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Smallpox in Washington's Army: Strategic Implications of the Disease During the American Revolutionary War

Ann M. Becker

Abstract

The prevalence of smallpox during the early years of the American War for Independence posed a very real danger to the success of the Revolution. This essay documents the impact of the deadly disease on the course of military activities during the war and analyzes smallpox as a critical factor in the military decision-making process. Historians have rarely delved into the significant implications smallpox held for eighteenth-century military strategy and battlefield effectiveness, yet the disease nearly crippled American efforts in the campaigns of 1775 and 1776. Smallpox was a major factor during the American invasion of Canada and the siege of Boston. Rumors over the British use of biological warfare, controversy over inoculation, and attempts to control the spread of smallpox all impeded the progress of the war. Recruitment was adversely affected, desertions increased, and commanding officers were forced to proceed with inadequate forces because of smallpox. This frightening disease affected the actions of the Revolutionary army and its generals, reduced the American ability to attract and hold recruits, and influenced the controversial development of preventive medical policies.

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"THE Smallpox! The smallpox! What shall we do with it?" So mourned John Adams as he contemplated the collapse of the American Northern Army's Canadian campaign in June 1776.[1] Adams's poignant lamentation indicates the scope and magnitude of the contemporary response to the problems caused by this disease during the American Revolution.

The conditions under which the American Revolutionary War was fought have long been discussed and debated by historians. Scholars have addressed the difficulties of supplying the army, the problems of morale and desertion, the mutinies, and the debates over officer's pensions, as well as the details of Revolutionary War battles. One particular aspect of the sufferings of General George Washington's army to which little attention has been given, however, is the prevalence of smallpox during the war. Many histories of the Revolution accept that the smallpox virus was a destructive force during the early years of the war; however, they do not examine its impact on military matters in a substantive way. The fact that smallpox was instrumental to the American defeat in Canada is merely mentioned in passing, with little attempt to analyze primary sources in detail to explain how or why the disease affected military strategy.[2]

1. Peter Force, *American Archives Consisting of a Collection of Authentick Records, State Papers, Debates and Letters and Other Notices of Public Affairs, the Whole Forming a Documentary History of the Origin and Progress of the North American Colonies* (Washington: n.p., 1837–53), 4:6, 1083.

2. Alan Bowman, *The Morale of the American Revolutionary Army* (Port Washington, N.Y.: Kennikat Press, 1964); James Kirby Martin and Mark Edward Lender, *A Respectable Army: The Military Origins of the Republic* (Arlington Heights, Ill.: Harlan Davidson, 1982); Richard M. Ketchum, *The Winter Soldiers* (Garden City, N.Y.: Doubleday, 1973); Lynn Montross, *Rag, Tag, and Bobtail: The Story of the Continental Army, 1775–1783* (New York: Harper and Brothers, 1952); and Louis C. Duncan, *Medical Men in the American Revolution, 1775–1783* (Carlisle Barracks, Pa.: Medical Field Services School, 1931); Robert M. Hatch, *Thrust for Canada: The American Attempt on Quebec in 1775–1776* (Boston: Houghton Mifflin, 1979), 182–85; James Kirby Martin, *Benedict Arnold: Revolutionary Hero* (New York: New York University Press, 1997), 163–64, 205; Elizabeth A. Fenn, *Pox Americana: The Great Smallpox Epidemic of 1775–1782* (New York: Hill and Wang, 2001); Philip Cash, *Medical Men at the Siege of Boston* (Philadelphia: American Philosophical Society, 1973); Hugh Thursfield, D.M., "Smallpox in the American War of Independence," *Annals of Medical History* 2 (1940): 317; Hans Zinsser, *Rats, Lice and History* (Boston: Little, Brown, 1935), 15. Zinsser discusses the worldwide impact of disease from ancient times and notes that various diseases have dramatically affected military activity throughout history. He does not, however, focus on the American Revolution or smallpox in particular. See also James E. Gibson, "The Role of Disease in the 70,000 Casualties of the American Revolution," *Transactions and Studies of the College of Physicians of Philadelphia* 17 (December 1949): 121–27; James E. Gibson, "Smallpox and the American Revolution," *General Magazine and Historical Chronicle* 51 (1948): 55–57; D. Bardell, "Smallpox during the American War of Independence," *ASM News* 42 (1976): 526–30; R. B. Stark, "Immunization Saves Washington's Army,"

The focus of this paper is the impact of smallpox on soldiers and on military strategy during the American Revolutionary War. Smallpox was an especially critical factor during the Canadian campaign and George Washington's siege of Boston during 1775 and 1776. Rumored British use of biological warfare, controversy over the need for inoculation, and attempts to control the spread of smallpox all influenced the progress of the War for Independence. The prevalence of smallpox adversely affected recruitment, increased desertions, and forced commanding officers to proceed with inadequate forces in the face of the disease. Smallpox was a formidable foe for the combatants during the first years of the war, and military strategy was altered to compensate for its dangers.

In North America, smallpox appeared periodically in epidemics and was universally feared, whereas in Europe it was primarily an endemic disease generally suffered in childhood, particularly in urban areas.[3] Medical historian Patricia Watson describes smallpox as a "sudden and terrifying scourge" for American colonists in the same way the plague was for Europeans. British historian Thomas Babington Macaulay asserts, "That disease . . . was then the most terrible of all the ministers of death. The havoc of the Plague had been far more rapid; but the Plague had visited . . . once or twice and the smallpox was always present, . . . tormenting with constant fears all whom it had not yet stricken, leaving on those whose lives it spared the hideous traces of it power."[4]

Surgery, Gynecology and Obstetrics 144 (March 1977): 425–31; Terrence C. Davies, M.D., "American Medicine During the Revolutionary Era," *Journal of the Medical Association of the State of Alabama* 6 (November 1976): 34–36; Joseph M. Miller, M.D., "Vignette of Medical History: George Washington and Smallpox," *Maryland Medical Journal* 43 (May 1994): 457–58; Stanhope Bayne-Jones, *The Evolution of Preventive Medicine in the United States Army, 1607–1939* (Washington: Office of the Surgeon General, Department of the Army, 1968); Solon S. Bernstein, "Smallpox and Variolation: Their Historical Significance in the American Colonies," *Journal of the Mount Sinai Hospital* 18 (1951): 228.

3. For a description of the physical effects of smallpox, including the incubation period and symptoms, see Elizabeth A. Fenn, "Biological Warfare in 18th Century North America: Beyond Jeffrey Amherst," *Journal of American History* 86 (March 2000): 122; James Thomas Flexner, *Doctors on Horseback: Pioneers of American Medicine* (Garden City, N.Y.: Doubleday, 1939), 4; Sylvia Frey, *The British Soldier in America: A Social History of Military Life in the Revolutionary Period* (Austin: University of Texas Press, 1981), 43–44. An endemic disease is defined as one where the infection is always present within a certain population, while an epidemic is the periodic outbreak of disease as a susceptible population is born or moves to an area. For a description of public reaction to smallpox, see Daniel J. Boorstin, *The American Colonial Experience* (New York: Random House, 1958), 214–20.

4. Patricia A. Watson, *The Angelic Conjunction: Preacher-Physicians of Colonial New England* (Knoxville: University of Tennessee Press, 1991), 15; Thomas Babington Macaulay, *History of England* (London: Macmillan, 1913–15, 1957), quoted in Bernstein, "Smallpox and Variolation." Watson writes: "In New England, [smallpox] was sporadic, and the isolation of the individual towns often prevented it

Caused by the variola virus and extremely contagious, smallpox was the most "deforming and lethal of the plague-like epidemics of the seventeenth and eighteenth centuries."[5] According to medical historian Donald R. Hopkins, for "the suddenness and unpredictability of its attack, the grotesque torture of its victims, the brutality of its lethal or disfiguring outcome, and the terror that it inspired, smallpox was unique among human diseases."[6] Smallpox could pit the skin grotesquely, make eyebrows and lashes fall out, result in scarring so severe as to close up the nostrils, and cause blindness. Those disfigured by the disease suffered social ostracism, and some even committed suicide.[7] The outbreak of smallpox often resulted in widespread flight from affected areas. In 1721 William Tumain reported in a letter to a friend in London: "the Small Pox broke in upon the City of Boston, where it very much appeared withe the Terrors of Death to the Inhabitants."[8] During this epidemic, an estimated nine hundred of ten thousand people left Boston to avoid the infection. In 1751, when another epidemic threatened the city, over eighteen hundred of the fifteen thousand residents fled to the country,[9] believing that

from being transported from one area to another. With each successive generation, the population grew steadily, rapidly producing new groups of non-immune children. The effect was a regular increase in the frequency of epidemics." For a detailed discussion of smallpox in Britain, see S. R. Duncan, Susan Scott, and C. J. Duncan, "Smallpox Epidemics in Cities in Britain," *Journal of Interdisciplinary History* 25 (Autumn 1994): 255–71.

5. Stark, "Immunization Saves Washington's Army," 425; Thursfield, "Smallpox in the American War of Independence," 313.

6. Donald R. Hopkins, *Princes and Peasants: Smallpox in History* (Chicago: University of Chicago Press, 1983), 3; see Lester S. King, M.D., *Transformations in American Medicine: From Benjamin Rush to William Osler* (Baltimore, Md.: Johns Hopkins University Press, 1991), 68, 71, and 76, for a description of smallpox, its symptoms, its indications, and its properties; John Duffy, *Epidemics in Colonial* America (Baton Rouge: Louisiana State University Press, 1953), 16; John B. Blake, *Public Health in the Town of Boston, 1630–1822* (Cambridge, Mass.: Harvard University Press, 1959), 17 and 107; J. Worth Estes, "The Practice of Medicine in 18th Century Massachusetts: A Bicentennial Perspective," *New England Journal of Medicine* 305 (October 1981): 1040–47.

7. Francis D. Moore, "Zabediel Boylston and Colonial Surgery," *Bulletin of the American College of Surgeons* 68 (May 1983): 13; Stark, "Immunization Saves Washington's Army," 425.

8. William Tumain (?), *An Account of the Method and Success of Inoculating the Small-Pox, in Boston in New-England* (London: J. Peele, 1722), quoted in John Harley Warner and Janet A. Tighe, eds., *Major Problems in the History of American Medicine and Public Health* (Boston: Houghton Mifflin, 2001), 31.

9. Duffy, *Epidemics in Colonial America,* 23; Blake, *Public Health in the Town of Boston,* 109. The population of Boston in 1721 was 10,700.

only by avoiding contact with those already afflicted could they prevent infection.[10]

Part of the exanthemata group of specific diseases and related to measles and chicken pox, smallpox was identified by the particular or peculiar characteristics of its symptoms. These initially included headache, chills, backache, high fever, vomiting, and anxiety, which occurred approximately twelve days after exposure. About four days after the first symptoms, a rash broke out on the face, chest, arms, back, and legs. The first sores of smallpox appeared in the mouth, throat, and nasal passages, and soon erupted on the skin's surface. The pustules were raised and tended to concentrate on the soles of the feet, palms, face, forearms, neck, and back. They were either discrete or distinct, or in the more severe confluent smallpox, ran together into an oozing mass. Smallpox victims often developed a telltale pungent, sweetish odor as a result of the cracking and running of the sores, and victims suffered in agony as the disease progressed. Scabbing began about ten days after the eruption of the pocks. By the fourth week, if the patient survived, unsightly, permanent scarring became evident in many cases. The disease was contagious from the appearance of the first symptoms until the last scab fell off about four weeks later.[11]

Once exposed, a person not protected by an existing immunity would almost certainly acquire the infection and develop smallpox. Spread by physical contact, the disease affected children and adults alike. Smallpox was easily recognizable, and colonials understood that exposure to the disease led to infection, though the mechanism of contagion had not yet been proven medically. American colonists simply knew that smallpox was communicated between individuals and could also be contracted from inanimate objects used by those suffering from the illness. Smallpox epidemics were recurrent, devastating, and frequent, and mortality from the disease ranged from 15 to 50 percent.[12]

Colonists tried every means available to prevent outbreaks of smallpox, including isolation and inoculation, which was first introduced in

10. Blake, *Public Health in the Town of Boston,* 105; King, *Transformations in American Medicine*, 237, 68–71, and 76.

11. Jonathan B. Tucker, *Scourge: The Once and Future Threat of Smallpox* (New York: Atlantic Monthly Press, 2001), 2–3; Fenn, *Pox Americana,* 16–20; C. W. Dixon, M.D., *Smallpox* (Boston: Little, Brown, 1962), 5–12; and Frank Fenner et al., *Smallpox and Its Eradication* (Geneva: World Health Organization, 1988), 6, 41, and 188.

12. Watson, *The Angelic Conjunction,* 41; Tucker, *Scourge,* 9; Moore, "Zabediel Boylston," 13; Duffy, *Epidemics in Colonial America,* 24; J. W. Estes, "'A Disagreeable and Dangerous Employment': Medical Letters from the Siege of Boston, 1775," *Journal of the History of Medicine* 31 (July 1976): 275. Duffy noted that close to 100 percent of those exposed to smallpox without prior inoculation or immunization acquire the infection.

Boston by Zabediel Boylston and Cotton Mather during the epidemic of 1721. The medical procedure of inoculation deliberately introduced the infection to the patient, resulting in a mild case of smallpox and lifelong immunity to the disease. After undergoing inoculation, the patient became contagious at the end of the twelve-day incubation period and remained so for two weeks, a shorter period than if the disease had been contracted naturally. Inoculation was not always successful and carried medical risks.[13] Its use was controversial, especially in New England during the decades preceding the Revolution. One of the most serious risks of inoculation was, in fact, the tendency for smallpox to spread out of control if those persons inoculated were not effectively quarantined until all danger of infection had subsided. Without strict control of the procedure, the disease could actually be generated and spread.

To comprehend colonial reluctance to use inoculation, an understanding of the ongoing medical debate and public controversy that surrounded this procedure is crucial, and some of its inherent dangers must be explained. Smallpox was a perpetual threat to public health throughout the colonial period. Around 1720, reputable physicians in England became acquainted with the practice of inoculation. This crude method consisted of transplanting pus from the pustules of a smallpox victim into an incision in the skin of a healthy person. The procedure resulted in a mild infection, with much higher rates of recovery than was usual in cases of smallpox received through natural means (ordinary exposure to the infection).[14] General acceptance of the practice was slow, however, and the procedure inspired violent controversy in some areas. According to medical historian Brooke Hindle, "the matter of smallpox inoculation showed retrogression

13. Estes, "The Practice of Medicine," 1043; Bayne-Jones, *The Evolution of Preventive Medicine,* 15; Donald R. Hopkins, "Benjamin Waterhouse, the 'Jenner of America,'" *American Journal of Tropical Medical Hygiene,* 5 Pt. 2 Supplement (September 1977): 1060; Hopkins, *Princes and Peasants,* 7. In 1798 Edward Jenner developed a smallpox vaccine from cowpox, an animal disease not fatal to humans. Vaccination, or immunization, results in a very mild, nonsymptomatic infection, which is not contagious, and also results in lifelong immunity. Death is rare from vaccination, and infrequent with inoculation.

