall history of variolation. I used this source for general understanding of variolation’s history and about the effects of the Norfolk Riots in Virginia.

Najera, René F. “Washington’s War Against Smallpox: The Revolutionary Inoculation Campaign.” *The History of Vaccines*. 7 Apr. 2025. historyofvaccines.org/blog/washingtons-war-against-smallpox-revolutionary-inoculation-campaign.

This article by an epidemiologist at the Philadelphia College of Physicians describes Washington’s concerns over smallpox’s impact on the Revolutionary War and how he mandated variolation to counteract the spread of smallpox. I used this source for information about why Washington had banned variolation initially and why Washington eventually changed his mind.

Riedel, Stefan. “Edward Jenner and the History of Smallpox and Vaccination.” *Baylor University Medical Center Proceedings* 18, no. 1 (18 Jan. 2005): 21–25. www.ncbi.nlm.nih.gov/pmc/articles/PMC1200696/, <https://doi.org/10.1080/08998280.2005.11928028>.

This scientific article by Stefan Riedel detailed the history of smallpox variolation and vaccination from the 1720s to the 1820s. I used this source for information on the statistical approach used by Cotton Mather and Zabdeil Boylston to prove the effectiveness of variolation.

Sivils, Matthew Wynn. “Dissecting the Pamphlet Literature of the Boston Smallpox Inoculation Controversy.” *Literature and Medicine* 29, no. 1 (2011): 39–57. <https://doi.org/10.1353/lm.2011.0315>.

This article published in Literature and Medicine discussed the pamphlets in support of and objecting to variolation in colonial Boston. I used this source for the views of the pro-variolation and anti-variolation figures of the time as well as details on Cotton Mather's motivations to pursue variolation.

St. Luke's Historic Church & Museum. "Against All Odds: George Washington, Smallpox, and the American Revolution" *St. Luke's Historic Church & Museum Blog*. April 27, 2020. <https://stlukesmuseum.org/edu-blog/against-all-odds-george-washington-smallpox-and-the-american-revolution/>.

This article published by St. Luke's Historic Church & Museum described George Washington's efforts to counteract smallpox during the Revolutionary War. I used this source for information on the impact of smallpox on the failed Canadian invasion including statistics on how many soldiers contracted smallpox.

Tharian, Bindu. "Smallpox." *New Georgia Encyclopedia*, last modified Jul 20, 2018. <https://www.georgiaencyclopedia.org/articles/science-medicine/smallpox/>.

This article published by the New Georgia Encyclopedia provides information about smallpox in Georgia. I used this source to describe the 1768 Georgia law banning variolation, which illustrated that Virginia was not alone in outlawing variolation.

Thursfield, Hugh. "Smallpox in the American War of Independence." *Annals of Medical History* 2, no. 4 (July 1940): 312. <https://pmc.ncbi.nlm.nih.gov/articles/PMC7942582/?page=3>.

This journal article published in the Annals of Medical History described the overall impact of smallpox on the Revolutionary War including details on the Boston and Canadian encounters. I used this source to explain smallpox's effects on the siege of Boston to both the British and Continental armies.

Turner, Matthew D. and Jason Sapp. "Washington's Victory over Smallpox, Military Medicine" *Military Medicine* 190, issue 9-10 (Sept/Oct 2025): 216–218. <https://doi.org/10.1093/milmed/usae497>.

This journal article published by Military Medicine in Oxford Academic discussed Washington's strategies in controlling the spread of smallpox during various encounters with the disease. I used this source to explain how the Continental Army was able to protect itself from smallpox during the siege of Boston.

"Washington Inoculates an Army." *American Battlefield Trust*. 26 Jan. 2017. www.battlefields.org/learn/articles/washington-inoculates-army.

This article from American Battlefield Trust details the actions Washington took to mandate variolation in the Continental Army. I used this source for an overview of

Washington's views on smallpox in the Continental Army and his efforts to mandate variolation.

Widmer, Ted. "How an African Slave Helped Boston Fight Smallpox." *The Boston Globe*. 17 Oct. 2014. www.bostonglobe.com/ideas/2014/10/17/how-african-slave-helped-boston-fight-smallpox/XFhsMMvTGcV62YP0XhhZI/story.html.

This editorial from the *Boston Globe* discussed Cotton Mather's story, the various kinds of opposition he faced, and the 1721 smallpox outbreak in Boston. I used this source to quote Mather's opponents, for background information on Mather's life, and for statistics on the impact of the smallpox outbreak.

Wisecup, Kelly. "African Medical Knowledge, the Plain Style, and Satire in the 1721 Boston Inoculation Controversy." *Early American Literature* 46, no. 1 (2011): 25–50. <https://doi.org/10.1353/eal.2011.0004>.

This article published in *Early American Literature* examined the opposition to Cotton Mather's variolation proposal. I used this source for details and quotes on William Douglass' justifications for opposing variolation.