



Germs at Bay







Germs at Bay

Politics, Public Health, and American Quarantine

Charles Vidich



An Imprint of ABC-CLIO, LLC
Santa Barbara, California • Denver, Colorado



Copyright © 2021 by Charles Vidich

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, except for the inclusion of brief quotations in a review, without prior permission in writing from the publisher.

Library of Congress Cataloging-in-Publication Data

Names: Vidich, Charles, author.

Title: Germs at bay : politics, public health, and American quarantine /
Charles Vidich.

Description: Santa Barbara : ABC-CLIO, [2021] | Includes bibliographical
references and index.

Identifiers: LCCN 2020034372 (print) | LCCN 2020034373 (ebook) | ISBN
9781440878336 (hardcover) | ISBN 9781440878343 (ebook)

Subjects: LCSH: Quarantine—United States—History. | Public health—United
States.

Classification: LCC RA665 .V53 2021 (print) | LCC RA665 (ebook) | DDC
614.4/60973—dc23

LC record available at <https://lccn.loc.gov/2020034372>

LC ebook record available at <https://lccn.loc.gov/2020034373>

ISBN: 978-1-4408-7833-6 (print)
978-1-4408-7834-3 (ebook)

25 24 23 22 21 1 2 3 4 5

This book is also available as an eBook.

Praeger

An Imprint of ABC-CLIO, LLC

ABC-CLIO, LLC

147 Castilian Drive

Santa Barbara, California 93117

www.abc-clio.com

This book is printed on acid-free paper 

Manufactured in the United States of America

To my wife, Clare, and my three sons, Jamie, David, and Paul



Contents

<i>Acknowledgments</i>	ix	
<i>Introduction</i>	xiii	
Chapter 1	The Quarantine Grab Beg	1
Chapter 2	Quarantine through the Generations: Five Stages of Practice	11
Chapter 3	Quarantine in the Colony	22
Chapter 4	The Inoculation Controversy	45
Chapter 5	Branding the Outcasts: Warning Out and Red Flags	59
Chapter 6	Large-Scale Sequestration	77
Chapter 7	The Revolutionary War and Its Aftermath: A New Perspective	86
Chapter 8	Yellow Fever and the Emergence of Boards of Health	112
Chapter 9	Boston Board of Health	134
Chapter 10	Vaccination	141
Chapter 11	Yellow Fever Outbreak of 1819 and the Excesses of Quarantine	150
Chapter 12	Miasma Theory, Maritime Commerce, and Quarantine Restraints	157
Chapter 13	Der Island Quarantine Station	179

Chapter 14	Cholera Contagion and the Resurrection of Quarantine	193
Chapter 15	Gallop's Island	197
Chapter 16	The Evolution of the Cowpox Vaccine	207
Chapter 17	The Smallpox Epidemic of 1872	217
Chapter 18	Germ Theory Reframes Quarantine	238
Chapter 19	Federal Solutions to Quarantine	248
Chapter 20	Boston's Last Epidemics	258
Chapter 21	The End of Boston's Maritime Quarantine Department	267
Chapter 22	Quarantine under U.S. Public Health Service	283
Chapter 23	Redefining Quarantine for the Twenty-First Century	310
<i>Appendix A: Chronology of Key American Quarantine Events, 1647–2020</i>		329
<i>Appendix B: Chronology of Nineteenth-Century Boston Quarantine Ordinances, 1822–1873</i>		339
<i>Appendix C: History of Boston's Port Physicians, 1779–1915</i>		343
<i>Appendix D: Quarantine Decision Tree</i>		347
<i>Glossary</i>		349
<i>About Sources</i>		359
<i>Notes</i>		369
<i>Index</i>		483

Acknowledgments

This book would not have happened without a series of chance encounters that opened me to consider quarantine as a critical tool for the twenty-first century. I am indebted to James Bromberg, MD, JD, MPH, for our endless days of studying quarantine at the Harvard School of Public Health (HSPH). Without his friendship and camaraderie, I would not have undertaken this book. Indeed, in my own experience, James Bromberg is one of the few attorney-physicians who fully grasps the importance of quarantine in the modern world.

In 2001, I had been working on the government's response to the anthrax crisis in the postal system when I met Dr. Don Milton at the anthrax conference held at the Centers for Disease Control and Prevention in Atlanta, Georgia. Through a series of discussions and subsequent meetings, I took a one-year limited leave from my normal duties in the government to pursue my interests in bioterrorism and infectious disease. Through Don Milton I met Drs. Jennifer Leaning and Arnold Howitt, who would later become my faculty advisers on a special project to investigate the application of quarantine to nineteenth-century communicable diseases. Laura Lynn Taylor, Jim Bromberg, and I spent a semester investigating the application of quarantine in New Orleans, San Francisco, Los Angeles, and Boston. Our research was taking place as the Asian SARS epidemic was emerging, which gave added impetus to our efforts.

After completing my degree program at the HSPH, I suggested an extension of my work to complete a more comprehensive investigation of the 1872 Boston smallpox epidemic. This epidemic had never been studied in detail, and yet it offered an enormous number of remarkable lessons for public health officials concerned with the twenty-first-century application of quarantine. HSPH accepted my request to pursue this scholarly investigation under the guidance of Jennifer Leaning. As a visiting scientist at HSPH, I have been deeply indebted to Jennifer Leaning for sponsoring my research

and suggesting ways of framing the quarantine project. She is nothing short of one of the most remarkable persons I have ever met—equally at ease in the world of medical history as she is in the world of real-time emergency response to medical disasters throughout the world. To have had this opportunity was certainly fortuitous and was enabled by my chance meeting with Don Milton.

I am deeply indebted to Rebecca Orfaly Cadigan and Anson Wright, both of whom spent considerable time and energy reviewing earlier versions of this manuscript and providing editorial and substantive suggestions. In the world of quarantine research, there are very few who have invested the energy and time in understanding these issues as well as Anson Wright and Rebecca Orfaly Cadigan. This book would not have been possible without their insightful comments.

I am also indebted to John Freitas for reviewing an early version of the manuscript and providing insightful comments about the history of Boston as only a true Bostonian could do. The discussion of island quarantine would not be as complete without his comments. Two other people who opened my awareness of Boston Harbor were Peter Tropeano, captain of Boston Waterbus Services, Inc., and Darryl Forgione of the Massachusetts Department of Environmental Conservation. Mr. Tropeano provided marine transportation to numerous Boston Harbor islands during the summer of 2005, and Mr. Forgione provided access to Gallop's Island at a time when it was off limits to the public. Without their support it would not have been possible to connect the dots between nineteenth-century harbor geography and the landscape of today.

The amount of research required to complete this manuscript was formidable. There is no one library or research facility where all of the quarantine records for Boston or federal quarantine programs can be found. Indeed, over forty different libraries and research facilities were extensively consulted to prepare this history. Harvard's Widener, Countway, Lamont, Pusey, Littauer, Law, and Houghton Libraries contained extensive records of the early history of Boston and the epidemics of the eighteenth and nineteenth centuries. The Countway Library of Medicine's Rare Books collection was invaluable for tracing the nineteenth-century history of quarantine and the dual role of Harvard's medical professors as consulting physicians to the city of Boston. I am indebted to Jack Eckert, reference librarian, and Peter Rawson, archivist, and their colleagues for supporting my research. In addition, Joseph Garver, reference librarian, and his colleagues at the Nathan Marsh Pusey Library assisted with access to the historic maps of eighteenth- and nineteenth-century Boston. These ancient maps were invaluable in depicting harbor channels, quarantine grounds, and island features that explained the geographic constraints faced by port physicians, harbor masters, and

commanders when negotiating their way from Boston's docks to its quarantine islands.

The Boston Public Library staff was of tremendous help in the completion of this book, particularly Henry Scannell, curator of microtext and newspapers. Mr. Scannell spent countless hours helping to identify smallpox cases and incidents of quarantine in eighteenth- and nineteenth-century Boston. The microtext files for the *Boston Globe*, the *Advertiser*, and the *Boston Herald* provided detailed coverage of the 1872 smallpox epidemic that was critical to the completion of this book.

The quarantine history of Boston cannot be told without access to federal records. In this regard, the National Archives and Records Administration (NARA) staff in College Park, Maryland, provided exceptional support with the identification and retrieval of Public Health Service records from the early twentieth century. David Pfeiffer went above and beyond the normal responsibilities of his job and pulled many Boston Quarantine Station files for my review during evening hours when I had the time available to scour the extensive federal records for Gallop's Island.

Eva Murphy, reference librarian at the Massachusetts State House Library, was also extremely helpful in identifying laws, legislative histories, and statutes pertaining to the long history of quarantine in Massachusetts. As a result of her efforts and the efforts of her colleagues, important legal riddles concerning the promulgation and rescission of disease reporting laws in the nineteenth century and the reasons why quarantine laws influenced the outcome of the Revolutionary War in Boston have been solved. Another important source of crucial information on Boston's history is Historic New England, previously known as the Society for the Preservation of New England Antiquities (SPNEA). Emily Novak, librarian/archivist at the SPNEA, helped provide access to various old photographs and newspaper clippings that shed light on the history of Boston Harbor islands. Similarly, Chester R. Kennedy, executive director of the Public Health Museum in Tewksbury, Massachusetts, was extremely generous with his time and attention and provided expert guidance on the history of public health issues in Massachusetts. The Public Health Museum in Tewksbury is a rare gem for those interested in the history of public health in Massachusetts.

I was also fortunate to have the support and editorial services of my father, Dr. Arthur Vidich, during the early stages of preparing this manuscript. His comments and critiques of earlier manuscripts were invaluable and certainly improved the analysis of the political and social aspects of quarantine administration. His support was particularly meaningful insofar as he gave unstintingly his time despite the challenges of his failing health. Finally, I wish to thank Susan Morrison who thoroughly reviewed the manuscript and

immeasurably improved the storyline—making what otherwise might be a dry topic accessible to a wider audience.

Most importantly, I wish to acknowledge the support of my wife, Clare, and my sons, Jamie, David, and Paul, all of whom let me spend years of my so-called free time on the pursuit of this book. Their sacrifices cannot go unmentioned. After all, someone had to take care of the routine matters of a household while I was lost in the bowels of Harvard’s Widener Library or the National Archives in Washington, DC.

Introduction

Quarantine, as an invention of man, is the most primitive and universal instrument of defense against contagious disease epidemics. Almost universally maligned or ignored by historians, quarantine is like an iceberg with 90 percent of its secrets hidden from view in inaccessible archives of the government. The few American historians who have studied quarantine have skimmed its surface, dissuaded by the effort required to pull together vast amounts of primary source materials scattered all over the world. Yet, there is a rich history to be told. Quarantine has played a central role in the survival of colonial and postcolonial America and indeed remains central to our survival as a species. Boston as the oldest and most quarantine-tested city in America provides a rich historical record to delve into the origin and evolution of American public health strategies for controlling epidemic disease.

After spending many months self-quarantined off an undisclosed island along the eastern seaboard, I had the opportunity to reflect on the nearly four hundred years of American quarantine practice distilled from nearly twenty years of research at Harvard and throughout the world. Immersing myself in the history of American quarantine was a far greater task than I ever imagined. My research took me to quarantine islands throughout the United States, Europe, and the Caribbean, where the archaeological remains of maritime quarantine stations can still be found. In some locations, such as Boston's Gallop's Island, I found the names of port physicians carved into boulders almost as if they resisted their life's work being lost to history. In other locations, such as Philadelphia, urban renewal transformed the city's nineteenth-century quarantine station into the town hall of a Philadelphia suburb. Perhaps most importantly, working with a team of some of the most brilliant men and women I have ever known, I served in various capacities on the Unified Incident Command Center's Rapid Response team, including as the incident commander, responsible for containing the 2001 anthrax attacks that spread the disease and fear across the nation. In working to

protect the health of the nation, I came to realize the challenge of dealing with so-called novel pathogens and how little was known about the proper role of quarantine. I have come to understand that quarantine is a mirror into the soul of each generation—reflecting its social, political, and medical values.

The history of American quarantine is one of fits and starts coincident with discoveries of disease transmission. If a disease was not considered communicable by inhalation or contact, quarantine was less likely to be imposed. However, many communicable diseases were not recognized as such, with devastating consequences for public health, such as the mismanagement of tuberculosis as a noncommunicable disease in nineteenth-century America.¹ Communicable diseases often spread extremely rapidly, which is facilitated by overcrowding and highly congested living environments found in modern cities. Germs can travel from one person to another simply through a cough, kiss, or handshake or even by sharing common eating utensils. When a germ is both highly communicable and pathogenic, it becomes a public health threat, especially when cases multiply faster than resources become available to counter its spread. The African Ebola epidemic of 2014 and the COVID-19 pandemic of 2020 are cases on point. Epidemics inevitably overwhelm hospital resources and can lead to restrictions on social gatherings, school closings, and travel and even various forms of quarantine.

Quarantine has long relied on physical separation of the infected individual or vessel from the rest of society. For example, one early Massachusetts law required persons on infected vessels to be at least four rods, or sixty-six feet, away from any other person not on board. Other colonial laws required infected vessels to be quarantined at designated harbor moorings at least one mile from shore.² These laws shared the belief that miasmas, or noxious air, could travel long distances and impact those in its downwind pathway. These same distancing principles, while dramatically altered by over one hundred years of bacteriological and viral research, still remain important public health strategies that complement the more confining principle of quarantine. Ironically, while neighborhood-based quarantines are less commonly used than in any previous period in American history, there are more communicable diseases known today than ever before, and more importantly, more diseases require quarantine, isolation, or special distancing strategies.³

Ebola has taught us the limitations of modern medicine. Not all pathogens can be controlled through antibiotics or antivirals, and it is under these unique conditions that quarantine rises to the top of public health priorities. Yet, each disease has its unique vulnerabilities to medicine and quarantine. Like medicine, quarantine works best when founded on evidence. Without insight into a pathogen's trail of infection, we fall prey to voodoo public health strategies that create as many problems as they solve. Indeed, the

search for the Holy Grail of disease transmission has spanned the history of quarantine in America, evolving in response to different types of epidemics each with its unique pathogen characteristics. Yet, this is not how our forefathers dealt with epidemics. Prior to the germ theory of disease, many contagions were grouped together as pestilential or contagious simply for lack of knowledge concerning its mode of transmission.

By clarifying the effective pathways of disease transmission, we shed new light not only on evolving quarantine principles but also on the unique events that delayed American acceptance of public hygiene and disease surveillance, leading to discriminatory immigration policies prohibiting entry of those with loathsome communicable disease. Quarantine, in brief, is intimately connected to America's immigration control system as witnessed by the disease-based suspensions of immigration during the cholera epidemic of 1892 and COVID-19 pandemic of 2020.⁴

The failure to understand disease transmission—even in the twenty-first century—is the primary challenge we face, and it is even more challenging in the arena of novel pathogens where, by definition, we have limited knowledge of disease transmission dynamics. By following the trail of disease transmission, this book shows how quarantine concepts continue to evolve, reflecting contemporary social and political values and the nuances of exposure unique to each microbial threat.

The increasing interconnectedness of the world's inhabitants has meant our potential exposure to highly communicable pathogens from distant lands can occur in less than twenty-four hours. Our public health and immigration systems are not capable of stopping such instantaneous invasions, and for many emerging diseases, there are no pharmaceutical remedies—think SARS, MERS, and COVID-19. During the twentieth century, this nation systematically dismantled its maritime quarantine program at a time when antibiotics seemed to offer a panacea to all diseases. In the fifty years following World War II, communicable disease was relegated to a lower-order public health priority. As a result, this generation of Americans has little understanding of quarantine and why it remains a critical public health tool.

Although quarantine has operated on the margins of modern society, it has been indispensable in stopping wave upon wave of smallpox, cholera, yellow fever, and typhoid epidemics.⁵ Its power and influence have not been determined by the face time in American history books or its regularity of use in combating epidemics.⁶ It appeals to our deep-rooted communal need for survival by seclusion from gruesome disease, possible death, or economic destruction. Indeed by the standards of the amount of air time it gets in non-pandemic years, quarantine would continue to be of little interest to the average person. It is said that history is written by the victors, and in this context the medical breakthroughs from twentieth-century vaccines, antibiotics, and antivirals have buried the contributions made by quarantine. Yet, quarantine

practice, which lost favor after World War II, became the nation's new public health mantra in 2020 as a natural response to the rapidly changing environmental, political, and sanitary conditions throughout the world, including the onslaught of zoonotic diseases—such as COVID-19, the coronavirus disease that emerged in Wuhan, China, in December 2019.⁷

As the world's population expands, increasing routine contact with exotic microbial forms of life, there has been a noticeable increase in zoonotic disease—where animals serve as the reservoir for infecting human beings.⁸ Hundreds of new zoonotic diseases have been discovered in the last fifty years as virologists, bacteriologists, and microbe hunters stomp through the African, South American, and Asian jungles in pursuit of the next deadly plague.⁹ Seeking the next pandemic, these hunters have discovered a range of highly mutable avian viruses, a host of mosquito-borne hemorrhagic fevers (including less lethal fevers such as zika, dengue, etc.), and the common Lyme disease spirochete.

With our improved understanding of disease transmission, twenty-first-century quarantine need not be “one-size-fits-all” approach. Quarantine should never be considered as simply a form of confinement. Innovations in modern medicine, engineering, and behavioral science research have expanded the principles of quarantine to also encompass what might be called “pathogen quarantine” or “pathogen exclusion” strategies, such as the use of personal protective equipment like face masks and personal hygiene or the use of mosquito repellent to thwart vector-borne diseases like yellow fever or malaria. Rather than confining people, the focus should be on confining disease vectors based on more detailed understandings of their pathways.¹⁰ For example, does the microbe enter the body through inhalation, skin contact, sexual intercourse, injection, or ingestion?

Diseases deemed to have unpredictable or unknown transmission characteristics are inevitably poorly understood.¹¹ Similar challenges have also been faced by far more communicable diseases such as COVID-19, which by virtue of its novelty had no readily available vaccine during the early phase of the pandemic when disease containment was most critical. Under these circumstances, desperate people apply desperate measures, creating fear-driven strategies that have become one of the legacies of past unscientific applications of quarantine.¹² It is like a sharp shooter in a dark room trying to shoot at something that he or she can't see. Simplistic as this may sound, modern quarantine strategies continue to suffer from the dilemma of “needing to do something” even as there is uncertainty in the mode of disease transmission.

Telling the story of quarantine in America represents far more than a litany of its uses and abuses. This book explores the roots of quarantine practice in America, through the lens of Boston's long history with epidemic disease, with the aim of elucidating its critical role in shaping modern

conceptions of epidemic response plans, disease surveillance, and immigration controls. The early years of this story are best told through the colonial and postcolonial public health practices of Boston since it was the leader in many of the most significant quarantine innovations in early America. Indeed, quarantine, as a public health tool, was exclusively a state and local responsibility prior to our Declaration of Independence from the British Empire, and it remained as such, for practical purposes, until April 29, 1878, when Congress charged the U.S. Marine-Hospital Service with enforcement of public health regulations promulgated by the U.S. secretary of treasury.

Where is quarantine going today? Is it a medieval tool that has outlasted its usefulness, or has it been transformed into the most powerful prescription for highly communicable and highly lethal disease? Perhaps more importantly, playing the instrument of quarantine requires a master cadre of professionals who have played the quarantine tune and know how to lead those who must adhere to its practices. Much like the Pied Piper who magically rid the rats from their hiding places and saved a German village from the plague, the art of quarantine requires the right blend of skills, resources, and public support for any public health Pied Piper to succeed. You will soon learn of many ways that quarantine has gone wrong, but you will also learn of the magic that makes it work.



CHAPTER ONE

The Quarantine Grab Bag

The modern notion of quarantine dates back to 1917, when Dr. Haven Emerson, one of the great public health reformers of the twentieth century and the grandnephew of Ralph Waldo Emerson, defined it as the limitation of freedom of movement of those suspected of exposure to a communicable disease for the incubation period of the disease.¹ Emerson distinguished quarantine from the concept of isolation, the latter referring to those confirmed as having a communicable disease who are separated from susceptible persons.

These old definitions, while still useful, fail to incorporate the grab bag of newer quarantine concepts such as “directly observed treatment,” self-quarantine, disease transmission dynamics, the “healthy carrier” paradigm, and the economic consequences of long-term confinement for the poor. For example, the concept of isolation was dramatically altered in the 1950s when it was decided tuberculosis patients could avoid confinement if they could be directly observed taking their medications.² Similarly, allowing self-quarantine of individuals without supervision is perfectly reasonable for diseases that are relatively nonlethal and not easily transmitted and can be easily managed from a distance via phone, fax, internet guidance, or telemedicine.³ But what if hospitalization is required? Hospitals must be capable of handling surge capacities in an emergency and must have access to emergency hospital systems that are transportable and properly staffed at the perimeter of the hot zones. To be effective, quarantine systems must consider the complete range of disease transmission dynamics and must be supported by (1) public policy, (2) public resources, and (3) public support. Quarantine only works if these three key elements are present. These principles are of critical importance when quarantine is applied to low-income persons incapable of financially weathering the consequences of unemployment during a pandemic. Unless quarantine is humanized in its applications, public health officials can expect significant resistance to traditional forms of confinement.

Since 2006, mindful of the pejorative meanings of nineteenth-century uses of quarantine, some public health officials have referred to “nonpharmaceutical interventions” as a more acceptable means of dressing up quarantine concepts in new clothing.⁴ Nonpharmaceutical interventions is a much broader concept than quarantine, since such interventions include voluntary and involuntary restrictions on movement and social gatherings of the general population as well as government-imposed public hygiene and business closure measures.⁵

What makes quarantine an intellectually challenging assignment for a public health professional is that all of the major elements of the quarantine grab bag—including policies that impose hospital or home isolation; close ports, airports, and border crossings; and require social distancing and respiratory protection—all depend upon three key variables: public trust, transparent government decision making, and the ability to adopt triage principles when resources and staff become scarce. These issues are discussed in the last chapter of this book.

Quarantine as the Ultimate Weapon

Outdated concepts of quarantine are not the only reason for the sluggish acceptance of distancing strategies as a viable tool in twenty-first-century epidemic response plans. Our inability to respond to epidemics also reflects another major development: our increasing vulnerability to novel pathogens. In 2001, Mark Woolhouse and his colleagues identified 1,415 infectious organisms that are pathogenic for humans. A total of 61 percent of these pathogens are zoonotic in origin, underscoring the degree to which human disease is influenced by our ever-increasing contact with other species.⁶ This ever-expanding list of communicable diseases impacting modern society also raises the fundamental question of what level of public health threat merits the imposition of hospital, home, neighborhood, or citywide quarantine. As a result of limited public policy debates, we still live with quarantine principles that share much in common with the expulsion rites of primitive societies even as the science of disease transmission and prevention has evolved.⁷ We have raised our understanding of appropriate treatments for communicable disease far beyond those available in the colonial era, yet we still operate with an all-too-simple definition of how quarantine should be applied.⁸ Since the beginning of the twentieth century, quarantine has been transformed from a tool to inspect and detain ships engaged in maritime commerce to one primarily applied in a hospital setting. Yet, few epidemics of the past were ever completely managed in a hospital. Indeed, hospital resources are always insufficient to cope with large-scale epidemics.⁹ It is well-nigh time to thoroughly review non-hospital-based quarantine in light of our woefully inadequate expertise in handling large-scale epidemics. Few large-scale quarantine events have ever had all of the necessary ingredients to be effective. In short, we have only a few shining examples in American history where a

scientific and humanitarian approach to quarantine has been successful in non-hospital settings.¹⁰ Like playing a violin, practice determines success, and we live in a society where few are practicing for the arrival of a large-scale epidemic. It is hoped that the historical quarantine practices this book documents will illustrate how large-scale events can be effective and explain how some of the brilliant quarantine masters of the past succeeded—or at least minimized ineffective strategies. Just remember the Ebola crisis of 2014 if you need a recent example of a faulty response to a relatively small-scale epidemic. If the Ebola crisis was a wake-up call for action—with barely any impact on the American public health system—the COVID-19 pandemic is a full-scale battle cry for the survival of America's hospitals, nursing homes, and the nation's economy.

Why have quarantine practices been so poorly studied in a society so focused on scientific advances in the public health and medical fields? With only a few exceptions, the absence of large-scale epidemics in America during the period 1960–2003 has curtailed scientific interest in quarantine practice.¹¹ Epidemics are the testing ground of new ideas and policies, and it is only events like the 2003 SARS epidemic, the 2014 Ebola crisis, and the 2020 COVID-19 pandemic that help crystallize revised approaches to quarantine. Quarantine, as one of the most extreme distancing strategies, should be reserved for the most lethal of all communicable pathogens.

Epidemic Response—Large-Scale Quarantine

The mere existence of isolation hospitals does not end the need for large-scale quarantine—they merely dampen the urgency for such strategies as long as cases of communicable disease can be identified and treated promptly. Desultory responses to an outbreak inevitably raise the resources required to quell the spread of disease and make it impossible to contain epidemics within isolation hospitals. Waiting months before responding to an epidemic inevitably increases the cost of detection, inspection, treatment, and quarantine as well as the needless sacrifice of lives.¹² Successful containment strategies depend upon enabling laws, public health infrastructure, financial support, and the application of the latest science of public hygiene, social engineering, and “nudge” principles advocated by Cass Sunstein.¹³ As Sunstein has correctly pointed out, people can be encouraged or nudged to do the right thing and accept quarantine when they are offered the right incentives and choices.

Germs and Public Hygiene

Antibiotic drugs are only a recent invention dating back to the period prior to World War II.¹⁴ Previously, it was common practice to isolate individuals infected with contagious disease. However, improvements in the diagnosis of quarantinable disease followed by rapid discoveries of their etiology and

transmission characteristics made it possible to improve treatment and disinfection strategies and minimize the use of isolation practices.¹⁵ By 1893, when the U.S. Treasury Department declared cholera, smallpox, typhus fever, yellow fever, plague, and leprosy as quarantinable diseases, the etiology of half of these diseases was known.¹⁶ By World War I, these diseases were identified as either bacterial or viral in nature and whether they were vector-borne (e.g., plague is transmitted via the rat flea, yellow fever via the *Aedes aegypti* mosquito, and typhus via lice). These developments dramatically changed the use of quarantine. Rather than past efforts that focused on miasmas and overemphasized broad-brush sanitation of vessels due to a misconception that filth was a causative factor of disease, the U.S. Public Health Service (USPHS) developed disease-specific isolation and disinfection strategies.¹⁷ These dramatic improvements in public hygiene and vector-based quarantines raised public trust in public health and facilitated expanded legal authority for the USPHS in its fight against epidemic disease.¹⁸

In 1893, when Congress authorized the federal government to assume control of maritime quarantine, it set in motion the nation's first systematic and scientific approach to large-scale disease control. Knowing the critical role vectors such as the rat flea play in the spread of bubonic plague completely transformed traditional quarantine. Rather than focusing on ship sanitation without a specific disease in mind, by 1910, the revised quarantine regulations of the USPHS identified specific fumigation strategies to rid vessels of rats and rat fleas. Quarantine could now focus on isolation and destruction of disease vectors rather than isolating the passengers and crew—unless there was evidence to the contrary. The USPHS invested millions of dollars to improve its fumigation methods to minimize damage to ships and their cargo and maximize the extermination of rats and rat fleas. Their fumigation techniques were so successful that in World War II the Nazis adopted the use of these same chemicals for the horrific killing of Jews in gas chambers.¹⁹ Zyklon B, the fumigant of choice for post–World War I American maritime quarantine stations and for Nazi gas chambers, remains one of the most lethal fumigants ever created. Its legacy is now forever more tainted by its misuse, not only in Germany but by careless applications during vessel disinfection.²⁰

Advances in public hygiene have not all led to unintended and sinister applications. Improvements in our standard of living have led to better nutrition and hygiene habits, which in turn have facilitated a greater public receptivity to self-actuated quarantine strategies that rely on our own distancing skills and hygiene practices to enhance our well-being.²¹ Changes in cultural practices over the last one hundred years have also dramatically changed our exposure to disease. For example, spitting in restaurants or on public streets was prohibited in many American cities after it was learned expectorate could harbor the causative agent of tuberculosis.²² Similarly, the requirement

that food service workers adhere to handwashing became a public health priority after it was learned that typhoid could be conveyed as a food-borne illness.²³

Personal hygiene, in so far as it establishes standards for limiting the spread of germs, is central to self-actuated quarantine, which can be defined as choosing to isolate yourself from society, your workplace, or social gatherings to minimize exposure to communicable disease. This includes handwashing, avoiding hugs and handshakes, avoiding or limiting contact in publicly shared spaces (e.g., avoiding doorknobs, bus and subway straps, and armrests, etc.), avoiding contact with exotic animals, and keeping outside the cough zone of others during an epidemic.²⁴ Why are such practices important? The federal government neither has the resources nor capability to control your exposure to communicable disease. Individual responsibility for personal hygiene is the foundation for any healthy society.

Inevitably, disease control depends upon an informed and educated citizenry that understands what is in its own best interest to survive. Common-sense quarantine principles can be applied to limit disease exposure,

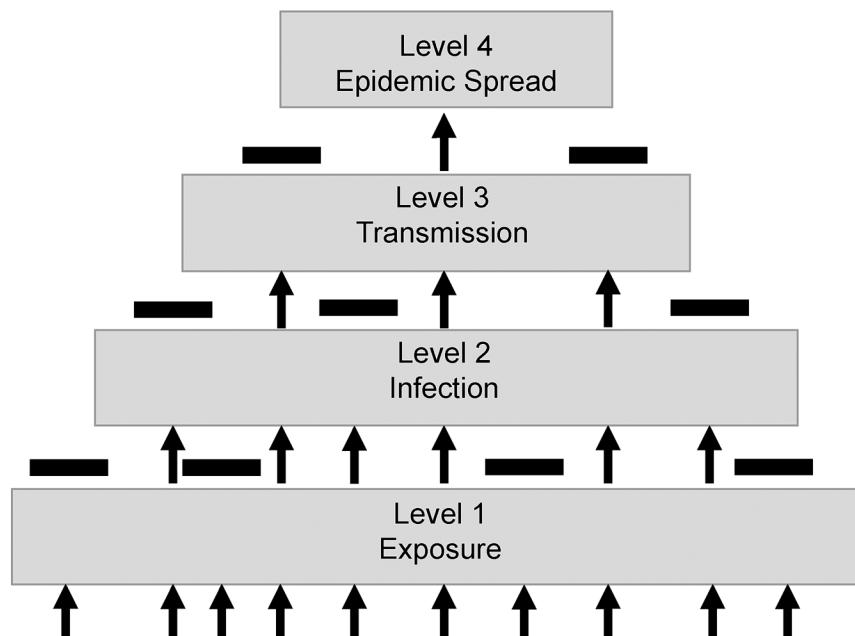


Figure 1.1 The Pathogen Pyramid. (Mark Woolhouse & Eleanor Gaunt, "Ecological Origins of Novel Human Pathogens," *Critical Reviews in Microbiology*, 33:236, 2007. Reprinted by permission of Taylor & Francis Ltd, www.tandfonline.com.)

infection, transmission, and, under worst-case conditions, the epidemic spread of disease. These four levels have been described as the pathogen pyramid and provide a useful model for understanding where self-actuated quarantine begins and government-sponsored quarantine takes over (see figure 1.1).²⁵ To be effective, quarantine works best when undertaken at the bottom of the pyramid—when you make the effort to limit exposure to human pathogens. This, of course, implies you understand how disease is transmitted.

Overcoming Quarantine Baggage

Despite its intended use as a tool to segregate those with communicable disease from the rest of society, quarantine's unwritten purpose often went beyond public health—influenced by concepts of class, ethnicity, and entitlement dictated by the ruling class.²⁶ Colonial quarantine practice was rooted in a paternalistic approach to public health that, in most cases, quarantined the sick with little input from those affected.²⁷ When islands were found to be too small to contend with large-scale epidemics, neighborhood quarantines were used against the poor, disenfranchised ethnic groups, and other undesirable classes of immigrants. Forced removal or neighborhood confinement fell out of favor after the colonial era when it became acceptable to permit home quarantine. The unintended impacts of various types of quarantine have left cultural scars on its legacy, which must be attended to before scientific approaches to quarantine can achieve maturity. There is simply too much distrust of governmental “top-down” approaches to quarantine to be effective without expiating the sins of the past. To resuscitate evidence-based quarantine, we also need to understand its value and public health benefits if we are to successfully overcome its historical baggage. Four pieces of that intellectual baggage are most salient: (1) its past focus on coercive means of implementing large-scale quarantines, (2) culturally insensitive approaches to quarantine of minorities and ethnic groups, (3) disease reporting as a form of ratting out minorities, and (4) gaps in the effective integration of the media into the organization and communication of quarantine strategies.

Noncoercive Confinements

The public health profession believes quarantine should always be used as a last resort for species preservation.²⁸ It has long been applied to lethal communicable diseases to isolate the individual from the rest of society—not for their own good so much as for that of the broader society. The common cold is highly communicable but far from lethal and

therefore has never met the test for quarantine—even though having a cold might get you a note to stay home from work or school. Government intervention is implied by the use of the term “quarantine,” and it is axiomatic that self-quarantine as in the case of the common cold would not be acceptable for lethal communicable diseases. The litmus test of whether self-quarantine could take the place of government-imposed quarantine depends on whether this less restrictive means of isolation could achieve the same objective. Third-party supervision is implied by today’s quarantine laws with the presumption that force, or at least voluntary compliance with mandatory procedures, may be required to restrain infected individuals from spreading disease. Yet, time and again quarantines have failed when the authority to quarantine is imposed without consultation with the people most directly impacted—those suspected of exposure to lethal pathogens. The results have often been counterproductive: those forced to undergo quarantine experience an overwhelming desire to evade its clutches when personal freedom of movement, freedom of choice, and social contact with family and friends are violated.²⁹ Americans have long had antiauthoritarian inclinations when forced into large-scale quarantine.³⁰ Applying military or police powers to control epidemics, without the resources or public acceptance to do it properly, has often unwittingly spread diseases like smallpox and cholera into the hinterlands when their victims tried to escape.³¹ The lessons from Boston’s history are quite clear. Quarantine fiats carry a heavy price: they can fuel epidemics when such practices activate the “fight-or-flight” syndrome among infected victims.

Culturally Sensitive Isolation

The intellectual detritus of quarantine also includes misguided policies that applied force to confine smallpox patients on islands, comingling the infected and exposed populations in crowded pest houses,—a seventeenth-century term for communicable disease hospitals, neighborhood quarantines imposed based on class or ethnicity, or required ship sanitation for diseases that could not be transmitted through fomites. These past abuses or misuses have discouraged modern-day uses of quarantine even when ample evidence exists that it plays an important role in stopping disease transmission. Some of the ill effects of quarantine can be fixed by improving the decision-making process. For example, before quarantine is applied, public health officials should always select the most effective strategy that does the least harm to the patient. This approach is consistent with the nonbinding Siracusa principles issued by the United Nations Economic and Social Council.³² The Siracusa principles espouse certain inalienable rights of citizens to freedom of mobility: “Freedom from fear and want allowing everyone to enjoy his civil

and political rights, as well as his economic, social and cultural rights when a nation declares a public emergency such as a pandemic.³³

Use of excessive force to confine or banish ethnic groups is not the only historical legacy of quarantine. Those who fell victim to ghastly communicable disease were often isolated from friends and family at a time when such connections were most needed. Modern epidemiological studies have shown that survival rates of socially isolated persons decrease with loss of social contact.³⁴ Despite hundreds of years of experience with quarantine, we have made precious little progress in understanding the health impacts of short-term human isolation or of improving the care and treatment of individuals forced to undergo large-scale quarantine.³⁵ If you need a recent example of this problem, the death of nearly fifty thousand people in American nursing homes during the first three months of the COVID-19 pandemic points to a failure to balance the need for emotional support systems with the tandem need to halt the spread of the virus.³⁶ Similarly, there are few credible studies that have evaluated the efficacy of using various distancing strategies to those exposed or infected with a communicable disease.³⁷

Defanging Race-Based Surveillance

A third element of quarantine baggage is its long history of being tied to arbitrary and capricious disease surveillance and reporting laws that emerged in response to trade and migration-induced epidemics.³⁸ For example, time and again foreign vessels entered Boston Harbor without paying heed to its quarantine and inspection requirements. In 1717, the Massachusetts General Court, the colony's legislative body, required commanders to check in with the military outpost on Castle Island in Boston Harbor before entering the port. Commanders were ordered to report disease on board under penalty of significant fines or even imprisonment.³⁹ If the Holy Grail was to be found, it rested on their honesty and civic-mindedness. After numerous incidents of falsely reported "clean bills of health," many colonies required a vessel inspection by either the island keeper or a physician to validate the commander's sanguine assessment of passenger health. To the extent commanders without medical degrees could vouch for the health of their passengers and crew, this system worked relatively well for several hundred years.⁴⁰ However, today we know some diseases are communicated by healthy carriers with no clinical signs of disease or by individuals with subclinical but contagious infections.⁴¹ Such nuances were not known prior to the twentieth century and certainly explain why even the most perfect colonial quarantine system was challenged to contain an outbreak when its disease surveillance system rested on the functional equivalent of quicksand. Occasionally, deadly pathogens slipped

through under the island keeper's gaze simply because the passengers looked well.

Surveillance became more reliable in the nineteenth century when physicians were ordered to take an active role in disease assessments. Yet, physicians in private practice argued they were not the gatekeepers of American port cities and resisted disease reporting laws.⁴² Despite their protestations, they clearly had a greater understanding of disease symptomology than the average citizen and were growing in professional stature as medical societies took root in the young republic.⁴³ By 1919, every state and territory required physicians to report specified communicable diseases.⁴⁴ Yet, tagging physicians with responsibility for disease reporting did not eliminate arbitrary, and in many cases discriminatory, reporting of quarantinable diseases that targeted the most impoverished immigrant classes in urban America. Disease reporting has been rightly declared one of the great public health achievements of the nineteenth century. Yet, few historians have dared question the adverse impacts this reporting system has had on the abusive quarantine practices imposed on minorities. Certainly, disease reporting revolutionized modern responses to epidemics. For example, by the end of the nineteenth century, the battlefield for disease surveillance shifted from the doctor's office to the public school system when Samuel Durgin, chairman of the Boston's Board of Public Health, was shocked to find thousands of sick children—the sons and daughters of immigrants and the city's minority classes—when he ordered public schools inspected in 1894.⁴⁵ While children were rightfully tagged as the superspreaders of disease, these scientific discoveries led to increased government authority over the inspection, testing, and reporting of quarantinable diseases, which in turn validated the need for quarantine. To the extent that disease surveillance systems target minorities and function as a form of ratting out the poor and disenfranchised elements of society, government-sanctioned quarantine measures are tarnished as dictatorial or paternalistic measures. In the last chapter, we discuss alternatives to traditional reporting practices that avoid “ratting-out” practices of the nineteenth and twentieth centuries.

Pitfalls of Freedom of the Press

Last but not least, quarantine has suffered from its coverage in the media, which has often influenced the success or failure of quarantine. Colonial newspapers were often responsible for inciting mass panic when reported stories claimed no cases existed or, even worse, that the last case had been quarantined when the reality was far different.⁴⁶ It was proverbial that epidemics only happened in some distant land—not in the newspaper's home city. Business interests were major customers of colonial and postcolonial newspapers, and it was not in their best interest to throw “gasoline on the

fire" and frighten shipping and commercial activities away from their home port. For better or worse, the media has always played a central role in spreading fear. On the positive side, newspapers have frequently given warning of emerging disease, enabling individuals to plan for an evacuation. For example, in 1764, thousands of colonists were warned to get out of Boston as fast as possible before smallpox reached epidemic proportions. On the negative side, not everyone could afford to leave their business behind when the economic consequences of not working meant living without financial aid or assurances of a seamless reintegration back into the work world.⁴⁷ Without financial support, quarantine evasion and disease transmission among the cash strapped were much greater. This is a lesson that has far greater policy implications today than in eighteenth-century colonial America. Today, with an estimated 24 percent of all American families living within 200 percent of the poverty level, quarantines that fail to put food and money on their table when they are out of work (think rent, utilities, and other fixed costs of living in America) are sending a deadly message.⁴⁸ Concerns with COVID-19 have struck the economy like no other time in recent American history, revealing the fiscal consequences of a poorly financed public health system incapable of responding to a pandemic in a timely manner.⁴⁹

The freedom to report on epidemics comes with some important moral and legal obligations that remain largely unresolved even today.⁵⁰ The media's obligation to work under government supervision in the interest of a unified voice to the people remains one of the impediments to the successful use of modern quarantine. In an age where "government bashing" has become a popular media pundit sport, the public is often at a loss as to whom to trust. In fairness to the media, revisionist government positions on the risk of disease transmission for novel pathogens inevitably stoke fear in the public's mind. For centuries, government officials faced with an actual or perceived epidemic have downplayed the communicability of the epidemic *de jour*. In their effort to dampen fear, they have often underestimated the communicability of novel pathogens or the wide range of ways they could be transmitted. Whom should we trust? On the one hand, the media makes its living by sensational stories that are intended to excite our innate fear of highly lethal gruesome diseases.⁵¹ On the other hand, the public is suspicious of the constant mission creep found in government declarations that "all is well" and that the disease in question is not very communicable. The media plays a critical role in checking government cover-ups or manipulation of the facts. However, in societies where the freedom of the press is given higher standing than stopping an epidemic, the challenges of controlling fear and panic remain vexing issues.

Quarantine through the Generations: Five Stages of Practice

American quarantine practice has passed through five distinct stages in its evolution. These stages are not necessarily progressive and teleological steps toward a more scientific and humanitarian approach to quarantine. They represent generational stages that reflect the evolving political, social, scientific, and economic factors that have shaped quarantine practice. Indeed, the battle against epidemic disease has always been fought through both our emotional (e.g., fear and flight) and rational (e.g., scientific and analytical evaluation of communicable diseases) faculties, and for this reason many of the stages through which the concept of quarantine has evolved remain latent within our collective consciousness even today. What might be considered primitive approaches to quarantine, such as banishment or exclusion of certain classes of people deemed infected or “disease carriers,” may become popular when novel pathogens emerge that trigger fear of the unknown. Under this scenario, reasoned assessments of the risks of exposure may not be feasible, especially when limited evidence exists to make decisions. Regardless of whether quarantine was favorably or unfavorably perceived by each generation, it is one of the most important public health strategies available for highly communicable disease.

The five stages are (1) quarantines based on expulsion of the infected—or what may be called the use of the “quarantine net” to stop migration; (2) quarantines reliant on inspection and confinement until patients are free of disease; (3) quarantines of exclusion based on overseas surveillance systems

aimed at nipping disease transmission in the port of departure; (4) international quarantine strategies based on the premise of cooperative treaties among trading partner nations; and (5) quarantine strategies that enable internationally sponsored disease strike forces to quickly thwart disease transmission when the speed of transmission—not just exposure—drives the creation of pandemic events. The five stages represent overlapping and universal principles of quarantine practice that manifest to a greater or lesser degree depending upon the political, economic, and cultural values in each age. Throughout its nearly four hundred years of existence in America, quarantine has relied on the dueling principles of exclusion and acceptance of immigrants with one or the other achieving hegemony depending on the politics of the day. American quarantine evolved in tandem with the ever-increasing federal consolidation of power over public health. There is an ever-changing balance between efforts to consolidate quarantine powers at the federal level and the ongoing need for intergovernmental cooperation with states and local governments. Similarly, at the international level, quarantine can be understood within the context of an ever-changing balance between national biosecurity and the need for international cooperation in the battle against the common enemy of epidemic disease. These dynamic forces have shaped the use of quarantine consistent with the values of each age. With these caveats, American quarantine concepts have evolved through a series of anomalous events toward a more scientific and humanitarian approach.

The Quarantine Net

In its earliest stage, quarantine functioned like a fishing net that captured incoming vessels to enable port physicians to identify and exclude sickly immigrants from landing on American soil. This strategy spanned the first one hundred years of settlement in Massachusetts, the colony that had the longest and most extensive use of exclusionary quarantine.¹ Quarantine complemented laws that stipulated the wealth required of prospective residents and “warned out”—by excluding indigent or sickly newcomers—those who might pose a burden upon the community.² Indeed Massachusetts went so far as to warn out those suffering from smallpox.³ Banishment of smallpox victims might seem cruel today, but such laws reflected the harsh realities of a highly contagious disease: as many as one-third of those infected died.⁴

With limited resources, and little emphasis placed on the public health of the immigrants, colonies set up island quarantine stations, desolate places of banishment devoid of hospitals. During the seventeenth century, nine of the thirteen colonies used offshore islands to quarantine vessels infected or suspected of contagious disease, and three (Maryland,

Virginia, Delaware) made no use of island quarantines—preferring to save money by detaining vessels in their port harbors over other alternatives. Much like primitive societies that exiled and stigmatized the impure to die a slow death in the netherworld, the colonial network of quarantine islands, spanning over eighteen hundred miles of coastline, were used to intercept and, in many cases, perform the last rites for immigrants before they ever set foot on American soil. Thousands of souls never made it to America—forced to live out their last days on quarantine islands managed by disciplinarian island keepers who were the functional equivalent of public health police with vast powers to inspect, detain, and fumigate people and their goods.⁵ The island keepers' primary targets were those suffering from fevers, smallpox, typhus, and other so-called pestilential diseases. After six weeks of rolling breakers and tumultuous seas leaving English and Irish immigrants prostrate with sea sickness during their transatlantic passage, immigrants could still spend an equal number of days in quarantine until the military command, and later the island keeper, declared them dead or healthy enough to enter America. In the seventeenth century, there were no laws that required commanders to vouch for the health of their passengers or crew. Indeed, one of the lessons learned in colonial ports like Boston was that commanders had no vested interest in reporting the true state of health on board their vessels. The “good word” of commanders meant little to port physicians, when the survival of an entire city depended on an accurate assessment of the health of immigrant passengers. Similar disease reporting evasions have continued even to the present day, as many either can't afford or would prefer not to seek medical treatment for mild infections that might stigmatize them as victims of a communicable disease.

Immigration and Inspection

With increasing migration to America, eighteenth-century American port cities began to accommodate the medical needs of the arriving passengers, building pest houses on offshore islands.⁶ A primary motivation for improved pest houses—the term of art for seventeenth-century hospitals—was the need to separate sickly residents from the rest of the population, and islands were the best means of doing so. At this stage quarantine did not stop the poor and sickly classes from entering America, but it did stop most from entering their port in a sickly condition. Rather than excluding immigrants from entering America, they were merely forced to remain on quarantine islands until they either died or recovered and no longer posed a threat to the residents of colonial port cities. Quarantine took on greater urgency when the colonies became the dumping ground for British convicts and the sickly poor. In 1717, the British Parliament passed legislation authorizing the

transport of prisoners to the American colonies. There was very little colonial governments could do to stop the influx of these disreputable members of society.⁷ Thousands of Irish, Scots, and English came to America in lieu of serving out their jail terms in England. With the huge loss of life in colonial port cities from recurring epidemics, the need for migrant labor to support the commercial activities of the young colonies took precedence over exclusionary policies, and port physicians were hired to inspect incoming vessels to achieve those objectives. Pest houses were an investment in the care and support of immigrants who performed much of the essential work in the colonies.

A network of eleven quarantine islands was established near major ports along the entire eastern seaboard to evaluate the health of arriving immigrants.⁸ The locations chosen reflected the major ports of entry into colonial America but fell far short of providing a medical inspection system at dozens of smaller ports. While these islands were chosen without any thought of a coordinated intercolonial disease surveillance system, their common mission was to keep disease at bay with minimal consideration of the needs of the crew or passengers. Unlike today, the earliest island quarantine stations offered minimal shelter, failed to provide separate quarters for the sick and healthy, and expected the commander and his passengers to fend for themselves. Virtually, every major American port had a quarantine island that intercepted vessels prior to port entry.

Medical inspection was no mean challenge for eighteenth-century towns like Boston, which, in the space of fifty years prior to the American Revolution, inspected immigrants coming from over one hundred and thirty different nations around the world.⁹ It is estimated that seventy-five thousand immigrants and sailors were detained or quarantined in eighteenth-century Boston. With the massive influx of immigrants, the health of the nation depended upon the quarantine practices of each port. Before a vessel could reach port, it had to stop and report the existence of any quarantinable disease. All American colonies had quarantine regulations, and many were modeled on those adopted by the Massachusetts Bay Colony.¹⁰

Island keepers—not physicians—continued to be responsible for routine medical inspections throughout the eighteenth century with exceptions made when novel diseases emerged where the expert opinion of physicians were sought. Eventually, at the end of the eighteenth century, physicians were hired to conduct the work due to an increasing number of epidemics and a growing need for vessel inspections. As vessel inspections became a routine element of the quarantine net and epidemics became more common, Philadelphia and Boston hired physicians to conduct this work. It took more than a hundred years after the nation's first quarantine before Boston's Selectmen established an advisory role for physicians in 1779. A permanent full-time role requiring physicians to live on offshore islands took even

longer—that did not occur until 1832 when the city's quarantine committee ordered a cottage built on Rainsford Island.¹¹ The creation of this physician outpost coincided with the unprecedented influx of tens of thousands of Irish immigrants into Boston and triggered a large public investment in pest houses to contain epidemics on the offshore islands.¹² Over 1.2 million were detained or quarantined in nineteenth-century Boston. In time, quarantine islands expanded to offer well-appointed hospitals designed with separate quarters for the sick and healthy and with farms, cemeteries, and separate living quarters for the island keeper and his charges.¹³

After America's independence from Great Britain, immigration policy remained a state and local governmental function. With increased immigration, some states imposed head taxes and bonds to cover the burdens of caring for the indigent.¹⁴ State and municipal quarantine inspections were deployed in tandem with state-sponsored immigration policies until 1875 when the U.S. Supreme Court ruled immigration policy to be the domain of the federal government.¹⁵ By 1893, immigration policy was squarely in the control of Congress, and soon thereafter the U.S. Marine-Hospital Service began its takeover of state maritime quarantine programs, which it completed in 1921 when it took over these functions in eighty-five American port cities.¹⁶ This brought immigration and maritime quarantine functions into federal oversight at all American ports of entry. This was a revolutionary change in American immigration and quarantine policy, shifting both of these functions from state responsibilities—consistent with the U.S. Supreme Court's decision that the federal government has exclusive jurisdiction over international and interstate commerce.

Since 1893, American immigration laws have had overlapping jurisdiction over communicable disease with explicit prohibitions on the entrance of foreigners with loathsome diseases—an official term applied to tuberculosis, syphilis, and leprosy.¹⁷ In contrast, American quarantine laws had a different purpose: to temporarily detain passengers (i.e., foreigners and American citizens) when infected or suspected of exposure to a limited number of quarantinable diseases, all of which were distinctly different from those regulated by the immigration service. The rational basis on which some diseases became a permanent bar to entrance while others merely triggered a short-term detention remains one of the legacies of the politicized classification system for communicable disease. Incurable and loathsome diseases triggered expulsion, whereas an individual infected with a curable communicable disease was detained in quarantine with the assumption that he or she would eventually have a lifetime immunity after they recovered. When the U.S. Public Health Service (USPHS) identified two communicable diseases but only one was curable, the curable disease could be quarantined, but the other called for expulsion. Congress never

intended quarantine to be a permanent bar to entrance into American ports. In contrast, U.S. immigration laws for loathsome diseases were purposely crafted to bar entry into American ports—or what might be called a quarantine of exclusion.¹⁸ The principle of quarantine has never been limited to a system of confinement. Excluding immigrants with loathsome disease represents one of many quarantine strategies used throughout the ages and perhaps one of the most controversial anti-immigrant strategies ever adopted in America. Yet, quarantines based on exclusion became far more sophisticated in the twentieth century when the United States switched the venue for medical inspections from the port of arrival to that of departure.

Coordinated Surveillance

By the early nineteenth century, seasonal medical inspections of vessels were imposed to avoid a rash of epidemics that coincided with an increasing trading relationship with Caribbean islands where yellow fever was endemic. In the third stage, the good word of the commander was replaced by an inspection by the port physician. Charges of government interference in commerce were heard in the press of the day, but these concerns were tempered by the overwhelming adverse impacts epidemics had on early American port cities. In the post-Revolutionary War era, surveillance systems and quarantines were generally managed by local governments with financial support provided by the state legislature.¹⁹

As the nation grew and became more complex, the “immigration and inspection” stage gradually expanded to a much broader system of coordinated surveillance as the central government acquired more legislative and regulatory authority over public health—especially with respect to quarantine.²⁰ The first step toward a more coordinated surveillance system came with the expansion of the quarantine authorities vested in the U.S. Marine-Hospital Service (USMHS), forerunner of the USPHS. Rather than each state operating on its own recognizance, the USMHS initiated standard procedures for quarantine and disinfection and expected compliance or face a federal takeover. The second step toward a more coordinated surveillance system emerged when the USMHS created an early warning system to provide information on overseas epidemics and conduct passenger and vessel inspections before their departure for America.²¹ This was a radical departure from past practice and one of the most significant policy changes in protecting America from imported disease—shifting public health burdens from America’s quarantine stations to the health-care system of the immigrant’s home nation. A third step in the evolution of coordinated surveillance was the federal government’s massive expansion of vessel and passenger inspections entering American ports prior to World

War II. Over forty-six million passengers and crew were inspected at federally managed quarantine stations during that period.²² The commitment to disease prevention, including looking for disease at overseas ports before vessels departed for America, signaled the birth of international cooperation, which also led to a drastic decline in reported cases on board incoming vessels.²³

International Cooperation

The international cooperation that emerged after the USPHS established its worldwide empire of medical surveillance represents the fourth stage and would not have been possible without the trailblazing work of over twenty nations that adopted six major international quarantine and sanitary conventions between 1900 and 1926.²⁴ These conventions created the foundation for collective public health decision making to prevent the spread of communicable diseases beyond national boundaries. While the United States rarely took part in international sanitary conventions during the nineteenth century, individual states collaborated in the pre–Civil War Era recognizing the need for a unified national strategy before international cooperation could ever occur.²⁵ America was unable to participate in the development of international sanitary treaties until 1893 when Congress authorized the U.S. Treasury to take full control of the maritime quarantine system. International diplomacy required a unified strategy, and the United States was now positioned to negotiate international sanitary treaties and establish uniform nationwide quarantine practices. This stage saw the birth of American public health diplomacy and our increasing influence over sanitary treaties with our major trading partners—especially in the Western Hemisphere. The adoption of numerous international sanitary treaties prior to World War II standardized the control of quarantinable disease.²⁶ These treaties, including the International Sanitary Conventions of 1903, 1912, and 1926, the Pan American Code of 1924, and the Sanitary Aerial Navigation Treaty of 1933, were some of the most important political achievements of the twentieth century and reflected the power that could be exerted against our bacterial and viral enemies when nations came together for a unified response to pandemics.

International Disease Strike Force and Self-Enabled Quarantine

The age of the airplane, beginning immediately after World War II, represents the fifth stage and has now forced nations to band together to collaborate on epidemic intelligence and disease prevention strategies like no other period in human history. While large-scale quarantine is generally less effective in halting the ever-mutating influenza viruses, it still has a role in numerous less contagious diseases for which medical prophylaxis options are not

available or ineffective, as discussed in later chapters. Telepathogenesis, I submit, represents a unique new development in disease transmission, facilitated by the rapid movement of infectious agents transported by our vastly expanded air transport system that relies on tightly packed seating arrangements with travel times far faster than the incubation periods of communicable diseases—or what is commonly considered the time between the moment someone is exposed to a pathogen and when he or she develops clinical symptoms of that disease. You can fly to anywhere in the world in less than twenty hours with only a slim chance that anyone will be found symptomatic of COVID-19 or any similar pandemic disease. Telepathogenic diseases, as I define it, rely on droplet or aerosol transmission of infectious agents facilitated by poorly engineered ventilation systems and highly congested transit systems, not to mention the unique role played by schoolchildren and other individuals who serve as disease superspreaders by virtue of their highly gregarious behavior, extended network of relationships, and unique abilities at spreading disease through coughing, singing, “spit talking,” and similar close contact behaviors. The very notion that social distancing will cure the ills caused by modern aerosol-borne epidemics is somewhat quixotic, when many of the principles espoused by government-sponsored social distancing concepts make many false assumptions concerning the appropriate distances to remain from other individuals and appropriate distances from someone who has just sneezed (at least six feet). “Social distancing” is a relatively new term of art for a very ancient practice. The premise of social distancing is that disease transmission can be curtailed by social behaviors and engineering designs that physically keep us at least six feet away from other people. While physical separation of people at home, work, and play can influence disease transmission, it is only one of the many factors that must be considered. For example, modern ventilation systems can be an important conduit for pathogen transmission even when people are separated by the so-called six-feet rule (more on that later). When an infected person exhales into a shared airspace and the air handling system functions to recirculate that air—in essence serving the role of a pathogen distribution system—social distancing is of limited value. Redesigning ventilation systems to exhaust shared airspace—rather than recirculating it—is the challenge we all face within congested working and living environments. Poorly designed ventilation systems in hospitals, hotels, the world of office cubicles, trains, planes, buses, subways, nursing homes, and other congregate living arrangements, where viral or bacterial particles can be transmitted through airborne means for extended periods, are examples of manmade techniques for efficiently spreading disease. Lost in the simplified messaging to the general public is a basic understanding of Stokes Law, which proves aerosol particles of less than five microns can stay airborne for longer periods of time than larger droplet discharges from someone who has just sneezed.²⁷ Perhaps

more importantly, these smaller micron-sized particles are also the ones that are capable of reaching the lower respiratory tract where diseases like COVID-19 are capable of doing the most damage. Smaller micron-sized particles can be ejected farther and stay airborne longer than larger droplets.²⁸ Understanding the physics of telepathogenic disease is critical to an effective and scientifically sound response to airborne communicable diseases.

We have entered an age where our own technological accomplishments have become the Achilles heel of our public health system. In the name of efficiency, we have created highly dense living, working, and entertainment environments that now facilitate the rapid transmission of disease. For example, the technological achievements of creating the New York subway system, high-rise elevators, escalators, and huge indoor sports arenas has enabled New York to make more efficient use of highly expensive real estate and become one of the most important entertainment and financial center in America. Yet, the price paid for these efficiencies in mobility and ever-smaller separation distances in public venues clearly influenced the number of people who died during the first three months of the COVID-19 pandemic. The consequences of our highly integrated world economy imply that few political leaders are likely to take dramatic countermeasures against epidemic outbreaks because, with limited epidemic response experience and no visible cases to be counted (after all who is counting all the asymptomatic cases that arrive daily into our airports), the fiscal consequences appear too great. The paradox of telepathogenic disease is that immediate action is required to contain the outbreak, but because few citizens display immediate symptoms of disease or those symptoms are associated with other less lethal disease, quarantine and social distancing mandates are postponed until there is a public health crisis.

The good news is that a crisis triggers a public demand for action—including quarantine and other nonpharmaceutical countermeasures. The bad news is that quarantine when applied as a reactive response to a crisis, days and weeks after the importation of many asymptomatic cases, is like closing the barn door after the horse is already halfway across the next county. The key to the fifth stage of quarantine is that self-actuated measures relying on individuals sheltering in place and adhering to some level of social distancing are some of the only politically effective tools to halt the spread of highly communicable diseases in America. The resources that would be required for the federal government or even any of the state governments to impose large-scale mandatory quarantine upon entire cities or states is simply not feasible. While self-actuated quarantines coupled with health conscious social distancing must rely on the common sense of each citizen to look out for their own health, such behavior can only last as long as food, shelter, and emotional support systems remain intact. In the fifth stage, unlike any other stage, individuals depend on logistical systems to provide food and other essential goods, and these services

require money and ultimately the fiscal support of federal or state governments to subsidize their needs and ensure the principles of self-quarantine can be practiced without the fear of death by other causes (e.g., starvation, freezing, or clinical depression leading to suicide or other self-destroying habits).

The unwieldy size of our social, political, and economic systems—and their inability to move quickly—requires individual adherence to self-quarantine practices for timely epidemic countermeasures to be achieved. Yet, this by itself is not enough; a complementary element of today's quarantine principles depends on a new form of international collaboration not previously practiced under past international health treaties. Rather than mere cooperation, we need coordination and unified efforts that transcend borders and politics based on the principle of protecting the human race as a whole.²⁹ The best and brightest epidemic response teams must now be deployed to the site of emerging epidemics anywhere in the world to identify the foci of infection and to deploy medical prophylaxis strategies in coordination with the ring quarantine strategy.³⁰ This coordinated approach to disease etiology and transmission is already emerging in the world's scientific community but has not been endorsed in the arena of epidemic response teams sanctioned under the International Health Regulations of the World Health Organization (WHO). For it to be realized, we will need a radical reformulation of the way the WHO operates so that nationalist interests are secondary to those of the world as a whole. This is no small challenge, but it is clear that COVID-19 and SARS have both revealed the vulnerabilities of adopting nationalist disease control strategies in a highly interconnected world. The same level of WHO effort that eliminated smallpox in the 1970s now needs to focus on developing the political support for international epidemic response teams that can quickly be sent to ground zero of an outbreak and impose ring quarantine to keep the infected right where they reside whether that be in a building, neighborhood, city, or nation. Ring quarantine is especially relevant during the incipient phase of any disease outbreak, especially if a rapid international response can dramatically reduce—if not halt—disease transmission. Fast-moving epidemics like the Spanish flu were once thought to be too contagious to control through quarantine—let alone ring quarantine at ground zero.

Yet recently, epidemic response strategists have modeled the potential value of home quarantine as a means to control the highly communicable novel influenza virus and concluded “household quarantine is potentially the most effective social distance measure, but only if compliance with the policy is good.”³¹ This finding supports the value of decentralized self-actuated strategies that do not rely on direct top-down enforcement of quarantine. There are simply not enough federal or state resources to apply traditional quarantine given the immense barriers posed by a highly mobile and uber-networked society. This is not to suggest the federal government or even state governments do not play a critical role in

responding to disease outbreaks. Rather it is the type of role they assume—it should be that of the pied piper, not the dictator. The federal government, using its bully pulpit, must continue to raise public awareness of disease transmission issues and personal and public hygiene as well as use its fiscal resources to revitalize public health priorities to give greater emphasis to infectious disease research. It also points to public education as the key ingredient in controlling highly communicable diseases like influenza and COVID-19. Indeed it is the most powerful tool we have in our fight against epidemic diseases. Forget about expecting a vaccine on short notice for an emerging communicable disease. By the time an approved vaccine is available, the worst viral epidemics are usually over, and the only ones who care for the dead are the nearest relatives and, of course, the editors of the *Morbidity and Mortality Weekly Report* (MMWR). This is not to say that a vaccine should not be pursued—it merely underscores the need to focus on the present crisis and apply sophisticated non-pharmaceutical strategies that can buy time for the eventual development of one or more vaccines.

Today, in a world of telepathogenic diseases, we are also far more dependent on international cooperation than ever before. There is an increasing need for nongovernmental quarantine strategies, as rural populations shift to urban centers worldwide and as ever-expanding humanitarian crises caused by war, famine, and vast migration of asylum seekers have created a perfect recipe for the spread of disease.³² The prime example of this emerging role is Doctors without Borders and the increasing public health consciousness of numerous billionaires who have taken on epidemic disease as a personal challenge. Bill and Melinda Gates are the examples of this new philanthropy transforming past governmental approaches to quarantine and disease surveillance.

International cooperation by itself is now no longer enough to stop a pandemic—especially when nationalist interests of keeping quiet about an incipient disease outbreak trump the “public good” of coordinated international response strategies based on a fast deployment strike force of public health professionals sent to ground zero of any given pandemic. Including self-actuated quarantine, private sector interventions, and more responsible advocacy roles for the mass media, other networking strategies are necessary to supplement government-imposed quarantine. The challenge we face is using the term “quarantine” to apply to a wide range of distancing, public hygiene, and disinfection strategies customized to the transmission dynamics of each disease. In our last chapter, we present a new approach to thinking about quarantining disease that reflects the realities of the twenty-first century. However, if we wish to avoid repeating the errors of the past, it is imperative we understand the origins of American quarantine and its public health, judicial, legislative, and regulatory foundations.



CHAPTER THREE

Quarantine in the Colony

Plagues of the seventeenth century were as feared as any natural disaster of the age precisely because humans had no control over who would be tapped for death and who might escape unharmed. There were five seventeenth-century epidemics that triggered quarantine in Boston, including the West Indies yellow fever epidemic of 1647, the 1665 London plague, and Boston's smallpox epidemics of 1677, 1689, and 1693.¹ These are the earliest-known instances where quarantine was applied in the American colonies. Its widespread use was fueled by the political, religious, and economic values of that era and the trading partners of Boston merchants.

Seventeenth-century physicians knew little of the causes of contagious diseases. At the time Boston was settled in 1630, the germ theory of disease was still about two hundred and fifty years away. Modern medical scholars have emphasized that few communicable diseases were recognized prior to 1800. For example, prior to 1629, smallpox and measles were treated as one disease in London's bills of mortality. Similarly, Boston's physicians failed to distinguish between diphtheria and scarlet fever during the throat distemper epidemic of 1735 to 1740. The medical historian Ernest Caulfield, the leading scholar of this throat distemper epidemic, points out that eighteenth-century physicians misunderstood the nature of communicable diseases and were often responsible for its unintended transmission.² Other contagious diseases were also confused, including yellow fever and malaria and typhoid and typhus.³ Terms such as distemper, malignant, and pestilential fevers and plague were often used to describe a wide range of highly lethal and contagious diseases simply because physicians were unable to distinguish the unique features of a disease. Yet, despite limited knowledge, physicians were able to identify many diseases based on symptomatology—even if many others remained indistinguishable. Contagious diseases were a special category

of concern to colonial governments; they signaled the need for quarantine to stop human-to-human transmission of diseases.

John Winthrop, the first governor of Massachusetts Bay Colony, had a rudimentary knowledge of the causes of various distempers yet felt perfectly comfortable in practicing preventive health measures without a physician. Disease was not the exclusive domain of physicians, when its root causes were perceived as attributable to lapses of morality, depravity, a dissolute lifestyle, improper dietary regime, or the inexorable laws of destiny.⁴ Physical health was taken as a sign of moral character and a gift of God.⁵ While these explanations were routinely used to explain public health disasters, Governor Winthrop knew they were of little practical value in responding to the horrors of an impending epidemic.

During an epidemic, the services of a physician—the vast majority of whom were either self-taught or learned their trade through apprenticeships—were generally sought as the last resort only after home remedies failed, escape from exposure was not possible, and fevers, vomiting, or uncontrolled pustular eruptions gripped one's entire body. Perhaps the only thing worse than contracting the plague was to die at the hands of a physician. Patients could either be bled to death, poisoned with mercurial antidotes, or fed purgatives to trigger stomach convulsions until vomiting or excrement was ejected from the alimentary tract.⁶ Fear of the consequences of these medical treatments made quarantine an appealing solution, especially if a targeted class of undesirable persons could be singled out for exile from the community. The rich were almost always able to survive epidemics more effectively than others because they had the resources to flee town or isolate themselves for extended periods of time.⁷ In contrast, the poor could neither afford physicians nor the price of self-quarantine; survival not only forced them to visit the marketplace where contagious pathogens were most likely caught but also forced them to continue working to make ends meet.⁸

Seventeenth-century Bostonians, like those in other port cities, died at an alarming rate from a wide range of communicable diseases.⁹ Smallpox was the most devastating disease to strike, and it seemed to return, on average, on a twelve-year cycle coinciding with each new generation of children. An epidemic hit Boston in 1638, and subsequent epidemics struck in 1647, 1666, 1677, 1689, 1693, 1702, 1721, 1730, 1752, 1764, 1776, and 1792.¹⁰ With few exceptions, Bostonians could virtually set their watches in anticipation of the next event. Epidemics were devastating, since children were without immunity to smallpox and quarantine was an imperfect tool for protection. Historical records exist confirming an estimated 4,280 Bostonians died of smallpox in the seventeenth century.¹¹ While this may seem like a small number, Boston was a village with about 4,200 people in 1677 when the worst smallpox epidemic occurred.¹² In that year alone, 750 people died. The town grew from an estimated 150 persons in 1638 to 6,700 persons in 1700, with much of this

growth coming from the arrival of immigrants.¹³ Smallpox infected virtually everyone who lived in seventeenth-century Boston. Those who survived its gruesome disfiguring impacts gained a lifetime immunity and usually lived long enough to experience the epidemic cycle at least three times in their lives.

The pox was somewhat kinder to Bostonians in the eighteenth century; while there were 34,788 cases, only 2,416 died during seven major epidemics.¹⁴ These low death rates would not have been possible without the adoption of inoculation, the unprecedented quarantine of over thirty thousand Bostonians during the eighteenth century, and the decline in trade relations with England after the Revolutionary War.¹⁵ The value of quarantine was not merely a measure of deaths averted; it reinforced rigid bans preventing strangers and the poor from entering Puritan society.¹⁶ Quarantine protected the immunologically susceptible Bostonians from smallpox exposure and tended to lengthen the frequency of outbreaks compared with other colonial ports.¹⁷ Boston took quarantine more seriously than any other colonial port in the eighteenth century, issuing thirty quarantine orders against European, Caribbean, and sister colonies that lasted for over twenty-five years—a unique isolationist strategy that has until now never been discussed by medical historians.¹⁸ Smallpox quarantine orders accounted for nearly half of this twenty-five-year period, resulting in significant economic consequences for Boston merchants and their trading partners.

In response to each new epidemic, Governor Winthrop had only his English heritage to guide him. English strategies for controlling epidemics were very limited and focused on the isolation of households where infectious disease was found. Local governments in the Massachusetts Bay Colony were expected to manage epidemics with legislative support from the General Court. Even Boston, which was the largest port in seventeenth-century America, could barely afford the costs of responding to recurring epidemics, which in part explains why its chief elected officials, called selectmen, failed to allocate funds for quarantine or even public hospitals when such services were infrequently needed. Health was not a public commodity, rather it was a personal responsibility.¹⁹ Boston's priorities were the removal of household wastes and the maintenance of the public way, yet these routine services were the responsibility of the individual abutters, not the town itself.²⁰ Residents were also expected to fix their own sewers and care for their own families when sick.²¹

With virtually no effective medical remedies for communicable disease, physicians could only provide palliative care when epidemics struck.²² Poorly educated and relying on symptomatology to dispense medicines, physicians were trusted insofar as they confirmed the folk remedies citizens would otherwise seek on their own.²³ Physicians were sought only when folk remedies failed and the patient had no other options.²⁴ In an epidemic, every man, woman, and child had to fend for themselves.²⁵ There were simply not enough physicians to meet public needs during a smallpox outbreak.²⁶ In practice, managing the isolation of

smallpox-infected households, when quarantines were imposed by government fiat, required significant human effort to guard infected houses, feed the sick, and, in the winter, provide wood for heat. Typically, it might take several watchmen to guard a smallpox-infected family, and in some rare cases, dozens of watchmen were required to cover round-the-clock needs of large families. The inevitable shortage of guards meant quarantine barriers were porous, allowing contagious individuals room to roam about on their own—whether to accomplish essential functions or simply because they were “stir crazy.”²⁷ While Boston’s Selectmen provided guidance to halt the wayward behavior of gregarious townspeople, their public notices and orders were often ignored or never seen.

Far more popular were approaches keeping the infected from ever setting foot in the colonies. Virtually, every colony had its own quarantine island to keep the infected isolated from the rest of society.²⁸ Islands were popular solutions to imported cases of smallpox but were like a bitter pill for the merchant class and frowned upon by the Privy Council, the King’s trade advisers. Little quarantine guidance was gleaned from the motherland, since such restrictions were a threat to unfettered commerce and, with few exceptions, was not supported by the British Parliament until 1710.²⁹ As far as the Privy Council was concerned, public health and the lives of ordinary people were subordinate to the culture of commerce propagated by British merchants and shipping magnates.³⁰ Yet, British mercantile policy had little influence on quarantine practice in Massachusetts.

Religious Origins of American Quarantine

To understand the religious origins of American quarantine, it is first important to understand the political and social systems that enabled systems of confinement and exclusion that had strong support in the underlying isolationist values found in Puritan New England. Isolationist thinking found expression not only in the colony’s single-minded focus on Puritanism as the only religion; it was also expressed in the social and political policies of that era.

While quarantine was certainly not an American invention, the Massachusetts Bay Colony strongly influenced its modern development. The colonists’ emphasis on island quarantines in lieu of pest houses in the seventeenth century, the use of experimental strategies such as the eighteenth-century use of inoculation for control of smallpox, and the use of town meetings to assess public support for quarantine measures were more American in flavor than any previous British use of the practice that relied on orders from the King or his Privy Council.³¹

Yet, Bostonians also built a public health defense system that borrowed principles used by gated European cities. Boston, unlike most other American ports, was physically isolated from the mainland. The shores of the Shawmut Peninsula served as a natural barrier, and the gate at Boston

Neck, stretching about one hundred yards from the Charles River on the north to Boston Harbor to the south, controlled access to the entire town. The town was ideally situated to defend itself from any intruders, whether they be wild panthers, strangers, or infectious diseases. The town's watchmen provided security throughout all hours of the day and week.³² When watchmen closed the Neck, the only points of entry were by sea, making it easy for them to inspect strangers and warn them away.³³ Its unique geography made it simple to close the town to all potential intruders and contributed to its dominant role in the evolution of quarantine concepts in colonial America.

Boston's founders, after all, were not initially keen on maintaining close relations with the mother country. The Puritans had fled to Massachusetts to establish their own separate religious utopia unfettered by the religious tenets of the Anglican Church.³⁴ They were not seeking to create a British colony, even if they relied on their motherland for trade.³⁵ Puritan life stressed the importance of the church and the unity of its parishioners in working harmoniously in a world dedicated to a godly life. Outside influences from agnostics, disbelievers, or members of other religious sects were not tolerated even though the church that was organized in 1630 was far from an orthodox institution. It took several years for these colonists to become acquainted and forge friendships and a common way of worship and, more importantly, a sense of unity within their community.³⁶ Boston's Puritan founders valued their isolation to avoid bickering with the Anglican Church on the validity of their beliefs and evade the oversight of the English Parliament. Charles Andrews, the eminent American historian, pointedly stated, "The Puritans in America wished to establish a state of their own which should be independent of alien control, not only of the principal company in England but also of the King and the English parliament."³⁷ In reality, Puritans and Anglicans were more similar than different in their religious beliefs. Very little separated their views apart from the Puritan emphasis on the Bible as the revealed word of God; the Anglicans saw the Bible as the revealed word only on broad principles of the Christian religion.³⁸ Yet, these differences, while minor compared with the Anglican Church's schism with the Catholic Church, were sufficiently large in the Puritan's mind to warrant the establishment of a separate colony, separate church, and separate community in the new world. Their withdrawal from the Anglican Church in pursuit of Winthrop's vision of a shining "city upon the hill" created the conditions that fostered isolationist thinking that permeated the social and political institutions of seventeenth-century Boston.³⁹ This isolationist mentality had and continues to exert spillover impacts on our immigration, public health, and infectious disease policies.⁴⁰

Until 1686, the Massachusetts Bay Colony had its own charter, which gave the colonists a small quasi-independent church-state seemingly divorced from the influences of the Old World.⁴¹ The Puritan community had very

little tolerance for deviant religious practices or social behaviors. To some degree this attitude might be interpreted as a measure of self-protection used by the founders to maintain the integrity of their religious way of life.⁴² For example, as early as 1631, the colonists denied admission to their community except church members. Four years later, this restrictive residency standard was extended to limit the sale of property to church members or those likely to be received as members of the congregation.⁴³

Quarantine against vessels, in this context, complemented policies of keeping out undesirable persons. Bostonians were painfully aware of the trials of living self-sufficiently, and for this reason strangers were not admitted unless they provided proof of their competence to contribute their fair share and gave bonds that held the town harmless from any and all damage associated with their entertainment.⁴⁴ This principle, adopted by the General Court under Winthrop's administration, took hold as early as May 17, 1637, limiting visitors to a three-week visit, but subsequent legislation passed in 1692 allowed visitors to stay up to three months.⁴⁵

For seventeenth-century Bostonians, disease was also a manifestation of God's displeasure with deviant behavior and a sign the congregation should renew its faith and atone for its sins. Spiritual ablutions were called for to cast off the poison of the heart that precipitated routine smallpox infections. For spiritual leaders like John Cotton, considered one of the most eminent clergyman of his age, disease was an opportunity to seek pardon from the Savior and be cleansed.⁴⁶ While the focus was on self-purification, the threat of disease inevitably called attention to the dangers posed by strangers who brought the virus from overseas. In this context, quarantine was used as a fence against the incursion of infidels and disbelievers until they could be cured. Time spent in recovery offered an interlude from sin, where the purifying influences of prayer and repentance could draw out the poison and cleanse the soul.⁴⁷ This was not a metaphoric perspective on Puritan public health strategies. Indeed seventeenth-century Puritan ministers like John Cotton believed epidemic diseases came directly from the hand of God and any attempt to intercede through quarantine or otherwise bordered on a defiant gesture against God almighty.⁴⁸ Disease had a spiritual purpose, and one who sought to subvert such lessons by stopping destiny through self-quarantine might be viewed as one of little faith. Yet, quarantine, understood in its loosest sense as a confinement from worldly affairs, also served a useful purpose, purifying the body and soul of the infected, and for this reason its role was accepted.⁴⁹

In contrast, Puritans practiced hands-off compassion for pox-infected immigrants landing in Boston. Those who arrived in port with contagious disease in the seventeenth century faced expulsion. Captain Samuel Legg's quasi-incarceration on an offshore island during the summer of 1677 and the detention of British sailors on board *HMS Seahorse* in 1721 were two of the

most egregious examples of how quarantines were applied more severely to strangers than to the members of the Puritan congregation. To the extent communicable disease was imported, Puritans could hypocritically apply quarantine against foreigners even when they were conflicted over its application to kith and kin.

The Puritan mind was a rational one. They knew faith alone was not always enough to protect against the ravages of disease. Common sense dictated taking precautions. Their lessons were born out of survival and the fear of deadly pathogens. For the most part, Puritan leaders acted in the public interest, recognizing quarantine as a necessary tool to protect the community.⁵⁰

Trade Patterns and the Path of Disease

Restrictions on travel and trade existed in Boston since its earliest colonial days due to weather conditions on the Atlantic Ocean, the availability of goods to barter in trade, and disease and famine. Boston enjoyed limited but regular trade with England for almost ten years before it was founded in 1630.⁵¹ However, commerce was vulnerable to epidemics, and trade contracted with serious outbreaks of plague in English port cities during the years 1618, 1621, and 1629–1631. Again, during the period 1636–1637, London, Norwich, Sandwich, and many other English ports suspended commerce for months at a time.⁵² These voluntary contractions in maritime commerce set the stage for more draconian measures: governmental exclusions imposed upon infected ships coming from the motherland and elsewhere.

In March 1647, the Massachusetts General Court passed an order establishing a strict quarantine over all vessels coming from the West Indies. The order, the first of its kind in America, prohibited anyone from coming ashore or within four rods of anyone not otherwise connected to the vessel.⁵³ Vessels could land on uninhabited islands but required license from the Governor's Council. Every port town within the province was ordered to quarantine persons and goods on merchant vessels or offshore islands. The order came at a time when Boston felt the economic impact of reduced migration to New England.⁵⁴ Emigrants had provided a ready market for colonial products, but as that market declined, Bostonians sought new trade outlets in the Caribbean islands and other ports where their goods could be bartered or sold. It certainly must have surprised Winthrop when the growth in trade resulted in the unintended importation of lethal diseases. The constant influx of English immigrants between 1630 and 1640 had provided predictable exposures to known diseases, of which the first Puritan settlers had relatively high immunities. Opening trade routes to the tropics was like opening Pandora's Box—it exposed Boston merchants and

seamen to frightful fatal foreign fevers that failed to respond to the remedies of the day.⁵⁵

Fear of a highly lethal epidemic prompted Governor Winthrop to enact landmark quarantine legislation when he learned six thousand had died from a pestilential fever in Barbados and an equal number had died on Christopher's Island.⁵⁶ Winthrop was one of the most respected members of the Massachusetts Bay Colony. Bred to the law, by eighteen he was a justice of the peace, and by forty-two he was chosen governor of the Massachusetts Bay Colony. He served as governor for eleven years and ruled with fairness, generosity, and a firm conviction in the principles of liberty.⁵⁷ The colony had adopted a Code of Liberties, and Winthrop was instrumental in showing their congruity with those of England. Winthrop walked a fine line between keeping the colony from becoming an isolationist religious bastion of Puritanism and one that maintained strong trade relations with the outside world.⁵⁸ Their challenge was maintaining sufficient trade with the outside world to meet their worldly needs and keeping as far away from the British Parliament's meddling with their internal affairs. The commitment of establishing laws to create an ordered society also required their charitable execution. Judges and legislators had to be sensitive to the dangers posed by overly exacting and, in many cases, unprecedented laws. Winthrop was respected for his ability to weave charity into the discipline of government orders, which was never more needed than in 1647 when the threat of pestilence prompted measures to stop the influx of contaminated vessels—the very vessels that were essential to the economic survival of the colony. Punishing the ship's captain with steep fines for a disease he brought to the colony would do nothing to stop the epidemic and might create an economic climate of distrust discouraging future merchants from doing business with the fledgling colony. Winthrop was fifty-nine years old when he issued the colony's first quarantine order. No other colony, or for that matter, not even England, had ever chosen the path of maritime quarantine legislation to halt the spread of disease.⁵⁹ Winthrop would die on March 26, 1649, less than two months before the order would be rescinded, but while he remained at the helm of government, he administered the law with sensitivity to the concerns of its victims—the sailors, passengers, and masters of the merchant vessels suspected of carrying a terrifying and highly lethal new disease. Unlike other Puritans of his age, Winthrop was willing to accept human frailties and recognized the “rule of hospitality to strangers,” which many of his peers were quick to dismiss if they did not see in them an overwhelming commitment to the Puritan faith.⁶⁰ Several twentieth-century historians believe this may have been one of the first recorded yellow fever epidemics in the West Indies.⁶¹ Its effect upon Boston commerce was severe, as the Governor's Council prohibited vessels from tying up at the town dock, forcing them to remain offshore.⁶² Whatever the disease, it killed its victims in

three days, though famine and drought in the West Indies contributed to this great mortality.

Novel pathogens have historically been a powerful stimulant for the application of quarantine, expulsion, and other draconian public health measures. Winthrop's decision to impose quarantine was made on the basis of the best available local intelligence. The Governor's Council never sought approval from parliament or from the Privy Council, the King's royal advisers.⁶³ After all, their charter granted them complete legislative autonomy, including control of maritime affairs.⁶⁴ Their unilateral action was typical of early Puritan legislators who made timely responses to life-threatening conditions. A six-week transatlantic crossing followed by untimely deliberations by the King's advisers and a subsequent six-week mail boat passage to Boston made it clear beyond doubt that epidemics should be dealt with locally in a timely and effective manner—an impossible task for the desultory decision making of the Privy Council.⁶⁵ Despite its value to the Puritan community, in the years prior to the American Revolution, British merchants voiced displeasure for American quarantine just as they did for American evasion of British taxes on American trade.⁶⁶

Quarantine Practice Aligns with Isolationist Policies

The 1647 quarantine order blockaded West Indies shipping for two years, posing an enormous constraint on routine business activities. Captains of merchant vessels, known as masters or commanders, found it difficult to make a living. Inevitably, the fear of losing one's livelihood eventually outweighed the risks of violating quarantine regulations, tempting several masters to fake their travel histories to gain access to town. The overwhelming desire to escape island detention was a strong motivation for masters to cover up their real ship manifests with a fabricated origin and destination for their passage. Such a ruse could only work if the crew and passengers colluded for mutually self-serving objectives, not a difficult decision compared to spending three weeks on a barren harbor island devoid of food or shelter. In one such ruse, the General Court discovered a man by the name of Dell conspired with three fishermen to convince Richard Davenport, captain of Castle Island, that they had not come from the West Indies.⁶⁷ Davenport, a military man of distinction and a seasoned veteran of many battles against Native American tribes, chose a measured response to Dell's deception. After an investigation, which determined the epidemic on Christopher's Island had ceased some three months earlier than Dell's arrival, Davenport released the men, but their cargo was held in quarantine.⁶⁸

As Davenport was given little guidance to implement quarantine law at Castle Island, it is not surprising that enforcement was relatively lax. For example, the General Court had only broadly defined disease as plague or

"like grievous infectious disease."⁶⁹ Once again, the infrequent and often novel nature of epidemics meant Boston Selectmen were left to their own wits to contain contagious disease outbreaks. If a passenger suffered from diarrhea, would that prompt Davenport to quarantine the vessel? A test case emerged two weeks later when another ship arrived in Boston Harbor with a prior nine-day transit through Barbados. This time Davenport inappropriately authorized the vessel to dock in Boston even though he found cases of dysentery on board—a condition he presumably thought to be of little risk to others. Four magistrates of the court inspected the vessel and countermanded his order, placing the vessel into a one-week quarantine on one of Boston's harbor islands until they were satisfied there was no risk of infection.⁷⁰ Medical opinions were never requested or considered despite or perhaps because of the dangers to public health.⁷¹

The 1647 maritime quarantine order, unprecedented in English history, was enabled by three major ideological developments that occurred in the prior decade. These were (1) the General Court's excommunication of religious dissenters and warning out of undesirable visitors through travel restrictions to Boston, (2) the use of islands for military detentions as a tool of war, and (3) a growing political independence from the motherland that led colonial legislators to believe they had authority over maritime affairs despite parliamentary and Privy Council edicts to the contrary.⁷² The Massachusetts Bay Colony charter gave it many sovereign privileges, but the British Parliament took exception to this independent-minded behavior.

The General Court had become adept in the art of detaining religious dissenters in jail and forcing confessions to bring wayward souls back to the fold. Those who refused to adhere to Puritan tenets were banished, as was ably demonstrated by the excommunication of Anne Hutchinson in 1637.⁷³ Such punishments illustrated the ease with which the General Court exercised severe reprimands—including prohibition of Quakers from entering Boston—for what today might be considered routine religious differences of opinion.⁷⁴ Excommunication of dissidents was an extreme case of the more routine activity of warning out. Despite Winthrop's belief in the moral obligation of Christians to care for strangers, the prevailing view was that strangers unable to pay their own way posed a threat to the economy and religious life of the community and should be excluded. Townspeople could ill afford to subsidize welfare cases when its own society was precariously surviving in the midst of ongoing battles with Native Americans and without support from the British Parliament. Under these circumstances, the colonists considered it a bitter pill to swallow when parliament began shipping them British prisoners—a unilateral action that only increased their preoccupation with warning out misfits, malcontents, and malingeringers.⁷⁵

A second development set the stage for Boston's use of island quarantine. Two full years before the Court declared quarantine, the colony was

captivated by an ominous application of military detention on its eastern shores. French and English settlers had long fought for possession of the Maine coastline, since it was the closest land for English settlers arriving from the home country and offered numerous commercial advantages for both nations. During the winter of 1645, Boston merchants sent a vessel to trade along the coast of Maine only to have it kidnapped by Monsieur Charles de Menou D'Aulney, captain of Penobscot and a wily French adversary of the Puritans. Captain D'Aulney exiled the sailors of the merchant ship on a nearby island along the Maine coast. For ten cold winter days, these sailors were held in a small wigwam without fire or adequate clothing until D'Aulney agreed to release them. Forced to return to Boston in an old two-ton shallop with limited provisions, no clothes, no compass, or any weapons for protection, they barely made their way home. Their harrowing tale of detention on a coastal island left a lasting impression on Governor Winthrop and the magistrates of the General Court.⁷⁶ An island exile had been used as a form of punishment against Boston's men, and the government took notice.

