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Pandemic Perspectives

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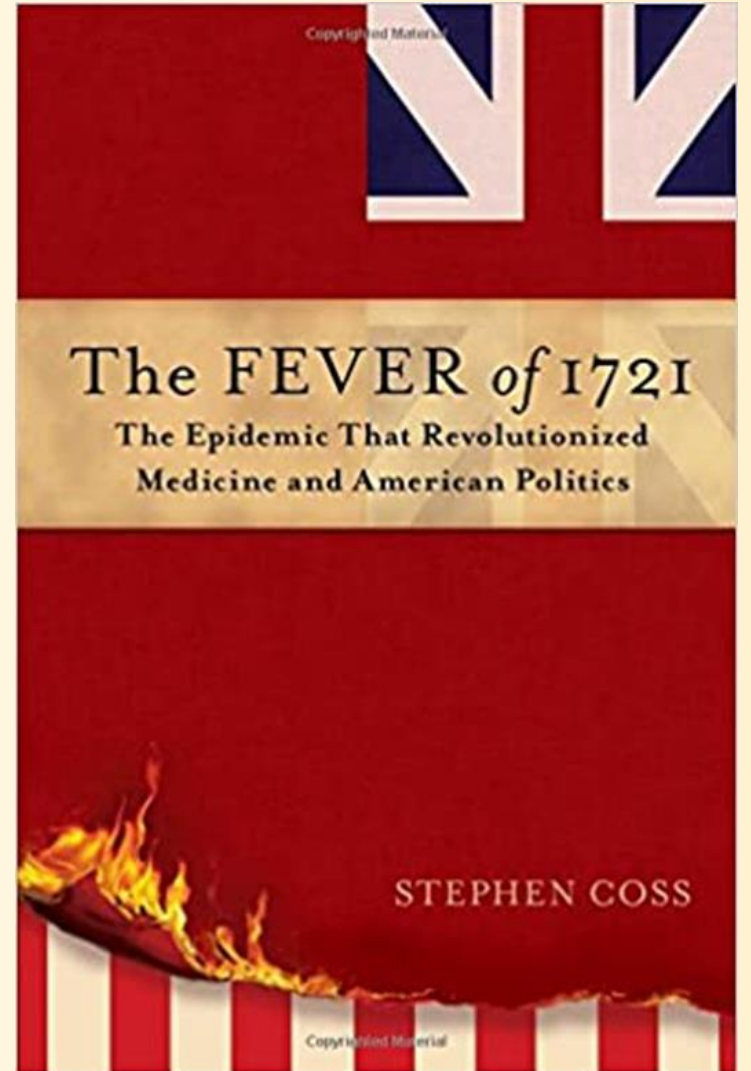
The Boston Smallpox Epidemic of 1721

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Smallpox in 18th Century Boston

- This presentation draws heavily on Stephen Coss, *The Fever of 1721: The Epidemic That Revolutionized Medicine and American Politics* (New York: Simon & Schuster, 2016)
- “The Boston smallpox epidemic of 1721 was the turning point in the eradication of history’s deadliest disease. It was also the catalyst for the coming of age of Benjamin Franklin and the beginning of American independence. It was a year that changed the course of medical history, American journalism, and colonial revolution.”



Origins of Smallpox

- Smallpox is an infectious disease unique to humans, caused by one of two virus variants, *Variola major* and *Variola minor*
- Smallpox localizes in small blood vessels of the skin and in the mouth and throat, which results in the characteristic maculopapular rash and, later, raised fluid-filled blisters
- Smallpox may have arisen in the human population as early as 10,000 BCE
- The earliest physical evidence of the disease is the pustular rash on the mummified body of Pharaoh Ramses V of Egypt, who died in 1157 BCE



Smallpox victim with the typical rash and blisters
(Credit: Coss)



Boston, 1721

- Smallpox was highly contagious, and mortality could reach as high as 30 percent
- Boston had been plagued by smallpox outbreaks in 1690 and 1702, and measles in 1713
- The only protection from smallpox was having previously been exposed; hence, outbreaks tended to be periodic
 - In Boston, epidemics tended to appear in a twelve-year cycle, striking new vulnerable populations
 - Native Americans, with no immunity, were especially decimated [see Karen Marrero's presentation, "[Smallpox Epidemics among Indigenous People](#)"]: the first outbreak of smallpox in colonial New England in 1622 killed 950 of the approximately 1,000 indigenous people who contracted the disease