14. Duffy, *Epidemics in Colonial America,* 24–25; F. D. Moore, "Zabediel Boylston," 14; Fenn, *Pox Americana,* 18; James H. Cassedy, *Medicine in America: A Short History* (Baltimore, Md.: Johns Hopkins University Press, 1991), 13 and 16. Inoculation generally produced a milder form of smallpox known as a "discrete" case, where the pocks were separate and distinct. This differed from the more serious and deadly "confluent" case, usually the result of natural infection, where the pocks ran into one another to form an oozing mass.

rather than advance" throughout the colonial period.[15] As inoculation was common among Native American and Negro populations, it became known as a "heathen" practice in New England, and the religious significance of tampering with God's plan rendered it problematic for some colonists. One clergyman questioned whether inoculation was a "distrust of God's overruling care," and another asked, "is not smallpox a judgment of God sent to punish us and humble us for our sins?" The Puritan divine Cotton Mather, however, convinced of the soundness of the practice, had his own son inoculated in 1721 during the smallpox epidemic in Boston. His actions were decried, and an attempt was made to bomb his home. The note attached to the bomb read, "Cotton Mather, you dog, damn you. I'll innoculate you with this, with a pox to you."[16]

The idea of voluntarily introducing this virulent disease into a community was repulsive and offensive to many colonists. Physicians were skeptical, and only gradually did inoculation gained acceptance. The fatality rate from smallpox induced through artificial means was considerably lower at 2 percent than the 14 percent rate seen in Boston during the 1721 epidemic among those infected naturally. These statistics eventually helped generate support for the procedure among a skeptical populace.[17] Improper management of inoculation, however, could result in widespread, deadly epidemics of the disease. Mistrust of the procedure, combined with religious scruples, resulted in strong opposition to inoculation in the city of Boston, and indeed, in much of New England during the Revolutionary period.[18]

To maintain control of the procedure, most colonies established restrictive laws to prevent epidemics, with quarantine and notification both requirements. Concern about the possibility of inoculated individuals transmitting the disease resulted in the outright prohibition or strict control of the procedure in New York, New Hampshire, Connecticut,

15. Brooke Hindle, *The Pursuit of Science in Revolutionary America, 1735–1789* (Chapel Hill: University of North Carolina Press, 1956), 300. Hindle goes on to say that "With some reason for their fears . . . the legislatures of all but 5 states came to prohibit the practice."

16. Stark, "Immunization Saves Washington's Army," 428; Cotton Mather, *The Diary of Cotton Mather,* ed. Worthington Chauncey Ford (Boston: Massachusetts Historical Society, 1912), quoted in Fenn, *Pox Americana,* 36. See also Watson, *The Angelic Conjunction*, for a discussion of the relationship between health and religion, especially regarding epidemic diseases as "evidence of God's wrath at the collective sins of society," 10.

17. Duffy, *Epidemics in Colonial America,* 29–32; See also Hopkins, "Benjamin Waterhouse," 1060, for a discussion of the 1751 epidemic and fatalities.

18. Duffy, *Epidemics in Colonial America,* 38; E. H. Kass, "A Brief Perspective on the Early History of American Infectious Disease Epidemiology," *Yale Journal of Biology and Medicine* 60 (July-August 1987): 342; Cassedy, *Medicine in America,* 13.

Virginia, and Maryland.[19] The town of Chelsea, Massachusetts, maintained strict rules governing the administration of smallpox inoculations through the 1770s. These regulations ensured "an undertaking properly conducted, and necessary rules adhered to for avoiding the spreading of the infection the natural way . . . and preventing the many distresses which always are occasioned by that malignant disease when it becomes generally prevalent." The directives for safe inoculation included designation of physicians permitted to perform the procedure, provision of a sufficient number of nurses and servants to care for the patients, restricted access to a distant and guarded inoculation location, quarantine, and secured delivery of provisions. Bonded patients agreed to the stated regulations and were subject to prosecution for failure to maintain the rules.[20]

Due to restrictive regulations, General Washington experienced difficulty arranging for the inoculation of his soldiers during the war. He found it necessary to work with local authorities in New England and to request their permission to inoculate his troops.[21] On 9 July 1776 John Avery of the Massachusetts Board of War advised Major General Artemas Ward that, "The Board was this day informed that you had given Liberty to a Number of Continental Troops now Stationed at Winter Hill to receive the Small Pox by Inoculation—The Board are unwilling to credit such a report as there is an Act of the Colony prohibiting Inoculation except in the Town of Boston." Fear of the disease and control of the inoculation procedure remained constant. In response to public reports of Major General William Heath's plan to inoculate troops in 1778, Brigadier General Henry Knox informed Heath that "the Town of West Springfield [Massachusetts] . . . absolutely refused and forbid any Continental Soldiers being inoculated there, unless permission is first asked of the Town."[22]

19. Blake, *Public Health in the Town of Boston,* 108; Abbas M. Behbehani, *The Smallpox Story in Words and Pictures* (Kansas City: University of Kansas Medical Center, 1988), 33; Gibson, "Role of Disease," 121.

20. John Collins Warren, letter to the Selectmen of the Town of Chelsea, 18 November 1774, John Collins Warren Papers II, Massachusetts Historical Society (MHS), Boston, Massachusetts.

21. William Heath, letter to the Massachusetts Board of War, 7 April 1777, William Heath Papers, MHS. Numerous documents illustrate the reluctance of New Englanders to advocate inoculation and highlight the legal restrictions against the practice in effect during the Revolutionary period. James Cassedy notes that the introduction of inoculation, though controversial, was the most important colonial contribution to American health and medicine; Cassedy, *Medicine in America,* 16.

22. Massachusetts Board of War (John Avery), letter to Artemas Ward, 9 July 1776, Ward Family Papers, MHS; Henry Knox, letter to William Heath, 25 March 1778, William Heath Papers. Ward was commissioned general and commander in chief of the Massachusetts army on 15 May 1775 and directed siege operations at Boston until the arrival of Washington on 2 July 1775.

Smallpox spread most virulently in unsanitary and crowded conditions, which begins to explain its significance to a discussion of the American Revolution.[23] The disease flourished when large groups of previously unexposed populations converged, as they did in army camps during the Revolutionary War. For the soldiers who were confined to quarters in unsanitary and densely packed areas, the threat of infection and fear of smallpox were constant. The overall health of the troops had important military ramifications, and was of particular concern to Washington, the commander in chief, and his generals. Although smallpox was present in the British army throughout the war, the Continental Army and militia troops were more susceptible to the disease for a variety of reasons. As we have seen, inoculation was controversial in the colonies, in fact, prohibited by law in some areas, because the rapid, epidemic spread of the contagion was more common in America.[24] The British army, however, routinely practiced inoculation, and the majority of the King's troops had been exposed to the disease from childhood, rendering immunity to smallpox much more likely. By the beginning of the American Revolution, smallpox rarely occurred in epidemic proportions among British troops, although the disease did cause problems for the army at various times during the war.[25]

When General Washington arrived outside Boston to take command of the assorted military volunteers who had besieged the city immediately after the Revolution's first battles at Lexington and Concord, Massachusetts, on 19 April,[26] he was forced to confront the problems of organizing an army and battling the enemy for the first time, while at the same time a smallpox epidemic in Boston threatened his fighting forces.

23. Duffy, *Epidemics in Colonial America,* 18; Tucker, *Scourge,* 6–9; Mary C. Gillette, *The Army Medical Department, 1775–1818* (Washington: Center of Military History, 1981), 3; D. Peter MacLeod, "Microbes and Muskets: Smallpox and the Participation of the Amerindian Allies of New France in the Seven Years' War," *Ethnohistory* 39 (Winter 1992): 46; Estes, "Practice of Medicine," 289; James Thomas Flexner, *Washington, the Indispensable Man* (Boston: Little, Brown, 1974), 8. Sir John Pringle, British army surgeon and Physician General, speculated that putrid air caused infection.

24. Hindle, *The Pursuit of Science*, 63 and 187; Boorstin, *The American Colonial Experience,* 219–20. See Nancy Tomes, *The Gospel of Germs: Men, Women and the Microbe in American Life* (Cambridge, Mass.: Harvard University Press, 1998), 20, for a clear description of medical terms, including epidemic, endemic, infectious, contagious, and communicable.

25. Frey, *The British Soldier in America,* 43–44. Colonial restrictions on inoculation caused some difficulties for the British in utilizing the procedure.

26. John Boyle, "Boyle's Journal of Occurences in Boston," *New England Historical and Genealogical Register* 84 (1930): 374; John Shy, "Thomas Gage: Weak Link of Empire," in George Billias, ed., *George Washington's Opponents: British Generals and Admirals in the American Revolution* (New York: Morrow, 1969), 3, 23.

Protecting his troops against the scourge of smallpox was of primary concern to Washington throughout the war. Writing from headquarters on 5 August 1776, he affirmed, "the General has nothing more at Heart than the health of the Troops."[27]

Personal experience played an important role in Washington's attitude toward and understanding of the variola virus. While traveling in Barbados in November of 1751 with his brother Lawrence, Washington himself had been stricken with smallpox. Confined with the illness for twenty-six days, he suffered greatly and was permanently pocked by the experience. Only nineteen at the time of the attack, Washington developed lifelong immunity as a result. The disease may also have rendered him incapable of fathering children, as modern scientists have documented infertility as a complication of smallpox.[28]

Over the course of the war, Washington's attitude toward smallpox progressed from an awareness of its dangers to forceful attempts to contain its spread, followed by arguments in favor of inoculation and entreaties for his officers and medical staff to vigorously pursue that course. Although a dependable defense against the scourge of smallpox, inoculation was still an inherently dangerous procedure and did not present itself as a clear strategy until 1777.

George Washington's own family members also expressed concern over inoculation against smallpox. In 1771 his stepson Jack was inoculated at Baltimore, Maryland. Since his wife, Martha, expressed "anxiety and uneasiness" at the thought of her son submitting to the smallpox infection, Washington chose to withhold news of the procedure until Jack's recovery was assured.[29] By 1776, no doubt due to her proximity to the troops, Martha herself considered undergoing inoculation though Washington stated, "I doubt her resolve." Eventually, the fear of naturally acquiring the disease convinced Martha to submit to the procedure. Washington reported from Philadelphia in May 1776 that "Mrs. Washington is now under Inoculation in this City; and will, I expect, have the

27. Quoted in Bayne-Jones, *The Evolution of Preventive Medicine*, 33; Hopkins, *Princes and Peasants,* 257; Blake, *Public Health in the Town of Boston,* 126.

28. Miller, "Vignette of Medical History," 457; Stark, "Immunization Saves Washington's Army," 429; Behbehani, *The Smallpox Story,* 33; J. Worth Estes, "George Washington and the Doctors: Treating America's first Superhero," *Medical Heritage* 1 (January 1985): 47; A. M. Phadke, N. R. Samant, and B. D. Dewal, "Smallpox as an Etiologic Factor in Male Infertility," *Fertility and Sterility* 24 (October 1973): 802; Hopkins, *Princes and Peasants,* 221. According to Hopkins, variola (smallpox) can cause male infertility. As George Washington contracted the disease in 1751, and it is commonly accepted that he was sterile, this may have been another way in which smallpox affected his life and the course of American history.

29. George Washington to Jonathan Boucher, 20 April 1771, in John C. Fitzpatrick, ed., *The Writings of George Washington from the Original Manuscript Sources, 1745–1799* (Washington: GPO, 1931), 3:41–42.

Small Pox favorably."[30] In August 1777, when laws restricting the practice of inoculation still impeded Americans from protecting themselves against smallpox, Washington congratulated his brother "very sincerely on the happy passage of my Sister and the rest of our Family, through the Smallpox. Surely the daily Instances which present themselves of the amazing benefits of Inoculation must make converts of the most rigid opposers, and bring on a repeal of that most impolitic Law which restrains it."[31]

Throughout the revolutionary period, smallpox posed a substantial threat to the health of citizens and soldiers alike. Statistics specific to this disease are not readily available, but anecdotal evidence and historical analysis strongly suggest that in eighteenth-century warfare, disease invariably caused more deaths than wounds. Historian Mary Gillette estimated that "90 percent of the deaths occurring among the inexperienced, poorly clothed, poorly fed soldiers of the Continental Army, most of them country boys without previous exposure to communicable diseases . . . were from disease."[32] John Adams, who served on the Congressional War Committee, noted in a letter of 13 April 1777 to his wife, Abigail, that for every soldier killed in battle, disease killed ten.[33] Though it is difficult to determine from the descriptions offered by physicians which diseases most commonly affected the men, it was widely accepted that "smallpox could wreak havoc in the ranks of American armies."[34]

Accurate estimates of Revolutionary casualties are difficult to assess. According to medical historian James Gibson, U.S. War Department statistics indicate that 250,000 men served during the war and roughly 40,000 were active in any given year. These government numbers reflect a loss of 10,000 men from sickness and wounds. Contemporary casualty reports, however, varied widely. Dr. James Thacher, who served as regimental surgeon with American forces in Canada, estimated that an astounding 70,000 Americans, including 11,000 prisoners of war, died during the Revolution, but he does not distinguish between illness and

30. George Washington to John Augustine Washington, 29 April 1776, ibid., 4:529–30; George Washington to John Augustine Washington, 31 May 1776, ibid., 5:93.

31. George Washington to John Augustine Washington, 5 August 1777, ibid., 9:21.

32. Gillette, *Army Medical Department,* 4; Frey, *British Soldier in America,* 28–29; MacLeod, "Microbes and Muskets," 47; Estes, "'A Disagreeable and Dangerous Employment,'" 279; Duncan, *Medical Men in the American Revolution,* 375. See also Benjamin Rush, *Directions for Preserving the Health of Soldiers,* American Culture Series II, 2nd yr. XVIII Medicine 3, Diseases and Health, Reel 108, A107, 3.

33. Gillette, *Army Medical Department,* 39.

34. Ibid., 4; Flexner, *Doctors on Horseback,* 3; Gibson, "Smallpox and the American Revolution," 55; Editors of Military Affairs, *Military Analysis of the Revolutionary War* (Millwood, N.Y.: KTO Press, 1977), 18.

battlefield casualties.[35] Thacher's estimates cannot be verified with any accuracy; however, he does describe in detail the impact smallpox had on the army. Historian Howard H. Peckham asserts that 25,324 men in the American military died during the Revolutionary War, including 6,824 on the battlefield, 10,000 in camp, and 8,500 in prison. The U.S. Department of Defense lists the number killed as 4,435 and wounded as 6,188. The totals of the Adjutant General's Office are "4044 killed and 6004 wounded," though "considerably below the real numbers."[36]

Charles Lesser's detailed Revolutionary War troop strength reports, also called returns, allow a comprehensive interpretation of the impact of illness on Continental troops. The problems Washington faced at various times during the war can be analyzed statistically by tracing the percentage of sick among the rank and file from the opening campaign outside Boston in 1775 to the final mustering out of troops in July 1783. In 1775 the new volunteers and militiamen were relatively healthy, with an average rate of sickness of 13.8 percent, but between 1776, after smallpox had appeared in the Continental Army, and 1778, the number of sick rose from 16.6 percent to a high of 35.5 percent. According to troop strength reports during several months in the early years of the

35. Howard H. Peckham, *The Toll of Independence: Engagements and Battle Casualties of the American Revolution* (Chicago: University of Chicago Press, 1974), xii–xiii, 130–34; Gibson, "The Role of Disease," 127; James Thacher, *The American Revolution from the Commencement to the Disbanding of the American Army; Given in the form of a Daily Journal* (Boston: Cottons and Barnard, 1827), 370; Duncan, *Medical Men in the American Revolution,* 369. The often transient and intermittent nature of military service during the American Revolution made it hard to find accurate data regarding troop strength and casualty statistics. The passage of the Revolutionary War Pension Act of 1818 resulted in a flood of applications by veterans far exceeding congressional estimates of eligibility. Over eighty thousand pension files exist in the National Archives Revolutionary War Pension and Bounty Land Warrant Application Files, 1800–1900, M804. Given the stringent indigence requirements for pensions, the high number of eligible veterans indicates a vast level of military participation, however brief. A small pamphlet published by the Brookhaven, Long Island, Town Bicentennial Committee lists the burial places of 270 veterans of the Revolution for the town of 2,158 residents in 1776. Only 504 residents were white males over the age of sixteen. If accurate, these numbers are staggering, considering that Long Island was in full possession of the British for much of the war and that many patriots emigrated. A large-scale, detailed study of local military participation may shed light on the actual level of military commitment during the Revolution. For a list of the veterans, see Brookhaven Town Bicentennial Committee, *American Revolutionary War Patriots Buried in the Town of Brookhaven* (Brookhaven, N.Y.: Brookhaven Town Bicentennial Committee, 1976). For a 1776 census of Brookhaven Town, see Force, *American Archives,* 4:6, 1237–40.