Despite strong opposition from the merchant class, vessels were held on offshore islands, and passengers and crew were expected to fend for themselves—an indignity that stretched Governor Winthrop's notions of Christian charity. This strategy was, on its surface, designed to separate the sick from the healthy, though its style of application carried clear signs of punishment. Victims were treated as impure of spirit as well as of body. Shocking as it may sound, it was expected survivors would fend for themselves largely because Boston officials professed no moral obligation to care for these strangers.⁷⁷ Ministrations to those in such a condition were limited under Puritan mores to members of their own community. Survival of the fittest was the rule of the day. Contrary to some modern misconceptions that Puritans placed religious principles above all otherworldly values, under the duress of another epidemic, the Puritans practiced tough love, and pox-infected strangers were denied care on the mainland in the interest of protecting the public health. An insular society that survived on its own could ill afford such dangerous policies as allowing strangers to have access to local physicians.⁷⁸ Quarantine was a blunt instrument of self-defense against the "spiritual disorders" of outsiders.⁷⁹

The General Court would not adopt quarantine laws against their own community members until the eighteenth century, when smallpox outbreaks became a more pervasive threat to public health. Quarantine as applied in the seventeenth century is best understood as a facet of a highly rigid social code that exiled, tortured, isolated, and removed dissidents to achieve its objectives. The distinction between excommunication, restricted visitation rights for outsiders, limited access through Boston Neck (i.e., the gateway to Boston), and quarantine of people and goods revealed the

diversity of strategies aimed at protecting Puritans from the evils of the outside world. Diversity of religious beliefs was not a virtue. Indeed, it represented a frontal assault on the integrity and way of life of Boston's founding fathers.⁸⁰

Despite an avowed belief that each person should realize his or her abilities on earth through good works, Boston's early settlers supported a broad underclass composed of blacks, Indians, Irish, and indentured Englishmen who performed manual labor and most of the colony's dirty work. These social classes were not considered equals even when they were members of the Congregational Church. For example, the General Court required the Irish to register upon arrival in Boston with the intent to control their mobility, limit their full participation within society, and record their differences from the Puritans.⁸¹ The General Court supported the Puritans' caste system by restraining secular activities to bend human behavior toward Christian values. Even though Winthrop sought a theocratic state where religious liberty was cherished and the community could lead a godly life, these liberties were narrowly cast, limited to creating a society that supported a Puritan way of life; therefore, other religious groups were not welcome, at least not prior to the charter reforms of 1686.

A society that fosters a caste culture establishes the social milieu that facilitates the application of divisive social policies in various other arenas as well. For example, the leading families in Boston kept American Indians as domestic servants.⁸² While Puritan families viewed such practices as compassionate acts designed to save the lives of Indian women and children who survived the bloody battles with the settlers, there was no question about the spiritual hierarchy that emerged. Africans shared a similar fate. The slave trade with West Indies brought hundreds of Africans to Boston prior to 1700, and these individuals were virtually all conscripted as domestic servants. In instances where Africans and American Indians were set free, of which there were twenty-six known in Boston, social policy still called for them to conduct street cleaning, remove waste, and perform other menial tasks as dictated by the town's chief elected officials.⁸³ Separating the working classes into groups in subordinate order to the Puritans created a social structure compatible with quarantine principles. Quarantine, in its broadest sense, was not applied as a tool to solve a medical problem per se; it strengthened established lines of social division and protected the social and religious values of the community. Its medical benefits were a fortuitous secondary value that reinforced the underlying caste system.⁸⁴ Yet, quarantine could not be applied to commercial trade on a routine basis without disastrous economic consequences. Fortunately, for the merchant class and those whose livelihoods depended on trade, the Court repealed the quarantine order against the West Indies on May 2, 1649, after seeing "it hath pleased God to stay the sickness there."⁸⁵

Evading Plague Quarantine

Virtually, every communicable disease that struck Bostonians hitched its way into town on the backs of immigrants, merchants, their crew, or infected goods.⁸⁶ Maritime trade determined the portfolio of diseases Bostonians could contract. For all of their independent-minded posturing, they had no economic incentives to limit British trade.⁸⁷ Yet, when the General Court learned of the ravages of the plague in London, they realized unfettered trade must stop. Placing a quarantine order against their motherland was like severing the umbilical cord between the mother and child.

The panic in Boston was palpable. Despite their “otherworldly” values, Puritans increasingly relied upon British goods to support their lifestyle, and yet each and every vessel that arrived might carry the plague. The loss of commerce might cause suffering and affect the quality of life, but catching the plague was a virtual death sentence. No one knew how it was transmitted, thereby heightening anxiety for those who made their living through trade. More importantly, the plague’s catastrophic impact on European civilization in the sixteenth and seventeenth centuries made it a disease of international concern because of its lethality and the speed with which it infected the European population.⁸⁸ Over 50 percent of those who contracted the plague died.⁸⁹ Its symptoms were gruesome: purplish buboes appeared on the body of victims at the site of lymph nodes, which would become engorged with pus as the body’s immune system tried to fight off the *Yersinia pestis* bacteria.⁹⁰ Death was the expected outcome once the bloody buboes spread across the body—not even bloodletting could save souls at this late juncture.

Fearing the plague, on October 11, 1665, the General Court issued a warrant ordering Captain Roger Clapp, commander of Castle Island, to quarantine all vessels coming from England. An industrious fifty-four-year-old man Clapp and his six gunners were the town’s only quarantine staff responsible for holding germs at bay. Clapp had assumed command just two months earlier after Captain Richard Davenport was struck by a bolt of lightning while resting on Castle Island.⁹¹ Captain Clapp, although a deeply religious man of courteous and pleasant manner, had no particular interest in the health of passengers, even though he was now the final arbitrator of what constituted an infectious disease. His only duty was to stop vessels at Castle Island and collect the appropriate entry fee and fourteen pennies for the health fee before vessels entered Boston.⁹² If all went well during Captain Clapp’s inquiry to determine if any sickness might be aboard the vessel, quarantine would not be imposed, and the only potential exposure the townspeople faced might be exposure to sickly or asymptomatic immigrants who had been overlooked by the colony’s military personnel stationed on Castle Island, about two miles from the easterly end of Boston’s Long Wharf.⁹³

Erected in 1634 under the leadership of Governor Winthrop, it served as the town's de facto quarantine station.⁹⁴ With a military command managing quarantine and shipboard sanitation, it would be expected that infected passengers received little care, especially since the fort lacked nursing or medical staff, though the commander served as the de facto chaplain. The potential consequences of a motley crew of military men who had little appreciation of their role in monitoring the health of vessels can only be imagined. If physicians of the day were unable to distinguish between various types of diseases such as scarlet fever and diphtheria, how could these skills be expected from poorly paid soldiers?⁹⁵

Imposing a rigid quarantine against the motherland was an enormous risk for Governor Richard Bellingham to take, but it was one that soon paid dividends for the colony. His efforts to isolate Boston from European trade had the salutary effect of avoiding an American epidemic. While over sixty-eight thousand died from the London plague, the bacterium *Yersinia pestis* and the rat flea that transmitted this deadly disease never reached the shores of Massachusetts.⁹⁶ Whether Boston's success was a matter of dumb luck or its draconian quarantine measures, the specter of cataclysmic loss of life had been averted. No other American colony imposed, or indeed dared impose, a similar quarantine against the motherland, nor were there any reported cases in the American colonies.

The quarantine order was repealed on October 9, 1667, two years after its enactment. In reality, the order could have been rescinded in the summer of 1666, but Bostonians were so fearful of its wrath they did not accept second-hand accounts of the dissipation of the London epidemic. Merchants knew better than to contest the governor's quarantine order, even though it would prove to be the longest one of the seventeenth century.⁹⁷ Only a few isolated cases of plague occurred in London during subsequent years, but these few cases kept Bostonians on edge.⁹⁸ Bellingham believed averting the plague was worth the sacrifice even if it meant some economic hardships. Why didn't other colonies pursue similar quarantine strategies? In large part, the Massachusetts Bay Colony exercised a degree of autonomy from the English Parliament and the King's Privy Council, which had no parallels in the other colonies.⁹⁹ Their charter, authorized by King Charles on March 4, 1629, gave the colonists a great deal of authority over their own self-government as long as their local laws were consistent with those of England.

The London plague also underscored the importance of tracking epidemics in all port cities where Boston commerce was carried on. Bellingham and his assistants—assistants were the forerunners of the House of Representatives—were mindful of the limited value of information provided by arriving seamen and, consequently, relied on letters from merchants or diplomats reporting from foreign countries. Published reports were few and far between, in part because none of the American colonies published

newspapers in the seventeenth century. Only the diaries kept by a handful of literate merchants, ministers, and magistrates have left evidence of the devastating loss of life from epidemics.¹⁰⁰ One might think that masters and commanders would be the logical source for epidemic intelligence, as they were obligated to provide reports of epidemics. Yet, they had little reason to report “an outbreak” if it might quarantine their ship. Moreover, smallpox, remittent fevers, and various fluxes were endemic in many of the ports visited by seventeenth-century Boston merchants, so reports of overseas epidemics (i.e., outlier outbreaks beyond the normal annual fatality rates) were the exception rather than the rule.

Despite the paucity of epidemic reports, documented cases invariably pointed to external maritime threats rather than from within Boston proper. Removing ships far enough out of port to satisfy the fears of Bostonians was the usual solution to seventeenth-century threats, even though such actions were undertaken with little formal legislative guidance. Starting on July 18, 1669, it became routine practice for Captain Clapp to deny harbor access to a ship with smallpox or other contagious disease or one coming from ports where such disease was present without the approval of the colony’s governor.¹⁰¹ Such quarantines, continued to be exclusionary in nature, with no humanitarian support to the passengers or crew, typical of responses to previous epidemics of the seventeenth century.¹⁰²

The provincial government enforced numerous quarantines based on orders issued by the governor rather than permanent laws. One of the worst epidemics in American history occurred during the period 1677–1679, when over seven hundred Bostonians, or nearly 18 percent of the population, died from smallpox. The ghastly epidemic started on July 10, 1677, when a smallpox-infected vessel landed in Nantasket about eight miles from downtown Boston.¹⁰³ Several Charlestown residents ventured on board, and within months thousands were sick. Bostonians had never experienced so many deaths, and by all counts the mortality rate was as severe as the London plague of 1665.¹⁰⁴ Perhaps because of the relative laxity of the measures taken in July, the Governor’s Council took no chances with subsequent vessels entering the harbor. For example, when Captain Samuel Legg arrived in Boston Harbor later that year, the Governor’s Council ordered him to land his vessel on Deer Island and stay there for eight days before his passengers were released.¹⁰⁵ In effect, the Council said, “Stay out until we’re satisfied you are not a risk.” To demonstrate the seriousness of this quarantine, it imposed a sixty-pound penalty on anyone violating their order.¹⁰⁶ Since Deer Island was uninhabited, Captain Legg’s passengers fended for themselves until the order was lifted. More importantly, this incident revealed one of the flaws of this quarantine system; Bostonians did not consider the burdens of disease on board sickly vessels to be their responsibility, and Castle Island was never formally declared a hospital available for use by sickly immigrants—it was

only an inspection station for arriving vessels. Sick and healthy passengers were equally excluded until Clapp determined if they were sick. However, if there had only been one or two cases of disease on board, the outcome may have been far different for the passenger and crew, since Castle Island was ill suited to accommodate everyone on board. For this reason, Deer Island became the safest way to handle this public health crisis. Similar exclusionary quarantines occurred more than once in the seventeenth century with severe consequences to innocent passengers from the motherland.¹⁰⁷

These callous exclusionary policies prompted the town's selectmen to rethink maritime quarantine. On May 6, 1678, the selectmen instituted home isolation and ordered those who survived to clean their infected clothing at three designated common areas: the hill overlooking the Charlestown ferry, Fort Hill; one of the town's highest promontories; and Boston Commons. There was only one condition. All clothing had to be removed and cleaned in the dead of night.¹⁰⁸ Their intuitions about disease causation may have had little basis in evidence, but they proved remarkably accurate. Modern studies have shown smallpox can be transmitted through contact with recently infected clothing.¹⁰⁹ Working off these experiences, for the next one hundred years, it was standard procedure to require smallpox patients to shed their old clothes before release from the town's various pest houses. The selectmen's strategy represented the first public effort to apply the principles of decontamination and disinfection to smallpox-infected individuals.

Founding of the British Customs Service

Control of communicable disease was complicated by seventeenth-century British navigation laws. The Navigation Act of 1651 required goods from the colonies and other dominions within the British Empire to be imported into England in English-owned and English-operated vessels.¹¹⁰ Likewise, it required imported goods to be carried in English vessels and to pass through English ports before arrival in America.¹¹¹ It was also intended to subvert Boston's trade with the Dutch in New York and ensure the Crown got its share of the revenues generated from colonial trade. Naturally, Bostonians strongly opposed the act, believing such laws could only be enacted by provincial governments along the eastern seaboard.

The navigation laws not only encouraged subversion of the British system for collecting taxes; they also had the unintended effect of making it more difficult to stop the entry of communicable disease into the colonies. Quarantine, to be effective, had to be uniformly enforced at the principal ports of entry into America. Without the resources for strict supervision over clandestine ports of entry, the colonies could only afford to monitor the health of vessels at its largest ports of trade. As a result smugglers reached New England through a wide range of small ports dotting the coastline. For pirates,

smugglers, and those seeking to subvert the customs laws of the British Crown, New England's ports and unguarded islands were havens for contraband activity.¹¹²

With hundreds of natural harbors along the colonial coastline, it was impossible for one person to enforce the navigation laws of the British Empire. Yet, this is the strategy the British Treasury chose to implement. In 1678, Edward Randolph became Boston's first customs collector. At the time of his appointment, Randolph, a forty-seven-year-old British government agent, was already a despised public figure in Puritan Boston. A monomaniac with an obsession with capturing every excise tax due to the Crown, Randolph had a knack for alienating virtually every New Englander he ever met.¹¹³ His efforts to squeeze every dollar of navigation taxes out of colonial merchants seemed to have a personal flavor. Before leaving England, he suffered financially even though he was employed in several apparently legitimate forms of employment, including working for the commissioner of the Navy buying timber and for the Duke of Richmond in Scotland in connection with some unsuccessful timber speculation. His work eventually brought him in touch with the inner circle of the Royal Court, a connection that led to an appointment as a glorified courier for the complainants of the Mason and Gorges heirs who laid claim to vast areas of the new world. His bossy investigatory style gained him few friends in New England. However, his confrontational tactics were thought useful to the Crown, and he was sent to New York to assume his duties, landing there on December 7, 1679.¹¹⁴

Randolph did more to annoy colonial merchants than any other British civil servant of the seventeenth century. His overzealous efforts to catch smuggling merchants and pirates along the New England coastline contributed to a break down in public health inspections of vessels in Boston Harbor. His activities heightened public distaste for English navigation laws and were a harbinger of the eventual annulment of the Massachusetts Bay Colony's charter. Randolph took it as his personal mission to discipline the unruly colony on its flagrant violations of British trade laws.¹¹⁵ He vowed to bring the recalcitrant colony into compliance with these laws. His efforts, largely unsuccessful, underscored the inevitable link between commercial trade and the propagation of communicable disease. Unenforceable navigation laws subverted quarantine of infected vessels leading to little public awareness of the condition of such vessels.¹¹⁶ These cat-and-mouse customs enforcement policies became a routine challenge to Boston merchants during the last thirty years of the seventeenth and most of the eighteenth century. The British customs service did not prohibit quarantine legislation in seventeenth-century Massachusetts Bay Colony, but it did view such activities with suspicion, since they were undertaken without the sanction of British law.¹¹⁷ More importantly, the overzealous enforcement of the navigation laws undermined disease surveillance and encouraged disease transmission at smaller New England ports where Randolph was less apt to visit.

Quarantine as a Public Health Tool

The grim reaper regularly cast the pox into the province with fatal consequences to its inhabitants.¹¹⁸ During the seventeenth century, thousands of Bostonians suffered from smallpox, with as many as 70 percent of the population infected, yet the fatality rate was generally less than 20 percent.¹¹⁹ The severity and frequency of these epidemics, coupled with the failure of routine methods of treatment, prompted the General Court to enact its first quarantine law in 1699, enabling selectmen to quarantine infected persons in separate houses. It also authorized two justices of the peace, working with the selectmen, to issue warrants directed to the sheriff, requiring them to place infected persons in convenient housing and stop any infected persons on board ships from coming ashore. Bostonians were facing a brave new world under the revised charter of 1686, where colonial laws no longer stood on their own authority but required approval from the Crown—even for matters affecting maritime affairs.¹²⁰ This quarantine legislation was rejected by the Privy Council on October 22, 1700, since it was unaware of any similar legislation in any of His Majesty's plantations, and the General Court offered no explanation for their privileged powers. The Privy Council was concerned these powers could be misused and noted that terms such as "contagions" or "epidemical" lent themselves to abuse and therefore were inimical to British trade.¹²¹ The legislation was taken up the following year and eventually passed on June 25, 1701, after the General Court eliminated references to the quarantine of cotton, wool, and other goods and dropped financial penalties against shipmasters—thereby gutting the enforcement of the new law.¹²²

The 1701 legislation prohibited anyone with plague, smallpox, or pestilential or malignant fever to come ashore and who came from a port where disease prevailed. The justice of the peace was charged with supervising maritime quarantine and issuing warrants under the authority of the sheriff or constable.¹²³ As trade expanded, so did deadly epidemics. An estimated four thousand people lived in Boston in 1675, but despite at least two intervening smallpox epidemics, the population grew to sixty-eight hundred in 1701, confined within less than one square mile area.¹²⁴ Not surprisingly, this trade fueled higher density urban development that consumed virtually all the land not already dedicated to commercial, residential, or farming uses and made disease transmission a more pressing public health concern.

Despite heightened awareness of the devastation wrought by epidemics, there was little understanding of how to regulate the "fly-by-night" activities of masters and commanders. It was clearly cheaper for a commander to off-load smallpox-infected persons and let the town assume the cost of care. The 1701 legislation did not require vessels to be inspected or for the commander to check in with local authorities before docking at Boston piers.

They were not even required to have a copy of the provincial quarantine laws on board their vessel, nor were they briefed before arrival on their obligations to comply with these requirements. The law merely indicated the selectmen could isolate those with contagious diseases such as smallpox, plague, or pestilential fever in separate houses. It also allowed the justice of the peace to issue a warrant to impress housing for the sick and to restrain those with contagious diseases from coming ashore. How a justice of the peace could determine if someone was sick was not defined. Maritime control of disease assumed compliance with a hidden body of law that was less than perfect in its administration. With such limited guidance and enforcement, it is no wonder so little port security existed to control threats posed by sickly vessels.¹²⁵

Despite its flaws, the law addressed both land and maritime quarantine and was one of the first in North America to establish permanent procedures to manage outbreaks of infectious disease.¹²⁶ Enacted nine years before the first British quarantine legislation, this law suggests the Massachusetts Bay colonists were far more concerned with imported contagions than their English kith and kin.¹²⁷ They were also more concerned with home isolation even though this was Boston's secondary defense strategy. The primary strategy had long been to close the town's gates at Boston Neck and ward off undesirable visitors unable or unwilling to pay their own way. This was easier said than done, as Boston Neck was constantly being eroded by the sea and damaged by illegal gravel mining activities.¹²⁸ To reduce the ravages of the sea and improve this property, the selectmen leased out the neck lands to Bostonians willing to install fences, improve the road, and create a line of defense against enemies real or imagined. Those who had taken stones from the flats near the neck were requested to return them so that a fortification could be constructed.¹²⁹

Eventually, the selectmen ordered a fence built across the narrowest stretch of the isthmus to limit access into Boston.¹³⁰ Two watchmen were appointed to keep out undesirable persons and enforce the colony's quarantine laws.¹³¹ Years later, the selectmen erected a substantial fort across the neck and closed the town at night—much like a medieval walled city.¹³² The fortification can clearly be seen on the 1722 Bonner map of the town of Boston.¹³³ In observance of the Sabbath, they also restricted access every Saturday night for a twenty-four-hour period ending Sunday evening.¹³⁴ The selectmen's strict control over strangers entering town, its lockdown of public access in observance of the Sabbath, and its restriction of nighttime revelry established the physical infrastructure necessary to protect Boston from incursion of infidels. These exclusionary policies also supported a sophisticated disease control strategy the likes of which existed nowhere else in colonial America. In this sense, the town's religious practices and xenophobic social policies were a natural complement to their quarantine policies.¹³⁵

Despite efforts to control access through its borders, sickly people inevitably slipped through the gates or found someone willing to row them across the Charles River to one of the many town docks. Whether they carried disease from towns in the hinterlands or from newly arrived ships is not known. We do know house quarantine was put to use within the first year after this landmark legislation, when Boston Selectmen granted the justices of the peace a warrant to remove Widow Paige and her family to a local quarantine house because it was feared they would spread smallpox. Six days later four of the selectmen recommended home confinement of Mr. John Jenkins' African servant who was alleged to be infected with smallpox.¹³⁶ These distinctively different approaches to quarantine were presumably motivated by fear of inadvertently spreading the pox (i.e., Widow Paige's younger family members may have been harder to quarantine in a home environment than Mr. Jenkins' servant). At a broader level, these isolation strategies confirmed the limitations of the colony's quarantine program. Home isolation was the direct result of its lax enforcement of maritime quarantine. Failing to capture infected immigrants at Castle Island meant the selectmen needed an extensive number of expensive watchmen to monitor infected families in one of the most congested colonial ports in America. The chances for a successful containment of smallpox were constrained by a (1) limited number of watchmen, (2) the poorly managed interactions between infected families their watchmen and physicians, and (3) inadvertent contact with pox-contaminated blankets and other essential supplies that carried the pox virus into and out of infected homes.

These isolated cases soon blossomed into an epidemic in June 1701, but the first deaths did not occur until August. To stop its spread, the selectmen retained the services of the town watchmen. For example, the selectmen paid Thomas Davise twenty shillings, or at the rate of slightly more than one shilling a day, for watching the house of Henry Sharps for fifteen days.¹³⁷ With hundreds dying and thousands infected, guards were not only expensive but few and far between; immunized guards were drawn from a limited number of elderly residents who had survived the epidemics of 1689 or 1693.¹³⁸ By October, Cotton Mather, Boston's famous Puritan evangelist, expressed the views of the populace when he proclaimed, "Smallpox is on every side of us."¹³⁹ With few resources to contain and isolate the infected, the disease spread so rapidly that in December alone over eighty people died. The epidemic was soon out of control despite all efforts to contain it. Mather's three children were placed in house quarantine. Surprising as it may seem, one hundred different watchmen were retained to care for these children's needs. This extraordinary support, while somewhat unusual, and perhaps reflective of Mather's higher station within the community, is an extreme example of the financial burdens created by home isolation.¹⁴⁰ Given his exalted spiritual status, it may have been considered a badge of Christian generosity to

look out for Mather's pox-infected children. The fact that his wife passed away on the first of December made his quarantine woes an even greater burden that would alter his fortunes as a minister and set him on a collision course with destiny seeking a scientific solution to the smallpox scourge. The epidemic may have infected as much as half the population and stretched resources to the limit, especially once the town adopted its labor-intensive home isolation strategy.¹⁴¹ The consequences of lax enforcement were significant. In 1702, a total of 313 persons, or 4.4 percent of Boston's population, died from smallpox.¹⁴²

Birth of an Island Quarantine Hospital

As the town of Boston prospered from increased trade with the West Indies, South America, and Europe, imported cases of smallpox increased.¹⁴³ Prior to 1715, attempts to isolate domestic cases of smallpox were handled by confining residents in private houses or in the town pest house located on Fort Hill, the former military garrison overlooking Boston. Despite its convenient location, many residents were less accepting of its insidious presence insisting the pest house be relocated fearing it spread disease.¹⁴⁴

These concerns prompted a call for reforming provincial quarantine practices, including the nuisance of the town's pest house. In September 1715, public interest in a safer quarantine location surfaced at a town meeting.¹⁴⁵ After considerable delay, on June 11, 1716, a committee was appointed to identify a remote location for a quarantine hospital. After six months of deliberations, Spectacle Island and Squantum Neck were deemed the two most suitable locations. One of the factors that may have influenced their selection of sites was the fact that Samuel Bill, owner of Spectacle Island, had previously allowed his island to be used for quarantine with the consent of the provincial government.¹⁴⁶ Despite this precedent, the committee narrowed its recommendation to a site on Squantum Neck.¹⁴⁷ The House of Representatives accepted the committee's report, and 150 pounds was set aside to purchase one acre on Squantum Neck, about six miles south of downtown Boston.

This decision was rejected by the inhabitants of Dorchester, Braintree, and Milton who were most immediately impacted by this location. The town's inhabitants petitioned the House of Representatives that no hospital be built on Squantum Neck. Bowing to this public outcry, on April 11, 1717, a new committee, composed of Adam Winthrop, William Payne, Samuel Thaxter, and Jonathan Dowse, was appointed to find a more suitable hospital location.¹⁴⁸ Adam Winthrop was the great-great-grandson of Governor John Winthrop and a member of the Governor's Council.¹⁴⁹ The others were all members of the House of Representatives with Dowse representing Charlestown, Thaxter representing Hingham, and Payne the town of Boston. Their selection underscored the importance the General Court placed on the views

of the town's representatives in choosing the next quarantine station. After evaluating several sites, including Deer Island and Spectacle Island, their decision was almost a foregone conclusion. They established the southerly end of Spectacle Island for the quarantine hospital. In exchange, Samuel Bill and his wife received 100 pounds for their property. About two months later, the province reimbursed Bostonians for building the hospital by paying them 173 pounds for their efforts.¹⁵⁰

Within a few weeks of the disbursement of funds and before the hospital could even be completed, some eighty passengers arrived in Boston Harbor with smallpox. In keeping with past practice, they were exiled to Spectacle Island. Since the facilities were not yet ready, at the request of the provincial government, Samuel Bill personally accommodated the sick on his half of the island. Unfortunately, their needs overwhelmed his resources, and in their desperate effort to survive on the island, they despoiled his property.¹⁵¹ In an attempt to literally "mend fences," the General Court paid Bill for his troubles and even installed a fence to stop future invasions of his property.

Belatedly, the General Court opened Spectacle Island hospital on February 14, 1718.¹⁵² The ninety-seven-acre island, only four miles from Boston's Long Wharf, was large enough to accommodate future development. Depending upon the level of the tide, Spectacle Island used to appear as two separate islands or as a pair of spectacles connected together by a short bar of land, which is how it got its name. It lies between Thompson's Island and Long Island about two miles southwest of Deer Island, where Boston's modern sewage plant now resides. One of its greatest advantages was it fell within the jurisdiction of Boston, thereby trumping past intermunicipal feuds concerning acceptable locations for a quarantine hospital. This island, along with Deer Island, Hogs Island, and Long Island,¹⁵³ had been granted to Boston in 1634 and was well positioned to receive ships coming into the harbor, since it had easy access to Boston services using chartered sail and rowboats.¹⁵⁴

The offshore pest house wasn't large enough to accommodate a shipload of infected passengers. At best, it could handle several dozen patients at a time operating on a shoe string budget while relying on the goodwill of its neighbor to cover unexpected costs, such as supporting some seventy Irish passengers quarantined for six weeks in November 1719.¹⁵⁵ Yet, despite its limitations and the problematic honor system for disease reporting, the quarantine station's existence reflected an emerging civic responsibility to meet the housing, health, and social needs of the victims.¹⁵⁶ The provincial government recognized the value of a hospital even if their calculations underestimated its proper size and needs. Over time, the concept of needs would be extended to cover nurses, reliable boat service, reading materials, sanitary facilities, and rudimentary bathing facilities.

Boston had survived for eighty-eight years without a hospital for its own citizens. In 1718, population growth and the challenges of higher density

development forced legislators to rethink its house quarantine strategies and choose island isolation as the accepted mode of care. Coincidentally, this year also marked the beginning of regular stagecoach service between Boston and Rhode Island.¹⁵⁷ While seemingly unrelated, these events were in fact linked. There was a growing awareness that Boston was not merely a thriving maritime port but also a town with growing trade relations with neighboring cities to the north, south, and west. Its population, estimated at 10,450 persons in 1718 found travel within the colony to be much easier than ever before, as old Indian trails were turned into wider paths that soon allowed passage by horse and carriage.¹⁵⁸ While most people walked on foot, the more affluent rode on horses or, if very wealthy, rode in a horse and buggy. Long distance travel was not easy and could be very exhausting, since early New England roads were nothing more than worn pathways over bare earth and became mud holes in the rainy season and impassable wastelands in the winter. Relatively poor provincial roads influenced the decision to locate the quarantine station offshore rather than in the hinterlands. Spectacle Island could be reached in a rowboat in several hours. More importantly, it could be reached without passing through any towns, avoiding political controversies associated with a location in Boston's suburbs or the provincial hinterlands.

CHAPTER FOUR

The Inoculation Controversy

The practice of inoculation was first introduced in America in 1721, when Dr. Zabdiel Boylston applied it on Bostonians fearful of contracting smallpox the natural way. Inoculation for the prevention of smallpox involved making a precisely planned incision in the arm of the patient and inserting the virus. Persons infected with smallpox via inoculation experienced a far less severe form of the disease than those who contracted it naturally. Moreover, inoculation was less likely to leave one pockmarked for life. An individual might have a number of pockmarks on the arm where the inoculation was given but would not suffer the full brunt of the disease. One of the reasons smallpox engendered universal fear was because of its high fatality rate and the disfigurement of those who survived it. It was said beautiful men and women could be transformed into ghastly-looking figures permanently scarred over their entire bodies—shunned for the rest of their lives. Under its worst form, called confluent smallpox, patients who survived were forever stigmatized by the pockmarks covering their face. Indeed eighteenth-century notices for missing persons would often refer to these facial pockmarks for easy identification, thereby reinforcing the shame of this disease.¹

Smallpox was even feared by physicians. Many kept what today might be called an appropriate social distance from patients with pustules and ulcerous blistering skin; some patients might be covered in purple spots, while others experiencing the most lethal symptoms hemorrhaged blood at the mouth, nose, and bodily extremities, leading to violent inflammations and swellings in the eyes and throat.² Patients with these symptoms might scarcely be able to breathe and unable to swallow anything. In some cases, the pockmarks created blisters, leaving the skin to strip off the raw flesh. In other cases, patients had loathsome deep ulcers—a term commonly used in that era to describe conditions such as pox pustules and encrustations over

the entire body. It was not uncommon for some to become cripples, others deranged, and many blind for the rest of their lives. Just one case in the community could trigger waves of fear launching a flight to the country, reprisals, and public health protection strategies such as quarantine.

Less than three years after the General Court established Spectacle Island as its quarantine station, the phobias of working with the pox infected led to a dramatic shift in the use of quarantine through the remarkable and daring medical experiment of inoculation. Public health policy had called for smallpox to be kept at bay through a vigilant inspection of incoming vessels and for landside quarantines to be avoided at all costs. No one could have imagined quarantine policy would be subverted by several of Boston's own physicians who adopted a radical new concept of self-infection.

The notion of self-infection must be understood within the backdrop of past practice. On April 22, 1721, the *HMS Seahorse* arrived from the West Indies with smallpox onboard. Despite gallant attempts to stop its spread, at least one infected man from the ship entered Boston. With an incubation period between seven and seventeen days, it did not take long for the infected sailors to become contagious. On May 8, Elisha Cooke, a prominent physician and one of the wealthiest men in the province, joined six other selectmen in ordering the town's watchmen to stand guard at smallpox-infected houses.³ Cooke soon realized that quarantine would not be enough. Four days later, the selectmen ordered Captain Thomas Durrell, commander of the *Seahorse*, to "fall down to Bird Island with the ship to prevent the spread of infection," even though numerous sickly British sailors were already ashore.⁴ The only apparent reason Bird Island was selected as the location to anchor the vessel was because Spectacle Island's hospital may not have had sufficient beds to accommodate the British sailors and the commander had the onboard resources to shelter and feed his crew. This order was "too little too late," requiring a large number of men to escort the ship and its skeleton crew to Bird Island (now located under one of the runways at Logan Airport) and watch over it during quarantine. Evasion of quarantine orders was not just a problem found in Boston proper; sailors were quite familiar with evading posted watchmen, sneaking to shore in rowboats, swimming on favorable tides, or even conniving with other onshore friends to get to shore.

Fearful of relying on quarantine alone, the following week the Boston Selectmen ordered the town's twenty-six free Africans to spend six days cleaning the streets and removing dirt to prevent smallpox from spreading. Despite being nominally "free," these African residents were expected to perform certain "dirty work" as a condition of their status within the community. Though conscripted to this task in the hope of removing the presumed sources of disease, their efforts failed. By June 5, smallpox had swept through School Street, prompting the selectmen to close the public grammar school.⁵ As the virus spread, quarantine guards were removed from their duty

stations, as the need for home isolation soon far outpaced the supply of able watchmen.⁶ The desperate effort to quell the epidemic created fear and panic, and virtually no one was immune to its effects.

Cotton Mather Touts Inoculation

At least one brave soul of the ministry was prepared to wage war against this pestilence. In the midst of retreating quarantine guards, Cotton Mather felt more should be done. He was one of the most brilliant evangelical Christian ministers of the eighteenth century, and his sermons were followed by a great many in Boston. Mather was perhaps the most influential and certainly the most charismatic minister in colonial America. At age twelve, he was the youngest student ever admitted to Harvard and graduated from there at the ripe age of sixteen. A prolific writer of more than 450 books and pamphlets, he considered himself a scientist and a dabbler in modern medicine. Mather had eclectic reading habits, a renaissance interest in the sciences, and a deep interest in British scientific literature on inoculation. He felt it was his duty to inform the town's physicians of a meaningful alternative to quarantine. His passion for action may have been activated by the scientific literature of the day, but his real motivations were quite personal. As discussed earlier, two of his family contracted smallpox in 1702, and four of his children died during the measles epidemic of 1713. He suffered greatly from the ravages of communicable disease; nine of his fifteen children died before the epidemic of 1721.⁷ These personal tragedies inspired a need to make something good out of this senseless loss of life. As early as 1706, Mather learned from his African slave, Onesimus, that African natives practiced inoculation. He became obsessed with learning more about this practice, since it apparently provided immunity to smallpox. Through the assistance of William Douglass, a prominent Boston physician, he obtained a copy of an article on inoculation published in the *Philosophical Transactions of the Royal Society*. After reading about this practice, Mather was convinced it could stop the emerging epidemic. His unpublished diary of May 26, 1721, revealed his aspirations to protect the public health:

The grievous calamity of the smallpox has now entered the town. The practice of conveying and suffering the smallpox by inoculation has never been used in America nor indeed in our Nation. But how many lives might be saved by it, if it were practiced. I will procure a consult of our physicians, and lay the matter before them.⁸

After writing a letter encouraging Boston's physicians to try inoculation, Mather privately contacted forty-two-year-old Dr. Zabdiel Boylston to begin a trial. Like many physicians of his age, Boylston had never attended medical school but had apprenticed with his father, Thomas, and later on with Dr. John

Cutler. Boylston was favorably impressed with Mather's idea. His own narrow escape from smallpox nineteen years earlier convinced him of the value of the experiments, and on June 26, he successfully inoculated his six-year-old son Thomas and his two African slaves, Jack, thirty-six, and Jackey, two and a half years of age.⁹ Pleased with the results, on July 17, Boylston took out an advertisement in the *Boston Gazette*, in which he explained his actions and declared inoculation was a sure and certain means to avoid contracting smallpox the natural way.¹⁰ He even asserted there was no need to fear having lifelong scars from pockmarks over ones face or of ever having smallpox again. The dreaded disease could be vanquished, in his view, by the art of inoculation. No American physician had ever published such daring claims in a newspaper about such a radical medical experiment, and his notice soon enough provoked widespread skepticism and even fear at the potential consequences his actions might have on the welfare of Boston society. To proclaim the need for quarantine as a means to stop an epidemic was always a politically dangerous act; it inevitably required enormous resources, increased taxes, and required many brave men and women to risk their lives against highly contagious and lethal diseases. However, no one had ever dared to proclaim that self-infection through a new process called inoculation was a solution to an epidemic. It was tantamount to a forest fire brigade starting a so-called controlled burn to stop the onslaught of a roaring inferno.

The selectmen and numerous physicians of the town were angered by Boylston's experiment and soon opposed his efforts. Indeed, even though Boylston claimed positive results, the practice of inoculation was deemed sufficiently dangerous that many Bostonians wanted this practice controlled by the town's selectmen and some felt—like Dr. William Douglass—that it shouldn't be authorized at all.¹¹ A barrage of newspaper articles fueled public opposition to Boylston's radical practice, including thoughtful essays by an anonymous author that appeared in the first four issues of the *New England Courant*, a newspaper published by James Franklin, elder brother of Benjamin Franklin.¹²

While the town's physicians were opposed to the inoculation practice, by a strange alignment of interests, the town's ministers were fully supportive because Mather, the eighteenth-century equivalent of a religious rock star, had blessed this medical experiment.¹³ Their views were of considerable importance to many Bostonians who held their ministers in the highest public trust. Indeed, inoculation could not have taken root were it not for Mather's exalted status within the community. His enormous influence over the Puritan congregation and other ministers and his single-minded support of the inoculation experiment did much to mollify public opposition. Yet, Mather was also disliked for his passionate support of the highly rigid Puritan way of life, especially as the next generation of Bostonians found little comfort in the strict religious practices of their elders.¹⁴

In contrast to the fatalistic school of religious thought, Mather and his colleagues espoused an experimental faith placing emphasis on man's ability to

intervene against the forces of disease and other evils. Traditional belief held pestilence and famine were “God’s wrath against the wicked” and were to be accepted as a divine purgative for their evil actions.¹⁵ Mather himself had frequently counseled his flock on the virtues of accepting such wrathful dispensations as the hand of God. And yet, in this hour of darkness, this uniquely American evangelist preacher spoke of the congregation’s right to survival and the moral responsibility to try an effective remedy to death by smallpox.¹⁶ As such, Mather and his preacher colleagues counseled that it was not God’s will that Bostonians should die from smallpox. Citizens had a choice and should make efforts to protect themselves. Inoculation, he asserted, was one such way of doing so. Religion and science were not antithetical worldviews. Rather, he believed, science afforded God’s flock the opportunity to do good work in the service of the Lord. His scientific interest in inoculation, aligned with his principles of doing good, appeared to conflict with religious notions that wars, famine, and pestilence were preordained events.¹⁷ Mather asserted disasters could be stopped even though many felt such events were the inexorable outcome of an unfavorable position of the planets.

Mather’s advocacy of self-infection placed the ministers on the side of experimental science and the physicians cautiously on the side of traditional medicine. It signaled the emergence of a new era in American medicine and arguably a new era of experimental faith in the Puritan community. Yet, despite Boylston’s efforts to inoculate hundreds of Bostonians, in defiance of public wishes but under the moral authority he received from the clergy, the epidemic raged out of control for over six months—though Boylston’s rash behavior has little impact on the death toll. Boylston could not imagine his actions compromised public safety or contributed to the further spread of disease. In many ways, he operated as if he had been anointed to carry out God’s work, so the recriminations of the worldly were of little concern to him during his holy mission.¹⁸

The crisis took on even higher stakes when the General Court learned plague had broken out in France. Fearful of its consequences, the Court required vessels from French or Mediterranean ports to undergo a forty-day quarantine, a period of confinement not previously sanctioned by legislative action.¹⁹ Undoubtedly, their ongoing battle against smallpox during the summer of 1721 heightened public interest in the enactment of this legislation. After all, it was the failure of the current maritime quarantine system against a British naval vessel that had led to the townwide epidemic. Specific measures were taken to control access to the harbor, lengthen the quarantine of arriving vessels, and avoid summertime arrivals, when it was believed this pestilence was most lethal. To make it clear they meant business, the General Court imposed the death penalty on any offenders.²⁰ If smallpox was a frightful disease, plague engendered panic tantamount to holocaust. Legislators

were not about to trust commanders of merchant ships with the health of Boston. Preemptive actions were necessary. As a result, this law was not restricted to plague-infected vessels; it applied to *all* vessels coming from French and Mediterranean ports where “plague and other pestilential and mortal distempers prevailed.”²¹ Vessels that had been in plague-infected ports within the last six months were also covered. The forty-day quarantine law would remain in effect for a period of three years, expiring in September 1724.²² Its requirements set new standards for disease disclosure by commanders and their passengers.²³

A double disaster—the threat of plague from France along with the town’s smallpox epidemic—meant Elisha Cooke and the six other selectmen had scant tolerance for maverick behavior by misguided physicians. Cooke was not only a physician but one of the most powerful men in the colonies with extensive real estate holdings in Boston and thousands of acres in Maine. Yet, his wealth had less to do with his legacy than his extraordinary political skills. He was credited with creating the first political machine in British North America based on the concept of the political caucus, a term he possibly derived from the Greek word “kaukos” for wine bowl, suggesting his view of the close affiliation between “bottles and ballots.”²⁴ Others have claimed the word was a corruption of Cooke’s house, while the esteemed John Pickering, a famous nineteenth-century philologist, finds evidence it was a corruption of “caulker’s meeting”—reflecting the powerful influence of boat builders and ship owners in Boston politics.²⁵ As one of the town’s leading power brokers, Cooke had already developed some antipathies toward Cotton Mather’s political views, and those sentiments may have colored his views of the inoculation controversy.²⁶ Not surprisingly, Cooke was troubled by Boylston’s clandestine inoculation activities. While the natural transmission of disease posed a significant threat to public health, it was the manmade exacerbation of the epidemic through inoculation that was his chief concern. Should those undergoing inoculation be subject to quarantine regulations? If the same virus that caused the lethal disease could also be used to provide a milder exposure through the inoculation process, were there medical procedures that should be implemented to protect against a fatal exposure? Cooke and his fellow selectmen did not pretend to have the answers to these questions. However, they had the good sense to consult with a French physician who claimed familiarity with the inoculation process and probably shared Cooke’s medical views. He recommended inoculation be prohibited, since it was too dangerous and should not be practiced. Armed with this advice, and without opposing public testimonials from Boylston or Boston’s ministers, the selectmen briefed the townspeople on the potential risks of inoculation. On November 4, 1721, over six months after the *HMS Seahorse* brought the virus to Boston, it was almost a foregone conclusion the townspeople would vote to send

smallpox-infected persons, including those seeking inoculation, to the town's emergency pest house or Spectacle Island hospital. Cooke likely played an instrumental role in staging the town meeting to reach its intended outcome. The townspeople rightly feared inoculation would further spread smallpox among them, and Cooke, no neophyte at political stage management, invited a French physician who proffered to their fears. Indeed, because of misinformation provided by the French physician, the townspeople were led to believe inoculation was even worse than contracting smallpox the natural way.²⁷

With the moral authority of the townspeople behind them, six of the seven selectmen took action against those who sought inoculation. The tide of public opinion had shifted toward a more cautious solution to the control of epidemics. Unsanctioned experimentation would never again be acceptable to Bostonians. A week after the town meeting, the selectmen (William Hutchinson was absent at the time) ordered the justices of Boston to issue warrants for the removal of anyone seeking or receiving inoculation to their respective towns or Spectacle Island.²⁸ Warnings of this nature would have deterred the timid and faint of heart but not the stubborn and self-confident Boylston.

Unbeknown to the selectmen, their colleague William Hutchinson had caught the pox from Dr. John Clark, the fifty-four-year-old Speaker of the House of Representatives, a fellow member of the General Court. Clark was the third generation of physicians named John Clark and was an intimate friend of Elisha Cooke. Clark's role in spreading the pox immediately caused a panic and led to the closing of the General Court that had been in session in Cambridge. Hutchinson, only thirty-eight years old and a man of independent wealth, died on November 30, 1721. His death sent shivers through every member of the House of Representatives and set them headlong for home to avoid a similar fate.²⁹ Clark, his colleagues believed, had failed to disinfect himself thoroughly after treating a pox-infected patient—a belief that was consistent with public opinion about the dangers posed by lack of disinfection.³⁰ The ease of pox transmission—even through the caring hands of a renowned physician such as Clark—should have been a warning to those playing with the volatile pox virus.

During the next six months, Boylston inoculated hundreds of residents in Boston and adjoining towns with only six caught and removed to Spectacle Island. He remained defiant, believing he was doing the right thing even if his actions were inconsistent with the wishes of the community. His arrogance set up an inevitable confrontation between the purveyors of the new science and the torchbearers of democracy, who relied on the wishes of the people to determine public policy. It presaged the inevitable conflict between science and public policy.³¹ Boylston could fervently believe he held the truth and could show how even his own body of evidence supported his views, but

neither government officials nor public opinion endorsed his “scientific demagoguery.”

The selectmen believed inoculation was no different and perhaps worse than the natural transmission of the smallpox virus, and as such the town’s traditional quarantine laws were needed to thwart inadvertent exposure. While Boylston was never punished for his actions, toward the end of the epidemic, six of his inoculated patients, including Samuel Sewall, one of the town’s most respected citizens, were forced to undergo treatment on Spectacle Island.³² The selectmen had reached the limits of tolerance for the wayward behavior of this experimental physician. They made it clear elected officials, not physicians, had the ultimate authority for public health. While dozens of historians have described and reinterpreted the inoculation controversy of 1721, none have addressed how Boylston’s inoculation practices strengthened rather than dissolved the principles of quarantine.³³ Most of the modern literature focuses on Mather’s role in promoting the scientific principle of inoculation as a prophylaxis for smallpox. Yet, with one exception, this literature skirts the dangers posed by uncontrolled inoculation.³⁴ While it was the failure of the town’s quarantine system that led to the epidemic, Boylston’s actions unintentionally created the public backlash necessary to revitalized quarantine and gave it a new role in the inoculation process—a point not made by past historiography of the 1721 epidemic.³⁵

The epidemic eventually abated after over six months of wrenching personal and public battles between the clergy, the physicians, and the townspeople over the value of inoculation. The selectmen had aborted the townwide quarantine when it was apparent there were insufficient guards to enforce this measure. They made no effort to stop Boylston’s inoculation activities until it was too late to make a difference. The debates over the value of inoculation were played out in the town’s three weekly newspapers and tended to stymie rather than facilitate a coordinated public response to the epidemic. The dangers of inoculation were magnified by letters in the *New England Courant* without any contravening assessment by Boylston. The result was a public crisis of confidence in the medical profession and a paralysis of public policy. Only the deaths of hundreds of Bostonians galvanized public action to stop the epidemic and restore a sense of calm to the community. Quarantine, a tool traditionally applied to those exposed to smallpox the natural way, was not reactivated after its initial failure—caused in part by a lack of watchmen—but was applied as a form of punishment to those who exposed themselves to smallpox through inoculation. The desultory effort to quarantine six patients who “took the pox” from Boylston at the end of the epidemic revealed the state of disarray in quarantine policy. Yet, much good came from this crisis. Without Boylston’s arrogance, Bostonians would not have had proof that inoculation worked.³⁶

On the other hand, Boylston's self-centered efforts failed to give credence to the public health concerns of the town's selectmen, citizens, and physicians. The selectmen could have called a town meeting to air opposing views and establish a democratic resolution of the crisis. Unfortunately, convening a meeting of a large number of contagious citizens might have exacerbated the spread of smallpox, leading to even higher rates of mortality than were experienced in 1721. Numerous physicians raised concerns that smallpox could spread when inoculation occurred without quarantine controls. Boylston dismissed these concerns, acting as if his actions were above reproach. Yet, some of his patients did come into contact with the public, and there were suspicions that these uncontrolled encounters contributed to the spread of disease.³⁷ In those days, quarantine meant separating the infected family members from others in the neighborhood—not from their own family. During an epidemic of this magnitude, sending thousands of townspeople to Spectacle Island was nothing short of folly that was never seriously considered. Other apparently healthy family members were free to roam. As a result, family members who were exposed to the virus but not yet sickened by it might become disease spreaders when they came into contact with neighbors, friends, or children living in the neighborhood. Without strict quarantine procedures requiring all family members to remain at home, smallpox spread like a wildfire. Similarly, those undergoing inoculation could also expose other family members to smallpox, and these exposures could have the same lethal consequence as exposure to the disease the natural way.

Although "exposure" was not a well-understood term in the early eighteenth century, it was generally thought infection occurred by touching the clothing or skin of an infected person or breathing air in the immediate environment.³⁸ For this reason, isolating infected persons and their family members was believed to be the single most effective technique of blocking disease transmission. At the time, no one knew how long the virus remained active on clothing, on the skin, or in air, but it was generally believed to last for a considerable period of time. As many also believed the virus could be inhaled like a miasma—foul air that might permeate certain environments such as swamps, landfills, and other noxious smells—Bostonians kept their distance, at least four rods, if colonial laws were a reliable barometer of human behavior.³⁹

Did pox transmission of a person infected in the natural way apply equally to one who was inoculated? At the time, the issue was novel, and the perspectives were as varied as the extant theories of contagion. Boylston's experiment challenged physicians to consider whether a controlled insertion of the virus into the arm or leg of an individual posed the same risk of exposure in the natural way. It is instructive that Boylston made no effort to force his patients to remain isolated from immediate family members; at

least he never made such views part of his inoculation theories. His own practice revealed a tendency to keep his patients indoors, but there were numerous instances where he allowed them outside. In one case, a patient was released outside due to heat prostration. In another case, a patient was moved to more suitable quarters, and in a third case, he let his patient fight a nearby house fire.⁴⁰ His failure to assuage the concerns of an anxious public about the transmissibility of the virus to nearby innocent bystanders did much to inflame the rage against his methods. At its root, public fear was driven by a lack of understanding of the risks posed by inoculation to the recipient and innocent bystanders. How dangerous was this practice to those who watched from afar? In one instance, Dr. Boylston allowed a volunteer fireman to fight a fire while still undergoing inoculation, claiming that this short-term exposure to the public did not pose a significant risk of spreading disease.

Traditional views of his experiment have focused on the dangers of an untested inoculation procedure applied to hundreds of desperate citizens. His experimentation had three facets that would shape quarantine thinking for years to come: (1) enabling self-experimentation, (2) utilizing inoculation as a preventive treatment for the infected, and (3) raising public awareness of the contagious characteristics of the inoculation process. On one level, his experimentation was simply an example of consenting adults accepting an exposure to a virus that seemed inevitable. What did it matter that an exposure was rigidly controlled if the exposure was inevitable anyway? In reality, there were several other levels to his experiment that might not have been apparent to historians but were central elements to future medical practice. Inoculating those who had already been exposed, which Boylston admitted happened on numerous occasions, was extremely dangerous.⁴¹ Inoculation may have served as a preventive measure, but there was no evidence for its use to attenuate an infection during its asymptomatic gestation phase. Boylston boldly proclaimed it “criminal” not to support such patients with inoculation than to let them be the victims of a cruel and “merciless distemper.”⁴² If this second aspect of the experiment was not bad enough, Boylston flouted the quarantine laws by exposing entire families to the virus without consideration of its communicability. How could he be sure the virus would not spread as rapidly through inoculation as it did naturally? Despite the views of numerous medical historians who have lauded his risky behavior, his experiments were nothing less than an arrogant misuse of the rights of ordinary Bostonians—a view held by the town’s selectmen.⁴³ Working under Mather’s spiritual mantle, he did more to legitimize independent-minded thinking than hundreds of physicians before him, but his approach marginalized his profession for years to come, eventually leading to greater public controls over the practices of physicians.⁴⁴

Boylston's reputation as a physician was damaged by the public criticisms of Dr. William Douglass.⁴⁵ Douglass did not consider him a legitimate physician and publicly fumed over his inoculation practices. However, contrary to the self-centered views of Douglass, who disparaged Boylston as an unschooled physician without a medical degree, he was accepted by the community standards of Bostonians of his day as one of ten physicians serving the town.⁴⁶ His public acceptance was perhaps the best test of his professional standing.⁴⁷ Public licensing and credentialing were not requirements of the time, and Boston physicians lacked a professional organization until Douglass established the Boston Medical Society in 1735.⁴⁸ However, that society was limited in its impact, since it did not control licensing, fees, or malpractice among its members. The 1721 epidemic and subsequent outbreaks in the 1730s eventually helped physicians coalesce into a profession with specific occupational and public interests. The Boston Medical Society did not last, although the principles behind it saw fruition in 1781 when the Massachusetts Medical Society was established.⁴⁹

Boylston's rash actions in promoting inoculation reinforced public perceptions of the importance of quarantine.⁵⁰ Quarantine was a public health strategy determined by the will of the people, not based on the opinion of one self-described expert. In the end, the "truth" of Boylston's "valiant" efforts to save Bostonians from smallpox relied on independent action divorced from the power of local government. Boylston's so-called truth—the scientific value of inoculation—was not brought to the negotiating table of public opinion. In his mind, it was "my way or the highway." Democracy relies on addressing the concerns of the people, and Boylston's "truth" failed to deliver on this important step. In the end, the political stalemate crippled Boston and led to more deaths than any other smallpox epidemic of the eighteenth century.⁵¹

Aftermath of the 1721 Epidemic

Perhaps one of the great lessons learned from Boylston's efforts was that inoculation could have unintended fatal consequences for those inadvertently exposed to this procedure. After the epidemic was over, the debate over its benefits raged on. For some, inoculation was preferable to contracting smallpox the natural way. However, many were influenced by Douglass' view who said it posed an unacceptable risk to those inadvertently exposed to the virus. These concerns were well expressed by an anonymous author who declared inoculation not a private event but one requiring the consent of the affected community. Those desiring inoculation were urged to "withdraw from the community into such places where there can be no danger to their neighbors or else obtain a common consent."⁵²

Even Boston's physicians recognized the dangers of inadvertent exposure during the inoculation process.⁵³ Several ministers who supported the inoculation procedure eventually acknowledged its dangers to the susceptible members of the community. Their apologist position suggested that in the midst of an epidemic the practice of inoculation added little danger to the preexisting risks already present within the community.⁵⁴ Even Douglass reported smallpox had only affected Boston and two or three adjacent towns. In reality, numerous towns throughout New England were directly affected, including Hingham, Salem, Woodstock, Marblehead, Ipswich, Newport, Rhode Island, and New London, Connecticut.⁵⁵ The smallpox contagion prompted Rhode Island, Connecticut, and South Carolina to immediately enact quarantine laws to counter the potential spread of the disease by land or by sea.⁵⁶

Based on Douglass' observations, smallpox was not a miasmatic disease and, therefore, not transmitted as a gaseous contaminant but through close contact with infected individuals.⁵⁷ His epidemiological insights concerning the communicability of the virus would eventually be lost in the archives of medical history, overlooked by many nineteenth-century physicians enamored with the miasma theory of disease.⁵⁸ The emergence of the miasmatic theory as a tool to subvert quarantine would take time to surface in colonial America. Its cogency as a new theory was linked to the yellow fever outbreaks that devastated American port cities at the close of the eighteenth century. Yellow fever outbreaks triggered quarantine, whether it be of vessels, neighborhoods, or entire towns.⁵⁹ Yet, even the increasing prevalence of so-called miasmatic diseases, such as yellow fever, that were thought to be uncontrollable through quarantine by many members of the medical profession did not dampen its public support.⁶⁰ As long as disease was transported to the colonies in vessels, quarantine remained an essential tool. Nearly two hundred quarantines were imposed on vessels entering Boston Harbor during the eighteenth century, including vessels with smallpox, yellow fever, and other contagions. Miasmatic diseases were subject to quarantine just as much as smallpox.⁶¹

Aside from Boylston, there were plenty of others who could be blamed for Boston's worst smallpox epidemic, including the selectmen, who failed to enforce house quarantines, which in turn contributed to the rapid spread of the epidemic.⁶² In contrast, maritime quarantine efforts were more successful. No other cases of smallpox were reported on vessels entering Boston Harbor following the *HMS Seahorse* incident. On February 26, 1722, the selectmen declared no more cases remained in Boston.⁶³ Despite their assertion, isolated cases continued to appear during the spring of 1722. The devastation from the epidemic was great. Out of a population of 10,565 inhabitants, 5,759 persons contracted smallpox, of which 842 died.⁶⁴ This

was the worst smallpox epidemic in Boston history, striking down almost eighty out of every thousand residents. The death rate could have been higher had not some 700 inhabitants escaped to the country to avoid exposure to the disease. Boylston and two other physicians inoculated 282 persons in Boston and nearby towns. Six persons died after the inoculation process, illustrating that it was not without risks.⁶⁵

Inoculation was a dangerous practice, yet, years later, the public eventually permitted it to continue as long as isolation procedures were government-sanctioned and met community standards of protection. Boylston's inoculation experiments were conducted without government-controlled house quarantines. If he had attempted to obtain approval for his experiment, public sentiment might have been entirely different. Public opinion shifted in support of inoculation after the epidemic when physicians and citizens had the opportunity to adjust Boylston's practices to be consistent with their expectations for sequestration and the social responsibilities of physicians. The term "sequestration" was never used to describe eighteenth-century procedures for isolating those undergoing inoculation. It is used throughout this book to clarify the distinctly different laws and procedures it engendered. Boston's other physicians were not necessarily against inoculation. Indeed, even Douglass privately admitted to his close colleague Cadwallader Colden that smallpox was probably better taken by inoculation compared to taking it the natural way.⁶⁶ Despite his unsanctioned experiment, Boylston revolutionized future responses to smallpox epidemics throughout America. His success brought him fame in England and recognition from the Royal College of Physicians in London. Within the next fifty years, five of the thirteen colonies authorized inoculation when practiced under the supervision of a physician at specially designated inoculation hospitals and with prior approval of government officials.⁶⁷ The only outright prohibition occurred in South Carolina where the practice was prohibited after hundreds of Charleston residents died from the wanton use of unregulated inoculation.⁶⁸ As interest in inoculation grew, quarantine changed from a tool for isolating the poor and immigrant classes to one sought after by the wealthier classes of colonial New England society. Boylston's inoculation experiment would eventually have other impacts as well. It changed public perceptions of those who contracted smallpox through inoculation. No longer were they victims; they became willing patients undergoing inoculation quarantines, or "sequestrations," which distinguishes this form of isolation from that triggered by exposure to the disease the natural way. While eighteenth-century laws did not distinguish between quarantine and sequestration, there were clear differences in the experiences. Sequestrations were triggered by a voluntary desire for immunization to avoid the full brunt of the natural disease. In contrast, quarantines were coercive and involuntary acts imposed on those who already caught the

disease. Sequestering patients during the time of inoculation would soon become an important element of Boston's eighteenth-century public health interventions and influence public health policy throughout all the British colonies. Yet, inoculation would never fully overcome the invectives tossed about Boston during 1721; it would become a highly regulated strategy that survived only under significant governmental controls and public consent.

Branding the Outcasts: Warning Out and Red Flags

In the years following the introduction of smallpox inoculation, Boston expanded as a result of growing trade with its sister colonies and dozens of Caribbean ports. Puritan culture was gradually fading away and being replaced by a mercantilist ethic that focused on free trade and laissez faire capitalism. The wealth amassed by Boston merchants created an environment that attracted a growing number of Irish immigrants desperate to flee the poverty and religious and economic tyranny of their homeland. On the one hand, Boston merchants sought hardworking, reliant laborers to support their shipping trades. On the other hand, the town fathers used every imaginable tool to exclude poor immigrants who might become welfare cases.

One of the relics of Puritanism was the town's intense antipathy for groups incompatible with its religious and social values. The Irish, whether they were Protestant or Catholic, were considered lazy, unreliable, and beneath the moral code of Puritan families that founded Boston. From 1721 to 1741, Ireland experienced four major famines and economic and religious oppression in their homeland.¹ Irish Catholics could not even vote or own land in their own country and were persecuted for their religious beliefs. The price of being a Catholic was exceedingly burdensome on poor Irish farmers. Any son who converted to Protestantism, by such apostasy, gained grounds to inherit his father's estate. Under such conditions, children were set against their parents, and Catholics were forced to live under the political whims of the Protestants.² Tens of thousands fled their homeland, seeking a better life in America, with the peak influx in 1729, when eight vessels arrived from Ireland packed with poor souls searching for a better life.³ Bostonians were rightfully concerned, not only at their incessant arrival but the disease they

brought with them, and urged legislative action. The General Court's reaction was swift and methodical: it strengthened existing laws to restrict Irish settlement, required them to register, and applied quarantine to vessels coming from Ireland at the slightest threat of disease on board.⁴ The previous law, enacted in 1723, had given them forty days to register, but this proved unworkable as many Irish slipped into Boston's Irish families and disappeared into the fabric of the community.⁵ In 1726, the General Court required strangers to register with the selectmen within twenty days of their arrival. To avoid these immigrants becoming charges to the town, the General Court held their hosts responsible for declaring their presence to the selectmen and requiring bonds in case they should become unproductive members of the community. These laws were built on principles espoused by Boston's founding fathers. As early as 1639, the General Court held towns responsible for the care of the "deserving poor," empowering them to warn out transients. Boston's Overseers of the Poor was established in 1692 to better organize social service functions previously handled by the town's selectmen, including providing alms for the poor and care of abandoned or abused children. Eventually, medical treatment was added to their list of services, but this did not happen until the second half of the eighteenth century.⁶

The Irish were not only taxing the town's social services; their poor health also overburdened the Spectacle Island hospital, lending weight to those calling for a larger hospital and quarantine facilities that separated the infected from the exposed. Lacking adequate hospital quarters, sickly immigrants might never see America. Hundreds of such souls were confined in ill-equipped buildings on offshore islands, often dying of unknown contagions and buried in unmarked island graves.⁷ The number of immigrants quarantined on Spectacle and Rainsford Islands has never been documented. However, the town's selectmen kept records of the number of vessels quarantined. From 1725 to 1798, a total of 204 vessels were held in quarantine, with 70 percent detained because of smallpox and another 24 percent because they came from a suspicious port. Yellow fever accounted for 1 percent of the cases and infectious distempers for another 3 percent. Assuming typical loads of 35 immigrants and/or sailors per incoming vessel, as many as 7,140 immigrants were quarantined in Boston during the eighteenth century—a relatively small percentage of those who arrived in that period. This estimate excludes Bostonians quarantined when smallpox broke out in 1721, 1730, 1752, 1764, 1775, and 1792 or when yellow fever struck in 1793. During those seven townwide epidemics, an estimated 22,241 persons were quarantined, reflecting the massive scale of epidemic responses in eighteenth-century Boston.⁸

The selectmen were not only at loggerheads with an unprecedented number of poor Irish immigrants; they also faced political battles with the British Parliament and the King's Privy Council over their independent management of public health policies. The British Parliament was not about to relinquish

its authority over the colonies and they expected the Privy Council to be the watchdog of colonial legislation.⁹ Laws affecting trade and commerce were of particular concern to the Privy Council, but health legislation, while presumably a local concern, still posed a potential threat. To avoid meddlesome oversight, every eighteenth-century Massachusetts quarantine law lasted three to five years with legislative extensions for comparable periods of time. Undoubtedly, the prevalence of plague in the Mediterranean, the town's worst smallpox epidemic, and an increase in international trade and its attendant risk of exposure to imported disease encouraged legislators to improve hospital buildings on Spectacle Island.¹⁰

Thomas Cushing, one of the most prominent of the Boston Selectmen, serving in that role for over twelve years, knew Bostonians had only themselves to blame for the growing poverty and endemic disease brought ashore by Irish immigrants. Colonial laws were based on the honor system. Only shipmasters, often referred to as masters, who declared disease on board were subjected to quarantine. If no disease was reported by the shipmaster when cases actually existed, a pathogenic Trojan horse was sure to follow. Cushing was one of a handful of members of the Boston caucus, composed of Harvard graduates and numerous physicians who played a powerful role in formulating public policy in the years after Boylston introduced inoculation to America. Cushing's physician friends in the Boston caucus included Oliver Noyes, John Clark, and Elisha Cooke.¹¹ This group of politically savvy physicians played a key role in changing the way quarantine applied to community-wide inoculations, but it would be a new group of selectmen, including Samuel Adams, that would be responsible for enforcing it.

At the age of forty, Samuel Adams was one of the most adept political figures of his age. A member of the Caucus Club and a wealthy maltster by profession, Adams played an important role in preserving provincial isolationism despite the encroachments of commerce.¹² As the father and namesake of seven-year-old Samuel Adams, the boy who would eventually grow up to be the famous Revolutionary War hero, he played a key role in shaping the antiestablishment thinking of his son and the generation to come. His election as a selectmen in 1729 coincided with an outbreak of smallpox that tested his public health resolve. It was also the first time Adams and his fellow selectmen were tasked with enforcing provincial quarantine laws. Routine administration of quarantine required staffing and vigilant enforcement to be successful. Self-disclosure of infection on vessels was no longer acceptable without a medical inspection. The selectmen demanded masters report disease onboard, even though as seafaring men, they had a vested interest in delivering their passengers ashore.

Adams and his fellow selectmen were doing the best they could to thwart the influx of communicable disease, but their efforts barely made a difference: ineffective enforcement, limited and perfunctory medical inspections, and poor hospital quarters reduced quarantine to a stopgap measure applied to the

most egregious cases of onboard smallpox. With scant public resources to inspect vessels, the Irish were an easy target as smallpox was frequently found on vessels from Ireland and, to a lesser extent, on vessels from sister colonies.

As trade increased and more infected vessels reached Boston, the selectmen realized the hospital inappropriately operated like a one-room schoolhouse: passengers, whether infected or only suspected of exposure, shared the same quarters. More importantly to trade, the quarantine station lacked buildings to store contaminated goods. To address these concerns, in 1728, Spectacle Island hospital was expanded with two new buildings, one for the sick and the other to protect valuable property in quarantine—essential services needed by the leading port in America whose economy depended on unfettered trade. Provincial and British law both required proper protection and control of goods and merchandise. Yet, overzealous fumigation and other decontamination strategies frequently damaged the commercial value of imported goods, which provoked complaints from the town's shipping and mercantile classes.¹³ Quarantine procedures, while an important public health tool, needed to remain subordinate to the town's trading interests.

With the exception of mercantile oversight of the decontamination process, the quarantine establishment of the 1720s was a seemingly self-regulating system. Unfortunately, in 1729, several violations of quarantine laws—including the entry of pox-infected immigrants into Boston—captured public attention. Normally, Bostonians paid little attention to the quarantine station except when the Irish brought deadly pathogens to the mainland. Responding to public demand for action, William Dummer, acting governor, ordered Irish vessels held at Spectacle Island until the elder Sam Adams and his fellow selectmen said otherwise—a subtle rebuke to the island keeper who might have had a lapse in judgment when letting the Irish enter Boston. To ensure no slipups, new procedures were established with the master of the lighthouse directed to notify vessels of this order and the selectmen or the justice of the peace directed to make inspections of pox-infected vessels.¹⁴ This incident was the landmark case of how Bostonians singled out Irish immigrants as the cause of smallpox outbreaks, which in turn prompted the selectmen to revamp the inspection process.¹⁵

Sequestration as a New Public Health Tool

Despite the devastating impacts of the 1721 epidemic, the General Court never regulated inoculation—even though a law was passed and submitted for the concurrence of the governor.¹⁶ In fairness to the General Court, the fear of catching smallpox forced it to adjourn on five separate occasions during 1721 and 1722 with sessions held in George's Tavern on Boston Neck and various locations in Cambridge. These chaotic movements of the Court may have contributed to the loss of these legislative records. As a result of the helter-skelter condition of the General Court, preventive medicine remained

in a state of suspended animation until 1729, when it was left to the purview of the town's selectmen. Seven years earlier an effort had been made to regulate inoculation, but the governor and council turned it down. Because inoculation was inherently risky, Adams might never have supported its use without the reappearance of the pox. Like previous decisions, another epidemic was the most immediate cause for reviving the practice.¹⁷ Despite any explicit laws governing inoculation, by 1729 physicians recognized the need to avoid the inadvertent spread of disease. Yet, physician self-regulation of the inoculation process was out of the question in a community that wished to restrict the maverick actions of men like Boylston. Most Bostonians could still remember Boylston's previous unregulated use of inoculation and believed it spread disease. Citizens demanded the selectmen intervene as many were already taking inoculation without appropriate precautions.

In a blow to the independence of physicians, on March 9, 1729, the free-holders and other inhabitants of Boston voted for municipal controls over inoculation, the first of its kind in the world.¹⁸ As a Boston caucus member, Adams relied on the medical counsel of Elisha Cooke even before he heard the will of the people expressed at town meetings. Like many political decisions of the 1720s, the outcome of the town meeting may have been orchestrated by Cooke and Adams well before it was brought to a popular vote. The caucus left little to chance even when it roused the emotional sentiments of the citizenry in an apparent upwelling of public consensus.¹⁹

The tide had turned and physicians were forced to comply with the new sequestration law even though many had previously dismissed its value.²⁰ This time it was different. Sequestration would not be a tool for forced exclusion, as typically happened in the case of island quarantine. Instead, because it was a voluntary practice, it complemented and made inoculation respectable. There was money to be made by offering inoculation services and the town's physicians accepted these government restrictions as the price of gaining public trust. By 1730, Bostonians had made a remarkable turnaround in their acceptance of inoculation and the importance of the physician for the successful grafting of the pox virus under the skin. Although physicians did not explicitly discuss their financial interest in promoting inoculation, it is clear from their role they were compensated for their services. Both Boylston and his former antagonist, Douglass, promoted voluntary inoculation through newspaper editorials published in February and March 1730.²¹ As a result of their efforts and those of other physicians, four hundred Bostonians were inoculated in 1729 and 1730.²²

The sequestration rules for those seeking inoculation were relatively simple. Anyone wishing inoculation had to remain in their homes and give notice to the neighborhood of their proposed action. No one could step outdoors until their incisions were cleaned and had healed.²³ The townspeople also ordered physicians to provide a weekly tally of persons they inoculated.

This is the first recorded instance in which colonial physicians were held responsible for reporting their inoculation activities. The stakes were high for those who deliberately violated this legislation, yet the historical irony is that it would be another ninety-nine years before the Commonwealth of Massachusetts extended the physician's duty to report to cover natural cases of smallpox. This evolution of disease reporting might seem illogical, but not from the selectmen's perspective. They believed the conscious decision to infect another human being with one of the most lethal viruses known was a more significant public reporting responsibility than documenting the existence of a natural case. Whether the physician acted as a benefactor or a criminal was of great concern to everyone and was determined by their compliance with sequestration, or what might also be called the medical use of quarantine.

In contrast to home quarantine, physician-sponsored sequestrations were a novel event in Boston. Previously, watchmen were hired to single-handedly restrain pox-infected persons in their homes and accommodate their needs for food and fuel. This practice, of course, continued, but for the first time in American history, physicians were charged with undertaking inoculation procedures and completing evaluations and reports to ensure sequestration restrictions were properly managed. Previously, quarantine had always been handled as a law enforcement function with oversight by the selectmen.²⁴ Using sequestration as a benign tool to facilitate a treatment, in this case the application of safe inoculation procedures, changed public perceptions of physicians. Under controlled conditions, inoculation could save more than nine out of ten persons, and yet sequestration did nothing for the patient's ability to move about the town.²⁵ It merely guaranteed that fewer neighbors would inadvertently be exposed to smallpox from the infected person convalescing at home. Adams knew public acceptance of inoculation was greatest in the face of an imminent epidemic, and under these circumstances he believed sequestration would be acceptable. While it was well received, there was an underlying distrust in its routine use. The risk of taking inoculation might be acceptable during an epidemic, it was far from a trivial risk during other times as there was a 10 percent chance one might die or have a serious case of the pox. If Bostonians could avoid inoculation by strengthening maritime quarantine and warding off laws, epidemics might be less common. For the average Bostonian, maritime quarantine was preferable to a mass inoculation. Ben Franklin's firefighting advice would have resonated well with Bostonians: "An ounce of prevention is worth a pound of cure."²⁶

Within eight years of Boylston's controversial experiment, the selectmen had convinced themselves of the benefits of inoculation. Because the procedure required care and some expertise, most citizens stayed away from self-inoculation—even though that illegal practice was extant in Boston—preferring to take it under the auspices of a physician. The trust

placed in physicians, in turn, meant more was expected of them. Indeed, it signaled that physicians would also be held responsible for the proper enforcement of sequestration as a special form of home quarantine.²⁷ Surprisingly, medical historians have generally overlooked the crucial role played by Boston's Selectmen in legitimizing the services of colonial doctors and inoculation as a public health measure. The March 9, 1729, town meeting was the first time in American medical history where physician's status was elevated to be sanctioned responders to epidemics. Sadly, because medical historians have glossed over the nuances of colonial quarantine practices, it has taken nearly three hundred years to set the record straight.²⁸

Red Flag Legislation

Despite the successful use of inoculation, the smallpox epidemic of 1729 left a multitude of widows with 3,600 cases of smallpox and 500 deaths in a population of less than 13,000.²⁹ Many of these widows and their surviving children became the town's wards supported through the charitable works of the Overseers of the Poor unable to survive on their own without public welfare.³⁰ As a Puritan community, residents felt obligated to care for their own. But brotherly love stopped at the town line. These nagging social problems, coupled with the flight of many of its wealthier citizens to the countryside, were a significant blow to the economy.³¹ Like previous epidemics, it also had a substantial impact on trade, resulting in an 11 percent decline in the number of ships entering Boston Harbor in 1730 compared with the previous year. The loss of shipping was even greater in the coasting trade between the United Colonies and Canada—a 78 percent decline undoubtedly reflecting the speed with which rumors of pestilence looped back to the home ports of affected commanders who curtailed travel. Most affected were those trading with nearby ports in sister colonies where rumors traveled quickest.³²

In the 1730s, the Puritan lifestyle continued to lose its grip on the town while the merchant class became ascendant. Trade and public health policies remained in tension throughout this period as merchants expanded their trading to virtually all the major continents of the world. Trade continued to bring an influx of immigrants, slaves from Africa, and sailors from over eighty different international ports, raising the chances a deadly pathogen might strike again.³³ Diseases also spread across town lines, becoming a vexing eighteenth-century public health issue aggravated by the General Court's order requiring the sick to disclose their health condition to public officials, a demand that even today might be looked at with bemusement. Their landmark legislation, called "An Act to Prevent Persons Concealing the Smallpox," took effect on February 2, 1732, and required the head of

each family to immediately notify the selectmen of the presence of smallpox. There was nothing subtle about the notification procedure. A red cloth at least one yard long and a half yard wide was hung on a six-foot pole in the most public part of the house. The flag was to stay raised until the selectmen judged the house thoroughly aired and cleansed.³⁴ If the head of the family failed to comply, the courts could impose a penalty of fifty pounds, the equivalent to losing one's income for an entire year. Paradoxically, the law did not apply when more than twenty families contracted smallpox. In those instances, an epidemic condition was in effect, and public disclosure was declared superfluous. Presumably, public interest switched from disclosure to survival.

As one might expect, this law did not achieve a high level of compliance. Undoubtedly, numerous cases of smallpox went unreported prior to this legislation, but the mere act of making the pox a reportable disease did little to change human behavior. Even with stiff financial penalties, family members were hesitant to report, since it might result in removal of the infected person to the island pest house.³⁵ Perhaps worse, the law required heads of family to visibly publicize their predicament and brand themselves as victims of a loathsome disease. A red flag not only stigmatized the affected family; it undoubtedly caused financial hardships that extended well beyond the costs of disinfecting their home and belongings, including loss of income from public hesitancy to buy farm produce or goods from a pox-infected neighbor when other options were available.³⁶ This "red flag legislation" lasted for ten years but was routinely reactivated so that its psychological impacts would be felt for the rest of the eighteenth and nineteenth centuries until red flags were abandoned in the smallpox epidemic of 1872.³⁷

Xenophobic Public Health Policies

Smallpox was not the only public concern facing Bostonians in the 1730s. Although its merchants were conducting a thriving business with the Caribbean, the British Parliament believed such commerce should benefit Great Britain. By imposing a tax on imported molasses (i.e., molasses originating from non-British ports), the British customs staff felt commerce would shift to the English Islands where a 4.5 percent import duty could be collected. At the urging of planters in the British West Indies, in May 1733, parliament passed the Molasses Act imposing a prohibitive duty on molasses imported from foreign islands in the West Indies.³⁸ While the British customs service was ill equipped to administer and enforce this law, it still created a great deal of havoc in the commercial world. Over half of the molasses used in New England came from foreign islands, and without this ingredient Bostonians couldn't make rum. Rum, in turn, was central to merchant trade with

Africa, where it was traded for slaves who were, in turn, sold to sugarcane plantations in the West Indies.³⁹

Simultaneously, Boston fishermen were complaining about the loss of their cod fishing to the French, who could undersell them in the European marketplace using better curing methods. By 1735, domestic and overseas trade dropped by 15 percent over 1730 levels, creating Boston's worst fiscal crisis of the eighteenth century. Faced with major losses of revenue from molasses and cod fishing, in 1735, the costs of underwriting the town's almshouse seemed formidable—especially when its cost more than doubled in just five years.⁴⁰ The town's almshouse, while not a quarantine station, had analogous functions, since it isolated the poor, including the sickly poor, from the fabric of the community. To better identify and remove the poor to the almshouse, the town was divided into twelve wards, with one overseer of the poor assigned to each ward. Overseers had broad powers to care for their wards and were even authorized to address the related problems of transients, health, and crime.⁴¹ Working with the town's constables, they could "warn out" strangers, beggars, and the infirm to their place of origin. Expulsion of strangers, especially the sick, accomplished all the objectives of the town's quarantine program without its expense. Thousands of transients were warned out, including many whose health, poverty, and contagion would have imposed burdensome liabilities.⁴² In this sense the almshouse and quarantine station were complementary but more benign elements of colonial warding off policies.

Despite their "tough love," the overseers routinely accepted 125–250 persons a year who qualified for support, many of whom were none other than the orphans or victims of the last smallpox epidemic.⁴³ The financial, social, and political impacts of caring for sickly immigrants, orphans, and widowers in pre-Revolutionary War Boston has received scant attention by most scholars of the American Revolution.⁴⁴ Nor have historians properly analyzed the effect of this "disease-driven" poverty on the discontent and anger seething in the souls of the parents who sired the sons of liberty some thirty years later.⁴⁵ For years, Bostonians shouldered enormous social welfare burdens with no help from the King or his Privy Council. These community burdens reduced public toleration for ill-conceived British taxes and fomented public discontent.⁴⁶ It was bad enough dealing with the unceasing flow of destitute immigrants seeking refuge in town. The Molasses tax simply added oxygen to the fire of public resentment with British trade and immigration policies.

Boston's great depression of the 1730s did not spare any class. For many years, its merchants were important contributors to the almshouse, serving as Overseers of the Poor in keeping with their religious commitment to tithing and the care of the needy. Yet, their largess had its limits. They could not afford the cost of caring for the poor Irish who came in droves during the 1730s. Their arrival led to a new round of xenophobic strategies, including new

residency restrictions, registration of aliens, increased oversight of the poor, and more organized investments in public health and quarantine services.⁴⁷

Fear of Throat Distemper Leads to New Hospital

The fall of 1735 brought even more bad news: Bostonians learned the throat distemper was prevalent in southern New Hampshire, a mere fifty miles away. This epidemic killed over six hundred people in New Hampshire in less than six months.⁴⁸ Physicians, including William Douglass and John Clark, recognized the importance of collecting reliable epidemiological data on the causes and symptoms of this fatal disease. In response, Douglass founded the Boston Medical Society, giving physicians the opportunity to work collaboratively to improve the diagnoses and treatment of this rapidly spreading disease that would eventually creep into Boston. Physicians, including John Clark, recognized the importance of developing reliable data on the causes and symptoms of this fatal disease, and were equally committed to understanding how to treat it before it reached Boston.⁴⁹ The epidemic struck Boston in August 1735, killing 140 people in less than eight months before it was declared under control in May 1736. An estimated one-fourth of all Bostonians came down with the disease. However, Ernest Caulfield, a modern medical historian, has suggested the New Hampshire epidemic was diphtheria, while that found in Boston was scarlet fever due to the differing fatality rates between the two epidemics.⁵⁰

Regardless of modern reinterpretations of the throat distemper epidemic, Boston's Selectmen believed it to be a contagious disease and asserted the need for quarantine. Spectacle Island hospital appeared to meet the town's needs should the epidemic reach Boston. The only catch was there was no known remedy for throat distemper. Undoubtedly, this fact came to the attention of Mr. Richard Bill, the co-owner of Spectacle Island, a man with a long interest in the continued use of the island as a hospital. Surprisingly, based on his past willingness to let the world's infected live next to him, his response was "Enough is enough." He claimed Spectacle Island was no longer an appropriate location for a hospital.⁵¹

Taking a push from Mr. Bill and mindful of expanded immigration to Boston, the selectmen limited the entry of aliens and developed a proposal for alternative hospital quarters to distance infected persons as far away from town as possible—a location not suitable for the convenience of the sick. During these deliberations, home quarantine was the only option available for those suffering from throat distemper. In January 1736, the selectmen declared Spectacle Island was no longer a convenient location. The 15,400 people who lived in Boston in 1736 faced a new challenge if they got sick.⁵² The town's new strategy would banish those with communicable disease to

an even more distant harbor island—not an immediate concern as long as Bill refused the use of his island, no other islands were available, and the selectmen allowed home quarantine as a stopgap measure.

Lacking an immediate threat from the throat distemper, plague, or smallpox, the committee took ten months before it recommended the purchase of Rainsford Island. On December 2, 1736, the General Court approved the purchase of the preferred eleven-acre island for 570 pounds.⁵³ Another year would pass before Boston was authorized to form yet another committee to care for the sick and oversee the new quarantine hospital. With help from hardworking Bostonians, the committee completed work on the new hospital on October 18, 1737, and hired its first island keeper to manage the quarantine station.⁵⁴

The island was seven and a quarter miles from Boston and some five miles over the ice from the nearest shore—making it an arduous three-hour trip battling against the tides.⁵⁵ Based on descriptions from the early nineteenth century, the northern elevation of the island was covered in grass, but the remainder of the island was barren. One nineteenth-century historian suggested Rainsford Island had been informally used as a quarantine site for many years before being officially established as such by the provincial government: “It is very evident that a large number of persons were buried there before the colony had any control over it, and this has led some to believe that the Indians themselves brought their dead from the neighboring islands to inter them on this particular spot.”⁵⁶ Rainsford Island might not be conveniently located, but this was perceived as an advantage by those who chose it.

The first patient arrived on Rainsford Island in November 1737 to find a fairly modest two-story facility with four rooms on each floor, garrets, cellars, a well, and furniture for the sick.⁵⁷ William Waters, the first island keeper, was a former boat captain with extensive experience sailing to Caribbean ports. He and his family resided in the northern wing of this facility, while the southern wing was used for dining and for a reading room and the second story for sleeping rooms. In keeping with the partnership between the provincial government and the town, Boston owned the furniture, but the land and building belonged to the province.⁵⁸ Other than acting as an absentee landlord, the provincial government had virtually no responsibilities other than to authorize funds for major improvements. Routine costs such as nursing, island maintenance, quarantine administration, boat service, and the salary of the island keeper were paid by the selectmen.⁵⁹

With divided legal responsibilities, Waters was given day-to-day authority to manage hospital and transportation affairs. He had complete control over island activities, and during his ten years of service (1737–1746), he cared for infected vessels as well as residents who contracted smallpox. While he had a great deal of autonomy, Waters needed the selectmen’s concurrence whenever quarantine

and decontamination procedures were used. Physicians were infrequently consulted—except in the case of smallpox or other contagious diseases—primarily because provincial law assigned the selectmen the responsibility to impose quarantine and prescribe disinfection procedures—decisions that did not take medical training for aliens held on offshore islands.⁶⁰

Despite his subordinate position, Waters exercised a great deal of independent quarantine authority but rarely saw the need to apply it. Undoubtedly, because he lived miles offshore, which for practical purposes was like living in a different country, he made many decisions without consultation with the selectmen. When infected vessels arrived, he was authorized to muster the boats, nurses, and medical supplies required to contain the outbreak. Under his contract, Waters bore all costs for quarantine administration without reimbursement from the selectmen. This job requirement implied the island keeper was a man of some resources, since his salary was only fifty pounds a year.⁶¹ His skill came in the collection of fees from masters of vessels and their passengers who were declared infected and therefore subject to quarantine. Waters' term of office marked a transition from an ad hoc, arms-length administration of quarantine by the first selectmen and the General Court to a well-managed pest house ministering to the needs of the sick. During his tenure, quarantine became a routine public health practice supported by dedicated staff and funded through the town budget and fees collected from passengers.

With Waters as island keeper, the town broke new ground with proactive campaigns for quarantining port cities that were known or believed infected with smallpox, but these duties did not include responding to the throat distemper on the mainland. In his ten years in office, Waters implemented ten quarantines against sister colonies, islands in the West Indies, and European ports.⁶² This dramatic expansion of the maritime quarantine program, previously limited to self-declared cases of “contagion,” revealed the degree to which smallpox was being disseminated along the eastern seaboard and the danger it posed to Boston. The quarantine of ports in other colonies reflected the town’s desperation to control the fiscal impacts of epidemics when it was hemorrhaging money spent on British taxes and welfare cases during a depressed economy.

Warning Out Smallpox Victims

Landside quarantines became popular in the year following England’s declaration of war against Spain in 1739, a war some felt was designed to expand the realm of British trade.⁶³ Travel between towns in the colony was increasing as a result of trade and migration, and nearby colonial ports could be reached by overland routes often as easily as by merchant vessel. As more and more people traveled to Boston by land, the need for “sanitary

cordons”—often referred to as “cordon sanitaire”—using fences, barriers, or watchmen to expel the sick became evident. On June 15, 1739, the General Court made it unlawful for a smallpox-infected person to enter a Massachusetts town, forcing infected persons to leave town within two hours of arrival, or if unaware of this law, from the time they were first informed of their duty to notify the selectmen or town clerk.⁶⁴ This quasi-immigration control was unique to Massachusetts, becoming the first legislation in America to restrict the intertown movement of smallpox victims. It was nothing less than the scarlet letter of reverse quarantine—saving lives by preventing entry of the sick rather than through their confinement. Because of its blatant disregard of caring for the sick, Pennsylvania never promulgated any comparable legislation and New York took more than fifty-five years to impose much less restrictive standards that merely required persons coming from out-of-state infected places to be inspected, and if infected, sent out of state.⁶⁵

The lack of community support for smallpox victims coming from other communities was not conceived in Massachusetts: “warning out” undesirable persons dates back to 1359–1375, when English municipalities began to restrict the movements of vagabonds.⁶⁶ By the end of the fifteenth century, London constables were ordered to “warn out” vagabonds and beggars, and eventually extended this social policy to the poorest classes as well.⁶⁷ Yet, despite its pedigree, this reverse quarantine legislation had a uniquely American flavor, an interbreeding of British poor laws with the colonial exigencies of thwarting rapidly spreading epidemics. For example, the Court took a parochial view when it declared it to be unfair to burden a community with the medical needs of strangers and vagabonds. In their opinion, such costs should be assumed by the community from where that person had come. The sick and infected were ostracized from the services offered outside their own community, since each community was expected to care for its own. Rather than promoting the benefits of a cooperative society, the Court was driven by a “drawbridge” mentality to stop the migration of smallpox-infected Bostonians into the country. Undoubtedly, it was the fear of a mass exodus of Bostonians into the countryside during one of its periodic smallpox epidemics that drove rural legislators to establish this draconian quarantine law. In 1743, the provincial government adopted additional quarantine regulations for Rainsford Island hospital and continued previous requirements to display a red flag on the house for those with smallpox. The flags could be removed only after a thorough cleansing of the infected house. In 1763/1764, the selectmen were authorized to appoint guards to prevent persons entering or leaving a smallpox-infected house.⁶⁸ It is noteworthy that Boston Selectmen never prohibited its citizens from fleeing to the country as a means to escape urban outbreaks of smallpox.

The legislature eventually concluded laws relying on individuals to disclose disease were ineffective at best and a catalyst for disease transmission at worst.

Police powers were needed to control the movements of those infected or exposed to smallpox. Moreover, police powers were easiest to administer when the venue for quarantine had limited points of entry and exit. Fiscal considerations inevitably drove legislators to stick with island isolation. The island pest house continued to appeal to legislators seeking a noncontroversial solution to maritime and intermunicipal spread of communicable disease.