Transmission

- Boston, with its deep harbor, was the main trading port in New England, with ships regularly arriving from England after a two-month, 3,280-mile voyage
- The main vectors for spreading disease were sailing vessels with infected sailors: ship captains with ill crew members were expected to dock voluntarily at an offshore island that served as a public quarantine hospital or “pest house”
 - Isolation and quarantine were the means of protecting the population from deadly contagious diseases: smallpox, measles, yellow fever, and the plague



HMS *Seahorse*

- This containment system worked well until breached by the captain of the *Seahorse*, who failed to dock at Spectacle Island (instead landing at Castle Island), arriving in Boston Harbor on 27 April 1721
- Captain Durrell was returning from Barbados, where smallpox had recently struck; he allowed ill sailors to enter the town



City of Boston, c. 1721

Credit: J. Carwitham (active 1720-1740), Yale Center for British Art (public domain)



Politics and the Pandemic

- As Stephen Coss describes, the political leadership in Boston in 1721 was fraught with open antagonism between the Crown-appointed Governor and the rebellion of influential anti-Crown political leaders, both within and outside of government legislative bodies, the Massachusetts House and the General Court
- This political wrangling influenced the government's response to early news, reported on 29 May, that eight individuals residing in different areas of the town were ill with smallpox
 - Officials initially played down the outbreak



Religion and the Pandemic

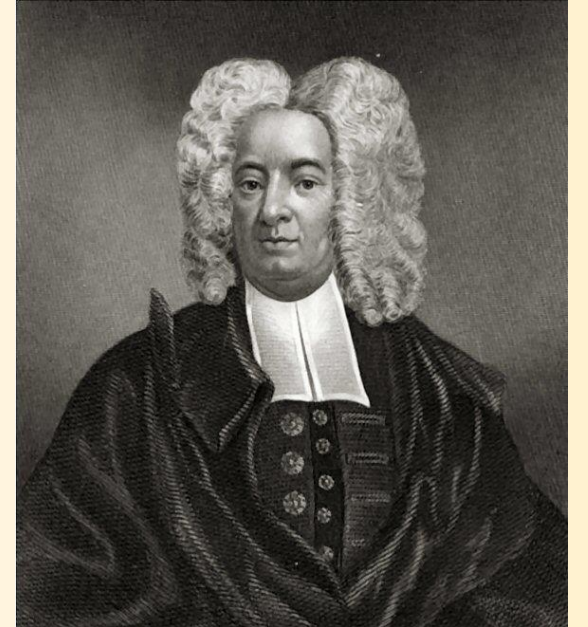


- In a city founded by Puritans and governed by officials who were members of the Church of England, religion was an element that influenced political discourse
- Congregationalists, moreover, were divided into two camps:
 - a conservative, ultra-orthodox faction
 - a liberal yet orthodox group
- With memory of the 1692 Salem witch trials still fresh, a new proposal to counter the smallpox epidemic through introducing *variolation* (or inoculation) was controversial



Cotton Mather

- Cotton Mather, son of Increase Mather, a prominent Congregational cleric, physician, and president of Harvard College, was minister at North Church, one of Boston's largest congregations
- Having played a role in the Salem witch trials by affirming the belief that individuals could be possessed by the Devil, Mather was both influential and controversial
- Like many ministers, he had a particular interest in natural philosophy [science], greatly influenced by Robert Boyle; he began contributing pieces published in the prestigious *Philosophical Transactions* of the Royal Society of London in the 1710s and later became a Fellow
 - He cultivated Boston's physicians and intellectuals



Cotton Mather
(1663-1728)

Credit: Peter Pelham, artist,
c. 1700 (public domain)