36. Peckham, *Toll of Independence,* xii–xiii.

war, between 30 percent and 35 percent of Washington's soldiers were sick and unable to perform their duties or prepare for battle.[37]

Although the returns do not specify smallpox as the cause of illness, the significant impact of the disease may be inferred from anecdotal archival evidence. The most prevalent diseases, as recorded by surgeon Thacher, were autumnal fevers and dysentery. Still, a large enough number of soldiers suffered from smallpox to convince Thacher himself to undergo inoculation, though against military orders, in May 1775.[38]

While overall troop health was important to the conduct of the war, it is in the details of specific military campaigns that the significant effects of smallpox on the progress of the War for Independence become clear. Many problems, not least among them smallpox, awaited Washington as he assumed command in Boston in July 1775. Smallpox had been present in Boston since the British troops arrived to occupy the city the previous year. Naturally acquired smallpox (with its severe symptoms) had spread throughout Boston and the surrounding countryside, as had the milder form of the disease produced voluntarily through inoculation. The outbreak of military hostilities on 19 April 1775 marked the beginning of a new wave of smallpox epidemics.[39] Containment of the disease immediately became a vital military issue. Continental Army orders dated 2 July 1775 called for the appointment of a "suitable person" to make daily inspections of the men of each company for illness, and any soldier showing symptoms of smallpox was isolated immediately. In General Orders issued on 4 July, Washington cautioned against travel in infected areas "as there may be danger of introducing smallpox into the army."[40]

Washington was already keenly aware of the seriousness of the disease and the catastrophic impact an epidemic would have on the troops. The largest threat to the health of his army massed outside Boston was the smallpox raging in the city. Newly recruited soldiers, recently arrived from outlying rural areas, were not yet subject to the various camp afflictions that would become so debilitating to the soldiers later in the war. Washington wrote in July 1775: "I have the satisfaction to find the Troops . . . very healthy."[41] Comfortably dressed, well fed, and healthy,

37. Ibid., xi, 130; Charles H. Lesser, ed., *The Sinews of Independence: Monthly Strength Reports of the Continental Army* (Chicago: University of Chicago Press, 1976), xxx–xxxi.

38. Gillette, *Army Medical Department*, 56; Thacher, *American Revolution,* 44.

39. Blake, *Public Health in the Town of Boston,* 126; Duffy, *Epidemics in Colonial America,* 69; MacLeod, "Microbes and Muskets," 46.

40. Washington's General Orders, 4 July 1775, in Fitzpatrick, *Writings of George Washington,* 3:310.

41. Gillette, *Army Medical Department,* 52; George Washington to the President of the Massachusetts Congress, 10 July 1775, in Force, *American Archives,* 4:2, 1623.

these men were, however, liable to catch smallpox. The lack of regular exposure to the disease as children rendered many Continental recruits, especially those from New England, extremely susceptible to this disease. Colonists knew that conditions in the army were conducive to its spread both among the soldiers and within the local civilian population.[42]

Writing to Congress on 20 July 1775, shortly after his arrival at Boston, Washington stressed that he had "been particularly attentive to the least Symptoms of the Small Pox, hitherto we have been so fortunate, as to have every Person removed so soon, as not only to prevent any Communication, but any Apprehension or Alarm it might give in the camp. We shall continue the utmost Vigilance against this most dangerous Enemy."[43] Aware of the impact that fear of the disease had on his ability to recruit soldiers, the general was careful to avoid the spread of smallpox among his troops lest word get out and retard his efforts. Unfortunately, by December, the contagion was all around the troops. Washington directed Lieutenant Colonel Loammi Baldwin to "prevent any of your officers from any intercourse with the people who . . . came out of Boston." He continued, "there is great reason to suspect that the smallpox is amongst them, which every precaution must be used to prevent its spreading."[44] In January 1776, the army established a hospital at Dorchester, Massachusetts, to isolate American officers and soldiers who contracted the disease. To do so, the army needed local permission, and Colonel Joseph Ward reported to General Artemas Ward that he had "sent to the Selectmen of Dorchester to provide a Hospital to put them in directly."[45]

The presence of smallpox in Boston also affected the British army, which, unlike the colonial forces, routinely inoculated its troops against smallpox. The British had instituted preventive measures after the Seven Years' War (1754–60), during which seven out of nine infantrymen contracted the disease, and one in four died from it. In June 1775 Major General Thomas Gage,[46] the British commander in chief and Massachu-

42. MacLeod, "Microbes and Muskets," 46; Blake, *Public Health in the Town of Boston,* 112. Colonists experienced virulent outbreaks of smallpox during the Seven Years' War.

43. George Washington to Congress, 20 July 1775, in Fitzpatrick, *Writings of George Washington,* 3:351.

44. Stephen Moylan, letter to Colonel Baldwin, 4 December 1775, Miscellaneous Bound Manuscripts, MHS.

45. Joseph Ward, letter to Artemas Ward, 6 January 1776, Ward Family Papers, MHS.

46. Gage was appointed commander in chief of the British army in North America on 17 November 1763, to serve during the time Jeffrey Amherst was in England. When Amherst did not return, Gage was formally commissioned commander in chief on 16 November 1764. He remained mostly in New York until he received the additional appointment of governor of the province of Massachusetts Bay. He arrived there

setts governor, warned: "Notwithstanding the care that has been taken to Provide the [camp] women with proper places to stay in, some . . . have broke into houses and buildings that were infected with the Small Pox, by which there is Danger of it spreading through the Town."[47] Established inoculation procedures and isolation were not enough to completely protect British troops, however. A Boston correspondent indicated that smallpox was "very prevalent among the soldiers, there has been three buried every day for this month past."[48]

In an attempt to forestall the debilitating effects of smallpox, the British instituted a voluntary inoculation program in Boston during the siege and quarantined soldiers who refused to participate. Lieutenant General Sir William Howe,[49] who succeeded Gage on 10 October, ordered in November that: "The smallpox being likely to spread, it is Recommended to the Commanding Officers of Corps to have such of their Men Enoculated as have not had it as soon as possible." By 1 December, with "the smallpox spreading universally about the Town," Howe ordered quarantine for those British troops infected or recently inoculated with the disease.[50] The frequent occurrence of the disease and the need for inoculation (which removed troops from active duty for

on 13 May 1774 to replace Governor Thomas Hutchinson and carried out Parliament's order to blockade the harbor of Boston. The same year British soldiers arrived in Boston to quell the developing rebellion.

47. Thomas Gage MS Orderly Book in the Boston Public Library, 102, quoted in Walter Hart Blumenthal, *Women Camp Followers of the American Revolution* (New York: Arno Press, 1974), 39. The women referred to here were likely among the camp followers who traveled with the army and performed duties such as cleaning, laundry, and nursing for the soldiers. Sometimes wives and children accompanied the soldiers, but the camp women (whatever their matrimonial status) were an integral part of camp life, and were subsidized by both the British and American armies.

48. From the *London Evening Post,* 25–28 March 1775, as quoted in Margaret Wheeler Willard, ed., *Letters on the American Revolution, 1774–1776* (Port Washington, N.Y.: Kennikat Press, 1968), 58.

49. The British government, unhappy with Gage's performance, gave Howe command of all troops south of Canada. Major General Guy Carleton headed the British army in Canada, beginning in September 1775. John Richard Alden, *General Gage in America* (Baton Rouge: Louisiana State University Press, 1948), 283.

50. Quoted in Allen French, *The First Year of the American Revolution* (New York: Octagon Books, 1968), 495. French indicates on page 546 that "smallpox was sporadic, but caused no great harm among the British troops in Boston." Frey, *British Soldier in America,* 43–44. See also Samuel White Patterson, *Horatio Gates: Defender of American Liberties* (New York: Columbia University Press, 1941), 60; and Howard H. Peckham, *The War for Independence: A Military History* (Chicago: University of Chicago Press, 1958), 22. For another perspective on the British army's experiences with smallpox, see Estes, "'A Disagreeable and Dangerous Employment,'" 289. Estes asserts that the British sustained higher casualties from the disease than the Americans. Smallpox indeed affected the British, but they prevented greater losses by using inoculation.

weeks at a time) affected British strategy, reportedly as early as July 1775: "It is said that the deserters report that General Gage has several times attempted to get the Regulars to go out of Boston, and give battle to the Continental Army, but they have refused to go; that the Regular Army consists of about six thousand men, and that great numbers are sick."[51] Still, historian Sylvia Frey concludes, "it is highly probable that on balance the fatality of smallpox [for British troops] was lessened by inoculation."[52] Though smallpox had an impact on the British troops, measures they took mitigated its effect for most campaigns during the Revolutionary War.

The presence of smallpox in Boston influenced Washington's decision to lay siege to the city and the timing of his attack on the British. On his arrival at Boston, Washington's primary strategic goal was to contain the British and protect his army. As long as the Continental Army existed, British authority was defied and the Revolution sustained.[53] The general wrote: "To prevent them from penetrating into the country with fire and sword, and to harass them if they do, is all that is expected of me."[54] Early in the siege Washington argued for a more active stance against the British in Boston, but during three military councils in September and October, he failed to convince his subordinates because of the lack of men, powder, and artillery.[55] Though inclined to attack, the American commander in chief maintained caution and chose to wait out the British in Boston through siege rather than risk exposing his troops to smallpox by attacking.[56]

51. Ezekiel Price, "Diary of Ezekiel Price," 1775–1776, in *Proceedings of the Massachusetts Historical Society* 7 (November 1863): 200.

52. Thursfield, "Smallpox in the American War of Independence," 313; Behbehani, *Smallpox Story,* 33; Frey, *British Soldier in America,* 44.

53. Peckham, *War for Independence,* 24. An entry for 2 August on page 202 indicates that Bostonians and British Regulars "die in considerable numbers of the flux," and gives the number of Regulars as six thousand, of which fifteen hundred were unfit for duty. Richard R. Coakley and Stetson Conn, *The War of the American Revolution: Narrative, Chronology and Bibliography* (Washington: U.S. Army, 1975), 97.

54. Dave Richard Palmer, *The Way of the Fox: American Strategy in the War for America, 1775–1783* (Westport, Conn.: Greenwood Press, 1975), xvi, xvii; Editors of Military Affairs, *Military Analysis*, 1; Allan R. Millet and Peter Maslowski, *For the Common Defense: A Military History of the United States* (New York: Free Press, 1984), 66; Flexner, *Washington,* 71.

55. Palmer, *Way of the Fox,* 97; Fitzpatrick, *Writings of George Washington,* 3:320 n, 415–16.

56. Gillette, *Army Medical Department,* 56; Hopkins, *Princes and Peasants,* 258; Thursfield, "Smallpox in the American War of Independence," 314. For a description of Washington's early strategic planning, see Willard M. Wallace, *Appeal to Arms: A Military History of the American Revolution* (New York: Harper, 1951), 61; Coakley and Conn, *War of the American Revolution,* 33.

As he held the British hostage in Boston throughout the nine-month siege, the American commander in chief exercised every precaution to protect his troops from smallpox. Washington restricted camp access, checked refugees, and isolated his troops from contagion to avoid the spread of the disease. On 13 December the general's aide-de-camp warned "that notwithstanding his orders to the contrary, some of the persons that came east from Boston to Point Shirley [Massachusetts] have been at this Camp . . . [Washington] is extremely desirous to prevent any measure that may prove of fatal consequences to the army." The general understood the danger smallpox posed to the existence of his army.[57]

Smallpox, though present in Boston, had not yet reached epidemic proportions.[58] Washington was concerned lest the disease escape the city and contaminate his army during the fall of 1775. After lamenting in November that "by a fortnights recruiting amongst men with Arms in their Hands, how little has been the success," Washington noted that since "the small Pox is now in Boston, I have used the precaution of prohibiting such as lately came out [from Boston] from coming near our Camp."[59] If an epidemic had broken out in Boston, fear of the disease would have lessened revolutionary ardor among prospective soldiers as well. Abigail Adams remarked about the disease: "The desolation of War is not so distressing as the Havock made by the pestilence."[60]

Although the British occupied Boston, they did not control the heights on Dorchester Neck, overlooking the city. Historians have questioned General Howe's failure to seize and hold the heights, seemingly a significant defensive move on the part of the British. Overconfidence, procrastination, or failure to see the importance of the position have

57. Robert H. Harrison to Colonel Loammi Baldwin, 13 December 1775, in Force, *American Archives,* 4:4, 255.

58. The disease hit Boston hard in late November and early December 1775. By mid-January 1776, smallpox was under control. Cash, *Medical Men,* 114–15; French, *First Year,* 653–54; Gillette, *Army Medical Department,* 56; Troyer Steele Anderson, *The Command of the Howe Brothers During the American Revolution* (New York: Oxford University Press, 1936), 90; Charles Martyn, *The Life of Artemas Ward: The First Commander-in-Chief of the American Revolution* (New York: A. Ward, 1921), 186. For details on General Howe's inoculation orders, see Benjamin Franklin Stevens, ed., *General Sir William Howe's Orderly Book at Charlestown, Boston and Halifax, June 17, 1775 to 1776, 26 May* (Port Washington, N.Y.: Kennikat Press, 1970), 144, 148, 155, 156.

59. George Washington to the President of Congress in Fitzpatrick, *Writings of George Washington,* 4:122.

60. Quoted in Mary Beth Norton, *Liberty's Daughters: The Revolutionary Experience of American Women, 1750–1800* (Ithaca, N.Y.: Cornell University Press, 1980), 200–201.

The Siege of Boston, 1775–76.

Colonists began fortifying positions around Boston in late April 1775. Construction of fortifications on Breed's Hill brought on the action known as the battle of Bunker Hill (17 June). George Washington assumed command of the militia around Boston on 2 July and spent the remainder of the year enlisting and training a new army.

been given as reasons for the general's inaction.[61] Howe would have preferred that the rebels "quit those strong Entrenchments to which alone they may attribute their present security," yet he did not believe his forces to be in immediate danger of assault. Why did Howe claim not to expect an American attack? Perhaps the threat of a smallpox epidemic was the reason. Washington's letters illustrate his belief that the British hoped the spread of smallpox within Boston would prevent an aggressive American move. On 14 December 1775 Washington complained to the President of Congress, John Hancock, that "small-pox rages all over the town. Some of the military [British] as had it not before, are now under inoculation. This, I apprehend, is a weapon of defense they are using against us."[62] He explained to Joseph Reed on 15 December that "small-pox is in every part of Boston. The [British] soldiers who have never had it are, we are told, under inoculation, and considered as a surety against any attempt of ours to attack. If we escape the smallpox in this camp, and the country around, it will be miraculous. Every precaution that can be is taken, to guard against this evil, both by the General Court and myself."[63] By inoculating his nonimmune troops, the British commander could protect his army while preventing an American attack, since Washington was loath to expose his troops to smallpox.

Washington was informed in December 1775 of the likelihood that the British were intentionally introducing the disease among the Continental forces to impede their activity. Rumors of germ warfare in Boston had been circulating for months. In January 1775 a gentleman in Boston asserted that British "soldiers try all they can to spread the smallpox but I hope they will be disappointed. One of their officers inoculated his whole family without letting any person know it."[64] Seth Pomeroy, who had known Gage during the Seven Years' War, wrote in May 1775: "If it is In General Gages power I expect he will Send ye Small pox Into ye Army."[65] The widespread accusations that the British were attempting to infect the American troops with smallpox strengthened Washington's resolve to protect his army and convinced him to maintain cautionary tactics.