The Trials of the Island Keeper

Waters' success as a quarantine administrator soon proved to be his own undoing. More importantly, his attention to administrative detail raised public expectations concerning his responsibilities on the island, and his reward was a heavier workload. Waters' fortunes changed on June 8, 1739, when the selectmen learned smallpox broke out in Newport, Rhode Island. To ready themselves for its potential arrival, they urged Governor Jonathan Belcher to stop entry of vessels so they could be examined. Three days later a vessel arrived from Rhode Island with smallpox on board, and Waters placed it in quarantine off Rainsford Island.⁶⁹

Within a month of the quarantine order against Newport, Waters faced another public health crisis that made him reassess his occupational interests. On July 10, 1739, John Robinson, master of the schooner *Mermaid*, arrived in Boston Harbor with eleven white passengers and fifty slaves. Master Robinson hailed from the coast of Guinea, and before his arrival he had lost three passengers to smallpox. The survivors soon succumbed to measles and the flux, a dysentery-related disease. Fifteen slaves died from the flux during its passage on the Gambo River, and more died on the long journey over the Atlantic Ocean, including two within sight of Cape Cod. Upon arrival many slaves were still sickened with the flux, although none had the measles.⁷⁰ Their predicament would challenge Waters' patience to involve the selectmen in his routine responsibilities, including reassessing his duties.

The selectmen insisted a doctor inspect the vessel and investigate the whole affair. Doctors Davis and Isaac Rand visited the schooner and reported twelve slaves sick of the fever and flux. "A very dangerous stench was on board," prompting Rand to send the schooner down to Rainsford Island for disinfection.⁷¹ The selectmen also ordered the fifty slaves kept in quarantine, but this task and its financial burdens fell on the shoulders of Waters supported by a handful of nurses and boatmen. It was one of the most prominent examples of a growing number of incidents that overburdened the island keeper and revealed the flaws of contracting out quarantine services on a shoestring budget.

Lacking the skills and resources to contain all pox cases, inevitably Waters let many infected persons, especially those from nearby colonies, enter Boston. To care for needy cases, particularly women and young children, the

selectmen agreed to establish a smallpox hospital in the westerly part of town, an unusual decision in light of past practices. On December 14, 1739, through a “sweetheart” contract with an African woman named Betty Wou’dbe, living in a house owned by Benjamin Clough, the town arranged for smallpox patients to recuperate in her home.⁷² One can only wonder whether the fifteen shillings a week that Betty was paid was enough to suffer the injustices of becoming the colony’s first quarantine hostess or whether she already had a natural immunity to the pox and took her new role on with an eye for profit. Apparently, Betty did an excellent job of nursing those who stayed in her home as the selectmen decided to maintain her home as the town’s smallpox hospital under an annual contract beginning August 8, 1740.⁷³

Even with Betty Wou’dbe handling pox cases in Boston proper, work at the quarantine station eventually proved too much for Waters. On June 24, 1741, he appeared before the selectmen and declared he would not continue working at a salary of fifty pounds a year. Quarantine services were not free, and everyone was expected to pay for their own hospital care. When patients and shipmasters paid their bills and cooperated with the island keeper’s rules, things went well. However, when large-scale outbreaks emerged, collecting hospital bills from passengers proved more difficult for reasons we can only imagine. He never complained about the slave ship incident at the town meeting nor the challenges of providing extended care for over sixty passengers and crew. Yet, events like this one undoubtedly influenced his decision to resign. Waters requested the selectmen to double his salary. Surprised by his demands, they declined his proposal and decided to advertise for another “suitable person.”⁷⁴

As fate would have it, the selectmen could not find anyone else willing to take on his dirty work. The qualifications for the job were formidable for the average Bostonian. If a newspaper advertisement had been written, it would have said, “Wanted: An island keeper to live permanently on Rainsford Island, seven miles from Boston. The successful candidate must be willing to cover all expenses for food, clothing, shelter, medical supplies and boat service for any and all infected persons sent to the pest house. Candidates should own their own boat and be immune to all communicable disease. Salary is 50 pounds a year which must cover all quarantine costs.” With demands of this kind, only fools would be jobseekers.

Caught in a plague pickle, the town could not wait hoping another candidate would be found. About two months after Waters’ resignation, the selectmen learned of a yellow fever outbreak in Philadelphia. After consulting the town’s physicians, they decided the governor should institute quarantine against Philadelphia. How such a quarantine would be implemented without an island keeper was never stated. The stakes in the gamble with public health were rising, and the selectmen were in no position to negotiate the

island keeper's job qualifications in face of another epidemic. Fortunately for the town, two weeks later, Waters agreed to return to work at his old salary with the proviso that he be reimbursed twenty-five shillings per week for each person sick or well who he brought to shore. This new salary, part fixed and part based on a commission, was enough to induce Waters to accept his former job.⁷⁵

A commission-based salary proved far more lucrative than the selectmen anticipated. Waters was fortunate either that there had been an upswing in business or that he found creative ways to confine more immigrants on Rainsford Island. Whatever the case may have been, the following year, Waters' salary was reduced to twelve pounds per annum and his commissions to six shillings and three pence per week to be collected from each person staying on the island.⁷⁶ The laws of supply and demand were working, although Waters was a master at making a living under whatever contract he might sign.

Smallpox epidemics may have had their victims, but at least they proved profitable for the town's greatest risk taker, the island keeper. Without his services and immunity to smallpox, the town could not have operated its maritime quarantine program. Though Waters spent time in the tropics before he became the town's island keeper, it is doubtful he was immune to yellow fever. Fortunately for Waters, yellow fever was rarely seen in eighteenth-century Boston.⁷⁷

He cared for hundreds of sick sailors, passengers, and slaves and knew the limitations of relying on masters to self-declare their vessels free of infection even though he had no mandate to interfere with maritime commerce.⁷⁸ Yet, despite these constraints, his powers to quarantine passengers and commercial goods were extensive. He was the sole judge of when a patient was free of disease and how much cleaning was necessary to make a vessel or its contents free of germs.⁷⁹ It was the most dangerous work performed in the colony, and yet his services were little appreciated and barely noted in the town's annual listing of public officers.⁸⁰

The relatively extensive literature on colonial physicians and their contributions to medicine and public health makes no mention of Waters' critical role or that of subsequent island keepers in controlling contagious disease outbreaks.⁸¹ Waters was the public health gatekeeper to colonial Boston, and his contract made him the field general for epidemic intelligence services in the busiest port in the American colonies. He is credited with improving and expanding hospital accommodations, establishing equitable rates of pay for the island keeper, and creating standard decontaminating procedures for vessels. He was never recognized for his public health contributions or for raising awareness of the special needs of the exposed, even though his ideas would eventually become the foundation of modern quarantine practice in America. He was woefully underpaid for his services and operated with little

support from the medical community on the mainland. His underappreciated role contributed to his low social status, a problem compounded by the stigma of quarantine work, his lack of formal education, and the remoteness of his work from the community that he served.

Hospital Isolation for the Exposed

Relying on a former sailor and the word of commanders to manage quarantine inevitably meant the selectmen might be forced to deal with problematic cases confined at the Rainsford Island hospital. For example, what if a person was only suspected of smallpox? Should they be quarantined in the same hospital as well? The selectmen realized disease might be inadvertently spread by forcing those under suspicion of infection to share the same hospital with smallpox victims. Soon enough they established separate isolation facilities for those suspected of having smallpox, a practice modeled on hospitals in the motherland.⁸²

Yet, the town was cash strapped. In the spring of 1745, the Massachusetts Bay Colony was preparing to go to war with France, and virtually, all of its resources were allocated toward that end. The General Court had little enthusiasm for island hospital improvements, and for this reason it restricted the house to twenty feet long, eighteen feet wide, and using fourteen-foot studs “as cheap as may be.”⁸³ The tide of public opinion on quarantine had begun to shift the moment the General Court funded the new island hospital building. Their legislative actions acknowledged the need to isolate patients according to their potential infectivity or susceptibility to disease, which was expected to improve survival.

Coincidentally, as the distinction between exposed and infected became more apparent, the selectmen placed more importance on improved boat service. Those forced to live at the quarantine hospital relied on the island keeper for transportation. With a limited number of smallpox cases, boat service was slow but generally reliable. Not so in the case of epidemics infecting large numbers of persons. During the first forty years of its operation, the quarantine hospital used rented boats to bring patients to the harbor islands.⁸⁴ This was not only expensive it was also inconvenient. Patients were brought to the town wharf on a special palanquin ambulance where they were met by the island keeper who then took them to Rainsford Island—a voyage that probably felt interminable to the smallpox patient, especially in the cold winter months. Early eighteenth-century rowboats had no amenities, no roof, no plumbing, and no respite from the cold. Ocean waves could reach three or four feet in height, and the breeze could blast patients with a relentless stinging spray of salt water that burned the skin of patients with smallpox, irritating their pustules and aggravating their pain. Numerous patients died while making the treacherous harbor crossing.⁸⁵



Rainsford Island Hospital. Photo taken circa 1865. (Courtesy of Harvard Count-way Library)

After Waters retired in 1746, he was replaced by Thomas Murfey, who held this post until 1748. Neither of these island keepers attempted to change the basic principles of island quarantine, although Waters made important strides in making life on the island more comfortable. In contrast, the town's third island keeper, James Hamilton (1748–1757), was a bold advocate for improved hospital care and island transportation. Based on his appeals and with the support of the selectmen, in April 1749, he asked Governor William Shirley to approve an expanded wharf and purchase a boat suitable for carrying those sickened with smallpox.⁸⁶ Though Shirley denied his request for a dedicated boat, he did approve a "wharfe of twenty feet square and fourteen feet high" on Rainsford Island to better handle the needs of larger numbers of patients.⁸⁷ Persistent as he was, the following year, Hamilton repetitioned the General Court, and his wish was granted on April 7, 1750, with forty-five pounds authorized to purchase a new boat.⁸⁸

These improvements made life a little easier for the sickly seafarer yet did nothing to assure cooperation with quarantine laws. The minutes of the meetings of the Boston Selectmen from the 1740s are replete with examples of masters who ignored these laws. In some cases, masters failed to acknowledge they came from an infected port. In other instances, the military on Castle Island failed to stop and inspect vessels before letting them dock in Boston. Despite flaws in the quarantine system, the General Court was rarely

concerned with the threats posed by exogenous disease. There had only been thirty-three reported incidents of actual or suspected disease on board vessels from 1725 to 1750.⁸⁹ Boston was a remote colonial outpost of the British Empire and suffered from the illusion that diseases of European, Asian, or tropical origin were unlikely to strike, and if they did, quarantine controls would be sufficient to intercede. Because published statistics were not maintained, it is unlikely Bostonians ever learned that over 40 percent of smallpox cases came from nearby sister ports of Philadelphia, Martha's Vineyard, and New York.⁹⁰ Another third came from England and Ireland, and the balance from the Caribbean and various French and Spanish ports. Over ten years of research for this book allowed all the pieces of this ancient puzzle to be put back together.

In contrast to the arms-length approach taken by the General Court, Boston's Selectmen were keenly aware of the flaws of the quarantine system. In their view, it was their duty, not the justices of the peace, to manage public health issues. In response to their demands, in 1744, the General Court made substantial changes to provincial quarantine regulations, authorizing the selectmen to declare whether a ship was free of infection. Previously, this was a role given to the justices of the peace—even if the routine day-to-day responsibilities of managing infected vessels fell on the shoulders of the island keeper. In addition, the new law reaffirmed a long-held policy that required masters, seaman, or passengers to confess if they came from an infected port or pay a fine of fifty pounds or spend six months in jail. Additional revisions issued in 1750 authorized a simple majority vote of the selectmen before a vessel could pull into the town dock.⁹¹ These legislative changes caught up with the reality that the selectmen were the best judges of what quarantine procedures should be applied, shifting quarantine administration from a legislative to an administrative function of government.

Placing maritime quarantine with Boston's Selectmen changed public perceptions of how such strategies should be applied even though they had previously played critical roles in the routine management of epidemics. Two factors altered its use in pre-Revolutionary War Boston: trust in the administration of the Boston quarantine establishment and the need to locally manage the workload. Bostonians begrudgingly trusted their selectmen more than the provincial legislators. This reflected their accountability to the citizens who were perfectly capable of voting them out of office if quarantine affairs were mismanaged. Quarantine was also affected by the resources available to respond to an epidemic. With more frequent outbreaks flowing from increased travel and trade, Bostonians were best positioned to care for patients and tend to island affairs. The governor was too far removed to handle this growingly burdensome workload.

Large-Scale Sequestration

Despite the selectmen's endorsement of inoculation as an antidote to smallpox, it was only when word spread of another epidemic that the public would accept the purposeful insertion of the virus into their body. Why would anyone risk their life by taking inoculation if they felt self-quarantine was a sure and certain preventive measure for those unexposed to smallpox? Voluntary self-quarantine was certainly practiced by Bostonians to one degree or another but without any formal guidance from legislators or even the town's selectmen. Public trust in quarantine or self-quarantine as stand-alone solutions were judged, in part, by the attitude toward competing disease control strategies, including self-inoculation (an illegal activity that attracted some do-it-yourself types), physician-monitored inoculation under town-authorized sequestration, flight to the countryside far removed from those gripped by the infection, and making the decision to stay home with limited forays to carry on ones work or to purchase or barter for essential goods in the marketplace. Perhaps, more importantly, many physicians had reservations about the inoculation practice because it was not fully controllable, sometimes resulting in severe or unintended consequences such as confluent or hemorrhagic smallpox—an almost certain prelude to death.¹ Inoculation, while recognized as a preventive measure, and even supported at a Boston Town Meeting in 1729, had not been widely accepted until the smallpox outbreak of 1764. Whether it was the alignment of the stars or greater public confidence in the inoculation process, the 1764 inoculation strategy would revolutionize the principles of quarantine and become the model for one of the greatest public-private partnerships in the battle against epidemic disease.

Inoculation Hospitals

The opportunity to debate the value of quarantine occurred in the winter of 1764, when inoculation hospitals captured the public imagination. On January 19, 1764, the *Boston News-Letter*, the town's primary newspaper, notified the public that fourteen houses on Fish Street in Boston were infected with smallpox. In keeping with past procedures, William Cooper, the town clerk declared flags be installed on infected houses and "guards placed to prevent the further spread of infection."²

Cooper made similar efforts to calm worried readers of the *Boston News-Letter*, declaring, "Care is taken that those houses in which persons have died, or recovered or from which they have been removed, should be so smoked and cleansed as to prevent any infection being received there from."³ Over the next three weeks, the *Boston News-Letter* published the name and address of each person suffering from smallpox. With the exception of one smallpox-infected person on board a vessel sent to Rainsford Island, Bostonians were quarantined at home.⁴ This strategy was consistent with the General Court's ruling that home quarantine should be implemented whenever epidemic conditions existed. However, a case could have been made that smallpox should have been treated on Rainsford Island in accordance with provincial law. Unfortunately, the hospital on Rainsford Island was too small and too distant to handle a mass inoculation of the entire population. Other accommodations would be needed closer to the mainland yet remote enough from town to satisfy public sensibilities.

Because of the risks of bystander exposure posed by inoculation, and in deference to public sentiment, remote locations were selected for two temporary hospitals. This placement decision posed a stiff challenge for the twenty-one physicians charged with inoculating the 15,500 residents of Boston. On February 24, 1764, one inoculation hospital was established at Point Shirley (now part of the town of Winthrop), which could be reached by boat traveling about 4.5 miles over the choppy waters of Boston Harbor. The second was located in the barracks on Castle Island about a 2.5-mile rowboat ride from Boston's Long Wharf. Both hospitals were quickly fabricated from the cloth of existing structures to meet an immediate short-term need for sequestration. Despite their distance from Boston, and their relatively plain accommodations, they attracted large numbers. While no one factor was responsible for its widespread acceptance, it is clear that the General Court's support for the inoculation program, coupled with the selectmen's reliance on public consensus making to determine the scope of the program, made a huge difference. A third factor contributing to its unprecedented success was the united support of the medical profession in Boston. These three success factors had not existed during previous smallpox epidemics—nor were they found in any other colony.⁵

People throughout Massachusetts Bay had an interest in taking inoculation, causing a demand far greater than anyone had first imagined. In view of the demand, the townspeople allowed physicians from Boston and adjoining towns to provide inoculation services to meet this public health crisis.⁶ Point Shirley was outfitted with “many decent houses” capable of accommodating five hundred people at one time. To control the process, on March 8, the *Boston News-Letter* published the town’s quarantine regulations. The new regulations prohibited visitors to the Point Shirley hospital unless absolutely necessary.⁷ The hospital did not handle smallpox cases induced the natural way, only those undergoing inoculation. This death-defying urge for inoculation forced the selectmen to make a tough decision. Should they open the gates to residents of neighboring towns? The decision, debated over two meetings, welcomed strangers to the inoculation hospitals, provided such services were used before April 20.⁸

This open invitation drew out of town traders, farmers, and professionals who routinely conducted business in Boston. Seekers came from as far away as Portsmouth, New Hampshire, to avail themselves of this normally taboo service.⁹ The fact that stagecoach service took twenty-seven hours to reach Boston from Portsmouth was not a disincentive to those fearing for their lives.¹⁰

Included in this assembly was John Adams, a resident of Braintree and a man who would eventually become the nation’s second president. He left his own account of the horrors of inoculation in correspondence with his bride-to-be, Abigail Smith. “Don’t conclude from anything I have written that I think inoculation a light matter. A long and total abstinence from everything in nature that has any taste, two heavy vomits, one heavy cathartick, four and twenty mercurial and antimonial pills, and three weeks close confinement to an house, are according to my estimation of things, no small matters.”¹¹ Despite his protestations against inoculation procedures, he recognized its value. He wasn’t the only one to benefit from its life-preserving qualities. By April 26, the editors of the *Boston News-Letter* announced not a single person had died from the inoculation procedures implemented at Point Shirley.¹² Yet, comparable statistics on the deaths from smallpox were slow in coming. Bostonians were left to their own devices to gauge the death rate because newspapers only reported a limited number of cases during the earliest stage of the epidemic before their free-flowing ink jars seemed to go dry. The pox mercilessly struck children, representing nearly three out of every four cases in the first two months of the epidemic. Hundreds died, but this panic-inducing fact remained outside of public view as newspapers focused on the heroic work of the town’s physicians at the inoculation hospital.

After four months of satisfactory service, the selectmen decommissioned these hospitals on May 12 after Bostonians claimed these institutions might actually exacerbate the spread of the disease. Success from the public’s perspective was a “time limited risk,” and the sooner it ended the safer they felt.

Three days later the town acknowledged the outstanding service of its twenty-one physicians who supplied medicine and attended gratis to the needs of 526 of the 1,025 poor inhabitants seeking their aid.¹³ Reversing direction, because of continuing demand, the selectmen allowed a new hospital to open on Noddle's Island (now known as East Boston). However, permission for its use was withdrawn two weeks later after a considerable number of inhabitants strongly opposed a hospital on Noddle's Island.¹⁴ The primary concern was unintended disease transmission by practitioners who may not have adhered to the highest standards of sequestration. Boston's physicians were well aware that as many as 30 percent of infected persons died from this disease. However, even though physicians were aware of the risks, not everyone was aware inoculation without sequestration posed a risk of fatal exposure to susceptible bystanders. The epidemic could have been far worse without an inoculation program and if the medical community and selectmen had not offered inoculation at no charge for Boston's poor undergoing sequestration.¹⁵

This would be the first and last time before the Revolutionary War an inoculation hospital was opened and was accessible to the entire colony and other nearby colonies. Similar ventures undertaken in Virginia had opposite outcomes leading to violence, anti-inoculation riots, and the prohibition of the practice for many years.¹⁶ Boston's success is attributable to the selectmen's ongoing consultations with the townspeople concerning the timing, duration, and conditions for deploying inoculation hospitals. As such, its strong legacy of making important decisions through town meetings created a political legitimacy for sequestration. In contrast, unsanctioned inoculation strategies in Virginia failed miserably because the concerns of the average person found no outlet in public forums, and physicians were distrusted to balance the personal benefits of inoculation against the public risks of its transmission. In Virginia, physicians had been making public policy without a legislative hearing process. That was a recipe for disaster in Norfolk, Virginia, which effectively delayed public acceptance of inoculation until many years after Boston's successful experiment.¹⁷

By July 5, after the heat of the pox battle had subsided, the selectmen reported that 699 persons contracted smallpox the natural way, including 124 who died. Remarkably, 4,977 out of 15,500 inhabitants voluntarily took the inoculation—an unprecedented achievement. Only 46 persons or less than 1 percent of all those inoculated died from this procedure.¹⁸ The massive quarantine measures initiated on Castle Island and Point Shirley had confined over 20 percent of Boston's residents in island and remote peninsular locations for a three-week isolation period, a humanitarian achievement that could not have happened without a public-private sector partnership.¹⁹ Between Castle Island and Point Shirley, the governor created over 10,000 person-weeks of hospital accommodations—revealing that the amount of hospital capacity was enough to accommodate 10,000 people over the course of the epidemic—during a harsh Boston winter with remarkable support

from an intermunicipal partnership between the towns of Chelsea (i.e., Point Shirley was part of Chelsea in the eighteenth century) and Boston (Castle William). Over two-thirds of those inoculated used these remote hospital locations, with the balance served by physicians offering home sequestration in Boston proper.²⁰ Virtually, the entire medical community of greater Boston rose to the occasion to provide the inoculation services needed during these desperate times. By choosing more convenient and hospitable locations for sequestration, the selectmen's efforts stand out as one of the finest responses to a public health emergency in the city's history.

Apparently, public concern with the inadvertent transmission of smallpox by those undergoing inoculation left an indelible impression on the members of the General Court. To erase any questions concerning public policy, on June 15, 1764, the Court imposed a fine of one hundred pounds and removal to a pest house for noninhabitants inoculated in Boston without the selectmen's approval. It also held citizens personally responsible for similar financial penalties if they communicated smallpox to others. Inoculation in any house without the selectmen's approval was strictly prohibited. This legislative measure, coupled with a large immunized population seemed to have a salutary effect.²¹ This would prove to be the town's last major smallpox epidemic prior to the outbreak of the Revolutionary War.

By July 12, William Cooper declared smallpox no longer existed in Boston. Residents and outsiders were told they could "safely return and transact business" without fear of disease.²² Yet, there still was a lingering concern smallpox would have a long-term effect on the local economy if the public lacked confidence in the decontamination of affected houses and businesses. The news media emphasized life had returned to normal.

Controlling the Press

The apparent "calm after the storm" was not entirely a surprise to the town's chief elected officials. At the height of the inoculation deployment initiative, the selectmen requested Richard Draper, owner of the *Boston News-Letter*, to attend one of their meetings and promise to limit stories on the smallpox to only those they authorized. He was also instructed to inform other newspaper publishers this guidance applied to them as well.²³ This remarkable revelation helps explain why Boston was able to inoculate nearly five thousand persons without any civil disobedience or violence in the streets. Simply put, citizens were kept in the dark about the sordid aspects of the epidemic so selectmen could calm public jitters and quickly restore the town's commercial activities to normal. Like all epidemics, sensational newspaper coverage increased public fears, discouraged interstate trade, and commerce with the rural hinterlands. While the selectmen could not control the spread of rumors, they could minimize their impact on trade and commerce. Citizens may have believed they

were reading news from a free press but in reality the news accounts were skewed toward positive accounts of the inoculation program. For example, the *Boston News-Letter*, in an effort to calm the fears of readers requesting discontinuance of newspaper delivery, notified them that smallpox infection from newspapers would not be an issue.²⁴ When the epidemic subsided, the newspaper publishers said it was even safe to read the newspaper again, even though its publisher never declared the paper free of the virus. Perhaps, smartly, the publisher let the passage of time and the lack of cases speak for itself. Declaring a newspaper free of smallpox would have implied it was a source of disease in the first place—a thought no publisher would dare nurture in his readers.

Could you blame the selectmen for these efforts? The economic consequences of smallpox epidemics were generally catastrophic. Merchants such as John Hancock faced delays and upset trade relations with suppliers in England and the West Indies. Certain goods were subject to quarantine including clothing, some foodstuffs, and all letters coming from infected ports. Once rumors spread of smallpox cases in town, country farmers, piggeries, cattlemen, and woodsmen avoided Boston. The mere presence of the pox was enough for country folk to forestall paying off their debts to town merchants. Moreover, many of the richer families bolted for their country farms, effectively closing their shops until it was clear the epidemic was over. Caught between the adverse consequences of maritime quarantines and the restricted access to country trade, Hancock's business suffered terribly. Following the 1764 epidemic, he and other Boston merchants petitioned for relief from the provincial government.²⁵

Imagine a major American city locked down for several weeks without access to essential goods and services.²⁶ Boston was entirely dependent on foreign trade and commerce with the countryside for its survival. Long gone were self-sustaining farms on Shawmut Peninsula. Boston lived or died on its vital network of trade routes and farms and cottage industries in the hinterlands. Quarantine might be a vital public health tool; however, its application called for rapid deployment and quick recovery for the sake of the economy. Mindful of these concerns, the selectmen knew the power of the media and the essential need to restore public confidence in routine commerce.

Boston's straightforward approach of controlling the press was not unique. Other American cities have also had unreported epidemics. As a general rule, there was a code of silence based on an unwritten rule that newspaper editors kept quiet on outbreaks unless it was to report the "last case" of disease.²⁷ Yet, despite this rule, an enormous amount of newspaper publicity appeared with the release of the inoculation regulations and the opening of the various inoculation hospitals in Boston. After days and weeks of reporting yet another "last case" of smallpox, public sentiment was wary of the fictions of the press. It was rare to find a public record revealing town leaders forcibly manipulating news accounts to suit local government cover-ups. Such strategies stand

out in sharp contrast to the open government rule in pre-Revolutionary War Boston and reveal the limits of political freedom that existed in arguably the most liberal of all eighteenth-century American cities.

Inoculation as an Accepted Public Good

After the epidemic of 1764, quarantine could no longer be viewed as a tool to separate the infected from the unexposed. It would now also be used to separate those inoculated from the rest of the community. This development subtly changed the nature of the stigma of quarantine. By a remarkable psychological paradigm shift, physical confinement became associated with prevention and carried social acceptance within the community compared to victims of smallpox who contracted it through the natural way. Despite these positive developments for inoculation patients, the selectmen continued to support island quarantine for natural cases.

The financial burdens of managing natural cases in home quarantine remained the primary factor for maintaining a smallpox hospital on Rainsford Island. The cost of “watchers” and other security controls could be centralized at one location where such costs would be minimal at best. Island isolation provided immediate assurances patients would not escape to infect the community. Moreover, friends and family would be less apt to visit sick family members on Rainsford Island, as the sheer challenge of rowing seven miles out to sea kept them away. Seventeenth and eighteenth-century quarantine had been less about protecting the health of the individual than the community, yet this view changed when it became apparent that inoculation, if undertaken early enough, not only prevented an epidemic but also protected individuals exposed to the smallpox virus. Large-scale inoculations could not be performed on remote island hospitals and called for a decidedly new approach. Quarantine—in the form of sequestration—could only support inoculation programs if integrated within the community. Access to nearby hospitals was essential to the success of inoculation efforts whereas it was a recipe for disaster when containing smallpox. Paradoxically, the only difference between the two strategies was public perception and the threat of mob violence if historical precedent was not scrupulously followed.

Maritime quarantine continued to be a critical element of the town’s public health policies, especially as a means to limit the introduction of disease from foreign ports. However, it lost favor as a solution to the containment of smallpox on the mainland. The introduction of inoculation was the principal reason for its declining popularity. While there was initially a great deal of public mistrust of the inoculation procedure, this technique would eventually win the day. Even one of its staunchest opponents, Dr. William Douglass, one of the most respected physicians of his day, eventually acknowledged

inoculation worked, even if he quibbled with Boylston's version of the case fatality rate.²⁸

During the forty years following Zabdiel Boylston's revolutionary experimentation with inoculation, Boston's physicians better understood the dangers of inadvertent transmission. There were real risks in undergoing the three-week program of sequestration and the restricted dietary regime while the patient underwent inoculation. Yet, it was a risk worth taking in the face of another epidemic. The fact that inoculation was a choice, not a requirement, improved its appeal to liberty-loving Bostonians. That one-third of the town submitted to this prophylactic measure without coercion was a remarkable testimonial, proving it had become an acceptable public health rite of passage.

CHAPTER SEVEN

The Revolutionary War and Its Aftermath: A New Perspective

The American Revolution was fueled by the events occurring in Boston during the years previous to the battles of Lexington and Concord. The fateful date of April 19, 1775, marked the start of the Revolutionary War but offered no interlude to the colonial war against smallpox. The outcome of the war and the initial battles fought in the greater Boston area were, in part, influenced by the presence of smallpox in Boston. In 1774, just as Bostonians were growing angrier over British dominion, smallpox broke out. Cases began appearing in Boston and several of its surrounding towns, including one child of a British soldier.¹ Whether the child was infected before arrival in Boston will never be known. However, it would become clear that the British military had dismantled Boston's quarantine program, leaving its townspeople at the mercy of the British military's medical policies. From a political perspective, smallpox not only influenced the ensuing war but in many respects reflected the deteriorating relationship between the Massachusetts Bay Colony and the British Parliament. In 1774, the British imposed numerous trade embargos on Boston and did not countenance any of its colonial ports setting policies, whether trade or public health-related, that did not carry the approval of King George III or parliament.

The British military had no intention of cooperating with colonial quarantine policies or those of Boston; the collapse of all quarantine measures took place after years of inequitable trade policies, including the Stamp Act and taxes on tea and other luxury items. Efforts to tax the colonies after the French and Indian War reflected the growing financial burden of sustaining public services within the far-flung British Empire. The Stamp Act of 1764 was conceived as a means of raising revenues in the colonies to help pay for

an expensive war. Colonial merchants were outraged with the tax and responded by imposing embargos on goods from Great Britain.² In turn, these threats prompted stronger retaliatory measures by parliament, leading to restrictions on activities in the Massachusetts Bay Colony.

The Boston Tea Party Brings More Than Tea

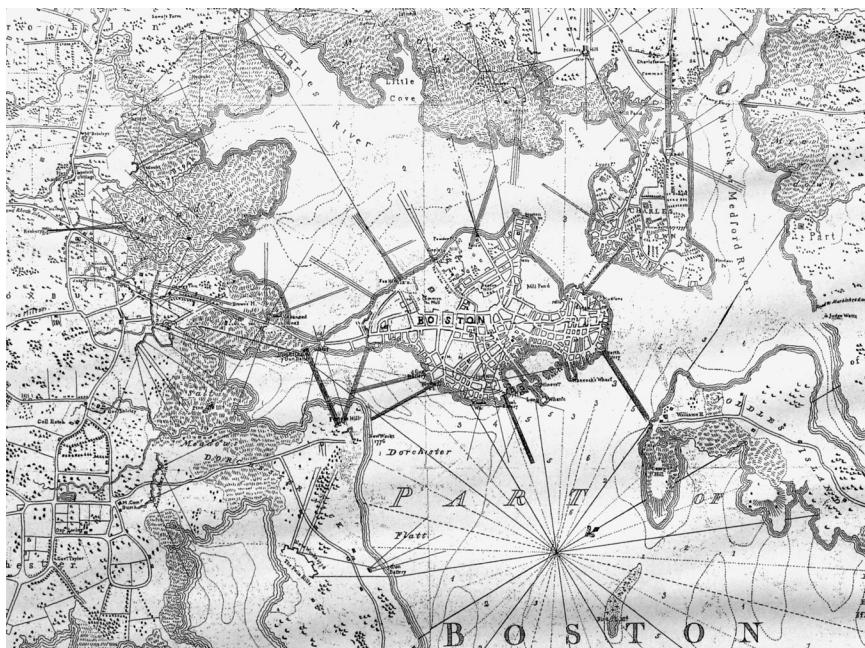
The embargo of British goods and the sabotage of British tax policy culminated in the Boston Tea Party of 1773. In protest of the tea tax, seventy-five men dressed up as Indians dumped thousands of pounds of valuable East India tea out of the merchant ship *Dartmouth* into the harbor. In turn, the British reciprocated by imposing a commercial embargo on all port activity entering or exiting Boston Harbor. Called the Boston Port Bill, it took effect on June 1, 1774, and had a devastating impact on some fifteen thousand residents presumably punished for the deeds committed by these “Indians.” A mere ninety-two thousand pounds of East India tea became the powder keg that set off the fury of the American patriots.³

The Boston Tea Party created more economic woes for the Boston shipping industry than any smallpox epidemic, war, or economic depression had inflicted during the previous fifty years. The British prohibited vessels from entering the harbor forcing masters to use Salem thirty miles away, becoming Boston’s only point of access to the sea.⁴ This embargo was more than commercial in scope. Due to several other intolerable acts, including the Boston Port Act that closed the port of Boston, the Massachusetts Government Act, which took away the colonies charter and the Quartering Act that authorized British troops to be housed in colonial towns even if their presence was not desired. Parliament also restricted the province’s right of assembly, its right to elect representative forms of government, and its right to a trial by a jury of their peers—essential elements of the eighteenth-century colonial government of Massachusetts Bay.⁵

The Boston Port Act galvanized Boston’s opposition to the arbitrary wielding of parliament’s political power over the colonies. Ironically, this “commercial quarantine” facilitated the spread of smallpox by crippling the existing medical quarantine infrastructure on Rainsford Island.⁶ The embargo of commercial cargo may have limited the entry of civilians but did not affect the entry of thousands of British soldiers who paid no attention to Boston’s quarantine rules. Essential to the province’s quarantine system was the interception of all vessels—military or commercial—at Rainsford Island. With the port of Boston and Rainsford Island shutdown under British martial law, John Scollay, chairman of the board of selectmen was unable to inspect and interdict British military vessels that might carry smallpox or other communicable diseases.⁷ These political confrontations immediately prior to the Revolutionary War not only set the stage for one of the greatest colonial uprisings in British history; it also fueled one of the most fatal

smallpox epidemics in America. Without an offshore quarantine island, smallpox could only be isolated on a house-by-house basis.

This smallpox outbreak received little newspaper publicity presumably because residents were far angrier over the impending military takeover of Boston. Serving as governor of Massachusetts and military commander of the British Army in America upon arrival from England on May 6, 1774, General Thomas Gage wielded enormous power over civilian and military activities in Boston. Parliament had appointed him governor through a stroke of the pen. As such, he did not owe the citizens or the General Court for his position and felt no urgency to uphold colonial laws inimical to his mission. This anger deepened when Gage took over the management of the Massachusetts Bay Colony on May 17, 1774.⁸ Gage, a fifty-five-year-old professional British soldier, had spent nearly twenty years in America and knew the difficulties of quartering troops in Boston. He had little tolerance for bullies and considered Bostonians the greatest bullies of all.⁹ Similarly, the British Parliament resented the independent-mindedness of Bostonians and made it known political and military force would be used to bring the colony under its control.¹⁰ In June 1774, Gage ordered British soldiers to control access and egress to the ferries and the town gate at Boston Neck. Just one month later, the British



The British held Boston at the start of the American Revolution, blockading town access from the mainland at the narrow isthmus. (*A Plan of Boston in New England with its Environs*, prepared by Lord George Germain, August 1755.)

strengthened the embargo when their Navy, under the command of Admiral Samuel Graves, anchored in Boston Harbor and took control of the shipping lanes.¹¹ The British takeover lulled citizens into forgetting the dangers of smallpox focusing instead on their loss of mobility and economic survival. There was little Bostonians could do. Maritime commerce was at a standstill under the first military-enforced commercial embargo in colonial America.

Vessels arriving from Salem or other nearby Massachusetts towns that required the services of the Boston quarantine hospital were refused entry into the harbor even if there was a legitimate public health need. Admiral Graves had no intention of listening to local officials, especially Boston's merchants or its political rabble-rousers such as Samuel Adams, John Hancock, and Joseph Warren. In the eyes of the British, these men had well-developed reputations for inciting riots and fighting against the basic principles of English law.¹²

Graves used a flotilla of naval vessels to control harbor access for nearly an entire year prior to the American Revolution.¹³ The British Parliament intent on showing who really was in charge expected Graves and his military colleagues to refuse to submit to routine medical inspections as called for by the province's quarantine regulations. Compliance with the province's quarantine laws was the last thing on Graves' mind, and British soldiers knew it. He had no tolerance for these rebellious colonialists, and his arrogance and stiff arm tactics, ironically, set up the British military's ultimate demise, aided in part by the proliferation of smallpox in Boston.

The British embargo soon enough depressed the local economy and adversely affected the town's most vulnerable residents. Poor living conditions, limited access to traditional maritime employment, and increased costs for basic foods and goods constricted diets of the poor, facilitating disease and malnutrition, especially for those living in Boston's decrepit Poor House. It was an institution authorized by law in 1735 to address the growing number of unemployed and poor people who were able to work, and when employed by the town created revenue from their labor, that supported the almshouse. Typically, as many as three hundred poor lived in the overcrowded Poor House, and up to 25 percent of those who entered never came out alive.¹⁴ Yet, Boston's poor weren't the only ones with substandard living conditions; the British army spent the summer of 1774 living in tents and makeshift accommodations on Boston Common and later near Boston Neck.¹⁵ Annoyed by the poor living quarters of his troops, Gage ordered the construction of barracks for the soldiers, but the town's carpenters showed little interest in meeting their needs.¹⁶ As a result, in the fall of 1774, British soldiers were packed into overcrowded barracks with few modern-day amenities, which were perfect conditions for the spread of disease.

With troops from various parts of the British Empire sharing tight quarters during the five months immediately preceding the battle at Lexington and Concord, Gage should have predicted smallpox cases would appear in

military families. Surprising as it may seem, the British troops were not all inoculated before they came to America, since there was no British law requiring citizens to avail themselves of this medical service.¹⁷ These military families had no idea of the cultural expectations of Bostonians and knew nothing of colonial laws that required prompt reporting of smallpox cases to the board of selectmen. The selectmen were contemptuous of military families that violated local public health laws. On November 28, 1774, the *Boston Evening Post* reported five children of a military family and one soldier contracted smallpox. The selectmen must have been angered to learn the index case was a British soldier of the Fifty-Ninth Regiment suspected of experimenting with self-inoculation, a practice forbidden under the laws of the Massachusetts Bay Colony.¹⁸ This event, by itself, may not have irritated the selectmen—military families, after all could not be expected to know local public health laws—but the cruelties of British troops who routinely subverted their civil authority fueled simmering resentments. Daily revelations of uncivil behavior were harder to overlook while Bostonians lived under a trade embargo and Gage tried to make them loyal subjects of the Crown.

Admiral Graves, chastened by the proliferation of smallpox cases in the British military, realized a commercial embargo of Boston could not be his only objective. As smallpox cases increased during the winter of 1774, he dedicated resources for a floating hospital to support British troops during their occupation of Boston.¹⁹ While Gage recognized the importance of isolating emerging cases among military personnel, his concerns proved to be too little and too late to halt the epidemic. By a quirk of fate, Gage was fighting a losing battle against an epidemic that had been kindled by the actions of his own troops. British commanders weren't the only ones concerned about smallpox. The selectmen, anticipating the onslaught of another epidemic, called a town meeting on March 28, 1775, to develop a response plan.²⁰ There was even a softening of relations with the military as the townspeople sought out additional quarantine facilities after its own hospital reached its capacity. Gage offered the floating hospital to meet this need even though it was intended for military personnel.²¹

The selectmen ordered the quarantine laws of the province published so everyone would be fairly warned not to conceal or spread the smallpox; ignorance of the law would be no excuse. A fine of 50 pounds, or about \$1,000 in today's currency, would be levied on offenders.²² There was ample cause for concern of an emerging epidemic when it was learned the selectmen confined thirty-eight smallpox patients to the floating hospital. Indeed, three of these patients went there the very day of the town meeting. An additional five persons remained quarantined in the West Boston pest house, near present-day Massachusetts General Hospital, including at least one British soldier.²³ While the selectmen thought their efforts brought the epidemic under control, they took no chances. They moved the hospital ship "some

distance from the wharf” as a precautionary measure and prohibited unsanctioned self-inoculation by warning against its use in the *Boston Evening Post*.²⁴ Both greedy physicians and fearful citizens taking inoculation without precautions were believed to be endangering the public health by their self-serving evasions of smallpox laws.

The selectmen’s efforts garnered little support from Gage or the civilian administration he installed to manage town affairs. The die had been cast the previous year when the old provincial charter was dissolved by Parliament on May 20, 1774.²⁵ The new charter prohibited town meetings except as approved by Gage. Under his rule, a town meeting could not be convened to discuss a smallpox response strategy without his permission. Parliament, at the hand of Gage, intended to break the will and authority of Bostonians, even if it should lead to inconsistent strategies for the control of smallpox.²⁶ Quarantine would not take place on Rainsford Island. That would no longer be feasible under the Boston Port Act and Gage made sure of that. Exercising the powers granted to him by the Port Bill, Gage not only paralyzed the island quarantine program he banned access to needed outside resources if the pox should spread.

In lieu of island isolation, the selectmen had only one viable option: the seclusion of smallpox cases in New Boston (i.e., the West End) under the care of William Dorrington, keeper of the Province Hospital and various nurses assigned to his staff.²⁷ Dorrington, appointed in April 1772, continued in that service until one month prior to the Revolutionary War. The British command’s unwillingness to cooperate with the town on a joint smallpox control strategy created the ultimate self-inflicted wound for the British regulars. Hesitant to apply mass inoculations to the troops and suspicious of the motives of the town’s civil and medical authorities, Gage was forced to face the wrath of the ensuing epidemic without legislative or medical support from the colony.

Germ Warfare

The American Revolution could not have come at a worse time—forcing Bostonians to simultaneously contend with a threat to their health and the traditional right to self-rule. Two weeks after public warnings of new cases of smallpox in Boston, British soldiers and American rebels engaged in the battles of Lexington and Concord.²⁸ The British were repulsed and then fled back to Boston, eventually garrisoning themselves and thousands of townspeople behind the fortifications on Boston Neck. The previous fall Gage had fortified Boston Neck in anticipation of an attack by rebel forces, and no one could pass without authorization from British sentries.²⁹ Trapped inside, residents now faced a macabre isolation that would incubate disease and exacerbate its spread. Less than half of Boston’s thirteen thousand inhabitants

had any immunity to smallpox.³⁰ This situation was aggravated by malnutrition, poverty, and stress as thousands of Bostonians cut off from food supplies by the embargo had been forced to live off charity during the previous year. Residents were very sickly with “ten to thirty funerals a day, but no bells allowed to toll.”³¹ By closing access to Boston, it was easy for the British to protect themselves from the rebel army camped outside the town, but the public health effects would be disastrous.

Yet, there were cries for humanitarian relief. Those selectmen who remained within the garrisoned town pleaded with Gage to release the poor and needy to the country, since Boston was now facing a reverse quarantine by the rebels; British soldiers were not allowed to leave Boston. The humanitarian crisis grew more serious: vital supplies were not available, and Bostonians had few reserves to fall back on. Within ten days of the Battle of Lexington and Concord, Gage agreed to free over forty-nine hundred poor in exchange for giving up their weapons.³² Anticipating an amicable resolution of their prisoner of war status Bostonians in good faith, relinquished over twenty-five hundred weapons of every imaginable size and shape.³³ However, before a mass exodus could be arranged, Gage refused to honor his earlier commitment, leaving thousands of desperately poor and unemployed citizens stranded in Boston. Rather than providing humanitarian relief, Gage had tricked Bostonians to disarm and kept them as hostages to strengthen his position.³⁴ To make matters worse, despite his objections to releasing women and children, he had no trepidations about letting some pox-infected Bostonians leave without any fuss—some of whom fled to the countryside but nevertheless posed a threat to the rebel army.³⁵ Boston was in the midst of a smallpox epidemic—caused in large measure by the antics of British soldiers and their wives and children. Indeed, on June 5, Gage gave orders to capture a band of women who had broken into houses and buildings in the north end of the garrisoned town and were infected with smallpox from last winter. These women were blamed for spreading the infection throughout the town, yet their antics were undoubtedly the unintended consequence of Gage’s short-sighted order of the previous week that presumably removed all the women and children from their husbands placing them in overcrowded barracks.³⁶ Subverting these orders the wives took up residence in the more spacious abandoned homes previously occupied by smallpox-infected Bostonians. In a form of revenge, the pox now passed back to the British through the touch of an infected blanket, couch, or bed.

Within the space of one year, Gage had gone from stalker to prey and from one who embargoed trade to the victim of a military siege that coincidentally shielded American rebels from exposure to the pox. Throughout the summer of 1775, the British remained ensconced on Shawmut Peninsula cut off from the rest of the colony by a narrow-gated isthmus entrance highly fortified by British soldiers. Whether they could survive the siege depended upon the

British soldiers' immunity to smallpox and the threat it posed to the Continental Army. George Washington was keenly aware of the dangers of smallpox. He had contracted the disease as a child and was said to bear light pockmarks on his face throughout his life.³⁷ He knew the dangers of a sick army and made it clear on his very first day of command that disease would be a formidable enemy. His remarks made to the Provincial Congress upon his arrival in Watertown on July 2, 1775, underscored his concern. He stated, "The youth in the army are not impressed with the absolute necessity of cleanliness in their dress and lodging, continual exercise, and strict temperance, to preserve them from diseases frequently prevailing in camps; especially among those who, from their childhood, have been used to a laborious life."³⁸

The next day Washington assumed command. He feared the Continental Army could be devastated by the smallpox epidemic festering in Boston. His concerns were not merely speculative. There were reports the British planned to release Boston's patriots from captivity. Washington sensed a release of poor people could be a subterfuge designed to infect his troops, most of whom were susceptible to this disease.³⁹ In response to this threat, he imposed a de facto ring quarantine on Boston proper as long as smallpox raged within the town.

John Scollay, one of the town's selectmen, was not happy with the confinement of the poor and petitioned the Massachusetts General Court for relief.⁴⁰ The General Court severed its relationship with Gage soon after the battle of Lexington and now served as a government in exile sanctioning the activities of the patriots and the fledgling army. Under its new role of Provincial Congress, it responded to the humanitarian disaster by negotiating with Gage's civilian representatives to release the poor. The rich were expected to be able to cover their own medical costs, but the poor had no support system other than the indulgences offered by local government charity. Continued confinement in Boston under martial law was a recipe for a medical disaster for all economic classes. By the last week of July, Gage agreed to free any residents seeking to leave town. Within two days, over two thousand townspeople applied to James Urquhart, the British appointed town-major of Boston, for exit permits. The very next day the Provincial Congress responded with settlement plans "to liberate their unhappy brethren of the town of Boston, if they may be suffered to remove with their effects agreeable to the solemn treaty of General Gage, entered into with the committee of that Town."⁴¹

For nearly a year, Gage, as the British commander in charge of over seventy-four hundred British troops, had given instructions to bring order to the town and the Massachusetts Bay Colony.⁴² Rather than controlling the colony, the patriots now had Gage's troops confined to Boston. Therefore, when Gage chose to release the townspeople into the hands of the patriots,

there were some people who questioned his motives. Releasing the poor to the enemy may not have been entirely altruistic. Gage intended to swap these people for loyalists who could join his ranks from throughout the province. The poor were anxious to flee from his cruel confinement and begged Scollay to get help from the Provincial Congress.

Cooped up for over three months, the Provincial Congress decided to remove Bostonians via water to Salem, where a hospital and other accommodations would be provided. The Salem hospital was to be used to cleanse the refugees, thereby removing apprehensions about spreading smallpox. The Salem selectmen agreed to receive the poor and make suitable accommodations for their arrival. The Provincial Congress consented to the Salem selectmen's offer as long as the British had no say in who left and who stayed behind. In effect, all who wanted to leave had to be permitted to do so.⁴³ Their efforts revealed the degree to which quarantine and military planning were intertwined.

Despite the best of intentions, the evacuation plan fell apart. Smallpox victims never went to Salem. The following day Washington learned of Gage's unilateral decision to let Bostonians leave for nearby Chelsea via the Winnisemete Ferry. Responding to this unexpected exodus, the next day the Provincial Congress promptly appointed a five-member committee to inspect the refugees in case they might pose a hazard to the safety of the country.⁴⁴ Jedediah Foster, a spokesman for the committee, reported those who arrived in Chelsea were not stricken with smallpox and the disease was no longer prevalent in Boston. At forty-nine years of age and with a Harvard education, Foster was well respected. He had been a member of the House of Representatives prior to the war and had firsthand experience with smallpox having taken inoculation earlier in the year.⁴⁵ Yet, despite his reputation, the committee thought his assessment was overly optimistic and recommended that a strict health inspection be conducted of each refugee. The rebels had not anticipated the need for vigilance against the release of the virus thinking Gage was a man of his word—even if his past negotiating tactics might have raised alarms. Gage promised to free Boston's residents into the hands of patriots in Salem. Yet, he refused to cooperate with Washington over the previous terms of the release, choosing Chelsea as the place to drop off those seeking to flee Boston—an unauthorized location that would soon be a harbinger of things to come.

During the summer Bostonians were under a form of house arrest. Frustrated by Gage's inaction and concerned at the possible spread of smallpox into the country, the Provincial Congress cut off ferry service between Boston and Chelsea.⁴⁶ There were clear signs Gage had nothing but nefarious plans in mind for the rebels, and an open ferry could only spell ruin for those on the receiving end of the ferry line. Simultaneously, on October 5, the Provincial Congress disbanded the five-member committee charged with

inspecting evacuees exiting Boston. The “drawbridge” had been raised, and Boston’s smallpox victims were still trapped in town at the mercy of Gage.

Apparently, Gage had no intention of releasing any more residents while he remained in charge. To the surprise of many patriots, he abruptly departed Boston on October 10, 1775, after his superiors in England decided that a change of command was necessary. Gage failed to disperse the American patriots at the battles of Lexington and Concord. He also paid a very heavy price in the victory at Bunker Hill, counting 1,040 casualties, of whom at least 217 died in battle.⁴⁷ This was a significant blow to the 2,500 British men who had fought at Bunker Hill.⁴⁸ It was also one of the reasons that neither Gage nor his successor, forty-seven-year-old General William Howe, attempted to fight their way out of Boston.

Despite months of previous negotiations, it would take another month before Gage’s successor agreed to release Boston’s inhabitants. On November 11, the Provincial Congress appointed yet another committee to facilitate a mass exodus to safe locations in the hinterlands.⁴⁹ However, Howe had his own plans as to where and how he would release Bostonians. In an unexpected turn of events, on November 24, three hundred destitute residents were granted permission to leave town and settle at Point Shirley. Coincidentally, on the same day, he also granted permission to Boston residents to initiate their own inoculations.⁵⁰ Whether his motives to inoculate residents were intended to deliberately infect the Continental Army or simply a gesture of goodwill is not known. At any rate, permitting self-regulated inoculations was inconsistent with previous provincial laws and without sequestration could be used to spread the virus.

In the fall of 1775, Howe was surprised to find many of his men had never had smallpox or taken inoculation. In late November and early December 1775, he gave orders for his commanding officers to direct the surgeons to inoculate his troops on a voluntary basis.⁵¹ He was undoubtedly more concerned with the survival of his own army than the health of Boston’s citizens. His own diary, discovered many years after the war, revealed his basic military priorities. According to his November 28 diary entry, his field officers were ordered to provide an immediate return from every corps of those soldiers willing to be inoculated. Three days later, his commanding officers directed the surgeons to inoculate all of the willing soldiers and keep them in separate houses with as little communication as possible with those who refused inoculation.⁵² His diary makes it quite clear the smallpox infection was at its worst during the month of November. It was also a time when the town’s supplies of food and fuel were extremely low, and Howe knew the military desperately needed these resources and ordered his staff to collect sufficient wood from wharves, houses, trees, and outbuildings to meet their needs.⁵³ A six-month blockade by the patriots left the British and their Tory loyalists with nothing but wharves, barns, and church steeples to burn for

fuel. Even the furniture of those who evacuated before the siege was fair game for kindling. Yet, the loyalists weren't the only ones suffering. Patriots remained in Boston under house arrest with little ransom value to Howe and a liability to his limited stockpile of rations.

Eight days after releasing 300 men, women, and children, Howe allowed 200 more to depart, followed by 300 on December 3 and another 150 on December 15.⁵⁴ By choosing to release nearly 1,000 destitute Bostonians not only reduced the general's requirements for provisions; Howe was clearly reducing his military burdens and shifting these wartime liabilities to the Continental Army. None of these people had sought asylum under British rule; they wished for freedom even if it meant leaving their hearth and home. Howe did not release all refugees to the care of Washington. Instead, he released the most destitute and, in some cases, the sickest. His actions transitioned Boston from a hostage-occupied city to one merely serving as a garrison for the British military.

Washington now faced an enormous challenge: defending his army from the mass exodus of captive residents—the single greatest threat it faced while waging war against the British.⁵⁵ If smallpox were to spread beyond Boston, the American army could be devastated, since few New Englanders had acquired immunity to smallpox, including members of the Continental Army.⁵⁶ Washington was normally a man in command of his faculties and had a high tolerance for the ineptitude of his own staff and irksome dealings with the enemy. He adhered to personal standards of civility and military protocol that were rare in his day, yet even he could not stand malicious efforts to create a dirty biological war. When Captain Thomas Crafts alerted him about Howe's diabolical scheme to infect the American troops, he took immediate action.⁵⁷ Enraged, he wrote to Congress of Howe's less than honorable intentions. Washington declared the poor patriots who had fled Boston were laced with the smallpox virus and were a military threat. He was compassionate enough to supply them with provisions but apprehensive they would communicate the contagion.⁵⁸ Unfortunately, poor living conditions and harsh winter weather brought at least five of the refugees to their graves before Washington could find accommodations for them. In an increasingly bitter war, smallpox had become a strategic military weapon, but one that ravaged all players indiscriminately.

From a military point of view, Washington considered inoculating all of his troops as one strategy to combat exposure to the virus. There were some obvious limitations to such a strategy, not the least of which would be the self-imposed sequestration placed over his men during treatment. Inoculation could be dangerous if soldiers did not follow sequestration procedures rigorously.⁵⁹ In the end, Washington decided against inoculation, deeming it a greater risk than the disease itself. He wisely worked with the Provincial Congress to stick with quarantine as the counterresponse to Howe's release

of infected Bostonians. Washington implored the five-member committee to employ every precaution known at that time, including decontamination, “smoking” victims, cleansing, airing, and detaining persons and their effects as they deemed necessary. Faced with too many military distractions out on Point Shirley, where Boston’s poor were exiled, Washington could ill afford to simultaneously sequester his troops.

Howe knew releasing one thousand hostages measurably extended his ability to survive the long cold New England winter and that, with fewer mouths to feed, his troops would be in a better condition to fight the rebels. There was ample evidence he had even more sinister motives. Simply shifting the burden of caring for the poor was an innocuous impact to the Americans compared to the continuing tales of bioterrorism. In the heat of British-American tensions, Washington’s Aide De Camp, Robert H. Harrison, warned the president of the Council of Massachusetts Bay that four deserters confessed the British were purposely infecting the Continental Army by inoculating the poor as they left town. The deserters claimed Howe was not simply unloading victims on Washington’s troops but had designs to “spread the infection in order to distress us as much as possible.”⁶⁰ Other evidence supported these assertions as well. Thomas Francis would later testify that he was inoculated with the smallpox while held by the British inside Boston and was forced into contact with hundreds of other Bostonians when placed onboard the vessel that carried the refugees back to the mainland.⁶¹ Pudding Point was the landing site for the refugees. It was now off limits to all of Washington’s troops unless they had previously been inoculated or had the disease the natural way. Harrison was shocked at this diabolical scheme, and he knew Washington would take appropriate precautions.⁶²

The following day Washington confirmed these warnings and painted an even grimmer picture of smallpox lurking at the edge of his camp.⁶³ Though a war crimes trial was never convened to prove Howe intentionally attempted to infect the Continental Army, one thing is clear: he gave orders to inoculate as many as one thousand loyalists and troops in December without isolation procedures typically expected by the standards of the time. Servants who had taken inoculation were walking around Boston even though they were still infectious.⁶⁴ How dangerous the epidemic had become remained hidden as a British military secret for over a hundred years. One of Howe’s administrative staff kept records of the inoculation program, and these records showed Howe benignly supported bioterrorism, using “lax quarantine procedures” that released smallpox victims at the height of their infectiousness.⁶⁵ At this point, Howe’s nefarious inoculation scheme became a critical feature of war planning.

A week after the third wave of infected refugees arrived in Pudding Point, Washington urged the Provincial Congress to take the necessary steps to prevent the epidemic from spreading. He knew a military response to

smallpox would be ineffectual without the support of the civilian government, especially because Howe had released over five hundred Boston residents from the siege in the first two weeks of December alone. Numerous refugees told Washington's staff that smallpox had devastated the British troops. Washington could do nothing about the sad state of affairs in Pudding Point, nor could he quell the epidemic in Boston, since susceptible British soldiers were being inoculated as an insurance policy against an attack by his troops. Washington knew if he could escape exposure to smallpox at his Cambridge camp and the surrounding area, it would be nothing short of a miracle.⁶⁶

Civic Responses to Smallpox in Wartime

December was an extremely cold month forcing patriots and the British alike to hunker down and stay warm. Temperatures fell into the single digits for days on end. Moving the refugees inland might have made it easier to provide them with food, clothing, and firewood, but this would not be feasible while the virus lingered on their clothes, bedding, and other personal effects. The Provincial Congress decided it was best to continue to quarantine the infected at Point Shirley because of the danger of triggering another epidemic.⁶⁷ Residents had waited six months to escape the clutches of the British only to land in quarantine at the hands of their compatriots. Guards took their places in front of infected homes to prevent escapes from the premises.⁶⁸ Yet, the patriots did show some compassion for the downtrodden. Where it was clear the poor were free of infection, the selectmen issued certificates of health and authorized travel to towns willing to take them in.⁶⁹ Weather conditions at Point Shirley were harsh, making it difficult for the Provincial Congress to contain the epidemic and supply fuel and shelter.⁷⁰ To make matters worse, the houses at Point Shirley offered little shelter as “the windows are all out and the floors taken up.”⁷¹ To protect refugees from these abysmal living conditions, the Provincial Congress ordered two soldiers to destroy vacant buildings for fuel while mindful to avoid exposure. It was nothing short of a nightmare for these destitute refugees.

Captains Foster and Searl were responsible for protecting the refugees. Foster gathered fuel to keep the refugees warm throughout the winter even when it meant condemning old decayed stores, barns, and fish houses as fuel for their relief.⁷² Washington did not have the luxury of extensive supply lines or depots and access to nearby sources of wood was simply not an option. All available trees had already been cut down leaving the smallpox victims to battle the cold and stave off freezing to death the best they could. No records exist as to how many died of starvation or succumbed to hemorrhagic smallpox. Undoubtedly, many died in agony without family and friends to comfort them in their final hours on earth.

While Point Shirley received some of the refugees, Chelsea received the bulk of the smallpox cases in the fall of 1775. The needs of these pox-infected souls were far greater than anyone imagined. Captain Thomas Crafts soon realized he had vastly underestimated the expense of this humanitarian intervention. An initial allocation of 200 pounds helped settle Boston's inhabitants in Chelsea, across the Charles River.⁷³ Soon thereafter, the Provincial Congress allocated an additional 300 pounds to Craft's committee to help refugees staying in Chelsea. Although their commitment to the support of the poor was not unprecedented, it was one of the most timely and responsive gestures in Boston's history. The town had never had a greater need for such support than at this dark hour. Gage had dissolved the board of selectmen, the town's usual support system, the previous year when he declared martial law. Without a duly elected local government, the townspeople had no choice but to turn to the Provincial Congress to support its neediest citizens.⁷⁴

The poor pleaded for help, but they also posed a threat. If a family contracted smallpox and failed to report it, the virus could spread. Families had no interest in reporting disease when it meant quarantine, which conjured up visions of island exile in the depths of winter. When temperatures plummeted to single digits for weeks on end, the poor snuggled together for warmth—conditions ripe for viral exposure. The Provincial Congress had no choice: it reaffirmed the colony's 1743 quarantine law requiring the head of the family to notify the selectmen when smallpox was in the home. It also declared Rainsford Island the official quarantine station for the colony despite the fact the British had badly damaged this island hospital.⁷⁵ The Provincial Congress knew legal, financial, and military resources would be required to combat smallpox, especially as Washington was anxious to invade Boston and such an action would raise the specter of infecting his troops.⁷⁶ They also feared an outbreak could lead to significant underreporting of disease and provoke vigilante justice if Washington invaded Boston. A large-scale quarantine would have required significant resources for guards, smoke houses, and police to control desperate citizens that might try to escape and infect the countryside. Washington knew better than to poke the pox.

The legislators must have taken stock of the vigilante actions of townspeople in Marblehead, located less than twenty miles away from Boston along the Massachusetts coast, when establishing explicit quarantine rules for the colony. That experience provided a sober assessment of the dangers of protecting the public health and the challenges of thwarting vigilante actions against government quarantine. It had only been two years since a mob burned the smallpox hospital and then tarred and feathered four men who presumably brought infected clothing off Cat Island, the town's quarantine station.⁷⁷ In retaliation for their presumed actions, the next day the unruly mob pulled these men out of their homes and paraded them on sleds across

town. To add insult to injury, one of these men was foolish enough to return to the hospital on Cat Island to retrieve his old clothes. Though it was not known if his clothes had been cleansed, the Marblehead selectmen immediately ordered him back to the ferry and told him to return to town. Upon arrival in Marblehead, a mob gathered around the man, anxious to take justice into their own hands. To appease the mob, the selectmen promised he would be properly punished the next day if found guilty, but impatient for justice, at least thirty men pulled him from his house late that night and carried him to a public whipping post, where he was whipped most cruelly.⁷⁸ Without explicit and well-communicated laws governing quarantine, decontamination of clothing, and procedures for confirming when it was safe to release recovered smallpox victims, colonial public health laws could do little to thwart vigilante justice, and the Provincial Congress was mindful of these possibilities.

Unlike the vigilante justice that prevailed during the Marblehead incident, Boston faced a more complex challenge. General Howe had no intention of notifying the enemy about the magnitude of the epidemic when such confidential information could expose his vulnerabilities to the rebel army. Indeed, Howe carried the secret of these smallpox vulnerabilities to his grave. Washington's challenge was to quarantine Howe's infected troops while blockading his access to the sea to force him to deplete his supplies of food, fodder, and fuel. Howe knew full well he could not win if he remained in Boston. He was outnumbered and outflanked. Moreover, his supplies were dwindling as the rebel navy had effectively captured many British vessels carrying military supplies.⁷⁹ After Washington's troops captured Dorchester Heights, strategic hills overlooking Boston, Howe knew it was time to escape. He tried to initiate a counteroffensive, but destiny favored the Americans, as high winds and waves forced the British vessels to return to port. This brief but epic storm gave Washington the window of opportunity to strengthen the entrenchments on Dorchester Heights, which was enough to convince Howe that a rapid departure from Boston was necessary.⁸⁰ The following month, on March 17, the British departed with many destined for Halifax in the loyalist province of Nova Scotia.

Boston's Liberation

It was a time of intense rejoicing for Boston's natives, who were thrilled that British troops, guided by what one rebel called the "wicked, diabolical British ministry," flew out of Boston.⁸¹ This joy was tinged with despair, as it became clear the city had been plundered. Tons of stolen goods found their way on ships bound for Nova Scotia. What wasn't carried away was ruined by the British or tossed into the sea and washed up along the Boston coastline. What they didn't steal they "burnt, broke or hove into the water."⁸²

Bostonians saw the Royal British Army in its true colors—as royal thieves not as the national guard of the British kingdom.

The forced isolation of families and friends who had been shut up for nearly eleven months, under what many Bostonians considered savage treatment by British soldiers, left physical and emotional scars that would take a long time to heal. Ezekiel Price—the secretary of the Boston Selectmen, a position he retained despite the British takeover of Boston—was one of the first to reenter Boston after the siege. He was shocked at the gaunt faces of his fellow citizens who had grown thin, flesh wasting away, and spirits running low under their virtual house arrest stretching back to April 1775. Despite their physical sufferings, they greeted Price with joy and renewed spirit embracing upon seeing their neighbor once again. What many residents forgot in their urge to reclaim old homes and acquaintances was the presence of smallpox lurking behind closed doors. A handshake, in some instances, or an embrace or a mere chance encounter with an old acquaintance, in other cases, or picking up a soiled blanket purposely slathered with the pox virus by retreating Redcoats may have communicated the virus to the stream of refugees that weathered the siege at farms owned by relatives or friends in the greater Boston area.⁸³ During this emotional reunion, many paid little attention to the strict code of isolation required to stop the virus from spreading.

Washington was not affected by such emotional dramas. He knew the dangers smallpox posed and acted with strategic resolve. On March 13, four days before the British evacuated, he ordered his officers not to enter Boston without specific permission from the commanding officers at Cambridge or Roxbury, since the town was full of smallpox.⁸⁴ On March 17, when the British left, Washington seized this opportunity to send in one thousand immune troops under the command of fifty-seven-year-old General Israel Putnam, known affectionately by his troops as “Old Put,” to cleanse the town and guard it from looting.⁸⁵ Washington had waited nine months to take action in part because of his personal fear of the havoc smallpox could wreak upon his army.

Washington was rightfully concerned about the sudden mixing of the Continental Army with the residents of the town.⁸⁶ Three days after liberating Boston, he ordered every possible precaution be taken to “destroy the infection of smallpox.”⁸⁷ Despite his order and military policy to stay clear of infected individuals, the contagion spread. Fearful of an epidemic, the Provincial Congress directed the selectmen to quarantine its inhabitants in the western part of the town and undertake a massive disinfection campaign. This order, issued within a week of the British departure, required removal of Boston’s inhabitants to the hospital, a building that survived the woodcutting wrath of the British regulars. It was not an easy or inexpensive initiative, as it required joint effort of the military and the civilian governments, neither

of which had previous experience in this endeavor. The Provincial Congress worked through a more circuitous committee process that called for investigations, reporting, and legislative action. In contrast, Washington acted promptly on smallpox threats issuing quarantine orders and imposing security controls as quickly as issues were brought to his attention. It was inevitable Washington and his staff would soon be out of step with the lethargic legislative initiatives of the Provincial Congress.

In fact, Washington had much more on his mind than the terrors of smallpox and was forced to delegate command of Boston to a trusted military veteran with years of political experience in the Massachusetts Bay Colony. He left Boston on April 4 to plan for the anticipated British invasion of New York, placing authority for military affairs in the hands of Major General Artemas Ward, a forty-eight-year-old Massachusetts native with more than two decades of experience in local and state politics. While Ward was suffering from numerous ailments and wished to retire, his personal sense of duty compelled him to continue serving Washington and the Continental Congress. He was a good choice, since he not only knew how to restore order in Boston but also understood the need for military strategies to circumvent the dangers of smallpox. His most immediate challenge was protecting two regiments of smallpox susceptible troops stationed in town and another five regiments stationed in the Boston area.⁸⁸ Washington expected all of his troops to take inoculation before they left Boston and Ward carried out his bidding.

The time for immediate action was at hand, and local officials knew smallpox would quickly spread if the Provincial Congress failed to act. Fortunately, the Provincial Congress allocated 80 pounds, or about \$2,000 in today's money, to cover the costs of removing victims to the hospital and covering their room and board.⁸⁹ Two days later, on July 4, they lifted the statutory ban on inoculation, as epidemic conditions were prevalent within Boston.⁹⁰ Unfortunately, this legislation got mislaid, forcing them to pass a new law virtually identical to the original.⁹¹ Even this new legislation was overly officious and failed to recognize the urgency of the situation. Residents didn't need more laws and restrictions that forced inoculation to occur in hospitals. They wanted immediate action.

Even Ward felt frustrated by the Provincial Congress' lethargic response to the outbreak. He brazenly inoculated his troops stationed at Winter Hill in Medford even though it had been restricted to Boston. His independent-mindedness prompted a rebuke from the Massachusetts Council and a request that he move the troops requiring inoculation to an authorized hospital.⁹² Learning of this snafu from his new headquarters in New York, Washington, the ultimate diplomat, ordered Ward to quarantine the infected troops in Boston. There was great urgency to complete the inoculation process before the British attacked New York City. Yet, Washington also

knew quarantine laws could not be administered by a military commander, especially when the adverse consequences of such actions might remain a legacy of his command.

Mindful of the military implications of delaying a mass inoculation program, the Provincial Congress finally got it right on July 13 when it passed “An Act to prevent the continuance of the smallpox in the town of Boston and to license inoculation there for a limited time.”⁹³ This and earlier legislative efforts did not actually delay the inoculation efforts that began in early July. Like Ward, physicians recognized the face of a public health crisis and began the inoculation process even before the public received notice of these legislative decisions through the local press. Like epidemics of the past, physicians and citizens alike took power into their own hands to quickly thwart the virus while legislators crafted the fine points of the new law.

Hundreds took inoculation on Friday July 5, and these efforts continued for weeks on end as almost everyone in Boston and the surrounding towns moved to protect themselves. Price estimated that more than half of those undergoing inoculation were not even from Boston.⁹⁴ Included in this group seeking freedom from smallpox was Abigail Adams and her children, the wife of the future president of the United States.⁹⁵ She did not measure freedom as the absence of the British army in Boston. It now carried a new meaning for her and the sick, the poor, and the elderly of freedom from disease. For Adams and thousands of Bostonians, smallpox was, in a sense, the revenge of the British, a legacy of their inconsiderate and arrogant policies that continued to “itch their skin” and burn their souls.

Just how extraordinary were these times? During this period, over four thousand Bostonians and all of the remaining Continental troops not yet inoculated underwent this procedure.⁹⁶ Despite efforts to isolate the infected, the Continental Army’s initial failure to comply with the province’s quarantine orders enabled indiscriminate fraternizing with the civilian population. As a result, despite valiant efforts to control quarantine and inoculation, the disease continued to hop, skip, and jump throughout the colony.

Legislative Intervention

Inoculation was taking place, but some of its unintended consequences aggravated the existing public health crisis prompting further legislative action. On July 15, the selectmen declared no one could leave Boston until they took inoculation and were free of infection. Similarly, no one could enter unless they had previously contracted smallpox. The stigmata of the cured would be the only currency used to buy ones way out of town. Those who failed to comply faced a forty-pound penalty.⁹⁷ The selectmen also curtailed normal liberties of free association and prohibited willful accommodation of strangers—even if they were friends—with a written request.

Physicians by themselves could not control inadvertent disease transmission and monitor the health of the inoculated during an epidemic of this magnitude. Sadly, these sanctions had broken down, and the military had contributed to its breakdown.

Once again, Boston faced a dual challenge: inoculating its susceptible population without transmitting the disease and simultaneously quarantining those infected the natural way. To restrict movement the selectmen directed those infected the natural way to a smallpox hospital. Although they intended it be used for a three-week period, it turned out to be wishful thinking. Provincial legislators soon realized that past quarantine laws were a poor fit for the exigencies of the present. Boston also urgently needed more hospitals to inoculate its entire population—separate from the smallpox hospital where those infected the natural way were confined.

Ironically, on the very day the selectmen imposed quarantine, its citizens also learned the Continental Congress had declared independence. Mail from New York City arrived on July 13 and carried word of this momentous event. Colonel Thomas Crafts, a central figure in Washington's effort to contain smallpox during the siege, had the honor of reading the Declaration of Independence to the assembled congregation on Boston Commons.⁹⁸ How cruel could be the gods of this fledgling nation to stamp the mark of the pox on faces that yearned for freedom from tyranny while they labored under quarantine. If the summer of 1776 in Boston was to be the litmus test of freedom, American independence would not rest on unrestricted mobility.⁹⁹

Boston's Second Siege: A Two-Month Quarantine

The war with the British might have ended in Boston, but the battle against smallpox remained in full swing. On July 19, the selectmen posted eight guards to control road and ferry access points to town. Four guards, Thomas Bayley, Samuel Greenleaf, Moses May, and Obediah Thayer, took control of Boston Neck. The other four guards, John Ballard, Samuel Sumner, John Minzey, and James Goadbridge, covered the Winnisemet and Charlestown ferry.¹⁰⁰ They had orders to prevent anyone from leaving Boston unless free from infection, in which case the selectmen issued certificates of health. Everyone else, including those undergoing inoculation, were quarantined until August 3. Soldiers and civilians alike were isolated until the inoculation process rendered each person free of infection. Special orders were issued for the “market people” in light of their unique threat to the health of the colony.¹⁰¹ On the one hand, the town could not survive without access to their agricultural produce. On the other hand, they posed the single greatest threat to the unchecked epidemic and were not to be trusted unless the guards were acquainted with them or found signs they previously had

smallpox. Regardless of their assertions, the market people would have to undergo smoking of their paper money or any other item which they brought into town.¹⁰² Fearful legislators were responsible for this requirement, fearing “filthy lucre” could infect them while staying in Boston.¹⁰³ Smoke houses were built on the outskirts of the town and designed to fumigate anyone entering the town regardless of rank or social status. Hot fires were prepared and strangers held on platforms above the fire pit while brimstone was thrown over the burning embers and paper money was placed directly over the flames until the heat and smoke wafted through the currency. The experience was as close to that of Dante’s *Inferno* as any Christian might imagine in this lifetime. It was thought heat and smoke were efficacious techniques for killing the virus, but for the stranger who experienced the scorching heat and suffocating smoke, this experience was nothing less than a foretaste of the vision of hell on earth.

Nothing was left to chance with an epidemic that had already lingered in Boston for over two years. Requiring the erection of smoke houses revealed the degree of concern about the communicability of this disease. Years later, one witness remembered, “They were all forced to alight (from their carriage), and go into a small house, where there was a fire, into which a person was throwing brimstone. Before the fire, was a platform, over which they all passed in turn, to be smoked, in order to prevent spreading the smallpox, which was then in Boston.”¹⁰⁴

Yet, taking chances was inevitable as Ward’s troops were given limited time to recover from inoculation. In principle, guards placed at the town gates restricted the exodus of individuals until eighteen days had passed since their initial infection, but under the pressures of war, these requirements were interfering with Washington’s military readiness plans. He needed his troops to move quickly to New York City and Ticonderoga, where the British were starting their next attacks, and yet he had also given strict orders to prevent spreading the disease to other battlefields along the eastern seaboard. In a rush to meet the enemy with full force, he ordered that soldiers “proceed as quickly as possible after they are well and clear of the infection” to New York City.¹⁰⁵

Two regiments departed for Ticonderoga on July 18, and on the following day, a third regiment headed there as well.¹⁰⁶ These soldiers were “smoked” before they departed, but many of them were still in their infectious period and could still shed the virus on susceptible soldiers or civilians with whom they might come into contact.¹⁰⁷ Eighteen days was simply not enough time to remove the communicability of the virus—even if scabs had formed on the soldier’s arms. Scabs are capable of transmitting the disease, and whether they were aware or not, the Continental Army departed Boston in a contagious state. That no known cases of disease were transmitted on route to Ticonderoga was fortuitous. In contrast, the two remaining regiments that

traveled to New York City during the first week of August underwent a more thorough decontamination and health review.¹⁰⁸

Despite these valiant decontamination and quarantine efforts, the selectmen's efforts fell short. The Provincial Congress, frustrated by their failure, took charge of the outbreak and ordered the selectmen to remove the infected to a remote location to avoid endangering the inhabitants. Their emphasis on island quarantine was a throwback to colonial policies, and yet they realized some flexibility would be required to accommodate those suffering from poverty, malnutrition, and sickness. They offered an important groundbreaking caveat: if the selectmen determined patients could not be moved without greatly endangering their lives, these persons could be treated at home.¹⁰⁹

Their actions came none too soon. Many Bostonians were too weak to move or be moved to a distant island hospital. While modern historians have largely overlooked the impact of the Boston siege on quarantine policy, this standoff had more influence on the adoption of a humanitarian approach to quarantine than any single communicable disease that would follow.¹¹⁰ It would forever change quarantine use in Boston and influence its application in many other colonies. Home isolation would eventually become the most accepted use of quarantine authority in America, and this practice was a direct outcome of the deplorable public health of Boston's sick and impoverished working class. Desperate times fostered innovative public health solutions that won the day—largely because the victims of quarantine were their own constituents and the resources were not available for a centralized confinement of the affected population. The unprecedented flowing of human compassion reflected a sensitivity to a human tragedy: for the first time in their lives, Boston's younger citizens were double victims of oppression, first surviving an unprecedented military siege, followed by a two-month quarantine lasting longer than any other in the eighteenth century.¹¹¹

These humanitarian efforts may have been well received by the victims but were implemented at great cost. Home isolation created challenges for the selectmen: it was much harder to control the virus when multiple houses were infected and required guards and special smoking and decontamination procedures. Despite care taken to smoke out the virus, there were seventy-eight persons suffering from smallpox on August 24 and forty-three persons as late as September 4.¹¹² It would take another two weeks before the epidemic subsided to levels deemed safe enough to revert to the red flag system of warnings. As red flags were used when the number of cases was less than twenty, their removal implied the epidemic would soon be over. The eight guards stationed at Boston's entry points were dismissed, and the selectmen urged residents to notify them if smallpox should breakout again.

This townwide quarantine ended on September 18 after nearly five thousand people took the inoculation. One historian called it the most

“successful regulated large-scale inoculation that the city underwent during the entire eighteenth century.”¹¹³ On a qualitative basis, the 1776 epidemic response was better regulated than that of 1764 with security provided not only by the Continental Army but also by the town’s guards. Unlike the 1764 epidemic, where patients were quarantined in a wide range of out-of-town locations, the victims of the 1776 epidemic were held at the town’s pest house or in their homes. Decontamination procedures were also improved in 1776 compared with the previous epidemic. The selectmen “smoked” anyone exiting the town to ensure the virus was not spread to the countryside. It was also the first civilian-military collaborative effort to control smallpox in America. This achievement would not have been possible without the Provincial Congress reaching out to the military to meet their special needs. Only 28 people died during the quarantine, although that failed to account for an estimated 230 who died from smallpox during the siege of Boston.¹¹⁴

Fire, Brimstone, and Smoke Houses

The end of the two-month quarantine did not end the fear of contracting smallpox. Unlike any other colony, the inhabitants of Massachusetts had accepted the principle of inoculation as the only means of avoiding the dreaded pox.¹¹⁵ The possibility smallpox might eventually return to Massachusetts prompted many towns to prepare for another round of exposure. The town of Lincoln (some fifteen miles west of Boston) requested the Provincial Congress to establish an inoculation hospital, which was granted on April 11, 1777, a year and nearly a month after the British fled Boston. This legislation also authorized the erection of inoculation hospitals in other counties sharing similar concerns that sensed the possible return of vindictive redcoats.

Their guidance was short lived, as public fears of another invasion relegated these hospitals to a lower priority. By the summer of 1777, the Provincial Congress issued a revised resolution prohibiting smallpox inoculation hospitals in eighteen towns in the greater Boston area, fearing the “enemy might make a sudden and powerful invasion into this state,” with Boston being the most likely target. It was believed an inoculation hospital would be a significant liability, consuming valuable building space that might be needed by the Continental militia.¹¹⁶ This policy lasted for less than a year, when it became evident a lack of inoculated soldiers affected Washington’s military strategies.

In an effort to improve military readiness, on February 6, 1778, Brigadier General William Heath took over the garrison duties of General Ward and focused on the troops’ susceptibility to the pox; he improved the barracks at Sewall’s Point in Brookline and established inoculation hospitals for new

recruits.¹¹⁷ Legitimizing private inoculations in a limited number of public hospitals was intended to control smallpox and facilitate the induction of immunized soldiers into the Continental Army. Enlisting soldiers without immunity to smallpox was a significant military liability, and Washington would not tolerate it. With the exception of those inoculated in Boston, smallpox prevention was a novel concept to the fledgling Continental Army, but it was a necessary strategy in view of the dirty war tactics of the British. Under Heath's command, Colonel Thomas Crafts was delegated responsibility for smallpox preparedness. This thirty-five-year-old vegetarian, one of the original Sons of Liberty and a "man of immense stature," had coordinated the inspection of refugees arriving in Chelsea in the winter of 1775.¹¹⁸ He implemented Heath's inoculation program by sending soldiers to the barracks at Sewall's Point in Brookline and soon thereafter to the West Boston hospital.¹¹⁹ Sewall's Point was convenient for the soldiers, and it was equally accessible for civilians interested in this service. However, the Provincial Congress' resolve only authorized Dr. Joseph Gardner to improve the West Boston hospital for the sole purpose of inoculating soldiers in Colonel Craft's regiment. While these efforts were laudable, inoculating the Continental Army created a demand for civilian medical services that soon led to dangerous consequences.

Behind the urgent military inoculation strategy was a brash effort to expand the medical practice of one of Boston's up and coming physicians. It was not a coincidence that on the same day the Provincial Congress authorized Dr. John Warren to conduct inoculations at Sewall's Point. Warren was the younger brother of the famous Dr. Joseph Warren, one of the fallen heroes of the battle of Bunker Hill. Because of illness suffered by the hardships of the military campaign of the previous year, he had received permission to leave the army medical staff in April 1777.¹²⁰ In the fall of that same year, Warren entered into a partnership with Isaac Rand and Lemuel Hayward to construct an inoculation hospital at Sewall's Point. One of the conditions placed on the hospital was guaranteeing security and public health controls to assuage the fears of neighbors. He was admonished to take "due care by posting guards and cleaning his patients to prevent the infection from spreading."¹²¹ No mention was made of the types of patients authorized to receive inoculation, although ensuing activities would make it apparent Warren's motives in serving anyone in need of his services were in conflict with the provincial laws restricting inoculation to soldiers.

These legislative actions did not sit well with the Boston Selectmen. Fifteen families had smallpox on March 14, and the townspeople feared it had spread from patients residing at the hospital. After learning of the disease's prevalence, the townspeople gave their consent to inoculation, but many were concerned one or more physicians had been performing unauthorized inoculations and spreading the disease.¹²² The selectmen assuaged their

concerns declaring none of the physicians had performed inoculation prior to the town meeting. Despite governmental assurances of safety, opening an inoculation hospital near a residential neighborhood was worse than opening a slaughterhouse next door. Rumors ran rampant of an inadvertent spread of the virus from partly decontaminated patients.

Public declarations apparently were not enough to calm citizen outrage. The selectmen called a special meeting on Sunday evening, March 15, at 7:00 p.m. at the home of selectman John Scollay, with all eleven of the town's physicians in attendance, including Warren. The physicians were warned to stop inoculation within ten days but, in the meantime, would only be allowed to continue this service if they promised to offer free inoculation to the poor. This deal was nothing short of a conspiracy of mutual benefit to the selectmen and the town's physicians. Unfortunately, some physicians continued inoculating past the deadline, which further eroded public trust in the medical profession.¹²³

The professional gaffes of Warren and his colleagues in extending services to unauthorized patients coupled with strong suspicions the Sewall's Point hospital was spreading the virus convinced legislators to close its doors on May 1, 1778.¹²⁴ Despite this setback, Warren's medical practice was tarnished but not destroyed by tempestuous neighborhood opposition. He would eventually play a critical role in establishing a medical school at Harvard College and become one of the leading surgeons in New England.¹²⁵ His son, John C. Warren would later play a significant role in the administration of the Boston quarantine establishment some forty years later.

Public agitation against the ever-present virus was not limited to demands to close hospitals: citizens also wanted protection from strangers who might carry the disease. There was only one way to do that in eighteenth-century Boston, and that was by "smoking strangers" until they were either dead of smoke inhalation or cleansed of the virus. Responding to public sentiment for dramatic action, the Provincial Congress ordered Boston, Roxbury, and Charlestown to erect smoke houses and require all persons passing through these towns to be smoked. The Court's frenetic legal efforts against smallpox reached its end in the spring of 1778 when Boston's inoculation hospital was stirring neighborhood debate, smoke houses were at every border crossing, and the legal tender of the land was tinged with smoke and brimstone. The controversy surrounding Boston's only inoculation hospital did not alter public support for inoculation in the rest of colony. As the threat of another British invasion diminished, legislators were pressured to address lingering cases of smallpox, which were deemed a greater threat. The edict prohibiting inoculation hospitals for the use of the civilian population was rescinded on April 10, 1778. Towns were authorized to erect inoculation hospitals under such rules and regulations that they may so direct.¹²⁶ Rather than controlling inoculation as a legislative prerogative, the Provincial Congress smartly

delegated its authority to local officials who were more apt to control the practice in ways acceptable to its citizenry.

The enemy had damaged the hospital on Rainsford Island during the siege of Boston to such a great extent that the selectmen were forced to rely on home quarantine to thwart the outbreak of 1776. The experience of fighting smallpox during the war gave birth to the nation's first documented humanitarian response to accommodate the needs of the sick even when their infections posed grave dangers to the community. Eventually, the selectmen repaired Rainsford Island hospital, but this decrepit island hospital did more to shape the future of American quarantine by its state of disrepair than any of the improvements made to it in subsequent years.¹²⁷

The presence of smallpox in Boston had a significant impact on the outcome of the war. The Continental Army achieved a great victory when Howe withdrew his troops in the spring of 1776. The wall-to-wall smallpox quarantine of Howe's troops could not have occurred if Boston's geography was other than that of a peninsula fortified at its neck. No other eighteenth-century colonial town ever experienced such an extended public health crisis.¹²⁸

The Effects of Smallpox on the Outcome of the War

The military risks posed by smallpox on susceptible troops had an incalculable impact on the later phases of the American Revolutionary War.¹²⁹ The fears engendered by smallpox led some soldiers to flee for the countryside rather than be exposed to the disease. For those whose patriotism was unaffected by smallpox, new requirements would be imposed. The siege of Boston forced the Provisional Congress to rethink the qualifications of volunteer soldiers. It was reasoned that American soldiers were highly vulnerable to smallpox and could become a military liability to Washington and his army. In February 1777, all soldiers throughout the colonies would be required to undergo inoculation before enlisting in the army.¹³⁰

While soldiers who fled this disease may have been few, Washington's efforts to oust the British were strongly influenced by the evasive tactics of the British generals and their willingness to release infected Bostonians from the garrisoned town. The stigma of contracting smallpox was an underlying fear factor discouraging Continental troops from invading Boston. Clearly, quarantine was a known strategy for controlling smallpox that conveniently aligned with Washington's siege of Boston. A containment policy worked as long as the British hesitated to release infected prisoners. Even when thousands of poor and needy were released, Washington successfully controlled the epidemic by working collaboratively with the Provincial Congress to find suitable accommodations where they underwent quarantine. His diplomatic skills in dealing with communicable disease prepared him for the complexities of managing the competing agendas of multiple governmental

jurisdictions, each of which took a stakeholder interest in the quarantine of smallpox.

As one astute observer of human nature noted, “character is not built in a crisis, it is only exhibited.”¹³¹ Washington’s crisis management skills were clearly exhibited during Boston’s battle against the dreaded pox and his cool, calm, and collected behavior created the ambience that inspired confidence in the Continental Army and the leadership of the Continental Congress that eventually turned the tide of the Revolutionary War.



CHAPTER EIGHT

Yellow Fever and the Emergence of Boards of Health

Following the Revolutionary War, Boston enjoyed nine years of peace before facing yet another epidemic. Winning the war against Great Britain was a major military achievement, but it created numerous unintended consequences. The United States had limited trading partners compared to its days as a colony of the British Empire. Commerce had not yet recovered under the British ban on American trade,¹ making the economy a shadow of its pre-Revolutionary War era.² Yet, even more critical than trade was survival in the face of another epidemic. The long period of relative trade isolation from the world had created a generation of Americans with minimal exposure to smallpox and a diminished “herd immunity,” a term coined 131 years later to describe the public health benefits that occur when a sufficient number of people achieve immunity to a communicable disease, thereby conferring a greater degree of protection to the population as a whole.³

Boston had long been at the epicenter of the fledgling nation’s battle against communicable disease. It was also home to John Adams, the nation’s first vice president and an avid student of quarantine. Adams knew Boston’s leading physicians and was even related by marriage to the town’s port physician. Because of his national prominence, epidemics in Boston were the “talk of the young nation,” which, in part, was facilitated by the inordinate number of newspapers serving the Boston area. Though there were only eighteen thousand citizens, Boston had five weekly papers, all of which carried medical news, including stories of emerging epidemics throughout the world. Like most Americans, Bostonians were fascinated with stories of devastation, calamities, and the plague just as long as such stories were of distant ports in foreign lands. Furthermore, as the nation’s busiest eighteenth-century port,

their overseas business interests depended upon greater intelligence and attention to foreign disease than other American ports. Commanders came to Boston from virtually every continent, and these ships increased the odds of exposure to the world's most lethal viruses and bacteria.