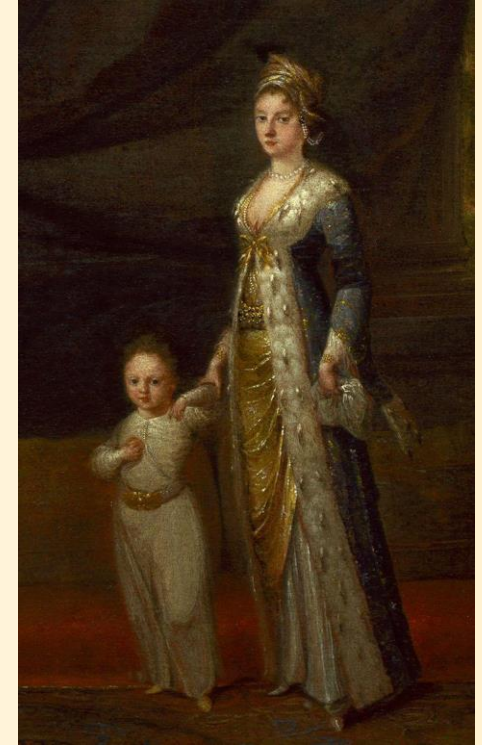
Introduction of *Variolation* to New England

- Mather read an article in the *Phil Trans* entitled “An Account, or History, of the Procuring the SMALL POX by Incision, or Inoculation: as It Has for Some Time Been Practised at Constantinople” (1716) by Dr. Emanuel Timoni, an Oxford-educated Italian and physician to the British ambassador to Turkey
- Just months earlier, Mather heard a similar account from Onesimus, one of his slaves; when Mather asked him whether he had ever had smallpox, he said: “both *Yes*, and *No*,” explaining that as a boy in Africa he had “undergone an Operation, which had given him something of ye *Small-Pox*, & would forever Praeserve him from it.”
 - Inquiring of other Africans in Boston, Mather learned that many others had been inoculated as boys
 - We now know this practice (developed in China c. 1000 CE) was extensively practiced in Africa (especially the Western and Central Sudan, Ethiopia, and Southern Africa) as well as in Asia (the Ottoman Empire and India)



Lady Mary Wortley Montagu

- Lady Mary Wortley Montagu (1689 –1762), wife of the British ambassador to Turkey, learned about inoculation from Dr. Timoni, her family physician, and from Turkish women
 - She wrote home about the procedure, stating: “There is a set of old women, who make it their business to perform the operation, every autumn ... when then great heat is abated ... thousands undergo this operation ... [and there] is not one example of anyone that has died in it.”
- Having survived smallpox when her brother died, she decided in 1718 to have her son inoculated, who was the "first English person to undergo the operation"; she had her next child, a daughter, inoculated in 1721 after the family returned to London
- As England was also experiencing an epidemic of smallpox, Lady Montague enthusiastically promoted the procedure, despite resistance from the British medical establishment
 - Many elite British physicians were skeptical of what they considered an “Oriental folk treatment”



Lady Mary Montagu
with her son Edward.
*Painting by Jean-
Baptiste van Mour*



Support of Aristocratic Women

- Despite the reticence of British physicians, Lady Montagu encouraged Caroline, Princess of Wales, to variolate her two daughters
 - Having herself experienced disfigurement from smallpox, Lady Mary knew full well that the disease could endanger the marriage prospects of young women
- To assure herself of the safety of the procedure, the Princess Caroline first had several prisoners and an orphan girl variolated; after all had successfully recovered, she had the royal children treated in 1722
- Sanctioned by such influential aristocratic women, over the next two decades, more than 800 people in Britain underwent variolation



Mather and the Boston Physicians

- Believing this procedure might save many lives, Mather determined to act when another outbreak occurred in Boston
 - “For my own part, if I should live to see ye Small-Pox again enter into or [our] City, I would immediately procure a Consult of or [our] physicians, to Introduce a Practise which may be of so very happy a Tendency.”
 - During the 1713 measles epidemic, Mather had lost his wife, newborn twins, and two-year-old daughter, which may have influenced this decision
- When the smallpox struck in 1721, he put these plans into action: in early June he circulated a letter among the city’s physicians about this procedure, citing the *Phil Trans* article and the testimony of Africans and offering a description of how the procedure was performed



The Procedure

- As Mather described it, an infected but healthy young person should be found and, using a needle, fluid should be withdrawn from pustules and placed into a clean vial
- The vial contents should be swiftly taken to the recipient and transferred via one or two cuts made in their arms, mixing the fluid with blood and then covering the wound with part of a walnut shell secured in place so that “the matter may not be rubbed off by the garments, for a Few Hours” (Coss, 79)
- After a few days, the individual usually experienced a mild outbreak of smallpox, which generally dried quickly and fell off without leaving a permanent mark, and giving them immunity



Depiction of Dr. Zabdiel Boylston inoculating a child (“Zabdiel Boylston,” geni.com)