61. Wallace, *Appeal to Arms,* 62. See also Force, *American Archives,* 4:3, 1672; Martyn, *Life of Artemas Ward,* 193.

62. George Washington to John Hancock, 14 December 1775, in Force, *American Archives,* 4:4, 262.

63. George Washington to Joseph Reed, 15 December 1775, in Fitzpatrick, *Writings of George Washington,* 4: 167; Richard Frothingham, *History of the Siege of Boston and of the Battles of Lexington, Concord and Bunker Hill* (Boston: Little, Brown, 1873), 280; Wallace, *Appeal to Arms,* 58.

64. Willard, *Letters on the American Revolution,* 57–58. Extract of a letter sent from Boston on 25 January 1775 and published in the London *Evening Post* on 25 March 1775.

65. Quoted in Fenn, "Biological Warfare," 134.

The Americans were inclined to believe these rumors as the British had used the tactic against the Native American population during the Seven Years' War. Elizabeth Fenn argues that British military personnel, including Jeffrey Amherst, British commander in chief and governor general of North America at the time, justified engaging in biological warfare during the Seven Years' War by recourse to the "just war" concept, that is, that any and all means may be used to achieve success in a total war or to defeat an insurrection. Evidence indicates that Amherst condoned a plot to expose Native Americans to smallpox during this war. General Gage, Amherst's successor, approved a bill in 1763 for "Sundries got to Replace in kind those which were taken from people in the Hospital to Convey the Smallpox to the Indians." Clearly, British officers reconciled these actions with the need to subdue their enemies.[66] In a book published in 1777, a British officer named Robert Donkin suggested the following strategy to defeat the Americans: "Dip arrows in matter of smallpox, and twang them at the American rebels. . . . This would . . . disband these stubborn, ignorant, enthusiastic savages. . . . Such is their dread and fear of that disorder."[67] His use of the term "savages" supports the idea that germ warfare would have been justified according to military parameters of the time.

In a report to the provincial council of Massachusetts on 3 December 1775, aide-de-camp Robert H. Harrison described how "four [British] deserters have just arrived at headquarters giving an account that several persons are to be sent out of Boston . . . that have lately been inoculated with the smallpox, with the design, probably, to spread infection to distress us as much as possible."[68] Writing to Artemas Ward on the same day, Major General Horatio Gates credited Washington with having "taken every possible precaution in his power . . . to prevent the Enemy from communicating this infection of the Small pox to this Army." Advising extreme caution, Gates instructed Ward to allow only soldiers immune to the disease to approach the British lines and to sterilize letters in vinegar before reading them.[69] Experience had shown that the variola virus could survive for a considerable time outside the human body. Clothing and bedding used by smallpox victims could shed virus-

66. Ibid., 133–34.

67. Ibid., 136. The quote appears only in the three known copies of the book, illustrating the controversy biological warfare likely engendered. Direct written proof of its use has been rarely found, but circumstantial evidence indicates it was considered, and probably used.

68. Stark, "Immunization Saves Washington's Army," 429; Robert H. Harrison to the president of the Council of Massachusetts Bay, 3 December 1775, in Force, *American Archives,* 4:4, 168.

69. Horatio Gates, letter to Artemas Ward, 3 December 1775, Miscellaneous Bound Manuscripts, MHS.

bearing particles and spread the infection for days or even weeks, therefore attempts at disinfection were common.[70]

On 4 December 1775, Washington informed the President of Congress that the British were sending Boston civilians contagious with smallpox out of the city to make room for military reinforcements: "By recent information . . . General Howe is going to send out a number of the Inhabitants. . . . A Sailor says that a Number of these coming out have been inoculated with the design of Spreading the Small pox through this Country and Camp."[71] Although reluctant to believe such perfidy possible of the British, Washington wrote to Congress a few days later that he was forced to give credence to the idea of germ warfare: "The information I received that the Enemy intended spreading the smallpox amongst us, I could not suppose them capable of; I now must give some credit to it, as it has made its appearance on several of those who last came out of Boston."[72] Months later, newspaper accounts supported Washington's belief that the British engaged in germ warfare. In February 1776, the *Boston Gazette* reported that young indentured servant Thomas Francis had been inoculated with smallpox and forced by his master to board a British refugee ship sailing to Port Shirley. As a result of this calculated exposure, several other passengers contracted the disease.[73]

The evidence gathered here indicates that General Howe may well have used smallpox as a weapon to further ensure the protection of his forces in Boston. The introduction of smallpox to the colonial forces would have sustained the standoff and effectively prevented a military confrontation Howe was not confident of winning. He was not anxious to move against the Americans himself, and complained in January 1776 "that the apparent strength of this [British] army, for the spring, does not flatter me with Hopes of bringing the Rebels to a decisive action."[74] The British commander's decision to inoculate his troops at this time, his actions in sending out contagious refugees, and contemporary reports that the British were attempting to infect the colonials all support the idea that the British used smallpox as a military weapon designed to protect against aggressive American maneuvers.[75] Given

70. MacLeod, "Microbes and Muskets," 46; Blake, *Public Health in the Town of Boston,* 127.

71. George Washington to the President of Congress, 4 December 1775, in Fitzpatrick, *Writings of George Washington,* 4:145.

72. George Washington to Congress, 11 December 1775, ibid., 4:157.

73. Quoted in Cash, *Medical Men,* 111, from the *Boston Gazette,* 12 February 1776. Though the evidence strongly suggests intentional exposure, Cash discounts the idea that General Howe deliberately spread smallpox among the refugees.

74. French, *First Year,* 629, 653; Force, *American Archives,* 4:3, 1672.

75. Thursfield, "Smallpox in the American War of Independence," 314; Hopkins, *Princes and Peasants,* 258; Cash, *Medical Men,* 37, 111. See also Frothingham, *His-*

their prior use of smallpox against the Indians and contemporary accounts, the intentional introduction of the smallpox virus by the British during the investment of Boston cannot be dismissed.

While the monthly return figures indicate that the incidence of smallpox was low for the American troops outside Boston during the early days of the war, the threat of the disease continued to hang over the area in the early months of 1776.[76] Only Washington's vigilance in segregating those infected with the disease, combined with his care not to allow soldiers subject to infection into Boston, prevented a disastrous epidemic of smallpox among the Continental troops and militia outside Boston during the siege.

The danger that smallpox held for the army not only influenced Washington's decision to lay siege upon Boston for many months, but also explained his extreme caution when he moved to occupy Boston after the siege ended. The heavy American bombardment begun on 2 March and the subsequent occupation and fortification of Dorchester Heights convinced Howe of the futility of remaining in Boston. He evacuated his troops on 17 March.[77] Washington believed there was a deliberate effort by the British to spread the disease among the Americans; he received additional confirmation of the plot as the British prepared to leave Boston. An informant told the general that "our Enemies in that place had laid several schemes for communicating the infection of the small-pox, to the Continental Army, when they get out of town."[78]

General Horatio Gates, known for his interest in maintaining sanitary conditions, probably influenced Washington's careful policies designed to guard his troops against the contagion. Gates himself, though not immune to smallpox, managed to avoid the infection as he rode into Boston with Washington.[79] As the enemy prepared to depart, Washington dictated "that neither officer, nor Soldier, presume to go into Boston, without leave. . . . As the enemy with malicious assiduity, have spread the infection of the smallpox through all parts of the town, nothing but

tory of the Siege of Boston, 280, for the often quoted statement, "The British commanders considered this disease alone as a sufficient protection against an assault from their antagonists." Frothingham seems to base his opinion on a London news report which credited the British with "being determined to act with the provincials on the defensive only."

76. Gillette, *Army Medical Department,* 56. A separate smallpox hospital had been established as early as 27 June 1775 by the order of the Provincial Congress of Massachusetts in order to enforce quarantine and contain the spread of the disease.

77. Coakley and Conn, *War of the American Revolution,* 97–98.

78. Washington's General Orders, 14 March 1776, in Fitzpatrick, *Writings of George Washington,* 4:394–95. Various letters confirm the existence of smallpox among the refugees from Boston. See Force, *American Archives,* 4:4, 1229, 1321, 1325, 1332.

79. Patterson, *Horatio Gates,* 61–62.

the utmost caution on our part, can prevent that fatal disease from spreading thro' the army, and country, to the infinite detriment of both. . . . Therefore no officer or soldier may go into Boston when the enemy evacuates the Town."[80] Continuing his cautious approach, on 19 March 1776 Washington issued General Orders directing Major General Israel Putnam to take possession of the Heights outside the city, but specified that the one thousand men to accompany him must have already had smallpox.[81] This use of immune troops marked one of Washington's calculated attempts to control the spread of smallpox.

The threat of smallpox continued to affect military maneuvers. In July 1776 General Ward refused to permit nonimmune troops to enter Boston in an effort to prevent the spread of the disease, "for in case of an attack by the enemy, the Country people would not come to their assistance" if the troops were infected. Here the general alluded to the fact that New Englanders were careful to avoid exposure to smallpox due to their susceptibility, and might refuse to engage in combat as a result. Charles Cushing, a soldier in the Continental Army, wrote to his brother from Canada that "The New England forces now began to be very uneasy about the small-pox spreading among them, as but few of them have had it."[82]

After the British left Boston, Washington continued his policy of removal and isolation to control smallpox, and set up another convalescent hospital at Cambridge, Massachusetts. Additionally, he inoculated one regiment before sending it into Boston.[83] Illustrating the extreme susceptibility of the Continentals to the disease, British writer John Haygarth later stated that when "General Washington inoculated his New England army, there were scarcely men enough free from the disease, or not liable to take it, to keep guard at the different hospitals."[84] By 3 July, when Boston selectmen finally authorized the use of inoculation, Drs. Thacher and Townsend were ordered to commence inoculating soldiers and civilians within Boston. Low mortality statistics from this medical experiment (only one in five hundred soldiers died) encouraged General Washington's later dependence on the procedure for the entire Continental Army. Still hoping to contain the disease, the general was not

80. Washington's General Orders, 13 March 1776, in Fitzpatrick, *Writings of George Washington,* 4:389.

81. Washington's General Orders, 19 March 1776, ibid., 4:404.

82. *Ward's Order Book,* 4 July 1776, quoted in Martyn, *The Life of Artemas Ward,* 186; Force, *American Archives,* 4:4, 129.

83. Washington's General Orders, 25 March 1776, in Fitzpatrick, *Writings of George Washington,* 4:430.

84. John Haygarth, *Sketch of a Plan to Exterminate the Casual Small-Pox and Introduce General Inoculation* (London: J. Johnson, 1793), 330.

ready to resort to mass military inoculation, as controlling the procedure was very difficult, and its use could actually spread smallpox.[85]

As Washington maintained his investment of Boston through the winter of 1775–76, the news he received from the Continental forces in Canada was unsettling. During the first year of the war, the Continental Congress viewed the inclusion of Canada in the American Revolution against Britain as strategically vital both to generate support and prevent a devastating attack from the north. In 1775 John Adams explained the quandary: "Whether we should march into Canada . . . has been the great question. It seems to be the General Conclusion that it is best to go, if we can be assured that the Canadians will be pleased with it and join us."[86] The Continental Congress tried to convince the Canadian population that the American colonies were acting in self-defense, and that the northern British colonies were in danger of losing their freedoms at the hands of the King's troops as well. Early diplomatic efforts in Canada seemed encouraging. Many French *habitants* were unsure of British rule, and many English-speaking Canadians were upset over the religious protections afforded by the Quebec Act, which took effect 1 May 1775.[87] Congress was not, however, willing to depend entirely upon diplomacy.

To ensure an adequate defense against possible British aggression from the north, in June 1775 the Continental Congress authorized Major General Philip Schuyler, the commander of the Northern Department, to capture posts in Canada in order to "promote the peace and security of these colonies."[88] According to Congress, the control of strategic positions along the route between New York and Canada was necessary to prevent a British attack from the north on the newly organized American colonies.[89] The paradox of attacking to facilitate peace can be explained this way: Congress believed a show of superior force would

85. Thacher, *American Revolution,* 44–45; Gillette, *Army Medical Department,* 57; Miller, "Vignette of Medical History," 458.

86. Hatch, *Thrust for Canada,* 32. See Edmund Cody Burnett, ed., *Letters of Members of the Continental Congress, August 29 1774–July 4 1776* (Gloucester, Mass.: P. Smith, 1973), 113.

87. Justin H. Smith, *Our Struggle for the Fourteenth Colony: Canada and the American Revolution* (New York: G. P. Putnam's Sons, 1907), 173–74.

88. 27 June 1775, *Journals of the Continental Congress,* quoted in Hatch, *Thrust for Canada,* 34.

89. Smith, *Our Struggle for the Fourteenth Colony,* 213; Coakley and Conn, *War of the American Revolution,* 26. American fears of an attack from the north were not unfounded. At the start of the conflict, General Frederic Haldimand, later Governor of Canada, urged Jeffrey Amherst to employ Canadians and Indians to "reduce the four New England governments to reason." Haldimand to Amherst, 15 December 1774, British Museum, Add. MSS 21:661 fol. 364, quoted in Smith, *Our Struggle for the Fourteenth Colony,* 78.

convince the Canadians that since an American victory would be forthcoming, their best course would be to capitulate immediately. Factions in Canada supported both the British and American causes with extreme vehemence, yet the vast majority of Canadians wished to remain neutral in the conflict.[90] Congress hoped to convince those favoring neutrality that an American victory was inevitable, thereby swaying them to support the War for Independence.