The arrival of yellow fever in 1793 created a crisis in the medical community. Few physicians had experience with this disease, and there was no settled doctrine concerning its origin or mode of transmission. This disquietude, first manifested in Philadelphia, would soon have a profound influence on quarantine practice in Boston and other major American ports. Because eighteenth-century isolation procedures were primarily motivated by the control of smallpox, the medical profession questioned the acceptability of this practice for the numerous yellow fever epidemics along the eastern seaboard.⁴ Many physicians believed this new disease was not linked to maritime trade or transmission by humans. Arguably, many had a vested interest in proving their services could replace the time-honored principles of quarantine. Physicians were becoming a more powerful force, influencing public health policies, and quarantine was often discredited simply because it was not a marketable element of their portfolio of services.⁵ Experimentation with new treatments and a heightened interest in sanitation followed the emergence of yellow fever, yet even these developments did not affect popular demand for quarantine. Behind the divergence between the public and medical views of quarantine was a divide over how yellow fever was transmitted and for this reason its emergence called for a reassessment of isolation procedures.

Smallpox Epidemic of 1792

Boston's Selectmen did not have the luxury of fighting one epidemic at a time when its citizens continued to face the scourge of smallpox even as yellow fever captured the fears of those living in America's port cities. A multi-prong quarantine strategy was needed, and the first order of business was a plan to address the recurrence of smallpox. It returned to Boston with a vengeance in 1792, ushering in a new era of national concern about public health and communicable disease, which, in turn, raised the importance of intergovernmental cooperation. The General Court recognized the need for a more systematic approach to the regulation of inoculation hospitals and the reappearance of the pox made it clear the time for action was now. It authorized Massachusetts' towns to establish inoculation hospitals, preparatory houses (where patients could reside until the inoculation could take effect), and smoke houses (to cleanse those who may come from such hospitals). Since their use during the Revolutionary War, smoke houses gained greater acceptance after their adoption in military settings as a postinoculation disinfection. For example, Dr. James Tilton, surgeon general of the U.S. Army, affirmed smoking as a valuable fumigation technique to the extent it used

heat, a powerful technique for reducing contagion.⁶ Convinced of its benefits, on November 7, 1792, the General Court authorized inoculation hospitals and smoke houses—in effect endorsing the practice of the previous fifteen years. The timing of this legislation could not have been better.⁷

On November 21, 1792, Boston's selectmen took notice of a case of smallpox in its West Boston hospital.⁸ For the next six months, the selectmen authorized townwide inoculations to avoid another epidemic. Taking no chances, the selectmen also ordered the identification and removal of strangers and foreign vessels no matter the evidence. The epidemic was soon brought under control by the selectmen's timely actions. Quarantines in eighteenth-century Boston were almost always triggered by the arrival of smallpox-infected vessels (67 percent of quarantines) or because the vessel came from a suspicious port (24 percent of quarantines).⁹

Yet, for all the fear it engendered, a new even more lethal disease began to worry Bostonians. Initially without name, it was frequently confused with "remittent" fevers associated with miasmas of swamp land or the foul odors of putrescible waste found on filthy urban streets. In its early stage, the disease triggered giddiness and dry hot skin soon followed by high fevers, throbbing arteries, and a flushing of the face leaving victims gasping for cool air. As the disease progressed, the victim would succumb to violent retching, ejecting foul black vomit and stools and saffron-colored urine. In the final stages, the victim could be in a state of delirium from two to forty-eight hours, during which time vomiting became more frequent and strained, tongue turning black, and eyes became yellow and sunken. Finally, the victim's body took on a deepening yellow color as blood oozed from the mouth and nostrils and sometimes even from the eyes and ears. Once a black and bloody mix of excreta were released in the vomit and stool, the victim's mutterings would reveal the depth of the ensuing coma and death followed in short order.¹⁰ It came to be called "yellow fever," since one of its symptoms was a yellow or jaundiced skin.

Yellow fever confounded traditional disease transmission theories and inevitably led to a reassessment of quarantine practice. Physical isolation was the conventional response to smallpox, but not so for yellow fever. Many physicians believed the new disease spread through invisible means and feared it traveled with the winds as an unstoppable, limitless primal force.¹¹ Faced with these imposing miasmatic threats, quarantine seemed a feeble countermeasure. Yet, the shift away from quarantine had taken root even before the specter of yellow death with the use of inoculation and inoculation hospitals immunizing the population before an outbreak. Humanitarian sensibilities were the call of the day for medical professionals, and quarantine was losing its cachet.¹²

Quarantine was also antithetical to some of the principles espoused by the new American government. Confinement of the sick without treatment was unacceptable, and medical professionals lobbied hard to demonstrate their

services were more valuable and preferable to quarantine offered at the hands of the town's island keeper. Physicians believed some form of intervention was required for virtually any communicable disease, even if they did not have any reliable pharmaceutical intervention. Physicians chose treatments based on their past experience with similar bilious and remittent fevers, and patients accepted these concoctions—various chemicals (i.e., toxic mercury), drugs, herbal remedies, emetics, and purgatives—willing to try virtually anything ministered by a respectable physician.¹³ The frequent use of these remedies reflected less on their efficacy than on the desperate search for alternatives to quarantine.¹⁴

The Yellow Fever Debate

Called Philadelphia fever by some, it struck America's port cities in the summer of 1793. Reports suggested the index case was found on August 5 near Philadelphia's dock district. Dr. Benjamin Rush, one of the city's leading physicians and one of the signers of the Declaration of Independence, ascribed the outbreak to putrefied coffee left on a wharf.¹⁵ The docks and public streets were dirty areas where citizens dumped their offal and other putrescible wastes. Human excrement was discharged into open sewers, and added to the aroma were the smells from fish wastes and the bodies of dead cats and dogs.¹⁶ Summer-time smells in cities like Boston and Philadelphia were often unbearable, searing the nasal passages of even the most hardened sailors. Unless you grew up in a city without sewers or functioning public drains, it was hard to comprehend the pungent fumes released by decomposing animals on a hot windless day. Smells of this intensity left a permanent memory of the presumed causative factors of disease. Not surprisingly, virtually any putrefying waste was believed to be an agent of disease.

Initially, Philadelphia's citizens thought nothing of this fever, since bilious and remitting fevers were common. Like most epidemics, this one started with a strong dose of denial, but after nearly three weeks of documented cases, forty-nine-year-old Governor Thomas Mifflin directed the "inspector of sickly vessels" to investigate the cause of the "malignant and contagious fever in the city."¹⁷ In turn, the inspector contacted Rush, Philadelphia's former port physician, for advice.¹⁸ After seeing numerous cases with extremely malignant outcomes, Rush was certain this was no ordinary bilious fever. He made his opinions known in late August of 1793, concluding the disease to be contagious. It took several weeks of working with hundreds of cases for him to decide that it was not. He noted that those who fled to the country rarely spread the disease, and even those in close contact with patients did not contract yellow fever. Rush believed this confirmed it was a filth-borne disease prevented by improved sanitation, personal hygiene, and street cleaning.¹⁹

Few physicians supported Rush's miasma theory, but among them were Noah Webster and two respected Boston physicians, John Warren and Isaac Rand (1743–1822). Warren, a forty-year-old physician and founder of Harvard Medical School, ministered to some of the wealthiest and most influential Bostonians of the age, including Abigail Adams. Rand, ten years older, collaborated with him in his medical practice. Both men had a profound impact on Massachusetts medical practice for the next thirty years, with Rand serving as president of the Massachusetts Medical Association from 1798 to 1804 and Warren succeeding him in that post until 1819. Their views on yellow fever as a miasmatic disease may have run counter to popular opinion, yet within medical circles it was quite different. Warren took his cues from Rush, believing gaseous emanations created epidemics under the right atmospheric conditions found on hot, windless summertime days, "where noxious air or putrid exhalations" are created.²⁰

The debate between the contagionists who believed yellow fever was an imported disease and noncontagionists who believed it was of domestic origin was not a friendly one. Much was at stake in this medical debate. If the contagionists were right, then quarantine should be expanded, and the federal government should be pressured to play an even greater role of mediating the public health and commercial policies of the young nation. If the noncontagionists were right, then greater efforts were needed to improve the sanitary conditions of American cities, remove marshlands, and control the location and activities of noxious trades. There was a growing awareness that urban development and its attendant uncontrolled discharges of sewage was contaminating drinking water and contributing to a noxious atmosphere. Filth and wastes found in urban areas was also thought to cause a wide range of endemic disease, including this "Philadelphia fever." Quarantine, for the anticontagionists, was also a legacy of medieval practices more akin to witchcraft than to medical science and therefore inconsistent with the prevailing views of many physicians.

Rush, like Warren and Rand, was an anticontagionist despite the prevailing view of most public health officials that held yellow fever to be contagious.²¹ In contrast, one of the strongest proponents of the contagion theory was William Currie, a Philadelphia physician and an old friend of Rush who pointed to its origin in the West Indies and identified numerous instances where ports along the eastern seaboard attributed yellow fever to vessels from tropical islands.²² If putrid exhalations from the streets and gutters were its cause, why weren't other cities with equally great levels of urban filth experiencing this disease? In a similar vein, years later, Currie questioned why cities with less putrid streets like Portsmouth, New London, Boston, and Wilmington should succumb to yellow fever.²³ He artfully poked holes in theories that overlooked evidence and did not support their worldviews even as he failed to see the holes in his own theories—notably, his naive view

of the cleanliness of port cities like Boston. Currie was not opposed to the miasma theory. He merely took the position it was not the cause of yellow fever, even if it might explain the origin of other seasonally recurring fevers such as bilious fevers. He also argued the miasma notion was not supported by experimental data and merely reflected the visionary opinions of those who also believed in such nebulous concepts as planetary forces causing plague.²⁴ Lives were at stake in this medical debate. Currie claimed it was dangerous to provide bedside services to the sick, since, without evidence to the contrary, it could further spread the disease. He also pointed out that outbreaks invariably occurred in port cities near infected vessels, persons, clothes, or bedding originating from the West Indies. To rebut this argument, anticontagionists provided numerous instances where nurses failed to contract disease even when in close contact with infected persons.

The threat of yellow fever came at a time when the young nation relied heavily on interstate trade for its prosperity, which was especially true for Boston, one of the nation's major commercial ports. Passage by vessel was the most common means of travel along the eastern seaboard, and therefore, vessels coming from infected ports posed a significant public health and commercial challenge for the new federal government. Moreover, because of the commercial policies of England and France, trade of American goods in tropical islands was forbidden even though illicit trade was carried on.²⁵

While these debates raged on, the Boston Selectmen, being practical men, imposed quarantine against incoming vessels from suspicious ports.²⁶ With the growth in interstate commerce and improved roads, the selectmen supplemented maritime quarantine with landside border security. Port cities blockaded vessels from sister ports and stagecoaches from inland towns at the first rumors of a yellow fever outbreak.²⁷ Preemptive quarantine became so common they triggered a national crisis of confidence. Port cities were quarantining their state trading partners at a time when such restrictions were intolerable. American trade relations with its European allies were luke-warm at best and Britain still controlled the shipping lanes across the Atlantic. When war broke out between England and France on June 8, 1793, the United States was treated like a neutral nation, and its ships were seized by either party. One historian described the American predicament as having her commerce "ground between two millstones."²⁸ The combination of trade embargos and quarantine proved a formidable obstacle to commerce that captured the public imagination and promised to sabotage the nation's economy.

In the midst of these international trade embargos, interstate quarantines raised public awareness of their adverse commercial impacts, which became more visible as the federal government created trade barriers of its own, imposing duties on European imports in an effort to give greater commercial advantage to its own shipping trade.²⁹ The adoption of the Jay Treaty in 1796

reduced trade barriers with the British but also imposed a significant number of new barriers to discourage American trade with the West Indies for molasses, sugar, coffee, cocoa, or cotton.³⁰ Nonetheless, within two years of its adoption, nearly one-third of American exports were destined for the West Indies.³¹ In turn, the islands provided food and goods for which Americans had a growing appetite. Unfortunately, the federal government could ill afford commercial dependence upon foreign nations, no matter how appealing the goods, and therefore, its first priority remained encouraging trade among the eastern seaboard states.

For those believing in the miasma theory, self-imposed trade barriers like quarantine were to be avoided at all costs. Jay's Treaty restrictions on commerce with the West Indies were already bad enough. In fairness to John Jay, a Supreme Court justice and negotiator of the Jay Treaty, he did not anticipate state quarantine regulations could adversely impact commercial trade. His treaty with Great Britain makes no mention of quarantine nor of its potential adverse consequences upon New England merchants.³² Yet, the threat of an unknown disease and the panic it generated caused numerous cities along the eastern seaboard to impose extended quarantines against foreign and domestic vessels and travelers. Despite unsettled medical opinion concerning its transmission, the politics of epidemics called for action, and maritime quarantine represented the least burdensome strategy to seaport residents. It also had another advantage: it reinforced fears of imported disease and placed the sacrifices on the shipping industry not the citizens. Without an international quarantine treaty to guide isolation and decontamination procedures, each port was free to restrict shipping for whatever length of time they deemed appropriate.

Regardless of the origin of this new fever, a public health intervention was a political necessity. In the fall of 1793, Philadelphia lost 4,044 persons, or about 10 percent of its population, in less than three months. This exceptionally high mortality was not merely a Philadelphia concern. As the nation's capital and center of commerce, it triggered a national debate on the role of the federal government in controlling the "saffron scourge."³³

Panic Principles Prevail

In contrast to Rush's theory of the local origin of yellow fever, Isaac Rand Jr. (1769–1819), Boston's quarantine physician, believed he had firsthand evidence it was imported from the West Indies—a declaration that stood in contrast to the views of his namesake father. Even before learning of the "dangerous and infectious disease" prevailing in Philadelphia, Rand learned the Captain of the schooner *Neptune* died eight days before its arrival in Boston Harbor on September 10, 1793.³⁴ The ship's mate arrived in Boston dangerously ill with the same disease. Rand inspected the vessel and ordered it

into quarantine on Rainsford Island. This was the opening salvo of a broadening war against pestilence; within ten days, the sloop *Peggy* arrived from Philadelphia carrying news that yellow fever had engulfed that city. The selectmen ordered Samuel Laha, the island keeper to quarantine *Peggy* and “proceed with more caution than in the smallpox,” a clear sign that Bostonians were doubly apprehensive of this novel disease.³⁵

News of the Philadelphia epidemic set off a tidal wave of legislative and public health activities, the likes of which few had seen since the smallpox epidemic of 1776. The very day *Peggy* arrived the legislature requested Governor John Hancock to issue a proclamation requiring sheriffs and constables in each of the towns to take measures to prevent its introduction into the Commonwealth. He also ordered every town to appoint a health officer to stop and examine persons and merchandize coming from Philadelphia or other infected places. These health officers were authorized to detain and remove persons and their baggage and ensure they were purified from infection.³⁶ Hancock was not taking any chances; even those suspected of infection were quarantined in the pest house on the southwest corner of Cambridge and Grove streets, about a block away from where the Massachusetts General Hospital would eventually be located some twenty-eight years later.³⁷

At the outset of the epidemic yellow fever was indistinguishable from other fevers. It was quite common for bilious and remittent fevers to be lumped into one category based on their common symptoms. Diseases like malaria, typhus, and typhoid were generally thought to be one disease throughout much of the nineteenth century.³⁸ It was the yellow color of the victims and the high mortality rate from yellow fever that distinguished it from other fevers. But these two clues were not immediately discernable at the outset of the epidemic.³⁹

Boston Selectmen appointed forty-five-old Josiah Waters Esq. as the town’s first health officer and charged him with examining all visitors—whether arriving by land or sea—and reporting back to them.⁴⁰ Despite some ninety years of history with quarantine, after the Revolutionary War, the Commonwealth had divested itself of its colonial health laws “sun setting” the most archaic under the assumption that landside threats would never recur in Boston.⁴¹ Waters had the formidable task of stopping all Philadelphians from entering Boston. With several ferries, two bridges to Cambridge, and a two-lane road over Boston Neck, this task was well beyond the reach of any one individual. Added to his duties, Waters was not only the town’s gate keeper; he was expected to distinguish between friend and foe for the next 145 days—the forecast Hancock proclaimed necessary to prevent yellow fever.⁴²

The response to the governor’s proclamation was overwhelming. Social, religious, military, and medical organizations joined forces to fight the

anticipated yellow scourge. Taking no chances the selectmen, believing it to be highly contagious, felt the safest place to send strangers was to Rainsford Island. Their fiscal prudence had time and again resulted in an appropriate response to past epidemics, but this time it was foolish to believe one health officer could stop every visitor arriving at multiple border crossings. A complete landside quarantine was needed, so the selectmen requested Hancock to provide military guards to reinforce Waters' efforts. As public interest heightened, military support was soon supplemented by the spiritual convention of the associated pastors of the churches in greater Boston that called for a day of prayer at the meetinghouse in Brattle Street in Cambridge. Persons of every denomination of Christian were invited and asked to "deprecate those judgments of heaven" that a sinful people deserved. The word "deprecation" at that time did not imply Christians were going against the will of God. It merely expressed their wish the epidemic might be averted. This expression of nondenominational Christian unity in the face of the onslaught of a deadly scourge may not have been surprising to readers of the *Columbian Centinel*—Boston's major newspaper of the day—but it certainly was a rarity for that time.⁴³

Prayers were not the only resource available. The Boston Medical Society believed their counsel offered the best means of averting an epidemic. Based on their guidance, on September 24, the selectmen crafted Boston's first quarantine regulation after the Revolutionary War era, reaffirming Rainsford Island as the place for isolating and cleansing infected vessels. Unlike previous laws, it authorized thirty-day quarantines, an unprecedented length of time and about five times longer than historical practices of the eighteenth century, revealing a disease's bark is always feared more than its bite.⁴⁴ This regulation also set forth one of the most remarkable disinfection strategies ever conceived. Vessels in quarantine were to be washed with vinegar and cleaned by the explosion of gunpowder between decks and in the cabin even if the vessel was without any sick persons on board. Presumably, vinegar's acidity was understood to have some value in disinfecting contaminated surfaces, and exploding gunpowder dispelled contaminated air and hopefully left the vessel afloat.⁴⁵

Unlike previous quarantine procedures that relied on the honor of the master or commander, the selectmen in post-Revolutionary War America took the extra precaution of depriving vessels of their landing boats and required government approval for any other vessel to approach one held in quarantine.⁴⁶ Travel by horse or stagecoach was now common, and Bostonians could just as easily expect to encounter visitors from Philadelphia landing by vessel as by stagecoach. Watchmen had not exercised quarantine duties at the town gate for many years, but yellow fever would resuscitate old warding off practices. For example, in late September 1793, Waters reported detaining ten persons at the town's entrance who had arrived from locations

south of the Connecticut River. Strangers admitting to be Philadelphians were removed to Rainsford Island, whereas residents of Massachusetts could enter but only if not staying overnight or had approval to stay with friends. Historians have romanticized the freedom of mobility in post-Revolutionary War Boston, yet in reality, epidemics created an atmosphere quite the opposite. Neighbors were expected to rat out fugitives as such guests were likely propagators of yellow fever.

Confining large numbers of out-of-town visitors also stretched the resources of the island keeper. Appointed in 1779, Laha was a seasoned quarantine official skilled at managing a wide range of disease outbreaks and coordinating services, including rowing patients to the island, nursing the sick, fumigating vessels, managing island agriculture, and preparing routine reports for the selectmen. Yet, the yellow fever scare overwhelmed him. To accommodate the surge in visitors, on October 3, the selectmen hired Captain Nathaniel Lyde to relieve Laha from his boat duties so he could guard against the escape of captive Philadelphians who were deemed flight risks. While few ever escaped, it would not have been impossible for a daring person to swim ashore on an incoming tide, especially during the summer months. But these were cool fall days, and an ocean escape route would have been close to suicidal.

Newspaper coverage of the anticipated epidemic had driven Bostonians into a frenzy. During the fall of 1793, the *Columbian Sentinel* chronicled the spread of yellow fever throughout the city of Philadelphia. On October 5, Bostonians learned as many as two thousand Philadelphians had already died and, four days later, that another twenty-five thousand Philadelphians, or about half of its population, had fled the city. Business was at a standstill, but the banks were said to be open—presumably so citizens could take their money and run for their lives.⁴⁷ Their concerns were heightened by the recent opening of a second bridge to Cambridge completed on November 23, making access to Boston even easier and a townwide quarantine more challenging.⁴⁸ The town's primary entranceways, Boston Neck and its two bridges, were cordoned off and access controlled by armed guards. The town's vigilance seemed to have no bounds, and now cost was no obstacle. In an uncharacteristic mood of generosity, the selectmen even bought Mr. Waters a horse to keep up with the travel required between various border crossings. As the first cousin of William Dawes, the famous Boston freedom rider, Waters was an excellent rider and thoroughly familiar with Boston.⁴⁹ While Waters used his trusted horse for security duties, he could count on two physicians to examine visitors coming from anywhere other than Philadelphia. If the physicians reported it safe, then visitors could enter. In contrast, anyone from Philadelphia, whether healthy or sick, was taken straight to Rainsford Island.⁵⁰

Apprehensive that hundreds of Philadelphians would be arriving at the town's doorstep, the selectmen soon realized previous plans were inadequate.

Was access to town really limited to Boston Neck, its two bridges, or public ferries? What if a visitor rented a boat and landed at one of dozens of town wharves? To address this concern, the selectmen appointed thirty-seven citizens, including Paul Revere, the famous silversmith and Revolutionary War hero, to make daily visits to all the houses within their ward and report the presence of visitors. Anyone so identified had to declare his place of origin, and if a person had already fled Boston, information as to his likely whereabouts. Bostonians were forbidden to harbor foreigners, without immediate notification to one of the designated ward watchers.⁵¹ Desperate times called for a resurrection of the town's "warding off" policy as long as yellow fever prevailed.

Some two months after the *Neptune* arrived in port, the *Columbian Centinel* reported yellow fever had subsided in Philadelphia with no new cases during the previous five days. Philadelphia's public offices were to open the following week and the city was said to be safe enough for President Washington to visit. Nevertheless, the life of the president was too precious to take any risks, so he stayed in the nearby suburb of Germantown even though it was believed Philadelphia was perfectly safe.⁵² Not surprisingly, this good news from a sister city was enough to prompt Boston Selectmen to deactivate personnel and dismiss Lyde from his job as the captain of Rainsford Island boat and order Waters to dispose of his horse and remove the guards and barriers placed at the town's entranceways.⁵³ The selectmen could ill afford these ongoing expenses after spending over 320 pounds, or about \$58,000 at today's prices, for civilian and military guards, the services of physicians, the health officer, boat service, and vastly expanded island quarantine.⁵⁴ These expenses would haunt the town for years to come as it sought fanciful ways to discharge its debts and meet its ongoing public health needs. In desperation, to support its public health responsibilities, the General Court gave the town six square miles of land north of the Waldo Patent in present-day Maine to be used for a Boston hospital.⁵⁵ Cash might be in tight supply, but the General Court was awash in land, and such real estate payments were the order of the day during the depressed economic times at the turn of the eighteenth century.

Boston's rapid deployment of quarantine and ward watchers was driven by the publicity surrounding Philadelphia's yellow fever epidemic. In a break from normal reporting customs, the *Columbian Centinel* gave front-page exposure to yellow fever stories and to the actions of the governor and the Massachusetts General Court.⁵⁶ Normally, such stories appeared on the second or third page of the paper with local news. Prominent news coverage contributed to the town's remarkably prompt public health response. Without solid information on the causative agent of yellow fever or its incubation period, speculation concerning its communicability increased the intensity of the response measures. Unlike quarantines against the Irish where their

ethnicity was used as shorthand for contagious disease, quarantines against Philadelphians did not align with any preexisting ethnic or religious forms of discrimination. Philadelphia was the nation's capital, so Boston's quarantine was driven by fear and panic not by ethnic prejudices.

Boston survived the saffron scourge by its ability to muster its traditional xenophobic legal instruments: quarantine controls, Puritan values of self-reliance under pressure, and the fortunate luck of being in northern latitudes beyond the normal temperature limits for yellow fever–carrying mosquitoes.⁵⁷ Remarkably, not one Bostonian died during the yellow fever scare of 1793, underscoring the degree to which governmental vigilance could be effectively fueled by the incendiary newspaper stories of cataclysmic events in Philadelphia.

Federal Intrusion into Public Health

Boston's hyperresponse to the Philadelphia epidemic had several unintended consequences. For one, other colonies took notice of Boston's excessive use of quarantine. They also noticed their continued abuse of such measures even after the epidemic was over. For example, when the selectmen quarantined three of Philadelphia's vessels in the fall of 1793, simply because they came from an infected port, Philadelphians were rightfully upset that quarantine had become a trade barrier and that only the federal government could impose duties or halt the free flow of trade. The seat of government was in Philadelphia so Congress had firsthand exposure to the ravages of yellow fever. They also knew variations in state quarantine laws created a crazy quilt of regulations adversely affecting domestic trade.⁵⁸

Representatives from seaport states took up the need for a national quarantine strategy during the fourth Congress, using the yellow fever panic and subsequent outbreaks as the catalyst for a federal quarantine law. Simple in its scope, the law authorized the president of the United States to direct revenue cutters to aid states in the execution of quarantine and health laws as he may deem necessary.⁵⁹ Unprecedented in its scope, it made public health a federal prerogative that nibbled at the authority of the states. One of the reasons for its notable simplicity reflected the fear of giving the president too much power over states and their political subdivisions. The Revolutionary War had toppled the monarchy's grip over the thirteen colonies and replaced it with political power resting at the state level. Expansion of the federal government's role was the last thing most states sought after liberating themselves from the centralized authority of the British Parliament.⁶⁰ Not surprisingly, William Lyman, a Massachusetts congressman, felt individual states should have sole control over quarantine. He pointed to Boston's quarantine regulations as a necessary local governmental control and asserted that while taxation of imported goods may be a federal power, it

should not extend to preventing the landing of persons infected with disease. Similarly, John Williams, congressman from New York, saw no need to give the president such power, since local governments could better manage and direct the time and place for performing quarantine. Pennsylvania's Congressman Albert Gallatin was also vocal in his opposition to the United States assisting individual states in enforcing their quarantine regulations, and he vehemently opposed giving it the sole right of making such regulations.⁶¹

Yet, there were some who recognized the federal government would need to play an active role, including Congressman William Smith from South Carolina. He asserted "epidemical diseases" not only affected the city where first imported but obstructed the commerce of all others, thereby injuring the revenues of the nation.⁶² Smith envisioned a federal government with broad powers to protect its citizens against disease and felt this authority was especially needed when some states failed to enact quarantine regulations. Despite such pleas for common sense, the majority of Congress voted against empowering the president to control quarantine. As a result, Congress limited the president's authority to a supportive role; if a state needed help with quarantine, the president could provide vessels and officers to assist with port security and other related functions. This watered down legislation, passed in 1796, would only last for three years. Continuing yellow fever outbreaks along the eastern seaboard coupled with ineffectual local quarantine of vessels and travelers inevitably led Congress to reconsider stronger measures to stave off the most lethal disease ever witnessed in eighteenth-century America.

A Tale of Two Quarantine Systems

Was Boston's eighteenth-century reliance on quarantine unique to its culture and form of government, or was it typical of other colonial port cities? Comparing the quarantine practices of Philadelphia with those of Boston provides insight into the varying dynamics of epidemic response between colonial governments. There are five key differences between the quarantine systems of these two colonial ports: (1) the governmental controls established by each municipality; (2) their quarantine policies; (3) immigration patterns and policies; (4) geography and harbor locations; and (5) differences in participatory forms of democracy.

Who's in Control

Unlike Boston, Philadelphia's colonial quarantine system was managed by the Pennsylvania provincial governor without oversight by Philadelphia's mayor or city council. Philadelphia was one of the few colonial ports where

quarantine policy rested in the hands of the governor.⁶³ It remained under the governor's authority from 1700 to 1798, when the Philadelphia Board of Health took over. Placing quarantine under the governor seriously limited its routine use. Pennsylvania's governor issued only two quarantine proclamations against infected ports from 1700 to 1775. In contrast, Boston Selectmen issued twenty-nine quarantine proclamations during this same period.

When Boston or Philadelphia experienced epidemics, news reached these sister cities quite quickly by colonial standards—usually within five days on the next inbound vessel.⁶⁴ Boston's selectmen ordered quarantine against Philadelphia vessels in 1736, 1741, 1750, 1756, 1762, 1793, and 1798.⁶⁵ By publishing these edicts in Boston newspapers, the selectmen guaranteed colonial ports along the eastern seaboard would be forewarned of their quarantine measures. Philadelphia vessels faced more quarantine inspections in Boston Harbor than vessels from any other colonial port city in the eighteenth century—reflecting Boston's great concern with Philadelphia's health.⁶⁶ Significantly, Philadelphia never issued a quarantine order against Boston vessels even though there were at least six occasions during the eighteenth century where it made sense.⁶⁷ For reasons reflecting lax quarantine management, a bias toward unhindered commercial trade, and the colony's liberal immigration policies, this never happened.⁶⁸

The huge disparities in the use of quarantine can't be dismissed based on the varying levels of epidemic disease or mortality. Indeed, eighteenth-century colonial Philadelphia had nearly twice as many epidemics and nearly double the smallpox mortality of Boston.⁶⁹ As Gilda Marie Anroman, a public health historian, insightfully notes, Philadelphia had at least ten smallpox epidemics in the eighteenth century with a greater loss of life than Boston experienced in its six epidemics.⁷⁰ Some historians have argued Philadelphia was more vulnerable to epidemics of yellow fever than Boston, reflecting its more temperate climate as well as its strong commercial ties with the West Indies where *Aedes aegypti* mosquitoes routinely hitchhiked passage to America in the holds of ships.⁷¹ Yet, Boston also had strong commercial ties with the West Indies, facing similar threats of imported disease, yet only experienced one yellow fever outbreak in the eighteenth century.⁷²

Lax quarantine had an adverse impact on smallpox mortality in Philadelphia.⁷³ An absence of stringent public health policies during the colonial era made the city vulnerable to communicable disease. For example, Philadelphia's Province Island quarantine station, established in 1743, was not fully operational until 1749 when the colonial legislature was pressed to construct suitable accommodations for the multitudes of immigrants pouring into Philadelphia each year.⁷⁴ In contrast, Boston established its official island quarantine program thirty-two years earlier and had an informal island quarantine program for nearly a century before Province Island station was conceived. Boston required sequestration for those seeking inoculation, whereas

Philadelphia never constrained physicians practicing this craft, thereby contributing to the death toll from smallpox.⁷⁵ Boston required guards to restrict access to houses where smallpox was known to exist, whereas Philadelphia never enacted such laws or practiced house quarantine.⁷⁶ The disparities between the two quarantine programs are dramatic—reflecting Boston’s greater focus on self-rule, which led to much greater accountability and timely responses during epidemics. Power was leavened by those with the greatest stake in the outcome—its citizens. For these reasons, the ecological and commercial trade differences between the two cities were less important factors affecting epidemic disease than their disparities in public health enforcement.

Were there other factors that account for the relatively lackluster use of quarantine in Philadelphia? It certainly wasn’t the lack of epidemics or the loss of life for Philadelphia’s citizens. A high rate of mortality was taken as an inevitable consequence of the “seasoning” required to adjust to the climate and diseases of the new world.⁷⁷ Thousands died from smallpox and yellow fever, yet these epidemics rarely prompted a legislative reassessment of quarantine in Pennsylvania. After enacting its landmark quarantine law of 1700, requiring vessels to remain at least one mile from any port in the colony without bills of health, colonial Pennsylvania made very few modifications to how it was administered during the pre–Revolutionary War era.⁷⁸ One modification established the quarantine station on Province Island and the second required improved sanitation and living conditions on vessels.⁷⁹ These legislative actions were not as commendable as they might appear. As one historian noted, the quarantine law of 1700 was never really implemented, and subsequent revisions were either ignored by masters and commanders or disallowed by the British Privy Council.⁸⁰

In contrast, Boston enacted seventeen quarantine laws during the same period with each law designed to remedy failures of past quarantine practices. Bostonians were much quicker to seek legislative solutions to public health issues than their Quaker counterparts. Unlike Pennsylvania’s colonial legislature, which felt an allegiance with British government laws, the Massachusetts Bay Colony consistently found ways to evade British sovereignty and the Privy Council. Foremost among their tools for evasion was the use of temporary laws that fell outside the domain of the Privy Council and were reenacted as needed.⁸¹ Furthermore, by turning quarantine administration over to Boston Selectmen, routine decisions were completely outside the purview of the Privy Council.

As the classic management paradigm goes, “if it isn’t measured, it isn’t managed,” which aptly describes why Philadelphia fell victim to more epidemics and had a higher mortality rate than Boston. Revisions to quarantine strategies—whether they be maritime or land based—required data on their effectiveness. Boston conducted a census of morbidity and mortality after

each smallpox epidemic, including the number who took inoculation and those who died from it.⁸² During every eighteenth-century smallpox epidemic, its selectmen conducted a census of cases to determine the impact of its quarantine and inoculation policies.⁸³ In contrast, Philadelphia had no disease reporting system other than one imposed on shipmasters. Without such a system, home or neighborhood quarantine would be meaningless. Even a retrospective analysis of Philadelphia's epidemics has been far more challenging for modern historians than for Boston.⁸⁴ Philadelphia's smallpox and yellow fever mortality statistics are derived from a potpourri of sources—all providing sketchy assessments of past epidemics.⁸⁵

Immigration

Philadelphia, the city of brotherly love, also had a more accepting approach to immigrants than Puritan Boston.⁸⁶ As a result, Philadelphia saw far greater immigration in the eighteenth century than Boston.⁸⁷ The city's population grew five-fold between 1720 and 1774, a phenomenal rate that was primarily attributable to massive immigration to the colony.⁸⁸ In contrast, Boston's population only increased by 44 percent during the same period, reflecting significant outmigration, the impact of smallpox epidemics, and limited developable land on Shawmut Peninsula.⁸⁹ Anroman argues Philadelphia's massive immigration partly explains why the city's mortality rate was higher than that of Boston.⁹⁰ Smallpox struck Philadelphia more frequently, resulting in double the morality of Boston, although it had a lower smallpox death rate than that of Boston. This suggests Boston's quarantines created immune-naïve populations that were isolated from exposure for extended periods, making them more susceptible to smallpox than those living in Philadelphia. The chance of subclinical exposures were also much greater in Philadelphia with the arrival of far more pox-exposed immigrants, and this factor may have mollified the intensity of their epidemics. A groundbreaking smallpox investigation conducted in Pakistan in 1971 concluded even inapparent infections could have a positive influence on herd immunity and reduce the duration and intensity of virus shedding.⁹¹ This theory may explain why, on average, thirty-eight out of every thousand Bostonians died from smallpox in the epidemic years, whereas only twenty-four per thousand died in Philadelphia.⁹² It also suggests a quarantine paradox; efforts that reduced smallpox exposure may, in the long term, have increased its mortality. In a perfect world, quarantine would have protected Bostonians from disease carrying immigrants. Unfortunately, the eighteenth-century quarantine net was not without holes even in ports with rigorous quarantine. The only solution to this paradox would have been mandatory inoculation of the immune-naïve population, an idea never considered in eighteenth-century Boston or Philadelphia.

It was not in the moral fiber of Quakers to impose their values upon others.⁹³ In fact, Quakers accepted many religious and ethnic groups, whether they arrived in a sickly condition or not. Germans came in large numbers starting in 1708, and the Scots came starting around 1717; once settled, they were forceful in making the case for improved shipboard conditions to stem the horrendous loss of life of their countrymen on the transatlantic passage.⁹⁴ Rather than emphasize island quarantine as their primary strategy, Pennsylvania adopted laws to improve the comfort, cleanliness, and food quality of vessels. Advocates for German immigration asserted the greatest loss of life occurred on board vessels and this should be the colony's public health priority. Laws passed in 1749 and 1765 focused on improved vessel cleanliness, including requiring a ship surgeon when at least fifty passengers were on board. Unfortunately, the 1749 law was easily evaded by ship owners and that of 1765 was disallowed by the Privy Council.⁹⁵

These remarkably progressive public health laws were intended to improve life at sea but did not address glaring limitations of Philadelphia's porous quarantine system.

Geography

Before Philadelphia had a quarantine station on Province Island, quarantine was defined as distancing sickly vessels at least one mile from the city on the Schuylkill River. Unlike Boston, Philadelphia was only accessible to the Atlantic Ocean via the Delaware Bay and then up the Delaware River, a distance of some ninety miles. Philadelphian's could reach the Delaware River on the city's east side or could travel downriver on the Schuylkill River on the city's west side, which then merged into the Delaware River. Ninety miles of river shoreline provided a wide array of landing spots before entering Philadelphia harbor. Moreover, vessels often brought immigrants to multiple nearby ports in Delaware, New Jersey, or New York to circumvent Philadelphia's quarantine system.⁹⁶ Without a quarantine station available until 1743, it was easy for masters to evade the one-mile quarantine law and discharge passengers along the shores of the Schuylkill River to seek shelter in the city's suburbs.⁹⁷ Port physicians were helpless in these circumstances, since they did not have law enforcement staff to chase down quarantine scofflaws. Moreover, popular sentiment favored removal of passengers from over-crowded ships where disease and delay were considered a quarantine death sentence. Dependence on the Delaware River for commercial trade made illegal access to Philadelphia far easier than entry into Boston.⁹⁸ Boston's unique geography made the town a virtual island with strong gates at Boston Neck as well as a well-coordinated means to control harbor access facilitated by the light house keeper, the military commander on Castle Island, and the quarantine island keeper. In contrast, Philadelphia rarely attempted to

control entry via its ferries or land routes, which meant immigrants could disembark in nearby colonies and arrive via stagecoach or by foot. Lack of resources (i.e., limited staff, hospital space, legal authority, etc.) and lack of city government accountability for quarantine and medical inspections led to an unfortunate loss of life.⁹⁹

Despite the geographical disadvantages of a river-based quarantine system, Philadelphia did have dedicated port physicians to inspect vessels from as early as 1720.¹⁰⁰ No other colonial port city relied as heavily on the skills of its physicians to manage quarantine during the eighteenth century.¹⁰¹ Yet, Philadelphia's port physicians had relatively limited duties; they conducted routine medical inspections and ordered vessel decontamination as needed.¹⁰² Quarantine authority rested in the hands of the most responsible executive in the colony—the governor—which meant day-to-day management of epidemics was inevitably left to the governor's appointee, the port physician. Without local input, port physicians acted as directed by the governor and circumscribed by Pennsylvania law.¹⁰³ They had no authority to establish policy or determine the need for disease reporting, hospitals for the sick, or unilateral embargos of commercial trade. Moreover, the port physician had no authority over smallpox cases that might exist within the city, since their work was limited to the Province Island quarantine grounds.

In contrast, Boston's selectmen served as quarantine policy makers deciding on the need for increased vessel inspections, the type and scale of vessel decontamination, and the need for country quarantines as they thought fit. They also served as the town's de facto board of health in the eighteenth century, and the minutes of their meetings clearly reveal the depth of interest these men took in quarantine affairs.¹⁰⁴ Because of the selectmen's authority, its port physicians had very narrowly defined tasks and were only employed when their services were requested (see appendix C for a history of Boston's port physicians). Routine quarantine work was managed by Boston's island keeper, a position assigned to a seasoned sailor capable of negotiating the treacherous waters of Boston Harbor yet also able to care for sickly passengers.

Styles of Participatory Democracy

The comparison to Philadelphia's quarantine system suggests Boston's style of quarantine management resulted in fewer epidemics and less loss of life.¹⁰⁵ One factor that influenced Boston's use of quarantine was its commitment to a more participatory form of democracy. Its citizens demanded direct involvement in quarantine decisions at the annual town meeting and indirectly through the meetings of their elected selectmen. In contrast, Philadelphians had no means to directly influence quarantine, nor did they demand such influence. Aggravating this situation, Philadelphia's City Council

members held inherited positions—a political milieu created by the hands of William Penn—that did not permit citizen participation in municipal decision making.¹⁰⁶ Philadelphia's City Council operated much like the British House of Lords with posts held for life. These political conditions influenced the relatively lax approach taken by Philadelphia's City Council in response to eighteenth-century epidemics. Philadelphia's City Council was composed of affluent merchants with little to gain by quarantines that could stifle trade and commerce.¹⁰⁷ Even though the city council had no legal authority to impose quarantine, they could use their influence to nudge the governor to take appropriate action. However, such requests were rare, reflecting the governor and city council's bias for unbridled commerce.¹⁰⁸

Philadelphia's yellow fever epidemic of 1793 dramatically shifted public interest toward delegating quarantine authority to the municipal level. Within five years of that epidemic and after a series of severe yellow fever epidemics in 1794, 1797, 1798, and 1799, the Philadelphia Board of Health was established, and quarantine became one of its major responsibilities.¹⁰⁹ The governor of Pennsylvania would no longer issue quarantine orders or be responsible for the quarantine station as these responsibilities shifted to the board of health.¹¹⁰

Comparing the Philadelphia and Boston quarantine systems reveals cultural, political, and economic factors that led to remarkably different approaches to controlling communicable disease. While quarantine was never a perfect instrument in the battle against epidemic disease, it clearly worked far more effectively in Boston. In many ways, Boston's eighteenth-century story reflects the strength of citizen participation in local government, the importance of the annual town meeting, and the willingness of its selectmen to take a leadership role in public health policy. While mercantile interests were ever present in Boston and Philadelphia, the interests of Boston's merchant class were balanced against those of its citizens who had a personal stake in stopping epidemics. Self-interest drove local public health decisions that favored town residents. In contrast, Philadelphians, dependent upon the quarantine decisions of the colonial legislature, felt the needs of immigrants were often placed above stricter quarantine legislation. The result was Philadelphians suffered greater loss of life from communicable disease than their counterparts in Boston. The consequences of these flawed quarantine policies would lead to a national cry for quarantine reform.

Threat to the Seat of Government

During the eighteenth century, infectious disease was primarily a maritime threat best managed by harbor inspections and island quarantine. Yellow fever dramatically changed those perceptions. It proved to be poorly contained by lax quarantine procedures and spread quite readily in the

summer months, when interstate commerce was at its peak. Numerous states, including Massachusetts, continued to demand the national government take action and impose federal quarantine.¹¹¹

During the summers of 1796, 1797, and 1798, eastern seaboard cities experienced an unprecedented series of yellow fever outbreaks that altered public perceptions concerning the role of the president and the potential threat of landside exposure to disease. In Philadelphia alone 5,713 persons died during the epidemics of 1797, 1798, and 1799,¹¹² and another 3,381 persons died in other eastern seaboard towns during those same years.¹¹³ Boston was one of the fortunate port cities, only losing 200 persons in the yellow fever outbreak of 1798.¹¹⁴ Annual recurrences of this fever in seaport towns and widespread publicity of its loathsome impacts kept the saffron scourge under the scrutiny of Congress. Quarantine had always been a local or state police power, and citizens of the new republic, despite the 1796 legislation, were still uncertain if their president should play an active role. Three years of seasonal epidemics with at least 9,000 deaths and an incalculable loss of commerce shocked Congress into asserting federal jurisdiction over quarantine.¹¹⁵

These calamities created a window of opportunity for the nation's second president, a man steeped in Boston politics and intimately familiar with its quarantine program. John Adams played a pivotal role in the enactment of the nation's second quarantine statute and in centralizing public health powers. Elected in 1796, he soon realized the federal government needed to assert control over quarantine affairs. In his second State of the Union speech delivered on December 8, 1798, he implored Congress to establish suitable regulations to support the state's health laws. Since channels of commerce could be the vehicle for disease transmission, Congress needed to frame a system to preserve the general health consistent with the commercial interests of the nation.¹¹⁶ In his view, commerce and quarantine were inextricably linked, and therefore, the states should not be given exclusive authority in this arena. His visionary strategy was the nation's first health-care plan, and it triggered a heated political debate over the limits of federal power.

Adams not only recognized the critical role the federal government played in resolving interstate public health issues; he also knew commerce was a domain that fell exclusively under the jurisdiction of Congress. Unlike the medical profession, he understood the political importance of quarantine and its potential adverse consequences to the economic stability of the young nation if not properly managed. He noted the ravages of the disease, the importance of federal public health policy, and its intimate relationship to commerce. In his mind, quarantine could not be disentangled from the commercial interests of the nation and urged, "Congress, who alone can regulate trade, should frame a system which, while it may tend to preserve the general health, may be compatible with the interest of commerce and the safety of

the revenue.”¹¹⁷ Within ten days of his call for action, a committee was formed to create a comprehensive quarantine statute.

As a result of the president’s commitment to quarantine and public support for a resolution of the yellow fever crisis, on February 25, 1799, Congress authorized him to play a central role in its management.¹¹⁸ While it was the nation’s second quarantine law, it could have been called the nation’s first bioterrorism and emergency preparedness law, since it protected Philadelphia, the then seat of the federal government, from the adverse consequences of deadly epidemics. Under the new law, the president could “permit and direct the removal of any or all the public offices to such other place or places, as, in his discretion, shall be deemed most safe and convenient for conducting the public business.”¹¹⁹ It also authorized the chief justice to move the seat of the court to another safer location in the event of an epidemic and the president to redirect vessels arriving in various ports to other locations to protect the security of the public revenue. Such interventions were not intended to contravene local health laws, but merely to ensure interstate and international commerce was kept alive during epidemics. What few noticed was that Congress had strengthened the role of the president and cracked the monolithic authority of state’s rights.

The emergence of a national quarantine program meant Adams could trump state strategies inimical to trade or public health. He could also quarantine infected goods for extended periods of time and “vary or dispense with any other regulations” applicable to federal customs as long as these actions were consistent with state health laws. Adams was certainly concerned about the adverse consequences of arbitrary and capricious application of state quarantine laws. Under the new law, vessels prohibited from entering certain ports would be allowed to discharge their cargoes elsewhere—a clear concession to the merchant and shipping trades that were protesting inconsistent and arbitrary use of state quarantine regulations. Valuable cargo was being destroyed by local disinfection techniques. If the nation was to protect its financial interests, and international trade was an essential part of that interest, then Congress had to exercise greater control over the movement of goods into American ports. The new law also allowed the federal government to impose import duties, and states could not interfere in interstate and international commerce.¹²⁰

In contrast to the support Adams gave to quarantine, his good friend Benjamin Rush strongly opposed it. For various personal and political reasons, Rush remained silent on the sidelines of this national debate. Five years earlier, newspaper stories had slandered his bloodletting techniques and reviled his general approach to handling yellow fever patients. These criticisms certainly diverted his attention from lobbying Congress over the appropriate course of action concerning quarantine. More importantly, Rush’s impassioned views against quarantine were a victim of his financial crisis. Losing

patients and his income from a raft of bad publicity, he chose to supplement his salary by accepting a post in the Adams Administration. Adams appointed him the director of the Mint on November 27, 1797, even though Rush's political views were clearly different than his own.¹²¹ Since Rush was not in a position to bite the hand that fed him, one of the strongest medical opponents of quarantine, a tool he claimed had outlasted its usefulness, let his financial indebtedness to the president rule the day.¹²² As a result, the fledgling nation adopted quarantine despite the opposing medical views of some of its leading physicians. In the final analysis, physicians had neither the political influence nor the professional standing to thwart the adoption of federal quarantine policy.

The emergence of federal quarantine legislation was an indicator of the dysfunctional relationship between the eastern seaboard states and the fatal consequences of miscommunication, obstruction of commerce, and the patchwork of local regulation that set seaport towns in battles against each other. Quarantine legislation was one of the nation's first tests of its loose federalist confederation, revealing how little consensus existed for the relinquishment of local power to the politicians far removed from the fears and woes of its citizens in seaport towns. That the legislation actually passed was a testimony to the desperation for a grand solution. The young nation needed men with a broader vision of what was good for the country as a whole who could stop the misuse of quarantine that had characterized the yellow fever epidemics of the 1790s.

CHAPTER NINE

Boston Board of Health

A virulent strain of yellow fever appeared in Boston and other American ports during the summer of 1798, prompting the General Court to entertain a radical departure from previous public health measures. Boston had avoided any serious yellow fever outbreaks even though other cities to the south were battling for their survival. An outbreak in the Fort Hill section of Boston, close to the seat of state government, created a sense of urgency for progressive health reforms. A growing number of urban sanitation issues, seasonal eastern seaboard epidemics, and tripling of the population over Revolutionary War levels brought Boston's urban malaise to the top of the political agenda.

With enabling legislation authorized by the General Court, in March 1799, Boston established a board of health to regulate sanitation and quarantine, including requiring keepers of lodging houses to report diseases of seafaring men during the quarantine season (i.e., from May to November of each year).¹ Following the lead of city officials in Philadelphia, New York, and Baltimore, Boston Selectmen knew this “new” disease called for a more intensive commitment to improving urban sanitation. While smallpox certainly led to a great loss of life in the eighteenth century, such epidemics only occurred episodically—not as a routine annual public health crisis. Unlike smallpox, which was communicable by touch or inhalation of contaminated air, the threat of yellow fever changed the focus to sanitation, public hygiene, and the removal of filth from America’s port cities. These factors, coupled with pervasive news coverage of yellow fever, was a recipe for a relatively rapid adoption of boards of health in America’s largest ports. It was not a coincidence that the first municipal boards of health in Philadelphia (1794), Baltimore (1794), New York (1797), and Boston all had quarantine as one of their primary responsibilities.² Combined these four cities lost over 13,500 souls to yellow fever in less than seven years.³

With the threat of the saffron scourge at their doorsteps, the board appointed a port physician to examine vessels and passengers on Rainsford Island. It was the first time in Boston history a member of the medical profession was held responsible as the watchdog of public health—no longer the island keeper. Physicians took little interest in Rainsford Island, except when it was offered for lease as a safe house for the sale of inoculation services. The town's physicians made efforts to elevate their profession during the years following the Revolutionary War—including founding the Massachusetts Medical Society—and their rising influence strengthened the case for creating the post of port physician.⁴ The fact that Philadelphia had long relied on port physicians to manage their quarantines may have also influenced members of the General Court.

The board had a broad mandate to investigate nuisances to control the sale of putrid meats and fish and appoint scavengers to assist in the work of maintaining public health.⁵ Scavengers were the forerunners of today's sanitation industry charged with removal of the town's rubbish and offal. With nearly eighteen thousand inhabitants crowded into a one square mile area, the town had an average of twenty-five people living on every acre of land. Without municipal programs for waste removal, public sewers, and a public water supply, this crowding inevitably created a wide range of public health nuisances. The board's twin mission of sanitation and quarantine could not have emerged without increasing public awareness of the dangers of yellow fever and filth found in overcrowded tenement housing. The nauseating smell of decaying garbage, festering cesspools, and nearby slaughterhouses was bad enough to justify the town's heightened focus on public health by itself. Two hundred Bostonians died during the 1798 yellow fever epidemic, and many believed their deaths were caused by exposure to noxious urban odors, reinforcing the call for reform.

The White Knight of Quarantine

Boston wasted no time taking action. Within one month of this landmark legislation, the townspeople elected Paul Revere to the board of health. Revere and his fellow board members had enormous authority over public health matters, since they were not accountable to the board of selectmen except for their annual budget. Revere was sixty-four years old at the time of his appointment and was one of Boston's most respected patriots and businessmen. He had demonstrated his commitment to public health issues by serving as a ward watch during the yellow fever quarantine of 1793 and had firsthand experience with smallpox during the epidemic of 1764. Revere had close ties to the mechanics, merchants, and politicians of the town, and his legendary exploits prior to and during the Revolutionary War made him an urban legend capable of mustering the public's trust for activities that might otherwise sink the fortunes of any other man. As such he became the "white knight" of quarantine with the political capital to lead Bostonians toward a new strategy

for public health. He accepted the position of president of the board of health prompted by the pleadings of his fellow citizens and keenly aware he had to find a means to retard, if not prevent, a return of the “fatal sickness that pervaded the capital,” as he phrased it in his acceptance message.⁶

Remarkably, Revere issued the board’s first public health regulations within twenty-one days of his election to office. As one of the heroes of the American Revolution, his word carried enormous moral authority, particularly among craftsmen and the merchant class. Few other Bostonians could have demanded their fellow citizens pay as Revere insisted “rigid attention to cleanliness and an immediate removal of fetid substances in the town.”⁷ Throwing putrescible wastes and dead animals in the streets was common practice, and only someone as revered as Revere could challenge his compatriots to change their wayward behavior. Yet, filth was not his only concern. He soon released a nine-point plan to stem the tide of communicable diseases, including providing a plentiful supply of freshwater for street cleaning; ensuring routine cleaning of privies and cellars; removal of drains not discharging to common sewers; the fencing of vacant lots to avoid unauthorized waste disposal; restraint in the use of animal food in the summer months; avoiding contact with the dead at funerals; prohibiting the burial of bodies under churches in the summer; maintaining cleanliness “in person, in clothing and in bedding”; and restraint from the abominable practice of blowing meat with the “foul breath that passed through human beings.”⁸ While some of these recommendations were unusual insofar as they aimed at altering bizarre human behavior, most of them posited improved local government controls to achieve modern principles of sanitation.

Emphasizing sanitation, Revere and his fellow board members also relied on traditional quarantine strategies, but fearful their layperson policies might be questioned, established the permanent post of visiting physician. On May 2, 1799, Dr. Thomas Welsh was selected to fill that post, a position that would last for another 137 years and become the training ground for some of Boston’s greatest physicians. He was well qualified to serve in this capacity having graduated from Harvard in 1772 and learned medicine through on the job training under the mentorship of Dr. Isaac Foster, a prominent physician from Charlestown who played a central role in the smallpox epidemic of 1776. When Foster served as a physician to the minutemen in April 1775, Welsh assisted him. After spending more than a year as a military physician, Welsh returned to Boston and started his medical practice.⁹

Welsh was an excellent choice for visiting physician as he brought important professional affiliations with the Massachusetts Medical Society and close ties with the most influential politicians of the day. In 1781, he was a founding member of the Massachusetts Medical Society and served as its treasurer from 1782 to 1798. In 1798, he was appointed the first medical officer for the U.S. Marine-Hospital Service at its temporary quarters on Castle Island. If these activities were not enough to qualify him for the post of visiting physician, his firsthand

experience working with smallpox certainly helped. In 1792, he and fifteen other physicians inoculated the susceptible population of Boston, thereby averting a potential public health disaster. His medical experience wasn't his only cachet. Through his marriage to Abigail Kent, he soon was connected to very prominent members of Boston society, including John and Abigail Adams. Abigail Adams was the first cousin of Abigail Kent, a connection that provides insight into President Adams' single-minded support for national quarantine legislation.

One of Welsh's primary responsibilities was issuance of certificates of health to vessels entering the harbor.¹⁰ This new position brought him into contact with masters and commanders of vessels from all parts of the world. It also required him to work closely with Thomas Spears, the island keeper for the quarantine hospital. Spears had been running quarantine affairs like an island dictator with little public input from the selectmen for three years before the board of health took control. The remoteness of the sixteen-acre Rainsford Island guaranteed Thomas Spears a near foolproof means of controlling public perceptions of his practices. It was only when the board took an active interest in his affairs, with insights gained from Welsh's medical inspections, that his "slave labor" practices surfaced as a public issue.¹¹ Spears had been detaining immigrants to perform agricultural, manual labor, and hospital duties even after they were well enough to be released from quarantine. His practices were never publicized, and therefore the only reason such "slave labor" became known was because the Boston Board of Health documented his offenses in their internal meeting minutes, which have never been published.¹² He was somewhat startled by the board's effort to actively meddle in his affairs. With twelve children ranging in age from six to twenty-five, this certainly affected the routine affairs of the Spears family. Under the new quarantine program, Spears was also required to work in concert with Welsh whenever a quarantine order was issued. If Spears failed to comply with the board's orders, he was liable to a five-dollar fine.¹³

The board made it clear that it was in charge of quarantine affairs and would not tolerate informal intermingling of friends and family with the sick nor allow such persons to stay anywhere other than in Spears island house. To accomplish this plan, the board zoned the island into areas authorized for the exclusive use of the sick, those infected with smallpox, the convalescent, and gentlemen and their wives and children. Flags were installed to be the line of division between the sick and the well, and anyone found overstepping the line would be considered sick and confined to an area of the island known as the "sick head."¹⁴

Welsh's appointment restrained the island keeper's independent-minded activities. For the next twelve years, Spears conducted quarantines under the guidance of Welsh. Losing his authority to manage island affairs must have been a bitter pill to swallow for a man who had managed the hospital like a southern chain gang. Spears was a powerful man and his island kingdom,

through the dint of time, had become as much a family compound as a public lazaretto. His family routinely mingled with those quarantined on the island with little regard for the dangers of catching smallpox or other pestilential distempers.¹⁵ In less than three years, Welsh stopped these activities and turned Spears' family compound style of management into an organized but segregated public pest house.

While Welsh channeled his energies on modernizing island quarantine practices, the board focused on policies to exclude vessels from suspicious ports. Two and a half months after taking office, Revere clarified the town's two-prong public health strategy. If yellow fever was attributable to local causes, then a rigid program of public cleanliness would be in order. If it emanates from foreign sources, then vessels from infected ports would be required to undergo quarantine. To underscore the town's efforts to control yellow fever, on June 22, 1799, Revere quarantined vessels coming from the West Indies or South America. Such vessels could not enter without an inspection by the visiting physician and, where necessary, purification of the vessels, crew, and passengers.¹⁶ A week later, the board published and adopted comprehensive public health regulations, including provisions for street sanitation, quarantine, control of traders and dealers in salted foods, and regulations for keepers of lodging and boarding houses. In contrast to Revere's inclusive public health approach to containing yellow fever, the approach taken in Philadelphia during 1793 was much more divisive, reflecting party politics and a greater reliance on medical interventions. Unlike Philadelphia, Boston was not seriously harmed by yellow fever, so a more level-headed approach was easier to achieve. Philadelphia lost its port physician to yellow fever during the 1793 yellow fever epidemic—leaving it without sanctioned professional expertise. In contrast, in 1799, Boston had Revere at the helm of the board of health, a politically astute businessman.¹⁷

To resolve historic problems with the ineffectual enforcement of quarantine, Revere also made it clear that harbor pilots must provide masters or commanders with the town's quarantine regulations, and if they failed to do so could lose their jobs for twelve months.¹⁸ Holding harbor pilots accountable reduced the chances masters or commanders misunderstood quarantine requirements, one of the nagging problems of the eighteenth century. In turn, Revere held Welsh responsible for treating quarantined patients and collecting part of his salary from the fees charged to these unfortunate victims. If the patient died or was unable to pay, Welsh could charge the town for his services. Otherwise, much of his income came from fees.¹⁹

Revere and the other eleven members of the board took their jobs quite seriously. They emphasized each citizen's responsibility to maintain a clean and healthy environment and their duty to hold yellow fever at bay. Without their cooperation, Boston would be fighting an uphill battle against the financial interests of the business community. Regulations without the consent of

the governed would not work. The board required an informed constituency that understood compliance to be in their enlightened self-interest. Revere also appealed to the merchant's interest in protecting the public and requested them to cheerfully submit to quarantine procedures, even if such actions presented a loss of time and expense to their vessels and property during its performance. While acknowledging quarantine may lead to additional public and individual expenses, he appealed to their "liberality of spirit which so nobly distinguishes the inhabitants of Boston" to support these measures for the public good.²⁰

Fortunately, the decisions of the board of health were generally accepted. Board members were a representative cross-section of the town chosen from a wide variety of occupations, including printers, doctors, businessmen, shipowners, and mechanics. Each member was elected from within his own ward for a twelve-month term of office. The duties of the post were relatively demanding. With few exceptions, virtually, all of the 137 citizens elected to the board from 1799 to 1822 served for a one to two-year period. Unlike the town's visiting physician who was Harvard educated, only 10 percent of the board's members ever attended Harvard.²¹ The board was indeed the people's court of public health. As such, it was not surprising board members supported quarantine. Public opinion viewed yellow fever as a highly communicable disease even if no one was quite sure how it was transmitted. Board members were expected to represent the public interest even if their views might conflict with the town's leading physicians—John Warren and Isaac Rand.

In its first three years, the Boston Board of Health, under Revere's leadership, issued more maritime quarantine orders than had been issued in the previous twenty years, a reflection of the single-minded attention he and his fellow board members gave to the control of yellow fever and their relative autonomy from oversight by the Boston Board of Selectmen. Revere signed twenty-one quarantine orders during his two years as president, a feat no other man in Boston has ever achieved in such a brief period of time. His legacy as a freedom rider deservedly remains one of his great accomplishments of the early republic. What we now know is that Revere was also one of the greatest nineteenth-century champions of maritime quarantine. One of his notable accomplishments included applying strict quarantine controls to all incoming vessels from ports suspected of harboring yellow fever such as the West Indies, Africa, South America, or the Mediterranean. He also urged the port physician to distinguish between vessels coming from tropical ports and those with smallpox on board.²² In his first year of service, Revere and his colleagues quarantined 195 vessels and held 1,820 men in isolation on Rainsford Island, an unprecedented level of enforcement not seen in the previous seventy-five years.²³ This dramatic increase in quarantine could not have occurred without public consent attributable to an increased concern

for yellow fever outbreaks and a belief in the wisdom and leadership of Revere. His policies were maintained even after he retired from the board to pursue his business interests, a testimony to his prestige and power in the town. For the next two decades, the board maintained strict maritime controls over yellow fever. Typically, vessels were held for twenty-five days from the date they set sail or for three days since their arrival, whichever was longer. The basis for the twenty-five-day quarantine reflected the presumed length of its incubation period and revealed the degree to which evidence had percolated into its decision making.²⁴ This policy, developed in Revere's reign, was later applied to vessels from other ports suspected of harboring contagion. Fortunately, with the exception of minor outbreaks in 1802 and 1819, yellow fever disappeared from Boston's port, allowing the medical community to focus its energy on the control of smallpox.²⁵

CHAPTER TEN

Vaccination

While the specter of yellow fever increased public commitment to maritime quarantine, the board of health began to have misgivings over its use against domestic cases of smallpox. The board had broad quarantine powers to isolate cases of communicable disease—whether such cases emerged among arriving immigrants or citizens of town. Yet, there was a growing trepidation about enforcing island isolation. Physicians, in particular, called for more compassionate care for the sick in lieu of exile to Rainsford Island. The Massachusetts Medical Society had a very articulate, educated, and politically connected membership that was deeply committed to upgrading the qualifications and professionalism of physicians in the Commonwealth.¹ Finding alternatives to the past practice of a “lights out” quarantine (i.e., where no treatment, care, or social support systems existed) was becoming a popular cause among humanitarian physicians at the turn of the century.²

Island exile also lost favor as the incidence of smallpox declined reflecting the introduction of vaccination into America. This revolutionary new medical technique would influence the way quarantine would be applied for the next 150 years and eventually changed public perceptions concerning the legitimacy of “lights out” quarantine on remote harbor islands. Eighteenth-century quarantines emphasized removal from the community with limited medical support. In contrast, thanks to the discovery of vaccination, nineteenth-century physicians took exception to island isolation strategies. John Warren, one of Boston’s most prominent physicians with previous firsthand experience operating a pest house, knew public phobia of epidemics fueled resistance to the construction of pest houses on the mainland, yet he stubbornly championed more accessible hospitals that could be reached by carriage, not by boat. He believed it was not acceptable to deny family access to a smallpox hospital when such services could and had been provided in Boston during the Revolutionary War. His efforts to make

hospitals more accessible influenced the use of quarantine but were overshadowed by the remarkable immunological discoveries of Edward Jenner.

Benjamin Waterhouse Controls Vaccine

Jenner's use of cowpox vaccine as an antidote against smallpox became a catalyst for the reassessment of quarantine principles. His discovery made medical history on May 14, 1796, when he vaccinated a young boy named James Phipps in Gloucestershire, England.³ In early 1799, Dr. Benjamin Waterhouse, a professor of the theory and practice of physic at Harvard, received a copy of Jenner's 1798 treatise, *Inquiry into the Causes and Effects of the Variolae Vaccinae*. Soon thereafter, he obtained cowpox vaccine from Jenner, and vaccinated his son, Daniel on July 8, 1800.⁴ The success of this venture triggered the vaccination of six more family members in early August. Cowpox vaccinations, unlike smallpox inoculations, created a relatively benign disease that conferred immunity to smallpox without any of the dangers of using the highly contagious smallpox virus. The advantages of using cowpox vaccine over smallpox inoculations led to a rapid public acceptance of this new strategy with thousands getting vaccinated in England.⁵ The vaccine offered the hope of destroying one of the worst diseases known at that time and, by implication, the harsh rule of quarantine.

Despite its promise, there were some notable setbacks to its use during the first few years, as Waterhouse and other American physicians learned the vaccine was difficult to manage. It was sensitive to temperature extremes, it required the timely extraction of lymph fluid to maintain a supply, it could become contaminated, and it could lose its potency by the frequency of its use and the method of storage.⁶ Yet, even with these limitations, vaccination was considered as a surefire antidote to smallpox leading to its widespread experimental use by physicians and dabblers in medicine. However, as vaccination was a domestic strategy, immigrants were not required to submit to this procedure as a condition of admittance into America. Thousands of immigrants arrived in the harbor each year, so imported cases of smallpox were inevitable. For example, within twelve months of Waterhouse's experiment on his son, the Boston Board of Health held some sixty incoming sailors with smallpox on Rainsford Island. Yet, these cases did not lead to new policies requiring vaccination of immigrants. The Commonwealth had no diplomatic relations with foreign ports, nor could it make health treaties with foreign nations, since such authority was exclusively the domain of the fledgling federal government. The idea of imposing vaccination upon immigrants would not surface as a public policy imperative until after the smallpox epidemic of 1872. The board of health was satisfied quarantine should remain the primary strategy for intercepting smallpox cases.⁷

Waterhouse's efforts to corner the market on vaccination reflected his drive to capitalize on the fears of smallpox and its stigmatizing scars before

others could compete with his services. He attempted to monopolize the cowpox vaccine by establishing himself as the only physician with access to a reliable and tested supply. Fortunately, others including Dr. James Jackson, got supplies directly from England and offered their patients this new preventive medicine. Unfortunately, not all of the vaccine was viable, and not many physicians were competent vaccinators. Several mishaps, including the death of sixty-nine people in Marblehead and Beverly from a cowpox vaccine tainted with smallpox virus, led to a rapid reassessment of this vaccine.⁸ The initial public reaction to the “Marblehead incident” was one of suspicion that cowpox vaccine was more dangerous than Waterhouse led on. While Waterhouse had not administered the vaccine to those living in Marblehead and Beverly, his outspoken advocacy for the vaccine placed him in an awkward public posture. Faced with this catastrophe and the loss of confidence in its efficacy, citizens were still more comfortable with smallpox inoculations because it was the “devil they knew.” Dr. William Aspinwall, the chief proponent of inoculation in New England, operated a 150-bed smallpox hospital three miles south of Boston. Considered one of the most trusted inoculators of his day, he urged Bostonians to stick with inoculation claiming cowpox was not a proven long-term deterrent. His assertions were published in the town’s weekly papers and read by physicians and citizens alike.⁹ Waterhouse was disheartened by Aspinwall’s self-serving remarks and soon successfully began work on a strategy to revive interest in his vaccine.¹⁰

Despite setbacks of one kind or another, by the spring of 1802, interest in vaccination had coalesced to a point that Boston physicians felt a more rigorous experiment would be required to confirm Waterhouse’s results and overcome public phobias stirred up by the Marblehead incident.¹¹ Some physicians questioned Waterhouse’s motives for promoting cowpox viewing it as a strategy to expand his medical practice. If cowpox was to be accepted, a well-respected physician would be required to champion the cause. Initially, James Jackson, one of Boston’s most respected younger physicians, attempted to persuade the board of health to conduct such an experiment without success. While Jackson was well liked, he had not had a lot of experience with vaccination nor was he affiliated with Harvard. In contrast, Waterhouse, a Harvard physician, one of the brightest in America, was the most respected expert on cowpox vaccine. In May 1802, he presented a comprehensive proposal for conducting a public experiment to prove the efficacy of the vaccine.¹² His prominence in the medical community, having served as a professor of medicine for twenty years, was critical to making the case for a government experiment to prove the efficacy of cowpox.¹³ After numerous debates concerning the appropriate location to carry out such an experiment, and a newspaper exposé concerning the efficacy of cowpox, the board of health, with the consent of the town, authorized it to be conducted on Rainsford Island. This location was soon enough deemed unacceptable to the physicians, since it was too far away from their medical practices and would

be difficult for them to visit "as often as would be requisite."¹⁴ They preferred a location within town but Bostonians opposed that idea, so a special isolation hospital was finally erected on Noddle's Island so that this unique experiment could be completed with medical supervision.¹⁵

Experimentation on Children

On August 16, 1802, nineteen children were inoculated with cowpox in the presence of eight prominent physicians, including Waterhouse. The young nation had never undertaken a medical experiment of this nature and the procedures used were unprecedented in scope. The children selected for the experiment were sponsored by members of the board of health and came from virtually every ward of Boston. The following week six of the town's physicians, including Waterhouse, Thomas Danforth, John C. Howard, Isaac Rand, and James Lloyd, examined the children and declared them to be "indisputably infected" with the cowpox and therefore ready for America's first government vaccine trial.¹⁶

After numerous delays associated with the construction of the new hospital and the collection of viable smallpox virus, on November 9, twelve of these children were inoculated with smallpox from a supply received from Dr. Francis Weeks at the smallpox hospital in Falmouth, Massachusetts.¹⁷ They were later exposed to two boys who had active cases of smallpox and none of these vaccinated children contracted smallpox, a good sign that the children were immune. The remaining six children were inoculated on November 21, and none of them contracted it either.¹⁸ Eleven leading physicians of the town, including Waterhouse, John Warren, Thomas Welsh, and James Lloyd, inspected these children and on December 15 declared cowpox prevented the children from contracting smallpox. This experiment increased public acceptance of cowpox vaccination and quelled some of the fears associated with the Marblehead incident. In contrast to the unauthorized inoculation experiments Boylston conducted in 1721, this one was based on a sound political footing with the backing of Boston's most prominent physicians. More importantly, it was sponsored by the board of health, a public agency that had the people's confidence and represented each of the town's twelve wards. The fact that the victims of this experiment came from virtually every ward strengthened public acceptance of the outcome and gave everyone a stake in its success. Indeed, children who participated in the experiment had been selected by their parents with a full understanding of the potential consequences of their decision. Such a collaborative approach to experimental medicine had never been attempted in America. It was a brilliant strategy that could not have occurred without an alliance between the board of health and the town's physicians.

The success of this experiment set the stage for a rapid expansion of vaccination services in Boston and throughout America. Within a week, twelve of Boston's physicians announced the formation of the Boston Vaccine Institution, an organization intended to provide free vaccinations to the town's poor, so physicians could maintain a constant supply of the vaccine. Some of the most prominent members of the medical community were members of the institution, including Drs. John Fleet Jr., William Ingalls, Samuel Brown, Thomas Danforth, John G. Coffin, James Jackson, Benjamin Shurtleff, Jacob Gates, Isaac Rand, Samuel Hunt Jr., John C. Warren, and John C. Howard.¹⁹ Conspicuous by his absence was Waterhouse, the leading advocate of cowpox vaccination in America. His absence from this list reflected the fact that he was not a resident nor a physician of Boston and therefore could not participate in the affairs of the "clubby" Vaccine Institution.²⁰ The Institution while a new concept was not an independent establishment. Its members had professional and business interests that benefited by offering care to the poor and public access to vaccine. Five of the twelve sponsors of the Vaccine Institution were also physicians at the Boston Dispensary and used their positions to promote the use of cowpox among the town's poor. Since the poor were thought to be more susceptible to the disease, it was only natural the town's physicians should give prominent attention to their needs. Their efforts to promote vaccination were also supported by the board of health. Yet, the public felt no urgency to try vaccination despite the physician's efforts. Smallpox was not endemic in Boston, and despite extensive advertising in local newspapers, citizens had little interest in the Institution's services.²¹

Interest in vaccination seemed to wax and wane with the number of reported cases of smallpox. After a case was reported in Boston in July 1805, public interest in vaccination heightened. Regardless of the caseload, the medical community actively promoted the vaccine and sought ways to improve its efficacy. Despite the success of the Noddle's Island experiment, there were still several unresolved issues. Physicians had no standardized procedure for applying the vaccine nor did they have criteria for validating that cowpox "took." The initial rush to apply the vaccine had pitted Waterhouse against much of the rest of the medical community. In subsequent years, his professional standing suffered as a result of his overbearing tendency toward self-aggrandizement.²² Partly out of opposition to his self-centered practice, other Boston physicians banded together to develop independent approaches toward the control of smallpox.

To correct medical misunderstandings concerning cowpox vaccination, two of Waterhouse's colleagues at Harvard, John Warren and Aaron Dexter, collaborated on a groundbreaking study with James Jackson and John Warren's son John C. Warren. Their seminal research was issued by the Massachusetts Medical Society in 1808 in a forty-eight-page report, which

concluded vaccination was as sure a preventive as smallpox itself.²³ By that, Warren and his colleagues meant immunity from the disease could only be granted in one of two ways; by vaccination or by previously contracting the disease and surviving its effects. They cautioned many physicians had not practiced vaccination properly, thereby not producing the disease “in the most perfect manner.”²⁴ For cases where the disease had not taken, they made the radical recommendation that individuals receive a second vaccination.²⁵ The prevailing view espoused by Waterhouse claimed one vaccination was enough for a lifetime. Waterhouse, incensed at Warren’s assertions, was a fallen star, no longer trusted by the Boston medical profession. Warren and his colleagues while advancing medical science had inadvertently torpedoed public confidence in smallpox vaccinations that would affect public attitudes for the next generation. The public now knew vaccination did not offer permanent protection and therefore was as tainted a medicine as many other of their concoctions were believed to be.

The vaccine, despite its limitations, still promised an end to the scourge of smallpox and some physicians were intent on its eradication. This time leadership came from the board of selectmen in Milton located some eight miles south of Boston. As a result of the virtual townwide vaccination efforts that took place in Milton in 1809, and with some lobbying by their selectmen, Governor Christopher Gore agreed to support statewide vaccination legislation. After six months of efforts, on March 6, 1810, the General Court passed “An Act to diffuse the benefits of inoculation for the Cow Pox.”²⁶ While this legislation called for towns without a board of health to choose vaccination committees and authorized them to provide vaccination, little was actually done because there were no penalties for noncompliance. The Boston Board of Health was no different. It saw no value in the legislation and felt these decisions should be left to the selectmen and physicians. Contributing to public apathy was concern with the efficacy of cowpox, the lack of motivation for vaccinations without the specter of an epidemic, and the relatively high cost of these services.

Even without local governmental support, the Boston Medical Association, a local society founded in 1806, urged a more systematic approach to vaccination. The Association agreed to reduce their regular fees for three months, starting April 1, 1811, for those who could afford to pay, and to provide free vaccinations to anyone the board of health or the Overseers of the Poor deemed worthy. Every morning of the week, except Sunday, the town’s physicians offered free vaccinations, a strategy that maintained fresh supplies of cowpox vaccine from the arms of their poor infected patients.²⁷ Yet, even their charitable offers were not enough to convince the wary vaccination was worthwhile.

One historian estimated the reduced fee still amounted to two dollars per vaccination, about forty-two dollars at 2019 prices, which certainly contributed to a

less than universal participation in the program.²⁸ Despite physician's best intentions, vaccinations were a luxury service with limited appeal to working-class men. In the face of public apathy, the board of health issued a desperate special request "To the Ladies of Boston" urging them to identify poor, widowers, orphans, or victims of other unfortunate circumstances who needed vaccination. Their hope was women would be able to touch their hearts and through this "melting charity," influence them to take the cowpox.²⁹ Front-page stories were carried in the *Columbian Centinel* reminding one and all to avail themselves of this special one-time vaccination. The Boston Medical Association even emphasized that a general compliance with vaccination would allow the town to be secured against the admission of smallpox and each could "do their part towards utterly exterminating it."³⁰ This publicity was credited with increasing public acceptance of the vaccination program and, by implication, reducing vulnerability to smallpox. The result of these efforts may not have achieved complete cooperation from everyone, but enough participated to ensure Bostonians were relatively free of smallpox for the next decade.³¹

In the ensuing years, vaccination was accepted throughout the United States as a pox-preventive remedy. Even the federal government adopted vaccination for the American Army using it during the War of 1812 with apparently positive benefits that rendered smallpox of little consequence.³² This successful military application along with a growing acceptance of the practice by the medical profession set the stage for a unique public health role for the U.S. Post Office. On February 27, 1813, Congress created the position of United States Vaccine Agent to promote vaccination throughout America. The law authorized the use of the Post Office for transmission of free vaccine. Dr. James Smith, of Baltimore, Maryland was the first to hold this position but was not able to accomplish a great deal, since the law only gave him franking privileges and the prestige of his title.³³ This law would eventually be rescinded after the accidental mailing of variolous matter to Dr. John F. Ward, of Tarborough, North Carolina in 1822 and the ensuing smallpox epidemic that killed thirty-four persons soon thereafter.³⁴ This was the first known instance of interstate transmission of smallpox through the mail, and its consequences would be devastating for federal preventive health measures, setting back federal vaccination programs for generations to come.³⁵

Even with this federal setback, Jenner's discovery of vaccination facilitated a greater focus on smallpox preventive measures in America. His protégé, Benjamin Waterhouse, had a profound impact on smallpox prevention strategies, particularly in Boston and throughout the nation raising public trust in vaccination. His efforts should not be overstated, since the public remained hesitant to try the vaccine unless there was a strong reason to take immediate action. Inevitably, an imminent epidemic or the expectation of one was

necessary for most Bostonians to take stock of their mortality and seek protection.

As smallpox became more controllable, the public put less stock in quarantine and more on vaccination. Nonetheless, the board of health continued its strong maritime quarantine program because it was accepted wisdom that vaccination itself could not prevent the introduction of imported cases of smallpox. Though some historians have underplayed the public health benefits of maritime quarantine, there is little doubt these aggressive quarantine programs stopped the introduction of smallpox.³⁶ The board deserves credit for strengthening the role of medical inspections compared to the practices of the eighteenth century. In its twenty-three years of existence, the board issued forty-one quarantine orders addressing the ever-changing threats from communicable disease. In contrast, far fewer orders were issued during the eighteenth century. These efforts were inherently local in scope reflecting its responsibility to protect Bostonians. As long as interstate commerce and passenger travel was by sea, municipal maritime quarantine strategies remained feasible. However, as roads between the colonies improved and expanded, disease began to migrate via coach, carriage, and horse.

Quarantine Scofflaws

The federal government had no immigration laws prior to 1819, so travelers could choose their own port of landing and avoid cities with restrictive quarantine laws. Although Boston was a popular destination for European immigrants, its quarantine laws were stricter than nearby fishing ports along the New England coast. Bostonians should not have been surprised that some passengers attempted to evade these laws by disembarking at nearby ports. Apparently, these types of evasive actions were the exception rather than the rule. Nevertheless, there were a sufficient number of scofflaws for the board to tighten up their quarantine regulations.³⁷

Other quarantine reforms were also pursued including efforts to make life on the quarantine island more appealing to its patients and to increase public understanding of maritime quarantine procedures. For the first two decades of the nineteenth century, the board diligently published notices concerning the length of the quarantine season, inspection procedures, and liberalized rights of victims of island isolation. Though the days of lax quarantine were clearly a thing of the past, this new philosophy was implemented with greater sensitivity to the needs of the victims simply by discarding its most barbaric past practices. A review of the regulations published during this period reveals quarantine practices evolved in response to public complaints. For example, prior to 1804, the board cared little about the psychological well-being of infected passengers and crew confined on Rainsford Island. In

the ensuing years, based on pressure from physicians, the board allowed family and friends to visit Rainsford Island during the quarantine season. On the one hand, this arrangement created potential pathways for the migration of disease back to the mainland. On the other hand, the island keeper had been indulging in such practices for quite some time without public oversight by the board or concern for the feelings of Boston citizenry. The board's intercession in island affairs reflected the attitudes of their ward constituency who judged its members by how their relatives were treated while confined at the harbor hospital.

The threat of disease caused by family members returning from the island was not the board's only concern. Periodically, it extended the quarantine season based on intelligence from other port cities or based on the presumed incubation period for yellow fever.³⁸ Extended quarantines, no matter their integrity, would ultimately be the undoing of the Boston Board of Health. The shipping industry was being forced to sail through a gauntlet of trade barriers, and the imposition of ill-timed public health edicts was threatening their business interests. Prior to 1807, the Massachusetts shipping industry saw a steady rise in the value of foreign exports. Despite quarantine restrictions, the value of Massachusetts exports exceeded \$20 million dollars in 1807, or nearly 78 percent more than the value of Massachusetts exports seven years earlier.³⁹ Nevertheless, while quarantine regulations normally had little impact on maritime trade, the emergence of real trade barriers imposed by President Jefferson, to counter the belligerent trade activities of Great Britain, would contribute to the notion that quarantine was an irrational means of controlling disease.

In December 1807, Jefferson signed the Non Importation and the Embargo Acts to bar many British manufacturers from entry into America and to hold American vessels in port indefinitely.⁴⁰ The Embargo Act, lasting from December 12, 1807, to March 15, 1809, prohibited trade with foreign ports and increased enmity between the United States and Great Britain.⁴¹ In the space of one year, the value of Massachusetts exports fell nearly 75 percent, forcing an entire sector of the economy out of work.⁴² After years of diplomatic impasse over trade relations and heavy commercial losses from impounded American vessels, Congress declared war on June 18, 1812.⁴³ The outbreak of war forced the board of health to extend quarantine to American vessels because of concerns the British could be intentionally infecting American sailors. On June 23, 1812, the board quarantined any "case of well apprehended danger from arrest by the enemy, during the existence of war," reasoning that contact with the enemy could be a means for passing disease to the citizens of Boston.⁴⁴ While no evidence was ever published to support their policy, the board supported a rigorous application of quarantine.⁴⁵

As a consequence of creating a popularly elected board of health, quarantine decisions had a populist flavor reflecting the views of the average person.

Yet, the board complemented their populist's views with professional advice from the resident physician. Its independence from the political affairs of the selectmen created certain advantages. Health issues were not lost on the agenda as they might otherwise be if forced to compete with urban development, commerce, and taxation issues. In addition, the informal and self-serving quarantine practices of the island keeper were modernized, eliminating intermingling of the diseased and the convalescent and enforcing stricter rules concerning the behavior and access rights of visitors. In the space of twenty years, Rainsford Island was transformed from the island keeper's personal estate to an institution supervised by one of the most eminent physicians of the day.⁴⁶

Yet, despite regulatory overhauls, basic island living conditions remained unchanged. There were only twenty-one blankets, thirteen bunks, two beds, and three mattresses available for all the sick.⁴⁷ A potpourri of miscellaneous items revealed the abysmal procurement planning that existed under the reign of Henry Spears. Anticipating the requirements that might prevail in an epidemic was not part of a quarantine manager's routine. The board remained more focused on exclusion than on the care and accommodation of its patients. Yet, there were clear signs Boston was reassessing its quarantine strategy. Revere had appealed to the civic-minded merchants to accept the commercial disadvantages of quarantine in the interest of public health. He advocated the greatest good for the greatest number and the merchants generally accepted this premise. However, this independent decision-making power led to collisions with the selectmen. Was quarantine more important than trade? What were the limits on the board's authority to quarantine and confiscate property? These and other public health issues were not discussed in town meetings but remained the exclusive domain of the board of health. These conflicts would reach an apex in 1819 with the ill-fated arrival of the ship known as *Ten Brothers* that would eventually undermine the integrity of the board of health.

Yellow Fever Outbreak of 1819 and the Excesses of Quarantine

The War of 1812 ended when Congress ratified the treaty of Ghent on February 15, 1815. The postwar years were good for the American shipping industry. The value of American exports boomeranged from a low of \$6.9 million in 1814 to \$93.3 million by 1818.¹ Subsequent treaties with Great Britain negotiated in 1818 extended the commercial conventions of 1815 for an additional ten years. Boston's commercial trade with the world was expanding rapidly and becoming more efficient with the adoption of new types of vessels that could carry more freight, travel at faster speeds, and tack in ways that earlier vessels were unable to accomplish.² Boston's shipping industry remained a critical element of the Commonwealth's economy and trade barriers were to be avoided.

Over the previous nineteen years, the town's quarantine regulations were a necessary evil for a port that survived off its sea trade. So when the medical community asserted quarantine was incapable of stopping the transmission of disease the ears of the merchants were pricked. Their assertions relied on miasma theory but were tinged with perspectives that went beyond the field of medicine: the town's physicians were affluent individuals with strong ties to the merchant class.³ For very different reasons, these two occupational groups found fault with the practices of the board of health. Composed of ordinary citizens, the board distrusted physicians and their bloodletting, purges, and mercurial practices for the treatment of smallpox and yellow fever. Indeed, working-class Bostonians, when faced with choosing between the lesser of two evils, preferred preventive strategies like home isolation over the medical concoctions of physicians.⁴

With little faith in physicians and no viable pharmaceutical remedies, conditions were ripe for “extreme” quarantine—defined as communicable disease controls that applied when (1) treatment was not possible, (2) case fatality rates were high, and (3) the public was gripped by fear. Under these conditions, board members were apt to alter routine quarantine practices in ways thought otherwise unacceptable. A confluence of events brought this into existence in 1819 when social and political conditions favored an epidemic of fear. After seventeen years without a case of yellow fever, Boston came unglued when several suspicious fever cases appeared. The *Columbian Centinel* published an account on August 14, revealing a malignant fever but downplayed its lethality. Although no indication was given that these few cases were the first signs of a yellow fever epidemic, when the editors tried to quell the panic, proclaiming the number of deaths to be exaggerated, it tended to affirm public suspicions.⁵ Thinking they could prove their point, the *Centinel* proceeded to list the names and cause of death of those who died during the previous week. Whether that publicity calmed the citizenry is doubtful. Indeed, like past publicity concerning yellow fever, the newspapers kept the story before the eyes of Bostonians for two full months. Philadelphia, Baltimore, Savannah, and Charleston were the focus of these news stories, even though behind the headlines was the ominous possibility the disease might reach Boston.

Stories of distant outbreaks mattered little as these were a routine news feature. In contrast, the townspeople noticed the arrival of a 231-ton vessel that hailed from Africa. Its arrival and the subsequent outbreak would ultimately embarrass the board of health and discredit some of its aggressive quarantine practices. The ship known as the *Ten Brothers* arrived at the quarantine station on July 21, and after the requisite holding time at Rainsford Island was cleared to land on August 1.⁶ Neither the captain nor the health officers were aware of any disease on board even though reports circulated from as early as July 7 suggested an outbreak. The board contended deaths of a “questionable nature” did not constitute yellow fever and took the opportunity to urge physicians to report any cases that might excite public apprehension. Physicians and residents of Boston were not required to report cases so there was no systematic means of determining the state of health. Medical reports made public several months later revealed physicians were aware of malignant distempers in the vicinity of Fort Hill and the Town Dock yet these private discoveries were never shared with the public.⁷ By coincidence, several days after the arrival of *Ten Brothers*, twelve persons died in various parts of town, but it was believed they had one thing in common—they had either worked on or about the ship known as the *Ten Brothers*.⁸

Unlike any previous epidemic, the board soon took some very dramatic measures prompted by a history of disease aboard the ship. The death of Joseph Mayor, junior master of the vessel, and two other crew members

during its voyage to Boston suggested a pestilential fever had arrived. However, these deaths did not trigger any action by the board. It took the death of three additional crew members within a week of the vessel's arrival, along with the deaths of several Bostonians, to convince board members the ship was infected with yellow fever.⁹

In response to these deaths, on August 11, the board sank the vessel within sight of downtown Boston, an unprecedented action that would have been considered inconceivable by the town's merchants. Content that it no longer posed a threat, the board announced its sinking and declared the public could feel comfortable the disease had been abated.¹⁰ Unfortunately, despite resting in a watery grave, the scuttled vessel continued to raise public apprehensions. On August 17, the board was forced for a second time to order the owners of the boat to remove it from its original grave to another suitable location selected by the town's committee on quarantine.¹¹ Once again this order was complied with but the public's agitation was so great that the board was forced to reconsider the second site of the sunken vessel and declare a new more suitable location for its watery internment. A notice of this final decision was published on August 23 with a warning that no one should attempt to visit this "sunk vessel."¹² This time the *Ten Brothers* found its final resting spot in the quarantine grounds near Rainsford Island. The vessel's name and its master, Captain Elijah Cobb, were finally disclosed—presumably to raise public confidence that the board had found the source of the disease.