The Response of Boston Physicians

- Among the thirteen physicians and several apothecaries who received Mather's missive, only one—Zabdiel Boylston—was receptive and agreed to attempt the procedure
- The most prominent physician in Boston, the Scot William Douglass (c. 1691–1752), with a medical degree from Utrecht and having attended courses in Leiden and Paris, was adamantly opposed, viciously leading an attack on Mather and Boylston over the course of the next few months
 - Physicians rejected a practice of giving someone a disease, even to save them from dying of it; such a practice violated the Hippocratic oath to “Do no harm” and could even open them to charges of murder
 - Moreover, as in Britain, there was prejudice against a procedure associated with Oriental and African practices: “Westerners simply couldn't accept that ‘heathens’ and ‘primitives’ had it upon so profound a discovery” (Coss, p. 87)



Zabdiel Boylston's "Experiment"

- Boylston (1679/80-1766) had no medical degree but apprenticed in medicine under his father, English surgeon Thomas Boylston, and Dr. Cutter of Boston
- Boylston had previously shown a willingness to try new medical procedures: he performed the first surgical removal of gall stones in 1710 and a breast tumor in 1717
- He began his experiment on 26 June, inoculating his six-year-old son Thomas and three of his slaves, who assisted him in his medical practice



Boylston's instruments. For inoculation, he used a toothpick rather than a lance to reduce fear.

Credit:

<http://www.pitt.edu/~super1/lecture/lec38991/031.htm>



Official, Professional, and Public Rebuke

- Boylston was ordered to appear before the General Court, Boston's legislative body, on 21 July, who warned him to desist
- He also suffered attacks by Douglass and other physicians, as well as from clerics (who believed smallpox was God's will), and prominent citizens, including pieces published in James Franklin's *New-England Courant* (the first independent newspaper in the colonies)
- Cautiously, as the epidemic raged in August and peaked in September and October, Boylston continued to inoculate anyone who wanted the procedure, charging £4 (which restricted the procedure to the well-to-do)



Mather and Boylston

- Cotton Mather, under attack for his anonymous yet poorly veiled attacks on his critics, calling them a “Hell-Fire Club,” failed to publicly support Boylston, yet he asked him to variolate his son Samuel, a student at Harvard and his only surviving heir
 - He had lost one daughter, Hannah, to the epidemic and another, Abigail, and her newborn child to an illness of unknown causes
 - Of Mather’s 15 children, 11 had died, and only two survived him
- In August and September, despite the town’s warning, Boylston performed more variolations, including on members of prominent political families (including Samuel Adams Sr. and his wife Mary, parents of Founding Father, Samuel Adams, Jr., born in 1722)