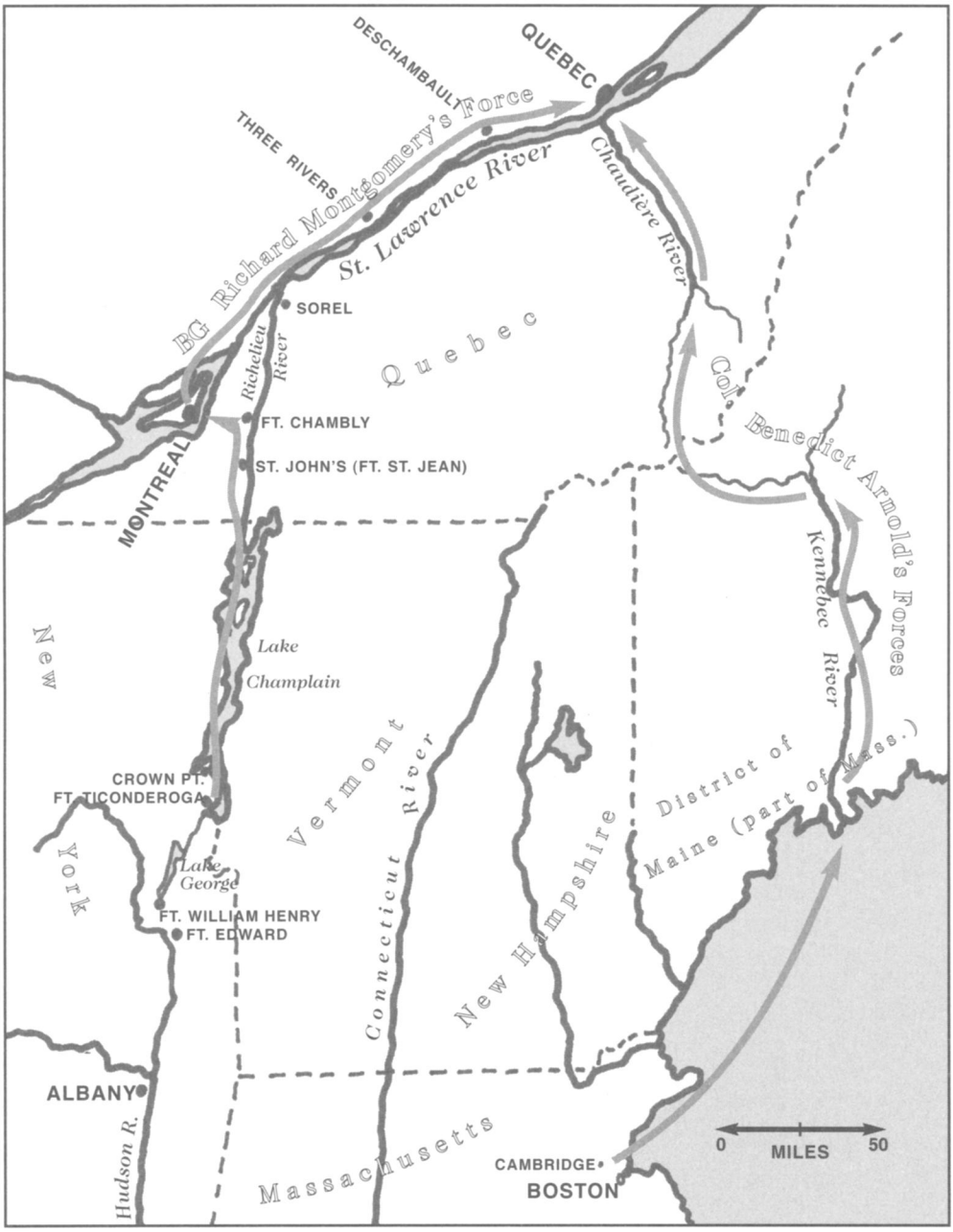
On 28 August Schuyler and Brigadier General Richard Montgomery led an invasion force north from Ticonderoga, New York, toward the St. Lawrence River. Under Montgomery the Northern Army troops took St. John's on 3 November and forced the surrender of Montreal on 12 November. From Massachusetts, General Washington sent Colonel Benedict Arnold and approximately eleven hundred men north through the wilderness of Maine toward Quebec. The original American goal for Arnold's expedition, as explained by Washington, was to "divert [British commander Sir Guy] Carleton from St. John's which would leave a free passage for General Schuyler, or if this did not take effect, Quebeck in its present defenseless state must fall into his hands an easy prey."[91] Arnold's soldiers departed on 11 September and arrived outside Quebec on 8 November. Montgomery, whose army had been drastically reduced by disease, desertion, and expiring enlistments, left garrisons at Montreal and St. John's under the command of Brigadier General David Wooster and marched with three hundred men toward Quebec, joining Arnold on 2 December. Here the Americans would be exposed to smallpox.[92]

American troops outside Quebec first mentioned the presence of smallpox among them on 6 December, and the disease spread rapidly. Given the incubation period of twelve days before the appearance of the easily recognizable symptoms, it is unlikely that the American troops could have brought the infection unnoticed. If the disease did not arrive

90. Hatch, *Thrust for Canada,* 37.

91. Wallace, *Appeal to Arms,* 67; Hal T. Shelton, *General Richard Montgomery and the American Revolution: From Redcoat to Rebel* (New York: New York University Press, 1994), 86; Hatch, *Thrust for Canada,* 62–63; Coakley and Conn, *War of the American Revolution,* 93; Force, *American Archives,* 4:3, 761–63; Fitzpatrick, *Writings of George Washington,* 3:510; John Joseph Henry, *Account of Arnold's Campaign Against Quebec* (New York: New York Times, 1877, 1968), 3–5; James A. Huston, "The Logistics of Arnold's March to Quebec," in Editors of Military Affairs, *Military Analysis,* 108. For the importance of Canada to the American Revolutionary cause, see Martin, *Benedict Arnold,* 107, 110.

92. Gillette, *Army Medical Department,* 59; Hatch, *Thrust for Canada,* 100, 141; Coakley and Conn, *War of the American Revolution,* 95; Gibson, "Role of Disease," 122; Wallace, *Appeal to Arms,* 80; Martin, *Benedict Arnold,* 68, 155; French, *First Year,* 598. On desertions, see Martin, *Benedict Arnold,* 164; Haskell Diary, 1 January 1776, in Kenneth Roberts, *March to Quebec: Journal of the Members of Arnold's Expedition* (New York: Doubleday, 1938), 485.



The American Campaign against Quebec, 1775–76.
Montgomery's forces left Fort Ticonderoga 28 August 1775, captured Montreal 13 November, and arrived before Quebec 2 December. Arnold's force departed Boston 11 September and arrived before Quebec 9 November. The attack, in which Montgomery was killed, took place 31 December. The American retreat to Crown Point began 2 May 1776.

General Richard Montgomery. (Painting by Charles Willson Peale, American Antiquarian Society.)

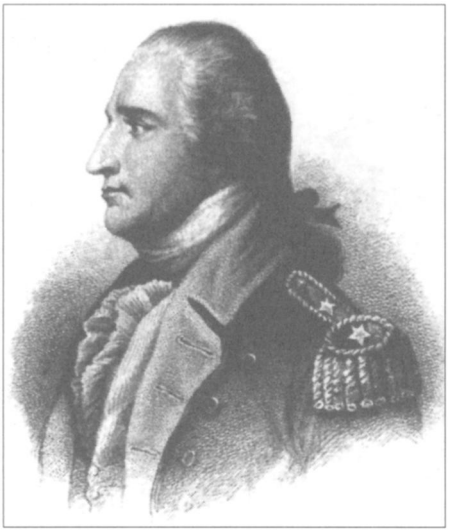
with the Americans, it must have been introduced in Canada. For a full-blown epidemic to erupt in the Continental Army camps within weeks of the troops' arrival, exposure must have occurred almost as soon as Arnold's soldiers reached Quebec on 8 November.[93]

British Captain Thomas Ainslie confirmed the existence of the disease in Quebec and speculated on its potential effect on the American troops. On 9 December he reported that the "small-pox does havoc among them—there are 200 now in hospitals, 'tis a deadly infection in Yanky veins. We have long had this disorder in town." Though not an overt admission of biological warfare, Ainslie's comments may be interpreted as such given his evident pleasure in reporting that the American forces were susceptible to smallpox and had been free of the disease to this point. Ainslie mentioned American problems with smallpox several more times in his journal. Reports from deserters indicated that on 23 December "the enemy is about 2000; they are sickly—the dread of the small pox kills many of the poor creatures."[94] Hours before the American

93. Fenn, *Pox Americana,* 19; King, *Transformations in American Medicine,* 68, 71.

94. Ainslie Journal entry, 23 December 1775, in Sheldon S. Cohen, ed., *Canada Preserved: The Journal of Captain Thomas Ainslie* (New York: New York University Press, 1968), 31.

attack on Quebec at the end of the month, a deserter told Ainslie, "the smallpox still rages among them."[95] The presence of smallpox among the Americans was certainly a British advantage.[96]



General Benedict Arnold. (Engraving from a contemporary portrait by Pierre Eugene Du Simitière)

Evidence indicates that Sir Guy Carleton, military governor of Canada, ordered or condoned sending contagious victims of the disease into the enemy lines with the intention of infecting the American attackers.[97] Some American soldiers suspected the British of intentionally spreading smallpox among them during the Canadian campaign. John Joseph Henry, a sixteen-year-old Pennsylvanian who marched to Quebec with Arnold, wrote in December that "the small pox, introduced into our cantonments by the indecorous, yet fascinating arts of the enemy, had already begun its ravages."[98] Private Caleb Haskell found "the smallpox . . . all around us, and there is great danger of it spreading in the army. There are spies sent out of Quebec every day, and some are taken almost every day, both men and women."[99] His implication that the spies were infected with smallpox supported the idea that the British were trying to intentionally introduce the contagion among the Americans. Such behavior by the British was certainly consistent with Washington's belief that a similar plot was underway in Boston and the British use of these tactics during the Seven Years' War.

American Captain Hector McNeal, who resided in Quebec just prior to the invasion, asserted to the congressional committee investigating the expedition's failure, "The smallpox was sent out of Quebeck by Carleton, inoculating the poor people at government expense for the pur-

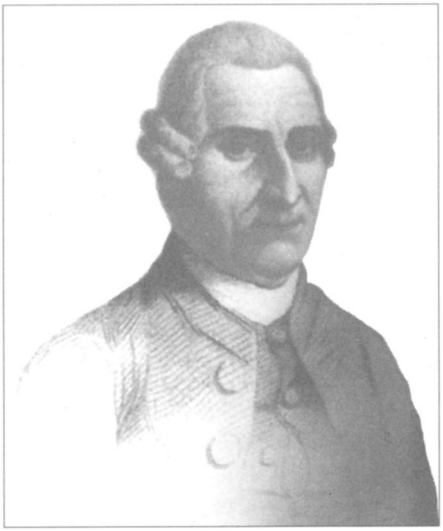
95. Ainslie Journal entry, 30 December 1775, ibid., 33; Hatch, *Thrust for Canada,* 129.

96. Cohen, *Canada Preserved*, 27.

97. Martin, *Benedict Arnold,* 163. Henry Journal, 374; Senter Journal, 230; and Haskell Diary, 484–85, all in Roberts, *March to Quebec.*

98. Henry, *Account of Arnold's Campaign,* 107; Roberts, *March to Quebec,* 375.

99. Haskell Diary, in Roberts, *March to Quebec,* 482. See also Martin, *Benedict Arnold,* 163.



General John Thomas. (Engraving from a contemporary portrait.)

pose of giving it to our army."[100] A Dr. Coates, interviewed by committee member Thomas Jefferson, also supported this contention and stated that it "was supposed Carleton sent out people with it." The military implications that the introduction of smallpox among the American forces held for the British and the eyewitness accounts that he believed credible convinced Jefferson "that this disorder was sent into our army designedly by the commanding officer in Quebec. It answered his purposes effectually."[101]

American firsthand accounts focus vividly and frequently on the impact of this frightening disease, addressing it almost universally. Numerous military journals discuss smallpox extensively.[102] On 17 December, Dr. Isaac Senter commented, "Smallpox broke out in the army." Major Return Jonathan Meigs recorded cases of smallpox in his journal on the twentieth. On the same day Private Haskell broke out with smallpox and recorded in his journal on the twenty-first: "small-pox spreads fast in our army." Due to its effects he did not participate in the

100. In June 1776, after the defeat of the American invasion of Canada, Congress formed a committee "to enquire into the cause of the miscarriages in Canada." Its members were William Whipple, Robert Treat Paine, Stephen Hopkins, Roger Sherman, George Clinton, James Wilson, Thomas Jefferson, Joseph Hewes, Arthur Middleton, and Lyman Hall. *Journals of the Continental Congress, 1774–1789* (Washington: GPO, 1906), 5: 474; 6:617–18.

101. Julian P. Boyd, ed., *The Papers of Thomas Jefferson* (Princeton, N.J.: Princeton University Press, 1954–), 1:435–37, 10:373; Fenn, *Pox Americana,* 90.

102. In Roberts, *March to Quebec,* see the Haskell, Henry, and Senter journals for extensive mention of smallpox. Only two accounts of the battle neglect to mention the disease: that of George Morris of Pennsylvania, reflecting his probable immunity due to childhood exposure or immunization; and that of Ephraim Squier, who served with General Roger Enos and never reached Canada. See also Ammi R. Robbins, *Journal of the Rev. Ammi R. Robbins, a Chaplain in the American Army, in the Northern Campaign of 1776* (New Haven, Conn.: B. L. Hamlen, 1850); and Lewis Beebe, "Journal of Dr. Lewis Beebe," *Pennsylvania Magazine of History and Biography* 59 (October 1935): 320–61.

American attack on the night of 30–31 December, still "being very weak and feeble after the smallpox."[103]

In addition to destroying the health of the soldiers in the field, smallpox affected the invasion force and dictated military strategy in other significant ways. The prevalence of the disease in camp was a factor in the dearth of recruits attracted and reenlistments secured for the Northern Army. Many of the soldiers' enlistments were scheduled to end on 1 January 1776. General Montgomery, desperate for additional troops just prior to his planned assault on Quebec at the end of December 1775, urged his New Englanders to reenlist until April, but most refused. Benjamin Trumbull, a Congregational clergyman and historian, recorded that, "The troops are very impatient, are averse to enlisting and long to be dismissed home."[104]

Rifleman Henry, reflecting on Montgomery's plans for the December attack, links the soldiers' refusal to reenlist with the presence of smallpox in the camps: "Many of the New England troops had been engaged on very short enlistments, some of which were to expire on the first of January 1776. . . . The majority were either farmers or sailors, and some had wives and children at home. Besides, the small pox . . . had already begun its ravages. This temper of the men was well known to the General."[105] As Dr. Senter explained, "Scarce any of the New England recruits had ever had the disorder . . . and gave apprehensions of taking it the natural way." As to the Pennsylvania riflemen, Private Henry wrote: "Like the eastern people, before, and at that period, they detested the introduction of the small-pox into their country by inoculation. Now they were its victims."[106]

Smallpox therefore, directly affected American military strategic planning in Canada, impeded recruitment, and jeopardized the health of the troops. Even before any direct action was taken at Quebec, smallpox "had made considerable appearance in [the] army."[107] Under great pres-

103. Haskell Diary, in Roberts, *March to Quebec,* 484.

104. Hatch, *Thrust for Canada,* 97; Force, *American Archives,* 4:3, 973–74; Benjamin Trumbull, "A Concise Journal on Minutes of the Principle Movements Towards St. John's, of the Siege and Surrender of the Forts There in 1775," *Connecticut Historical Society Collections* 7 (1899): 166, quoted in Hatch, *Thrust for Canada,* 97.

105. Henry, *Account of Arnold's Campaign,* 106; Henry Journal, in Roberts, *March to Quebec,* 374.

106. Senter Journal, 238, and Henry Journal, 396, both in Roberts, *March to Quebec*; Fenn, *Pox Americana,* 39. Henry later observed that smallpox was less of a threat to the Pennsylvania troops, as they had been exposed to the disease in their youth, either naturally or by inoculation. The use of inoculation began early in Pennsylvania, introduced and popularized by Benjamin Franklin and Dr. Benjamin Rush.

107. Boyd, *Papers of Thomas Jefferson,* 1:437.

sure to capture Quebec and secure Canadian support, Montgomery's three strategic options in December of 1775 were "siege, investment or storm."[108] An experienced military commander, the general understood the dilemmas of each choice. Without heavy artillery or protective trenches, a successful siege would be hard to sustain. Investment, or blockade, would likely require reinforcements, especially given Carleton's strong position. Preventing the flow of "necessary supplies of food and fuel" into Quebec with such a small American force would also have been difficult.[109] Canadian defenses were basically sound, though neglected and vulnerable in places. Quebec was a medieval-style city built above the intersection of the St. Charles and the St. Lawrence rivers, surrounded by walls twenty-five feet high and thick, with strategically placed ramparts. The effective firepower and superior artillery of the Canadian fortress posed problems for the Americans.[110] Confidence among the Americans was high, however, after their successes at Montreal and St. John's the previous month.