Because the *Ten Brothers'* decontamination was one of the most egregious and outrageous acts of the board of health, it had no choice but to select a committee to investigate its handling.¹³ The board had single-handedly sunk a ship multiple times, destroyed valuable commercial goods, and demeaned the integrity of the town's quarantine program by making it into a publicly controlled form of exorcism of commerce. After several months of deliberations, it published the results of its investigation on December 5, 1819. The Boston Board of Health determined the commander of the vessel had brought yellow fever into Boston even though it had undergone quarantine at Rainsford Island. While unable to determine the exact means of transmission, the board concluded Captain Cobb's sailors had gotten sick from yellow fever and spread it to others within town. It speculated some of the articles on board were very infected, but were unable to say if it was the putrid corn or a subtle poison imported from the "sickly climes of Africa."¹⁴ The board acknowledged knowing little about the disease but was certain, despite the growing number of cases, it was not contagious.¹⁵ Its self-serving investigation left much to be desired, including an explanation for the unprecedented sinking of a vessel as a cure for a noncontagious disease.

The board later admitted *Ten Brothers* was never fully fumigated while at the quarantine grounds off Rainsford Island. Such a confession would suggest the island keeper or the principal physician admitted an infected vessel. Yet,

choosing to protect them from public censure, it declared that fumigation had been properly conducted, even though it had not been thorough. Since the vessel had complied with requirements and the crew had remained on Rainsford Island, there was nothing left but to find fault with the ship itself. In an archetypal act of ritual sacrifice, the board destroyed the vessel believing nothing could cleanse it. It was the first and only time such an event was ever authorized in Boston and signaled the dangers of a democratically controlled board that wielded independent authority over public health issues with consequences that went far beyond their quarantine mandate. Valuable commodities were sunk in the lower harbor with the hope such action would purge the bay of disease. Yellow fever panic was virtually uncontrollable and extreme measures were needed to restore public confidence in the health of the town. Unfortunately, the vessel was said to contain rum, tobacco, clothing, hardware, and other valuable goods that might offer a temptation to plunder these underwater treasures for those unafraid of yellow fever.¹⁶ The competing forces of plunder and panic stirred up public apprehensions to a level not seen in the previous twenty-five years. Midnight pirates went diving for the sunken treasures and not much could be done to halt such activities.

The vessels' owners included three young wealthy Bostonians with connections to the city's political and business leaders: Benjamin Humphreys, Israel Thorndike Jr., and George W. Lyman.¹⁷ These men were distraught about the terror created by their vessel but made a point of letting the public know they suffered a significant unrecompensed financial loss at its sinking. The board never offered to compensate the owners, since in their view destruction of private property for the protection of the public health was a right of local government. While Lyman, Humphreys, and Thorndike objected to this final decision, they probably recognized the dangers of mob violence would be far greater if they took legal action to remedy their loss. In the end, the board identified shortcomings in their quarantine procedures revising its regulations the following year to explicitly extend the isolation period of twenty-five days from the date of the last death on board a vessel in transit—a clear admission its flawed regulations contributed to the *Ten Brothers* tragedy.¹⁸

Was this dramatic and unprecedented sinking of a vessel believed to be a solution to yellow fever, or was this a politically motivated action to appease an uneasy public? Boston's physicians undoubtedly favored the latter interpretation. They had little patience for the board's quarantine and disease control strategies. Indeed, many were fuming mad at the blatant disregard for what they believed were self-evident miasmatic causes of malignant dis temper.¹⁹ These physicians would long remember the tragedy of the sinking of *Ten Brothers* as an example of how quarantine regulations could be wildly out of step with disease etiology and transmission theories of the age. The sinking of a maritime vessel to control a yellow fever outbreak, without any consideration of the economic consequences of such an action, had never

been attempted in Boston's history and represented the ultimate misuse of quarantine authority contributing to the public mistrust of health officials and their edicts.

The persistence of yellow fever after the Revolutionary War posed major political and economic problems for the nation, in general, and Boston, in particular. The threat of yellow fever also had a long-term impact on maritime quarantine influencing the duration of the quarantine season and the ports of origin of vessels subjected to inspections. Even though no one knew mosquitoes were the vectors for this disease, public health officials recognized it disappeared in the winter months and was suspected of originating in the tropics or southern ports of the United States. Bostonians may have been spared exposure to yellow fever except in 1793, 1798, 1802, and 1819, but that did not mean they were not acutely aware each and every summer of the dangers posed by vessels coming from the tropics. They also noticed the disease did not spread far from the city's waterfront, a fact that, a century later, would be confirmed as a characteristic of the limited travel and dispersion habits of mosquitoes.²⁰

Cases like the *Ten Brothers* showed the dangers of unchecked authority and its consequences for commerce. The destruction of merchant vessels had never been used as a technique to rid an American port of yellow fever and would never be tried again. The *Ten Brothers* case would survive for years to come as the classic example of why quarantine was inimical with the interests of the merchant and shipping industry and why it needed to be managed by politicians.²¹

The Press and the Public

As the public health response to yellow fever unfolded, it became clear few believed the death reports submitted by the board of health. On August 21, the editor of the *Columbian Centinel* published a letter from one reader who declared the board was not to be trusted and that "not half the truth is known."²² Its credibility was at stake and it appeared their actions became more forceful as the public lost faith in their ability to stop the epidemic.

Public distrust also triggered interstate suspicions concerning the epidemic intelligence shared between port physicians and their chief elected officials. As yellow fever spread along the eastern seaboard, port cities enacted quarantines against other American cities suspected of having the disease. Preemptive strikes against ports suspected of harboring infection created "copy-cat" strategies in other ports that aggravated public misgivings about the saffron scourge. On August 25, New York City quarantined vessels coming from Savannah despite loud protests against this practice voiced by the mayor of Savannah. Three days later, New York City imposed a similar quarantine against vessels arriving from Boston, even though the editors of

the *Columbian Centinel* protested that Boston was just as healthy as New York City.²³

Like epidemics of the past, Boston's newspapers were not being completely forthright about the yellow fever panic. In early September after the outbreak appeared over, the *Columbian Centinel* acknowledged residents of Boston had previously left town to avoid inadvertent exposure to the disease. It also reported that after the end of the outbreak residents had returned to town and commerce with the countryside was back to normal.²⁴ The *Columbian Centinel* never published a story concerning the flight of the townspeople to the country. Was the newspaper under pressure to minimize the adverse consequences of the epidemic? Based on the exodus of businesses from New York City during this same period of time, there is little doubt the merchant class wanted to downplay bad news. By September 15, news reports claimed malignant fevers were limited to a small section of town and by the end of the month the board reported no more cases.²⁵ As a precautionary measure, and without advance warning,²⁶ the board extended the normal quarantine season an additional ten days resulting in the detention of dozens of vessels.²⁷

Unlike quarantines of the latter part of the nineteenth century, the board that held power in 1819 recognized its authority might conflict with the business interests of the city. It was not hesitant to protect the public health even if there was a severe price to be paid for such actions. Prophetically, they asked whether succeeding boards of health might consider "whether further restrictions on the commercial interests of our fellow citizens ought to be imposed to preserve the health of the town and country."²⁸ This would be one of the last significant decisions of the independent board of health and is credited with bringing about its downfall.

Miasma Theory, Maritime Commerce, and Quarantine Restraints

Boston became a city in 1822, reaching a population of 49,291 persons, or over triple its size a mere fifty years earlier.¹ This growth, fueled by a booming shipping trade, strained public services underscoring the need for improved utilities in Boston. Shocking as it may seem, the city was without a public water supply and had no municipal sewer system. Freshwater was in short supply as innumerable septic tanks and surface runoff from slaughterhouses, fish markets, and dead animals contaminated groundwater supplies. Indeed, the city council did not have the authority to install or repair sewers at the time the new government was formed. Raw sewage was dumped directly into Boston Harbor with no treatment or method for odor control.² These problems made it obvious Bostonians needed a more efficient form of government to deal with its urban decay, public health woes, and population growth.

Boston's shipping industry expanded as the speed and frequency of travel with foreign ports increased. By 1824, traders using the services of the Boston and Liverpool Packet Company were making the transatlantic crossing from Liverpool to Boston in the record time of seventeen days.³ In contrast, immigrants of the eighteenth century could spend five or six weeks at sea before spotting Boston Harbor.⁴ These faster passages brought more travel and trade, more immigrants, and, in turn, faster disease transmission. During the next fifty years, an unprecedented number of Irish immigrants would arrive in Boston, and the medical profession embraced new theories of disease transmission with profound impacts on public health. The Boston

medical profession would gain substantial control over the administration of quarantine and play an important role in determining when and if the city should declare public health emergencies. The transition to a city form of government would end the independence of the board of health and curtail quarantine.

Mothballing Quarantine

Urban growth pains led to a continuing series of administrative changes to the city's public health and quarantine programs and the delivery of services such as roads, sewers, and garbage collection. Supporters of sanitary reform urged investment in water and sewer infrastructure to consolidate a patchwork of homeowner-installed sewer lines.⁵ Their actions had a profound impact on quarantine practice by switching the dialogue from xenophobic threats of disease to improved living conditions.

Quarantine lost public support when the independent board of health was abolished in 1822, coinciding with Boston adopting a mayor and city council form of government.⁶ When the city council assumed control of quarantine, it was widely believed the past board of health had taken too much legislative and executive authority into its own hands. The city council form of government tightened political authority in the hands of fewer individuals, most noticeably dispensing with the annual town meeting where Boston's residents could vote on political matters of the day. A tipping point had been reached; participatory democracy no longer suited the rapidly urbanizing environment of the 1820s.⁷ Consultative processes that relied on direct input from electors at the annual town meeting were inefficient and unwieldy in a rapidly expanding multicultural population. This change in the structure and function of government significantly impacted the administration of quarantine.

During the administrations of Mayors John Phillips (1822) and Josiah Quincy (1823–1828) and those of subsequent pre–Civil War mayors, the city passed ten ordinances governing the activities of its health department and quarantine station, most of which did little to improve quarantine as a public health tool. These ordinances periodically relocated quarantine to various political instrumentalities with little independent authority, so the city council could focus on the pressing need for improved infrastructure.⁸

Boston's politicians might have resented the authority of the past independent board of health, but they also knew this authority was established by state law. By an act of legislature passed June 20, 1816, and later modified in 1837, the board of health was authorized to establish and regulate maritime quarantine to elect the necessary physicians and island keeper, boatmen, and other officers and servants in keeping with past practice.⁹ It also explicitly authorized the physical removal of those sick with smallpox to Rainsford Island or to any other place within Boston.¹⁰ The city council had

the authority to apply quarantine to the same extent as the previous board of health. However, taking their cue from the new mayor, the budget for quarantine was reduced and its function assigned to a subordinate group known as the Commissioners of Health—an agency with little funding and far less authority than the previous board of health. For four years, the commissioners did the council's bidding until they realized they were nothing more than pawns. In a fit of anger, the commissioners resigned in 1826, forcing the city council to assume that function. Routine quarantine duties were then assigned to the resident physician who served as the *de facto* quarantine master of Boston.¹¹ Under the new regime, city council members treated public health as one part epidemic response and one part street sanitation. Public health services were limited to waste removal and island quarantine and remained separate from each other for the next fifty years.¹² Numerous staffing and organizational changes occurred under the new government, but on a day-to-day basis, the resident physician was the program's island of stability.¹³ In 1833, the city council decided to place quarantine under the mayor and board of alderman—excluding its common council—and this arrangement remained in effect for the next thirty-four years. Boston's government was composed of the common council, board of aldermen, and mayor—an unwieldy management group that made quarantine easier to administer once jurisdiction was limited to the mayor and board of aldermen.¹⁴

Physical removal to Rainsford Island was not an experience anyone looked forward to. If you were forcibly removed, it was a sign you had insufficient funds to retain a personal physician for home treatment or were a perceived threat to the health of the community. Such decisions were usually made during actual or perceived epidemics. Upon arrival on the island, the patient would be taken to the Fever Hospital. This was a long one-story building with wide jutting eves to protect the convalescent patients from the sun and rain. Each room was furnished with two low single beds, suitable crockery, linen, and other necessities for life on the island. A ten-foot high fence was installed to prevent inmates from seeing the burying yard on the western side of the hospital.¹⁵ The graveyard was a gravelly site bound on one side by the hospital and on the other by the ocean. As of the 1820s, it was estimated five hundred graves were visible on the island and seven hundred might be recognized with some effort.¹⁶ Those who died were unknown and unsung victims of communicable disease, for the most part sailors and naval officers, who never set foot on American soil and were laid in a silent grave. The remainder were city residents who had been forcibly removed to Rainsford Island.

According to the port physician, it was not uncommon for vessels to arrive with sick men who were so far gone with disease they died "almost as soon as they are landed, before there is any opportunity of administering medicines."¹⁷ Prior to the city charter form of government, there were relatively few sick who landed at Rainsford Island and even fewer sent there by the board of

health.¹⁸ While Rainsford Island was routinely used to quarantine Bostonians and immigrants during the eighteenth century, the caseload was small compared to the years following the adoption of the city charter. Several reasons explain the increased demands placed on the station: (1) as the cost and speed of a voyage from Europe dropped with steam-powered, steel-hulled vessels immigration increased; and (2) immigration, in turn, expanded the number of poor living in squalor—conditions ripe for communicable disease. Rainsford Island attracted many healthy people as well with ten times as many landing there for business reasons (i.e., suppliers, doctors, boatmen, and businessmen) provided they had the proper permits to do so. Contacting newly arrived immigrants before others could do so gave the business edge to hotels, eateries, and retail stores looking to corner the market from their competitors. Access to the island was not free. Visitors paid twenty-five cents for a permit issued by the secretary of the board of health.¹⁹

Despite the importance of quick access to Rainsford Island for the business community seeking possible customers, the medical community continued to inveigh against its use for quarantine finding it to be an inhumane means of treating individuals with communicable disease. Their influence was significant and some of their most respected physicians would soon be responsible for the city's public health and quarantine management policies.

The Quarantine Brain Trust

In 1824, the city council appointed five consulting physicians to provide guidance to the mayor in case quarantine might be required. Unlike previous epochs, these physicians were retained as permanent advisers with important policy responsibilities for quarantine. The consulting physicians were vested with enormous power. If a majority of the physicians declared an infected person needed to be removed for the safety of the inhabitants, the mayor could order that person to a city hospital or a harbor island.²⁰ They could also recommend home treatment, in which case, the mayor could vacate other residents of the tenement for as long as necessary. However, he couldn't act without written approval from the consulting physicians, thereby giving them unprecedented power to guide public responses to epidemics. For the next forty-nine years, the consulting physicians would play a central role in the use of quarantine, advising the mayor on various smallpox, cholera, and yellow fever epidemics.

The consulting physicians were appointed on an annual basis by the city council. However, these positions were, for practical purposes, inherited posts. For example, Dr. John C. Warren was retained as a consulting physician for over thirty years (from 1824 to 1857); Dr. George Hayward for thirty-six years (from 1828 to 1863); Dr. George C. Shattuck for twenty-four years (1831–1854), and Dr. Jacob Bigelow for twenty-eight years (1838–1861). These four physicians were not only all Harvard graduates they were also all

professors at Harvard Medical School and four of the richest and most powerful men in Boston. Their combined wealth was estimated at \$1 million, but this was of trivial interest to most Bostonians when their consensus decisions could exile them to slow and painful death on Rainsford Island.²¹

Management of quarantine at this time was far removed from the democratic decision-making processes of Revere's days. An appointment as a consulting physician carried significant prestige and went to the most respected physicians in Boston. Harvard Medical School faculty dominated the appointments, holding this post for 75 percent of the time during the first forty years of this institution. Thereafter, as relations between politicians and physicians became strained, Harvard professors would continue to be represented, but other physicians—with no academic ties to Harvard—were appointed as well.

Drs. Aaron Dexter, John Gorham, James Jackson, Horace Bean, and John C. Warren were selected as the first consulting physicians in 1824 during Josiah Quincy's term as mayor.²² With the exception of Horace Bean, all were Harvard Medical School professors and influential members of their profession. These Harvard faculty members were also socially well connected to the political and business leaders of the city.²³ James Jackson was an exception to the rule, deriving his prestige from being president of the Massachusetts Medical Society and one of the most respected physicians in the Commonwealth.

Similarly, John C. Warren, one of the most famous physicians of the early nineteenth century, was the son of John Warren, who founded both Harvard Medical School and the smallpox inoculation hospital in Brookline during the Revolutionary War. Like his father, he attended Harvard College and graduated in 1797 at the age of nineteen. After spending three years in Europe studying with Napoleon's surgeon, he returned home to help his father who was in poor health. By 1806, he served as an adjunct to his father in the chair of anatomy and surgery at Harvard and then succeeded to the full professorship upon his father's death in 1815. He was a prolific writer, a brilliant surgeon, and a civic-minded health reformer who sought to educate the public and the medical profession on the principles and practices of medical science. He was also instrumental in the founding of the *New England Journal of Medicine and Surgery and Collateral Branches of Science* with his colleague James Jackson and six other Harvard professors. Indeed, six of the eight founders of the journal would eventually serve as consulting physicians and be responsible for the city's quarantine policy. Working with Jackson, Warren helped raise \$100,000 for the construction of the Massachusetts General Hospital in 1818 where he became its principal surgeon.²⁴ His brilliant medical career and decisive mind made him an obvious choice to be the chairman of the consulting physicians, a post he held for three years.

Despite their duty to advise the mayor on quarantine policy, these physicians were ideologically opposed to its use.²⁵ Instead, the focus was on

sanitation, improved morality, better diet, and improved personal hygiene as the primary public health concepts. Their views were strongly influenced by three main principles: (1) miasmatic causes of disease rendered quarantine useless; (2) island quarantine was inhumane and tended to aggravate rather than relieve the condition of those suffering from infectious diseases; and (3) past practices of fighting infectious diseases through bloodletting and drugging were ineffectual and should be abandoned. For nearly forty years, Warren and Bigelow played pivotal roles in restricting quarantine, making it a tool of last resort. In their view, isolation tended to exacerbate many medical conditions because patients, in fear of being sent to a quarantine hospital, would hide their condition from their doctor until it was often too late. Similarly, Bigelow railed against the evils of bloodletting, a practice that became less popular but was still administered to those with fevers.²⁶ Bloodletting, by itself, might weaken the patient well before an infectious disease could do its own damage. That patients survived these physician-assisted ordeals was a testimony to their will to live.

Bigelow's writings were extremely influential in America and were credited with the gradual abandonment of bloodletting and overreliance on the use of drugs to cure patients. As early as 1817, he expressed his wish to diminish the number of vegetable products put to medicinal uses.²⁷ He believed many diseases were "self-limited," the course of which could not be altered by drugs or bloodletting.²⁸ This was a radical concept to espouse, especially when drugs and bloodletting were in widespread use. Hailed as one of the seminal thinkers of the nineteenth century, Bigelow's work established the foundation for a later generation of researchers who sought to determine how the body reacted to and eventually fought off contagious diseases. If a disease was inevitable and drugs were ineffectual, then quarantine offered little hope as a defensive measure. Indeed, his belief in preventive public health measures was largely responsible for his limited support for quarantine. In his view, improved sanitation, better diet, and exercise were more important public health strategies than quarantine.²⁹ Nevertheless, he recognized certain diseases were prevented by vaccination (e.g., smallpox) or limited by drugs (e.g., intermittent fevers by quinine).

Yet, despite their distaste for quarantine, the consulting physicians called for its use on numerous occasions. The first city quarantine order, issued on January 21, 1827, revealed more about the symbiotic relationship between the medical profession and Boston politicians that it did about the principles of quarantine. At a special Sunday afternoon meeting of the board of aldermen, Mayor Quincy used the consulting physicians to justify a neighborhood quarantine on Brown's Court to isolate Daniel Summers from the rest of Boston.³⁰ Summers was a seaman who had recently arrived from Fayal where he had been exposed to smallpox. He lived in a remote neighborhood,

yet his case would normally be handled by island isolation. In keeping with past practice, the consulting physicians would have preferred to remove Summers to Rainsford Island, but the patient was in no condition to be moved and driving the sick man through the city streets to the quarantine dock could have unintended consequences; it might also arouse public concern of an emerging epidemic.

The consulting physicians were in a quandary: they opposed quarantine because of its adverse impacts on patient's emotional well-being, and yet they knew smallpox was contagious. It was over ten years since physicians had conducted a systematic vaccination program. A single case could expose the pox to many others and soon threaten the public health of over fifty-five thousand Bostonians. Their practical solution was to recommend installing two fences around the house and assigning a confidential officer to the case to prevent unauthorized entrance.³¹ Mayor Quincy accepted these recommendations and ordered the city marshal to immediately implement quarantine. His decision, published in the city newspapers, notified residents that smallpox had been identified and successfully isolated. Offshore isolation almost always trumped the more complex challenge of quarantining a house or neighborhood, and yet this is what the physicians recommended and sold to Quincy.

Quincy was undoubtedly aware of the dangers of publicizing a smallpox case and knew an ironclad disease prevention strategy was necessary to quell neighborhood opposition to landside quarantine. Perhaps more importantly, he knew a "cover-up" could only lead to a diminution of public trust and trigger rumors of an epidemic, making the actual situation look insignificant by comparison. In keeping with his commitment to complete disclosure, the mayor made sure residents were also informed Summer's place of quarantine was purified under the direct administration of Dr. Jerome Van Crowninshield Smith, the resident physician. The success of the purification process and the declaration that the house could now be freely entered could not have been done without public disclosure. The fumigation work was completed on February 5 and published two weeks later in the *Columbian Sentinel*.³²

His emphasis on open government was refreshing and certainly helped quell public fears. Even though additional imported cases would be identified in May when the Brig *Thomas & William* arrived from Ireland, the city's response was well organized, and the public sensed quarantine was working. Moreover, supplementing quarantine with vaccinations reinforced public perception the city had control over this disease.³³ For Quincy, these measures demonstrated city physicians were better quarantine administrators than the previous layperson board of health. He believed in the principles of efficient government managed by officials with access to the best medical advice available.³⁴ Quincy showed the city could operate like a private

business using a chain of command based on a strong mayor form of government.

Disease Reporting

About a year after this well-publicized incident, the Massachusetts General Court declared smallpox a notifiable disease. Boston physicians would now be required to report cases to the mayor and board of aldermen.³⁵ This was one of the first state laws to impose reporting obligations on physicians most of whom considered this an unwarranted intrusion into their private practice.³⁶ How could a physician win the trust of his patient who feared his disease might be reported? By creating a rift between the doctor and patient, it was argued the patient would be less likely to call a physician knowing he would be thrown into quarantine. There could also be adverse consequences to the profession if patients chose not to call their physician when they got sick. It was easy to imagine how forced reporting could suppress disclosure of smallpox cases and how a prolonged pattern of underreporting could lead to an ineffective public response to an epidemic. At the core of epidemic response measures is a baseline of data on the number, location, and rate at which disease is spreading. If those infected feared their physician as much or more than the disease itself, data collection would collapse under the self-serving desires of the victims seeking protection from the perceived dangers of quarantine. While physicians opposed this law, consistent with their traditional code of silence on matters that might divide the profession, they made no public protests. Nevertheless, it was clear doctors, including many of Harvard's most respected medical professors, were not pleased with this mandate.

Physicians dismissed this law for other reasons suggesting the limited utility of symptomatology by noting "half the time, it is impossible to decide whether the malady is dangerous to the public health or not."³⁷ How could quarantine be imposed if no one reported the disease? The response of the physicians was disingenuous, even if there might be diagnostic challenges in immediately determining the nature of a disease. As smallpox was quite easily identified by its symptoms, physicians were merely seeking a graceful way to avoid mandatory reporting. However, the pendulum had swung toward public disclosure of hitherto confidential patient information and there was nothing to alter its course.

What harm could there be in reporting cases? Were physicians hesitant to be held responsible for the imposition of quarantine? In reality, while many physicians opposed laws requiring them to report cases they were not necessarily opposed to quarantine. This would become clear in 1830 when Mayor Harrison Gray Otis, the city's third mayor, concerned with the threat posed by smallpox, requested the Boston Medical Association to recommend

measures for the permanent protection of citizens. Asked to consider whether quarantine should be eliminated and replaced by a mandatory vaccination program, the association recommended quarantine remain in effect. Despite its flaws, quarantine was a socially accepted tool that established mutual expectations concerning behaviors during an epidemic, encouraged social distancing, and fostered the rule of law. It also maintained order in desperate times. The association rightfully asserted citizens were not likely to adopt vaccination simply by the repeal of quarantine.³⁸

The association believed Boston's vaccination program was working quite well despite public hesitancy to its routine use. Out of an 1830 population of more than sixty thousand persons, only about four thousand had not either been inoculated or vaccinated.³⁹ This level of community-wide or herd immunity probably did not exist anywhere in Europe.⁴⁰ Simply stated, when there is a sufficiently high number of persons with immunity to a disease, the herd confers indirect protection to nonimmune persons by blocking the ability of the disease to reproduce.⁴¹ While this concept did not emerge until nearly one hundred years later, the association understood the benefits of vaccination even if they did not understand the notion that vaccination coverage did not have to be perfect to stop an epidemic. Those most vulnerable to smallpox were children under one year of age and recently arrived immigrants. Mandatory vaccinations were never considered, since physicians believed they could achieve a high rate of compliance by offering free vaccinations to the entire population. Physicians were specifically requested to keep track of all births and new domestic servants working for families under their care and to offer these susceptible persons free vaccinations. It was also recommended that the resident physician, the school committee, and the Overseers of the Poor identify those requiring vaccination to protect the entire population.⁴² These innovative measures were immediately adopted by the mayor and board of aldermen.

Physicians were pleased with the vaccination program but continued to find fault with the disease reporting law. Its mere passage did not guarantee mandatory reporting as physicians resented disclosures of personal information and showed no signs of embracing its principles. Indeed, a coalition of prominent physicians and businessmen plotted to rescind this legislation at a propitious time. Their efforts would take several years to coalesce into an effective lobbying effort when a more receptive state legislature took office.

Medical Opposition to Quarantine

In February 1836, the Massachusetts legislature repealed the quarantine laws of 1816. The Commonwealth needed to consolidate and modernize its plethora of laws, none of which had been organized into a body of statutes.

The laws were so confusing and uncodified it was not uncommon for city officials to request legal interpretations of what laws truly applied to public health. There were fifty-three volumes of laws, one for each year since the Commonwealth was founded, and none had ever been assessed to determine which remained valid, which had been modified, and which revoked. With the laws in a jumbled state, it was as easy for legislators to pass new laws as to determine what past laws might already address the topic at hand. One would not be off base in calling the state of affairs a legal quagmire.

The same year the Commonwealth tried to untangle the Gordian knot of public health laws, there was an embarrassing outbreak of smallpox—making Bostonians painfully aware of their overreliance on offshore quarantine facilities. The forced separation of one young girl from her parents and her ultimate death on Rainsford Island became the catalyst for a reassessment of the entire quarantine program. This debate was also artfully used to highlight the adverse consequences of disease reporting. If quarantine could be eliminated, then physicians believed disease reporting would become a lesser evil with fewer consequences to their profession.

On November 28, 1836, Dr. Jerome Van Crowninshield Smith, the resident physician, notified the board of aldermen that a little girl, daughter of Marty Sullivan, a resident of No. 2 Bread Street, had the pox. According to Smith, her parents refused to let her be removed to the Rainsford Island Hospital. Following established protocols, the consulting physicians were asked to opine on the appropriate medical response. After examining the child and confirming smallpox, they declared the “health and safety of the inhabitants of the city require its removal to the island.”⁴³ Such advice could never have been given by Boston’s mayor but with the cloak of medical authority covering his decision, Samuel Armstrong, Boston’s sixth mayor, took this cold and calculating guidance and ordered the child removed. One can only imagine the agony of the mother and father who watched as their young daughter was forcibly taken away in an open boat to windswept Rainsford Island. This decision must have haunted some of the consulting physicians whose professional sensibilities called for protecting patients, not exposing them to greater health hazards.⁴⁴

Marty Sullivan’s daughter wasn’t the only person quarantined. About a month later, on January 4, 1837, the *Boston Medical and Surgical Journal* reported eighty patients had been admitted into the smallpox hospital with a large proportion originating from the city.⁴⁵ This was one of the coldest winters on record and ocean travel in an open boat was tantamount to risking death at the hands of the elements. The epidemic continued to smolder during the spring of 1837 with the resident physician reporting cases during the months of March, April, May, and June. Most cases were removed to Rainsford Island, but in a dramatic reversal of policy, some Bostonians stayed at home.⁴⁶ Were the physicians gaining compassion for the sufferings of the

smallpox victims or was this merely a case of an overcrowded hospital incapable of accommodating an unexpected surge in patients? The suffering caused by a wintertime quarantine precipitated a reassessment of quarantine principles.

Exiling Bostonians to a distant island was losing public support particularly when the city's top medical advisers questioned the separation of infected children from their parents. In February 1837, the consulting physicians were asked to review the existing system of island quarantine.⁴⁷ This was the first formal request for a medical assessment of quarantine in the city's history. While citizens had debated the need for island quarantines in the eighteenth century, the focus was on the relative merits or demerits of alternative offshore islands—not the complete removal of the quarantine hospital from the harbor. With only thirty-five deaths from smallpox in the previous twenty-five years, physicians argued there was less need for quarantine because vaccination programs had been remarkably successful.⁴⁸ Quarantine, while previously useful, was considered not only harsh and cruel, but "impolitic, unreasonable and unwise."⁴⁹ However, the city council was powerless to discontinue island quarantine, a requirement established by state legislation.

City council members might not be able to eliminate island quarantine but they could develop a more palatable alternative. They tasked a committee to investigate the feasibility of establishing a smallpox hospital within the city to relieve patients from the cold and suffering caused by the long open boat journey to hell. The committee concluded, despite needing a nearby isolation hospital, the locations identified all had insurmountable objections raised by neighboring towns or residents.⁵⁰ In a rare move of public dissension, John C. Warren took issue with the committee's view and saw no serious objection to establishing an isolation hospital.⁵¹ He argued for a more humane approach and believed accessible hospital care was a basic public good that trumped past concerns with urban pest houses. He and his colleagues reminded city officials a smallpox hospital once existed within two miles of Boston without having spread any contagion—a reference to the hospital his father operated during the Revolutionary War in the West End.⁵² Perhaps one of the most important findings, to which the committee did not respond, was that fear of offshore quarantine would foster a cult of silence and tempt physicians and patients to conceal disease.⁵³ He counseled against quarantine, especially at a time when the disease had been significantly checked and mitigated by vaccination. Warren incorrectly claimed island quarantine was not practiced elsewhere and therefore it might not be a good idea to continue its practice.⁵⁴ Island isolation was discouraged for many of the reasons that might today be called psychosocial in nature. Surprisingly, Warren and his colleagues were persuasive. Effective, March 1, 1837, the city council halted island quarantine after over 120 years of virtually

uninterrupted service.⁵⁵ This seemed like a near lethal blow to this feared institution, especially in light of Warren's stature in the medical community. It was also the first step in priming public opinion for a broadside against disease reporting.

Repeal of Key Quarantine Laws

The next month the consulting physicians took on the challenge of revamping the Commonwealth's quarantine statutes. Since quarantine was governed by statewide legislation, they saw the need for broader reforms to stop the removal of children from their parents and invalids from their caregivers. The terror engendered by separation, they reasoned, was a violation of the rights of humanity and offered no countervailing public good.⁵⁶ Their impassioned pleas for a more humane treatment of those infected with contagious disease may very well be one of the first declarations of human rights for victims of quarantine.

While their initial efforts were not successful, a special committee of the General Court eventually heard their plea the following year. Warren along with eleven other physicians and eight prominent citizens signed a petition calling for the repeal of the Commonwealth's quarantine laws.⁵⁷ Included in this august group were the city's five consulting physicians and five physicians from Harvard Medical School. The physicians reinforced their medical views with political muscle from Boston Mayor Samuel Eliot, former Mayor Harrison G. Otis, a prominent bank president, a publisher, and several attorneys. With only a few exceptions, these lobbyists were some of the wealthiest men of their age connected through social status and the brotherhood of being graduates of Harvard.⁵⁸ The petitioners recommended repeal of the quarantine law citing their earlier opposition to isolation and its adverse psychological impacts, its infringement of privacy rights, and its tendency to give a false sense of security when true protection rested with vaccination. Simmering inside this opposition was their concern with obligatory disease reporting. Disingenuously, they suggested reporting "always creates panic, disturbing the quiet of the neighborhood, unnecessarily interrupting business causing troublesome inconvenience and unnecessary expense."⁵⁹

Their Machiavellian strategy to repeal reporting requirements worked. The legislature listened to these influential petitioners, and on April 20, 1838, major requirements for the protection from smallpox were repealed.⁶⁰ The Boston Board of Health would no longer be required to (1) find a suitable place to care for the infected; (2) establish a smallpox hospital in the event of another outbreak; (3) install red flags to warn travelers of its presence; and (4) receive reports from physicians and householders concerning its existence.⁶¹ The General Court fell under the spell of these influential physicians

even though little evidence was presented to substantiate its decision that it was a foolish superstition to display red flags as a means to warn travelers to keep a respectful distance. Taking their cue from these well-spoken lobbyists, the legislators believed smallpox could be conquered by the cowpox vaccine.⁶² Boston had not had an outbreak in thirty-nine years and vaccinations had done a remarkably good job of keeping it at bay.

With the benefit of hindsight, we know the legislators failed to consider the voluntary nature of vaccination, the rapid growth of Boston's population, the dangers of private physician management of smallpox outbreaks, nor the limited efficacy of the cowpox vaccination.⁶³ These physicians and their political allies certainly made a convincing case for this unfortunate legislation, but their views were quite shortsighted. The General Court soon recognized it had gone too far. Articles appearing in the *Boston Courier* nearly two years after this law was enacted shocked the public with the true facts behind the elimination of the disease reporting law. A physician serving Boston's aristocracy had chosen to keep the existence of smallpox in the blue blood section of town a secret. Rather than having the client removed from his home and placed in a quarantine hospital, the physician sought the support of James Savage, publisher of one of the city's daily newspapers, and teamed up with other blue blood physicians and politicians to repeal the disease reporting and quarantine laws.⁶⁴

As fate would have it, the repeal effort came one year prior to another smallpox epidemic in Boston with 296 cases during the last three months of 1839. Boston's lax approach to quarantine and disease reporting during the epidemic became a public embarrassment with the *New York Star* blaming Boston for causing the spread of smallpox to as far away as Vermont.⁶⁵ The abuse of privilege would ultimately boomerang against those who sought to protect the aristocracy at the expense of public health and tarnish the reputations of the medical profession. Harvard Medical School, while not an official sponsor of this special interest legislation, tarnished its reputation by letting its faculty act as lobbyists for the rich. It was an unfortunate example of the alignment of privilege, prestige, and profession in dramatic opposition to the needs of the general health and welfare of the community.

Within two years, the General Court restored the requirement that householders and physicians report to the board of health whenever a dangerous disease, including smallpox, is known to exist. However, the revised legislation did not go far enough.⁶⁶ Vaccination would be the only authorized public health measures in the event of an epidemic because quarantine lost its cachet. This might have been an acceptable strategy if the legislature had committed to a viable vaccination policy. Unfortunately, mandatory revaccination and stiff penalties for noncompliance with vaccination laws were not considered necessary. The General Court had restored its disease reporting law but left its thirty-year-old weak vaccination law untouched.

Members of the General Court may have been confused about the role of vaccination in combating smallpox. When the Commonwealth retained a team of editors to consolidate fifty-three volumes of its laws into statutes, legislators may not have noticed the subtle interpretations they made. The editor's interpretations were the *coup de grace* for mandatory vaccination. Effective April 30, 1836, cowpox vaccination could not be construed to be mandatory.⁶⁷ Like numerous other smallpox epidemics, the legislature would sooner respond to a crisis than implement proactive preventive health measures. Political support for quarantine reached its lowest ebb from 1838 to 1848 when the Commonwealth was without a robust quarantine statute. Legislators were smitten by the potential public health benefits of vaccination without understanding the practical exigencies of managing an epidemic, accounting for waning immunity and the absence of enforcement mechanisms for vaccination.

The Cult against Quarantine

Even though quarantine remained a state law, two forces throttled its use in Boston—the relatively low incidence of imported disease and the increased skepticism concerning its benefits. That there was a general decline in vessels placed in quarantine is well documented.⁶⁸ Improved ship board sanitation, the adoption of sanitary controls at major European port cities, and improved inspection and disinfection procedures at Rainsford Island helped limit the spread of disease.⁶⁹

The second and more persuasive reason for its declining use reflected the medical community's belief such measures were blunt instruments in the war against disease. In reality, the death of Marty Sullivan's daughter was the straw that broke the camel's back. The medical profession could not sit idly on the sidelines while city government enforced quarantine laws that ran antithetical to their medical ethics. Physicians had a moral responsibility to their patients that set them at odds with quarantine regulations and they needed to take action. Even though it would be six more years before the American Medical Association would adopt a code of medical ethics, Boston's consulting physicians acted with a moral resolve that revealed their tenderness and firm support of their patients' rights.⁷⁰

In 1841, the consulting physicians eloquently urged the Boston Board of Aldermen's Committee on External Health to reassess the value of quarantine. Their plea is perhaps one of the finest summaries of why the medical profession opposed quarantine. Appealing to modern sensibilities and improved understanding of the causes and means of diffusion of epidemics, they emphasized a rational approach to disease control. In their view, public dread of smallpox, yellow fever, and cholera led to a profusion of untested control strategies.⁷¹ Diseases the public thought to be contagious, such as

yellow fever, were found not to be according to the opinion of most physicians. In contrast, typhus fever was found to be contagious when noxious atmospheric conditions existed, which were also referred to as "epidemic environmental conditions," a term of art that had no evidentiary foundation.⁷² These emerging theories of disease transmission contradicted traditional maritime quarantine strategies.⁷³ In the case of smallpox, which was believed communicated by contact, not by miasmas, it could enter Boston more easily by land than by sea. This vulnerability suggested land cordons would be necessary to cut off communication with surrounding towns where the disease might exist. Such strategies, the consulting physicians believed, would be inefficient even in a peninsular city such as Boston. They argued the conditions that supported a townwide quarantine in 1776 were no longer present in 1841.⁷⁴ There were now three bridges into the city and the marshland surrounding Boston Neck had been filled in so there was no longer a single entry checkpoint. More to the point, these physicians had an ideological predisposition against quarantine regardless of the evidence.

The consulting physicians were some of the strongest American proponents of the miasmatic origin of disease.⁷⁵ According to them, why focus on the individual as the carrier of disease when atmospheric conditions played such an influential role. The foul odors of Boston and its polluted brackish saltwater wetlands were thought to harbor untold forms of disease. These foul smelling pits, lagoons, and cesspools existing in the pre-Civil War era were noxious enough to induce brilliant minds of the time to view them as breeders of disease. They urged the removal of putrescible substances that vitiate the atmosphere, the preservation of personal cleanliness, temperate habits of living, and a "perfect confidence in an all-wise overruling power."⁷⁶ Public health needed to focus on sanitation, not isolation. After constant exposure to the foul smells of human and animal waste discharged into Boston Harbor, it is no wonder physicians became the environmental activist of their age. In one sense, their views were remarkably modern in character: disease was caused by contagion and influenced by environmental factors. It was their overemphasis on atmospheric factors as the direct and driving force behind environmental exposure that separates their views from physicians of today.

The pleas of these environmental reformers reached receptive ears during the early 1840s, a time when few diseases were deemed quarantinable and quarantine use reached an all-time low. Alderman Abraham Lowe, chair of the 1843 Committee on External Health and a Dartmouth-trained physician, captured the spirit of the time when he opined quarantine was a defunct administrative function with no public health value. Lowe claimed abandoning quarantine would have little effect on public confidence in the city's ability to control contagion. Relying on the opinions of the medical profession, Lowe urged city officials to try more fruitful activities such as sanitation and street

cleaning.⁷⁷ Lowe and the consulting physicians had created a self-fulfilling prophecy; by redefining what diseases were quarantinable, they had reduced the scope and need for maritime public health measures. If it wasn't measured, it no longer needed to be managed.

The consulting physicians distinguished between infectious disease transmitted through the atmosphere and contagious disease, which required contact with the skin of one person with that of another.⁷⁸ They even downplayed the "contact" contagion theory by arguing skin was not a vehicle for disease transmission as long as it remained intact and exposure was of limited duration. For this reason, poison could only enter the body "if the skin should be broken," and therefore was not a routine risk. Based on this premise, epidemic disease such as yellow fever, plague, and cholera could not be transmitted by skin contact and were neither contagious nor infectious. In contrast, smallpox was only considered infectious when contracted through the atmosphere and not via skin contact.⁷⁹ While the consulting physicians closely followed European medicine, they were generally out of step with its latest medical research.⁸⁰

With medical views like these, the Boston City Council had little reason to support its quarantine station. During the ten-year period from 1839 to 1848, despite an enormous increase in immigration, the city imposed only two quarantine orders or 80 percent fewer orders than any previous decade in the nineteenth century.⁸¹ More importantly, there were no citywide vaccination campaigns during this period as there had been in 1816, 1824, 1830, and 1838. The declining use of quarantine was influenced by limited financial support from the General Court forcing the city to cover administrative costs even though its island hospital had been established for the good of the entire Commonwealth. This confluence of anticontagion forces should have ended quarantine services in Boston Harbor. Yet, the station survived even under this "anticontagion" onslaught, restricted funding, and a loss of political support. Its survival was a testimony to the unsung efforts of its port physician and his quarantine crew.

Port Physician as Epidemic Gatekeeper

The port physician was one of the few with a pulse on disease patterns in Boston. As the city's gatekeeper, he inspected incoming vessels from dozens of European and tropical ports. His influence on public health policy and the response to epidemics was considerable even if his duties were largely administrative in nature. The title of the port physician changed numerous times between 1799 and 1841, even though the duties remained substantially the same. Initially, the position was titled visiting physician (1799–1816) but was renamed principal physician (1817–1823) when multiple physicians were retained to supervise quarantine services. In 1824, under

the city form of government, it was renamed resident physician (1824–1841).⁸²

In 1826, Dr. Jerome Van Crowninshield Smith was appointed resident physician with responsibility for Rainsford Island quarantine station. Prior to his appointment, the city retained physicians on an “on call” basis and did not expect them to live on one of the harbor islands.⁸³ Smith, a twenty-six-year-old who graduated from Berkshire Medical Institution in 1825, was energetic and willing to take on a challenging career. He had a rare combination of skills that made him an exceptional physician, a keen observer of human nature, and a talented political operative in Boston. He was also a journalist who established the *Boston Medical Intelligencer* in 1823, a precursor of the *Boston Medical and Surgical Journal*. Stationed on Rainsford Island, Smith was given the gift of solitude to pursue his journalistic interests far from the maddening crowd, yet still remained in intimate contact with the public health issues that motivated his professional interests.⁸⁴ He left a lasting record of his association with Rainsford Island by carving his name into one of the rocks on the island. His graffiti was still visible during the summer of 2005 when the author visited the island.

The position of resident physician carried significant prestige in the early nineteenth century because his decisions had substantial impacts on public health, commerce, and city life. As a member of the Massachusetts Medical Society, Smith could also muster the support of a network of practicing and academic physicians to reinforce his advisory opinions to the mayor. Ironically, under the city form of government, while the prestige of the position grew, its role in regulating imported diseases declined. Decisions about quarantine were no longer made by laypersons. That was the old paradigm. Under the new city charter, the Boston City Council managed public health as one of hundreds of other issues it addressed. The consequence of their expanded responsibilities was the delegation of routine administrative decisions to committees and advisory boards. This, in turn, further removed the resident physician from key decision makers responsible for determining, if and when quarantine was warranted.

Assigning a physician to quarantine duties may seem logical today, but in the early nineteenth century this was a radical innovation. Seventeenth and eighteenth-century quarantines were enacted with little medical supervision and no dedicated medical staff. The role of the resident physician, established in 1799, grew out of the need to inspect foreign commerce and to apply medical expertise to decontamination of goods—a role best handled by a physician. As Smith’s duties expanded, he was required to reside on Rainsford Island during the quarantine season (from June 15 to September 15) and manage its affairs, including those previously assigned to the island keeper. His tasks ranged from the care and treatment of patients, harvesting agricultural products, tending of building and grounds, and managing

visitor and vendor activities. Of course, during quarantine months, Smith also boarded and inspected vessels and provided captains with the health ordinances and a red flag to hoist at the main mast.⁸⁵ Whether the master and his crew could read English was another matter.

Smith's island life was not one of idyllic seclusion. The vitality of nineteenth-century Boston could be seen at its wharves and piers where thousands of immigrants arrived each year bringing with them tons of goods. It was his job to inspect passengers and their goods for telltale signs of infection. What kind of workload could he expect? In a typical quarantine season, he inspected some 259 vessels in 130 days—or about two vessels every day.⁸⁶ Inspecting passengers and cargo was not only a full-time job, it was unpleasant and posed significant risks. This was as true for Smith as it was for the patient. In the age before motor-driven boats, patients would be taken by schooner over the treacherous waters of Boston Bay. This primitive arrangement began in 1750 when the government bought a boat to replace the unreliable leased boat previously used to reach Rainsford Island.⁸⁷ By the time Smith became port physician, he had access to the quarantine schooner *Massachusetts*, a seaworthy vessel he used to reach Rainsford Island as long as nature blessed him with favorable winds and waves.

Cold weather and open boat travel were enough to scare away all but the hardest of physicians. In the early days, port physicians relied on sails and oars to meet arriving vessels. However, by 1826, small steamer vessels were emerging as a viable means of travel.⁸⁸ Yet, new vessel technology would not be immediately adopted. It took another twenty-one years before Boston's politicians considered purchasing a steamer and even then only when such a vessel could be used for multiple purposes to reduce costs to the taxpayer.⁸⁹ Criminals, orphans, and the infected used the same boat to reach various offshore detention centers. Such opportunities for infecting others were of little concern to its elected officials.⁹⁰

Improved sea travel not only reduced the arduous voyage to reach the port physician's island home it also made it easier for politicians to reassign him to permanent residency in the city. They reasoned with fewer cases of infectious disease, and easy access to the island quarantine station, the port physician would be better used to monitor the health of prisoners and tackle endemic disease within the city.⁹¹ He would no longer rule Rainsford Island as his sole quarantine kingdom—a sobering prospect for a forty-one-year-old physician habituated to a relatively easy island life in Boston Harbor.

The abrupt termination of state support for Rainsford Island certainly influenced the city's decision to redirect Smith's duties. Not surprisingly, faced with diminished funding, the city decided effective June 17, 1841, Smith would live in Boston. Three days later, the city council took further cost cutting measures by merging the duties of the island keeper and boatmen into one position, thereby reducing expenses by 25 percent or over

\$1,200 a year.⁹² This new job was given to George Tewksbury, the former captain of the thirty-six-ton quarantine schooner, a vessel purchased in 1834 and kept in service until 1851. The city's quarantine committee also recommended other cost-cutting measures including changing quarantine regulations to focus on vessels with contagious sickness instead of ports suspected of disease.⁹³ This decision effectively reverted the city to the quarantine policies of the eighteenth century, a time when masters and commanders were free to enter the city at will.

With a growing recognition of the health consequences of poor city sanitation, inadequate water supply, and overcrowded prisons, Alderman Lowe wanted Smith on the mainland more than ever. Using Smith as the medical gatekeeper to the harbor was no longer a priority and for this and other reasons, his role as resident physician was renamed port physician on December 20, 1841, with his duties squarely focused on mainland activities. Until 1867, the port physician would remain responsible for the quarantine station nominally reporting to the mayor and aldermen even though on a day-to-day level, he worked for the city council's three-member quarantine committee. Despite his expertise, Smith was rarely afforded the opportunity to provide medical or public health opinions. That responsibility was reserved for the city's consulting physicians.

The impact of these tightfisted budgetary policies crippled the city's ability to respond to another epidemic. By fiscal year 1845–1846, Boston only spent \$424.16 for quarantine activities, its lowest investment in maritime quarantine in the entire nineteenth century. In contrast, eight years earlier, the city had appropriated nearly five times as much money when epidemic disease was a politically charged issue.⁹⁴ These cost-saving measures reflected a growing belief quarantine was too expensive and not good for commerce. The city could have charged for its quarantine inspection services like other American port cities but chose to stop such fees in the interest of supporting the shipping industry. Consistent with this pro-shipping policy, Smith was stripped of his responsibility to inspect vessels and collect fees. Assigning Smith to handle the duties of "Physician to the Gaol" made it impossible to maintain quarantine after 1843.⁹⁵

For the merchants, the complete breakdown of the quarantine program was no cause for alarm. They welcomed this new "arrangement" and had physician friends who felt the same way. In 1843, the *Boston Medical and Surgical Journal* noted Boston's quarantine regulations were well regarded by the "empire city" as it did not impose inspection on otherwise healthy vessels. The journal's editor, none other than Dr. Jerome Van Crowninshield Smith, noted that hundreds of thousands of dollars have been saved by this enlightened policy without adverse impacts to public health. In contrast, New York City's commerce suffered from burdensome quarantine fees charged to all vessels—whether diseased or not.⁹⁶

Keeping Smith assigned to jail work was a bad bet as massive emigration of sickly immigrants would soon inundate the city. The door to immigration was swung wide open in 1840 when Samuel Cunard opened the first commercial passenger service between Boston and Liverpool. Mayor Jonathan Chapman heralded it as a major step forward as it would bring access to European culture and ideas, which remained valued commodities despite America's political schism with Great Britain sixty-five years earlier. The mayor saw it as a turning point in the city's commercial fortunes rapidly taking local businesses from depression to success.⁹⁷ Cunard's passenger service was so successful it brought a surge in transatlantic travel. Over 1.4 million immigrants arrived in America in the 1840s, and hundreds of thousands chose Boston as destination, creating social, political, and public health challenges never seen before. With nearly three times more immigrants arriving in the 1840s compared to the previous decade, the city's capacity to provide adequate public services was severely strained.⁹⁸

This unprecedented influx eventually triggered massive investments in basic urban infrastructure. For example, in 1840, there were still no public sewers as we know them today. Human wastes were directly discharged into the harbor or Mill Pond, a large impoundment that served as an open cesspool, without treatment or odor controls. The city was also without a comprehensive public water supply system and no public hospital for the poor or destitute.⁹⁹ Those suffering from disease recuperated at home and often without the services of a private physician. The city's public health function focused on epidemic diseases and the removal of offal and other putrescible wastes.

If these conditions weren't bad enough, immigrants arriving in the 1840s were some of the poorest and neediest ever seen. Deluged with wave upon wave of public health disasters, the city's immediate response was to shoot the messenger. A Joint Special Committee of the Boston Board of Aldermen was convened on April 30, 1849, in an effort to address these issues. Shocking as it may sound, the committee was charged with abolishing the office of port physician. The board of aldermen, undoubtedly under the spell of the anticontagionists, thought its committee would carry out its assigned task. Fortunately, they quickly concluded this function must be maintained and expanded with additional medical staff capable of responding to emerging epidemics. The position of city physician was thus created within two weeks with a two-prong mission to control imported and endemic disease. After eight years of virtually nonexistent quarantine services, the port physician was ordered to take his new post on Deer Island, the city's new quarantine station.

For Smith, this reassignment did not fit into his career plans and he resigned after twenty-three years, the longest tenure of any port physician

in Boston's history. How could the city council have even considered eliminating the port physician—much less reassigning this function to jail service? Its decisions had been strongly influenced by some basic misconceptions; the apparent lack of infectious disease cases over the previous fifteen-year period. Yet, there was more to this story than disease statistics—of the lack thereof. The General Court had removed itself from fiduciary responsibility over quarantine, and the medical community dismissed the contagious nature of yellow fever. Swamped with development plans and growing city debt, the city council could not have anticipated the extent to which declining public immunity to smallpox, increasing migration, and deplorable tenement living conditions would alter the magnitude, type, and intensity of disease outbreaks. While fiscal pressures influenced the resources available to Smith, the consulting physician's fashionable support for the miasma theory also contributed to the demise of quarantine.¹⁰⁰

Turmoil within the maritime quarantine administration was obvious to the casual observer. In the space of fifty years, there were an inordinate number of transfers of public health and quarantine authority and reclassification of work assignments for the port physician and the board of health. During the same period, the city council reorganized its quarantine administration twenty-one times, including revision of the board of health function from an independent board to a subsidiary body of the city council (1822); reassigning this responsibility to the mayor and board of alderman (1849); and getting ahead of our story, later on reestablishing the independent status of the board of health (1873).¹⁰¹ For nearly thirty years, the city's public health game plan was nothing more than a series of piecemeal reorganizations, reassessments, and retractions of quarantine service with no endgame in mind.

Quarantine also declined because it lacked a governmental representative to champion its cause. Serving on the city council was an enormous responsibility leaving its members with little time for arcane quarantine policy. They rarely had the luxury of delving into public health matters as an exclusive assignment. Instead of investigating isolated outbreaks, they focused on the completion of massive public works projects, including building a vast network of streets and drains, filling in wetlands, and improving transportation systems. Saving individual lives was less of a priority than repairing and improving the overall city infrastructure. These massive projects were viewed as having a salutary effect on disease and trivialized the need for quarantine. Construction projects that generated jobs and patronage were far preferable to investment in hospitals, quarantine facilities, and vaccination programs.¹⁰²

Despite past municipal investment strategies, the massive influx of immigrants arriving on low-cost passenger vessels changed public health

priorities. Improved and expanded maritime passenger service created a new rationale for quarantine that was not immediately apparent to Boston's ward politicians. As we will soon see, the need for medical support for the poor, the disenfranchised, and the orphans of the immigrant class forced the city to find new ways of managing these public burdens. Boston's islands might have lost quarantine patients, but they would soon have more than enough poor and troubled youth to become small towns in their own right.

CHAPTER THIRTEEN

Deer Island Quarantine Station

The Irish potato famine brought tens of thousands of poor immigrants to Boston, most of whom had little wealth and few family ties in America.¹ Hard times on the farms in Ireland forced many to seek a new life in the New World. They traveled on overcrowded ships with few sanitary amenities and minimal staples for the journey. Between 1849 and 1851, over one million Irish were evicted from their homes and “encouraged” to immigrate to the New World.² Boston was their first port of call for those looking for the shortest voyage to America. Over twenty-four thousand immigrants arrived in Boston during 1847, and the majority came from Ireland.³ The influx of immigrants in 1847 was three to six times greater than any previous period in its history. With a population of 138,000, it could ill afford a one-sixth increase in its population in a single year. These were no ordinary challenges. In the five year period from 1846 to 1850, 112,664 passengers entered Boston by sea, and 65,556 had come from Ireland.⁴

In response to this immigration crisis, the city constructed two makeshift hospital sheds on the low lying flats of Deer Island to house the sick and destitute. These “shed” structures were created about a quarter mile apart to separate the men and women. Between the two sheds was the residence of thirty-six-year-old Dr. Joseph Moriarty, the superintending physician.⁵ Upon their arrival, Moriarty ordered the Irish off their ships and into these segregated barracks separating families and loved ones according to sex. For most Irish, their initial instinct was to fight every effort made to isolate them from other family members. In their view, Boston’s hastily assembled quarantine station smacked of an American prison system.

The immigration crisis brought other unintended consequences; virtually, every ship coming from Ireland that summer carried typhus-infected passengers in deplorable physical conditions. Over an eighteen-month period that began on May 29, 1847, a total of 2,815 poor and sick souls were cared

for in these two wooden hospitals. Although the overwhelming majority (1,698) came from Boston, 1,112 aliens were also quarantined, including 489 who died and were buried on the island.⁶ The unceasing arrival of thousands of Irish transformed Boston's traditional care for the poor from a service offered at the House of Industry in South Boston to an offshore detention center. The House of Industry, established in 1822, was designed as a workhouse for the able-bodied poor but it also accommodated vagrants, drunkards, and other indigent classes that could not survive without food, clothing, and shelter provided by the city. Moving the Irish to Deer Island was intended to resolve overcrowded conditions in the South Boston House of Industry. Yet, an offshore detention center did not address a wide range of social needs triggered by the Irish immigration.

Permanent Detention Center

During the summer of 1847 overcrowding on Deer Island and the House of Industry forced the Boston Board of Aldermen to find a political solution to Irish immigration. All politics are local and the aldermen knew they had to cool xenophobic rage—an unlikely strategy if the Irish remained concentrated in South Boston. Bowing to public pressure, the Committee on Public Buildings recommended the city council spend \$122,100 to relocate the House of Industry to Deer Island.⁷ What taxpayer would be willing to support such an expenditure unless it offered a financial jackpot? The committee claimed removing the House of Industry would free up valuable property in South Boston worth at least \$1.2 million. They also emphasized an island location would reduce expenses, since the medical needs of immigrants could be met at the same place where they were to be given work. Deer Island was envisioned as a full-service detention center for the poor, sick, and troubled youth. The House of Industry (the poor), the immigrant detention center (the Irish), the quarantine station (the sick), and the House of Corrections (the troubled youth and the criminal class) were envisioned as four facets of the city's grand solution to social deviants. Its location would not interfere with the city's commercial development and would appease the anti-Irish sentiments prevailing in Boston.

Placing this motley assembly of outcasts on Deer Island avoided duplicate city staff to meet their medical, housing, and employment needs that might otherwise be required if these services were offered within Boston.⁸ Moving the makeshift detention hospital off the 184-acre Deer Island was not even an option as Bostonians fumed about the Irish invasion. Bostonians were given the devil's bargain; keep the Irish in South Boston's House of Industry or move them to Deer Island. Given the options, the island's location provided a level of security and isolation unmatched by any other alternative. Only the most favorable circumstances would enable a daring inmate to attempt to swim against the tides and across strong channel currents to the nearest shore—Point Shirley.⁹

The Island's use as a temporary quarantine station strengthened the case for consolidating related welfare services offshore. Moreover, the poverty-stricken crowds sheltered in the House of Industry reinforced public clamor to remove this institution as far away as possible and Deer Island seemed the safest bet. The committee urged using the quarantine station to receive alien passengers "to the greatest advantage to the City and least disadvantage to navigation interests."¹⁰ The city council accepted their recommendation on October 21, 1847, and by the following year, to ensure the Irish could not escape from their clutches, the city boldly ordered vessels coming from Liverpool and all Irish ports to anchor at Deer Island for inspection and quarantine. Effective November 1, 1848, all Irish were detained on Deer Island regardless of their health or wealth, an unprecedented public health measure overlooked by most historians of the Irish diaspora.¹¹

While the city council had long provided for sickly and pauper immigrants, the Irish diaspora brought flotilla upon flotilla of needy souls who overwhelmed its resources. The magnitude of this public health crisis has never been fully told even though many historians have acknowledged the political and social upheavals created by this mass immigration.¹² This bizarre "ethnic cleansing" strategy would not have been realized until the city council combined the House of Industry and House of Reformation into one superbureaucracy known as the Board of Public Institutions with joint responsibility for quarantine and hospital services.¹³ City officials felt the basic strategy of isolating the sick and the poor in government-controlled detention centers worked well.¹⁴ While the strategy saved money, its impact on the Irish left emotional and political scars that lasted for several generations.¹⁵ The Irish would long remember the filthy conditions of traveling by steerage class and the painful experience of disinfection imposed by the post physician.

The moment an immigrant left his ship he was immediately subjected to a cleaning operation considered the most thorough and intrusive of its kind. His rags were stripped off his back and burned and his body was purified with hot and cold water and then covered in a highly caustic and poisonous white crystalline powder that served as an antiseptic to kill all the vermin with which he was covered. After this humiliating ritual, the men were given a clean set of clothes and marched into the men's quarantine hospital.¹⁶ This process might have remedied the ills of the refugees if the city had sufficient beds, physicians, dock space, and nurses to manage the arriving "masses." Unfortunately, seven hundred immigrants were living on Deer Island during the summer of 1847 with hundreds more arriving on a daily basis. Without beds or tents, city officials soon had no other choice but detain the sick refugees on board incoming vessels. Living conditions on vessels were almost always worse than those in the quarantine hospitals. Crowded steerage compartments with little ventilation and poorly maintained toilets were a near-certain recipe for catching disease. The results were predictable. During the summer of 1847, over 150 passengers were sickened by unsanitary shipboard conditions, aggravating the public health crisis.¹⁷

Between 1847 and 1872, 65,137 Bostonians were exiled to Deer Island, including 693 held in bondage.¹⁸ While most were victims of poverty or perpetrators of crime, their treatment was largely unaffected by the cause of their detention. Common criminals, truants, and the poor shared the same hospital accommodations with individuals harboring communicable disease, creating one of the most efficient instruments for spreading disease the city had ever created. In twenty-five years, 23,510 persons were hospitalized on Deer Island, and 3,456 of these patients died. This massive social engineering experiment commingled people without regard to their health, social behavior, or varied nutritional needs. Food riots, a high incidence of out of wedlock births, and overcrowded living conditions were the inevitable consequence of a city that sought efficiency in public administration without an overarching public health intervention strategy.¹⁹ Cost-saving measures trumped public health as Boston faced an unprecedented crisis that its underfunded social services could not resolve.

Rainsford Island had been the Commonwealth's quarantine station from 1737 to 1849.²⁰ However, pressure to curb galloping welfare costs precipitated by the Irish potato famine caused city officials to select Deer Island as its multipurpose detention center to solve a wide range of social service issues that would not have been possible on tiny Rainsford Island. The "Irish problem" was not the only precipitating factor. As early as 1843, the Commonwealth had refused to cover any of the costs of running Rainsford Island. Faced with the need to reduce the city's most significant quarantine cost—boat transportation—an island closer to Boston would be ideal.²¹ A Deer Island station solved other financial troubles as well. Rising levels of debt associated with widening and extending streets, building new schools, a new jail, the construction of over sixty miles of water lines, and a new city wharf left little room for welfare and public health reforms.²² The mayor and board of aldermen were tightfisted with taxpayer money, and this was especially the case when such funds were allocated for the indigent class, in general, and foreign paupers, in particular.

Poverty, Slums, and Cholera

During 1848, there were whispers of a possible outbreak of cholera among the famine-stricken Irish. Poverty, filth, and dissolute lifestyles were routinely blamed as causes of cholera, so it came as no surprise that Boston's unsanitary living conditions heightened public concern that another epidemic was imminent. Physicians monitored newspaper coverage with great interest. Boston had been spared from any significant cholera outbreak in 1832 when it first crossed the Atlantic. In June 1846, cholera reappeared in Bokhara and Samarkand, and in a matter of months, it passed through Baghdad and then to Teheran, by the following summer it had advanced to New

Russia near the mouth of the Don, and in October 1847 had nearly reached Moscow.²³ Its zigzag path across the Asian and European continents gave ominous clues it would reappear in North America.

The city's political leaders feared overcrowded tenement buildings were creating slums the likes of which had never been seen in Boston. Their concerns would eventually be fully documented in the 1850 state census revealing Ward 8 as having the highest concentration of Irish among the city's twelve wards. It also demonstrated the Irish were living in the most overcrowded conditions imaginable: on average, 21.18 persons were living in each house within Ward 8. In contrast, the average occupancy for the entire city was less than half that level (9.16 persons per house).²⁴ These immigrants were the poorest, downtrodden, unhealthy, and uneducated anyone had ever seen.²⁵ Horrendous living conditions coupled with the alarming news of the ongoing advance of cholera in Europe was enough for the city council to request the advice of the consulting physicians. Their response to the city council's request came on November 2, 1848, in a brief seven-page report recommending a three-prong strategy. First, avoid the use of alcohol because "a drunkard rarely survives the attack of cholera."²⁶ Second, avoid "long exposure to a damp atmosphere, confinement in crowded rooms, or heated carriages, with subsequent abrupt exposure to cold or night air . . . or proximity to the mouths of drains, and of mud containing decomposing organic matter, exposure to collections of offal and other nuisances that abound in cities"²⁷ Finally, despite their best instincts, the physicians recommended that arriving vessels be visited by the city's health officer to remove cholera patients and their belongings. This medical advice was a utilitarian blend of traditional miasma theory, a religious homily against moral turpitude and a begrudging concession to the public sensibilities of the average xenophobic Bostonian.

The public expected quarantine to be used whenever epidemics struck. Mindful of public expectations, Jacob Bigelow and four other consulting physicians concluded that for "tranquility of the public mind and a respect to the opinions of those who think differently," quarantine should be imposed when cholera patients are identified.²⁸ Psychosocial considerations and the feelings of the Irish immigrants were not prominent considerations influencing this decision. Fundamentally, Bigelow was a practical man who believed quarantine, if sparingly used and without undue delay to commerce or immigrants, could be tolerated.²⁹

Mayor John Prescott Bigelow was a populist at heart and worked hard to support the poor while embracing stringent sanitation and quarantine measures. He undoubtedly looked favorably on the opinion he received from his distant cousin Jacob Bigelow.³⁰ Yet, this quarantine policy reflected the political machinations of the ruling class. Not satisfied with their opinions, Mayor Bigelow prodded them for a politically more palatable solution that did not

adversely affect trade. Jacob Bigelow gave a lengthy reason for the inutility of quarantine restrictions, with one exception—sick immigrants should be placed in quarantine but not goods or merchandise.³¹ Thanks to the mayor’s “political heat,” physicians limited their disease theories to the dangers posed by cholera-infected immigrants. This revised opinion certainly pleased the merchant class, a group Mayor Bigelow knew was a key political faction behind his election. It also allowed the mayor to remain popular with Boston’s Irish as he agreed not to exile city residents to the island quarantine station.³² The mayor’s political agenda required an assertive quarantine strategy that deftly appealed to both the merchant class and the working class, and the consulting physicians begrudgingly provided the necessary opinion—even though it was inconsistent with their previous medical opinions.³³

Cholera Strikes

As a harbinger of things to come, Boston’s first cholera case struck an Irish man on June 3, 1849.³⁴ Acting with bold resolve, two days later, Mayor Bigelow hired Henry Clark as the first city physician. While his immediate task was to combat the cholera epidemic, Clark also emphasized public hygiene and sanitation over quarantine—revealing the degree to which he was influenced by his British peers. At the time of his appointment, he was a thirty-five-year-old graduate of Bowdoin Medical College and an active member of the Massachusetts legislature and Boston’s school committee.³⁵ He did not believe contact played a role in cholera transmission—a factor that helped discredit the use of quarantine. In his view, the variables affecting its spread included overcrowding, the poor health of immigrants, and the unsanitary condition of streets, sewers, and brackish wetlands.³⁶ Since miasmas were its cause, he reasoned quarantine offered no lasting solution.

Clark’s enduring contribution was his impartial appraisal of the devastation caused by the 1849 cholera epidemic, even if he failed to pinpoint its etiology. The search for its mode of transmission consumed the medical profession during the pre–Civil War years, though doctors were unable to pinpoint a precise causative factor other than foul swamp gas or the odors from putrescible wastes. Once cholera struck, the patient experienced severe vomiting and purging and later on rice water stools and cramps of the abdomen.³⁷ Unfortunately, despite Clark’s anecdotal evidence favoring its noncontagious character, his research fell flat. Cross-contamination by sharing eating utensils, plates or cups, and common towels was never even mentioned despite the popularity of these practices. Moreover, other modes of transmission including via food ingestion or contact with fecal matter were thought even less likely.³⁸ Similarly, dozens of published medical case reports had the veneer of medical evidence, but time and again plausible counter theories were proposed that undercut their premise.³⁹

On June 29, 1849, the city opened a special cholera hospital in the Fort Hill section of Boston.⁴⁰ Located in a building formerly used as a gun house, the hospital was outfitted with twenty-eight beds—a number that would prove inadequate to handle the burgeoning number of cases.⁴¹ The hospital's basement served as a temporary morgue until the bodies could be removed by the undertaker. The medical staff, composed of selfless physicians and nurses, worked tirelessly day and night without any financial compensation for their efforts. These were not ordinary times. Physicians were fighting for the lives of their patients and the survival of the city.

As the specter of cholera captured the public imagination, the city lost its most important quarantine manager, Dr. Smith. He resigned on July 31, 1849, rather than face responsibility for managing the island hospital and contending with the emerging epidemic. For twenty-three years, he reigned over the demise of maritime quarantine and actively formulated the medical profession's anticontagionist opinions through his role as the editor of the *New England Journal of Medicine and Surgery and Collateral Branches of Science*. He had never faced an epidemic of the magnitude and severity posed by cholera. Nor had he ever seen such primitive public health practices like those established on Deer Island under the aegis of the House of Industry. Smith opposed consolidating foreign paupers on Deer Island to such an extent that after his resignation he ran for elected office to put his own stamp on public health policy.⁴² He even blasted the board of aldermen—the de facto board of health—calling them “some of the most wooden headed, thick pated, unqualified person in the whole community,” and urged the city to establish a board of health exclusively constituted of physicians.⁴³

The epidemic ended on September 30 when the last victim—an Irish woman—died on Wharf Street. Clark documented that 711 persons contracted cholera the majority of which (72 percent) were Irish by birth or parentage—a deplorable loss of life reflecting their poverty, lack of access to private physicians, and malnourished condition.⁴⁴ In contrast, only seventy-nine native Bostonians succumbed to this disease.⁴⁵ The hospital closed on November 15 after handling 262 of the 711 cases.⁴⁶ Nearly three-quarters of all deaths occurred at home because the city never constructed a sufficient number of temporary hospitals to meet the demand.

While the cholera hospital left much to be desired, its existence rested on Bigelow's masterful quarantine opinion that cleared the way for treating cholera cases in a more humane fashion relying on the resources and support of private sector physicians to respond to the crisis. Instead of island quarantine, patients were accommodated within the city. Unfortunately, while the city ordered private physicians to care for cholera patients in home quarantine settings, it did not require isolation procedures or any standard precautions for their care. The city effectively treated the epidemic as a

privately managed crisis without recourse to its island isolation hospitals. Private physicians were the heroes of the day yet were never reimbursed for their efforts. This deplorable public health response, founded on avoiding island quarantine and shirking public investment in the response, coincided with the city's highest nineteenth-century fatality rate, nearly 4 percent of the entire population died in 1849 either due to cholera or some other disease.⁴⁷

The New Untouchables

The second front of the war on cholera raged on in Boston Harbor, where Dr. John Moriarty took command from his younger brother Joseph Moriarty who died on December 4, 1847, of typhus fever while in the line of duty. John Moriarty was a giant of a man, six feet four inches tall and weighing over four hundred pounds, yet he still had big shoes to fill. As a forty-two-year-old physician, he had little experience implementing public health policy but soon gained public trust for his courageous efforts as the Deer Island hospital physician. He was a public health warrior who dared to live among those suffering from a wide range of communicable diseases and minister to their needs. Temperamentally, he was the right person to take over as port physician and his Harvard medical education gave him the political connections typically expected of this position.⁴⁸

Moriarty inherited an entirely different portfolio of challenges than his predecessors, including care for a wide range of undesirable classes housed in facilities managed by the Board of Public Institutions. Quarantine and hospital care were ancillary services within an island prison compound containing some of the worst criminals in all of New England. The city managed the detainees according to their classification with assignments to prison labor, industrial arts, or corporal punishment as appropriate. Those who got sick while serving prison time were sent to the island hospital, which also doubled as the quarantine station. Nearly three hundred beds were available for the poor, convicts, troubled youth, sickly Bostonians, and immigrants. Faced with this disparate set of groups, Moriarty had no choice but to manage the island's untouchable class under "chain gang" rules. He had no idea what he was in store for, but it certainly was a challenge the likes of which no other physician in New England had ever seen.

Moriarty made valiant efforts to treat cholera cases on Deer Island, but his success was limited. The medical profession's failure to consider evidence that did not support the miasma theory coupled with strong pressures from the merchant class to dispense with burdensome barriers to trade and a public enchantment with sanitation and public water systems deflected Moriarty from using isolation techniques needed to curb the epidemic. However,

antiquarantine sentiment was not an exclusive artifact of the cholera debate. Smallpox prevention strategies also reinforced the view that it had outlived its usefulness.

Smallpox Reemerges in Boston

Declining support for quarantine coincided with a decline in smallpox cases in Boston and surrounding towns. Most Boston physicians continued to downplay quarantine and instead pointed to the benefits of vaccination services for school children. Earlier legislative efforts relegated quarantine to a tool to control imported cases of smallpox. Ironically, the mere existence of an available vaccine supply lulled Bostonians into a false sense of security.⁴⁹ By 1850, only 20 percent of Bostonians had been vaccinated and even fewer revaccinated since the last townwide effort in 1838. While preschool children might be susceptible, school-age children had some immunity as city regulations required vaccination before school admission.⁵⁰ In contrast, recent immigrants had never been vaccinated in their home country nor upon arrival in Boston. Mandatory vaccination of schoolchildren between 1828 and 1850 by itself was insufficient to outweigh the arrival of 181,593 immigrants during this same period, with most lacking immunity to smallpox. The potential dispersion of the smallpox virus in downtown Boston posed a risk that would be nothing less than a spark hitting a powder keg of dynamite.

A second factor increased susceptibility to smallpox. With the passage of time, evidence pointed to the need for booster vaccinations, which were best delivered after seven years.⁵¹ While Waterhouse claimed vaccinations were good for a lifetime, most physicians were aware of the limitations of a “one-time” vaccination. The *London Lancet* reported the benefits of revaccination being undertaken in Germany, and this story was known to contemporaneous readers of the *Boston Medical and Surgical Journal*.⁵² Yet, neither a revaccination campaign nor a physician interest in combating this disease emerged. From a practical perspective, no one saw the growing vulnerability of the population to the pox virus including the consulting physicians.

In 1850, smallpox came roaring back, and the board of aldermen pressed its experts about imposing quarantine. In a very predictable reply, copied from their opinion of 1843, the consulting physicians reaffirmed sanitary cordons and quarantines were of little value “in resisting the transmission of a noxious principle through the atmospheric air or through an unknown medium.”⁵³ They urged the city to build a proper hospital for cases of smallpox and imported typhus fever as well as recommended the city physician to attend to these patients, vaccinate the poor, and keep a watchful eye on atmospheric impurities.⁵⁴ This plea was undoubtedly influenced by the lack of hospitals in Boston. To add insult to injury, the General Court had struck

down the law allowing the construction of smallpox hospitals just two years before the epidemic struck. With no smallpox hospitals available, waning herd immunity, and a growing population of susceptible immigrants, it was inevitable the seeds of an epidemic would sprout.

Ironically, Warren and Bigelow who long ago had dismissed the relevance of dedicated smallpox hospitals must have been surprised by the resurgence of cases on Deer Island and in the old House of Industry in South Boston.⁵⁵ A total of 192 persons needlessly died for lack of an effective vaccination program. Having a dedicated smallpox hospital on the mainland would have helped, but for political reasons neither Warren and Bigelow nor the mayor advocated such a measure. Warren and Bigelow were culpable for other reasons as well. Although requested to opine on the value of vaccination, they carefully avoided any recommendations to impose it. Instead Bigelow recommended paupers afflicted with smallpox be confined to one of the harbor islands. Implicit in his avoidance of a vaccination strategy was the belief foreigners were the real cause of the epidemic. Quarantine reverted to its traditional role of separating foreigners from the rest of the society.⁵⁶ The xenophobic medical opinions of the consulting physicians would not have been an issue if the city council had responded to the pleas of its citizens who urged greater use of quarantine. No house or neighborhood-level quarantine program was enacted in 1850 even though clandestine quarantines were imposed by some city employees when faced with a quarantine policy vacuum.⁵⁷ Without an authorized smallpox hospital, the city employees took action on their own and instituted “vigilante quarantine” at the South Boston House of Industry as ward politicians refused to address the issue.⁵⁸

The incorrigible consulting physicians steadfastly opposed quarantine, despite another three hundred deaths from smallpox from 1854 to 1856. They even discredited medical inspections as one of the fundamental components of a sound quarantine program. In their view, the only instances where inspections were merited would be ships arriving in the summer months from ports where yellow fever prevailed. Even in those instances, such ships could be permitted to enter the city if deemed safe by the port physician.⁵⁹ In short, whether Bigelow and his colleagues admitted it, they were inextricably aligned with the interests of Boston’s Brahmins, not its working class, and their theories of disease causation were unsullied by the city’s past experience with smallpox.⁶⁰

Judging by the seasonally recurring smallpox epidemics from 1839 to 1856, one would have thought quarantine would have been tried at least once. If a smallpox-infected vessel had arrived in Boston Harbor, would quarantine have been imposed? This question became academic after 1841 when the port physician was no longer stationed on Rainsford Island. Aside from the brief imposition of maritime quarantine against typhus cases in 1847 and 1848 and the extended “Irish Quarantine” that lasted from

1847 to 1855, access to the city was not restricted based on the medical condition of immigrants.⁶¹ The port physician continued to examine passengers, inspecting over fifty-one thousand passengers from 1851 to 1856 when Irish immigration was at its peak. However, these inspections were perfunctory visual examinations that only captured the most obvious cases of disease.

Few sanitary reformers of the mid-nineteenth century championed quarantine, and as a result the principles of disease control through isolation, disinfection, medical observation, and nursing care were rarely part of the public debate.⁶² The benefits of isolating germs, applying disinfectants, maintaining clean hospital wards, employing contact tracing of suspect cases, and using trained nursing staff were concepts that would take Harvard's Medical School faculty another twenty years to accept. Once again the consulting physicians, as the most outspoken champions of sanitation reform, did more to dismantle quarantine than any other medical group in America.⁶³ Few physicians had economic or ideological reasons to advocate the need for quarantine with the exception of those working for government-managed island quarantine stations.

Vaccination Legislation

The broader medical profession believed better hospital service and wider use of vaccination were the most efficacious strategies to combat the pox. The pioneering work of Lemuel Shattuck in the field of public health and Jacob Bigelow in preventive medicine influenced legislative opinion in various ways, the most notable being their support for vaccination. The election of Dr. Jerome Van Crowninshield Smith, the former port physician, to be the fourteenth mayor of Boston also influenced public health policies. Taking office on January 2, 1854, with a groundswell of public support for his reformist ideas, Smith quickly focused on improving public health by protecting Boston Gardens, consolidating the services for the poor, the lunatics, and the sick on Deer Island, and expanding sewer and water services throughout the city. As port physician, he had time and again been overruled on the appropriate policies for managing paupers and the sick and for the implementation of a smallpox vaccination program. He was well respected with views that appealed to the Boston elite as well as many members of its working class. After over twenty years as port physician, Smith met tens of thousands of immigrant workers and had strong opinions about what needed to change in Boston. His reform agenda and emphasis on public health as the "first element of prosperity" revealed the degree to which Bostonians were desperately searching for a public health reformer.⁶⁴ While Mayor Smith had the best of intentions, his two-year stint in office accomplished relatively little.⁶⁵ When it came to legislative action, no amount of logic—even when

expressed by the city's own mayor—could ever replace the call for action triggered by an epidemic.

Fortunate for the mayor's legislative agenda, another serious smallpox outbreak hit Boston in the spring of 1855 that roused the advocates for vaccination creating a tipping point for change. Mayor Smith must have been delighted when the General Court passed "An Act to secure General Vaccination," a landmark legislation welcomed by the medical profession.⁶⁶ While the General Court had passed vaccination legislation some forty-five years earlier, the time had not been ripe for its acceptance. In contrast, the 1855 legislation responded to five years of nagging outbreaks that dampened trade and led to an unfortunate loss of life.

The act required parents to have their children vaccinated before the age of two, and those who failed to comply would be prohibited entry to public schools. It also required all other persons to be vaccinated or otherwise be liable for a fine of five dollars for each and every year's neglect. Chief elected officials were authorized to enforce revaccination whenever they judged the public health required such actions.⁶⁷ This discretionary authority, while a laudable public tool, never became accepted because there were no resources or mandates to force its use. Yet, its fundamental mandate of preschool vaccinations remains one of the major public health accomplishments of the nineteenth century.⁶⁸

The 1855 legislation became the first pillar of the new antiquarantine movement.⁶⁹ Vaccination not isolation would be the mantra of the medical profession. Despite physician support, public sentiment against vaccination along with a general distrust of the medical profession dissuaded most citizens from seeking its benefits. The only exception was the vaccination of school-age children. Prior to the 1855 legislation, the city physician vaccinated less than two thousand persons a year, or less than 2 percent of the city's population, most of whom were school-age children that required a certificate of vaccination before admission to public schools.⁷⁰ While some citizens may have been vaccinated by their private physician, no records were kept of these practices, even though they played an important role in improving smallpox immunity.

Waning community-wide immunity was not the only public health challenge. With the exception of the Boston Dispensary, the city had never had a permanent public hospital to treat its poor. Better hospital services became the second pillar of the antiquarantine movement and responded to the wide array of endemic diseases within the city. Faced with an inordinately high levels of infant mortality, the Boston Board of Aldermen, commissioned an eight-member Joint Special Committee to investigate the feasibility of establishing a free city hospital. Their report, issued on April 17, 1857, endorsed its creation with signatures from ninety private physicians supporting the measure. The committee concluded that privately operated hospital

accommodations were completely inadequate to meet the needs of the unemployed or those unable to cover their own medical expenses.⁷¹ This was a remarkable development for a city that just a century before espoused the old English law of warding off the poor. City fathers in the eighteenth century expected each family to pay its own way to increase the chances of survival of the community at large. The wretched condition of the Irish immigrants would forever change this old philosophy. Faced with the prospect of unceasing and unstoppable epidemics, the medical profession soon enough called for improvements to the health of the downtrodden classes, since the health of all depended upon the health of its most vulnerable populations.

Why would the city seek a hospital when it already had a very good hospital in its midst? Quite simply, Massachusetts General Hospital was not designed to meet the needs of the poor. The committee cited evidence that many persons were turned away from Massachusetts General Hospital because there were not enough beds.⁷² Perhaps of greater concern, there was a universal aversion among patients served by physicians at the Boston Dispensary—a free service for the city's poor—at being sent to Deer Island. The fear was so great that it was difficult to provide aid or treatment to patients who refused island isolation.⁷³ The poor knew quarantine could be the outcome of a visit to the dispensary physician and death was a likely outcome of a stay on the quarantine island. Under the spell of the inexorable logic of death by quarantine, a public hospital would be strongly endorsed by physicians and the poor alike.

One of the reasons patients strongly disliked island treatment was because, as one Boston physician put it, the island catered to the “dregs of society” and was not a suitable place for the “respectable poor.”⁷⁴ These respectable poor knew Deer Island was not only a place of quarantine, it was used to selectively rid the city of its diseased indigent class. Those who could afford medical care found physicians who provided home treatment. Those who could not were sent to Deer Island to join throngs of foreign paupers, criminals, and lunatics. A free hospital would be a cheaper means to prevent the spread of disease than to support the poor under the current state of affairs.⁷⁵ The board of aldermen agreed and authorized the common council to investigate sites for a hospital.

After several years of delay triggered by intense neighborhood opposition, the city broke ground for Boston City Hospital on September 9, 1861, and dedicated the building on May 24, 1864. The first patient admitted arrived on June 1, 1864.⁷⁶ This new hospital would soon play an important role in future epidemics as it was authorized to care for smallpox patients or other infectious diseases.⁷⁷ Yet, this authority had strings attached. The trustees could establish infectious disease regulations as long as the city council approved.⁷⁸ This policy was such a critical element of the new hospital's operating principles that eighteen months before the hospital opened the city

council passed an ordinance to avoid future confusion as to who really was in charge.⁷⁹ The birth of Boston City Hospital was an extraordinary example of unanimity of action within the medical profession to provide a palatable alternative to island quarantine.

Yet, Boston City Hospital was never a complete solution. Maritime trade continued to serve as the vehicle for the entry of new disease and the port physician remained the gatekeeper for that process. The port physician might have been the logical person to offer guidance on quarantine matters during the nineteenth century. Yet, by ordinance, the consulting physicians remained the arbitrators of epidemic disease. Their intimate relationship with Boston's ward politicians maintained their influential role over public health decisions with few political or professional consequences. No one could prove disease had been exacerbated by the lack of quarantine measures without evidence concerning the dynamics of disease transmission. However, as long as the consulting physicians condoned the lax use of maritime quarantine, the city remained a victim of its own medical experts.⁸⁰ It would take the germ theory of disease and a more rigorous evidence-based approach to epidemiology before city politicians reassessed quarantine, the horrendous multipurpose Deer Island detention center, and the role of its consulting physicians.

CHAPTER FOURTEEN

Cholera Contagion and the Resurrection of Quarantine

In the summer of 1860, just prior to the Civil War, Boston found itself at the center of a national debate concerning the value of quarantine. This national urge for standardization had a European pedigree inspired by the First International Sanitary Conference held in Paris, France on July 23, 1851.¹ This conference, while not entirely successful, created an international awareness of the need for quarantine reform, which drifted across the Atlantic to the American medical and public health professions, leading to the first National Quarantine and Sanitary Convention in Philadelphia six years later.² This was an era in which cholera was recognized as an important public health issue and the advocates for sanitation and quarantine battled over the most appropriate approach to controlling this disease. Physicians in Boston had long been averse to the use of quarantine for cholera epidemics, but these concerns were resolved by the brilliant work of Boston's city physician in the post-Civil War years.

The Fourth Convention on National Quarantine

The 1860 debate had a local flavor as Boston hosted the fourth National Quarantine and Sanitary Convention after previous conventions held in Philadelphia, Baltimore, and New York.³ The Fourth National Quarantine and Sanitary Convention grew out of an overwhelming need to reform American quarantine practices, which had undergone very little change since colonial times. Physicians and public health officials of major port cities closely followed European efforts to modernize quarantine and took note of

the First International Sanitary Convention. Unlike the Paris Convention that represented twelve nations, the Quarantine and Sanitary Conventions held in the United States lacked federal government sponsorship. While the Boston Convention copied many of the quarantine and sanitary recommendations of the Paris Convention, it did not create any binding obligations upon its participants. Jacob Bigelow, chairman of the consulting physicians, served as the president of the convention and took this opportunity to showcase the Boston quarantine establishment by hosting some of the meetings on Deer Island.⁴ While Bigelow was generally opposed to quarantine, he supported some of the purposes of the convention: to standardize the application of quarantine, minimize the adverse impacts on commerce, and apply scientific principles to the inspection of passengers, cargo, and vessels entering American ports.

Among the innovations discussed at the fourth convention were the obligation to use bills of health; an agreement that only plague, yellow fever, smallpox, typhus, and cholera were worthy of quarantine; and the need for an international code of quarantine to establish mutual expectations concerning the sanitary activities of port cities and the commanders of vessels. Before any state could act upon these recommendations, the Civil War broke out, and quarantine discussions were essentially overshadowed by the din of war.

Soon after the Civil War ended, cholera reappeared in Boston. Its arrival triggered a reexamination of whether it was contagious. One school of thought, espoused by Edwin Chadwick, the British sanitary reformer, held that poor drainage and ventilation were the causative factors. At the other extreme, followers of John Snow (1813–1858) took the view that polluted water was the causative factor. During the summer of 1866, Dr. Snow's views were debated in Boston as well as in London.