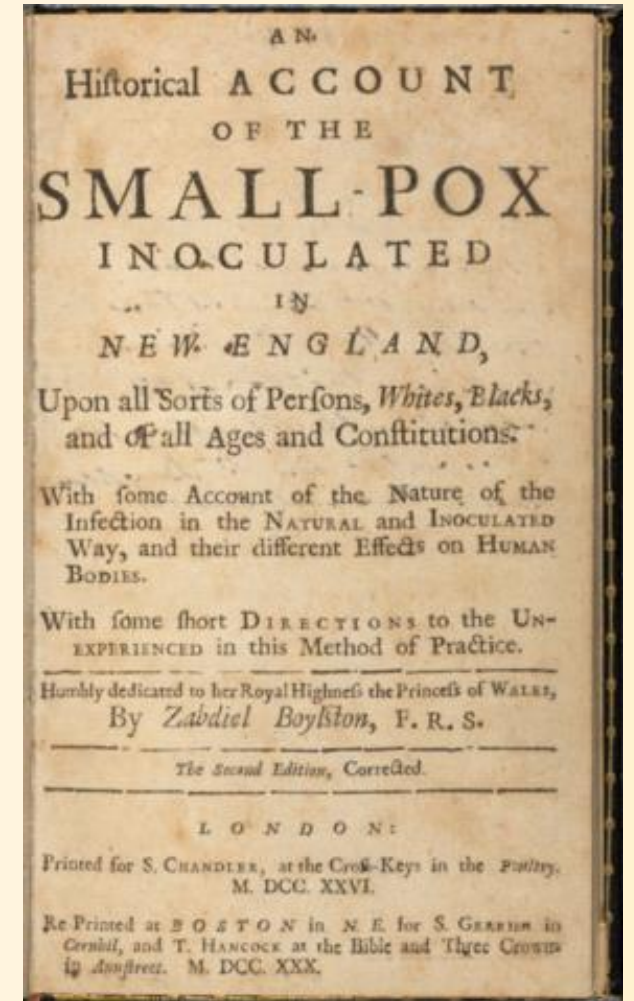
Deadly Autumn of 1721 – Then an End

- The month of October was more virulent still, and Boston resembled a ghost town, with all commerce on hold and funerals the only major activity
- As the epidemic ended in early 1722, out of the town's 11,000 residents, 6,000 contracted the disease and 844 died
- Boylston inoculated 280 persons, of whom 6 died (and these he believed were already in poor health)
- This 2.4 percent death rate was dramatically lower than the 14 percent death rate of those who contracted the disease naturally
- Mortality among the elderly and children was 50 percent



Boylston's Later Life

- Although he had saved lives (and pocketed £950), Boylston's career suffered because of his experiment
 - Not only did his reputation suffer, but he and his family's safety were threatened
- He did, however, receive recognition from medical and scientific authorities: in 1725 he went to London to appear at the Royal Society, introduced, in Mather's words, as "the Gentleman who first brought the way of saving Lives by the Inoculation of the Small-Pox, into the *American* world" (Coss, p. 196)



Boylston published his case statistics in a book of 1726



Edward Jenner and Vaccination

- In future decades, with smallpox endemic in England and regularly killing around 10 percent of the population (20 percent in cities), variolation was performed but with hesitation
- Physicians became interested in reports that milkmaids who had contracted cowpox (similar to smallpox, but much less virulent) appeared immune to smallpox
- In the 1790s, country physician Edward Jenner hypothesized that the pus in the cowpox blisters protected milkmaids from smallpox and he proceeded to test his theory



Edward Jenner
(1749-1823)

Credit: Wellcome
Collection Gallery,
V0023503.jpg



Proof of the Efficacy of *Vaccination*



- On 14 May 1796, Jenner inoculated James Phipps, the eight-year-old son of his gardener, scraping pus from cowpox blisters on the hands of a milkmaid with cowpox and transferring it into the boy's lanced arms; Phipps developed a fever and some sickness, but did not experience a full-blown infection
- To test Phipps' immunity to smallpox, Jenner then injected him with *variola* material, repeating this again when the boy did not become infected
- Emboldened, Jenner tested the procedure on 23 more subjects, none of whom became ill, thus showing that vaccinating with cowpox could provide immunity to smallpox



Women and the Acceptance of Vaccination

- Jenner's success was widely lauded, and despite the opposition of a faction of physicians who objected to injecting animal material into humans, the procedure was increasingly accepted in England and transmitted to other countries
- Women were particularly involved in promoting Jenner's views, spreading acceptance and even performing vaccinations: traditional protectors of children, many—both upper and middle class women—not only vaccinated their own children but helped extend the practice to the lower classes
- As Michael Bennett notes, just as Lady Mary Wortley Montagu aided the spread of variolation in the 1720s, in the early 19th century, “women were crucial to the rapid establishment of the new practice [of vaccination]: as mothers with experience of smallpox and cowpox; as discerning consumers and disseminators of medical knowledge; and as activists, in terms of both patronage and practice.”



Eradication of Smallpox

- Despite the increasing spread of vaccination throughout the 19th century, smallpox was responsible for an estimated 300-500 million deaths during the 20th century
 - In the early 1950s, around 50 million cases of smallpox occurred in the world each year
- As recently as 1967, the World Health Organization (WHO) estimated that 15 million people contracted the disease and 2 million died
- After conducting extensive vaccination campaigns, especially in non-industrialized countries, WHO was able to certify the eradication of smallpox in December 1979, the only human infectious disease to have been eradicated



Additional Reading

- Supercourse: epidemiology, the internet, and global health. University of Pittsburgh.
<http://www.pitt.edu/~super1/index.htm>; <http://www.pitt.edu/~super1/lecture/lec38991/024.htm>
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- Paul Saunders, *Edward Jenner, the Cheltenham Years, 1795-1823: Being a Chronicle of the Vaccination Campaign*. Hanover, N.H.: University Press of New England, 1982.