With siege or blockade ruled out, a military assault seemed the best alternative for the Northern Army to pursue.[111] Optimistic American leaders believed that Quebec had "a wretched motley garrison of disaffected seamen, marines and inhabitants; the walls in a ruinous situation, and cannot hold out long." Montgomery wrote to General Schuyler: "The works at Quebeck are extremely extensive, and very incapable of being defended." He believed a precipitous attack could succeed because of the weakness of the Quebec garrison, even though the number of troops he commanded was very low.[112] British General Howe himself expected an American victory. On 3 December he reported: "I learn Montreal has surrendered; that General Carleton was on his way down the river in a armed vessel, and that there was little reason to believe the capital would be able to withstand the expected attack."[113]

108. Extract of a letter from Richard Montgomery to Robert R. Livingston, in Force, *American Archives,* 4:3, 1638–39.

109. Martin, *Benedict Arnold,* 157.

110. William L. Stone, ed., *Journal of Captain Pausch: Chief of the Hanau Artillery During the Burgoyne Campaign* (Albany, 1886; reprint, New York: New York Times, 1971), 59–60 n; Martin, *Benedict Arnold,* 163; W. T. P. Shortt, *Journal of the Principal Occurrences During the Siege of Quebec by the American Revolutionists Under Generals Montgomery and Arnold in 1775–76* (London: A. J. Valpy, 1824), 9; French, *First Year,* 600.

111. Hatch, *Thrust for Canada,* 127–28; Martin, *Benedict Arnold,* 169.

112. Benedict Arnold to George Washington, 5 December 1775, and Richard Montgomery to Philip Schuyler, 5 December 1775, in Force, *American Archives,* 4:4, 188–90; Willard, *Letters on the American Revolution,* 250.

113. William Howe to the Earl of Dartmouth, in Force, *American Archives,* 4:4, 170.

Anticipating the problems severe winter weather would cause the army, which lacked needed supplies, and aware that the variola virus was circulating among the troops, American commanders in Canada had to decide when to attack Quebec. Though Montgomery had originally indicated that any attack must come before mid-April 1776 when British reinforcements were expected, smallpox and the expiring enlistments of the New England troops pushed up his deadline and forced Arnold and Montgomery to attack Quebec before the end of 1775 or give up all hope of conquering Canada.

Arnold had arrived at the St. Lawrence River with only six hundred men, although he believed that a force of two thousand would be needed to capture Quebec.[114] Both Arnold and Montgomery sought reinforcements in preparation for the attack on Quebec. Schuyler wrote Congress from Albany, New York, asking for "three thousand men . . . that they might seize the first opportunity of marching into Canada." Recruitment of Canadians to the cause, an integral part of American strategy, proceeded slowly, and the Americans still lacked a sufficient number of men. Acutely aware of the need to attack before the British received reinforcements and supplies, Montgomery implored Schuyler to "[s]train every nerve to send a large corps of troops down the instant the Lake is passable. It is of the utmost importance we should be possessed of Quebeck before succours can arrive."[115] Major Lockwood later reported to the congressional committee investigating the invasion's failure that "when Montgomery made the attack there were 2 or 300 sick."[116] The assault came with "not above 800 men fit for duty."[117]

Secrecy, a key element of Montgomery's planned assault, was difficult to maintain in light of the significant number of American deserters and the effective use of spies by the British. Governor Carleton knew that many American enlistments expired on 1 January and anticipated an attack during the last weeks of December.[118] The substantial effect of smallpox on American troops also worked to British advantage. With a

114. George Athan Billias, ed., *George Washington's Generals* (Westport, Conn.: Greenwood Press, 1980), 171; Roberts, *March to Quebec,* 92–94; Martin, *Benedict Arnold,* 150. Desertions worried the Americans—see Martin, *Benedict Arnold,* 164 and 169. Given the timing of the desertions, which coincided with the outbreak of smallpox epidemics, fear of the disease likely contributed to the loss of men.

115. Philip Schuyler to President of Congress, 8 December 1775, and Richard Montgomery to Philip Schuyler, 26 December 1775, both in Force, *American Archives,* 4:4, 219, 464, and 4:3, 1639.

116. Boyd, *Papers of Thomas Jefferson,* 1:435, 448.

117. Richard Montgomery to David Wooster, 16 December 1775, Sparks Manuscripts, no. 52, II, 60, as quoted in Hatch, *Thrust for Canada,* 127.

118. Martin, *Benedict Arnold,* 167; Cohen, *Canada Preserved,* 33; Shortt, *Journal of the Principal Occurrences,* 19–25.

paltry American force pitted against a well-entrenched enemy, and Carleton's forewarning by escaped spies and deserters, the attack that began on the night of 30–31 December failed miserably. Montgomery was killed at the outset of the battle, and Arnold severely wounded and taken from the field. Hundreds of Americans were captured, further reducing the strength of the American army in the north.[119]

Montgomery's death was a devastating blow to the campaign. Described as a strong leader, the general had a long and distinguished military career, which included service in the British army during the Seven Years' War. Soldiers noted his impressive bearing and "pock-marked face," which indicated his immunity to smallpox.[120] Having suffered with the disease, Montgomery might have understood especially well the danger it posed for his troops. Prior to the attack, Montgomery had taken steps to quarantine the hundreds of soldiers who already had contracted smallpox. Ezekiel Price told Thomas Jefferson, "the General had taken great care to keep [smallpox] out."[121] As a veteran of the British army, Montgomery must have been aware of the success of inoculation in preventing the spread of this contagion. Had he lived, this talented general might have been able to mitigate the effects of smallpox on the American army in Canada.

In spite of his wound, Arnold assumed command of the Quebec forces after Montgomery's death and tried to regroup, while Connecticut General David Wooster succeeded Montgomery as head of the Canadian expedition. Given Arnold's tenacious nature and his belief that conquering the city was still an "object of the highest importance," he probably would have made every effort to mount another attack on Quebec before the arrival of British reinforcements, had he been able to muster sufficient troops. Instead, he began a siege of Quebec and requested huge numbers of troops from Congress in order to maintain it. With British supplies and troops expected at spring thaw, only an immediate increase in men would allow Arnold to realize his goals, but reinforcements were slow to arrive, few in number, and extremely susceptible to the smallpox raging in the American camps.[122] As soon as recruits arrived, they took sick. Without viable reinforcements and lacking adequate provisions, shelter, and clothing, Arnold attempted to maintain pressure on Quebec with a blockade and a persistent series of retreats and skirmishes

119. Martin and Lender, *A Respectable Army,* 72; Martin, *Benedict Arnold,* 166; and January 1776, *Journals of the Continental Congress, 1774–1789* (Washington: GPO, 1906), 6:64.

120. Martin, *Benedict Arnold,* 156; French, *First Year,* 610; Henry Journal, in Roberts, *March to Quebec,* 363. References to the scars of smallpox indicate its significance in contemporary reports.

121. Boyd, *Papers of Thomas Jefferson,* 1:449.

122. Martin, *Benedict Arnold,* 182.

through the spring. He authorized the construction of batteries and burned houses outside the city to prevent their use as fuel by the British. Still, smallpox spread rapidly among the troops and recruits. John Adams later concluded, "This fatal pestilence completed our destruction."[123]

The desire of the soldiers to protect themselves from smallpox severely curtailed Arnold's ability to sustain an effective army in the field. Having seen the fatal consequences of smallpox taken the natural way, American prisoners and soldiers in Canada insisted on self-inoculation.[124] Though inoculation did provide individual immunity to the disease, and was later successfully introduced as army policy by George Washington, the uncontrolled and haphazard use of the procedure, as occurred in Canada, spread contagion among the soldiers indiscriminately. Against orders and without using proper medical techniques or following prescribed precautions, "Numbers of the soldiers inoculated themselves, and indeed several officers."[125]

Soldiers risked self-inoculation even without the isolation needed to prevent further spread of the smallpox contagion. Inoculation without quarantine exposed anyone not protected by prior immunity to the risk of illness. As the soldiers went about their business after inoculation, they infected others.[126] This procedure therefore created a spiraling sequence of events—as soldiers introduced the contagion, the incidence of disease increased, followed by fear of contraction and more self-inoculation. Smallpox spread rapidly among the American troops, removing soldiers from active duty at a time when Arnold needed every man.[127] While the medical department serving the Northern Army eventually made sporadic efforts at inoculation, it is not clear why Arnold did not institute this policy immediately.[128]

Self-induced inoculation wrested control of the health and well being of the soldiers from their commanders. As early as December 1775, Private Henry complained, "Great numbers of the soldiers inoculated themselves for this disease . . . either to obtain an avoidance of duty, or to get over that horrible disorder in an easy and speedy way." By January 1776 the disease was spreading rapidly and severely affected the ability of the invasion force to function. Arnold forbade the procedure in orders dated 11 February and 15 March, but the smallpox danger was so real to the

123. French, *First Year,* 688–89; Force, *American Archives,* 4:4, 796, 1001.

124. Coakley and Conn, *War of the American Revolution,* 91; Martin, *Benedict Arnold,* 197.

125. Senter Journal, in Roberts, *March to Quebec,* 238.

126. Fenn, *Pox Americana,* 38–39; Duffy, *Epidemics in Colonial America,* 38; Bardell, "Smallpox during the American War of Independence," 528.

127. Gillette, *Army Medical Department,* 59.

128. Official inoculation efforts were sporadic in Canada and not begun until the campaign had already been lost.

soldiers that they refused to stop. Though inoculation was punishable by death at that time, Charles Cushing acknowledged that "it was practiced secretly, as they were willing to run any hazard rather than take [smallpox] the natural way."[129]

By spring the condition of the American soldiers in Canada had deteriorated severely due to continuous outbreaks of smallpox in both the army before Montreal and the forces besieging Quebec.[130] Approximately half of the soldiers were ill. The majority of the new recruits were not immune to the disease, and reinforcements sent to Canada sickened quickly.[131] While serving on the committee investigating the American loss in Canada, Thomas Jefferson received information indicating that the "first recruits after the defeat came in about 6 weeks. These were 25 men. . . . As fast as they came they were laid up with the smallpox. Might be about 27 or 2800 [total]. . . . Of these might be not more [than] 800 or 900 effective."[132] Arnold reported that the troops at Montreal, where he had been transferred in April when Wooster moved to Quebec, were also suffering, and that nearly twelve hundred of the thirty-two hundred soldiers there had contracted smallpox. "From the 1st of January to the 1st of March, we have never had more than seven hundred effective men on the ground, and frequently not more than five hundred," wrote General Arnold to Silas Deane.[133] Hoping to curtail the effect of the disease, on 15 May Arnold wrote to the congressional commission charged with monitoring the condition of the Northern Army: "I should be glad to know your sentiments in regards to inoculation as early as possible. Will it not be best, considering the impossibility of preventing the spreading of smallpox, to inoculate five hundred or a thousand men immediately, and send them to Montreal . . . which will prevent our army being distressed hereafter."[134] The next day, with the commission's acquiescence, Arnold instituted a short-lived policy

129. Force, *American Archives,* 4:6, 129.

130. Miller, "Vignette of Medical History," 458; Hatch, *Thrust for Canada,* 186.

131. Hatch, *Thrust for Canada,* 199–200.

132. Boyd, *Papers of Thomas Jefferson,* 1:437.

133. Force, *American Archives,* 4:5, 549–50; Hatch, *Thrust for Canada,* 158.

134. Gillette, *Army Medical Department,* 59; Duncan, *Medical Men in the American Revolution*, 96; Benedict Arnold to Commissioners, 15 May 1776, in Force, *American Archives,* 4:6, 593. The congressional commission was appointed on 15 February 1776 and arrived in Montreal on 29 April. Originally formed for diplomatic reasons, the commission was drawn to strategic issues in the Canadian military campaign and the deplorable condition of the Northern Army due to smallpox, dearth of supplies, and lack of effective leadership. It made no progress diplomatically but monitored the problems of the army firsthand. Its members included Father John Carroll, Benjamin Franklin, Samuel Chase, and Charles Carroll. Hatch, *Thrust for Canada,* 148–51.

permitting the procedure.[135] Unfortunately, Arnold's decision came too late to be effective, and his order was quickly rescinded.

Optimism among American leaders continued, however, even in the face of the precipitous New Year's Eve defeat at Quebec and subsequent problems. In March 1776 a Philadelphia correspondent wrote: "The Continental Army indeed received a check in the affair when [Montgomery] fell, but they are now joined by a larger body [of soldiers] and are carrying on the siege, and it is supposed will soon be in possession of that fortress and of course of all Canada."[136] The same month, Major General John Thomas, a medical doctor and accomplished military commander, was appointed to replace General Wooster as commander of the forces in Canada.[137] When Congress dispatched Thomas to Canada, its members had high hopes that this talented general would positively and effectively influence the Canadian military situation. John Hancock wrote, "the Congress have been anxious to fix upon some General officer, whose military skill, courage and capacity, will probably insure success to the enterprise."[138] Surprisingly, though efforts to win Canada had so far proven futile and the condition of the Northern Army was precarious, the Continental Congress still hoped an experienced military commander might turn the tide for the Americans and that Canada could be won over to the American cause.

Arriving in Canada in April 1776, General Thomas was put in a difficult position. Dr. Senter explained, "General Wooster being superceded gave him great distress," and General Thomas was "an utter stranger in the country and much terrified with the smallpox," which he had never had.[139] When he reached Quebec on 2 May, Thomas found an army of nineteen hundred men. According to the general, however, "only a thousand were fit for duty, officers included; the remainder were invalids, chiefly confined with the smallpox."[140] With such a small force available and the tremendous burden of caring for huge numbers of sick soldiers, meaningful engagement with the enemy was impossible. Fearing further spread of smallpox within the army, and not able to effectively control the inoculation process, Thomas reiterated the military sanction against

135. Roberts, *March to Quebec,* Senter Journal, 239–240; French, *First Year,* 689 n.

136. *Morning Post and Advertiser,* May 1776, in Willard, *Letters on the American Revolution,* 269.

137. *Journals of the Continental Congress,* 6:186.

138. Force, *American Archives,* 4:5, 84; Hatch, *Thrust for Canada,* 182. For a description of the Continental Congress's desire to possess Canada, see *Journals of the Continental Congress,* 4:388.

139. Senter Journal, in Roberts, *March to Quebec,* 238.

140. John Thomas to George Washington, 8 May 1776, in Force, *American Archives,* 4:6, 453.

this procedure and on the seventeenth countermanded Arnold's order of the previous day permitting inoculation.[141] As a British attack was imminent, widespread use of inoculation was impossible, given the lengthy recuperative period of the procedure. The new commander did, however, order Dr. Senter to set up a smallpox hospital in Montreal in an attempt to quarantine those suffering from the disease, whether naturally or by inoculation.[142]

Thomas, who was not immune to the disease, was urged to submit to inoculation for his own protection by congressional commissioners sent to monitor the conduct of the Canadian military campaign. Unfortunately, as an example to the troops, General Thomas refused inoculation.[143] The medical situation was becoming critical. Commissioners Samuel Chase and Charles Carroll pessimistically noted in a letter to Congress that "three fourths of the Army have not had the small-pox" and were thus likely to contract the infection if exposed.[144] Fear of the disease was so great, and the likelihood of death so high if infection occurred naturally, that the injunction against inoculation was rendered useless. "The smallpox is an infinite detriment to the service; notwithstanding which and the most express orders to the contrary, both officers and soldiers privately inoculate themselves," lamented Thomas.[145]

On 10 May, after the arrival of significant British reinforcements, General Thomas called a council of war and argued for taking a military stand by fortifying at the Canadian village of Deschambault, where a steep rock and clay wall at the Rapids of Richelieu along the St. Lawrence River offered the Americans a strong defensive position. Outvoted by his officers, including General Wooster, Thomas conceded and agreed to move the troops back to Sorel, an American base of operations on the St. Lawrence River. Though a stand at Deschambault would have had difficulties, the retention of the post was later seen as crucial to the cause. Thomas was initially unwilling to leave without a fight, but since large numbers of his soldiers were sick and he lacked sufficient rations,

141. French, *First Year,* 642 n; Force, *American Archives,* 4:5, 549–51; Beebe, "Journal of Dr. Lewis Beebe," 328; Hatch, *Thrust for Canada,* 185; Martin, *Benedict Arnold,* 208.