In 1866, cholera was not a “reportable disease” in Massachusetts. Lacking data on the number of cases, the Suffolk District Medical Society decided a survey should be conducted to determine its prevalence. Their survey, reported in the February 14, 1867 issue of the *Boston Medical and Surgical Journal*, revealed at least thirty-seven documented cases of cholera identified in 1866.⁵ The first case was that of a man known by his initials of M.H., a teamster who lived on 9 Cherry Street in Boston who contracted cholera on April 5, 1866. With the exception of one case in May, the remaining cases occurred in July through November. The case fatality rate was 51 percent even with home treatment provided by private physicians. There was no consensus concerning the appropriate remedy, and treatments varied from the delivery of opiates, whiskey, rice water, external heat, lead acetate, creosote, turpentine, astringents, calomel, beef tea, and various types of stimulants.⁶

With extremely high fatality rates and less than efficacious treatments, it was inevitable that alternative isolation strategies would resurface. The

Suffolk District Medical Society took the position cholera was not contagious and did not require quarantine. The editors of the *Boston Medical and Surgical Journal* thought differently.⁷ They proclaimed the medical society was aligned with the merchants and neither group represented the opinion of the Boston medical profession. Ideology rather than evidence underlay their opinions.⁸ For the first time in nearly thirty years, the journal went on record as supporting quarantine expressing shock at being misquoted by the Suffolk Medical Society: “It will certainly be a surprise to many to learn for the first time by way of Philadelphia and New York that we in Boston are in favor of the abolition of quarantine.”⁹

This brouhaha was incited by Boston merchants who attempted to cloak their position under the mantle of medical objectivity until the journal said otherwise. The journal’s editorial stance, aligned with that of the consulting physicians, took an eminently utilitarian perspective: apply quarantine if it makes the public feel better. As long as any “rational doubt exists,” they said, “it would be culpable to act otherwise.”¹⁰ Unlike earlier periods, the consulting physicians of the post–Civil War period were quicker to accept the disease transmission theories of their British colleagues.

A Brilliant Scholar—William Read

For very different reasons, Dr. William Read, the third city physician (1864–1869), reached the same conclusion. A brilliant scholar with the courage of his convictions, this forty-six-year-old Harvard-trained physician debunked the miasma theory by strongly supporting the need for quarantine of vessels carrying cholera cases. He reminded Boston’s elected officials of their duty to employ the most stringent measures of quarantine to prevent its introduction.¹¹ He also pointed to the contagious nature of cholera—that it was spread by man—and that quarantine of the sick, disinfection of effects, and medical inspections were critical elements of a public health strategy. By 1866, news that cholera was a communicable waterborne disease had reached Boston, as had the official report of the British Cholera Commissioners.¹² Read saw the relevance of the British strategy and pointed to New York City’s success in extinguishing cholera at its quarantine station using stringent isolation measures suggested by the Cholera Commissioners. For the first time in thirty years, most of the medical profession from Boston embraced the principles of isolation. Rather than being lumped into the category of a “medieval tool,” Read embraced quarantine as one of the necessary strategies for fighting epidemic disease.

By identifying the route of disease exposure, Read’s emphasis on isolating the pathogen from susceptible populations represents one of the first American examples of evidence-based quarantine in America. Though his view may not seem radical today, he lived at a time when miasma theory

dominated the views of the older generation of physicians, including Jacob Bigelow and Boston's consulting physicians.¹³ Read's cholera work made him a stalwart physician and an upholder of the highest standards in medicine according to one historian.¹⁴ His impassioned case for the contagious nature of cholera stands out as a watershed moment in American medicine. He battled miasma theorists who believed the only possible salvation for mankind was to maintain a hygienic environment, even though there was little hope anyone could intercept gaseous plumes that migrated across the oceans! Miasma theory slowly gave way to remedies such as disinfection, and this enabled physicians to focus on specific practices to reduce disease transmission.

Read's isolation techniques, used in concert with medical inspections and sanitation, had a profound effect on quarantine. Since cholera was considered a "filth disease," public hygiene and sanitation had been given greater attention as methods of intervention than quarantine. During the cholera years (1831–1866), Boston's consulting physicians fell into the philosophical rut of miasma theory—failing to recognize that quarantine was a necessary complement to sanitation—a position that held back New England medicine for over forty years. It was eventually toppled by the brilliant epidemiological work of John Snow—who found contaminated drinking water to be its cause—and the courageous stance taken by Read. He emphasized the value of isolating the sick, disinfecting personal effects, and medical inspections—principles that played a key role in the city's quarantine program. Rather than a blunt instrument, the discovery of how cholera was transmitted (i.e., exposure by ingestion or hand-to-mouth behavior) allowed Read to legitimize quarantine with a laser focus on specific disinfection strategies. Read's courageous efforts to restore quarantine to its role as a legitimate public health tool might have prepared Boston for its next epidemic.¹⁵ Unfortunately, other factors, including Boston's parochial politics and the relatively marginal authority of its medical professionals, would soon create another public health crisis and lead to even more quarantine reforms. In 1849, Dr. Jerome Van Crowninshield Smith had insightfully predicted an independent board of health was needed before quarantine could be recast as a scientific disease control strategy.¹⁶

CHAPTER FIFTEEN

Gallop's Island

For those unfamiliar with Boston or its history, it might be difficult to imagine the importance of Gallop's Island. For most people, this island may not conjure any memories—other than a possible association with the Gallup Poll.¹ But for nearly 100 years—from 1866 to 1945—Gallop's Island was the first point of contact many immigrants had with America. During its heyday, the port physician for this quarantine island inspected more than four million passengers and crew and over fifty-five thousand vessels of all shapes and sizes. Indeed, with the exception of Ellis Island in New York's harbor, Gallop's Island welcomed more souls to its shore than any other island in America. Yet, so little is known about this desolate island.

Gallop's Island was not merely the first landing point for vessels carrying communicable disease. It also served as the primary hospital for Boston residents who contracted smallpox. For many, it was also a symbol of a deeply divided health-care system—a system that banished the victims of untreatable diseases to island isolation while those without contagious disease were free to choose their treatments and place of recuperation. Unfortunately, it was not the type of welcome one associated with the inspiring vision of the Statue of Liberty in New York harbor. Rather, it was a place of involuntary confinement reserved for immigrants with communicable diseases for which there were no known treatments. Virtually nothing has ever been written about this godforsaken island even though over ten thousand people were quarantined there, and it is the resting place for hundreds of smallpox victims and over a dozen Civil War casualties.²

The Move from Deer Island to Gallop's Island

While the intellectual battle over the value of quarantine raged throughout most of Boston's nineteenth-century history, it remained an important public health tool. Boston, as one of the largest cities in America, still needed

separate facilities for communicable diseases, which became an urgent political issue after the Civil War. Public pressure for improved hospital, nursing and medical care, and isolation quarters for cholera victims forced the board of aldermen to select Gallop's Island as the city's quarantine station in place of its previous location on Deer Island.

Public approval for its use was not required because it already belonged to the city having been acquired in 1860 from Charles Newcomb after two hundred years of private ownership following Captain John Gallop's bequeath of it to his wife in 1649.³ John Gallop was a famous sailor of the seventeenth century who helped Massachusetts fight several naval wars with the Indians. While alive, Gallop lived on his sixteen-acre island in Boston Harbor. During the Civil War, Boston loaned the island to the federal government for its use as a troop encampment area where it built numerous barracks to enable long-term habitation required to support war efforts in the south.

There is substantial evidence the city had no ulterior motives of using Gallop's Island as a quarantine station when it took possession immediately prior to the Civil War. The harbor islands were constantly ravaged by winter storms and city officials were keen to protect the larger islands from sand and gravel mining used for ship ballast.⁴ If their motives were to diversify and expand the city's quarantine resources, they certainly kept such plans top secret. Moreover, fiscal investments made in 1859 for a new smallpox hospital on Deer Island would suggest no such intention.

After the Civil War ended, the federal government advised the Boston City Council of the imminent threat of cholera and offered aid. The renewed threat of cholera and a resurgence in the number of immigrants arriving in Boston Harbor after the Civil War were driving factors for a better quarantine station.⁵ In 1866, over sixteen thousand immigrants entered Boston as inexpensive transatlantic passenger travel brought a new wave of immigration, comparable in volume to that following the Irish potato famine of the late 1840s. Mayor Frederick Lincoln Jr. feared the city would be overcome by the social and public health challenges of the pre-Civil War era, a time when 204,514 immigrants landed in Boston between 1837 and 1860.⁶ Some of these immigrants were destined for other states and some for other towns in Massachusetts. However, an enormous number chose to settle in the greater Boston area. In a span of twenty-five years, Boston's population grew from 93,383 in 1840 to 192,324 in 1865.⁷ The mayor was rightly concerned immigration would resume at its previous prewar pace bringing thousands of souls who had never been immunized against smallpox and devastate the city with filth diseases.⁸ The medical community had long held unvaccinated persons were propagating smallpox, and among this group strangers were the chief threat.

American physicians routinely treated many contagious diseases, including smallpox, cholera, and yellow fever. They also knew public opinion and the force of law called for them to quarantine their patients. The conflict between their private views of cholera as noncontagious and their public responsibility to

support the application of quarantine during an epidemic made many physicians reticent to express their views. The first Code of Ethics of the American Medical Association (AMA) was adopted in 1847 and reflected this dissonance. The AMA artfully held physicians responsible for enlightening the public in regard to quarantine regulations without specifying what that enlightenment might entail.⁹ The Code also held physicians to a higher calling of alleviating human suffering, even when it might jeopardize their own lives. Despite these pious principles, most Boston physicians were not convinced quarantine was good medicine. The Massachusetts Medical Society and its members placed greater emphasis on medical treatment where available and, where unavailable, on public hygiene to cleanse the filth and other disease-breeding materials from city streets.¹⁰

The consulting physicians, operating without the insight that would eventually be released by the British Cholera Commissioners several years later, were not convinced that federal officials were right and advised against the use of quarantine, asserting cholera was not contagious. Despite their cautious view, Mayor Lincoln was sufficiently concerned by another pandemic and sought to reacquire Peter Newcomb's farm and the military barracks to serve as a quarantine station. He pleaded with the federal government to release Gallop's Island so the city could be ready for the next pandemic.¹¹

Mindful of the mayor's concerns, on April 11, 1866, the Boston Board of Aldermen directed the Committee on External Health to "provide suitable accommodations for immigrants arriving at this port in vessels having sickness on board."¹² The board of aldermen saw the immediate necessity of using Gallop's Island as it offered several distinct advantages: it was within easy reach of Deer Island and was well situated along President's Road, the main navigation channel leading into Boston. The board of aldermen also saw the need for a strong agency capable of managing recalcitrant patients and truculent individuals forced into quarantine. The Directors of Public Institutions were the obvious choice as they were already responsible for managing orphans, the poor, and the criminal class on nearby Deer Island. As they already had the skills to cower the incorrigibles into submission, it made sense to expand their responsibilities to quarantine.

Before Boston could reacquire Gallop's Island, it had to purchase the military barracks. The U.S. government agreed to relinquish the dilapidated barracks at the appraised value of \$4,500. Thrown into the deal was the "admirable wharf" constructed by the War Department. It was felt this island could provide suitable accommodations and be conveniently accessible to the quarantine grounds on Deer Island. Based on unanimous support from the city council, Mayor Lincoln approved the purchase on June 1, 1866, and on the same day he amended the public health regulations to establish Deer Island and Gallop's Island as the city's joint quarantine grounds.¹³ These islands, slightly over a mile apart, were close enough to jointly handle anticipated diseases carried by foreign paupers.

Before the island could be put into service, repairs were initiated to make the existing buildings suitable for a quarantine hospital. However, the

buildings were in such abysmal conditions that the city was unable to repair them. The buildings erected by the War Department had become so dilapidated one blew over in heavy winds, and the military hospital was only kept upright by being propped up by braces.¹⁴ With the exception of the hospital, all of the old barracks on Gallop's Island were demolished. After the salvageable military buildings were renovated and the wharf repaired, Gallop's Island adequately met the immediate needs of the port physician.¹⁵

On March 1, 1867, Samuel Durgin was appointed the city's ninth port physician. Having graduated from Harvard Medical School just three years earlier, this twenty-eight-year-old physician was one of the youngest men to assume command of the quarantine station. Being single and fearless enough to accept employment that required exposure to deadly communicable diseases certainly qualified him for the solitary life of a port physician.¹⁶ While relatively young, he was not without experience. During the last year of the Civil War, he served as an assistant surgeon to the First Massachusetts Calvary and was at the Appomattox Courthouse at the time of Robert E. Lee's surrender. Unlike many previous port physicians, Durgin found his calling working in the field of public health. During the next six years, he lived on Gallop's Island overseeing the inspection of vessels and the quarantine of passengers. His loyalty to the city and commitment to public health causes would eventually make him the single most influential public health physician in Boston's history. He later would serve on the Boston Board of Health for forty years and become nationally respected for his pioneering work in controlling communicable diseases.¹⁷

Perhaps as a stroke of luck, within thirty days of his appointment, Durgin was stripped of responsibility for managing the multifunctional detention center designed for the sick, poor, and criminal classes. On April 1, 1867, the city stopped using Deer Island as a quarantine station transferring Durgin to Gallop's Island, the fifth remote harbor island to be declared a quarantine station in less than 150 years.¹⁸ While Gallop's Island was considerably smaller than Deer Island, it did not have any other competing uses; there was no House of Industry or House of Reform to distract Durgin from his work. Since Gallop's Island was owned by the city, issues of financial responsibility that complicated many past political battles with the Commonwealth did not arise. Prior to Durgin's removal to Gallop's Island, it did not operate as an isolated and self-contained station. It depended on Deer Island to meet the varied medical needs of newly arriving immigrants, the city's poor, reform school children, and convicted felons. While their medical needs were quite different, this band of misfits were in one sense all victims of quarantine—held against their will miles off the coast of Boston so that the city could achieve its cost-cutting objectives. This “shot gun” wedding of unwilling and unlikely bed fellows began to crumble on August 27, 1867, when the board of aldermen removed the quarantine function from its Committee on External Health and assigned it to the Board of Directors of Public Institutions, a mega bureaucracy that continued to manage the city's social misfits, criminals, and sickly immigrants (See table 15.1).

Table 15.1 Comparison of Islands Used for Quarantine in Boston Harbor, 1634–1945

Name of Island	Year Established	Year Terminated	In Service (years)	Size (acres)	Island Owner	Management of Island Quarantine
Castle William	1634	February 13, 1718	84		Province	None
Spectacle	February 14, 1718	June 28, 1738	20	97	Province	Town Selectmen
Rainsford	June 29, 1738	June 19, 1799	61	11	Province/ Commonwealth	Town Selectmen
Rainsford	June 20, 1799	February 22, 1822	23	11	Commonwealth	Board of Health
Rainsford	February 23, 1822	December 24, 1826	4	11	Commonwealth	City Council with delegation to Health Commissioners
Rainsford	December 25, 1826	June 8, 1847	21	11	Commonwealth	Board of Aldermen
Deer	June 8, 1847	April 1, 1867	20	210	Boston	Board of Aldermen
Gallop's	June 1, 1866	August 25, 1867	1	16	Boston	Board of Aldermen
Gallop's	August 26, 1867	March 28, 1872	5	16	Boston	Board of Directors of Public Institutions
Gallop's	March 29, 1872	January 14, 1873	1	16	Boston	Board of Aldermen
Gallop's	January 15, 1873	May 31, 1915	42	16	Boston	Board of Health
Gallop's	June 1, 1915	September 11, 1945	30	16	U.S. Government	U.S. Public Health Service
Total				311		

Consolidating services under this mega bureaucracy was an efficiency measure to further reduce costs and extend the services of the resident physician. Under the management of the Board of Directors, the resident physician was given responsibility for caring for hundreds of individuals in the House of Industry, the Almshouse, and the House of Corrections, all of whom lived on Deer Island. He, in turn, supervised the port physician who managed the day-to-day activities of the quarantine hospital on Gallop's Island. Durgin would continue to be affiliated with Deer Island until 1872, since he reported to the Board of Directors of Public Institutions, but for practical purposes his duties were now focused on quarantine.

By the fall of 1867, the resident physician had sole responsibility for the care of 374 inmates in the House of Correction, 358 workers in the House of Industry, 244 poor persons in the Almshouse, and 175 boys and girls in the House of Reformation, all of whom resided on Deer Island. If this was not enough, he also supervised the port physician, domiciled to Gallop's Island, who inspected 370 vessels during that quarantine season.¹⁹ For reasons lost in the shadows of history, many Bostonians were outraged the poor, through no apparent fault of their own, shared the same island facilities with criminals and those suffering from communicable diseases. Even the mayor and ward politicians felt this was inappropriate.²⁰

Fortunately, the sole responsibility for managing smallpox cases soon shifted to the Gallop's Island hospital. The board of directors wisely decided Deer Island inmates should be protected from quarantinable diseases.²¹ Durgin's quarantine hospital may have been removed from Deer Island but it was not isolated from their affairs. For reasons of administrative efficiency, the connection between these two islands was not entirely severed. On a day-to-day basis, Durgin used prison laborers on Gallop's Island to cultivate the arable land, maintain the quarantine buildings, serve as his oarsmen when he boarded arriving vessels, and perform various other functions required to maintain the station.²² Prison labor was readily available and quite dependable as there was little danger anyone would try to swim for shore. If assistance was needed in the event of a disease outbreak on Deer Island, Durgin was prepared to accept prisoners at the isolation hospital. Similarly, when the port physician needed help with gardening, building repairs, and other construction activities, the staff at Deer Island invariably supplied his labor needs. These arrangements were essential to the survival of the quarantine station at a time when the city could ill afford to fund other more essential public services. Mayor Lincoln had been reelected in 1863 to cut expenses and an elegant quarantine station would not be one of his priorities.²³ Relying on access to free labor, the resident physician operated Deer Island as a colony that survived by cultivating the land, practicing animal husbandry, and the sale of goods manufactured by convicts.

In contrast to prison labor, that never appeared on the ledger as a documented quarantine expense, the primary costs associated with quarantine were salaries. In 1868, Durgin, his assistant physician, the attendant, boat keeper, and the barge's crew had salaries amounting to \$3,538.19, or 72 percent of the total quarantine budget. In contrast, Durgin only spent \$8.75 for medicines at the quarantine station that year.²⁴ This exorbitantly low expenditure for medicines would suggest the quarantine station paid little attention to medical treatment. In one sense, this was true. At the time physicians were painfully aware no cure existed for smallpox. Whatever "treatment" was given took the form of comfort and assistance from the hospital nurse, the privilege of reading the daily newspapers, and access to the basic necessities of life (food, clothing, and shelter). No record exists that hospital nurses treated the fevers, pain, and skin lesions of pox patients—even though such treatments as the application of saline cathartics for fevers, warm water applied to painful feet, and glycerin and olive oil to relieve itching were used at earlier and later times on the quarantine island.²⁵

In contrast to its bare-bones administrative expenses, maintaining the quarantine station was an expensive proposition. Repairs to the hospital and other buildings was a never-ending drama reflecting the constant battles with the sea and the isolation of island existence. The number of new immigrants arriving annually had increased nearly ten-fold in thirty years yet the quarantine facilities were no better than those in existence at the turn of the century. To address these deficiencies, in 1870, the city council ordered the expenditure of an additional \$2,000 to repair the existing smallpox hospital.²⁶ Once renovated, the Gallop's Island isolation hospital served vessels arriving from around the world as well as local residents. From time to time, physicians complained about the sufferings and, in some cases, the death of patients caused by open boat travel across the bay yet no other options were seriously considered until 1871.

In 1871, Samuel Little, chair of the Committee on Health lobbied for a new steamboat to ferry the sick to the Gallop's Island hospital. The Committee on Health, formed in 1822 with various revisions to its name over time, was staffed by members of the Boston Board of Aldermen and functioned as the city's de facto public health advisers on quarantine affairs. It was simply beyond the capabilities of city council and common council members to manage the vast responsibilities of governing a city with a population of 250,000 persons in 1870. Little submitted a request to replace the open boat with a new "small steamboat" exclusively for quarantine purposes. Little pointed out the port physician was visiting 530 vessels during the height of the commercial maritime season working from an open boat. It was not only uncomfortable and dangerous but created "fatal exposure" for patients taken to the island hospital.²⁷ Responding to these concerns, in the winter of 1871, the Boston Board of Aldermen shifted smallpox patients to Deer Island as

they had no means to provide closed boat transportation to Gallop's Island. It would take many months and some \$14,000 to construct a new boat to meet these special transportation needs. Meanwhile, the city reverted to the use of Deer Island where the former smallpox isolation hospital remained in place. This interim strategy meant, once again, sharing the boat used for carrying convicts, orphans, and the poor with smallpox victims. One can only imagine the potential cross-contamination scenarios that were created by turning the city's steamboat *Henry Morrison* into a multipurpose transport vessel.²⁸ For lack of a properly enclosed steamboat, the city was unable to access Gallop's Island and its hospital facilities from mid-December 1871 to August 1872.²⁹

Resignation of Consulting Physicians

The support for establishing Gallop's Island as the city's quarantine station reflected the breakdown in broader public health and urban improvement policies under the jurisdiction of the city council and its consulting physicians. Since 1824, Boston had depended upon the professional opinion of its consulting physicians to fashion its quarantine policies. Over the years, Boston's most eminent physicians were selected to serve. As discussed earlier, their prestige was a factor in their selection and had the intended effect of increasing public trust in the mayor's decisions. This symbiotic arrangement generally worked out well when the professional interests of the physicians aligned with those of the mayor and ward politicians.

This close relationship began to unravel in the 1860s as Boston's physicians became active advocates for tenement house reforms and other public health improvements that could not be easily implemented by the city. The board of aldermen could pass legislation but were not as adept at implementing and enforcing it. This would prove true in case of the Tenement House Act of 1868. This law required owners of rental housing and lodging houses to (1) provide adequate ventilation in habitable rooms; (2) install fire escapes effective July 1, 1868; (3) provide water closets or privies; (4) connect to sewers when one exists; (5) prohibit occupancy of improperly ventilated and designed cellars; and (6) report contagious disease in their buildings to the board of health.³⁰ Two years after its passage, the consulting physicians took it upon themselves to identify urgent health problems and present them to the city council. After seeing repeated cases of inaction and failure to involve them in the decision-making process, three of the city's consulting physicians decided it was time to resign. On Monday December 5, 1870, Drs. George Derby, James C. White, and Paschal P. Ingalls submitted a letter of resignation to the board of aldermen. Their fury at the board's political lethargy permeated their resignation letter. While only three physicians signed the letter, future events would make it apparent their outrage was shared by

Boston's medical establishment indignant at how public health issues were being ignored.³¹

According to Derby, if the news media failed to pay attention to public health issues, ward politicians would ignore them as well. Boston's streets were filthy and its septic tanks were dysfunctional and overflowing with putrid house offal creating disgraceful tenement houses. These festering conditions led to the death of five hundred children from cholera infantum during the summer of 1870. Incensed at these conditions, the consulting physicians drew the dagger on ward politicians declaring that in Boston alone public health had been made a branch of the business of street cleaning. Insulted by their ill treatment, the consulting physicians said their advice is not asked, and when offered is rejected as of no value. Not surprisingly, with little respect given to their professional views, they had no choice but to retire from office despite their desire to effectuate tenement house reforms. Under such circumstances, a continuance in office was simply unacceptable.³²

Their resignation was an ominous event in a city that had generally ignored the unsanitary conditions and the health of its working class. Three days after their resignation, the *Boston Herald* carried their story. The *Herald*'s editors pointed out that despite the board of health's protests to the contrary (being another name for the board of aldermen), the city was not truly interested in resolving its public health problems. Rather the politicians who constituted the board of health were merely going through the motions whenever they had police inspect tenement buildings for nuisances. The *Herald*'s position was clear: "Five hundred children killed by cholera infantum attests the inadequacy of the measures instituted for the board of health, and the most important business of the next city government will be thorough sanitary reform."³³

Their resignation received national attention within the medical profession in the December 1870 issue of the *Boston Medical and Surgical Journal* (BMSJ).³⁴ The editors of the BMSJ pointed out the apathy of the city government in matters of sanitary health and their disregard of critical questions of sanitary science, threats posed by contagious disease, and the guidance of the consulting physicians.³⁵ Their medical battle was not a routine event. It signaled a professional schism between the board of health and the consulting physicians. Derby insisted the city needed a professional approach to public health policy and, by implication, the management of quarantine services in Boston Harbor. One of the fundamental reasons that island quarantine remained public policy is because the root causes of disease—including tenement house reforms, the adoption of sanitary systems for all dwellings, and school medical inspections of children—were still woefully unaddressed. The consulting physician's resignation also signaled the beginning of the end of a politically managed board of health. Within the next year, the

board of aldermen would be entertaining the creation of an independent board of health that could respond proactively to the issues raised by these courageous physicians.

Despite the urgent need for improved housing, there was ample evidence that Gallop's Island quarantine continued to appeal to Bostonians displeased with the public health challenges posed by Irish immigrants. In a sense, quarantine served as a low-cost alternative to tenement house reform and minimized the need for a citywide vaccination program. As long as the "dregs of society" could be confined to Deer Island, there would be fewer susceptible persons within the city and less crowding in the tenements of South Boston. Mayor Lincoln had been reelected on a platform of cutting costs, and island isolation of sickly immigrants remained a cornerstone of his fiscal policies. Gallop's Island quarantine station was a no-frills solution to the containment of contagious disease in a city with little sympathy for the plight of immigrants or commitment to humanitarian patient care on the mainland.

CHAPTER SIXTEEN

The Evolution of the Cowpox Vaccine

One of the fortuitous scientific discoveries of the post–Civil War years was that arm-to-arm vaccination was no longer necessary. Instead, vaccination could be achieved by direct transfer of cowpox virus from heifers to humans. Arm-to-arm transfer of cowpox virus was used as early as 1800, when Benjamin Waterhouse championed its use as the ultimate tool for the eradication of smallpox. Waterhouse maintained vaccine supplies by mining the scabs of his patients. Over time, other physicians found it difficult to maintain their supplies, especially when patients were unwilling to undergo vaccination. Limited vaccine production coupled with relatively lax procedures for its insertion, collection, and storage led to widely diverse standards of care and vaccine purity.¹

Animal Vaccines

In 1872, cowpox vaccination and production procedures were a cottage industry with no governmental oversight. It is little wonder the public had a low opinion of the medical profession and its vaccination practices. Although physicians had made remarkable advances in the arena of surgery and bone-setting practices, very little progress was achieved in the control of communicable diseases. Vaccination procedures and methods for mining patients scabs was more of an art than a science.

Dr. Henry A. Martin is credited with introducing animal vaccination to America in September 1870.² Martin graduated from Harvard Medical School in 1845 and practiced medicine in Boston before working as a staff surgeon in the Civil War. During the war, he rose to the rank of surgeon in chief of the Second corps of the Army on the Potomac, a post he held until near the

end of the war. During the war, he saw thousands of soldiers on both sides of the line succumb to smallpox and felt much more should have been done to improve the methods of vaccination.³ His wartime experience made him aware of the ravages of smallpox, and this soon became his passion.

Martin's work built on that of Drs. Gennaro Galbiati and Giuseppe Negri, two Neapolitan physicians who were the first to use bovine vaccine derived from a naturally occurring case of cowpox.⁴ He learned of the existence of true cowpox disease on a cow in France—it was a relatively rare disease—and immediately sent his agent overseas to obtain samples. According to Martin, Professor Depaul had collected the virus from a heifer that was naturally infected with cowpox.⁵ When his agent returned to America on September 23, 1870, Martin promptly secured the use of a farm in Dedham, a suburb of Boston that had fifty young bovines and vaccinated three of them that very same day. The next day he vaccinated two more heifers and continued this endeavor until he had exhausted his supply on nine or ten heifers. He soon turned his energies toward experimenting with cowpox virus carefully selected from live heifers. His passion for creating a more effective vaccine was not limited to the arena of medical research. Unlike many physicians, Martin was intent on leaving his mark on medical science by expanding the use of mass-produced vaccines. His research would eventually propel him to be chairman of the Committee on Animal Vaccination of the American Medical Association and one of the most respected vaccinators in America.⁶

Cowpox lymph from heifers was critical to Martin's research. Its advantage over that derived from humans infected with cowpox rested on his sanitary procedures and mass production methods. Martin believed vaccination was losing public acceptance because it was occasionally the source of disease transmission for syphilis and erysipelas, an acute febrile disease associated with intense inflammation of skin and subcutaneous tissue. Sloppy arm-to-arm transfer of cowpox virus was leading to unintended consequences, which dampened public trust in its use. It was not only transmission of syphilis that was of concern. Many physicians were not practicing vaccination properly leading to less than optimum outcomes. Failure to properly vaccinate meant no immunity was achieved. Of equal concern was the mistaken belief that one vaccination provided a lifetime immunity.⁷ These and other public misconceptions about vaccination and its health risks would become Martin's full-time obsessions.

Prior to Martin's effort to develop heifer-derived cowpox virus, collecting humanized virus (i.e., arm-to-arm transfer) was a tedious process as physicians could only replenish their stock by scraping off scabs on the seventh or eighth day after the patient's initial vaccination. If a patient refused to return for a checkup, a physician would be without access to a fresh virus supply. A more reliable scab production method was needed and Martin thought he had the solution. Building on his heifer experiments, he mass produced cowpox virus in quantities previously never imagined possible. His efforts were

a breakthrough in the delivery of higher quality vaccines, which influenced the vaccination practices of physicians throughout America.⁸ He was not just a vaccine provider, researcher, and wholesaler, he also shaped medical opinion on the proper uses and administration of cowpox vaccines.

The Battle of Medical Experts

In theory, the opening of Boston City Hospital in 1864 and the mandatory vaccination of the population required by the 1855 vaccination law should have made island quarantine less attractive. Perhaps the city's long history of casting the diseased into island quarantine was too powerful a concept to dismiss. Or perhaps ward politicians considered vaccination and hospital reforms untested ideas with limited real-world application to epidemics. Could physicians vaccinate an entire population to thwart a smallpox epidemic? Unfortunately, the city council was averse to an effective implementation of the mandatory vaccination law and, with the exception of Martin, the medical community took a lackluster approach to its adoption.

Despite Martin's groundbreaking vaccination efforts, many physicians in the Boston area were relatively indifferent to its widespread use. Like many great thinkers, his insights were dismissed or ignored by his colleagues until it was too late to make a difference. Physicians were strongly influenced by the editorial positions of the leading medical journals of the day and, unfortunately, Martin's research failed to attract timely news coverage. Instead, physicians took their cues from the editorials in the *Boston Medical and Surgical Journal*. After the Civil War, the journal carried numerous articles that questioned the efficacy of vaccination and revaccination. Rather than embracing its value as a means of extending immunity from smallpox, the journal published articles by several noted Boston physicians who took the opposite view. Using anecdotal evidence, Dr. Benjamin E. Cotting proclaimed that "possibly there have been as many deaths from repeated vaccinations as from varioloid (i.e. a mild form of smallpox) after first vaccinations."⁹ Cotting also raised concerns about the safety of a revaccination program he felt was of questionable value in extending immunity. With no evidence to support his assertions, he declared that one vaccination for a large proportion of the population was enough. These opinions might not have mattered if Cotting was not the purveyor of the journal's editorial policy.

Martin was incensed by these comments. He believed Cotting had misrepresented the facts about vaccination, in general, and had closed off discussion concerning the benefits of bovine-derived vaccine during the post-Civil War years. Martin and Cotting carried on a celebrated feud over the efficacy of vaccination, with Martin claiming the *BMSJ* was under the financial control of Cotting.¹⁰ Their disagreement, according to Martin, had led "to the most shameful injustice" being done to the heifer-derived vaccine in the very city in which it was first introduced in America. Case reports that contradicted his

research, he contended, were published without critique or peer review simply to undermine his work.¹¹ The *BMSJ*, he felt, was axiomatically opposed to vaccination programs and he believed there was evidence to prove it.

Many vaccination articles that appeared in the journal after the Civil War had an editorial slant against the efficacy of vaccination and revaccination strategies. Despite hostile attitudes in the journal, Martin continued his work on heifer-derived vaccines and began distributing them to Boston area physicians as early as September 1870. He was convinced it was the most effective and safe vaccine available in the marketplace and far preferable to lymph derived from humans, which over extended periods of time, had diminished potency, and led to a diminished duration of infection.¹² He believed cowpox virus derived from humans was of suspect quality and efficacy and unlikely to create an immunity to smallpox.¹³ His research showed that the longer the virus was removed from the cow the more likely it would have a shortened incubation period and a decreased intensity of the disease phenomena.¹⁴ For these reasons, the “humanized” virus did not provide the same degree of immunity as the heifer-derived vaccine. Martin also pointed out how sloppy vaccination practices and unregulated temperature and storage conditions were leading to unexpected declines in the effectiveness of vaccines. As a trendsetter, his own vaccine production methods kept the virus under controlled environmental conditions so it would not lose its potency.¹⁵ He considered conventional vaccination practices disgraceful, and the lack of emphasis on revaccination the Achilles heel of the city’s public health program. For almost twelve years, he prophesied an epidemic would hit Boston and surmised his prophecies were treated like “true prophesies generally are.”¹⁶ The importance of his findings would soon become apparent in the smallpox pandemic of 1872, a time when the virus was considered to be especially lethal.

Efficacy of Cowpox Vaccines

Armed with evidence supporting his theories, Martin continued propagating one of the purest forms of the vaccine available in America. Unlike modern times where giant pharmaceutical companies have taken on the responsibility of research, manufacture, and distribution of medicines, he single-handedly assumed these duties and maintained ongoing evaluations of the efficacy of his vaccines using his Dedham farm as his base of operations. Doctors learned of his vaccine production facilities through word of mouth and regular newspaper advertisements. The success of his vaccine was soon recognized by physicians and the general populace, and in short order Boston citizens began insisting, and in many cases demanded, cowpox vaccine be used only if the virus was from a nonhumanized source.¹⁷ He even received a request from Dr. Frank P. Foster from the New York

dispensary, who soon began a similar heifer vaccination program that began reaping similar positive results.¹⁸

Martin recognized his vaccine's success depended upon getting its production out of the hands of traders with a profit motive and directly into the hands of physicians.¹⁹ Unlike any other contemporary physician, he industrialized the vaccine production process using standardized procedures for developing, harvesting, and distributing the calf lymph vaccine. His success propelled the development of what might be called the first truly successful national mail order medical businesses in America. Years later, he would credit his success to the capacity of his establishment "to supply vast amounts of virus" in relatively short order to meet the needs of epidemic levels of smallpox.²⁰ If vaccination was to become an alternative to quarantine, it had to be available in pure form and in large quantities. Reliance on scab picking practices as a source of supply was too time consuming, unpopular, and unreliable.

While Martin's heifer-derived cowpox vaccine has almost been entirely forgotten by modern medical scholars, his reliable production methods created public acceptance for vaccine, which, in turn, expanded his reach in the marketplace. Prior to his vaccine, the public used vaccines provided by a limited number of largely self-trained physicians using virus stock that dated back to the days of Waterhouse with questionable potency and purity. Even the vaccines of the city physician were of suspect quality and therefore may have been of marginal potency. Boston's ward politicians recognized the importance of public financial support for vaccinations even if they were unaware of its declining efficacy. Since 1830, when the city established the Vaccine Institute, it offered free vaccinations to residents. These services became more accessible in 1849 when Dr. Henry Clark, city physician, was charged with providing vaccine to physicians as well as offering vaccination directly to citizens. On average, Clark and his successors vaccinated about two thousand residents each year during the fifteen-year period following the passage of the 1855 vaccination law.²¹ Physician demand for city supplied virus waxed and waned with public awareness of the prevalence of smallpox. In 1872, there were 245 physicians practicing medicine in Boston, and no more than 30 percent routinely provided this service.²² Almost all were using vaccines derived from arm-to-arm transfer supplied by schoolchildren forced to do so after the mandatory vaccination law took effect. The city physician required a return visit to his office so that the success of the vaccination could be verified and to renew his supply.²³ Its ready availability and mandatory use inevitably contributed to a false sense of public confidence in the vaccine based on its widespread use by schoolchildren.

While no statistics are available to confirm the number of privately performed vaccinations, the city physician's survey of 1868 revealed private physicians were the key to the city's high vaccination rate of 97.2 percent.

Whether all of these vaccinations were undertaken using proper medical procedures was subject to some debate. Nonetheless, the very existence of this vaccination program, even with its limitations of purity and potency, was thought to limit the degree to which smallpox could spread. But what if Martin was right and the arm-to-arm transfer of vaccine was not effective? The question of its effectiveness was soon overtaken by fiscal concerns that a revaccination program was too expensive and politically difficult to justify.

Fiscal concerns reflected the priorities of a pre-epidemic consciousness where the value of the vaccine was not measured in lives saved but discretionary spending foregone. News of an emerging European smallpox pandemic changed everything. Concerned the pox would cross over to America, Martin marketed his heifer-derived vaccines as the sure way to eliminate the dangers of humanized vaccine. Within seven years of his discovery, he claimed to have supplied heifer-derived vaccines to nine thousand physicians in the United States with enough doses to vaccinate over eight hundred thousand people.²⁴ Heifer-derived vaccine was being mailed throughout the continental United States to physicians, municipal health departments, and even the Department of War. His business was not limited to mail order services. He claimed to have personally vaccinated and revaccinated almost twelve thousand patients on his own in the smallpox epidemic of 1872–1873—a number that nearly matched the entire population of Boston residents vaccinated by physicians working for the city of Boston.²⁵ These efforts convinced him to abandon what little use he had made of the arm-to-arm form of vaccination.

He was a visionary medical research scientist whose concern for the vaccine's purity and reliability presaged the call for the safe use of viruses, serums, and toxins that occurred some thirty years later when President Theodore Roosevelt signed the Biologics Control Act on July 1, 1902.²⁶ However, despite his marketing efforts, his vaccine was not recognized for its improved efficacy prior to the smallpox pandemic. Like a streetside barker, his product's value was lost in the clamor of medical controversies concerning the value of vaccination and the credibility of the medical profession.

The Credibility of the Medical Profession

Public trust in the work of physicians was a far cry away from what it is today. Citizens were deeply suspicious of doctors and their wide range of vaccines—regardless of their source. These suspicions were fueled by stories published by those spearheading the antivaccination movement in America and sometimes merely by reporters who saw a good story to be had in the errors made by inexperienced physicians. Martin himself spent a great deal of his life countering the antivaccination literature that appeared in both the

popular and medical press and routinely traced unsubstantiated stories to their fountainhead invariably concluding that true animal vaccine never caused "any real trouble."²⁷ Martin's views had little impact on public opinion, since most Americans were unwilling to try vaccination without a compelling reason, and even more hesitant to believe revaccination was necessary when there was no consensus of its value.

Doctors were fighting an uphill battle of credibility. Why should the public take a risk when the last major smallpox epidemic occurred over seventy-eight years ago?²⁸ The nineteenth-century adoption of vaccination was a huge public health success story. Yet, that success blinded many physicians and the public at large to its fragile hold on public health: a one-time vaccination conferred limited immunity (perhaps less than seven years), posed a danger of unintended disease, and was often suspected of limited potency from lymph of questionable quality. Most telling was the increase in smallpox deaths after 1841—the year when Cunard's line began passenger service between Boston and London. Over the next thirty years, 1,835 Bostonians died from smallpox as tens of thousands of unvaccinated Irish and English came to Boston. In reality, smallpox outbreaks involving the deaths of a hundred or more persons occurred in eight of the twenty years prior to the 1872 epidemic (1850, 1854, 1855, 1859, 1860, 1864, 1865, and 1867). Limited publicity concerning these outbreaks coupled with the city's woefully negligent oversight of public health blinded the public to the dangers of smallpox. Vaccination was a great success story—its only downfall was its lack of universal adoption by immigrants and the false sense of security for those who took the prick and believed a one-time vaccination was good for life.

One of the inevitable results of continually rising public health expectations was that relatively low smallpox mortality rates of the nineteenth century were taken for granted by a generation that knew nothing of the fearsome epidemics of the eighteenth century. Certainly, the public relied and desperately needed doctors when they were sick or likely exposed to smallpox. But when their health was not at stake, the common perception was that there was nothing to be gained by vaccination. As one observer noted, their reputation made it especially hard for them to rally residents to take vaccination: "The prescription of the best physician is a simple experiment; that which operates favorably upon one constitution may be next to fatal in another. The dose required to produce a simple given purpose in one individual would prove sufficient to poison another patient, and thus doctors work in the dark, and grope their way along a path in which hidden dangers swarm everywhere."²⁹

Tarnished by their limited success in fighting nineteenth-century epidemics and limited patient tolerance for ongoing debates over the efficacy of vaccination techniques, physicians failed to create a unifying voice of acceptance

for one of the most important achievements in preventive medicine. The public watched these debates from the sidelines hoping to escape the next epidemic without revaccination or exile to the quarantine station. Physicians were not the only ones to blame. The Boston City Council failed to allocate the requisite resources to initiate a citywide revaccination campaign to boost public immunity to smallpox. Indeed, the city's investment was so small it was the equivalent to a rounding error in the annual budget.³⁰

The Revaccination Crisis

Boston's public health policies were a thin veneer of aspirations over a deep layer of political indifference. This was nowhere more obvious than in the city's tepid approach to vaccination and revaccination. Fifteen years after the Massachusetts General Court required vaccination, it was generally acknowledged this program was woefully lacking for children or adults—despite the statistics kept by the city physician. Although the language of the statutes explicitly called for revaccination, the authority to do so was left to the mayor and board of aldermen who were distracted by more pressing urban priorities. They could require children to be revaccinated five years after their initial vaccination and in the case of adults they had even greater discretion. The statute allowed chief elected officials to decide on revaccination based on an assessment of the public health.³¹ Contemporary newspaper accounts claimed the law had little practical value in promoting revaccination, and physician's ideological predisposition to a one-time vaccination contributed to this public atmosphere of indifference. As Dr. Martin continued to emphasize, revaccination was not only ignored, it was dismissed by many of the most influential physicians in the greater Boston area.³² By 1870, older Bostonians were unlikely to have been revaccinated, mistakenly believing one exposure conferred a lifetime immunity. They would soon learn that unless it had been recently received, vaccination was unreliable.³³

Yet, despite or because of institutional inertia and medical indifference to revaccination, Martin was concerned the city was more vulnerable than ever. While Martin's blustering style may have oversold his role as the city's savior, there was much at stake in the battle to protect the public health. The city added 25,574 foreign-born residents to its population, including 10,663 persons from Ireland, in the seventeen years since the passage of the vaccination law.³⁴ By 1870, Boston's population had swelled to 250,526 persons, of whom 87,986 persons or 35 percent were foreign born.³⁵ As nearly three out of every four (73.6 percent) immigrants came from England and Ireland, Boston's immunity to the pox virus was strongly influenced by the vaccination policies of its former sovereign. Neither the medical profession nor ward politicians understood this vulnerability, so few comprehended

how this intercontinental transfer of pox susceptibility weakened the city's public health armor. Boston's native population was not much better off. Whatever protection they may have acquired had essentially been thoroughly diluted within the space of less than twenty years. Martin also reminded physicians that a one-time vaccination should not be conflated with immunity.

England adopted its Vaccination Act of 1840 to provide free vaccinations for the poor. This law also abolished inoculation, since it had long been known to be more disfiguring than the cowpox vaccine. Thirteen years later, the Vaccination Act of 1853 made vaccination mandatory throughout the United Kingdom requiring vaccination of infants within the first three months of life or the defaulting parents were liable to fines or imprisonment.³⁶ Those who migrated to Boston prior to 1853 were generally unlikely to have been vaccinated. Even when vaccinations were available, there is evidence that they were not performed as well in Ireland and England compared to Sweden, Norway, and Denmark.³⁷ Poor vaccination procedures and attenuated strains of cowpox contributed to a higher smallpox mortality rate among the Irish and English than other Europeans.³⁸ Moreover, even those who arrived in Boston after the British Vaccination Act of 1853 were unlikely to have received more than their initial childhood vaccination.

In contrast to the susceptible Irish immigrants, the city's residents seemed better off with only 2.8 percent of its 1868 population unvaccinated—if we can believe the statistics of the city physician.³⁹ The high vaccination rate may have lulled the city physician into a false sense of security when the real issue was the immunizing value of the vaccine itself.

Dr. Melville Emerson Webb, the city's smallpox hospital physician, would later complete groundbreaking work that determined those who only had one vaccination scar during the epidemic of 1872–1873 were nearly twice as likely to die of smallpox as those who had two scars. This was clear evidence a one-time vaccination was not sufficient to guarantee protection.⁴⁰ This knowledge was not an “after the fact” realization—even though this is how it struck home in Boston. Previous editors of the *BMSJ* published reputable articles on the need for revaccination dating back as far as 1845 and indeed the same journal reemphasized its importance in its April 25, 1867 and June 1, 1871 issues.⁴¹ Unfortunately, the board of health, run by ward politicians, never enforced vaccinations or revaccinations or required it as a condition of employment or residence.⁴²

Discarding quarantine as a crisis management tool, overemphasizing the value of a one-time vaccination, and remaining oblivious of public and personal hygiene set the stage for a disaster. Believing the city was virtually immune to smallpox, ward politicians made relatively few efforts to upgrade its smallpox quarantine program, even though its consulting physicians

acknowledged its value in stopping the spread of smallpox.⁴³ Yet, despite recognizing its utility, ward politicians hesitated to systematically apply various quarantine measures when they heard physicians claim a well-implemented vaccination program would be enough. A one-time cowpox vaccination became the Trojan horse offered by the medical profession as its gift to the city. The city could take it or leave it. It chose to take it.

CHAPTER SEVENTEEN

The Smallpox Epidemic of 1872

The smallpox epidemic of 1872 was said to have begun in France toward the end of 1869 and by 1870 had spread throughout England, Ireland, and other European nations. The British considered it to be the most virulent and malignant epidemic since the enactment of vaccination laws in England, Scotland, and Ireland.¹ In 1871, a total of 23,126 persons died from smallpox in England, including 7,912 in London alone. Another 19,094 English citizens died of this disease in 1872.² In contrast, Boston's port physician Dr. Samuel Durgin had only seen 41 smallpox cases in the first three years of his quarantine station duties (1867–1869) and hoped that the pandemic would skip Boston. It should have been an omen of things to come when 59 cases appeared in 1870 and another 56 in 1871. Initially, Durgin thought Boston might escape unscathed, since only nineteen cases were quarantined on Gallop's Island during the first nine months of 1871. Others in state government shared his concerns but warned preventive measures were necessary to avert an impending outbreak.

State public health officials believed proactive strategies that relied on vaccination and quarantine might insulate Boston. On April 10, 1871, the Massachusetts Board of Health issued a circular to every town in the Commonwealth, urging vaccinations to avoid the spread of the “present epidemic in New York” as well as outbreaks in several Massachusetts towns. These recent epidemics were to “be taken as warnings to be prepared for this loathsome and destructive disease.”³

Dr. William Read, the city physician during the post–Civil War era (1864–1870), believed Boston had little to fear, even though the city gained 87,312 persons in the previous twenty years.⁴ As discussed in the previous chapter, the mistaken belief that one vaccination granted a lifetime

immunity lulled Read and other influential private physicians in Boston to dismiss a revaccination program.

Ward politicians also saw no immediate need for a response plan based on Read's survey.⁵ Indeed, it would take reports of severe cases of smallpox arriving on vessels in the sister cities of New York and Philadelphia on April 10, 1871, before the Boston Board of Aldermen applied historically reliable maritime quarantine controls to hold this contagion at bay, imposing a five-month maritime quarantine effective June 1.⁶ Unlike previous seasonal quarantine orders,⁷ this one applied to vessels from Europe, the Mediterranean, the Canary and Cape Verde Islands, the west coast of Africa, American ports south of the capes of Virginia, and all Central and South American ports.⁸ Yet, despite efforts to improve quarantine procedures, the epidemic of 1872 would soon overwhelm the city's capacity to respond and reveal the degree to which public health was affected by substandard housing and poor sanitary conditions.

Inadequate Resources to Manage an Epidemic

There were many signs of disarray in quarantine procedures starting with the "fair weather" quarantine vessel used to transport pox victims to Gallop's Island without protection from the elements. Forty-five-year-old Samuel Little, chairman of the Boston Board of Aldermen, a well-respected businessman versed in railway transportation, insisted it be replaced, since it offered no protection from the elements—an important consideration for wintertime travel to Gallop's Island.⁹ In granting his wish to take it out of service until a proper vessel could be purchased, the board of aldermen also agreed to reuse the old smallpox hospital located in the rear of Boston City Hospital on Albany Street while Gallop's Island was temporarily mothballed. This austere wooden building, used ten years earlier for a relatively mild smallpox outbreak, could accommodate no more than thirty persons.¹⁰ Beds were lined up in rows with minimal aisle space and lavatory facilities. The rooms were large with numerous windows, a bare floor, and whitewashed walls. It was adequate for the summer months but lacked a heating system.¹¹ A city with 250,000 residents was operating without an all season quarantine vessel and with an appallingly small capacity to care for its sick. City residents were no longer transported to Gallop's Island until Chairman Little procured a new vessel—an effort that took the first eight months of 1872. While the island remained a maritime quarantine station for arriving immigrants, this function was of little benefit in addressing the smallpox epidemic within the city. If the pandemic had skipped over Boston, these bare-bones fiscal strategies for hospital facilities might have been occasion to recognize the city's finance manager for his cost-saving efforts. The course of history would not favor the city's tightfisted public health policies.

Smallpox tiptoed into Boston in the fall of 1871 without a trumpet call from the media or any explicit warnings from city officials. There were only twenty-eight deaths in 1871, but these local cases failed to garner much

public attention compared to the 144 smallpox deaths just four years earlier.¹² The callous acceptance of smallpox as an endemic disease may have inured physicians to dismiss the first cases as nothing more than the recurring agony of the poor and dispossessed. Four-year-old Katherine Koernle was the first to go to City Hospital where she died on January 2, 1872. About a month later thirteen-year-old James Toole died there as well. One can only surmise physicians at Boston City Hospital knew their patients were being treated in violation of the quarantine laws of Massachusetts, which allowed patients to stay in their own homes.¹³ However, when six more smallpox cases were found in overcrowded tenements, the General Court promptly endorsed the actions of the hospital physicians by abolishing a patient's right to home care on April 12, 1872. The board of health could now remove smallpox patients from boardinghouses, hotels, and dwellings with two or more families.¹⁴ This was a remarkable step backward for a city with limited isolation room capacity.

In theory, this new quarantine authority diminished the danger of smallpox in overcrowded tenement houses by removing the infected to island quarantine—the official site for detaining pox-infected persons. The only mollifying factor countering the sin of island banishment was a lackadaisical enforcement strategy. The forced removal of smallpox patients from tenement buildings may have seemed helpful but would not work without an adequate hospital. Fortunately, the Board of Trustees of Boston City Hospital quickly recognized the need for an alternative isolation strategy and assigned one of their buildings for that purpose.¹⁵ This well-reasoned decision would not last long.

Another problem contributing to the city's public health woes was an inordinately high turnover among those working as city physicians in the post–Civil War period. For reasons hidden in the archives of Boston history, in 1869, Read lost political favor, barely retaining his post after the city council remained deadlocked through seven ballots. Read did not seek reelection in 1870 with the result that William H. Page took over his duties. However, he too was replaced the next year by Dr. Samuel Green, the fifth city physician (1871–1882). Green thought the city's disease control and surveillance network was working fine. A forty-one-year-old veteran surgeon of the Civil War, Green had a medical degree from Harvard but limited experience with communicable disease outbreaks.¹⁶ Yet, Green's unwearied commitment to his work and sympathy for those in need of care stood him in good stead in his early years.¹⁷ His first year as city physician would test his administrative skills working for a board of health composed of ward politicians and force him to reassess the city's capacity to respond to an epidemic.

The Role of the News Media in the Emerging Crisis

During the summer of 1872, the smallpox hospital kindled neighborhood fears of disease transmission and attracted a great deal of newspaper publicity.¹⁸ Every day, vehicles were bringing patients from all over Boston to the

smallpox hospital. Residents were fearful close proximity to the hospital placed them at risk. The fledgling newspaper, the *Boston Globe*, reported horrific conditions existed in the smallpox hospital. The *Globe's* reporter was eloquent in portraying the barbaric conditions inside the hospital, declaring the water closets "foul in the extreme" were exposing the patients to a constant nauseating odor. A building designed for twenty-five patients held upwards of forty with some doubled up in the same bed or sleeping on the floor. Food service was delivered in a large basket dragged across the yard from the doctor's house and placed in the middle of the floor for each patient to help himself. The sick, unable to get out of bed, relied on others for food. Many patients suffered the worst states of the disease and had ravenous appetites; "A brood of chickens over a dough dish would be a fair illustration of the scene."¹⁹

The editors of the *Boston Globe* were not content to merely attack the city's mismanagement of the smallpox hospital. That same day the *Globe* also found fault with the city council's indifference to the existence of hundreds of sanitary measures that call "imperatively for immediate attention but which are utterly unheeded." For example, the editor pointed out the "seeds of typhoid float in the air in half the streets of the town because of local filth and local pests."²⁰ But the problems were even larger, suggesting smallpox was merely the straw that broke the camel's back. The size of the proverbial straw took on greater dimensions with the aid of the media. The level of public revulsion at the state of the city's health oozed from every word of the editorial lambasting city government. The *Boston Globe* reporters declared, "There are sections of the north part of the city that are so foul as to be almost impassable by people not accustomed to them."²¹ As the city's youngest paper, it needed to attract public attention and develop its readership and its articles certainly achieved that objective.

It didn't take long for these journalistic broadsides to make their mark on local politicians. The evening these stories were published, the board of aldermen responded to the public outcry by creating a committee to investigate the evils at the smallpox hospital and the mistreatment of its patients. Underlying the city's investigation was the desire of local residents to remove this hospital to another location. However, more importantly, the investigation was also the pretext for allowing politicians to shift blame for the smallpox crisis. On July 30, 1872, the *Globe* reported that the board of aldermen did not believe the current crisis was their responsibility. Rather they saw the trustees of the hospitals as the "lords of the premises" and alleged these trustees wanted no interference from outside authorities. Furthermore, doctors were blamed for the poor food, claiming their nine-dollar-a-week contract for patient care was the root cause, as they were responsible for feeding the patients.²² Even the foul odors found in the neighborhood were not the responsibility of the board of aldermen but that of the committee on

sewers who should be held culpable for this nuisance. The Boston Board of Aldermen was saving face when the crisis pointed to a failure of leadership.

Community Outrage

Those most affected by the epidemic, residents of the Albany Street neighborhood that bordered on the smallpox hospital, were the most vocal in demanding city officials take charge of the crisis. Despite three public hearings in the summer of 1872, the city council dawdled. This political inaction triggered a disparate group of over five thousand workers, businessmen, and residents to demand they intercede before more people needlessly died.

On the evening of August 2, gentlemen residing in the south end of Boston, near the Albany Street neighborhood, held a large meeting at the Central Club, at the corner of Worcester Square and Washington Street. It would be fair to say this group did not have the best interest of the public in mind when it demanded the city close the smallpox hospital. Yet, their parochial interests also touched on citywide concerns for improved care of infected residents and most importantly asked for an independent board of public health to address the present crisis. Angry residents demanded Mayor William Gaston take action, which he artfully did by submitting the coalition's petitions to the board of aldermen for consideration. The urgency of their plea was soon lost in the maze of legislative committee processes designed to frustrate even the most seasoned ward politician. The board deferred action seeking advice from its Committee on Health,²³ which, in turn, established a special committee to investigate problems with the smallpox hospital and find a suitable replacement location.²⁴ Despite the city council's apparent resolve, it took a desultory approach to selecting an alternate site. The result was not unexpected. No public action was taken until the epidemic got out of control. Boston's political bureaucracy was enough to frustrate the most compelling political logic of the day and give new meaning to the phrase "caught in Boston politics."²⁵

Over the next two weeks, anger over hospital practices would eventually force ward politicians to retract their support and order the remaining patients transferred to Gallop's Island. Bowing to public pressure, on August 9, 1872, the board of aldermen banned use of the smallpox hospital even as patients begged to be left in Boston.²⁶ But, despite their pleas, the board took its cue from residents of the immediate neighborhood, the most vocal hospital opponents. The confrontation pitted those advocating for more modern strategies of public health care (the doctors) against neighbors fighting against the spread of smallpox to their families and properties. It was perhaps the most emotional and combative battle in the city's long history of using urban pest houses.

By the end of September, 175 residents had died from smallpox simply because ward politicians hesitated to take positions inconsistent with the desires of their constituents nor distribute vaccines to the largely susceptible immigrant population of South Boston.²⁷ They caved in to neighborhood demands to close the hospital in lieu of protecting the public health of the overall city. The forced relocation of smallpox patients brought many public health issues to a head—including patient transportation, disease reporting, limited fumigation, and a major fire in downtown Boston—with Bostonians realizing politicians could not manage public health matters. Inappropriate means of transporting patients to the hospital in hackney carriages created concerns about the safety of using this public service in an age before subways existed. Undoubtedly, the careless use of hackney carriages to convey patients to the smallpox hospital galled public sentiment against the neighborhood hospital. Why weren't dedicated ambulances used to avoid contamination of public conveyances? Fortunately, the General Court took notice, and on October 7, 1872, prohibited hackney carriages from serving as ambulances.

Lack of prompt transport of smallpox patients to the hospital was also a concern. The telephone had not yet been invented and the city physician relied on couriers and private physicians to notify him of new cases. In response to this "foot dragging" problem, the city implemented a telegraphic dispatch of ambulances from city hall.²⁸ This novel idea was the first instance where this new technology was used to summon emergency responders to transport smallpox cases to quarantine hospitals. The New York City Board of Health gets credit for being the first to use the police department's telegraph system to expedite disease reporting, which, in turn, was then used to contact ambulance services.²⁹ Yet, prohibiting the use of hackney carriages for ambulance service failed to dampen the neighborhood's fierce opposition to this facility, which was kept alive by ongoing incendiary news coverage.³⁰

Smallpox Spreads

As the number of deaths steadily rose, ward politicians could no longer ignore the bleak state of affairs. On September 28, the *New York Times* reported the Boston Board of Aldermen undertook desperate measures to counter the spread of smallpox. The board passed an order to divide the city into twelve districts, assigning one alderman to each to act as an assistant board of health, with authority to employ physicians to visit all dwellings, vaccinate inmates, and take sanitary measures to prevent the spread of smallpox.³¹ Those monitoring the epidemic saw a substantial jump in the number of smallpox victims in the month of September (see figure 17.1). The city's response was long overdue. How the board could have allowed the epidemic to persist without a significant public response is hard to believe. Prior to the *Times'* exposé, the city had entrusted medical response to the city physician and the good will of

private physicians. That same day, the board mandated private physicians report all cases of smallpox. Until then, many cases went unreported until it was too late. According to Dr. Melville Emerson Webb, a thirty-year-old hospital caretaker with a ringside view of the epidemic, the “poorer classes, secreted their friends, sometimes not even employing a physician for fear that the sick one would be sent to the Island, and often a reported death would be the first intimation the authorities had that the disease existed in a certain locality.”³² As there were few incentives for reporting disease, in many instances, it was only when victims died that their residences were discovered.

Another factor contributing to poor disease reporting and the spread of disease was a lack of public knowledge of which houses contained infected persons. Historically, the red flag, the ancient symbol attached to smallpox-infected houses, gave warning of infection in the neighborhood. Unfortunately, during the 1872 epidemic, these flags were often removed by family members to avoid the wrath of their neighbors. Perhaps worse, the city physician even admitted he believed red flags could only be used if the house where the pox victim resided was declared a hospital, and since no such declaration had been made the city physician was not installing red flags. Whether red flags were purposefully removed by fearful families or withheld from use by the self-serving opinion of the city physician, hiding smallpox cases in tenement buildings accelerated its transmission.³³

Normal precautions of the day called for disinfection of contaminated residences. However, such services were offered for a price. At the time, the so-called board of health charged citizens \$3 (\$68.40 in 2019 values) for fumigating one-room tenements and \$5 (\$108.00 in 2019 values) for fumigating a whole tenement with advance payment.³⁴ In most instances, these financial arrangements were too expensive for poor tenants, with many dwellings left with no disinfection of bedding, clothing, and so on. Dozens of tenement houses in the city served as superspreaders of the disease. The combination of overcrowded housing, nonexistent disinfection of tenement houses, and inadequate home isolation procedures resulted in 21 percent of all deaths originating from seventeen tenement houses during the first ten months of the epidemic.³⁵ Virtually, all these tenements were located in South Boston, yet it was only a matter of time before these topsy-turvy policies adversely affected the entire city.

Massive Fire Derails Smallpox Response

To add to the challenges faced by Boston’s ward politicians, a massive fire broke out in the warehouse district on November 9 that quickly spread due to a strong northerly wind destroying sixty-five acres of downtown Boston—making it the worst fire in Boston history. The fire was such an enormous spectacle that the city’s police were deployed to stop rushing

into the scene while firefighters fought a fruitless battle to contain the blaze. Using telegraphic communications, the city pleaded with neighboring cities to help them save Boston. According to one historian, the fire destroyed “millions of property, impoverished hundreds of business men, and broke all but two of the local insurance companies of the city.”³⁶ In the weeks that followed, thousands of onlookers gazed at the devastation and city officials were consumed with crowd control efforts, the removal of dangerous walls from tottering buildings destroyed by the fire, and ongoing efforts to inventory the damage and re-establish accessible transportation corridors within the city. Since the destroyed area was one of the city’s most important trading and employment centers, the impact was not merely a loss of property but a loss of employment and trade. The fire put over twenty thousand people out of work, destroyed 999 firms, destroyed 776 buildings, and caused almost \$75 million in damages, making it one of the worst fires to hit any American city.³⁷ One of the contributing factors to the city’s inability to fight the blaze was the presence of an epizootic influenza among horses, which hampered the speed of the fire department’s response to the fire due to a lack of horses. The devastation caused by this fire heightened public concern with improved building code standards and better tenement housing—raising public interest and demand for public health reform to levels not seen in the previous fifty years.³⁸

A Lackluster Vaccination Program

Getting Bostonians to focus on getting vaccinated was not easy with the distractions posed by the Great Fire, the horse epizootic, and concerns with abusive treatment of patients in the Boston Smallpox Hospital. Despite these distractions, vaccinations were initiated in September but were plagued by limited public support and a spotty search for susceptible persons. Numerous physicians urged better vaccination techniques but their views were ignored by the city council. Dr. Henry A. Martin, the leading proponent of calf lymph vaccines, provided seventy thousand points of the vaccine to Boston physicians during the epidemic, yet, despite his local celebrity and willingness to help, the city council made its own decisions on the level of effort needed to stem the epidemic.³⁹

Dr. George Derby, a member of the Massachusetts Board of Health, was perplexed by the politicians serving on the city’s board of health. Using his initials G.D., on January 3, 1873, Derby wrote a letter to the editor of the *Boston Herald* exposing the deficiencies of the city’s vaccination strategy. He noted vaccinations were unreliable primarily because the “matter” had been kept too long or had been inappropriately diluted. He also warned patients should not be fooled into thinking their vaccination had taken simply because they had sore arms.⁴⁰ Derby pointed out that city vaccinators

working in November and December did an ineffective job, making the vaccination program a “mere farce” based on a lackluster level of effort.⁴¹ It wasn’t merely the failure to implement a thorough vaccination program that galled Derby. He faulted the city’s bungled approach to the hospital closure as well.⁴² The city had eliminated its one smallpox hospital on the mainland at the end of August and allowed four months to pass without creating a suitable nearby facility. In his view, the two most important strategies—vaccination and isolation—were left to die on the vine of political indifference.

The consequence of political inaction resulted in over 3,684 persons contracting smallpox and the death of 1,026 persons.⁴³ In just two short years, more Bostonians had died from smallpox than in any previous period in Boston history (see table 17.1), even though the mortality rate was far less than colonial times.⁴⁴ Less than 1 percent of Boston’s 1872 population died of smallpox. In contrast, nearly 8 percent of the population died from smallpox in 1721. Clearly, Boston’s vaccination program, albeit flawed, was key to this low mortality rate. However, comparing the city’s smallpox mortality rate to colonial times obscures the unique logistical and political challenges city officials faced. Hordes of unprotected immigrants were living in abysmally substandard housing and lacked a voice in city government. Boston’s politicians were notorious foot draggers—an artifact of the city’s adoption of a bicameral government based on a common council, a board of aldermen, and a weak mayor, which shared much in common with the “do nothing” U.S. Congress of 2010–2014. The city council had the resources and the expertise to mitigate the outbreak and could have mandated vaccination yet it chose to take a passive role—simply providing access to physicians deputized to provide such services.

Table 17.1 Deaths from Smallpox in Boston, 1811–1900

Year	Smallpox Deaths
1811–1820	6
1821–1830	7
1831–1840	214
1841–1850	534
1851–1860	717
1861–1870	500
1871–1880	1078
1881–1890	22
1891–1900	31

The Window of Opportunity—The Fall Elections

This epidemic was entirely preventable. Despite the efforts of Samuel A. Green, he did not get the cooperation of his political leaders and was unable to stop the outbreak. In July 1872, there were ninety-one cases and thirty-two deaths attributable to smallpox. By the fall of 1872, the average number of deaths doubled in the last two weeks of September and then doubled again in October (see figure 17.1).

This horrid death toll was a disturbing development to residents watching smallpox ambulances passing through their city's streets. According to one historian, "A pall of fear enveloped the people of Boston by mid-October and they were thoroughly aroused over health issues; smallpox, fear and agitation increased simultaneously."⁴⁵ Fortunately, their clamor for action coincided with upcoming fall elections. The combination of election pressures, the strong pro-reform protests from citizens, and the significant news coverage and editorials in the *Boston Globe* demanding a health board made local elected officials aware that the time for action was nearing.⁴⁶ In a desperate attempt to save their political careers, on December 2, 1872, the city council authorized the formation of an independent board of health. On December 10, the city held its municipal elections. It was called one of the most exciting elections in Boston's history because the issues of the day—the smallpox epidemic and the massive downtown fire on November 9—meant efforts to control smallpox were placed on hold for weeks while the city council responded to the economic impacts of this gargantuan fire.⁴⁷

Public dissatisfaction with "do nothing" politics contributed to the resounding defeat of numerous ward politicians.⁴⁸ Surprisingly, Gaston, most strongly behind an independent board of health, also lost his office in the tightest mayoralty election in Boston history. Initially, it appeared Gaston was reelected. The citizens of Boston were not happy with these election results or the shocking indifference to public health issues displayed by ward politicians. Numerous parties called for an investigation of the election sensing voting irregularities existed. After howls of "foul play," the city's Special Committee on Elections conducted a recount and Gaston lost. The final committee report documented voter fraud, drunken election inspectors, and careless vote counting. One newspaper declared "there seem to be few safeguards against fraudulent voting or corruption among those in charge of the polls."⁴⁹

Two-thirds of the aldermen holding office in 1872 would no longer be in power on January 9, 1873, when the new Mayor, Henry L. Pierce, took office. Inevitably, local politicians were more concerned with the political implications of their decision, of where smallpox patients should be treated, than with the health of the patients or the well-being of the broader public. This election would haunt the careers of the mayor and the board of aldermen and

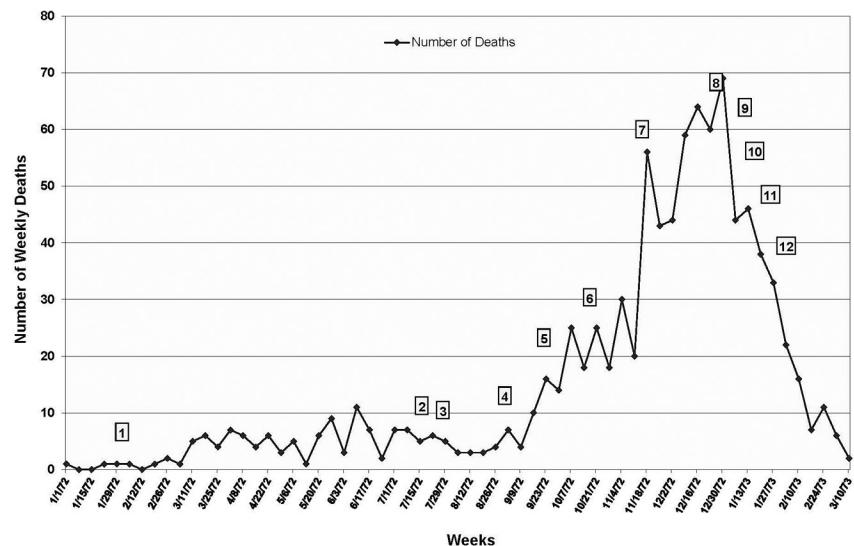


Figure 17.1 Smallpox Deaths in Boston, 1872–1873

Notes to Figure 17.1: Key Events Influencing the Smallpox Epidemic

Reference	Date	Event
1	February 16, 1872	Boston Board of Aldermen authorize Board of Trustees of Boston City Hospital to accept smallpox patients.
2	July 30, 1872	Citizens of South Boston demand that action be taken to remove the smallpox “pest house” from their neighborhood.
3	August 5, 1872	Boston Board of Aldermen prohibits Boston City Hospital from accepting smallpox patients. Patients shifted offshore to Gallop’s Island.
4	September 24, 1872	A total of 3,124 people petition board of aldermen for a new board of health—including five doctors from Harvard Medical School.
5	October 7, 1872	Boston Board of Aldermen prohibits hackney carriages from carrying smallpox patients to limit inadvertent disease transmission.

(continued)

Notes to Figure 17.1 (continued)

Reference	Date	Event
6	November 9, 1872	Boston fire engulfs the city resulting in losses of nearly \$75 million. Over twenty thousand people are out of work, 776 buildings were destroyed, and some twenty persons died. Efforts to fight the fire and clean the city were blamed for the city's lethargic response to smallpox.
7	December 2, 1872	Mayor Gaston signs law creating an independent Health Department.
8	January 9, 1873	City physician indicates that eight hundred Bostonians are sick with smallpox.
9	January 13, 1873	Board of aldermen authorizes city physician to retain guards at every home if residents refuse to place smallpox cards or flags on door.
10	January 15, 1873	New board of health takes control of the smallpox epidemic. It immediately opens and takes charge of two smallpox hospitals within the city of Boston.
11	January 20, 1873	Board of health publicly appeals to physicians and Bostonians to report contagious diseases.
12	January 25, 1873	Board of health authorizes appointment of medical inspector in each ward with responsibility for providing vaccinations and other medical support.

rewrite the political campaigns of virtually every ward politician in Boston.⁵⁰

Before Gaston left office, the outspoken Webb reported 872 cases and 246 deaths from smallpox in December 1872. He strongly believed the “obstinate do-nothing policy” of the city was responsible for the epidemic. Fortunately, this crisis had some positive impacts. It ushered in an independent three-member board of health appointed by the mayor with broad authority to establish quarantine, remove patients to treatment hospitals, and inspect homes for signs of communicable disease. The ordinance abolished the role of the five consulting physicians who had previously advised

the mayor and city council on appropriate actions to take to prevent disease.⁵¹ Public health professionals would no longer play an advisory role; they would be charged with directly overseeing the activities of the board of health.

Destruction of the Smallpox Hospital

While the political climate took a positive turn after the municipal elections, neighborhood hostilities and vigilante activities continued to fester. At 8:50 p.m. on December 26, 1872, the city's newly constructed smallpox hospital located in South Boston and known as Pine Island was engulfed in flames, and the city's chief engineer said its cause was due to an incendiary—vigilantes taking justice into their own hands—as the fire was set in two or three places.⁵² The fire was said to have originated from the west wing of the hospital but rapidly extended to other parts of the building. Because the hospital was far removed from any fire hydrants and the harbor was frozen during a heavy snowstorm, it took over twenty minutes for the fire department to respond, and with this delay, the fire got out of control and everything was totally consumed.⁵³ The fire could be seen from miles away.

The hospital building was two and half stories tall and contained some seven thousand square feet of floor area. The tragedy is that the construction of this building had only started three weeks earlier even though the city council had approved the \$16,500 project in mid-November. As early as September, public health officials had urged the city council to stop debating the merits and demerits of various potential hospital sites and take immediate action. The contractor had worked day and night during December to complete the building so patients could avoid exile to Gallop's Island in the dead of winter.

After the suspicious fire, the city council wasted no time reconstructing the burned down structure. Within four days, the joint committee of the city council signed a \$9,000 contract to build a new hospital on the same site. The contract called for the building to be completed in ten days with a \$200 financial incentive if it was built sooner. Amazingly enough, the contractor, William Smith & Co., hired one hundred workers and completed the new smallpox hospital in six days demonstrating financial incentives and a resolute city government could achieve remarkable objectives when the political iron was hot.⁵⁴ The size and shape of the new structure were the same as that destroyed by the fire, with the exception that the building was only one story instead of the two stories that burned down. This time the city left nothing to chance. Eight watchmen were kept on guard throughout the night to ensure such an accident would not recur.⁵⁵ Anyone approaching the building who

did not halt when challenged was ordered to be shot immediately.⁵⁶ The city council was not taking any chances this time.

Surprisingly, only one major Boston newspaper covered the fire on Swett Street even though it was sensational news. Clearly, the loss of the city's one smallpox hospital on the eve of its opening would not play well to the thousands of residents who were expecting to use it. The existence of this disaster likely spread by word of mouth but had less impact on public sensibilities than if it had been front-page news in the city's major newspapers. The city needed to focus on some good news for a change. And yet, even with the successful reconstruction of the Swett Street hospital in six days, the city was still in crisis, and the new mayor, Henry Pierce, knew it. The new hospital could only accommodate 120 beds, even though eight hundred patients were waiting for care. He acknowledged most of these patients "live in tenement houses, boarding houses or hotels. It will be impossible to eradicate the disease unless the persons so situated are sent to the hospital and the principle of isolation fully carried out."⁵⁷

The mayor wasted no time in garnering expert opinion to guide his decision making. Similar to virtually all of Boston's mayors of the nineteenth century, he called upon the physicians at Harvard Medical School to provide advice, asking them whether additional hospital accommodations would be required, and if there might be danger to those living along the line of transportation to the hospital. The physicians gave him the only advice that could be given at that time: an additional hospital was needed to meet the growing number of cases. However, mindful of past neighborhood opposition in the vicinity of the smallpox hospital in the South End, they added "if proper care be taken, residents on the line of transportation or in the vicinity of these hospitals will not be exposed to danger."⁵⁸

Stigma and Disease Reporting

In the midst of the epidemic, the General Court—the traditional name for the state legislature—also joined the fray by (1) increasing the powers of public health inspectors, (2) sponsoring the construction of a new smallpox hospital in Boston, and (3) imposing penalties on those removing flags from houses where smallpox patients reside. Increased public health inspection authority was provided to resolve one of the most serious city problems—failure to report cases. As the city mandated reporting of smallpox cases, immediate action could be taken to contain the epidemic. Yet, disease reporting was flawed by a requirement that reports be made to the police department rather than physicians or public health officials. This tended to discourage full disclosure among certain classes of citizens.

The state legislature's passage of a special act prohibiting the removal of flags from houses where smallpox patients resided revealed the degree to which smallpox was a stigmatizing disease. Families infected with smallpox were not eager to suffer under the scarlet banner. Yet, the state legislature opposed such secretive practices and felt a deterrent to uncivil behavior was needed. Stigma was not limited to the victims of smallpox. Even city workers assigned to fumigation work were victimized by fearful citizens. For example, on October 8, Augustus Stevens and twenty-four other neighbors living on Auburn Street in the West End petitioned the city to relocate a city fumigator after he decided to move into their neighborhood. Stevens feared this fumigator threatened his family "from a loathsome disease on account of the proximity of the fumigator's residence to ours."⁵⁹ The petition was referred to the Committee on Health but there is no record this request was ever acted upon. The city would have been suicidal if it had caved in to such fearmongering when the fumigators work was an essential public service central to the abatement of the epidemic. While very little fumigation work was performed in the first phase of the epidemic—because costs were borne by the property owner—during the last three months of the epidemic these services were offered without cost.

The *Boston Herald*, one of the city's major daily newspapers, captured the public concern with slipshod hygiene practices when it noted human beings bearing the mark of the pox on their faces were stalking the streets, visiting public buildings, riding on mass transit, and enjoying places of public amusement, thereby spreading the disease far and wide. The *Herald* reporter was shocked that such behavior was tolerated and that no officials took action to stop such dangerous behavior. The reporter declared that his critique was "a mild" account of current conditions and that the "malady is more widespread now than ever before and has been growing steadily worse for six months."⁶⁰ At the height of the epidemic, public impatience and news stories like this prompted Mayor Pierce to arm the new board of health with the appropriate staff and resources to handle the response. Pierce would waste no time searching for solutions.

A New Board of Health Takes Control

Mayor Pierce had been handed a mandate for public health reform by the previous administration. The ordinance authorizing an independent board of health made it the mayor's duty "to be vigilant and active in protecting the public health," to enforce the health ordinances, and communicate his views to the board of health or city council as he thought fit.⁶¹ Because the board of health had been under the control of the mayor and board of aldermen since 1849, it was not easy for them to relinquish their authority to independent

medical and public health officials.⁶² Some Aldermen felt the public health function should continue to remain a matter best managed by themselves.

Yet, Mayor Pierce knew the previous ad hoc three-member Committee on Health had no medical or public health experience or the time to attend to public health complaints, conduct inspections, compile statistics, prepare epidemiology studies, and respond to emerging disease.⁶³ Prior to the 1872 epidemic, the Committee on Health rarely enforced regulations and made little effort to remind residents of their public health duties. The board's intransigence on a wide variety of severe tenement housing issues was directly responsible for the rift with the consulting physicians. The egregious errors in managing the city's worst epidemic revealed the underlying flaw of vesting public health decisions in the hands of unschooled parochial ward politicians.

With strong public support, the new board of health took charge of the epidemic on January 15, 1873, and quickly quarantined those infected with smallpox. Those too sick to move and not living in multifamily dwellings were allowed to stay at home provided they could be properly isolated and family members supported them. All others were moved to one of two newly established hospitals in South Boston (one located on Swett Street and the other on Marcella Street) or as a last resort to Gallop's Island. Removal of the infected from multifamily houses was critical to stopping disease transmission but this was only a part of the solution.

Quarantine by itself would not be enough. The Boston Board of Health also quickly retained the services of men who had previously been vaccinated for smallpox to enter and examine suspected places, to aid in removing the sick to hospitals, and to provide guard service at these hospitals. Using deputized medical inspectors, in January, the board vaccinated over fourteen thousand susceptible residents and isolated the infected, thereby turning the tide just when the epidemic was at its peak. It also thought a series of smallpox hospitals would also be needed. New buildings were contemplated in the North End and public hearings were even scheduled to obtain comments on the proposed locations. However, before architects could finalize the plans, the epidemic had abated, and by February 5, the project was abandoned altogether.⁶⁴

On March 7, 1873, this "once in a century" epidemic precipitated numerous other changes in Boston's public health regulations, including codifying past practice of the quarantining of vessels with any sickness on board at the time of their arrival; written approval from port physician before discharge of passengers from infected vessels; and establishing new vaccination regulations for immigrants who, in the judgment of the city physician, were not protected against smallpox. However, in less than two months, the board revoked its order after recognizing the folly of their strategy. Boston could not thwart an epidemic when other port cities failed to take comparable

measures. Boston was not an island despite past policies to the contrary. This failure was an obvious reason for adopting a federal vaccination strategy for immigrants entering the country. Officials from the Massachusetts Department of Health knew a uniform protective approach to disease control was needed along the eastern seaboard and urged such an approach.⁶⁵ Yet, a co-ordinated federal approach would take almost ten years to be realized.

End in Sight

Soon after the board of health's first meeting on January 15, 1873, the city saw a decline in the number of smallpox cases. Hiring professional health officers to support the work at the hospitals and home isolation facilities and funding improved hospital facilities helped in the turnaround of events. The Boston Board of Health also declared, the house of an infected person as a "hospital," a decision welcomed by the city physician concerned with the risk to a patient's health by removal to a public hospital.⁶⁶

On a broader level, home isolation would have been less critical if the city had invested in an isolation hospital with a large bed capacity easily accessible to the sick. If such a facility had been present at the outset, the city might have contained the epidemic far earlier and minimized its spread to other municipalities throughout Massachusetts. Over the two years during which the epidemic raged, a total of 1,697 persons died from smallpox in Massachusetts, including 1,026 within Boston. Nearly two-thirds of those who died outside of Boston could be directly traced to those exposed to persons or fomites from the city.⁶⁷

The epidemic ended on July 23, 1873, when the final patient was discharged. By the following year, there were only five isolated cases reported in the entire city—none of which resulted in death.⁶⁸ There would be very few smallpox cases in Boston for the next twenty years.

After the emergency subsided, state health officials took issue with the strategies used to quell the epidemic. In retrospect, the city learned the best care was offered at the newest facilities—the Roxbury Almshouse and Hospital No. 1 (see table 17.2)—where improved treatment and better isolation techniques were practiced. In contrast, island isolation had the least survival value confirming Webb's view that support systems provided by family and friends were an important component to the success of the treatment program. Many patients' health was affected by attempting the arduous transportation to Gallop's Island. Selective removal of older and socially isolated individuals to Gallop's Island also contributed to the higher mortality rate on the island. By law, the board of health could remove the tenement house dwellers to quarantine regardless of their financial or medical condition. In practice this meant that about 62 percent of all those who died of smallpox on Gallop's Island were immigrants, whereas only about 37 percent of all

Table 17.2 Effectiveness of Smallpox Isolation and Treatment in Boston, 1872–1873

Treatment Location	Number of Cases Treated	Number of Deaths	Percent Mortality
Albany Street Hospital	322	76	23.6
Gallop's Island	487	182	39.6
Home Treatment	2,342	659	27.1
Hospital No. 1 (Swett Street)	233	49	21.0
Roxbury Almshouse	300	60	20.00
Total	3,684*	1,026	27.9

*The number of cases is inconsistent with other information presented by Dr. Webb that indicates another thirty-eight cases. However, those thirty-eight cases are not accounted for in Dr. Webb's analysis of the relative efficacy of the hospital and home treatment options.

those who died on the mainland were immigrants. These inequitable isolation policies led to different survival rates in the city's three temporary hospitals.

The state board of health felt Massachusetts was extremely vulnerable to infectious disease outbreaks because of its high foreign-born population and high levels of immigration. It also believed the state needed to play a more central role in future epidemics to avoid the city's poor performance:

While our knowledge of the laws that govern this epidemic is at best limited, we have a right to expect its return with equal severity when an accumulation of non-vaccinated infants and strangers shall be effected with a like susceptibility. If the experience of the past year has taught us anything, it is that this greatest security is not found in unguarded ports or in leaving vaccination entirely in the hands of local authorities. The inevitable result is that the vigilant and active cannot effectively protect their own against the inertness and inefficiency of others. The greatest safety lies in entrusting the care of the ports, and the supervision of the vaccination, to the State board of health, or some other competent body, and in holding that body to a strict responsibility.⁶⁹

Despite their self-assuredness, the fledgling state of board of health, created in 1869, was painfully aware that unless the federal government played a central coordinating role at all U.S. ports, smallpox could easily reenter Massachusetts through a back door. State governmental agencies did not have the

resources or the authority to address epidemics that spread well beyond municipal and state boundary lines.

Impact of Isolation and Vaccination

The 30 percent smallpox mortality rate in Boston was comparable to that experienced in New York or Philadelphia, where similar epidemics were occurring, but Boston had a greater number of deaths when normalized on the basis of deaths per thousand living persons.⁷⁰ Among the 1,232 hospital cases were ninety-seven hemorrhagic cases that were especially virulent and resulted in a 100 percent mortality rate.

The death rate was exceedingly large among the unvaccinated as well. Webb's survey found that fifty-five out of 113 unvaccinated persons died from smallpox—a 38.8 percent mortality rate. In contrast, only 130 of the 690 persons who had been vaccinated died—an alarmingly high 19.6 percent mortality rate for those who believed vaccination provided lifetime immunity. Webb also showed an increased survival value in having more than one vaccination. Those who had two or more smallpox scars had virtual protection from the disease—a clear indication revaccination was a critical element of any control program.⁷¹ From May 1872 to April 1873, the city completed 2,694 vaccinations and revaccinations. Most of this effort occurred during the last three months of 1872 after each alderman was assigned a physician to undertake free vaccinations and house inspections. Its limited success reflected slipshod implementation under crisis conditions rather than as a measured response prior to the epidemic.

While the number of vaccinations may appear impressive, the city physician's efforts were of little consequence in a city containing 250,526 persons, including 60,772 persons between the ages of five and eighteen. Fortunately, once the new board of health took charge it began a more rigorous and comprehensive vaccination program by deputizing paid medical inspectors who fanned out into every city ward providing door-to-door services and completing 14,977 vaccinations from January 27 to March 15, 1873.⁷² These efforts, while not reflected in the official statistics compiled by the city physician, were credited with stopping the epidemic.

Webb, one of the few physicians who took an interest in the epidemiology of this outbreak, recommended that in future epidemics, cowpox vaccination be given again regardless of the duration of time since the last vaccination. He emphasized the importance of this work, especially in "tenement houses where the disease exists."⁷³ He also advocated the use of animal virus for vaccination and agreed with Martin that heifer-derived vaccines posed no danger of introducing syphilis or other diseases. His views were known to the general public and were even covered in the major newspapers of the day.⁷⁴ Some physicians, like Martin, even went so far as to capitalize on the

epidemic to advertise the availability of the cowpox vaccination so customers could avail themselves of the protection this vaccine offered.⁷⁵

The aftershocks from the epidemic also pointed to underlying weaknesses in the maritime quarantine program supervised by Durgin. He was a weak link in the epidemic intelligence network as he had little fiscal support or staff to inspect vessels and tend to the sick on Gallop's Island. In 1873, Durgin's successor, twenty-seven-year-old Dr. Chester Irving Fisher, faced a horrendous workload. That year he inspected 617 vessels, of which only seven carried sickness of a quarantinable character requiring detention at the station.⁷⁶ Fisher was at work from sunrise to sunset during the quarantine season. Indeed, prior to June 1, 1866, the port physician had no backup staff.⁷⁷ With a workload sufficient for several physicians, it is surprising that anyone would take the job. Typically, in the post-Civil War years, port physicians lasted for no more than three or four years before deciding on a less demanding way of making a living. Similar to virtually all port physicians before him, Fisher soon realized married life would be incompatible with exposure to a wide range of contagious diseases while living a world away from civilization. Few women dreamed of living in Boston Harbor and even fewer had a desire to do so on an island that housed the most contagious diseases known on earth.⁷⁸

Prior to May 1, 1872, the Board of Directors for Public Institutions had overall responsibility for island affairs with day-to-day management left to the port physician and his assistant.⁷⁹ Afterward, the Committee on Health, as the agent of the board of aldermen, resumed control. After the new board of health was established, quarantine became one of its duties, but neither of these realignments did much for the port physician or his resources. For lack of funds, he continued to grow his own vegetables and sufficient hay to keep a horse and cow throughout the year. The island had its own barn, coal shed, and a new wharf. Despite these so-called amenities, the port physician learned a great lesson from the epidemic. At least two more island hospitals were needed—one for yellow fever and another for ship fever.⁸⁰ Indeed, if cholera should reemerge, the port physician suggested a third hospital might also be required. None of these requests were immediately supported. The port physician was ignored as smallpox gradually disappeared from the city. Yet, another epidemic was only one infected vessel away, making his work nothing less than the proverbial Dutch boy holding the waters back with his finger in the cracked dam.

For all the weaknesses of the quarantine island, the epidemic would not have blossomed if the city had adopted a revaccination strategy, uncoupled disease reporting from law enforcement, offered free fumigation services, provided timely house-to-house inspections, and dedicated ambulances for pox cases. In less than three months, the new independent board of health demonstrated that a proactive approach to complaint management, inspections, and

timely corrective actions of public health problems were the key to a progressive city government. Moreover, the city was no longer on its own. The state board of health insisted on conducting epidemiological investigations and establishing public hygiene and sanitation controls for cholera, measles, diphtheria, and typhoid fever. Boston's health policies would never again be divorced from those of the Commonwealth.⁸¹



CHAPTER EIGHTEEN

Germ Theory Reframes Quarantine

By the midseventies, British and French medical literature recognized germs as the causative factor of disease. However, for various reasons, some American physicians did not immediately accept the germ theory. To complicate matters, medical terminology for causative agents of disease was appallingly vague, making it difficult to achieve consensus among scientists. Terms such as contagion, miasma, and virus were not sufficiently defined to ensure consistent applications in the medical literature. In reality, these terms were theoretical concepts that had little evidentiary basis to support their use. Because of this predicament and the limited American investment in scientific and medical research during the 1870s, with the exception of Samuel Durgin and his colleagues at the board of health, many of Boston's physicians, like those elsewhere in America, were slow to adopt the germ theory.¹

Then, in April 1876, Robert Koch definitively linked the cause of anthrax to the *Bacillus anthracis* bacterium.² This discovery that microbes were found to be the causal factor for numerous infectious and communicable diseases shifted the focus of maritime quarantine to disinfection in preference to confinement. Koch's work represented the first scientific proof of the germ theory of disease.³ Public health measures could no longer exclusively entertain the "miasma" theory of disease transmission. Disease would eventually be uncoupled from atmospheric gases, or miasmas, long considered uncontrollable through quarantine. Koch's discovery and those of numerous other scientists would change the scope of the debate as the causative agents for literally dozens of diseases were revealed to the eyes of scientists during a brief forty-year period preceding World War I. Koch and Carl Joseph Eberth discovered typhoid bacillus in 1880; Koch discovered the tubercle bacillus

in 1882 and then cholera in 1883; Theodor Klebs identified the diphtheria bacillus in 1883; Louis Pasteur developed an antidote to rabies in 1885; and Alexandre Yersin and Kitasato Shibasaburo discovered the etiologic agent for plague in 1894.⁴ These and dozens of other less significant bacteriological discoveries would soon change the quarantine landscape.

Changing Public Opinion on Germ Theory

It was not until 1898, that Henry Bowditch, dean of the Harvard Medical School, declared “the germ theory of disease established upon a firm basis.”⁵ Despite its relatively early acceptance by Samuel Durgin, miasma theorists took many years to disappear from the medical world.⁶ Inevitably, the long held allegiance to miasmatic causes of disease also delayed acceptance of the principles of disease incubation periods. Nonetheless, numerous fundamental premises of the miasma theory were eroded in the 1880s when it was shown that bacteria are not given off from moist surfaces (1877); that they are not present in “expired air” (1881); and that they die quickly when dried (1897).⁷ Rather than gaseous modes of transmission envisioned by nineteenth-century miasma theorists, scientists like Winslow and Robinson convincingly demonstrated droplet aerosols were the causative factors of disease (1910). Extensive experiments conducted at the turn of the century clearly showed aerosol droplets could only communicate disease over relatively short distances—generally no more than nine feet.⁸ Furthermore, the germ theory was given greater scientific credibility when Koch issued his famous postulates of disease transmission—increasing the medical profession’s acceptance of germ theory.⁹ Miasma was out and the scientific basis for quarantine was clearly in vogue.

Koch claiming that microscopic organisms and not gaseous emanations caused disease shook the worldview of millions of Americans unprepared for a war on germs. Because it was stitched tightly into the medical thought of the day, it would take at least forty years for the germ theory to completely supplant filth and miasmas as causative factors for epidemics. For example, the Commonwealth’s Bureau of Vital Statistics continued to classify smallpox, cholera, yellow fever, typhoid, measles, and scarlet fever as miasmatic diseases as late as 1900.¹⁰ Miasmatic effluvium as a causative factor of disease was obsolete at the third International Nosological Conference held in 1900.¹¹ Thereafter, Massachusetts would refer to these diseases as being of an epidemic not miasmatic character. Nevertheless, shortly after World War I, one leading public health advocate noted how difficult it was for public health professionals to accept germ theory. He noted several scientific errors that continued to be perpetuated by the public health community, including “that disease breeds filth instead of merely carried in filth. Another is that all kinds of dirt are dangerous, not merely the secretions and excretions of the human body. A third unfortunate hypothesis is that infectious diseases are usually air-borne.”¹²

Despite the slow rate at which the medical community accepted the nuances of the germ theory, it received considerable attention in the popular literature of the day.¹³ Because of increased understanding of disease, quarantine stations adopted isolation and disinfection strategies based on disease-specific modes of transmission. These developments made port physicians the leading epidemiologists of their day. Under Durgin's leadership, the city's quarantine program was operating with a rational approach to disease control measures. The Boston Board of Health recognized quarantine could not be limited to a willy-nilly detention of passengers on board ship or on Gallop's Island. Ship and cargo disinfection were important tools needed to enhance the efficacy and public palatability of quarantine. Fomites—not just people—were now considered credible causes of disease owing to the ascendancy of germ theory. During this period of rapid scientific discoveries, Boston's port physicians, Chester Irving Fisher (1873–1875) and Alonzo Wallace (1875–1879), stayed on top of the developments in the fields of public health and ship sanitation. Indeed, working with Samuel Green, the city physician (1871–1881), they implemented disease-specific isolation and sanitary measures at the quarantine hospital and its sleeping quarters.¹⁴ Indeed, the energetic twenty-eight-year-old Wallace was one of the first to apply the science of isolation to maritime quarantine.¹⁵

Incubation Periods for Quarantinable Disease

Disease-specific incubation periods were tracked by the Boston Board of Health as early as 1867 for smallpox, yellow fever, and typhus, and as early as 1878 for scarlet fever and diphtheria.¹⁶ Diseases of an unknown origin originally called for a quarantine of observation, where sick persons were placed under observation until a suitable diagnosis could be achieved or the patient recovered. Observing passengers for telltale symptoms was not a new idea. However, it marked a shift away from lumping actual and suspected cases into an undifferentiated target of quarantine. For example, a quarantine of observation separated the victims of smallpox from those exposed and undergoing vaccination. It was a more humane form of confinement that acknowledged the hierarchy of risks to the community with lesser treatment for lesser risks. The new policy accommodated the needs of the healthy individual. In 1882, under the watchful eye of chairman Durgin, the board of health began recording the number of instances where such quarantines were required.¹⁷

Despite Durgin's trailblazing efforts, the Boston quarantine establishment was not the first to practice incubation-based confinements. As early as 1872, physicians in New York City were applying disease-specific quarantines based upon their incubation periods and modes of communication.¹⁸ The International Sanitary Conference held in Constantinople in 1866 established a ten-day period as the maximum time a suspected person should be kept under observation, provided the vessel upon which he arrived had a

surgeon on board. Physicians in New York City understood stricter isolation procedures would be necessary for diseases “conveyed through the air or in vapor of water than with those which are transmissible only by solid or liquid media.”¹⁹ In contrast, Boston’s port physicians made no reference to disease incubation periods in any of their annual reports from 1873 to 1914, even though they applied these principles to quarantines of observation.²⁰

Evidence-based incubation periods only came to the forefront of public health practice in 1905 when Durgin, chairman of the Committee on the Infectious Period of Communicable Diseases of the American Public Health Association (APHA), made a report on the infectious period of eleven major communicable diseases. Durgin was not merely a major force in the city’s public health program he also served on important state and national public health boards, including twenty years as first vice president of the Massachusetts Association of Boards of Health and one year as president of the APHA. In his seminal report to the APHA, Durgin concluded there was insufficient evidence to establish uniform time periods for the incubation of infectious communicable disease.²¹ Without such evidence, port physicians could not apply universal formulas to impose quarantine and continued to rely on symptomatology.

While the incubation periods for many diseases were generally known, they were not universal—meaning a range of times existed before symptoms appeared depending upon the dose and virulence of the bacterium or virus and the immunocompetence of the victim. Inevitably, these case-specific factors derailed the standardization of disease-specific quarantine. Though Durgin and the city’s port physician knew these differences existed, this knowledge was never codified as a public health regulation. Nonetheless, he synthesized current scientific knowledge of isolation procedures and shared that information with public health officials throughout the nation.²²

Prior to the notion that disease could only be transmitted during its infectious period, quarantine may have been overly restrictive for its victims though its purpose was to protect the community. Medical science may have cast a blow against religious belief that equated disease with sin, but the same science created new forms of segregation and stigma based on the incubation and infectious periods for communicable disease. The knowledge that there was a unique incubation period and mode of transmission for each disease soon evolved into the modern concept that each patient should be segregated to avoid contracting other diseases. Little was known about the specific routes of transmission so isolation wards initially relied on proper ventilation, adequate sunlight, and disinfection of patient’s clothing and bedding.²³ Most notably, because yellow fever’s route of transmission remained a mystery until the early twentieth century, yellow fever wards of the late nineteenth century were of limited value unless mosquito netting or window screens were incorporated into the hospital’s design. Change would take time and depend on greater understanding of underlying disease transmission principles, which

often took years to confirm and in many cases remain mysterious even today.²⁴ Yet, limited scientific evidence did not stop the port physician from exercising prudent judgment in the face of danger.

Disinfection and School Quarantine

In 1881, the Boston Board of Health began tracking the fumigation of incoming vessels. Now it was no longer a question of what caused disease, the focus shifted to how such diseases could be prevented to minimize quarantine.²⁵ Some of the first efforts of the fledgling field of bacteriology focused on effective disinfection strategies, which soon convinced the Boston Board of Health that isolation and disinfection of sick wards was as important, if not more so, than disinfection of entire cities or of shipping terminals. If microbes had relatively short lives outside of their hosts, public investments should instead focus on controlling the sick patient and the contacts that he or she may have had with others.²⁶

Disinfection strategies got a huge boost from Dr. George M. Sternberg, one of the pioneers in bacteriology who played a pivotal role in developing bacteria specific disinfectants. Sternberg, considered the father of American bacteriology, was keenly interested in prevention of infectious disease and believed he could eliminate these pathogens by identifying their specific pathways of transmission.²⁷ The knowledge that a disease like cholera was caused by ingestion of contaminated water quickly led to very specific public health strategies to treat and chlorinate water supplies. By 1885, the APHA reported chlorination was the best disinfectant available when cost and efficiency were considered.²⁸ Numerous large American cities were chlorinating their water supplies as early as World War I.²⁹ Cholera was gradually disappearing from the landscape as a result of the dual strategy of treating public drinking waters to minimize public exposure and imposing scientifically supported approaches to isolate those who became infected.

Treatment and disinfection were not the only outcomes emerging from the fledgling field of bacteriology. New vaccines were being developed for many of the most lethal diseases, including plague, anthrax, diphtheria, and rabies.³⁰ Edward Jenner's vision for smallpox eradication would become the vision for a wide range of communicable diseases and spurred the growth of preventive medicine through state-funded public health measures. For example, Boston was the first city to institute medical inspection of schools and used the services of the Harvard Medical School bacteriological laboratory to identify appropriate isolation periods for infected individuals. Harvard's laboratory became an important vehicle in its transformation from being a bastion of miasma theorists to a leading advocate for bacteriology and public hygiene. Harvard is believed to be the first American medical school to offer courses in bacteriology.³¹

Durgin was certain one of the most important public health measures he could undertake focused on school-age children. Because of the great dangers posed by diphtheria and scarlet fever, in November 1894, he ordered daily medical inspections of Boston schools to identify ill children—an unprecedented preventive measure for the city.³² Many were surprised when the visiting physicians found 10,737 of the 16,790 pupils inspected in 1895, the program's first year, were ill, including 2,041 who were too ill to remain in school for the day.³³ Included among the 10,737 ill children were 77 cases of diphtheria, 28 cases of scarlet fever, 116 cases of measles, 28 cases of chickenpox; 69 cases of pediculosis; 47 cases of mumps; 33 cases of whooping cough, and 8 cases of congenital syphilis, all of which could spread to other children in the school system. The remaining 10,372 sick children were suffering from various other diseases. Durgin had stumbled upon a mother lode of evidence that would forever upstage public health priorities in Boston and throughout the United States. It marked the dawn of school quarantine programs in America and expanded inspections from the narrow domain of emigrant vessels to school-age children.

For the first time, the city focused on one of the most explosive sources of disease—its school system—and the results were enough to disarm all opposition to this public health initiative. Boston school system and the community at large were solidly behind Durgin's program.³⁴ After all, what parent could be opposed to protecting his child from communicable disease? Keeping ones sick child home enabled parents to practice home isolation consistent with the city's quarantine program. Should a parent fail to recognize the signs of sickness or fail to observe hygiene rules, the school principal could take appropriate action using the city's medical inspectors. The subsequent year, the board required isolation for those infected with a communicable disease to prohibit contact with the public.³⁵

Public sanitation systems were also improved. By 1888, sewer systems that had discharged noxious smelling wastes onto the shores of Boston Harbor were intercepted and collectively discharged several miles off Deer Island and Moon Island.³⁶ Similarly, building inspections identified faulty plumbing and sewer connections, which enabled the city to fix its defective sewer system. This wave of public health improvements promised profound changes in the quality of life, and the public felt the city's fortunes were taking a turn for the better.

Redefining Disease Reporting

Behind efforts to control communicable disease exists a tacit contract between the victim and the liege of quarantine, the private physician. The tacit contract holds the victim responsible for reporting his disease as well as the physician who comes to his aid. Disease reporting struck at the sacred

bond of privacy that allowed patients to trust their doctors with the most personal aspects of self. The mere thought one's secrets would be disclosed might be enough for many Bostonians to abandon their physician.³⁷ Yet, despite this adverse consequence, it had little sway over the minds of state legislators who wrestled with the dangers of unreported epidemics.

Smallpox, despite its devastation and stigma, was actually one of the least burdensome of Boston's communicable diseases. Durgin knew improved intelligence was needed for other diseases that flourished in Boston. An unprecedented number of Bostonians died of diphtheria, typhoid, scarlet fever, smallpox, measles, and tuberculosis in the 1870s.³⁸ An early warning system was needed. On December 29, 1877, Durgin ordered Boston's physicians to report cases of diphtheria or typhus fever in addition to smallpox and scarlet fever.³⁹

With public awareness of the social and economic consequences of morbidity, Durgin had the political leverage to track public health statistics. In 1875, 40 percent of all Bostonians died from communicable disease, with foreign-born immigrants contributing a disproportionate share of these deaths. A select panel of Boston physicians pleaded for a greater commitment to the "prevention of filth infection" through improved sanitation and a greater vigilance coupled with isolation measures.⁴⁰ While requiring physicians to report cases of highly contagious disease might seem like a small change in policy, it signaled a switch from reactive responses to epidemic to preventive strategies.⁴¹ Death statistics might reveal the magnitude of an epidemic but were of no value in identifying those in need of care. Life needed to be protected and that required better real-time case reporting. In Durgin's view, disease reports were a necessary prerequisite for improved enforcement of quarantine.

Tens of thousands of immigrants were arriving annually from some of the most impoverished regions of eastern Europe, Russia, and Italy. By 1890, over thirty thousand immigrants were entering Boston on an annual basis bringing with them a wide range of contagions. Durgin's groundbreaking disease reporting requirements set the stage for the Commonwealth's adoption of similar standards some thirteen years later. On March 19, 1890, the General Court revised the definition of reportable diseases to focus only on infectious or contagious disease dangerous to the public health. Previously, the definition did not include the phrase "infectious or contagious" disease.⁴² Under this new definition, smallpox would no longer be the only reportable disease. Indeed, three years later, on May 3, 1893, the General Court ordered local boards of health to report any contagious disease—not just smallpox. The Commonwealth's reporting program, built on Durgin's trailblazing epidemic intelligence strategy, served as the model for the rest of the nation, and as such has long been watched by health policy experts and historians concerned with disease surveillance.⁴³

It is not coincidental these reporting requirements emerged in the 1870s. Public health issues were becoming important to Bostonian's for various reasons. Boston had one of the highest mortality rates in the nation, and yet even government estimates of the scope of the health crisis rested on questionable data.⁴⁴ State and local officials recognized the need to publicly intervene and one of the first requirements was valid mortality and morbidity data. One factor that certainly facilitated improved disease reporting was the 1877 state law authorizing the creation of local boards of health with the authority to enforce sanitation laws and budget for public health. Four years later, in 1883, the state legislature gave these boards the added responsibility to report the existence of quarantinable diseases.⁴⁵ Another factor was the increased attention paid to the microscopic and culture plate analysis of infectious disease, which made it possible to make positive identification of diseases that had hitherto been diagnosed by symptomatology. Bacteriology labs could conclusively pinpoint bacterium by name, and thereby, became independent gatekeepers validating future outbreaks.

Legislative meddling in disease reporting had been a necessary evil as long as local governments operated without boards of health, and the Commonwealth had a weak board of health. In 1886, the state board of health divested itself of the state's charity and lunatic cases and soon became a national leader in disease reporting. With a professional state board in place, on March 8, 1907, the General Court provided it with the authority to independently determine what diseases were dangerous to the public health.⁴⁶

It was inevitable quarantine strategies changed as new modes of transmission were identified. Durgin applied modern epidemiological principles to identify and contain the spread of diphtheria, scarlet fever, measles, and typhoid fever using hospital and home isolation like no previous city physician could have imagined. Boston had battled so-called epidemics but failed to fathom the dangers of the much greater challenge of battling endemic disease. This changed when Durgin's staff started tracking a wide range of contagious diseases, providing the scientific basis for massive public health investments in hospitals, medical inspections, home isolation, and medical treatments. If it isn't measured it isn't important clearly became the mantra for the new public health movement that survived on morbidity and mortality data to drive fiscal investments in disease prevention.

Within 150 years, disease reporting had been uncoupled from quarantine and tied to communicable disease tracking and epidemiological investigations. By the late nineteenth and early twentieth century, it no longer automatically implied island isolation. Well-run mainland isolation hospitals could be managed with little danger to the community.

Emergence of Isolation Hospitals

Today we expect nearby access to a hospital as a fundamental right of public health. In the late nineteenth century, for Bostonians, access to a hospital for treating communicable diseases was a novel concept. Boston's isolation hospitals were trendsetters in their day. Few American cities invested in dedicated isolation hospitals as most still relied on general hospitals or, if located along the eastern seaboard, on island hospitals removed from the hubbub of urban life.⁴⁷ Boston, unlike any other American city, also recognized the need to segregate patients by disease within one mainland hospital setting. The need was certainly great. In 1888, just sixteen years following the smallpox epidemic of 1872, there were only 30 cases of smallpox, but over 12,590 cases of diphtheria, scarlet fever, measles, and typhoid.⁴⁸ These alarming levels of contagious disease and the inadequate facilities in Boston Hospital's South Department—a code name for Boston's pest house—prompted Mayor Hugh O'Brien, the city's first Irish mayor and a champion of the working class, to build two new wards exclusively devoted to cases of scarlet fever and diphtheria. Prior to O'Brien's reign, there were no hospitals in America that served diphtheria patients. The new wards were opened for patients in February 1888 and replaced previous mixed wards not intended for disease-specific isolation.⁴⁹

By 1895, Durgin expanded the city's quarantine authority to address smallpox, diphtheria, membranous croup, and scarlet fever for a full-scale war on germs. He appointed a team of fifty physicians to investigate every case of diphtheria, membranous croup, and scarlet fever reported in the city.⁵⁰ New isolation regulations, effective July 1, 1895, called for home isolation unless it was not feasible, in which case hospital isolation would be required. In either case, the isolation precautions had to be satisfactory to the board of health. This dramatic expansion of mainland isolation coincided with an increased investment in public health, an expansion of state public health oversight over communicable disease, and a rapid expansion of services offered through the city hospital. Boston expended 64 percent more funds for public health in 1895 compared to the previous thirteen years. While quarantine services did not keep pace with overall public health expenditures, the city still spent 36 percent more for maritime quarantine compared to that previous period.⁵¹

Yet, despite these investments, Durgin and his staff could not keep up with a caseload that more than doubled between 1888 and 1895 stressing the staff at Boston City Hospital. Bursting at the seams, on August 31, 1895, South Department replaced its two contagious disease wards built a mere seven years earlier as they were now inadequate to meet the explosion of diphtheria and scarlet fever cases.⁵² Boston City Hospital was considered the first modern infectious disease hospital in America and an essential

foundation to Durgin's plan to gain control over communicable disease. The new wards consisted of a group of seven buildings located along Massachusetts Avenue bounded by Albany and Northampton Streets. Two of these buildings were dedicated for isolation and contained sixteen wards that could accommodate two hundred beds with ease and more under crisis conditions.⁵³ Indeed, during the first five months of operation, the hospital routinely exceeded its capacity, a telling sign that infectious disease remained America's number one killer.⁵⁴

The birth of isolation hospitals was not entirely surprising. In the 1890s, state boards of health throughout the United States were convinced of the communicability of various dangerous diseases, as well as the need for special isolation wards where disinfection and special nursing services could be administered. By November 1899, fifteen out of sixty-two American cities provided hospitals for isolation, and more were built as physicians recognized the dangers of improper ventilation, inadequate room sizes, excessive occupancy limits, and the use of mixed wards that were contributing to the tragic spread of disease.⁵⁵

The scale of Durgin's battle against germs called for isolation facilities far in excess of those available on Gallop's Island. More importantly, Boston City Hospital offered specially designed "state of the art" isolation facilities. For a Bostonian needing medical treatment, the choice between the two options was night and day. To distinguish itself from island isolation, the term "quarantine" was strictly avoided in the hospital terminology of the time. The operative word became isolation and the emphasis was on nursing care under controlled hospital conditions. For hospital administrators, isolation was good medicine while quarantine smacked of island death camps.⁵⁶ Increased acceptance of germ theory helped morph what were once ghastly quarantine practices into more informed and humane isolation tactics in modern facilities no longer plagued by the ill conditions of pest houses of the past. These quarantine reforms would continue to be debated as the federal government began its efforts to control maritime quarantine stations along America's coastlines.

CHAPTER NINETEEN

Federal Solutions to Quarantine

Coincident with public awareness of the germ theory, the U.S. Marine-Hospital Service (USMHS), the predecessor to the U.S. Public Health Service, saw an opportunity to expand its mission beyond the care of sailors returning from foreign ports.¹ At the request of Congress, it took an active role in quarantine following the yellow fever outbreaks that devastated the southern states in 1878. In prior years, the USMHS assisted state and local governments with the enforcement of quarantine but such assistance was only provided upon request. This changed on April 29, 1878, when Congress charged the USMHS with enforcement of public health regulations promulgated by the Secretary of Treasury.² Federal regulations were urged as a means to address the plethora of state approaches to quarantine and their adverse impacts on foreign commerce. Each American port exacted different requirements for medical inspections, fees, and quarantine—interfering with the smooth running of shipping, placing some cities at a distinct disadvantage in attracting maritime commerce.

Congress gave the USMHS the authority to create uniform quarantine regulations, subject to the approval of the president.³ While federal bureaucrats were not to interfere with local quarantine regulations, they could impose stricter requirements when necessary to avert an epidemic. Despite inevitable reservations by members of the Boston Board of Health, Durgin soon realized the USMHS offered the city substantial public health benefits it had never achieved on its own. No longer was disease to be prevented by a last minute intervention on a vessel entering Boston Harbor. For over two hundred years, Bostonians had relied on the island keeper, port physician, or selectmen to inspect vessels and passengers before entry. In 1878, Congress declared such inspections were best implemented overseas and the USMHS must establish

consular officers to advise the supervising surgeon general regarding the presence of contagious disease in foreign ports.⁴ Epidemic intelligence would now come from trusted federal surgeons who could provide an early warning system for the arrival of infectious disease to state and local quarantine authorities throughout the United States. In the battle against germs, only spies working for the allies were to be trusted when the price of misinformation spelled catastrophic loss of life for thousands of Americans.

After seventy-nine years of playing a passive role, this legislation empowered the federal government to take a systematic nationwide approach to disease control relying on an international network of microbe hunters working in the world's major ports. The stakes were too high to continue allowing vessels to reach our shores through dozens of independently operated quarantine stations. Over 4 million immigrants entered the United States, and nearly 250,000 entered Boston between 1865 and 1878 bringing thousands of cases of communicable disease.⁵ An ounce of prevention was worth a pound of cure and President Rutherford Hayes knew pre-embarkation public health screenings were the key to a radically new national quarantine strategy. Modeled after British shipboard public hygiene, it emphasized vessel inspections, ship physicians, and consular bills of health as a means to avoid the debilitating impacts of quarantine.⁶

National Board of Health

Federal oversight over public health took another leap forward on June 2, 1879, when Congress created the National Board of Health to make regulations to better protect the country against infectious disease. The quarantine authority originally granted to the USMHS was transferred to the National Board of Health because Congress recognized the pressing need for a unified public health strategy to address recurring epidemics of yellow fever and cholera. The southern states were suffering from significant loss of life during virtually every summer season following the Civil War—a reflection of their warmer climate offering a longer and more suitable living environment for the *Aedes aegypti* mosquito.⁷ The death toll and economic malaise were so staggering that the Congressional Committee on Epidemic Diseases estimated as many as twenty thousand had died in just one yellow fever epidemic (1878) and that economic losses ranged from \$100 to \$200 million.⁸ As a result of this tragic loss of life, Congress ordered a national investigation of its causes to develop appropriate preventive measures.

This groundbreaking investigation, in turn, influenced Durgin to stay abreast of the epidemic intelligence received through newspapers and vessels arriving from southern ports. Durgin imposed summertime quarantines against southern states regardless of the duration or magnitude of the outbreaks, a rare strategy not seen since the yellow fever outbreaks of 1802 and

1819. These quarantines lasted from May to November for virtually every summer from 1865 to 1898.⁹ However, in response to the 1878 yellow fever epidemic, the board also imposed a strict six-month quarantine on vessels coming from Europe, Western Madeira, Canary or Cape Verde Islands, the Mediterranean, the west coast of Africa, West India, and the Bahamas or Bermuda Islands, as well as any American port south of Virginia, including Central and South America, and vessels from United States or Canadian ports, if they previously stopped at suspicious ports.¹⁰

Vaccination and Immigration

Containing yellow fever wasn't the only strategy. Due to concerns with the potential introduction of smallpox effective November 14, 1881, the National Board of Health ordered the nation's quarantine stations to enforce vaccination whenever immigrants are found to be unprotected, and required merchant ships to obtain proper sanitary papers at their port of departure.¹¹ If the states failed to enforce this rule, the president could designate an officer to carry out this task. Since quarantine was a municipal responsibility in Boston, it was only natural its board of health adopted the regulations of the National Board of Health to avoid a hostile takeover. On January 7, 1882, Durgin issued new procedures, adding vaccination and fumigation to the city's traditional maritime quarantine program. Unprotected persons had to be vaccinated and undergo a "quarantine of observation."¹²

This landmark decision was the first federal effort to vaccinate immigrants even if its execution left much to be desired. In accordance with this order, Boston's port physician vaccinated susceptible passengers whenever smallpox was found onboard incoming vessels.¹³ In 1873, the city had briefly required all immigrants to be vaccinated, a strategy that was ahead of its time in terms of preventive approaches to smallpox but failed without a federal government public health policy for immigrants. In 1881, Dr. Alfred B. Heath, a graduate of the New York College of Physicians and Surgeons and the city's tenth port physician, vaccinated 1,691 persons onboard infected vessels. Heath typically requested passengers to show their smallpox or vaccination scar and, if this was not evident, asked them to roll up their sleeve and submit to vaccination. The stubborn ones who refused were told they faced a fourteen- to eighteen-day quarantine of observation. It was their choice and not surprisingly few asked Dr. Heath for quarantine over vaccination.

Despite a well-managed vaccination program, Heath felt he was spitting into the wind as he saw firsthand unparalleled emigration threatening Boston's meager safeguards against diseases prevalent in foreign ports.¹⁴ How could Boston protect itself if other states were not imposing similar requirements? Even if Heath conducted the best medical inspections in the world, communicable diseases could enter through the least restrictive American port and travel by land back to Boston and disarm its maritime quarantine

restrictions. Heath knew an uncoordinated assembly of state quarantine programs along the eastern seaboard—even with a federal vaccination order—did not constitute a coherent national public health shield against imported disease.

These glaring vulnerabilities in the nation's maritime quarantine system would linger as the federal government played a passive role—issuing orders without enforcement. In the eight years following the 1872 smallpox epidemic, Boston escaped an outbreak even though over 155,000 immigrants landed at its docks. There were only twenty-seven cases and two deaths from smallpox, one of the longest periods of virtual exemption from this disease in city history.¹⁵ During that same period, Boston only had seventeen cases and two deaths from yellow fever—all imported and quarantined on Gallop's Island.¹⁶ Other American cities were not as lucky and suffered heavily from summertime outbreaks of yellow fever. Located in a cooler climate, Boston saw far fewer cases compared to ports in the southern states. Yet, fearful of its potential contagious character, Durgin, chairman of the Boston Board of Health (1876–1912), had no compunction in applying strict quarantines against vessels from southern ports.

A strong quarantine program could avert an epidemic and conserve Boston's precious fiscal resources. Durgin intensified vessel inspections following the 1878 yellow fever outbreaks. The city also kept its contagious disease hospitals on high alert as an insurance policy in case yellow fever should reappear. Uncertain of its mode of transmission, Durgin relied on quarantine and vessel disinfection to keep yellow fever at bay.

Improved Vessel Fumigation

In the same year, the board also began routinely fumigating suspicious vessels. The port physician burned sulfur based on the formula that three pounds was required for every thousand cubic feet of space inside the hold of the vessel.¹⁷ Massive quantities of chemicals were applied without any understanding of their disinfecting power nor of their long-term environmental impacts. Such issues were barely even considered. The real concern was the destruction of highly lethal pathogens that had resulted in tens of thousands of avoidable deaths. Durgin tracked his fumigation efforts, since these statistics were vital justifications demonstrating the essential nature of quarantine service.

The vessel sanitation procedures of USMHS had a profound impact on late nineteenth-century quarantine practices. Through medical and scientific journals of the day, port physicians were reminded of the benefits of cleaning and disinfection practices and their relevance to maritime quarantine. As a result of this federal emphasis, the city's maritime quarantine program adopted three major objectives to contain smallpox: isolation, disinfection, and vaccination. All ships and passengers were inspected during the

quarantine months, and vessels fumigated if there were any signs of dangerous diseases.¹⁸

By 1883, Durgin focused his energies on the potential transmission of disease through fomites (i.e., food, animal, and plant products). The belief that animal and plant products could transmit disease was not new. Paul Revere's first board of health had also established stringent disinfection controls for merchant ships. In the intervening eighty years, port physicians finally had evidence germs could be transmitted through inanimate objects, which, in turn, helped underscore the importance of modern disinfection techniques promoted by Ignaz Semmelweiss and Joseph Lister. Lister's groundbreaking research in antiseptic treatment of wounds (1865) and Semmelweiss' work proving the importance of handwashing techniques (1847) gradually shifted quarantine efforts from strategies of exclusion to those of accommodation and disinfection.¹⁹ The golden age of disinfection also shifted municipal funding from improved island hospitals to better disinfection techniques. By 1891, eight years after the city passed stringent disinfection controls for commercial cargoes, it spent \$56,702.18 to construct four new buildings and a separate disinfecting plant on the mainland near the Swett Street smallpox hospital. These investments were thought to make Boston as "protected a city as any in the country against attacks of cholera and yellow fever."²⁰

This new equipment ushered in an era of more rigorous ship and cargo fumigation though it rarely impacted the commercial trade. On average, less than 2 percent of vessels visiting Boston from 1882 to 1898 needed fumigation. As ship sanitation gained acceptance, quarantine became a measure of last resort. It was rarely enforced with the strictures seen when *Ten Brothers* was sunk in Boston Harbor as a remedy to stop yellow fever. With new disinfection techniques and better nursing care, quarantine was primarily used for known or suspected carriers of smallpox, cholera, or yellow fever. The targeted group, while smaller than the population of potential quarantinable persons under earlier regulations, was still considerable. Over five thousand souls were exiled to Gallop's Island from its opening in 1866 to World War I, even though the primary objective of the quarantine program remained ship inspections.²¹

Federal jurisdiction over quarantine remained tenuous during the 1880s as Congress hesitated to supervise public health, an arena of law long considered the domain of the states.²² Concerned with the unchecked power of federal public health officials, on June 2, 1883, Congress disbanded the National Board of Health and its quarantine authorities reverted to the USMHS.²³ The board's demise would have little immediate impact on the Boston quarantine establishment—other than receiving mail from the supervising surgeon general rather than the National Board of Health. Ironically, the USMHS would soon become as powerful a bureaucracy as the National

Board of Health, eventually responsible for quarantine at every port of entry into the United States.²⁴

The act of 1878 enabled the USMHS to develop, slowly but surely, an empire of quarantine stations along the American coastline. Initially, federally controlled quarantine stations were limited to cities at the mouths of the Delaware and Chesapeake Bays, on the Georgia Coast, and at Key West, San Diego, and Port Townsend.²⁵ However, over time, the USMHS acquired state and locally operated quarantine stations and inserted its own staff, regulations, and procedures in place of those that had previously existed. It would take some forty years before it owned the rights to all local and state quarantine stations, though it did not take that long for cities like Boston to see the benefits.

Locally administered quarantine benefited not only the city where immigrants arrived but all cities and states where they finally settled down. As the USMHS acquired quarantine stations, it became evident their disease control strategies were working and only patronage and political accountability were to be derived from local control of quarantine. Instead of burdening the sick, quarantine was now burdening the city's fiscal resources. Why should Boston bear the public health costs for other cities and states simply because it was the most accessible port of entry? The costs of a locally managed quarantine station appeared to be outweighed by the benefits of a federal takeover. However, as long as epidemic diseases were held in relative check, Boston's ward politicians were content to leave Gallop's Island alone under the watchful eye of Samuel Durgin.

However, gradually, after years of uncoordinated local and state control of quarantine along the eastern seaboard, it became clear that aggressive federal intervention was not only inevitable but necessary to the successful control of communicable diseases.²⁶ Even Durgin, Boston's longest serving public health official (1873–1912), recognized the uncoordinated actions of individual states could not collectively thwart an epidemic. Time and again, yellow fever struck the southern states during the late nineteenth century triggering severe quarantines, restricting travel and trade, but not always the spread of disease. Without evidence proving that quarantine worked, southern merchants perceived quarantine as a trade barrier giving economic advantage to northern ports where yellow fever was less prevalent.

Dr. Joseph Holt, a member of the Louisiana Board of Health, became one of the strongest proponents of a federal quarantine system. He recognized states did not have the authority to stop the interstate and international transmission of disease. Unlike Durgin, he believed state quarantine programs were giving economic advantage to northern ports that could access the midwest via rail lines instead of using maritime links up the Mississippi River. In his view, when Boston imposed quarantines on southern ports, it simply facilitated improved east-west trade using the railroads and crippled

maritime commerce through southern ports. In the fall of 1892, he spoke in favor of a national solution to replace the inconsistent line of defense against communicable disease created by a crazy quilt of state quarantine regulations. This situation wreaked havoc on southern commerce, and the only means of resolving the crisis was to create a unified sanitary barrier to address interstate and international threats of quarantinable disease. Such a strategy, according to Holt, could only be achieved by placing quarantine authority in a single national bureau that could take a nonpartisan approach.²⁷ For Holt, northern state quarantines were nothing less than a continuation of the Civil War disguised as a public health crisis. Holt's concerns were not unique. Yellow fever had decimated southern port cities such as New Orleans virtually every summer after the Civil War prompting half the population to leave until the first frost.²⁸ Those who remained behind faced the spectacle of death. "On every hand the weary and the heart broken, the dying and the dead, everywhere dead, blasted hopes, aimless existence deserted industries, ruined commerce, blighted prosperity, poverty!"²⁹

And yet, despite these horrific experiences and subsequent efforts by southern states to plead for a national quarantine strategy, Congress failed to respond. It would take over ten years and a different political calculus—in the form of masses of East European Jews emigrating to Boston, New York City, and other eastern seaboard states during the cholera epidemic of 1892—for the nation to support a federal quarantine program. Waves of pogroms in Russia and Eastern Europe during the late nineteenth century were largely responsible for these mass migrations. As the first settlers adjusted to American life, other relatives and friends back home learned of the opportunities and liberties in America and soon picked up their worldly belongings and followed suit.

Purification Rituals for Human Disinfection

The 1892 epidemic became the catalyst for establishing a unified quarantine system under the command of the U.S. surgeon general. New York City was at the epicenter of the cholera epidemic but other cities faced similar challenges. For example, Boston faced its own dilemma when on September 6th the steamship *Michigan* brought 125 Russian Jews into Boston Harbor. Upon their arrival, Charles Cogswell, the port physician, ordered the steamship to anchor at quarantine and for immigrants to undergo disinfection on Gallop's Island.³⁰ Boston had relatively crude disinfection equipment and washing facilities, which might be considered deplorable by modern standards, though these disinfecting procedures had been the standard for Gallop's Island for over ten years. Men and boys were forced to strip in one common room and then compelled to take hot water baths and clean themselves with objectionable disinfectants. A doctor would then examine each

passenger for signs of cholera. While forced to strip and remain naked in a crowded room, the men waited while their clothing was properly fumigated in the steaming room before it was returned. After it dried and they donned their clothing, the men turned the room over to the women who took the same course of treatment.³¹

Shockingly, only two or three old washtubs were used to disinfect these 125 passengers. Dozens of passengers were forced to line up for hours waiting for their turn to use these washtubs. If the city had experienced a large influx of cholera-infected immigrants, it would not have been capable of managing the disinfection process. For whatever reason, or simply good fortune, Cogswell never treated an imported case of cholera in 1892 or 1893. Yet, this close brush with a cholera epidemic had a salutary effect. When the president of the Boston Common Council learned of these deplorable washing facilities, he requested Durgin to take immediate action and appropriated \$50,000 for new facilities.³² The city council had relied on Durgin to manage public health issues and was embarrassed by the adverse publicity generated by the ill prepared quarantine station. Durgin took the blame for this public embarrassment even though he was merely a civil servant with no political authority. Like so many times before, Durgin swallowed his pride and took the heat for the thin-skinned and tightfisted politicians of Boston.³³

The deplorable state of Gallop's Island had gone unrecognized for years. The arrival of the *Michigan* and subsequent events embarrassed Mayor Nathan Matthews who predictably insisted on sanitary measures to remove nuisances from the city. Citizens were requested to improve the sanitary condition of their households, and their efforts were supported by an army of city workers deputized as health inspectors. Filth, dirt, and festering lagoons were to be cleaned up and sewer discharges into the Charles River removed so cholera would not have a place to settle. These were tall orders to implement, but Matthews knew he had a narrow window of opportunity to fix a broken quarantine station.

Matthews also realized that Gallop's Island barracks were inadequate and ordered \$7,000 appropriated including funds for a disinfection plant. As an interim measure, he directed Durgin to reactivate the former smallpox hospital on Swett Street as a cholera hospital. If that wasn't enough, the mayor insisted the city's polling booths be removed to Swett Street to use "in case of necessity" as miniature barracks.³⁴ The Island quarantine station, with 6,407 square feet of hospital space and support buildings, had undergone few improvements since the smallpox epidemic of 1872. In 1877, an additional 4,770 square feet of hospital wards and support buildings were constructed, but even this expansion was insufficient to keep pace with the ever-increasing emigration to America.³⁵ The crisis motivated Matthews to double the size of the city's quarantine operations and fix its deplorable living conditions. Before Matthews barked his "call to health," there were only fifty bunks on

the island even though a single infected passenger ship might carry five hundred passengers. The mayor's exhortation got results. By the following year, Gallop's Island acquired an additional 761 bunks, enough to handle virtually any infected vessel.

New York City's cholera epidemic, Boston's near miss, and a general xenophobic attitude toward immigrants were the catalyst for national quarantine legislation. Americans were wary of eastern Europeans entering the country, and the thought that quarantine could be used to slow the pace of immigration was quite appealing. On the surface, public health officials identified a fragmented quarantine system to be the reason for enacting federal quarantine legislation. In response to the plethora of state and local quarantine regulations, the National Quarantine Act of February 15, 1893, authorized the USMHS to develop a uniform and systematic approach to quarantine.³⁶ Specific mandates of this legislation included (1) conducting inspections of vessels at their point of departure; (2) working cooperatively with state and local boards of health to ensure local regulations establish necessary controls to prevent the introduction of disease; (3) providing updated epidemiological and sanitary data on the health of foreign and domestic ports; (4) quarantining infected vessels at the nearest quarantine stations; and (5) suspending immigration when there is a danger of the introduction of cholera or yellow fever into the United States, as determined under the president's authority.³⁷

Congressman Isador Rayner, co-author of the National Quarantine Act, spoke for many when he said, "Hardly ever in the history of the country, in view of the experience of last summer, has an occasion presented itself that demands greater thought and watchfulness and more urgent action upon the part of those who are entrusted with this most important function of governmental duty to the safety of the people and to the commerce of the country."³⁸ Newspaper accounts concerning the cholera epidemic of New York City riveted the nation to the public health vulnerabilities posed by uncontrolled immigration.³⁹ Yet, disease control was only one part of the national quarantine strategy. As the medical historian Howard Markel has pointed out, the National Quarantine Act was also designed to stop uncontrolled migration. Senator William Chandler, in particular, was one of the proponents of controlling the public health "evils of immigration." He initially called for the suspension of immigration for a period of one year to control the cholera epidemic.⁴⁰ As his views were not those of the majority in Congress, he was forced to settle for relatively limited "immigration control" language in the final legislation. Immigration was taking its toll on America's public health but Congress was still unwilling to permanently bar entry to those with quarantinable disease.⁴¹

Perhaps the greater concern was the usurpation of state's rights by the federal government in the event of an epidemic of cholera, yellow fever, or other quarantinable diseases. The federal government had authority to

regulate interstate commerce based on the Constitution.⁴² However, the extension of this authority to cover citizens of the United States was deemed by many congressmen to be an untenable extension of the commerce clause into civil liberties that might have no connection to commerce. Moreover, the National Quarantine Act called for state and local health boards to enforce federal public health laws. This legislation, according to the House Minority Report, raised interesting legal issues, since it might force state and local health boards to comply with federal quarantine regulations.⁴³ After the passage of the Act, numerous congressmen voiced concerns that state's rights were trumped by federal quarantine. Perhaps mindful of these political sensitivities, the USMHS was extremely careful not to wrest control of quarantine procedures from state and local governments. Rather, their approach was to play an advisory and technical support role to facilitate better communication and cooperation among state boards of public health. As a result, these state's rights concerns remain substantially unchanged even today.⁴⁴

Not all states fought federal quarantine authority. In the case of Boston, the board of health adopted regulations for the quarantine of vessels comparable to those of the USMHS.⁴⁵ For example, the surgeon general distributed notices concerning the appearance of plague in San Francisco in 1900, the spread of smallpox across the nation from 1897 to 1901, and periodic outbreaks of diphtheria through its weekly public health reports. Rather than being perceived as an interference with the city's quarantine authority, federal guidance extended local intelligence to distant lands otherwise inaccessible to the port physician. This federal/local collaboration was an important element of Boston's maritime quarantine program prior to World War I and revealed the degree to which federal policymakers controlled local public health priorities.



CHAPTER TWENTY

Boston's Last Epidemics

The chore of fighting off smallpox at the gates of the city fell to Durgin and his staff. Perhaps more than any one person, Durgin epitomized the reformer who put public health interests above all other considerations. Unlike any other government official, he monitored the latest public health, sanitation, and quarantine ideas of his day. From 1883 until 1910, he taught public hygiene at Harvard Medical School and was an acknowledged leader of public health policy.¹ His pioneering work was well respected at Harvard, and his tenure there helped to shift the school off its miasmatic theories of the past.²

During his reign as the city's chief public health official, there were dozens of major changes in the management of communicable disease, reflecting the emergence of bacteriology as a new science, the development of disease-specific isolation hospitals built with far more sophisticated ventilation standards than pest houses, the recognition of tuberculosis as a communicable disease, an emphasis on school medical inspections, mandatory vaccination programs for smallpox, and new strategies for disease prevention that no longer required the use of quarantine. While these commendable public health initiatives helped to better identify and care for those with communicable disease, Durgin would soon find he did not have the luxury of focusing his efforts on one or two diseases when communicable disease was endemic in Boston. This proactive health reformer was caught off guard by the smallpox epidemic of 1901. With improved hospital isolation wards and an ongoing smallpox vaccination program, Durgin's efforts had been focused on the major epidemic diseases of the day, scarlet fever and diphtheria.

Smallpox appeared to be a disease of the past. And yet, despite the lessons learned from the epidemic of 1872 and the rosy hopes of vaccines supplanting the need for quarantine, another serious outbreak occurred at the start of the twentieth century. From 1901 to 1903, Boston experienced 1,596 reported cases and 270 deaths from smallpox. Patients were either treated at the Southampton

Street smallpox hospital (the new name for the Swett Street hospital)³ or on Gallop's Island. In contrast, to the 1872 epidemic, the milder cases were sent to Gallop's Island, which explains why the island's mortality rate was only 11 percent compared to a 20 percent mortality rate in the Southampton Street hospital.

But having a dedicated isolation hospital was not the same as preventing the spread of smallpox. An isolation hospital provided the capacity to respond to an epidemic—it did not prevent it. The 1901 outbreak could not have been predicted based on the caseload from 1874 to 1900, a period during which only sixty-three smallpox deaths occurred in Boston. Once again, Bostonians had forgotten about smallpox and, not surprisingly, ignored the value of vaccination or revaccination. With the exception of one “little flurry of smallpox in 1894” when a moderate amount of vaccination occurred, Bostonians acted as if smallpox had been eradicated.⁴

The health department observed three factors contributed to the dramatic resurgence of smallpox in 1901: (1) the strain that arrived was initially relatively mild and allowed many to continue their normal duties, thereby spreading the disease; (2) many Bostonians were unprotected by vaccination; and (3) doctors and victims were notoriously slow in reporting cases.⁵ The disease simmered throughout the summer months reaching its peak in October and November when cold weather forced residents to spend more time indoors in close proximity to friends and family members. Lax reporting, a public health focus on other diseases, and a mothballed vaccination program were a fertile ground for an opportunistic pox virus to take root. Like previous epidemics, the explosion in cases outstripped available accommodations forcing the city to construct additional buildings on the island. On November 16, 1901, Gallop's Island began receiving overflow patients and continued doing so until the outbreak subsided.⁶

Mandatory Vaccination

During the fall of 1901, Durgin deployed a squad of doctors and police to vaccinate men in boarding and lodging houses using physical force to accomplish their objectives. Tramps who objected to the vaccination party were held down by a team of police while doctors operated on their arms. The inadvertent spread of disease by the unvaccinated was not tolerated.⁷ The day after Christmas the board of health resumed its strong-arm vaccination campaign, and a week later on January 2, 1902, it sent 125 physicians accompanied by policemen into those portions of the city needing vaccination the most. On the first day, 15,000 persons were vaccinated, which was the largest number ever vaccinated in the country.⁸ Overall, 185,000 were vaccinated in 1901, and an additional 300,000 were vaccinated by private physicians, one of the most remarkable accomplishments in the city's 180 years of experimenting with vaccines and one of the greatest vaccination campaigns in American history.⁹

Only nineteen individuals faced prosecution for failing to cooperate with the vaccination order.¹⁰ Their predicament was of some legal consequence to the city and the health of its citizens. If mandatory vaccination laws were found to be unconstitutional, as violations of the rights of American citizens under the Fourteenth Amendment to the Constitution, then one of the three major prongs of communicable disease prevention would be eliminated. Not entirely by coincidence, the city of Cambridge adopted a similar mandatory vaccination law on February 7, 1902. This Cambridge law required all unvaccinated adults to be vaccinated if they had not already done so since March 1, 1897. A resident of Cambridge by the name of Reverend Henning Jacobson refused to accept these requirements and was taken to Massachusetts Inferior Court for a criminal complaint. After losing his battle in the Supreme Judicial Court of Massachusetts, he appealed to the U.S. Supreme Court where his appeal was denied on February 20, 1905.¹¹ The U.S. Supreme Court held mandatory vaccination to be a valid legislative function that did not interfere with the Fourteenth Amendment rights of Jacobson.¹² The Court cautioned that vaccination could not be mandated if it might seriously impact a person's health or cause his death. However, since Mr. Jacobson did not present any health issues, the court held him subject to the Cambridge vaccination law. This Supreme Court decision remains the landmark case establishing the legal validity of properly constructed vaccination programs.

Implicit in this landmark decision were the immunological benefits of vaccination. The Boston Health Department found the vaccinated had a much lower death rate (9.24 percent) than those who had never been vaccinated (20.82 percent). Indeed, a recent review of the original data from this outbreak led a team of modern doctors to conclude that even recent vaccinations improved the survival of smallpox patients. These doctors found patients who had never been vaccinated but received vaccination within three weeks of admission were more likely to survive compared with those who had never been vaccinated.¹³ The reason for the efficacy of the vaccinia virus as a prophylaxis rests with its shorter incubation period compared to that of smallpox (*Variola major*). Vaccinia has an incubation period of five to eight days compared to an incubation period of ten to twelve days for *Variola major* acquired through the respiratory route. Timely vaccination after exposure alleviated or even aborted smallpox.

Despite the city's strong-arm tactics, its vaccination program did not reach Bostonians in a timely fashion. As a result, the Southampton Street smallpox hospital was put into service to isolate cases even though its value was partly neutralized by adverse neighborhood opposition.¹⁴ Soon after the epidemic was over, city council member, Mr. John F. Hoar, a two-term member from Ward 17, complained of the presence of the Southampton hospital in his ward and requested its removal.¹⁵ On January 16, 1902, the Boston Common Council established a special committee to consider his request and make recommendations by no later than April 15, 1902.¹⁶ For no apparent reason,

the committee never issued a report so one can only surmise, once the crisis was over, neighborhood concerns died down and the issue disappeared from the political radar.

Consumption Recognized as a Dangerous Disease

Shocking though it may be, one the most dangerous diseases to ever plague Boston, tuberculosis, was not considered communicable until the twentieth century. More people died from tuberculosis in the nineteenth century than any other disease yet cases were grossly underreported. This wasn't caused by failed government policies but a failure of American medicine and its isolation from European science.¹⁷ European nations recognized it as a communicable disease as early as the 1870s, but this view was generally dismissed by Boston's physicians until 1900 when the Boston Health Department declared it a notifiable disease.¹⁸ Seven years later, the General Court declared tuberculosis a dangerous communicable disease.¹⁹ This was a shocking decision, since Massachusetts had hitherto not considered it communicable and virtually everyone lived with or knew someone with tuberculosis and had no idea of the danger that this exposure posed.²⁰ A political decision was called for if tuberculosis was to be controlled, especially since public understanding of its extreme communicability was virtually absent. It was a rare example of legislative leadership that positively influenced future efforts to gain control over tuberculosis and dealt a death blow to physicians who held it to be an inherited disease.

During the nineteenth century, Durgin never quarantined tuberculosis patients because he took his cue on its etiology from Harvard Medical School—not European scientists. Even though Koch discovered the tubercle bacillus in 1882, it would take nearly twenty years before Durgin, taking his cue from New York City, acknowledged its communicability as a dangerous disease.²¹ Instead of isolation, physicians relied on various remedies to combat tuberculosis, including “rest, abstinence, blisters, acetate of lead and opium.”²² While he was quick to adopt the scientific principles of disinfection and the germ theory, these realizations did not spillover into a quick adoption of the contagious character of tuberculosis. During the nineteenth century, Boston physicians relied on tried and true remedies and, because they misunderstood its transmission characteristics, their responses missed the mark. Thousands of Bostonians died at the grips of the *Mycobacterium tuberculosis*, a microscopic bacillus so small (in the range of 0.2 to 0.6 by 1 to 10 microns) and aerodynamically designed to remain airborne for extended periods of time that it posed great risks to those sharing the same breathing zone.

This bacterium is the causative agent of consumption or tuberculosis as it is now known. While tuberculosis was a significant nineteenth-century public health concern and Koch's discovery of the tuberculosis bacillus attracted

worldwide attention, it never attracted the routine level of attention given to smallpox or diphtheria, since it was not considered a quarantinable disease. The fact that it takes some two to ten weeks to incubate and does not result in any horrid outward symptoms like smallpox victims experienced relegated it to a lower order priority.²³ Yet, tuberculosis was extremely lethal. For example, in 1949, over 40 percent of those infected with the pulmonary form of this disease died in Boston.²⁴ More importantly it was also the leading cause of death in Boston throughout the entire nineteenth century and consistently killed over twelve hundred persons a year during the last twenty-five years of this century. As conventional wisdom did not consider it contagious, its existence precluded a declaration of epidemic or quarantinable disease. Ironically, while the greatest death toll from tuberculosis was in the nineteenth century, it generated more dread and fear in the twentieth century after its communicability was accepted by legislative decree.

Support for sweeping public health efforts to combat tuberculosis were initially quite lethargic. Despite years of tracking other diseases, the Boston Health Department first addressed tuberculosis in its 1901 Annual Report where it regretted it was unable to diminish its prevalence or alleviate its suffering, blaming their predicament on the lack of a suitable hospital for those in its advanced stages. Durgin found consumptives to be in a deplorable state of health frequently so impoverished that food, medicines, clothing, and ordinary comforts were beyond their means. Their poverty was often so severe sanitary instructions could not be enforced. Tuberculosis cases were not only a constant danger to the community, they created exceptional demands on municipal services and required levels of protection and public charity previously unknown.²⁵

For example, Boston needed a three-hundred-bed hospital for its consumptives but despite repeated funding requests it took an act of the state legislature to declare it a disease dangerous to the public health before the severity of the crisis was recognized. Arguably, one of the city's greatest medical blunders was its failure to track, accept, and adopt the bacteriological advances of the European medical and scientific community. Indeed, Durgin could have learned a great deal even from his colleagues at the New York City Health Department where tuberculosis was declared communicable three years earlier than Boston.²⁶

For all its cosmopolitan pretensions and belief that it was the "Hub of the World," Boston was a step behind European medical literature and invested little in tuberculosis research.²⁷ Boston waited far longer than New York before declaring its contagious character. To some extent, issues of public health linked to the needs of the poor and working class got less play in Boston than they did in New York City during the Progressive Era.²⁸

Declaring tuberculosis a danger to public health occurred on June 6, 1907, and set in motion a tidal wave of legislation aimed at the identification and

isolation of tuberculosis cases. Two months later, on August 1, 1907, the state board of health went even further by making tuberculosis a “notifiable disease” forcing physicians to report any and all cases.²⁹ In the space of ten years following its “coming out” party, there were dozens of Massachusetts laws addressing hospital controls, prevention, treatment, and municipal responsibility for quarantine and isolation procedures. Within seven years of the Massachusetts disease reporting law, 50 percent of the states would adopt similar laws, thereby transforming public perceptions of its dangers from an inherited illness to one of the most communicable of all diseases.

Unlike other communicable diseases, home quarantine of tuberculosis patients did not make sense. As one physician noted, “The long continuance of the disease renders impossible such house quarantine as is enforced in the case of smallpox, scarlet fever, measles and diphtheria.”³⁰ Moreover, its long incubation period made it difficult for family members to care for their loved ones in hygienic conditions comparable to those of a hospital.³¹ Physicians urged hospital care for these patients to protect the immediate family and members in the community even though such facilities did not exist.

Nonetheless, despite its initial hesitation to invest in these prevention programs, the General Court became a national leader in the fight against tuberculosis when it created health districts and appointed state inspectors to gather information concerning its prevalence within the various districts of the Commonwealth.³² State public health officials spent several years working with chief elected officials to develop suitable hospital facilities, an idea that would have been unthinkable twenty-five years earlier.

By February 1912, the city established the Boston Consumptives Hospital, a branch of Boston City Hospital, providing outpatient services with follow-up support by a team of twenty-five visiting nurses. This hospital also offered 150 beds for advanced cases and 50 cottage beds for advanced ambulatory cases. It had three pavilions for scarlet fever, diphtheria, and measles with 125 beds in each of the scarlet fever and diphtheria pavilions and 60 beds in the measles pavilion. Patients were sent there by attending physicians or by the health department when home isolation was deemed unsatisfactory.³³

One of the strongest rationales for public investment in isolation hospitals was not merely to save lives but reduce their economic impact on the community. Workers and children deemed free of tuberculosis could return to work and resume school. Despite their importance, the state board of health had a great deal of difficulty convincing towns and cities to invest in isolation hospitals when many faced much greater challenges with installing sewage treatment systems.³⁴ Public health policy was in its infancy and exposure to tuberculosis was perceived less of a risk than not treating raw sewage and providing potable drinking water. Even when towns were willing to invest in isolation hospitals, most municipal attorneys took a dim view of quarantine.

Forcible restraint of “incorrigible consumptives” was considered unacceptable, since it would make local boards of health vulnerable to potential litigation.³⁵

In contrast, Boston actively enforced quarantine against incorrigible consumptives using twelve police officers who worked directly for the health department.³⁶ Incorrigible consumptives were considered a public health risk, and their behavior, like that of a prisoner, was punished by forced isolation from family and friends. Home care was ruled out as an option for such patients if they refused to comply with isolation standards. In such cases, the health department removed them to an isolation hospital, an event that occurred twenty-five times in 1910; twenty-four times in 1911; and thirty-one times in 1912. In instances where forcible removal was challenged, it was upheld in court.³⁷

Inadequate hospital space was not the only issue. Residents of the Commonwealth were generally not well educated on the causes, preventive measures, and cures for tuberculosis. To address that need, in 1912, the state board of health released a pamphlet titled “The Control of Tuberculosis,” which emphasized the importance of personal hygiene in combating this disease. It identified numerous actions individuals could take to protect themselves, including (1) not spitting; (2) using a handkerchief when coughing or sneezing; (3) keeping ones clothing clean; (4) never using the bedding or clothing of a person who has contracted tuberculosis; (5) using wet methods in place of dry sweeping; (6) avoidance of restaurants where spitting is permitted and flies are in abundance; (7) taking care in the preparation of food that is uncooked; and (8) making sure the hands, mouth, teeth, and nails are cleaned often and thoroughly.³⁸ While laudable in their own right, these self-help initiatives would not be enough. Massive municipal investments in isolation hospitals and improved sanitation were still required in a city where tuberculosis remained the number one cause of death.

In 1913, the state board of health initiated an epidemiological investigation to determine the causative factors and the magnitude and severity of tuberculosis within the Commonwealth. State inspectors found a wide range of contributing causes, including lack of public sewers, inadequate public water supplies, improper disinfection of contaminated homes, and lack of nursing support. Among these factors, contaminated public water supplies was considered the chief culprit for the large incidence of tuberculosis cases in Massachusetts.³⁹ Today, tuberculosis causes some 10 million deaths worldwide each year with a global case fatality rate of 15 percent, down from a rate of 23 percent in 1999.⁴⁰ An estimated 1.7 billion people are infected with this disease.⁴¹ It remains one of the few diseases that still requires isolation or quarantine to minimize transmission to the uninfected.

Even though an antibiotic for tuberculosis was many years away, the Boston Health Department made remarkable efforts to control its spread. By

1940, only 456 persons died from tuberculosis. In the space of thirty-two years, the city had reduced tuberculosis deaths by 65 percent compared to 1908 (the first full year of mandatory reporting) when 1,317 persons died from this disease. This achievement could not have occurred without the Health Department's isolation hospitals. Yet, hospitals played a small role in the eventual decline of tuberculosis. The sheer number of cases throughout the city precluded hospital care for everyone, and this ubiquitous deficiency paved the way for a more accepting attitude toward contagious disease wards.⁴²

Perhaps more important than public acceptance of isolation hospitals was the remarkable transformation brought about by antibiotics. Unlike earlier epochs, antibiotics have altered the way isolation practices are applied. After World War II, the state authorized the release of tuberculosis patients from isolation as long as they remained on antibiotics. Quarantine in this context would not be circumscribed by the incubation period for tuberculosis but by the discipline of the patient in taking his antibiotics. Quarantine evolved from a form of medical isolation to a contract between the doctor and the patient. The patient could be free from isolation on condition that an antibiotic regime was followed religiously. This altered the fundamental basis of quarantine authority long practiced in Boston Harbor. It would now only be an option for the recalcitrant patient. All other patients who behaved properly (i.e., taking their medicines or posing a minimal risk for noncompliance) could escape hospital confinement. Tying quarantine to pharmaceutical or physician-mediated solutions also defused patients' fear of confinement. It was in the physician's interest to intercede on behalf of his patient, since a solution that relied on quarantine in lieu of a pharmaceutical intervention divested him of his ability to make independent decisions. Quarantine was a tool that could not be applied without government authorization. In the post–World War I era, the suggestions of physicians were aimed at divesting quarantine of its most dreaded features—enabling them to influence and limit its application to the most extreme cases of willful superspreaders.

Quarantine Fiefdoms

The emergence of tuberculosis wards added another layer of isolation hospitals to the wide range of disease-specific quarantine practices in Boston. The proliferation of knowledge concerning the communicability of numerous diseases ushered in a potpourri of local control efforts fragmented by the existence of multiple agencies responsible for addressing these ills. The Health Department was responsible for quarantine but the Boston City Hospital also claimed jurisdiction over treating cases of communicable disease. Their authority had been granted in the hospital's charter approved by the city council during the Civil War. The medical profession lobbied for a role as

well, emphasizing the importance of home care and the role they could play in managing contagious cases through home isolation. Specialized types of isolation also emerged for contagious disease in school systems, isolation hospitals for tuberculosis, and for leprosy.⁴³

Within fifty years of Boston becoming a city, the authority to quarantine had begun to divide into separate responsibilities depending upon whether the infected person arrived by boat, was a poor person, a student, a carrier of tuberculosis, or had a loathsome disease such as leprosy or syphilis. A range of subtle but very distinct gradations of isolation applied to the victims of communicable disease based on its loathsome character of their disease, its lethality, presumed contagiousness, the victim's place of origin, income level, and exposure. Quarantine had metastasized into numerous isolation and disease control strategies, reflecting medical knowledge of disease transmission and public demand for government intervention. The age of bacteriology profoundly altered quarantine. On the one hand, bacteriology brought greater attention to the role of microbial pathways in disease transmission. On the other hand, the increased scientific knowledge of disease contributed to a greater public acceptance and belief in government's ability to control disease through prevention, sanitation, and nonquarantine interventions. Isolation hospitals were an example of how the science of disease transmission was revolutionizing quarantine practice. Similarly, school inspections, bacteriological laboratories, and mandatory vaccination programs grew out of an increasing public awareness that diseases could be controlled. The standard-bearers of the new science did not come from the old crowd of miasma theorists. The public health innovators came from the frontlines of those fighting epidemic disease at the quarantine station and its contagious disease wards.

CHAPTER TWENTY-ONE

The End of Boston's Maritime Quarantine Department

With the exception of the smallpox epidemic of 1901, the Boston quarantine establishment had stayed below the radar for over fifteen years. It maintained a large crew of boatmen, quarantine station attendants, and physicians that exceeded twenty employees during its peak years. Yet, few Bostonians ever boarded a quarantine vessel and had little stake in the activities on Gallop's Island. By this time, there were a wide variety of specialized hospitals for tuberculosis (the Boston Hospital for Consumptives established in 1906)¹ and special wards of Boston City Hospital for highly contagious diseases (August 31, 1895)² that made it virtually certain few, if any, Bostonians would be exiled to Gallop's Island. But victims of certain exotic diseases continued to be exiled to the island's quarantine services. After the 1893 cholera outbreak, Boston supported the federal government's medical inspection of immigrants and foreign vessels. As long as maritime quarantine did not create any additional costs, Boston's politicians seemed content to leave "well enough" alone. In nonepidemic years, these positions were the ultimate in the spoils of patronage: invisible positions that gave power to Boston's mayors without the fear of public scrutiny. The costs of island quarantine had remained hidden and relatively stable from year to year.³

The birth of isolation hospitals took place at a time where the public expected improved services, more efficient government, and greater regulation of the corrupt practices of big business. The business practices of the private sector affected local government, since many of its services were contracted out. Public revelations of corrupt behavior by large corporations was not the only public concern. Ward politicians were also getting media attention for excessive spending and cronyism and the misuse of their authority to staff municipal departments with their political supporters.

By 1907, the Boston patronage system had created bloated expenditures for inefficiently provided municipal services. As a result of these practices including mismanaged municipal contracts and a political system that favored expenditures for major public works projects, for the first time in the city's history, there was a sizable deficit. Simply put, the city was spending far more than it was appropriating.⁴ This local embarrassment became a national scandal in the spring of 1908 when President Theodore Roosevelt called attention to the collusive practices of big businesses that raised the cost of municipal services provided to the average American. In his April address to the Senate and House of Representatives, he pointed out that Nathan Matthews, chairman of the Boston Finance Commission, identified "evil practices" of various corporations doing business with the city. Roosevelt had made a cause of regulating greedy corporations operating as if the interests of the public were subservient to those of unfettered capitalism. The municipal corruption found in Boston caught his attention because it resonated with his passion to subdue powerful corporations that were riding roughshod over the interests of the average person.⁵

The heightened public attention to Boston's fiscal crisis and the suggestion that its municipal government was inept came as a crushing blow to Mayor John Fitzgerald. After all, he was the mayor who had sought to reform the city government by creating the Boston Finance Commission in 1907.⁶ He was the grandfather of future president John F. Kennedy and the first Progressive Era mayor under the new city charter. Known as "Honey Fitz" to his constituents, Mayor Fitzgerald was himself a victim of a political system that rewarded inefficiently managed government services and gave too much authority to an unwieldy eighty-seven-member city council. Roosevelt's focus on the control of corporate greed and Boston's storied mismanagement of its municipal budget brought the General Court's involvement in the city's financing and led to a legislative review of its charter. Boston's municipal expenditures were out of control. Within twenty years, the city's annual expenditures had increased from \$16 million in 1886–1887 to \$32.7 million in 1906–1907. During that same period, debt grew from \$46.8 million to \$101 million.⁷ Municipal departments, especially the street, sanitation, and sewer departments, were bloated with patronage filled positions and contracts let with minimal oversight or cost controls.⁸ While the Boston Finance Commission's final report identified numerous improvements to city administration, it did not focus on the quarantine department. Nonetheless, it was clear mismanaged budgets, contracts, and personnel were pervasive within the Fitzgerald Administration.

State oversight of Boston's municipal budget created a witch hunt mentality, with the Boston Finance Commission closely scrutinizing expenditures for every city department. It was given considerable authority to investigate and compel testimony from business and government leaders and determine the causes of the city's financial crisis. The commission's findings and recommendations would also lead to the complete overhaul of the city charter and the replacement

of the ward-based, eighty-seven-member bicameral city council with a single chamber of nine members elected at large.⁹ Under the new regime, power shifted to the executive branch with greater emphasis placed on appointed experts to head municipal departments. This transition in authority also institutionalized the role of the Boston Finance Commission as a permanent administrative oversight board appointed by the governor. These dramatic changes were strongly supported by the General Court reflecting the prevailing public interest in good government that emerged under the Roosevelt Administration.

With increasing federal government oversight of maritime quarantine and sanitation including the president's ratification of the International Sanitary Convention of 1903 and limited local government support for quarantine, it was only a matter of time before the Finance Commission took a magnifying glass to quarantine administration.

The Vigilant Controversy: The Boat That Sunk Quarantine

The Boston quarantine establishment was not immune to the effects of the probing investigations of the Finance Commission. The first sign that something was wrong with maritime quarantine did not come by edict of the federal government or even as a result of ineffective medical inspections conducted on vessels anchored near Gallop's Island. It came in the form of a decrepit quarantine tug that appeared to require an extensive overhaul to continue in operation. After over twenty years of service, the boats serving Gallop's Island began to show wear and tear. Mayor John Fitzgerald recognized the need to overhaul these boats, although he had an enormous responsibility for balancing the budget and reducing years of profligate spending by the previous bicameral city council. Boston's government was in a state of crisis and Progressive Era groups such as the Good Government Association demanded fiscal responsibility.¹⁰

In response to these pressing concerns, on June 26, 1911, he requested the city council to provide a loan of \$48,000 for the construction of a new steamboat to take the place of the *Vigilant*. This steamboat had been purchased in the spring of 1886 at a cost of \$17,500, but after twenty-five years of service, repairs were needed. It was time for a new ship capable of handling larger numbers of passengers and meeting modern standards of convenience. To the mayor this was a very straightforward request and he saw no reason why it would not be granted. In 1909, the new city charter gave him sole responsibility to prepare budgets and this request fell within his routine responsibility.¹¹ The mayor suggested a new boat be paid with the reserve funds and requested the city auditor transfer these funds, a decision fully supported by the health department. However, when the request was brought before the city council on July 7, 1911, it was defeated because some council members believed a loan should be used to cover the costs for a new boat—not a direct allocation of funds. Ten days later, the city council

reconsidered this request but the motion failed. This impasse might have seemed like the inevitable give and take of Boston politics. Its long-term impact on the quarantine program would be lethal even though this would not be immediately apparent.

The following month, the Finance Commission brought in a boat expert to evaluate the need for another boat. The expert, Guy C. Emerson, a consulting engineer, concluded the *Vigilant* was in excellent condition for a boat of its age and only needed about \$8,000 in repairs—not \$48,000 for a brand new boat. Mayor Fitzgerald was not pleased at this turn of events. On August 16, he replied back to the Finance Commission that he had commissioned an inspection of the boat prepared by Frederic H. Fay, division engineer of the Bridge and Ferry Division, who concluded the boat was in poor condition. To move beyond this impasse the mayor volunteered to get an outside opinion to put an end to the political bickering. On September 11, he submitted a new request to the city council, this time attaching a report from James Donald, a naval architect. Donald's credentials seemed impeccable—twenty-five years of experience including work for Fore River Shipbuilding Company, a firm that had built two Argentine battleships and worked for the New York Ship Building Company, one of the largest of the American shipyards. His assessment of the *Vigilant* showed the old boat was so decayed that deck planking could be removed with one's own fingers, the boiler was supported by rotten wood, and the deck coaming failed to prevent water from washing into the deckhouse.¹²

Donald's report also showed the *Vigilant* was out of compliance with American navigation laws. Even though the *Vigilant* was built before the prevailing Navigation Law of 1895, Donald encouraged the city to provide suitable accommodations for the captain. In place of the five foot nine-inch ceilings on the *Vigilant*, Donald recommended seven-foot ceilings to conform to current standards.¹³ However, he concluded the boat was in such poor condition it should be replaced by an updated vessel of larger dimensions. It was estimated a replacement vessel would cost \$48,000. The Executive Committee accepted the report, adopted the recommendations, and sent them to the Finance Commission for consideration.

Unfortunately, because of the city's fiscal crisis, the General Court maintained fiscal oversight over Boston's budget. No expenditure could be authorized unless approved by the state-appointed members of the Finance Commission. On October 25, John A. Sullivan, chairman of the Finance Commission, countered the mayor's technical expert with an updated report prepared by Guy C. Emerson. Emerson dismissed Donald's claim a new boat was needed. He contended no evidence was presented to refute his position that \$8,000 was sufficient to repair the *Vigilant*.¹⁴ The Finance Commission's expert had the last word.

This *tête-à-tête* essentially stalled the entire effort for over nine months and transformed the administrative task of repairing or replacing the *Vigilant*

into a political debate over the future of quarantine services. By the summer of 1912, the city council earnestly considered turning its quarantine station over to the federal government. On the surface, the argument was purely economic in scope. Why should Boston be the last city to fund quarantine service for immigrants coming to America? With the exception of Baltimore and New York, which used state funds to support its quarantine services, all other American ports were operating under the aegis of the U.S. Public Health Service (USPHS).¹⁵

On June 3, 1912, Councilman Smith requested the Chamber of Commerce be allowed to review the feasibility of turning Boston's quarantine service over to the federal government. Three weeks later, the secretary of the board of health requested a \$13,000 allocation from the mayor to repair the *Vigilant* in the event the city should be visited with epidemic disease that summer. This request was approved and submitted to the Finance Commission for action. The actual bids for repairing the *Vigilant* exceeded the proposed budget. But of greater consequence, more important issues were being raised.

Councilman Smith asked whether the city wouldn't be wasting monies allocated for fixing the *Vigilant* if it could turn quarantine over to the U.S. government. These contentious arguments surfaced in public meetings of the city council on June 23, 1912. Smith knew there had been a sharp difference of opinion between the mayor and the Finance Commission concerning the repair or replacement of the old boat.¹⁶ His inquisitive mind and penchant for tightfisted budgeting kept the debate on the federal takeover alive during the summer of 1912. It would take several years before the city could untangle the philosophical debate that emerged over the bow of the *Vigilant*.

Sale of Quarantine Station

During the next two years, the Chamber of Commerce was requested to submit testimony concerning a federal takeover of Boston's quarantine establishment. The issue came to a head in the spring of 1914 when the new Mayor James M. Curley submitted a proposed ordinance to abolish the quarantine service and transfer it to the U.S. government.

Curley was one of the most powerful mayors in Boston's history. He took office in January 1914 by disassociating himself from the machine politics of the time. Not beholden to ward bosses for his election victory, he was intent on making his own mark on Boston politics. Curley was a self-made man with a powerful appetite for the stage. Yet, he also knew how to appeal to the sensibilities of the average person, particularly those of Irish descent. Having disagreed with Fitzgerald's quarantine maintenance program, he wasted no time in working behind the scenes to sell Gallop's Island.

His antipathy to quarantine was in part personal. He opposed the policies of Fitzgerald even if he might have derived benefit by filling the quarantine department with his own cronies. In public speeches, he claimed Fitzgerald had left the city penniless. Finding ways to revitalize the city had to start with some belt tightening. On March 23, Curley indicated the transfer of the quarantine station would not only save \$40,000 a year but would make possible uniformity of supervision, uniformity of control, and uniformity of treatment of quarantine and commercial matters. The mayor was fully intent upon making this transition and he brought in representatives from the USPHS to convince the city council quarantine could be better maintained under their supervision. In an unprecedented move, Curley invited Dr. Leland Cofer, assistant U.S. surgeon general to directly address the city council in its own chambers.¹⁷ Such access to Boston officials had never been authorized before. This special access to power allowed Cofer to confirm the mayor's views: "What we want to establish through a transfer of this sort is uniformity. By uniformity we get economy of administration. We believe that all matter that have to do with maritime commerce should as far as possible come under government control; that is to say questions relating to entrance of vessels to the United States from foreign countries."¹⁸

Despite Cofer's assertion that the USPHS offered uniform standards and economic administration of quarantine, this was more ideology than reality. The agency was desperately attempting to standardize medical inspection procedures, determine safe and effective fumigation strategies, and impose standard sanitation strategies such as rat guarding at each American quarantine station. Dr. Rupert Blue, the nation's surgeon general was intent on creating a national quarantine network and could ill afford to have his staff sound like Washington bureaucrats. His strategy was to instruct his staff to placate state and local government officials whatever the cost and concessions that might be needed.

Cofer's scripted ten-minute speech, following on the heels of Curley's endorsement of the federal takeover, signaled the beginning of the end of Boston's long history of island quarantine. Taking their cue from Curley, the city council recognized the financial advantages of the takeover but gave play to opposing views from the Chamber of Commerce and other business interests.¹⁹ It also considered the financial implications of the property transfer and the treatment of smallpox patients originating from Boston proper. None of these considerations seem to have altered their determination to relinquish control over quarantine services.

The Chamber of Commerce pointed out a transfer of quarantine services to the federal government would make the city vulnerable during a future epidemic. They also felt the city would be unable to care for patients from Boston if the city hospitals faced an epidemic like that of 1872. Indeed, the chamber's fifteen-member Committee on Maritime Affairs argued half of the

expense for Gallop's Island were for quarantined city residents. Such costs might not be covered if the federal government assumed control of Gallop's Island.²⁰

Blue, a keen negotiator, recognized the need to appease Boston's business and shipping interests. He promised shippers services comparable if not better than those previously offered and committed to extensive improvements to Gallop's Island hospitals and sleeping quarters so the city could handle epidemics that might create caseload impacts three times greater than any previously experienced. In short, Blue was a shameless appeaser of business interests as long as such concessions opened the door for a federal takeover of the quarantine station. He knew his promises would be difficult to keep, since the quarantine station pandered to the status-based demands of rich travelers and the USPHS could not continue such services.²¹ Boston had exempted first-class passengers from the routine medical inspections applied to the steerage class. Under a federal program such distinctions would not be tolerated. Blue chose to deflect attention away from this explosive issue. Boston's elite and its merchant class would have fought the federal takeover if it had been revealed the USPHS would apply quarantine and medical inspections without favoritism to class or social status of the traveler. Blue swept this issue under the rug until he could complete the essential transfer of property to the federal government.

The Chamber of Commerce did not defeat Curley's sale of Gallop's Island but it did influence the final agreement. On December 21, 1914, Curley requested the Boston City Council to approve the sale provided residents would continue to be received there whenever necessary.²² This stipulation was a concession to businessmen who were concerned that local epidemics still required a fail-safe strategy built upon island quarantine. After considerable discussion, the city council agreed to lease Gallop's Island to the federal government for \$1 pending an assessment to provide a basis for a mutually agreeable price.²³ The City also established minimum considerations that would have to be met before the real estate transaction could be consummated: island treatment of smallpox patients and other Bostonians suffering from contagious diseases; reimbursing the federal government when quarantine services were required for city residents; hiring existing Boston quarantine staff as employees of the USPHS; and round-the-clock service consistent with current Boston quarantine regulations.

After months of backroom negotiations, public meetings, and extensive news coverage, Curley leased Gallop's Island to the U.S. government effective June 1, 1915.²⁴ It was only fitting that an Irish mayor should preside over the denouement of the quarantine station. The Irish were the one ethnic group most victimized by nineteenth-century quarantines. Conservative, upper-class Boston Brahmins had authorized the most horrific island quarantines in Boston's history a mere sixty-five years earlier. In contrast,

Curley was a people's politician and his affiliations were clearly with his Irish wards. Above all other considerations, he represented their social, public health, and economic needs. As a practical and fiscal-minded Irish politician, Curley knew what his constituents needed. As one Boston Brahmin, said "God help the rich now that Curley is mayor. The poor, after all, can beg."²⁵ Slicing quarantine out of the city budget allowed the mayor to use such funds to create public works programs and dole out jobs to the needy. For Curley, there was no downside to the loss of the city's ancient quarantine program. Boston's downtrodden classes could not have thought twice about keeping Gallop's Island as a municipal service. Curley knew the importance of focusing on the needs of the people and made every effort to find jobs for those quarantine staff displaced by the federal takeover.²⁶

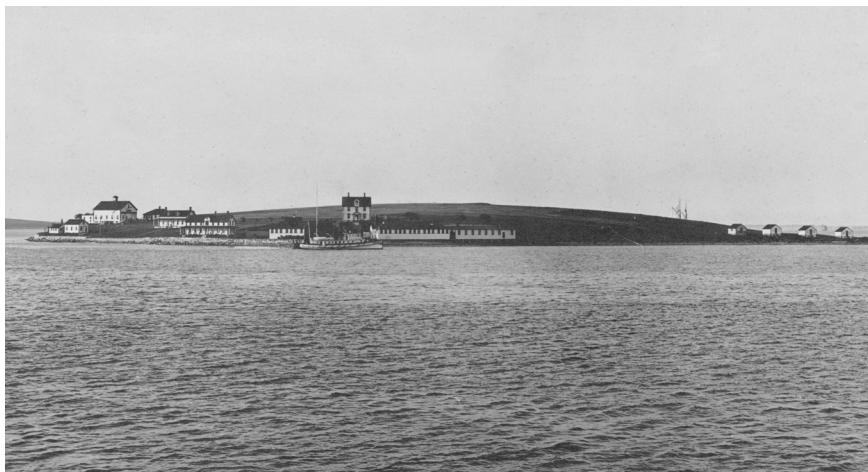
Rupert Blue was delighted with Curley's decision. Indeed, for the USPHS this was a decisive moment in the agency's long quest to assume complete control of the nation's port quarantine program. The surgeon general knew Boston was more than one more port city under federal jurisdiction. It represented the most important addition to the federal quarantine network since President McKinley took office. Blue lost no time in using this historic event to influence the governors of New York, Texas, and Pennsylvania to make similar decisions.²⁷ The surgeon general saw the fall of Boston as the critical domino that would consolidate agency control over the national quarantine program. What the USPHS had not been able to achieve through legislation would now be achieved through the power of the federal purse strings. Blue's efforts to expand the power and reach of the USPHS coincided with one of the greatest periods of expansion in the federal government that began after World War I, in which law enforcement, immigration, agriculture, and public works improvements increased dramatically reflecting the nation's growing demand for federal government services that emerged out of the Progressive Era.²⁸

Blue immediately assigned his staff to manage the Gallop's Island quarantine station. However, sale of the island and its many buildings was delayed until the city and the federal government completed appraisals and agreed on a fair market price. On November 13, 1916, Boston sold Gallop's Island for \$150,000.²⁹ In turn, the U.S. Treasury, the caretaker for the USPHS function, agreed to treat Bostonians with contagious diseases on Gallop's Island for \$1 per day provided the city furnished nurses whenever epidemic conditions existed.³⁰ It was believed this agreement would ensure the city was prepared for future epidemics of smallpox. Blue's hollow promises cemented the real estate transactions but did little for Boston in the long run. This unenforceable agreement would become a contentious issue some twenty years later.

The end of Boston's quarantine service did not limit the city's access to Gallop's Island. These services remained available, but city taxpayers would no longer be responsible for quarantine or the health of immigrants, which now became a national responsibility. The massive European migration of 71,047 immigrants to America in 1913, just prior to World War I, coupled with a mounting city debt was enough to convince ward politicians they had no dog in the fight against maritime-generated infection and underscored the need to cede power to the USPHS.³¹ There was little doubt the federal government was a more suitable gatekeeper for diseases imported from foreign ports. Traditionally, these burdens had been assumed by the provincial government in colonial times, by the Commonwealth in the early days of the Republic, and, finally, by the city of Boston after it took control of Deer Island and Gallop's Island during the latter half of the nineteenth century.

Curley believed a federal quarantine program was also in the best interest of the shipping industry. Even if the USPHS had not yet created a "uniform quarantine program," it had the ability to tighten the rein on America's port cities and create a national epidemic intelligence service. The USPHS was already providing standard services in fifty-four American port cities and overseas inspections in thirty-eight foreign and insular ports.³² City officials could not hope to achieve an integrated national response to maritime quarantine on their own or even as a subordinate partner within this national system. For Curley, the sale of the quarantine establishment reduced debt and gained valuable concessions from the federal government. The health of the city would not be endangered as Boston City Hospital was capable of managing most small-scale communicable disease outbreaks. In the event these resources proved inadequate, the agreement with the federal government provided surge capacity on Gallop's Island.

Three major factors contributed to the federal takeover of the quarantine program: the surge in immigration, the recognition that only the federal government was capable of providing uniform and consistent quarantine services, and the changing public health priorities in Boston. Immigrants did tax local resources but, to local businessmen, the more persuasive factor was that a federal takeover allowed for consistency and uniformity of services. Curley was convinced Blue would not only meet current maritime quarantine needs but expand quarantine services in anticipation of major cholera and plague outbreaks associated with the unsanitary conditions emerging from World War I. Blue promised major investments in quarantine infrastructure to placate city and state officials and contended that in a world at war the federal government was best suited to coordinate needed resources. Blue gave his word that the USPHS would meet Boston's needs, and there seemed to be little reason to believe it would not be able to meet its half of the bargain.



A view of Gallop's Island Quarantine Station in Boston Harbor. The building with two chimneys in the center of the photo is the surgeon's residence. The four buildings on the far right are "tent buildings" used to handle surge capacity. July 1915. (National Archives)



The Vigilant was the transport vessel responsible for taking patients from downtown Boston to Gallop's Island. The fight over its repair changed the course of state maritime quarantine programs in America. July 1915. (National Archives)



A westward view of the quarantine station, as would be viewed by arriving immigrants, including the disease hospital in the center. July 1915. (National Archives)



The wharf on Gallop's Island. Over the period 1867–1945, this wharf was repaired and replaced numerous times as a result of the damages inflicted by winter storms. July 1915. (National Archives)



The Gallop's Island wharf where quarantine boats docked, supplies were received, and coal was stored. July 1915. (National Archives)



In the 1890s, Boston invested in sterilization equipment and bath facilities for arriving immigrants. Under the direction of Boston's mayor Matthews, sterilization equipment was modernized. July 1915. (National Archives)



The bathhouse was designed to clean large numbers of immigrants or foreign sailors before arrival at Boston docks. Prior to its construction, the city had two or three washtubs to handle disinfection. July 1915. (National Archives)



A close-up of the disease hospital on Gallop's Island, as one would see it coming from Boston by tug. July 1915. (National Archives)



The women's detention barracks on Gallop's Island. In the background is the surgeon's residence. July 1915. (National Archives)



The mess hall. Even after the U.S. Public Health Service leased out the island to the Coast Guard in 1939, it reserved the right to use this building for emergency use in the event a large number of people required quarantine. July 1915. (National Archives)



The surgeon's residence located on Gallop's Island. U.S. Public Health Service surgeons resided on Gallop's Island following federal takeover of the island on June 1, 1915. July 1915. (National Archives)



The carpenter and paint shop on Gallop's Island. For many years immediately following the Civil War, prisoners held on nearby Deer Island performed much of the work done on the island. July 1915. (National Archives)



The Gallop's Island horse stable. Boston expected the quarantine island to be self-sufficient. Farming was conducted on the island, and horses moved produce and people. (National Archives)



Tent houses were temporary shelters used to separate infected passengers by class of disease. By the early 1920s, these buildings were in deplorable condition and were eventually torn down. July 1915. (National Archives)

CHAPTER TWENTY-TWO

Quarantine under U.S. Public Health Service

There is little doubt Rupert Blue was building a quarantine empire and Boston was the keystone in the nation's maritime disease intelligence service. To prove his commitment, Blue embarked on a major hospital and disinfection plant building program founded on fear.¹ The specter of epidemic disease was raised time and again as the driving force for an expansion of quarantine services. However, unlike previous building plans on Gallop's Island, federal investments focused on new priorities that linked immigration issues with the needs of the national shipping industry and constrained quarantine principles to management strategies within the sphere of federal control even when such strategies might be inimical to local or state business interests.

Slowly and subtly, Gallop's Island shifted to a federally managed autonomous quarantine program. Decisions previously authorized by the city council were now handled by bureaucrats in Washington, DC. Yet, no one seemed to mind as the federal takeover took place during a period of rapid expansion of hospital services in the Boston area. In the space of twenty years ending in 1910, metropolitan Boston's hospital beds increased by 79 percent.² With such improved bed capacity, the U.S. Public Health Service (USPHS) was not under pressure to address quarantinable disease prevalent in Boston. Quarantine authority was divided between the city's public hospitals and the maritime quarantine branch of USPHS. The federal government took control of contagious immigrants and the city's hospitals assumed responsibility for all other cases.

Grubbs and Gallop's Island

When the USPHS took charge of Gallop's Island it promised to cede authority to its quarantine station physicians as a concession to the Boston Chamber of Commerce. Shipping companies were concerned a federal bureaucrat taking orders from officials in Washington, DC, would be unresponsive to their scheduling needs.³ The shipping industry agreed to a federal takeover provided the requisite services—speedy inspections and round-the-clock response times—they had come to expect under the patronizing approach of the Boston Health Department remained. They expanded the quarantine station on Gallop's Island as payoff for the chamber's support of the federal takeover.⁴

For the next thirty years, the USPHS assigned various acting assistant surgeons to live on Gallop's Island. Forty-four-year-old Samuel B. Grubbs was the first surgeon in charge and his mandate was to renovate the island's facilities as Blue had promised. Grubbs arrived in Boston May 28, 1915, and reported to Mayor Curley the following day. Wasting no time he took charge of the station on June 1.⁵ He was a man of deep religious beliefs, a good student of character, and one of the most experienced and senior surgeons in the USPHS. Blue certainly needed his medical and diplomatic skills to contend with Curley and the Boston medical establishment. Despite his hectic schedule, he found time to teach a course on maritime quarantine to public health officers at the Harvard School of Public Health.⁶

Grubb's responsibilities were not for the faint of heart. His staff processed 69,365 passengers the previous year, although only 1,000 steerage passengers could be housed on Gallop's Island during the summer months. Lack of housing was Grubb's most immediate challenge even though he also needed new equipment for fumigation and disinfection, a laboratory, and better baths.⁷ Preparing for refugees arriving from European war zones meant having adequate surge capacity for possible epidemic conditions. The chief concern was the importation of cholera, typhus fever, and plague with the greatest threat posed by typhus fever.