142. Senter Journal, in Roberts, *March to Quebec,* 239–40.

143. Hatch, *Thrust for Canada,* 182, 186; Huston, "The Logistics of Arnold's March," 117; Peckham, *War for Independence,* 31; Force, *American Archives,* 4:6, 592.

144. Commissioners to President of Congress, 27 May 1776, in Force, *American Archives,* 4:6, 590.

145. Force, *American Archives,* 4:6, 588–89; Hatch, *Thrust for Canada,* 183–85; Bayne-Jones, *Evolution of Preventive Medicine,* 51.

guns, and ammunition, an American retreat was inevitable.[146] In addition, the general was already suffering from the symptoms of smallpox, which he had contracted soon after arriving in Canada. By 19 May he was "under great indisposition of body" because of the disease.[147] Desperately ill, Thomas could not make necessary military decisions as he attempted to evacuate his army. On 27 May secretary Theodore Sedgewick wrote that General Thomas was "from his present circumstances incapable of attending to the necessary concerns of the Army." Thomas died at Fort Chambly on 2 June.[148]

In the last days of his illness, Thomas had turned over command of the Northern Army to General Wooster, who was the ranking officer in Canada until the arrival of Brigadier General John Sullivan on 2 June. The congressional commission monitoring the Canadian situation wrote Washington that they believed Wooster to be, "in our opinion, unfit, totally unfit, to command your Army, and conduct the war." Faced with certain defeat in the field, and the disintegration of American hopes for a Canadian ally in the war against Britain, the commissioners advised the immediate recall of Wooster.[149] Confidence in Wooster within the army was weak as well. General Gates wrote: "This altogether convinces me that Wooster is not Man fit to command there, or anywhere."[150] Dr. Lewis Beebe, who attended Thomas during his illness, mourned at his death, "had we a W-n or a Lee, to take command . . . we might have hopes of regaining Quebeck." The loss of General Thomas then, destroyed the inclination and ability of the Northern Army to fight, and smallpox continued to wreak havoc with the Canadian campaign.[151]

146. Martin, *Benedict Arnold,* 205; Hatch, *Thrust for Canada,* 184–85; Coakley and Conn, *War of the American Revolution,* 99. For a description of the value of Deschambault, see Smith, *Our Struggle for the Fourteenth Colony,* 303–4.

147. John Trumbull, *Autobiography, Reminiscences and Letters of John Trumbull* (New York and London: Wiley and Putnam, 1841), 27, 299; Force, *American Archives,* 5:1, 130; Burke Davis, *George Washington and the American Revolution* (New York: Random House, 1975), 85; Martin, *Benedict Arnold,* 209; Beebe, "Journal of Dr. Lewis Beebe," 328; Force, *American Archives,* 4:6, 578.

148. Hatch, *Thrust for Canada,* 187; Force, *American Archives,* 4:6, 589; George Washington to John Sullivan, 13 June 1776, in Fitzpatrick, *Writings of George Washington,* 5. According to Dixon, *Smallpox,* 9–11, the victim exhibits listlessness, indifference, mental confusion, lack of physical control, and muscle tone, and experiences slowed reactions. For a poignant description of General Thomas's death, see Thacher, *American Revolution,* 45.

149. Force, *American Archives,* 4:6, 589–90; Hatch, *Thrust for Canada,* 210; Huston, "The Logistics of Arnold's March," 118.

150. Horatio Gates, letter to John Adams, 4 May 1776, Adams Family Papers, MHS, in Bernard Knollenberg, "Correspondence of John Adams and Horatio Gates," *Proceedings of the Massachusetts Historical Society* 67 (October 1941–May 1944): 143.

151. Beebe, "Journal of Dr. Lewis Beebe," 331.

Lack of leadership had been a problem in Canada since the loss of Montgomery and the wounding of Arnold. Smallpox had reached epidemic proportions in the American expeditionary force and severely compromised its ability to maintain the siege of Quebec and hold Montreal. In one of his last letters to the congressional commissioners, General Thomas reported that "a great part of the Army are, or speedily will be, unfit for duty by means of inoculation, notwithstanding everything I have been able to do to prevent it."[152] In May Benedict Arnold wrote from Sorel, "I believe the difficulty of provisions may be got over; but the small-pox and gondolas to secure our navigation and retreat, are very great obstacles in our way."[153] Leaderless, ill, burdened with huge numbers of soldiers incapacitated by smallpox, the Northern Army struggled even to retreat. With Thomas's death from smallpox, the last hope of success in the Canadian campaign was lost.

General Washington was well aware of the devastation caused in Canada by smallpox. On 7 June 1776 he acknowledged to General Schuyler that the "situation of our affairs in Canada is truly alarming."[154] By the end of June, Horatio Gates, who had been sent to command the Northern Army, was reporting "near Three Thousand sick."[155] Washington quoted from a letter by General Sullivan that: "The army is sickly, many with the smallpox, and he is apprehensive the Militia ordered to join them will not escape the Infection."[156] To ensure an effective fighting force, this disease had to be controlled.

The regimental return figures bear out the disastrous consequences left by the smallpox epidemics in Canada. While statistics for the early months of the Canadian campaign are sketchy at best, by March 1776 it was clear that the Northern Army was in severe trouble. Return data from Quebec indicated that 31 percent of the soldiers there were sick. The percentage of sick fluctuated between 15 percent and 37 percent of the total number of soldiers involved in the assault on Canada.[157] Contemporary accounts indicate that smallpox was a primary cause of ill-

152. John Thomas to Commissioners, 20 May 1775, in Force, *American Archives,* 4:6, 592.

153. Benedict Arnold to Samuel Chase and Charles Carroll, 17 May 1776, in Force, *American Archives,* 4:6, 593; Charles P. Whittemore, *A General of the Revolution: John Sullivan of New Hampshire* (New York: Columbia University Press, 1961), 26–27.

154. George Washington to Philip Schuyler, 7 June 1776, in Fitzpatrick, *Writings of George Washington,* 5:101.

155. Gates to Adams, 4 May 1776, quoted in Knollenberg, "Correspondence of John Adams and Horatio Gates," 145.

156. George Washington to President of Congress, 14 July 1776, in Fitzpatrick, *Writings of George Washington,* 5:272.

157. Lesser, *Sinews of Independence,* 17–18. See also Gibson, "Role of Disease," 124.

ness in the army, and severely damaged the effectiveness of the Canadian campaign. Dr. Jonathan Potts, appointed physician and surgeon in the Canadian Medical Department on 6 June, complained, "the distressing situation of the sick here is not to be described, without clothing, without bedding, or shelter sufficient to keep them from the weather. . . . We have at present upwards of a thousand sick, and crowded into sheds, and laboring under the various and cruel disorders of dysenteries, bilious putrid fevers, and the effects of confluent smallpox."[158]

After the collapse of the Canadian campaign, General Gates conceded, "As fine an Army as has ever marched into Canada has this year been entirely ruined with smallpox. The line of retreat extended near 13 miles distance and a great part of them sick with smallpox. . . . I am creditably informed no less than 30 captains died of it and not more than 1 in 3 that took it in the natural way lived."[159]

Washington received word from Gates on July 29 that:

> Everything about this army is infected with the pestilence; the cloathes, the blankets, the air, and the ground they [the troops] walk on. To put this evil from us, a general hospital is established at Fort George, where there are now between two and three thousand sick, and where every infected person is immediately sent. But this care and caution have not effectually destroyed the disease here; it is not withstanding continually breaking out.[160]

John Adams, writing from Philadelphia in June 1776, laid the blame for the defeat in Canada squarely upon the effects of smallpox: "Our misfortunes in Canada are enough to melt a heart of stone. The small-pox is ten times more terrible than Britons, Canadians, and Indians together. This was the cause of our precipitate retreat from Quebeck; this is the cause of our disgraces at the Cedars."[161] The same month General Sullivan complained to General Schuyler: "that infernal disorder, the small-

158. Flexner, *Doctors on Horseback,* 33; J. M. Toner, *The Medical Men of the Revolution* (Philadelphia: Collins, 1876), 57; William O. Owen, ed., *The Medical Department of the United States Army: Legislative and Administrative History during the Period of the Revolution* (New York: Paul Hoeber, 1920), 6 June 1776, 39.

159. Terrence C. Davies, "American Medicine During the Revolutionary Era," *Journal of the Medical Association of the State of Alabama* 6 (November 1976): 36; Horatio Gates to Major Hawley, 10 August 1776, Force, *American Archives,* 5:1, 901.

160. Horatio Gates to George Washington, 29 July 1776, in Fitzpatrick, *Writings of George Washington,* 5:303.

161. Davies, "American Medicine During the Revolutionary Era," 36. Extract of a letter from John Adams, 26 June 1776, in Force, *American Archives,* 4:6, 1083. Adams continues, "I could almost wish that an inoculating hospital was opened in every town in New-England," indicating that smallpox was especially feared in that region, and that inoculation was still controversial for its residents.

pox, has ruined our army."[162] Ultimately, the congressional committee ordered to investigate the defeat in Canada concluded "that a still greater, and more fatal, source of misfortune has been, the prevalence of the small pox in that army; a great proportion whereof has thereby been usually kept unfit for duty."[163] Contemporary evidence is overwhelming: smallpox destroyed the Northern Army and all hope of persuading the Canadians to join the Revolution.

While the incidence of smallpox itself had a devastating effect on both the British and American armies, fear of the disease especially influenced American recruitment efforts and desertion rates early in the war. Though the Revolution was a popular cause, recruitment of soldiers proceeded slowly. Among other factors, one important hindrance was the fear generated among the colonial population by tales of the disastrous effect of smallpox on the Northern Army at Quebec and Montreal. Jonathan Trumbull, Governor of Connecticut, wrote to General Washington on 4 July 1776:

> The Retreat of the Northern Army and its present Situation, have spread a general Alarm. . . . The prevalence of the small pox among them [the troops] is every way unhappy; our people in General have not had this Distemper. Fear of the infection operates strongly to prevent Soldiers from engageing in the Service, and the Battalions ordered to be raised in this colony fill up slowly: are there no measures may be taken to remove the Impediment? May not the army soon be freed from that infection? Could any expedient be fallen upon that would afford probable hopes that this infection may be avoided?[164]

The problem continued as the war wore on. On 7 August Horatio Gates wrote from Ticonderoga: "The very great desertion rate from this Army has, I believe, been principally occasioned by the dread of the smallpox." He continued, "I am apprehensive it will be extremely difficult to retain [the soldiers] for another campaign."[165] In October Colonel William Smallwood, complaining of overall poor medical care, wrote: "One good-seasoned and well-trained soldier, recovered to health is

162. John Sullivan to Philip Schuyler, 24 June 1776, in Force, *American Archives,* 4:6, 1201.

163. *Journals of the Continental Congress,* 5:618. See also Miller, "Vignette of Medical History," 458, where the author estimates a 40 percent mortality rate for the Canadian campaign.

164. Jonathan Trumbull to George Washington, 4 July 1776, in Fitzpatrick, *Writings of George Washington,* 5:252.

165. Horatio Gates to George Washington, 7 August 1776, in Force, *American Archives,* 5:1, 827.

worth a dozen new recruits . . . this neglect is very discouraging to the soldiery, and must injure the service upon the new enlistments."[166]

In spite of the continuing threat of smallpox, Washington was reluctant to consider inoculation of the troops because of the way undisciplined and haphazard efforts at inoculation had spread the disease among the troops in Canada. In New York, Washington conceded that he was "much obliged" to the Provincial Congress and General Committee there "for their care in endeavoring to prevent the spreading of the small-pox (by inoculation or any other way) in this City, or in the Continental Army, which might prove fatal to the Army." In May 1776 he ordered strict punishment for any officer who submitted to the inoculation procedure, and careful rules to ensure all new cases were isolated immediately.[167] James Livingston, from the committee appointed to "take into consideration the dangerous consequences of the Small-pox," recommended to the Congress of New York a series of precautions needed to avoid the epidemic spread of the disease in New York. In his report he noted that "great numbers of the Army have not had it," indicating an awareness of the danger faced by nonimmune troops. Washington anticipated that his generals would be able to prevent the further spread of smallpox through the use of proper precautions such as containment and isolation without mass inoculation.[168]

In January 1777, however, Washington instituted a new military strategy to protect his troops and sustain the Revolution: systematic troop inoculation. He directly linked his decision to the loss in Canada: "The deplorable and melancholy situation, to which one of our Armies was reduced last Campaign by the small Pox . . . has determined me . . . to introduce inoculation immediately."[169] He explained that, "when I recall to mind the unhappy situation of our Northern Army last year I shudder at the consequence of this disorder if some vigorous steps are not taken to stop the spreading of it."[170] Writing on 6 January to Dr.

166. Force, *American Archives,* 5:2, 1100; Toner, *Medical Men,* 64. Smallwood's comments illustrate the value placed upon the long-term Continental soldier as an effective fighting tool, and show how disease in general and smallpox in particular affected the army's capacity to maintain its effectiveness.

167. Committee Report, 26 May 1776, in Force, *American Archives,* 4:6, 635–36.

168. James Livingston to Congress, 3 June 1776, in Force, *American Archives,* 4:6, 1357; George Washington to John Sullivan, 13 June 1776, in Fitzpatrick, *Writings of George Washington,* 5:132; George Washington to Jonathan Trumbull, 7 July 1776, ibid., 5:235.

169. George Washington to Nicholas Cooke, 10 February 1777, in Fitzpatrick, *Writings of George Washington,* 7:131.

170. George Washington to Robert Hanson Harrison, 20 January 1777, ibid., 7:38.

William Shippen, Jr., director of the Army Medical Department, Washington resolved to solve the problem in the following way:

> Finding the smallpox to be spreading much and fearing that no precaution can prevent it from running thro' the whole of our Army, I have determined that the Troops shall be inoculated. This Expedient may be attended with some inconveniences and some disadvantages, but yet I trust, in its consequences will have the most happy effects. 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. . . . If the business is immediately begun and favored with the common success, I would fain hope [the soldiers] will be soon fit for duty, and that in a short space of time we shall have an Army not subject to this, the greatest of all calamities that can befall it, when taken in the natural way.[171]

Washington's optimism was premature, however. Not until late in 1778 did the army effectively control the inoculation process and Washington himself believe the Continental Army to be free from the threat of smallpox.

Throughout January and February 1777, Washington continually exhorted his medical staff to contain the constant eruptions of the disease among the soldiers. Special hospitals were set up in attempts to quarantine smallpox victims, though with the constant movement of troops and addition of new regiments throughout the winter months, containment of the disease appeared hopeless. The infection spread rapidly among civilians and soldiers alike, possibly through the use of unsupervised inoculation procedures.[172] In February 1777 General Heath notified George Washington that "The spread of the Small Pox at and near Stamford [Connecticut] . . . is alarming. I am informed that some of the inhabitants are Secretly Inoculating their family."[173]

In late January, General Washington had second thoughts about his earlier decision to inoculate, and on the advice of Dr. Shippen, he decided to curtail his plans of inoculation in an attempt to stop the rampant spread of infection. Though a staunch supporter of properly utilized and supervised inoculation, Dr. John Morgan, the Medical Department's former director general, later blamed the army's "disgrace and misfortunes in Canada" on "the shameful proceedings of the Surgeons, in

171. George Washington to Dr. William J. Shippen, Jr., 6 January 1777, ibid., 6:473–74.

172. Miller, "Vignette of Medical History," 458.

173. William Heath, letter to George Washington, 11 February 1777, William Heath Papers.

spreading the smallpox by inoculation . . . in the face of the enemy."[174] Perhaps fearing this possibility, Washington decided to halt inoculation.

In early February, however, the general found new resolve and informed Congress on the fifth that "The smallpox has made such Headway in every quarter that I find it impossible to keep it from spreading throughout the Army, in the natural way. I have therefore, determined not only to inoculate all the troops now here, that have not had it, but shall order Doctor Shippen to inoculate the Recruits as fast as they come into Philadelphia."[175] Washington acted quickly to implement this new military medical policy. Doctors were dispatched to Morristown, his winter headquarters, and Trenton, New Jersey; Fishkill, Ticonderoga, and the Hudson Highlands in New York; Bethlehem, Newtown, and Philadelphia, Pennsylvania; Dumfries, Colchester, Georgetown, and Alexandria, Virginia; and locations in Connecticut, where mass inoculation of soldiers and recruits were carried out.[176] Divisions submitted to inoculation en masse at five-to-six-day intervals. The army used guarded private homes and churches as treatment and isolation centers.[177] Told that militiamen sought to leave the Morristown area with their families as inoculation of the troops commenced, Washington counseled Brigadier General William Maxwell to "let them know that their Families will be under not the smallest danger of catching the small pox. I have taken every possible care of them . . . to prevent the Infection's spreading."[178] With the need for control of the disease so pressing, Washington issued General Orders on 15 February insisting "that no persons will presume, on any account whatever, to inoculate without first obtaining leave."[179]

Washington took a great military risk by instituting mass inoculation. The preventive measures needed to eliminate smallpox induced illness and thereby effectively removed large numbers of soldiers from

174. George Washington to Horatio Gates, 28 January 1777, in Fitzpatrick, *Writings of George Washington,* 7:72–73; John Morgan, *A Vindication of His Public Character in the Station of Director-General of the Military Hospitals, Physician in Chief to the American Army, anno 1776* (Boston: Powers and Willis, 1777), 51.

175. George Washington to the President of Congress, 5 February 1777, in Fitzpatrick, *Writings of George Washington,* 7:102–6.

176. Fenn, *Pox Americana,* 94; Gillette, *Army Medical Department,* 74–75; William O. Owen, ed., *The Medical Department of the United States Army [Legislative and Administrative History] During the Period of the Revolution [1776–1786]* (New York: Paul B. Hoeber, 1920), 57–58.

177. Richard B. Stark, "Immunization Saves Washington's Army," *Surgery, Gynecology and Obstetrics* 144 (March 1977): 430–31. Some evidence indicates that the contagion escaped military camps in spite of Washington's precautions, and smallpox infected residents of Princeton and Morristown in the spring of 1777.

178. George Washington to William Maxwell, 18 February 1777, in Fitzpatrick, *Writings of George Washington,* 7:158.

179. Washington's General Orders, 15 February 1777, ibid., 7:153.

active duty at critical junctures in the war, affecting his ability to function militarily. The need for secrecy was great, as the British would have had a significant advantage had they known of the debilitated condition of the American troops as they recovered from induced smallpox.[180] The general urged Dr. Shippen to keep "the matter as secret as possible" to prevent the enemy from learning that the American army would be subjecting its soldiers to a lengthy process of infection and recuperation.[181]

Washington's desire to have an army healthy and ready to fight in the anticipated summer campaign explains his insistence on having the inoculations done as soon as possible although the procedure temporarily left him without able soldiers. From January to March 1777, Washington referred often to the fact that his most reliable troops, those in the Continental Army, were ill with smallpox. As he anticipated a move by the British from Brunswick, New Jersey, he complained to General Gates in February that, "unhappily for us, most of those that could be depended upon, are down with the Small Pox, either by Inoculation, or in the natural way."[182] Over the next weeks, the commander in chief continually urged his generals and various state governors to see to the immediate inoculation of the troops. He offered encouragement by writing: "Inoculation at Philadelphia and in this Neighborhood had been attended with amazing Success."[183]

By late March, Washington needed soldiers and recruits for the upcoming campaign season but did not consider interrupting the ongoing troop inoculations. He told General Heath to "leave no means untried, to send those immediately forward, who have had the Small Pox, and those who have undergone inoculation, as soon as they can safely undergo the fatigue of the march."[184] In March Washington instructed Brigadier General James Varnum "that as fast as yours [recruits] are inlisted, they may be sent to some convenient place and there take the infection. By this means no time will be lost for the Men will go thro' the disorder while their Arms and Cloathes are preparing," suggesting that the inevitable period of delay between enlistment and equipping of the soldiers be utilized by having them inoculated immedi-

180. Gillette, *Army Medical Department,* 75. Washington's gamble paid off. Only four of every five hundred soldiers inoculated died, and Washington had all of his nonimmune troops inoculated during the winter of 1778 at Valley Forge. Though the mortality rate was low, between three and four hundred soldiers must have died from inoculation in 1777 alone, as nearly forty thousand soldiers underwent the procedure.

181. George Washington to William Shippen, Jr., 6 January 1777, in Fitzpatrick, *Writings of George Washington,* 6:473.

182. George Washington to Horatio Gates, 20 February 1777, ibid., 7:176.

183. George Washington to Jonathan Trumbull, 3 March 1777, ibid., 7:230.

184. George Washington to William Heath, 23 March 1777, ibid., 7:315.

ately upon joining the army. The general's overriding concern was to have the new recruits inoculated with all due speed, then marched off to join the Continental forces in readiness for battle. A month later Washington complained to Varnum that his earlier order "that you would have inoculated, all the Recruits of the two Regiments to be raised by Rhode Island, as fast as they enlisted" remained unexecuted. As a result of Varnum's delay, his recruits were not ready to take the field. Washington told Varnum that "the troops here, that were inoculated the beginning of March, are recovered and in the field. . . . I can't find a good excuse for this delay; Such dilatoriness must increase our difficulties."[185] Though he later conceded to Varnum that the possibility of a British attack on Newport, Rhode Island, necessitated Varnum's decision to delay inoculation, Washington's letters indicate a growing frustration with the forced detention for inoculation of new recruits he so desperately needed, and at the cavalier attitude taken by some of his generals towards smallpox. On 17 April he wrote to Brigadier General Alexander McDougall, "I am much surprised to hear that the inoculation of the Troops has been countermanded . . . I have never done or said anything Countenancing such a measure . . . I have pressed and urged the necessity of it in every instance." Washington insisted, "I must request that not a moment may be delayed in carrying such of the Troops thro' that disorder, as have not had it."[186]

Smallpox continued to affect Washington's efforts to build his army. He commented on the problem of recruitment in a letter to his brother Samuel in April: "Our troops come in exceedingly slow."[187] Virginia Governor Patrick Henry explained that he was unable to supply his quota of much needed troops primarily because of "The terrors of the smallpox, and many deaths occasioned by it."[188] Washington answered Henry's plea on 30 April:

> The apologies you offer for your deficiency of Troops, are not without some Weight; I am induced to believe that the apprehensions of the Small pox and its calamitous consequences, have greatly retarded the Inlistments; but may not those objections be easily done away, by introducing Innoculation into the State, or shall we adhere to a regulation preventing it, reprobated at this time, not only by the Consent and usage of the greater part of the civilized World,

185. George Washington to James Mitchell Varnum, 3 March and 3 April 1777, ibid., 7:237, 356.

186. George Washington to Alexander McDougall, 17 April 1777, ibid., 7:423.

187. George Washington to Samuel Washington, 5 April 1777, ibid., 7:360.

188. Patrick Henry to George Washington, 29 March 1777, General Correspondence, Series 4: 1741–1799, George Washington Papers, Library of Congress, Washington, D.C.

> but by our Interest and own experience of its utility? You will pardon my observations on the Small pox, because I know it is more destructive to an Army in the Natural way, than the Enemy's Sword, and because I shudder, when ever I reflect upon the difficulties of keeping it out.[189]

This passage sums up Washington's understanding of the dangers of smallpox to his army and his belief in the importance of inoculation. In order to build the army he needed to deal effectively with the British, Washington first had to defeat smallpox. After he realized that inoculation was the only way to maintain both the health and strength of the Continental Army, Washington pursued this course relentlessly.

By late May, the commander in chief was urging his generals to send new recruits directly to the American supply base at Peekskill, New York, thereby giving himself greater control over his troops in the event of an attack, and more importantly, over the inoculation process itself.[190] On 17 June Washington complimented Israel Putnam on his efforts. "You have done well in sending on the Troops, tho' they have not had the Smallpox. The Camp is thought to be clear of infection, and so is the Country pretty generally; But if it is not, Inoculation may be carried on, should it be found expedient."[191] Failure to follow his instructions on occasion resulted in troop shortages. As late as December 1777, despite his orders to inoculate recruits, Washington was "mortified to find the fine detachment of Men that came forward . . . rendered intirely useless for this Campaign" because "the small pox broke out upon them."[192]

Despite occasional setbacks, Washington's efforts to eliminate smallpox were not in vain. He succeeded in removing a major threat to the health of his soldiers through an innovative, enforced regimen of quarantine, isolation, and inoculation. Though smallpox would continue to affect the troops, the disease was not able to flourish in epidemic proportions among the soldiery, primarily due to Washington's insistence on these preventive medical practices. The elimination of smallpox as a threat to the American army was due primarily to Washington's vigorous insistence on mass inoculation, and his care to separate its victims from the general army population. By 1777 inoculation procedures were well established within the Continental Army. Smallpox no longer threatened the health and safety of Washington's fighting force, or, more importantly, affected military strategy in a significant way. After 1777 recruitment increased, and the army welcomed thousands of new soldiers. By

189. George Washington to Patrick Henry, 13 April 1777, in Fitzpatrick, *Writings of George Washington,* 7:409.

190. George Washington to William Heath, 18 May 1777, ibid., 8:85.

191. George Washington to Israel Putnam, 17 June 1777, ibid., 8:257.

192. George Washington to William Heath, 17 December 1777, ibid., 10:165.

October 1777, with Washington's successful inoculation program well underway, returns indicate over thirty-three thousand soldiers on active duty with only 17.7 percent reported ill.[193]

This change was largely due to Washington's foresight and perseverance in ensuring that both his medical and military staff members enforced his wishes in this area. Having his army inoculated ensured Washington control over the movements and ability of his troops to fight when and where needed, and protected the overall strength and reliability of the Continental Army. From a public health perspective, compulsory army inoculations helped encourage the civilian population to use this preventive procedure as well. Inoculation gained popularity with American citizens with the greatly increased likelihood of acquiring the infection during the war and as they became increasingly familiar with the protection afforded by inoculation.[194]

After 1778 Washington mentioned the problem of smallpox far less frequently in his correspondence. Secure now in the knowledge that his policies of containment and inoculation had prevented continued devastating epidemics, he continued to encourage inoculation of the troops and focused most of his comments on this issue. Typical of these references is the following excerpt from General Orders issued in March 1778, which assert that since inoculation had been "happily performed . . . it is necessary to guard against the fatal effects of that disorder taken in the natural way. The Commander . . . therefore enjoins all officers . . . to make immediate and strict inquiry whether they have had the Small Pox, and order such as have not to be innoculated without loss of time." In April, Washington reminded his officers that the "strictest attention to [smallpox] is called for to prevent taking it in the natural way."[195]

The Continental Army's policy of inoculation was well established by 1778. The medical department also was using new techniques and careful controls, such as the Dimsdale method of inoculation.[196] Washington, however, remained vigilant to the danger of smallpox. As late as 1779 Washington insisted that recruits, though urgently needed, undergo

193. Miller, "Vignette of Medical History," 458. See a chart and graph in Lesser, *Sinews of Independence,* xxxi, for statistics on the total number of rank and file soldiers. The number fluctuated, but descended to a low of 2,188 in April 1776 at the height of the smallpox epidemic in Canada.

194. Blake, *Public Health in the Town of Boston,* 131.

195. Washington's General Orders, 18 March 1778, and General Orders, 17 April 1778, in Fitzpatrick, *Writings of George Washington,* 11:107, 271.

196. Blake, *Public Health in the Town of Boston,* 129; Thomas Dimsdale, *The Present Method of Inoculation for the Small-Pox* (London: W. Owen, 1767). Beginning in 1776, Dr. John Morgan recommended the Dimsdale method of inoculation. This method, utilizing a healthy diet prior to inoculation, mild purges and a slight incision with a lancet, resulted in mild cases of smallpox, with low mortality.

inoculation before joining the army campaigns in order to maintain the protection against smallpox the procedure provided.[197] With smallpox under control, General Washington was able to concentrate his efforts on his strategic and military objectives, rather than the health of his troops. According to medical historians, the Continental Army north of Virginia experienced remarkably little sickness in the years 1779 and 1780. This has been attributed to the routine inoculations given to new recruits, the increased proportion of seasoned troops in the army, and efforts to improve sanitation and discipline. Although severe weather and lack of provisions killed many soldiers at Morristown during these years, the incidence of smallpox was significantly reduced.[198] After reaching a high point of 36 percent in February 1778, the percentage of soldiers who reported sick dropped precipitously to between 9 percent and 11 percent in the later months of 1778 and throughout 1779. By May 1781, army surgeons, having effectively controlled the disease, seldom listed smallpox as a cause of illness among the troops. The lesson taught by the devastating effects of the disease early in the war had not been forgotten. At the conclusion of the campaign season each year, care was taken to inoculate the troops not immune to the disease as well as the women and children who generally accompanied the army to their winter quarters.[199]

Several significant facts regarding the impact of smallpox during the Revolutionary War have emerged. Certainly, the specter of smallpox cast a dark shadow on the early days of the American War for Independence. The disease's destructive effects dramatically affected American military strategy and battlefield decisions in both the siege of Boston and the campaign in Canada in 1775 and 1776. In Boston, evidence indicated that the existence of smallpox in epidemic proportions in the city and the British use of biological warfare precluded an assault and instead forced Washington to maintain a nine-month siege. His cautious moves designed to limit the exposure of his troops to smallpox on occupying the city demonstrated his concern about the effect the disease would have on his troops. Washington took extreme care to protect his army from smallpox. In Canada, an effective attack on Quebec proved impossible due to the prevalence of smallpox and the inability of the American commanders to recruit and retain sufficient numbers of healthy troops. The quality of military leadership suffered with the death of General Thomas, whose ultimately fatal bout with smallpox rendered him incapable of

197. Flexner, *Washington,* 132.

198. Gillette, *Army Medical Department,* 102–3; Miller, "Vignette of Medical History," 458. Mortality from supervised inoculations at Morristown was less than 1 percent versus the 16 percent mortality from natural infection.

199. Gillette, *Army Medical Department,* 115; Lesser, *Sinews of Independence,* charts on xxx and xxxi.

making crucial military decisions as the Americans retreated from Quebec. General Sullivan arrived on the scene too late to rally the troops or take effective action to salvage the campaign. Nearly all of the participants, as well as the congressional committee established to review the loss, refer to smallpox as the cause of the defeat in Canada.

Recruitment efforts were stymied, and desertion rates skyrocketed as a result of the unhealthy conditions soldiers were forced to endure and the smallpox contagion. Washington's policies of containment and inoculation developed as a response to the impact of smallpox epidemics on his ability to wage war. The general directed much of his early military strategizing and administrative efforts toward solving the problems smallpox caused for his troops, and ensuring a healthy, reliable military force capable of effective fighting. After the Canadian debacle, Washington embraced inoculation in order to safeguard his army and increase recruitment and reenlistment figures. Washington made a major contribution to preventive medicine by developing a mandatory inoculation policy for his soldiers during the American Revolution. Due in large part to his perseverance and dedication to controlling smallpox, the Continental Army was able to survive and develop into an effective and reliable fighting force, unhampered by recurring epidemics of that disease. By constantly working with "the utmost Vigilance against this most dangerous Enemy," Washington succeeded in vanquishing the threat of smallpox and protecting his troops against its devastating effects.[200]

200. George Washington to the President of Congress, 7 July 1775, in Fitzpatrick, *Writings of George Washington,* 3:351; Miller, "Vignette of Medical History," 458.