When Grubbs first arrived, disinfection procedures were relatively crude. Working with the tools at hand, he vigilantly enforced delousing by separating passengers by sex. He then required each passenger to disrobe and be sprayed with a solution of one part soap, four parts water, and four parts gasoline, diluted with five parts of hot water. They were then made to pass through a shower bath fifteen feet long in which water stood twenty inches deep, which was the only means of reaching the bath house exit.⁸ While this disinfection strategy was a relic of the Boston Health Department, Blue had promised the shipping industry capital investments would be made to improve the station, and Grubbs did his best to deliver on this promise. However, not all of his promises would be met, notably, local autonomy for the quarantine station.

Maritime quarantine was enormously costly even though federal resources were limited to inspecting arriving immigrants. During and immediately

after World War I, Boston was overrun with over 200,000 immigrants seeking political asylum, the hope for a better life in America, or a reprieve from war and famine.⁹ To process and inspect these immigrants, Grubbs created a mega-scale quarantine operation on Gallop's Island. Within the first year of his takeover, he had two acting assistant surgeons, one pharmacist, seven attendants onshore, and seven on the quarantine steamer *Vigilant*. It was a small empire including one office building that also served as a dining room and kitchen for the staff; two barracks with standee bunks accommodating six hundred; a kitchen and dining room for steerage passengers; a bathhouse; two hospitals of four wards each; two storehouses and a barn.¹⁰

His staff barely kept up as medical inspections were expanded to cover alien seamen as required by a 1916 Act of Congress.¹¹ If that new workload was not enough, during the postwar years, a flood of immigrants made Boston the second busiest port in America, with 109,442 passengers inspected in 1924 alone.¹² These new responsibilities prompted the USPHS to reorganize its services to expedite the physical examination of all alien seamen and passengers but delayed merging the work of immigration inspectors until March 7, 1928.¹³ The USPHS made the historic decision to relocate medical examinations of steerage and tourist passengers previously occurring aboard ship to onshore.¹⁴ With these expanded duties, five positions were created, including two new positions on the steamer *Vigilant* and three at the station.¹⁵

On August 7, 1917, Grubbs was relieved of his position and replaced by Surgeon Donald H. Currie, a forty-one-year-old medical prodigy who had previously served as director of the Molokai Leprosy station in Hawaii and was considered one of the nation's leprosy experts.¹⁶ Currie was one of the brightest surgeons USPHS had ever known and he quickly set out to make further facility improvements, contributing to the construction of eight new buildings with occupancy slated by the winter of 1917 within his first year of service. Over the course of his life, he improved and expanded the quarantine station with accommodations for a hundred hospital patients and barracks capable of detaining thirteen hundred passengers.¹⁷

Experimentation upon Navy Volunteers

Desperate times trigger desperate measures and the arrival of the Spanish flu in Boston would be a case in point. Hundreds of Boston residents contracted Spanish flu during the months of August through October 1918. The morbidity of this fast spreading disease was unlike any normal flu ever seen. Surgeon General Blue rejected quarantine as an ineffectual approach to the flu,¹⁸ but recommended social distancing strategies such as curfews, reduced travel, and canceling meetings at places of assembly that served to spread the disease.¹⁹ Blue was searching for the causative agent of Spanish flu as thousands of Americans were dying of a highly infectious disease that left its victims writhing in pain, gasping for breath, and turning blue from lack of

oxygen.²⁰ There was no treatment available and this worried Blue. He and his quarantine station physicians across the nation knew very little about the etiology of this novel virus. He knew it was critical to learn as much about its mode of transmission before the pandemic ran its course. Like previous human experimentation on Boston Harbor islands, Blue was willing to risk human life for scientific advancement.

Under Blue's orders, the USPHS undertook a series of extensive experiments on Navy enlisted men during the height of the 1918 pandemic.²¹ Blue authorized Currie and a team of doctors and scientists to initiate a series of tests on sixty-two Navy volunteers ranging in age from fifteen to thirty-four based on their relative susceptibility to the flu. Could the flu be transmitted from those already infected to those who had never been previously exposed?²² The experiments were designed to determine if secretions of infected service men introduced into the nose, throat, and eyes—or as a direct injection into the blood system of healthy volunteers—could cause disease. Currie quarantined the volunteers on Gallop's Island for a six-week period starting on November 5, 1918, but his experiment was abruptly terminated on December 23, 1918, after he died of influenza.²³ The official report, titled "Experiments upon Volunteers to Determine the Cause and Mode of Spread of Influenza, Boston, November and December 1918" never suggested Currie died as a result of the government experimentation, gruesome details behind his death that the USPHS tried to hide. However, the termination of the experiment, coincident with his death, suggests something may have gone wrong.²⁴ Surprisingly, the sixty-two volunteers exposed to the flu never came down with any symptoms conclusively linked to Spanish flu. Several volunteers became sick from inhaling the aerosolized secretions of flu-infected service men. However, researchers could not rule out other diseases as the cause of their sickness. Prior immunity to the flu and ill-conceived methods of transmitting the virus between the sick and the conscripted sailors may also have contributed to the experiment's failure.

The USPHS carried out a similar experiment on Angel's Island in San Francisco Bay during the same period with similarly inconclusive results.²⁵ After a two-month hiatus, the USPHS recommenced its experimentation on Gallop's Island. This time forty-three additional volunteers were conscripted driven in special vehicles to the Portsmouth, New Hampshire Navy prison where they were directly exposed to the secretions and coughing of Navy prisoners experiencing the peak symptoms of the flu. They were then driven back to Boston and ferried to Gallop's Island on the steamer *Vigilant*.²⁶ Several cases of tonsillitis were manifested but only two apparent cases of influenza emerged from the experiment, leading scientists to conclude that influenza was quite difficult to transmit by means of the secretions of infected service men. The recipients being young male adults in a region where epidemic influenza was prevalent may have had more than an average resistance to the exposure.

Spanish Flu

Although Boston was at the epicenter of the pandemic, Gallop's Island was not used to quarantine for flu cases. Instead, the Massachusetts National Guard working with the city and the Massachusetts Department of Health established a tent hospital on Corey Hill in Brookline to care for the worst victims of the flu, including men from the training ships of the United States Shipping Board.²⁷ While Gallop's Island no longer belonged to the city—even though Blue's agreement with Mayor Curley authorized its continued use—it was far too small to handle this epidemic. Moreover, Blue's covert experimentation with flu transmission meant Gallop's Island was "off limits" for Boston's sick.

Despite the highly communicable nature of the Spanish flu, the use of quarantine was the exception rather than the rule. For various reasons, neither Blue nor the Massachusetts Department of Health advocated quarantine. Blue was indisposed to its use, in part, because of his experiences in combatting bubonic plague in San Francisco, and, in part, because it was less effective against a fast spreading disease.²⁸ From a practical perspective, Blue could not implement a meaningful quarantine strategy even if he had been disposed to do so. His agency simply did not have the resources to support such an initiative on a national scale or the authority to interfere with state-level quarantine interventions unless they posed a threat to interstate commerce and the interstate spread of disease. Nor did he know how to stop it—after all, his Gallop's Island experiment gave no evidence of how the flu was transmitted. His flawed experiment left state and local health departments no better off than tools used by purveyors of nineteenth-century quarantine.

Blue's failed medical experiment meant federal quarantines were never used in Boston—an outcome that was guaranteed by his preemption of Gallop's Island for his secret experiments on conscripted Navy men. The only quarantine imposed in Boston was the one in Brookline and military quarantines of Navy enlisted men stationed on Bumpkins Island in Boston Harbor and soldiers at Fort Devens where thousands of soldiers had contracted the flu.²⁹ These were said to be some of the few Spanish flu quarantines imposed in New England. One of the reasons for its limited use was it took enormous human effort to contain this lethal disease. Unlike previous epidemics, the Spanish flu consumed public health resources as quickly as swarms of locusts feasting on fertile cropland. Hospitals were unable to operate without sufficient nursing staff, bed space, and doctors. Desperate for medical and nursing support, Boston pleaded for help from medical professionals in nearby states.³⁰ Whatever hospitals the city had previously used were inadequate to handle the explosion in cases.

The tent city on Corey Hill, activated on September 10, was an essential element of Boston's quarantine response. The resources of the Red Cross, the National Guard, the Catholic Church, and a phalanx of medical professionals from around the country provided indispensable services during this unprecedented emergency.³¹ The epidemic eventually subsided in late October after tens of thousands of cases and thousands of deaths in the greater Boston area. No one ever could give an accurate count of the total number of cases. At the height of the epidemic, the *Boston Globe* reported, "there are so many cases without medical attendance and so many overworked physicians that probably not more than one fifth of the cases are reported."³² One fact remains certain; more Bostonians died in 1918 from Spanish flu and related diseases than died in any one year from other communicable disease in the city's history.³³ Indeed, Boston had one of the highest rates of death of any American city.³⁴

Typhus Strikes Boston Harbor

The tent city was not the only reminder that Gallop's Island was not staffed and furnished for a major epidemic. Despite vast station improvements, the USPHS was barely able to meet the medical inspection, vessel fumigation, and quarantine needs of the shipping industry. Passenger steamers had grown in size from those operating in the late nineteenth century. It was not uncommon to have over two thousand passengers onboard large steamers. While the island workforce could handle large passenger loads it was not prepared for combative or riotous crews. Crowd control was a missing element of previous quarantine programs reflecting the general docility of passengers in the face of their quarantine masters. Quarantine riots had happened in the past but usually these were cases of angry citizens destroying hospitals or quarantine stations out of fear of the contagion. Rioting passengers and crew were virtually unknown except when passengers were together long enough to act as a mob, or when seamen were singled out for cruel or unusual treatment.

The arrival of the White Star line's S.S. *Cretic* on July 13, 1920, brought an Italian vessel whose crew, unlike that of any other that had entered Boston Harbor or for that matter any other port in America, refused to comply with medical inspection protocols. Surgeon William Bryan had neither the staff nor the skills to manage civil unrest caused by this "very unruly and more or less riotous" crew. The U.S. secretary of Treasury went so far as to say that "what took place on the *Cretic* was tantamount to a mutiny."³⁵

Faced with a riotous crew, the USPHS requested the U.S. Army to restore civil order but it refused. After frantic efforts to protect government property on Gallop's Island, two U.S. Marshals arrived to quell the disturbance. The impasse was relatively simple. The crew refused to cooperate with the

delousing procedure for suspected cases of typhus. Whether they considered it illegal, or insufficient force was used to coerce them into compliance, will never be known. The Italian crew submitted to delousing, preferring that option over an open-ended quarantine.³⁶

This unfortunate chain of events reflected a broader public health problem. The Italian government did not permit sanitary supervision of its vessels prior to departure for the United States. Arguably, the Italians had legal grounds for taking such action. The International Sanitary Convention of 1912, which governed the maritime quarantine affairs of Italy and the United States, did not treat typhus as a quarantinable disease.³⁷ Despite this legal technicality, the medical profession knew typhus fever was a highly communicable disease. In 1909, Charles Nicolle, Director of the Pasteur Institute in Tunis, found typhus fever to be transmitted by lice.³⁸ His discovery had a profound effect on American quarantine programs. Steaming of infected clothing and baths for typhus carriers became the norm. Despite improved sanitary controls at ports of arrival, and the known limitations of the 1912 International Sanitary Convention, the USPHS attempted to convince the Italians of the benefits of inspecting for typhus at their ports of embarkation. Their efforts were rebuffed and as a result, without American Consular bills of health, the USPHS had no choice but to impose quarantine.³⁹ The *S.S. Cretic* incident coincided with a growing worldwide threat from typhus, the need for more sophisticated contingency plans to address crowd control and mutinies, and more flexible international sanitary conventions to address emerging diseases.

Within a year of the “*Cretic Incident*,” there was a dramatic increase in typhus cases originating from European ports. The number of cases was so large that during the months of February, March, and April of 1921, a total of 150 attendants and 25 female nurses were hired to manage the extreme case-load in Boston Harbor.⁴⁰ Despite vastly expanded quarantine facilities, this new typhus epidemic proved Gallop’s Island facilities were still incapable of housing the influx of European immigrants. Under duress, the USPHS insisted representatives of the steamship lines pay for additional temporary shelter on nearby Deer Island and Rainsford Island to handle passengers held in quarantine. Representatives of the steamship lines objected to this unfunded mandate but acquiesced to relieve the suffering of nearly two thousand passengers on board the steamer *Patricia* and almost one thousand on the steamer *Mongolia*. Departing their vessels, these immigrants were quarantined in prison cells and other substandard housing for lack of space on Gallop’s Island. The unprecedented horde of immigrants stretched USPHS resources nearly to the breaking point and made Gallop’s Island and the surrounding islands the single largest quarantine detention center on the entire eastern seaboard.⁴¹

To make matters worse, typhus-infected passengers were appearing at many quarantine stations along the eastern seaboard. Each eastern seaboard

quarantine station was normally expected to handle its own arriving passengers, whatever their health condition. Boston officials were infuriated when USPHS directed all typhus-infected ships to land in Boston with hundreds of cases that otherwise should have landed in New York. As a federal agency, the USPHS had broader issues to address than local politics when finding suitable quarantine grounds for the flood of infected immigrants. The USPHS believed an efficiently coordinated approach was necessary—even if it ruffled relations with state and local officials—and saw Gallop's Island as the most suitable facility for handling virtually every case along the eastern seaboard—despite its acknowledged capacity limitations. USPHS's plan was simple; quarantine all European vessels with typhus cases on Gallop's Island. After medical inspection and clearance from its Boston Quarantine Station hundreds of immigrants were sent to New York, their original intended destination, via train. New York health officials were incensed. The level of distrust was so great these immigrants were reexamined upon arrival at Grand Central Station as New York officials would not accept the inspections carried out in Boston—having no idea of the disinfection procedures previously applied and, in part, disgruntled with the USPHS heavy-handed mismanagement of typhus-infected vessels that created great expense for state public health officials.⁴²

Despite the diversion of hundreds of immigrants to New York, Boston was still overwhelmed with cases. In an ironic reversal of Surgeon General Blue's past promise to provide surge capacity to Boston in an epidemic, Hugh Cumming, Blue's successor, pleaded with Boston for housing assistance for all the typhus-infected passengers in Boston Harbor. Recognizing the housing emergency, Boston authorized the temporary use of its prison system on Deer Island, since it could accommodate up to a thousand passengers, and the Rainsford Island reform school added another five hundred beds. Combined the two islands could hold fifteen hundred steerage passengers or about the average number entering Boston on any given nine-hour day. While the prison and reform school expanded the island's quarantine capacity over previous eras, it still fell short of meeting worst-case conditions.⁴³ This was the second largest maritime quarantine ever imposed in Boston Harbor and illustrated the physical and political limitations of island confinement. The USPHS could not meet the housing needs of typhus carriers without aid from Boston—yet it was a poor collaborator making the epidemic more expensive than it might otherwise have been. Accommodations for thirteen hundred persons detained for a twelve-day stay in Deer Island prison cells cost the Service an additional \$27,000, or about \$392,269 in 2019 dollars.⁴⁴

Neither the USPHS nor the city had a strategic plan for managing a caseload ten times greater than any event in the previous fifty-four years. Planning for routine disease outbreaks was not difficult. The real challenge was

maintaining flexibility within the nation's quarantine network to expand medical and quarantine services at a moment's notice. As the USPHS could not provide physical infrastructure to accommodate outbreaks that might only occur once in a generation, it was imperative it maintain access to low-cost shelter and be more vigilant with medical inspections conducted at ports of embarkation. The USPHS learned a lesson in the basics of epidemic preparedness, including the need for early consultation with state and local chief elected officials.

Like previous epidemics, the typhus outbreak strengthened the resolve of the island's medical officers. So, when the next outbreak occurred, involving 373 steerage passenger, they subjected these souls to an intensive medical examination for lice—the suspected cause of transmission.⁴⁵ One of the root causes of the epidemic reflected America's limited demands for reform of international health treaties. The USPHS urged revisions to immigration legislation and began a campaign to revamp the recently signed International Sanitary Convention in which typhus quarantines were conspicuous by their absence.⁴⁶ Like previous epidemics, the USPHS fell victim to the same classic inability to plan for the unexpected.

Keeping Rats and Lice at Bay

Boston got a federal bailout after the typhus disaster of 1921, and after considerable political maneuvering by the Boston Health Department, Congress authorized \$150,000 to renovate the Gallop's Island station.⁴⁷ The barracks were expanded to house thirty-two hundred persons and two new independent bathing rooms were constructed to handle about a thousand persons.⁴⁸ These improvements, including purchase of two vessels, were completed by July 1, 1923.⁴⁹ Like so many times before, the quarantine program expanded in response to the painful lessons of past epidemics.

In that same year, Bryan established a laboratory on Gallop's Island to examine rats for plague, a major concern ever since March 1900 when the first American epidemic of bubonic plague appeared in the Chinatown section of San Francisco.⁵⁰ During ensuing years, the USPHS became extremely concerned about new outbreaks. Moreover, under the International Sanitary Convention of 1903, the United States was expected to notify member nations of any plague occurring within the United States. Such notifications required bacteriological laboratories capable of identifying *Yersinia pestis*, the bacterium responsible for plague. In compliance with treaty obligations, rat inspections began in 1923, and this work became a staple of future activity on Gallop's Island. On December 8, 1924, Surgeon George Parcher, the USPHS's sixth port physician and a graduate of Harvard Medical School, was directed to implement even more stringent plague control measures after Surgeon General Cumming declared plague-infected rats had been

found at New Orleans.⁵¹ The new requirements called for fumigation of vessels arriving from New Orleans and other plague-infected ports. Masters and commanders would now be required to use rat guards when landing in Boston.

Based on Cumming's edict and treaty obligations, in subsequent years, the USPHS became obsessed with rat eradication and the development of more effective fumigants. Its experience in New Orleans in 1915 and 1916 proved previous efforts to eradicate rats had been ineffective. For over four hundred years, quarantine stations had used sulfur dioxide as a fumigant even though there were few, if any, studies that tested its efficacy.⁵² After the New Orleans quarantine station investigated the kill rate for sulfur dioxide, they found it was no more than 50 percent effective. Learning it was inadequate, the USPHS developed alternative fumigants but their initial efforts were hampered by their toxicity. Hydrocyanic acid gas was tested at the Boston Quarantine Station during World War I and abandoned as it was as great a danger to the fumigator as it was to the rats.⁵³

Despite these setbacks during the 1920s, the USPHS continued to look for ways to improve vector control and experiment with some of the most lethal fumigants ever invented.⁵⁴ Eventually, based on trial and error and lessons learned from the use of hydrocyanic gas, the Boston Quarantine Station settled on the use of Zyklon B as the fumigant of choice.⁵⁵ Future annual reports from Gallop's Island would give rat counts from vessel fumigation to prove the success of their program. Quite ominously, the USPHS had begun to place greater emphasis on zoonotic causes of disease than transmission by humans. Riding the wave of recent bacteriological discoveries, the USPHS focused on vector control to minimize unnecessary delay to passengers in transit. Quarantine officers were working for the U.S. Treasury Department and knew full well their mission was to support not obstruct the free flow of commerce. The integration of quarantine and immigration functions facilitated an "efficiency orientation" toward disease control. In this context, fumigation was preferable to labor intensive sanitary inspections, which were, in turn, more cost effective than thorough medical inspection of all passengers. These operational factors soon made quarantine a subordinate activity of rat eradication programs.

The USPHS also made substantial efforts to educate ship captains on the importance of onboard disease control strategies. Sailors and captains were given a basic understanding of the causes of communicable diseases such as plague (the rat), yellow fever (mosquitoes), typhus (lice), and cholera (impure food and water).⁵⁶ These public education programs appealed to the economic interests of shipowners and captains. Owners could avoid the hardships of quarantine and the costs of ship disinfection by ridding their ship of the vermin, mosquitoes, and lice that carry disease. Captains were told, "It is up to you to decide if you want to clean your ship. However, if you don't take

action and disease is found onboard you not only face a great expense for fumigation and disinfection, but significant operational impacts from having the vessel placed in quarantine." Once again, rather than being a tool quarantine became a threat.⁵⁷

The education and fumigation activities of the Gallop's Island medical staff paid off. In the twelve months ending on June 30, 1923, not one person or ship was held in quarantine, an unprecedented achievement not seen in the previous fifty-six years.⁵⁸ Unfortunately, this hiatus would not last long. On July 7, 1923, a steerage passenger on the steamship *Samaria* coming from Liverpool and Queenstown had typhus resulting in the quarantine of four additional people suspected of exposure.⁵⁹ The low rate of vermin infestation among steerage passengers was attributed to the passenger inspections conducted overseas by USPHS officers and by shipowners who deloused steerage passengers before arrival in Boston.⁶⁰ Inspecting passengers at the port of embarkation was a radical improvement over the inspections conducted at the ports of disembarkation. After World War I, the USPHS conducted medical inspections of immigrants at their port of embarkation and required a fourteen-day quarantine period for all passengers coming from "dirty countries"—those with endemic communicable disease.⁶¹ Rather than catching infected passengers at their port of arrival, this new approach made Gallop's Island the last and least important element of the nation's quarantine net—catching cases the USPHS's overseas surgeons might miss. The result of this radical shift was to nudge European nations to improve their overall public health and sanitation programs in response to USPHS quarantine policies.⁶² American public health initiatives were changing the politics of international public health interventions placing the burden on emigrants, and, in turn, other nations, to provide proof, in the form of a bill of health signed by an authorized physician, prior to boarding.

The Cult of Secrecy

With the decline in quarantinable diseases like plague and smallpox, individual cases took on greater public visibility. The USPHS had long been cognizant of the dangers posed by inappropriate and unsubstantiated news coverage of isolated cases of smallpox and plague.⁶³ Surgeons also knew the dangers of making decisions without timely support of the U.S. surgeon general. In an emergency, telegrams were the standard means for the staff on Gallop's Island to reach the surgeon general. The only problem was the potential release of confidential disease information to those operating the telegraph offices. These offices were the equivalent of twenty-first-century chat rooms where reporters could pick up tips on breaking news. To get around this problem, as early as 1896, the USPHS developed an elaborate code to communicate between its field offices and the surgeon general.⁶⁴

Public hysteria and inappropriate news coverage could do more harm to the general welfare of the community than an individual case of smallpox merited. The surgeon general's need for secrecy was not merely an innovation of a desperate bureaucrat, it was necessary for rapid responses as the USPHS's mission expanded by leaps and bounds. It came as no surprise to some USPHS personnel when Surgeon Alvin Sweeney at the Boston Quarantine Station sent the surgeon general a telegram on January 6, 1928, indicating one case of ETPIM on board the British steamship *Mahsud*. The public at large may have been concerned if it had known that ETPIM was code for smallpox, especially since there had not been a case in Boston since 1921 and not a single death in the previous sixteen years.

The surgeon general's staff maintained a top secret code converter to be able to quickly assess the true meaning of otherwise "gibberish sounding" telegrams from port quarantine stations. Only two such code converters survive today and are closely guarded at the National Library of Medicine. In most cases, any half attentive telegraph office operators might be able to ascertain the existence of disease by a quick perusal of the telegram. It was more difficult to discern the specific disease and the severity of the threat.

As an example, when the British steamship *Mahsud* arrived in Boston Harbor, Surgeon Sweeney quickly contacted the surgeon general via telegram (see Figure 22.1).⁶⁵ Penciled on the surgeon general's copy of the telegram above the code ETPIM was the word "smallpox."⁶⁶ Fortunately, the USPHS was able to control the spread of smallpox through its fast acting staff. More importantly, there was limited news of the steamer *Mahsud*'s six East Indian crew members who were held for a fourteen-day observation period.⁶⁷ Mention of revaccination in the telegram was not a tip off that a smallpox case was found—vaccination was a routine practice whereas smallpox cases were not. The USPHS had successfully suppressed incendiary information and kept Bostonians blissfully ignorant of the real state of affairs. For critics of secret government, this case illustrated the dangers of removing quarantine decisions from local government scrutiny. For quarantine advocates, it demonstrated the successful isolation of carriers of communicable disease. The historical dilemma has long been finding proof quarantine works when media coverage invariably point to instances where it does not. The *Mahsud* incident proved the value of tightly controlled epidemic intelligence.

Merger of Immigration and Quarantine Services

The cult of secrecy was one result of a highly successful federal maritime quarantine program that valued limited public exposure of their routine quarantine activities. During the 1920s, international cooperation with disease reporting contributed to fewer cases of communicable disease. Prior to World War I, the United States signed three international sanitary treaties

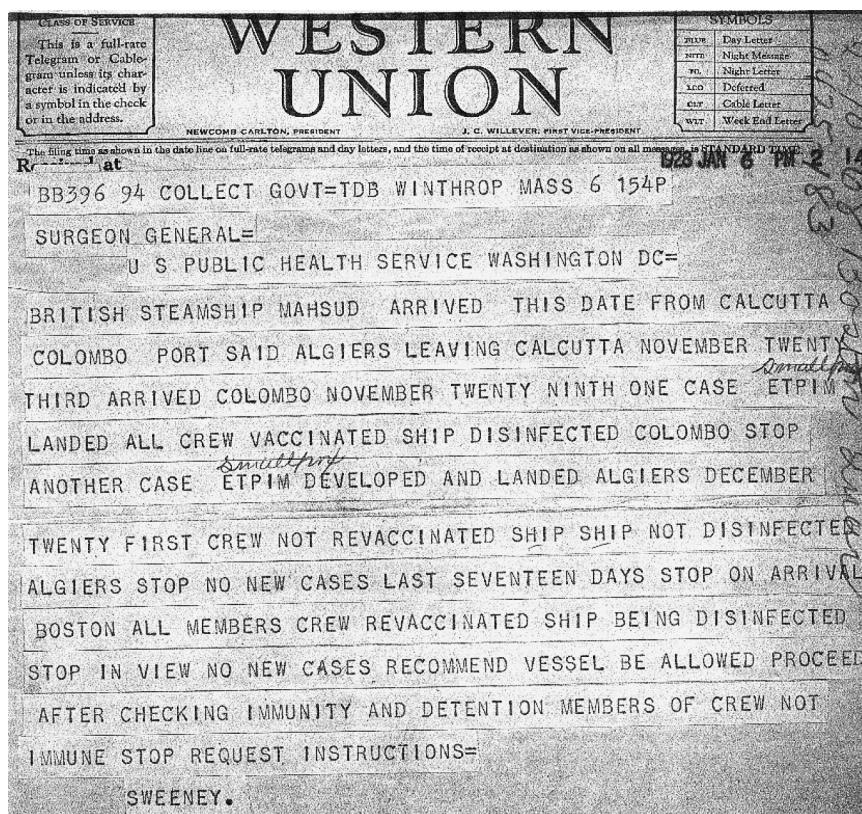


Figure 22.1 Coded Telegram Sent to the Surgeon General. (National Archives)

that had limited jurisdiction over communicable disease.⁶⁸ Some of these limitations were resolved on November 14, 1924, when the United States signed the Pan American Sanitary Code. This code established international public health and quarantine agreements among the signatory nations for cholera, plague, yellow fever, smallpox, typhus, epidemic cerebrospinal meningitis, acute epidemic poliomyelitis, epidemic lethargic encephalitis, influenza or epidemic la grippe, typhoid, and paratyphoid fevers among others. Its primary purpose was to ensure timely notification of epidemics among member nations so control measures could be implemented in affected ports. It also established uniform quarantine procedures consistent with the latest discoveries concerning disease incubation and infectious periods. Soon thereafter, on February 27, 1925, the USPHS amended the nation's quarantine regulations to exclude vessels operating exclusively between Canadian and American ports from the need to present consular bills of health, an omen of things to come.⁶⁹

With a decline in infectious disease, the workload of USPHS dropped shifting its focus to preventive measures, such as ship fumigation, international cooperative agreements, and the epidemiology of infectious disease. Reduced workloads also created an opportunity to improve coordination between the quarantine station and the immigration inspections conducted at the Boston piers. On March 7, 1928, a system for combined quarantine and immigration inspections was instituted with satisfactory results reported a year later.⁷⁰ This consolidation of services could not have occurred until the immigration and public health functions were both managed under the same federal authority. The transfer of immigration functions from the Commonwealth to the U.S. Treasury in 1894 and the subsequent transfer of maritime quarantine functions from the Boston Board of Health to the USPHS in 1915 had set the stage for this simplified federal gate keeping function. While the U.S. Treasury Department could have simplified its organization much earlier, it had not yet resolved how the distinct inspection requirements for quarantine and immigration could be effectively merged. For the previous thirty-seven years, the USPHS immigration division had separately inspected immigrants under an 1882 federal law prohibiting the entry of idiots, insane persons, anyone who might become a public charge, and persons suffering from a loathsome or a dangerous contagious disease.⁷¹

Merging quarantine and immigration services, while convenient for the U.S. Treasury Department as it supervised both programs, raised dangerous issues concerning the relative importance of business, labor, and public health policy when addressing the regulation of immigrants entering America. In contrast to the nineteenth century when states decided how and when to apply quarantine, in the twentieth century, quarantine and immigration became inseparable aspects of the nation's foreign and domestic policy, causing local or state public health concerns to often be ignored—as Boston painfully learned.

One positive result of the closer alliance was a recognition that federal quarantine resources could be placed at the disposal of the immigration service. These cost-cutting initiatives also shifted some public health functions to the private sector. For example, the quarantine station expanded the use of contractors for specialized medical services such as routine blood and stool examinations to identify hookworm infection. As passenger volumes increased, it also outsourced diagnostic and treatment services to Boston hospitals that could provide these services more efficiently.

Mosquitoes and the Age of Aviation

Paradoxically, maritime quarantine was further marginalized when airplanes became an accepted means of gaining access to the United States in the post–World War II years. At first blush, one would think letting airplanes have easy access to American ports would have prompted public health

officials to call for stricter quarantine inspections to avoid easy entry of disease. However, there was no call for international aviation treaties to control the spread of infectious disease prior to 1920. The early aviation industry was full of barn storming daredevils that captivated the American public with their stunts and showmanship but few would dare fly with these young pilots. Airplanes had a very limited flight range and were not originally designed for carrying passengers.

It was the U.S. Mail that started the aviation craze.⁷² Capturing a Post Office mail contract piqued the interest of airplane manufacturers who saw an opportunity to expand their business using airplanes originally built for use in World War I.⁷³ One key player in the emergence of international mail service was Inglis Uppercu, a former Manhattan Cadillac dealer with a law degree from Columbia University, who made a small fortune selling amphibious planes to the Navy in World War I.⁷⁴ With the end of the war, Uppercu saw an opportunity to open international mail and passenger service to Havana using his two twin engine amphibious planes built for the Navy. On November 1, 1920, Aero Marine West Indies Airways Company flew its two amphibious planes, the *Pinta* and *Santa Maria*, with five passengers on the *Santa Maria* and four on the *Pinta* along with five hundred pounds of mail to Havana. While normal government protocols would have triggered a range of customs and quarantine inspections, the company's owners expedited the red tape process for this maiden voyage.⁷⁵ Soon after this maiden flight, the USPHS revised its quarantine regulations to specifically exempt aircraft engaged in ferry service between Key West and Havana Cuba from obtaining bills of health and quarantine inspection—a clear omen of a *laissez faire* approach taken to disease control in the fledgling aviation industry. With this hands-off approach, there was no public health regulation of commercial passenger service before the Air Commerce Act of 1926 explicitly authorized the U.S. Treasury, through the offices of the USPHS, to manage communicable diseases attributable to air travelers. The law codified what had been prevailing practice since October 22, 1920, when the service began investigating the health of air travelers from nearby nations and inspecting air mail carriers that brought news from passenger vessels in transit in the Atlantic Ocean.⁷⁶ With airplanes that had flight ranges of 80 to 450 miles, trips to Mexico, Cuba, and Canada were the only feasible international air destinations in the 1920s.⁷⁷

In a nod to the virtue of unfettered air travel, on December 22, 1928, the USPHS amended its quarantine regulations to exempt “aircraft from foreign ports or ports in the possessions or dependencies of the United States from the necessity of obtaining a bill of health except during the prevalence of a quarantinable disease in such ports of departure or call.”⁷⁸ In essence, this amendment simply expanded the same privilege given to Mr. Uppercu’s company to all other international air passenger services. The USPHS could

still conduct quarantine inspections of aircraft arriving at officially designated airports of entry within the United States. In essence, all maritime quarantine requirements, with the exception of the “bill of health,” were applied equally to vessels and aircraft. To further simplify the red tape facing the aviation industry, the Aeronautics Branch of the Department of Commerce issued summary air travel regulations for the Post Office, the Customs Service, and its own branch on February 1, 1929, or over eight years after the first commercial flight.

With this new found authority over aviation, in 1931, the USPHS inspected 3,137 airplanes and 21,028 persons at thirty-eight official international airports of entry into the United States and its territorial possessions.⁷⁹ Twenty cases of communicable disease were identified but were never described in the agency’s annual report. Their existence was a well-kept secret, only accessible to those willing to peruse the technical data tables issued by the surgeon general. The USPHS did not wish to overemphasize the potential dangers of aviation-borne disease. Their silence may have been an artifact of the aviation industry’s political influence or the agency’s belief that aviation posed a minimal threat. Indeed, at least one USPHS officer believed the “class of passengers” found on airplanes was one reason there was less danger from planes than from ships.⁸⁰ Airplanes were viewed as a manageable risk as those who flew were the wealthy and did not typically travel from infected ports. For example, in the case of Boston, its quarantine station was inspecting ship to shore airplanes at a location contiguous to the Boston airport. Ship to shore airplanes carried mail and passengers to vessels in transit—a class of persons deemed of little risk.⁸¹

Not everyone was blinded by the revolution in air travel. Increasing air travel raised concerns among sanitarians that infectious disease could quickly hop from one country to another if nations did not cooperate to control traffic from sites of epidemic disease. The speed of travel made it possible for an infected person to arrive in the United States before a disease’s incubation period had expired. Unlike previous epochs where quarantine officers had the luxury of using a two-week transatlantic crossing to find signs of sickness, in the age of aviation flight, times conspired against revealing signs of disease.⁸² Nations would need to rely on international cooperation and epidemic intelligence services to give advance warning of geographic areas where infectious disease existed. International cooperation, as the USPHS learned with typhus, had its limits including inflexible definitions of quarantinable disease.

Despite some apparent efforts to squelch publicity about communicable disease arriving by aviation, Surgeon General Cumming soon recognized its threat. In his 1931 annual report, he noted “the journey by airplane from most of the endemic centers of these various pestilential diseases is usually less than the incubation period of these diseases, excepting journeys from

endemic centers of cholera.”⁸³ Cumming, as well as many leading sanitarians, had known for several years aviation posed a threat to public health. Other experts agreed. In May 1930, the Office International d’Hygiène Publique in Paris prepared a draft convention for the sanitary control of aerial navigation that underscored these concerns. With the potential for the unintended transport of mosquitoes on aircraft including *Aedes aegypti*, the carrier of yellow fever, in July 1931, the USPHS conducted a series of experiments in which *Aedes aegypti* were placed onboard aircraft in selected tropical ports after staining them with an aqueous solution to make them recognizable at the port of arrival. The experiment proved 20 percent of mosquitoes arrived at the port of destination even after repeated landings, refueling, and unloading taking place along the way. The USPHS concluded that while mosquito control was an important public health risk, it could be controlled through fumigation at the port of departure. The USPHS speculated that mosquitoes were probably not as great a public health risk compared to that of a passenger infected with a communicable disease.⁸⁴ Since the USPHS knew most quarantinable diseases had incubation periods that lasted longer than the plane flight, medical inspections would be an imperfect net to capture carriers of deadly pathogens—especially for diseases like tuberculosis with an incubation period of two to six weeks. This troubling issue would continue to resurface in succeeding years without any fundamental change in air travel controls resulting in an unceasing importation of alien tuberculosis cases—especially at major ports of disembarkation.⁸⁵

Another troubling development was the inability of USPHS to keep up with the growing demand for air travel to America. By 1933, the USPHS only inspected 50 percent of the airplanes carrying aliens into official ports of entry—due to an insufficient number of medical officers.⁸⁶ The technologic feat of rapid air travel trumped the quarantine protocols of the nineteenth century leaving the nation vulnerable to uncontrolled incursions of pathogens. The good news was that most quarantinable diseases had been subdued, or at least that is what many public health officials were thinking.⁸⁷

International Sanitary Convention for Aviation

The draft international sanitary convention for air navigation was tentatively approved by the Second Pan American Conference of Directors of Health at Washington in April 1932 and then adopted by the permanent committee of the Office International d’Hygiène in Paris at its April–May 1932 session. The treaty established uniform standards for quarantine of aircraft across the world, thereby supporting international air commerce.⁸⁸ The American minister at Hague signed the International Sanitary Convention for Aerial Navigation on April 6, 1934, and the United States ratified it on June 13, 1935, and it became effective November 22, 1935, after the United

States substituted a “journey log” for the bill of health carried by aircraft.⁸⁹ This convention governed quarantine procedures for those traveling by airplane into and out of the United States.⁹⁰ Its power lay in its acceptance by twenty-three nations, an achievement that might never have occurred so quickly without the groundwork of numerous pioneers working on dozens of earlier international sanitary conventions. The relative speed in adopting the treaty reflected the sense of urgency in resolving the public health risks of aerial navigation.⁹¹ While South American nations did not sign this treaty, the United States urged them stop mosquitoes from hitchhiking on commercial airlines as they posed an imminent risk of spreading yellow fever to America.⁹²

The ratified convention came none too soon as the aviation industry made a frenzied effort to extend the speed and distance limits of air travel on a tank of fuel. On January 12, 1935, Amelia Earhart completed the first solo eighteen-hour flight from Hawaii to Oakland, California, demonstrating the feasibility of air passenger travel from the West coast to Hawaii and Asian nations to the west.⁹³ By the end of the year, major improvements were made in airplane design that encouraged travel by air. On December 17, 1935, the Douglas DC-3 completed its first flight, and less than four months, later the Bureau of Air Commerce certificated this plane for air passenger service.⁹⁴ Within six years, the DC-3 would capture 80 percent of the U.S. airline fleet.⁹⁵ While air travel had not yet connected the Pacific coast with Asia, the USPHS was deeply concerned uniform quarantine would be needed when that travel market emerged in the ensuing year. Recognizing the need for a plan, in 1936, the USPHS instituted mandatory vaccination of aircraft personnel against yellow fever and the disinsectization of aircraft at all stopovers on route to the United States for air travelers coming from yellow fever-infected areas.⁹⁶

Other federal agencies faced similar challenges in regulating immigration and customs enforcement issues associated with the fledgling aviation industry. With so many diverse regulatory concerns emerging among disparate and fragmented federal bureaucracies, it was clear a unified approach would be the only way to avoid agencies tripping over themselves. The need to coordinate air navigation activities led to the issuance of joint regulations relating to public health, customs, entry, and clearance and immigration by representatives of the concerned federal agencies. Joint regulations, issued on August 28, 1941, became effective January 1, 1942.⁹⁷ This coordinated disease control strategy was largely an afterthought as thousands of aliens had been arriving by air without any medical inspections or aircraft fumigation at airports along the Canadian and Mexican borders. The USPHS had miscalculated the importance of mosquito control programs for the aviation industry. After over ten years of inadequate aircraft fumigation procedures, mosquito control became a central element of the new regulations. Like most

regulations, this one reflected the discovery of mosquitoes inside passenger cabins of aircraft landing in the southern states.⁹⁸

In 1945, the USPHS Quarantine Division recovered 24,930 mosquitoes from 12,367 aircraft, demonstrating the threat posed by the rapidly growing air passenger business.⁹⁹ Despite concern for a yellow fever epidemic, the USPHS adopted more lenient quarantine regulations the following year shifting responsibility to local health officers to conduct surveillance of suspect alien passengers rather than detaining these individuals under a quarantine of observation.¹⁰⁰ "Surveillance" was a term of art enabling release of passengers on their own recognizance with the proviso they report any symptoms of disease to local health officials. In keeping with its bias toward unfettered commerce, the USPHS also delegated its quarantine authority to local health officers when emergency landings occurred at inaccessible airports. The USPHS certainly made no effort to directly fund such "local emergencies," preferring to take a laid back approach—despite agency evidence that mosquitoes posed a real public health emergency.¹⁰¹

International travel became the rage after World War II jumping from 475,558 passengers in 1945 to 4,422,000 in 1957, or nearly ten-fold increase. With this rapid expansion of air travel, the USPHS was under increasing pressure to further simplify its medical inspection and quarantine procedures.¹⁰² Working with the newly established World Health Organization, it simplified procedures for the inspection and clearance of aircraft, freight, and passengers and their personal effects coming from foreign countries.¹⁰³ One change was the elimination of the bill of health codified in the 1944 International Sanitary Convention for Aerial Navigation. In its place, nations were required to report all quarantinable diseases that posed a menace to other nations and cases of yellow fever were not allowed to embark on international flights.¹⁰⁴

Sanitation Trumps Quarantine

The age of aviation had landed but maritime commerce continued to be an essential public service and, therefore, port quarantine stations remained within the federal epidemic response program. The USPHS continued to rely on island quarantine and the tugboats of the nineteenth century to carry its staff through their daily routines. While the nation's island quarantine stations survived, it was evident their level of activity had dramatically declined. Several factors affected their long-term value: (1) reduced passenger travel by boat; (2) a decline in infectious disease cases; (3) improved foreign inspections of ships and passengers before departure for America; (4) improved ship design and management reducing the number of rats on board vessels; and (5) improved ship owner instigated inspections prior to arrival in port.

Another outcome of improved sanitation was a decreased reliance on Gallop's Island to provide basic quarantine services. Since most day-to-day quarantine work involved boarding vessels and conducting fumigations, there was little need for Gallop's Island—other than as a holding area for foreign crew members while vessel fumigation was completed. Quarantine had shifted imperceptibly from the isolation of immigrants to the decontamination and disinfection of maritime vessels with special emphasis on vector controls. This vector-dedicated quarantine policy removed humans from the purview of medical inspections and brought about the demise of island isolation. Not surprisingly, the USPHS began hiring sanitary inspectors with the requisite skills to disinfect people, commodities, and vessels. With less emphasis on large-scale quarantine, the USPHS sought more convenient debarking locations for passengers and public health staff.

On December 2, 1936, H. J. Warner, the medical director for Gallop's Island, suggested to Thomas Parran Jr., the U.S. surgeon general succeeding Cumming, a new quarantine station be placed on the mainland. The Foreign Quarantine Division of the USPHS, aware of its high cost, estimated it could save \$20,000 by relocating quarantine to an Army Base in South Boston.¹⁰⁵ Within nine months and without media attention, the USPHS leased office and dock space on the Army Base, transferring its quarantine functions there on September 1, 1937.¹⁰⁶

While the public was kept in the dark, it took only six weeks for the business world to discover quarantine procedures had changed without notice.¹⁰⁷ Members of the Boston Port Authority were angry at this unilateral decision and immediately contacted Congressman John W. McCormack to notify him of these sub-rosa activities. On October 29, McCormack telegraphed Parran demanding an explanation of why Gallop's Island was abandoned without holding a public hearing. In his view, "the present quarantine station located at Army Base with inadequate facilities for fumigation of a vessel deprives the port of the use of a berthing space essential to the business life of the port particularly where available berths are so few." He demanded the reactivation of Gallop's Island.¹⁰⁸

The next day, Parran replied to McCormack explaining Gallop's Island had not been abandoned—merely placed in a caretaker status. He also pointed out his staff would provide better service from its new location at the Army Base in South Boston. It took some twenty days for the USPHS to convince local shipping authorities the new arrangements would be satisfactory by proving "there was little or no change in time of arrival at anchorage for early morning boarding as a result of the changed location when compared with the time of arrival a year ago."¹⁰⁹ While the business community was ultimately satisfied, this incident, along with the Service's generally tight control over its operations, made it clear gaining public trust was not its priority.

Within a year of moving the station to the mainland, Parran decided to shut down operations. The station's distance by water from the mainland and cost of operations contributed to its demise.¹¹⁰ From his perspective, an expensive quarantine station could not be justified for a handful of contagious diseases when there had only been twelve quarantinable diseases taken from ships in Boston since 1910, including one case of typhus fever, two cases of leprosy, and nine cases of smallpox.¹¹¹ With such a limited caseload, Parran saw no need for an offshore quarantine station. Instead the preferred strategy would be to contract for such services through local hospitals and eventually to meet these needs through a new marine hospital in Boston.¹¹² The Service's success in battling communicable disease had put its Foreign Quarantine Division virtually out of service and eventually resulted in the closure of most maritime quarantine stations along America's coastlines.

Radio Pratique

Improved sanitary conditions enabled ship owners to handle their own affairs with a concomitant reduction in federal oversight. In February 1937, Boston and New York became the first two American quarantine stations to adopt radio pratique, whereby vessels were relieved of quarantine inspections altogether. Radio pratique allowed vessels that made radio contact with the Public Health Service within twelve to twenty-four hours prior to arrival to avoid inspections and fumigations provided their vessel qualified as free of disease. A passenger vessel was eligible for radio pratique if (1) it had a full-time ship's doctor employed; (2) had not touched at a foreign port known to be infected or suspected of infection with a quarantinable disease; (3) carried no commercial shipment of psittacine birds (e.g., parrots were known disease carriers at that time); (4) was relatively rat free; (5) was in good sanitary condition; and (6) with no known or suspected quarantinable disease. Qualifying vessels proceeded directly to the dock without stopping for quarantine inspection.¹¹³ On a national level, this was the first time since 1893, when the Marine Hospital Service took ownership of maritime quarantine stations, that ships could proceed to dock without anchoring for inspections.¹¹⁴

Ironically, as the number of cases of communicable disease declined, the burdens placed on USPHS physicians were greater than ever before. Even though only twelve quarantinable diseases were reported between 1910 and 1938, the Service's physicians were in a constant battle to keep up with the demands of maritime traffic.¹¹⁵ Prior to 1936, they had no backup staff for relief from their dawn to dusk duties. Worked to the point of exhaustion, Assistant Surgeon Daniel Maguire, medical officer in charge in Boston, pleaded with Parran for more staff.¹¹⁶ The implementation of radio pratique in February 1937 must have been well received by Maguire as a

means to cut back on the nonstop demands of his job. Because of its success, the surgeon general expanded this program to Los Angeles and San Francisco the subsequent year declaring radio pratique had saved a tremendous amount of time for passenger vessels in New York and Boston and, not surprisingly, garnered widespread approval.¹¹⁷ Radio pratique put the shipping industry in the driver's seat in the effort to improve ship sanitation. The costs and administrative burdens of quarantine were sufficiently great to convince major shipping companies of its advantages and the surgeon general felt confident enough in its benefits to permanently relax quarantine regulations.

In the years following its adoption, the USPHS reported only one abuse of radio pratique.¹¹⁸ The program worked because it offered financial and administrative benefits without unreasonable self-policing requirements. Owners could achieve program benefits by retaining professional physicians to administer ship hygiene programs. The USPHS strategy was not a "sell out" to the shipping industry. It was a brilliant technique to provide maximum disease protection with the least obstruction to commerce. With improved epidemic intelligence at the ports of departure, vastly improved ship sanitation, and ship physicians on transatlantic cruises, fewer cases of communicable disease were being reported.

Confident in these sanitary controls, on February 15, 1945, Parran took the radical step of eliminating bills of health for aircraft or vessels—consistent with the 1944 International Sanitary Convention for Aerial Navigation.¹¹⁹ The shipmaster had used this ancient quarantine document for hundreds of years to vouch for the health of their vessel.¹²⁰ Parran now placed his faith in sanitary inspections and disinfection strategies—not the good word of officials in the port of departure. With a highly regimented inspection and sanitation system, the bill of health had become superfluous. On May 1, 1947, soon after the elimination of bills of health, Parran incorporated radio pratique into its quarantine regulations with little fanfare or publicity. The USPHS felt confident that self-policing worked but just in case the public questioned its value the surgeon general gave his medical officers authority to check the legitimacy of the shipmasters radio broadcast declarations.¹²¹ Random quarantine inspections, along with parallel disease reporting requirements of the Immigration and Naturalization Service, proved highly effective in identifying communicable disease.¹²²

Dismantling Gallop's Island

On July 1, 1939, the USPHS and the nation's quarantine stations were transferred to the newly created Federal Security Agency.¹²³ Congress designed this massive reorganization to prepare the United States to better manage a variety of civilian agencies in anticipation of wartime

conditions. It would be the final blow to island quarantine in Boston Harbor. The start of World War II would also alter the importance of quarantine. The United States could no longer rely on foreign nations to provide reliable reports of quarantinable disease. As a result, in 1941, Parran declared quarantine could no longer be relaxed as nations at war could not be trusted and treaties could no longer be honored. In contrast, American tank ships coming back to American ports to refuel were given expedited inspections in the interests of getting these ships back out to sea to support the war effort.¹²⁴

Anticipating the need for war preparations, the Federal Security Agency quickly turned Gallop's Island over to the U.S. Coast Guard in November 1939, just four months after taking control.¹²⁵ After seventy-six years of continuous use, Gallop's Island once again was placed in the service of wartime activities. The Coast Guard made use of the island for several years until such time as the War Shipping Administration took it over to provide radio training services for the U.S. Maritime Commission. This arrangement, established on January 23, 1943, lasted until November 1, 1945, when USPHS ownership was restored.¹²⁶ But Parran had no intention of taking the island property back and notified the Commissioner of Public Buildings of his decision on September 11, 1945: "Inasmuch as Gallops Island station is not required by this service, it is herewith declared surplus to Public Health needs and will be available to you for disposition on November 1 next."¹²⁷

Epidemic disease had been virtually eliminated as a maritime threat and the loss of Gallop's Island during the height of World War II certainly proved it was no longer an essential service. Within thirty years, the USPHS had incorporated Gallop's Island into the nation's network of quarantine stations. During this period, 21,955 vessels were inspected, 4,032 were fumigated, and 2,340,223 persons were inspected by the medical officers on duty.¹²⁸ The USPHS invested millions of dollars into the repair and expansion of the quarantine island. Yet, despite these sunk investments, the surgeon general knew it would be more prudent to eliminate island quarantine and manage cases through Boston area hospitals.

The Service vacated Gallop's Island on January 15, 1946, turning the property over to the General Services Administration (GSA) for disposal. After screening other federal agencies for possible interest in the property, the GSA redeclared the property surplus on July 31, 1951, and put it up for sale. As luck would have it, the city expressed no interest with the result that Charles Sassone, a private party, bought the property on May 12, 1953, for the paltry sum of \$5,200.¹²⁹ In the early 1960s, Sassone, in turn, sold the island to the Coleman Company for \$30,000, which used it as a dump for demolition material generated by urban renewal projects in downtown Boston.¹³⁰

Expanded Reporting

Ironically, as the need for island quarantine services declined, the Massachusetts Department of Health required the medical profession to report on an ever-increasing number of communicable diseases. In 1884, Massachusetts law required physicians to report the presence of three diseases—smallpox, diphtheria, and scarlet fever but by 1942 over forty diseases were reportable.¹³¹ This explosion in medical knowledge concerning the etiology of communicable disease was aided by a 1907 legislation authorizing the Massachusetts Department of Public Health (MADPH) to establish its own list of diseases dangerous to the public health. Freed from political oversight, the MADPH added to its list of reportable diseases based on ongoing recommendations of the American Public Health Association (APHA). More diseases were added immediately after World War I based on recommendations from the APHA Committee on Standard Regulations.¹³² With some exceptions such as the bioterrorism events of 2001, subsequent expansions of the list reflected updates to the APHA's "Control of Communicable Diseases Manual."¹³³

As a result of the explosion in public health reporting requirements, quarantine has not disappeared as a disease control measure, even though it is routinely limited to home and hospital isolation and when directly observed treatment with antibiotics or antivirals are too difficult to administer or insufficiently reliable to relieve quarantine. The age of antibiotics and antivirals has minimized the need for quarantines by shortening the period of infectivity. Detention is now driven by laboratory response times confirming the patient's germ free state. In contrast, in the preantibiotic era, a wide range of quarantine options were in play reflecting a greater need for flexibility and creativity to address large-scale epidemics.

Narrowed Conception of Quarantine

Modern public health officials have a limited understanding of the range of quarantine options reflecting its scant use in the age of antibiotics. Today's commonly accepted understanding of quarantine emerged in 1917 when the APHA arbitrarily defined quarantine as "the limitation of freedom of movement of persons or animals who have been exposed to communicable disease for a period of time equal to the incubation period of the disease to which they have been exposed."¹³⁴ In essence, the framers of this guidance were attempting to overcome the wide range of legal definitions that existed throughout the fifty states immediately after World War I. They also defined isolation as the means of "separating persons suffering from a communicable disease or carrier of the infecting organism, from other persons in such places and under such conditions as will prevent the conveyance of the

infectious agent to susceptible persons.”¹³⁵ Using this nomenclature, anyone infected by a communicable disease was isolated and anyone exposed quarantined.

The idea that healthy people should be subject to quarantine emerged in the 1880s when Boston’s port physicians applied “quarantines of observation” to family members living in close proximity to an infected individual. During colonial times, quarantine restricted the movement of passengers regardless of their exposure—holding anyone on an infected vessel away from shore.

The change in practice reflected improved understanding of the etiology of disease, better hospital quarters, and improved ship sanitation offered by modern passenger vessels. Overcrowded conditions among steerage passengers made it relatively easy, as a practical measure, to quarantine passengers regardless of their exposure status. Contact tracing as we know it today was not yet invented.¹³⁶ Nevertheless, for those who found fault with nineteenth-century quarantine practice, the unscientific approaches to medical inspection, and quarantine may not have unfairly victimized steerage passengers, since poor ship hygiene made vessels tinder boxes for contagion. Contact tracing in such an environment would have been inconceivably complex and far less efficient than the cruder quarantines imposed by class of passenger. Distinguishing the threat of disease based on a passenger’s income and social standing proved to be socially accepted proxies for the threat of communicable disease. While these strategies may be anathema today, they were part of a class-based disease control program consistent with the values of the time.

Exposure was not the only variable triggering quarantine. As late as 1920, the MADPH defined quarantine as “persons in the dwelling, tenement, apartment or other quarters under restriction shall not leave said premises, and no other persons save the physician, nurse, clergyman and authorized health officers shall enter such premises except by permission of the local health authorities.”¹³⁷ Prior to 1921, Massachusetts did not distinguish between isolation and quarantine. The term “isolation” simply qualified where and how a patient would be restricted within their home. For example, an entire dwelling unit could be held in quarantine with the healthy family members living in one portion of the house. In this instance, the sick person would be isolated in one room provided there was adequate protection for the remaining family members.

To apply quarantine or isolation presumed a physician could determine an exposure had occurred. In the hierarchy of disease gestation, exposure precedes the infectious stage of disease. Patients do not manifest symptoms of disease at the moment of exposure. If this were the case, quarantine would be a relatively easy process. The challenge posed by the modern definition of quarantine is to isolate the person exposed to a communicable disease at the earliest possible moment in time to prevent its spread without impinging on

his or her civil liberties. In reality, it is not possible to discern if someone has been exposed to a communicable disease without sophisticated diagnostic antibody tests but even tests have their limitations depending on their abilities to minimize false positives and false negatives. Exposure is a metaphysical concept or in today's science, a microphysical concept. Without access to laboratory tests, exposure can only be inferred based on circumstantial evidence that points to possible clues connecting the person to disease hot spots or known infected cases (e.g., proximity, duration of exposure, family relationships, marriage, sleeping arrangements, port of embarkation, etc.).

Two major factors altered quarantine practice. For one, as isolation hospitals became more commonplace American courts took a jaundiced eye toward quarantines that mixed the infected with the uninfected.¹³⁸ Second, the APHA guidance began to influence state public health officials to rethink the meaning of quarantine. Both of these trends placed greater attention on the rights of the individual over those of the community at large. Contact tracing, used to identify the dispersion patterns of communicable disease outbreaks, also minimized the need for blanket quarantines of entire neighborhoods.¹³⁹ The rationalization of quarantine has gradually led to a system of classification and ranking of disease and exposure risks reflecting modern hospital infection control practices.¹⁴⁰

Large-scale quarantines requiring neighborhood or other forms of isolation appeared unnecessary based on communicable disease trends prior to COVID-19. However, bioterrorism events or the outbreak of hitherto unknown viral diseases that quickly spread in densely populated urban areas continue to fuel public passions for some form of quarantine. The emergence of various untreatable, antibiotic-resistant, and highly lethal diseases such as Ebola and Marburg along with the periodic outbreaks of novel and recurring pathogens such as pneumonic plague, avian flu, swine flu, SARS, and COVID-19 underscore the ongoing relevance of various types of large-scale quarantine strategies based on new concepts to slow disease transmission.

The emergence of pandemics such as COVID-19 have dramatically transformed the relevance of quarantine and increased the national importance of the Centers for Disease Control and Prevention (CDC), the successor organization to the USPHS. The decay of the nation's quarantine program after World War II has hobbled the CDC's ability to respond to highly communicable disease outbreaks, since it has neither the staff nor the budget to play anything more than an advisory role to the quarantine interventions managed by state health departments. This is a serious deficiency in national public health policy that will continue to cripple effective response measures. For those who believe that pandemics like COVID-19 are once in a century occurrences, it may be difficult to convince them that the CDC must be properly funded, staffed, and empowered to provide professional guidance

without the meddling involvement of such pedestrian concepts as “return on investment” or the short-term thinking of politicians concerned with their next reelection campaign.¹⁴¹ Yet, we now live in an era of heightened disease transmission, where pandemics are returning with a fury and frequency unlike any other period in modern history, facilitated by modern transport systems that makes it clear that we are only one infected airplane away from the next pandemic.



CHAPTER TWENTY-THREE

Redefining Quarantine for the Twenty-First Century

In the twenty-first century, quarantine remains a tool of last resort to contend with the dangers posed by highly lethal pandemics. Over the last four hundred years, the principles of quarantine have dramatically changed as we have learned more about the epidemiology and etiology of the world's most lethal diseases and developed pharmaceutical and personal protective countermeasures that have obviated the need for traditional isolation practices. Gone are the days of island isolation on harbor islands and hopefully even forced removals to emergency hospital settings for pandemic events the likes of which appear once or twice every century. With all of the medical advances of the last century, let's revisit the question of does quarantine still make sense or are there alternative strategies?

Conventional wisdom in the medical profession holds that those infected with a communicable disease should be isolated and those exposed quarantined.¹ The U.S. Public Health Service memorialized this simple dichotomous strategy for controlling communicable disease in 1917 when it issued a report prepared by the American Public Health Association Committee on Standard Regulation.² At the time, there was no formal distinction between the concepts of quarantine and isolation even though hospital administrators adopted the term "isolation" to describe the confinement of patients infected with measles, diphtheria, smallpox, scarlet fever, and typhoid—despite the fact that such confinements had previously always been called quarantine. The range of quarantinable diseases the APHA addressed has rapidly expanded as we have learned about the morbidity and mortality of emerging pathogens. Yet, tremendous expansion of knowledge concerning transmission characteristics of quarantinable diseases has not been matched by a comparable evolution in quarantine

theory or practice. The basic principles of isolation and quarantine have not significantly changed in nearly a hundred years. Yet, nineteenth-century principles of quarantine can no longer survive in their current form in light of our improved understandings of disease etiologies, incubation periods, case fatality rates, diagnostic techniques, and political and information technology developments. A new theory for defining the limits of quarantine and less restrictive versions of traditional quarantine is needed. Earlier, we identified some of the institutional and governmental barriers to the use of quarantine and explained the conditions necessary for its proper application. Its application is also highly dependent upon the principles of political legitimacy and a full consideration of less harmful strategies before public opinion can coalesce in support of its use.

Quarantine Theory Revisited

What must an informed citizen know about quarantine for protection against the next emerging pathogen? The traditional role for quarantine focused on diseases meeting three criteria; (1) high human-to-human transmission potential; (2) a short incubation period between the moment of exposure and symptomatic infection; and (3) a high fatality rate (see figure 23.1). Cases of smallpox and diphtheria generally met these three criteria before both diseases were respectively conquered through eradication and vaccination. SARS, pneumonic plague, cholera, polio, measles, and meningococcal disease also meet these criteria. Yet, these diseases are now relatively rare in the United States with few cases and even fewer deaths in the last fifty years. Contrary to popular belief, only a limited number of communicable diseases can be called “diseases of interest” to a quarantine practitioner. The best way to understand the range of dangers posed by communicable disease is to visualize their infectious characteristics. Rather than one size fits all, a new theory of quarantine is needed that is founded on a hierarchy of disease-specific epidemic susceptibility factors.

The need for quarantine has always been associated with highly lethal communicable diseases. This theory has been dramatically modified by the twentieth-century discovery of antibiotics and antiviral drugs that drastically reduced the consequences of infection from numerous communicable diseases. Similarly, the theory of isolation has been linked to the transmissibility of infectious disease. As we have learned to control disease transmission through hospital isolation, the severity and duration of quarantine have been scaled back obviating the need for its traditional use.

One way to understand the new paradigm is to visualize the four principles of quarantine that ought to be adopted for twenty-first-century epidemics (see table 23.1). These four principles cover the management of a wide range of communicable disease consistent with the public health dangers they pose including; (1) traditional quarantine for highly communicable and

highly lethal diseases with relatively short incubation periods; (2) public surveillance systems for diseases with long incubation periods, moderate levels of communicability with acceptable pharmaceutical interventions; (3) self-tethering for diseases with short incubation periods, lower case fatality rates, and a relatively smaller threat to public health where individuals can perform voluntary quarantine when informed of their responsibilities to isolate themselves from others during the infectious period of their disease; and (4) the concept of Wu-Wei for cases where personal self-interest in disease management outweighs any need for societal interventions in the de-minimis negative externalities of personal infection (see table 23.1).

One way to visualize the varying threats posed by different communicable diseases is by plotting their maximum case fatality rates against their incubation period data on a log normal distribution (see figure 23.2). Figure 23.2 clearly shows that we should not treat all “quarantinable disease” alike. Ten diseases that have a high case fatality rate and a short incubation period meet the criteria for quarantine; five diseases with a low case fatality rate and short incubation period meet the criteria for “self-tethering,”³ and three diseases (i.e., tuberculosis, leprosy, and syphilis) with a high case fatality rate, long incubation period, and available antibiotics meets the criteria for public surveillance. One of the interesting findings of this analysis is that the 2009 international outbreak of H1N1 influenza did not meet the one key criteria for a quarantinable disease—a high case fatality rate. With a case fatality rate of less than one-tenth of 1 percent, H1N1 was not a sufficiently lethal disease to merit traditional quarantine standards, since the virus had limited virulence.⁴ Yet, this ex-post facto analysis misses one of the most challenging aspect of controlling any epidemic of a novel pathogen in its incipient stage where omniscience is nonexistent and limited epidemiological data exists to estimate its case fatality rate or its communicability. Furthermore, case fatality rates are not an inherent feature of any given pathogen but a reflection of the degree of epidemic countermeasures exerted to thwart the spread of disease. Let’s be clear, applying quarantine is both a science and an art and depends on an ever-evolving stream of new data to better gauge which of the four quarantine principles best match the evidence.

We base our four principles of quarantine for communicable disease on the concept that there are a range of societal threats and a range of appropriate controls to limit the transmission of disease—above and beyond traditional quarantine. Public surveillance is a viable alternative to quarantine for diseases with a long incubation period provided infected individuals demonstrate social responsibility with respect to activities that pose a threat to others (e.g., staying on their medications). Similarly, self-tethering is a self-enabled control system for communicable diseases that pose smaller societal threats (i.e., low fatality rates) or for diseases that overwhelm government resources. We distinguish self-tethering from home quarantine, since the latter involves a formal governmental oversight of communicable disease cases in the home, whereas the former is entirely self-enabled. Finally, we propose “Wu-Wei” as

a concept for all other communicable diseases that have long incubation periods, extremely low case fatality rates, and very low human-to-human transmission. Wu-Wei, the Taoist concept of “action without action,” implies that societal interests are not served by taking governmental actions in this arena because the benefits of such actions are not commensurate with the anticipated costs.⁵ A brief description of each intervention strategy and its applicability to communicable disease is presented below.

Table 23.1 Description of Four-Tier Intervention System for Communicable Disease

<p>Quarantine Criteria: Diseases with a high fatality rate, short incubation period, and high human-to-human transmission.</p> <p>Home Quarantine: Only when supervised accommodations are not available for care.</p> <p>Criteria for Validating Exposure: Symptomatology, oral history, and standard survey instrument. Real-time diagnostics (e.g., PCR or RT-PCR) useful in many instances.</p> <p>Personal Hygiene Considerations: Social distancing, handwashing, and cough etiquette.</p>	<p>Public Surveillance Criteria: Diseases with high fatality rate, long incubation period, and moderate-to-high human-to-human transmission.</p> <p>Home Quarantine: Not Recommended except in instances of incorrigible cases that flout personal hygiene considerations.</p> <p>Criteria for Validating Exposure: Symptomatology, oral history, and standard survey instrument.</p> <p>Personal Hygiene Considerations: Social distancing, handwashing, and cough etiquette.</p>
<p>Self-Tether Criteria: Diseases with low-to-moderate fatality rate, short incubation period, and moderate-to-high human-to-human transmission. Those who are “self-tethered” act on their own in the interest of the greater good.</p> <p>Home Quarantine: Only if self-tethering fails to control disease transmission. Home quarantine implies supervised oversight.</p> <p>Criteria for Validating Exposure: Symptomatology, oral history, and standard survey instrument.</p> <p>Personal Hygiene Considerations: Social distancing, handwashing, and cough etiquette.</p>	<p>Wu-Wei Criteria: Diseases with a low fatality rate, long incubation periods, and low human-to-human transmission. “Wu-Wei” cases primarily act on their own self-interest as their actions have little impact on the greater good.</p> <p>Home Quarantine: Not Relevant</p> <p>Criteria for Validating Exposure: Symptomatology, oral history, and standard survey instrument.</p> <p>Personal Hygiene Considerations: Cases meeting these criteria have not been well researched and few diseases have been identified that are classified “Wu-Wei.”</p>

In contrast to diseases that are communicable between humans, applying these quarantine criteria to vector-borne diseases caused by fleas (e.g., bubonic plague), mosquitoes (e.g., yellow fever), and ticks (e.g., Rocky Mountain spotted fever) makes no sense. Rather than isolation or quarantine, public health officials now recommend various “vector distancing” strategies in light of current knowledge concerning their transmission characteristics. In this sense, we have made tremendous progress in eliminating the irrational use of quarantine where evidence-based applications of vector isolation and extermination strategies have proven successful.

Our greater understanding of disease etiologies has not altered the fundamental threats posed by a wide range of highly communicable diseases, for which there are no pharmaceutical interventions.⁶ Quarantine or some form of less restrictive isolation remains a social and medical necessity for the survival of our species. While there are hundreds of bacteria and viruses that can cause sickness or death, a much smaller number of pathogens pose a risk to our survival. This latter group has the relatively rare quality of being highly communicable while also being highly lethal—characteristics normally considered incompatible.⁷ Individual cases of communicable disease are not the most important focus of public health policy. Such cases are indeed best left to the care of private physicians and health-care institutions

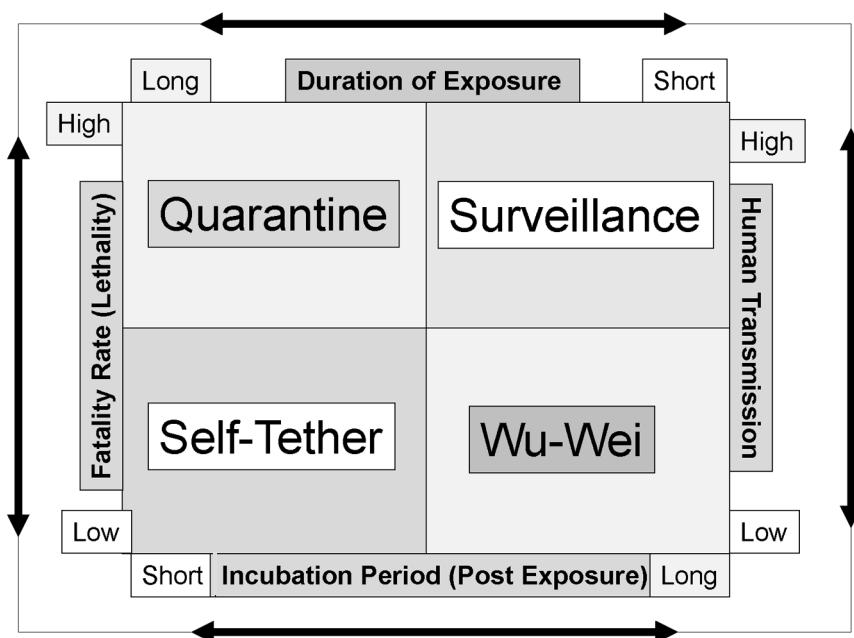


Figure 23.1 Quarantine Intervention Assessment Tool

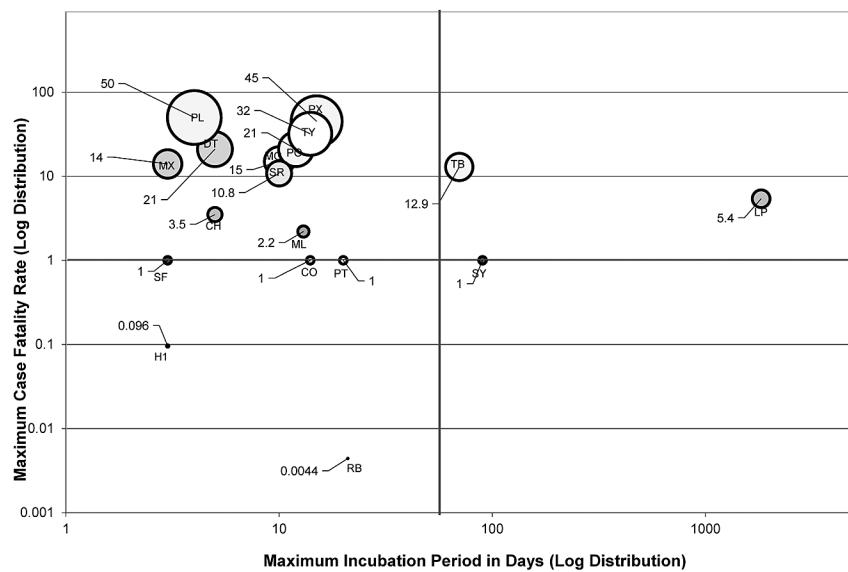


Figure 23.2 Diseases with High Case Fatality Rates and Short Incubation Periods

Numbers represent maximum CFR as a percentage of those infected by each disease. The data for COVID-19 is simply a best guess of its *maximum* CFR (including symptomatic and asymptomatic cases) at press time.⁸

Code

- CH = Cholera
- CO = COVID-19
- DT = Diphtheria
- H1 = H1N1 (influenza)
- LP = Leprosy
- ML = Measles
- MG = Meningococcal Disease
- MX = Monkeypox
- PT = Pertussis
- PL = Pneumonic Plague
- PO = Polio
- RB = Rubella
- SR = SARS
- SF = Scarlet Fever
- PX = Smallpox
- SY = Syphilis
- TB = Tuberculosis
- TY = Typhoid

provided they are properly isolated and cared for meeting public health standards. With the increased interconnectedness of our planet, our survival depends upon viable countermeasures to limit exposure to highly transmittable novel pathogens, for which we have no immunity, antidote, or vaccine. Under such a dire scenario, we must consider quarantine of some kind. For example, in just 152 years, Boston faced novel epidemics of smallpox, yellow fever, cholera, typhoid, diphtheria, whooping cough, and influenza that killed 95,398 people.⁹ These epidemics occurred before the age of antibiotics but their threat to public health was no different than the SARS epidemic of 2003 or the COVID-19 pandemic of 2020 when public health officials were without pharmaceutical interventions for these novel viruses.

Transparency, Trust, and Triage

The lessons of history show it is the novel or emerging pathogen—not the ones with which we have developed long-term symbiotic relationships—that pose the greatest threat. By definition, emerging pathogens arrive with little advance warning to prepare vaccines or appropriate antidotes. Applying some form of quarantine to thwart an emerging pathogen is a crowd control necessity, and its application will be well served by taking the lessons of history from the principles of transparency, trust, and triage that Boston's early public health officials practiced or at least aspired to achieve.

Transparency requires a public commitment to open government. For it to be effective, each citizen must have access to information about self-protection protocols and required community social distancing strategies. Trust is an inevitable outgrowth of a transparent government that delivers on its promises with the appropriate resources to achieve desired levels of self-protection. An epidemic almost always leads to a shortfall of resources and, therefore, a successful quarantine strategy must also rely on a prioritization of containment strategies to achieve the greatest good for the greatest number using the principle of triage to sort out the appropriate level of physical intervention required in any given outbreak.¹⁰ We should treat those who are most likely to spread disease differently than others who pose a minimal risk or those who pose no risk at all. Similarly, the principles of triage can be used to equitably reduce the loss of civil liberties for those that pose a risk of disease transmission. Quarantine is not just one concept, it represents a wide range of strategies to block the transmission of disease. Techniques for separation of the infected from the susceptible range from social distancing, curfews, school closings, personal hygiene to extreme forms of detention, and isolation in prison-like environments.¹¹ Identifying gradations of risk not only requires resources it also requires a reassessment of the 1917 concept of quarantine. At a minimum, it means acknowledging numerous categories of exposure to a communicable disease—not just one.¹²

Establishing Quarantine's Political Legitimacy

At the heart of the American debate over the federal use of quarantine is the political legitimacy of a federal takeover of public health. Militaristic strategies that President George W. Bush grafted onto coercive quarantine practices certainly diminished public trust in a humanitarian solution to a pandemic flu response. Why is military force needed to achieve political legitimacy when such strategies were rarely used in the past? Certainly the decline in public trust and its tendency to delegitimize federal public health policy might lead to coercive applications of quarantine. For such an eventuality to occur, Americans must become dissatisfied with federal public health policies that fail to inspire public confidence or trust. It is not surprising that some policymakers believe a complete reorganization of the public health powers in American society is needed to restore resources, power, and trust to the lowest level of government possible.¹³ In the absence of a national groundswell of support for pruning back federal quarantine authorities, the president of the United States may be forced to use military or police powers to enforce national or interstate quarantines in response to the next pandemic—especially if state level strategies fall far short of the mark.¹⁴ Inevitably military solutions lead to a contraction in government transparency and this in turn creates “diseconomies of scale” in the use of federal quarantine authority. In short, centralization of quarantine power is likely to lead to less effective control of people and to a greater distrust of the actions taken by federal bureaucrats.

Before policymakers jump too quickly to classify mass quarantine events as state secrets, it is critical that a full review be made of the scientific basis for such decisions and their impacts on our civil liberties.¹⁵ Mass quarantine as a tool for stopping pandemics only makes sense if a large segment of the population is at risk. Short of a mass extinction, public health officials need to expand the range of self-enabled and physician-supported services that can be brought to bear during epidemics. Centralized controls need to be replaced with decentralized solutions and approaches that leverage the range of technological, medical, and isolation controls that can be activated by smaller units of government and through self-policing social networks that rely on the self-interests of educated citizens tied to geographically defined communities.

Moreover, there are other policy considerations. Mass quarantine would also not make sense if there is not a “plausible” exposure. How long must an individual be exposed to a quarantinable disease before he or she be quarantined? For all the so-called medical advances of the last century, there are no real-time assessments that distinguish between the exposed and not exposed or between the susceptible and the immune. The concept of exposure is a subjective notion that continues to be driven by epidemic intelligence gained

through “shoe leather” investigations by trained epidemiologists—not by the software tracing applications developed by Silicon Valley tech gurus anxious to extend the reach of their digital empires. Presumably, if you had a long exposure to a highly contagious pathogen it might be enough to trigger quarantine. However, central to such decisions to curtail civil liberties on a massive scale are very poorly defined concepts of exposure, immunity, disease transmission, and human behavior. In the midst of an epidemic of a novel pathogen such information would, by definition, not be available. How many people must be infected and die before mass quarantine strategies become necessary? Would there be enough hospital resources to isolate large numbers of individuals without the danger of further spreading the disease through these mass relocations?

In all pandemics, we must decide, “Is this the greatest good for the greatest number based on the best available information we have at hand?” Time and indecision are our enemies when highly communicable novel pathogens manifest. The earlier we determine exposures have occurred, the more likely we can block pathogen transmission. In an epidemic, time may be the greatest enemy of freedom. Decisions to contain the movement of populations are triggered by the fear of uncontained, uncontrollable, and highly lethal pathogens annihilating entire populations. Such scenarios are rarely a reflection of the true threat posed by an epidemic. Yet, there is value in planning for extreme events, especially when it leads to early prophylactic measures such as the attenuation of disease transmission.

The value of promptly imposing quarantine has been confirmed through modeling for a wide range of infectious diseases with relatively short incubation times.¹⁶ However, while numerous theoretical models confirm the value of early isolation most fail to consider human behavior and peer group decision making in a crisis. Unless key groups that influence public policy support government-sponsored quarantines, we run the risk of a public backlash.¹⁷ Contrary to most public health literature, quarantine works best when it reflects the will of the people. Human behavior is best catalyzed by strong peer group support and tangible evidence of a public threat to human health.¹⁸ However, it generally takes time to achieve public consensus and it often takes a runaway epidemic to focus public action on a quarantine solution. An inherent conflict exists between the public health policies recommended by disease transmission modelers and those of behavioral psychologists who study crowd behavior. Imposing quarantine before public acceptance leads to suboptimal results reflecting evasion of confinement and flight from authority.¹⁹ Applying quarantine after a runaway epidemic, an approach typical of risk averse decision makers, avoids political suicide but sacrifices the lives of many who might have been saved by a dictatorial application of police powers. These opposing challenges give a very narrow sliver of time for an effective response to a pandemic—hopefully creating a

grumble line of minimal discontent for those subjected to quarantine and on the other side, raising minimal fear of having “screwed up” for those public health officials who must decide when to impose quarantine. Those “master minds” who recognize the narrow sliver of time that exists to successfully apply quarantine and who inspire public trust through their straight talk about the challenges ahead and the importance of public education are the true modern-day pied pipers critical to thwarting future pandemics.

Ironically, conventional quarantine often exacerbated an epidemic rather than abating it. Conventional quarantine often created such dysfunctional outcomes, especially if transparency, trust, and triage were abandoned. We have learned that quarantine often triggers panic and fear. Because of its tendency to create human opposition to its use, the way it was applied has always played a central role in the outcome of an outbreak. In many cases, fear of quarantine is often greater than the fear of disease itself.²⁰ Such fears are magnified when large-scale confinements are treated as state secrets, too sensitive to broadcast across the front pages of the daily news. Rather than allaying fears—as was commonly the case for quarantines applied to isolated cases in the past—this type of secrecy has an opposite effect when applied to large-scale confinements. Throughout history, fear of impending pandemics has been a contributing factor to the spread of disease. Secrecy in this context magnifies the fight-or-flight syndrome and increases public distrust of emergency response measures. Contrary to some past theories of disease transmission, it is not the fear that spreads the disease it is the flight from disease and its attendant acceleration of the interpersonal transmission of disease to so-called places of refuge that fuels this contagion cycle.²¹ Yet, the very sober assessments that have prompted the CDC and its predecessors to squelch outbreak events to calm public overreactions are also the very actions that have triggered local public health counter strategies to demonstrate a public resolve for locally sponsored action. This happened innumerable times in the twentieth century including Boston’s 1921 typhus scare, San Francisco’s 1900 bubonic plague outbreak, and the highly secretive Los Angeles 1924 pneumonic plague outbreak.²²

There is considerable distrust of the bureaucratic activities of the federal government and that is especially true with respect to the imposition of quarantine. Virtually, all pandemics create tensions between the forces of transparency and those of darkness and manipulation. These forces are all the greater with the centralization of power within federal bureaucracies and the increased alienation of the average American from these decision-making processes.²³ Today, the battle for survival during a pandemic takes on a greater challenge for many of us. We are not only fighting against the next emerging pathogen but also “us against public health bureaucracies” that claim to know what is best for our survival. Citizens have long taken power into their own hands when quarantine has been abused, either by a failure to

act (smallpox epidemic of 1721 in Boston) or through force (the smallpox epidemic of 1872 in Boston).

In an age of heightened distrust, our alienation from federal decision making has yet to surface in a battle of federal quarantine officials imposing their will on innocent victims in a pandemic. But sure as health care has become a national obsession fueling antigovernment anger against Congress, a national quarantine response could easily trigger riots, flight to the country and mass protests over abuse of power.²⁴

Unfortunately, the will of the people almost always takes time to coalesce and normally reaches its apogee not at the start of an epidemic but after it has spread to a critical tipping point. At its heart, quarantine works best when decisions are transparent, have defined outcomes, and link to the needs of the victims and their community. Such political considerations disappeared under the federal quarantine program of the early twentieth century because U.S. public health officials often saw no need to consult with local political leaders when making decisions. While CDC officials are acutely aware of these lessons of history, they are often cut off from local officials and their constituents during emergency response incidents just as they were during the early twentieth century. For this reason, direct federal quarantine interventions triggered by the threat of interstate transmission of disease are likely to remain the Achilles heel of any future CDC managed quarantine event.²⁵ Federal quarantines have almost always been controversial and contested whenever they were imposed. The animosity against quarantine is not simply driven by the loss of freedom for those forced into temporary exile from society. Issues of state's rights and local home rule have also distorted the effectiveness of such measures. The lessons of the past are clear: power corrupts and centralized quarantine power corrupts absolutely.

We should never impose quarantine simply because a large segment of the population has been exposed to a communicable disease. Exposure, and the related concepts of transmission and infection, is only one of many considerations in the decision to quarantine. For example, immunized individuals may be exposed without consequence just as others will be infected without becoming symptomatic or contagious. To impose quarantine based on a presumed exposure to a pathogen is to reverse the American system of jurisprudence and presume guilt without evidence. Because quarantine theory rests on a concept of exposure rooted in a presumptive "guilt by association," the only way to change this theory is to redefine the concept of exposure. We suggest reassessing the "exposure" test in light of advanced diagnostics that offer—when available at reasonable prices—a means to better determine immunity to various communicable diseases. Is exposure really the true barometer of the need for quarantine? Wouldn't it be better to base it on evidence such as proximity and duration of contact with an infected individual? We can collect such

information through the use of assessment questionnaires that develop weighted scales of potential for infection. These questionnaires are indeed the basis for the investigations conducted by “shoe leather” epidemiologists who make a reasoned assessment of exposure risks based on a range of exposure, dose, duration, and personal health considerations of each person. While time consuming and expensive, this work is orders of magnitude more meaningful than the data that might be obtained from software tracing applications that merely serve as proximity detectors without any relevant data to evaluate exposure, dose, and personal health considerations. Our obsession with gadgets should not blind us to the value of personal face to face or telephone contacts with potentially infected persons.

Advanced Diagnostics and the Internet

In the past, government officials imposed quarantine without even knowing the communicability of the disease and therefore the potential for it to be a human-to-human threat. Hospital or home isolation practices used in World War I are virtually the same as those used today. Patients are kept in separate rooms and nurses instructed to wear appropriate personal protective equipment including surgical masks, N-95 respirators, or powered air purifying respirators. Despite enormous advances in our knowledge of disinfection procedures the level of sanitation controls found in many hospitals is abysmal reflecting the suboptimal practices and training of their nurses and other health-care professionals.²⁶ In contrast, the use of engineering controls such as negative pressure enclosures for those with infectious conditions, positive pressure rooms for the immunocompromised, high-efficiency particulate air (HEPA) filtration systems, ultraviolet light disinfection, temperature and humidity controls, and similar systems for aerosol and fomites interventions have emerged as innovative hospital concepts with limited funding or acceptance. We continue to isolate the patient and not the germs.

In light of medical engineering developments and modern understandings of disease etiology, should the 1917 definition of quarantine still hold true? For starters, the public health community is far better informed than ever as a result of genetic, antibody, and antigen tests and evidence-based symptomatology available today. We now have the technology to dramatically reduce the length of quarantine and even its very application by deploying polymerase chain reaction (PCR) or reverse transcriptase-polymerase chain reaction (RT-PCR) testing for near real-time assessment of clinical infection. What really requires us to quarantine an entire neighborhood or building of presumably exposed individuals when PCR and RT-PCR technology stands at the portal of commercial breakthrough for a wide range of viral and bacteriological testing options? Fundamentally, there has been a paradigm shift in the field of diagnostic practices, and few have noticed how the

knowledge gained from near-real-time diagnostic techniques conflicts with traditional concepts of quarantine.²⁷ A paradigm shift has occurred without a commensurate mass adoption of new diagnostic capabilities as an essential new public health tool.²⁸ Arguably, COVID-19 has accelerated the increased application of PCR and RT-PCR testing and may become more routinely used in the future.

The knowledge derived from these diagnostic tools is also trickling into main stream culture. Public awareness of disease and transmission routes has improved dramatically reflecting rising literacy, higher education and an exponential growth in internet communication. Traditional quarantine practice is based on the theory that unchecked human behavior tends to spread disease and that coercive measures are required to correct these tendencies. Like the movie line in the *Men in Black* quarantine theorists believe that “a person is smart” but “people are dumb, panicky, dangerous animals.”²⁹ The entire system of quarantine is based on the premise that we can’t trust people to do the right thing. Is this still a good assumption or do we now have technological and communications strategies that might counter these basic human tendencies? Knowledge is power and the age of Google has created a generation of citizens that are far better prepared to contend with epidemics and identify appropriate self-quarantine strategies than ever existed in the pre-internet era. Nearly 92 percent of all Americans have internet access to more public health information than ever existed in the last two thousand years.³⁰ Because of accessibility to this public health knowledge, the success of future quarantine control measures is inextricably linked to these “query based” knowledge management systems. Traditional concepts of “panicky, dangerous animals” fleeing from the scene of an epidemic underlie quarantine theory. While human behavior may not have changed much in one hundred years the “information rich” world of the internet is diametrically opposite to the “information poor” world of our great grandfathers and facilitates a more dramatic, collaborative, and self-enabled response to infectious disease outbreaks.

Conflicting Agendas and Government Indecision

The net effect of improved diagnostics and internet access to public health information is to raise the importance of self-enabled strategies that might take place during a pandemic event. However, there are more fundamental issues at stake in the control of public knowledge pertinent to survival during a pandemic: numerous special interest groups, including pharmaceutical companies, some medical professionals and health-care organizations have vested interests in the promotion of “silver bullet” solutions to pandemics.³¹ Pharmaceutical companies are likely to oppose quarantine strategies, or at best, they are disinclined to support them. We cannot expect self-enabled

strategies to overcome these institutional counter forces without some war of disinformation.

Indeed, the vast majority of public health and medical literature is devoted to a myopic focus on pharmaceutical solutions for diseases even when simple solutions such as self-quarantine are useful and available.³² The massive focus on pharmaceutical solutions to the age old threats from pestilence should not beguile us into forgetting the simple fact that we are surrounded and outnumbered by microbial threats and remain ever dependent on ancient tools of exclusion, quarantine, self-quarantine, and flight for our survival. Quarantine and all of its subordinate concepts remain critical tools even though they may no longer be the exclusive solution to an epidemic response.

Unfortunately, there are few public health professionals with the practical skills to manage the crowd control, political, and logistical consequences of a large-scale outbreak. A pandemic event could represent a catastrophic release of a lethal pathogen on a worldwide scale. Ancient medical scholars coined the term “pandemic” for an outbreak that infected more than 2 percent of the world’s population—an estimate similar to that found with the 1918 flu pandemic.³³ In today’s world, that threshold translates into a disease affecting over 140 million souls. As a planning principle, the World Health Organization has chosen to predefine certain highly communicable diseases (think COVID-19) as reaching a pandemic stage—or what is called a Public Health Emergency of International Concern (PHEIC)—simply to muster resources for effective countermeasures when these diseases have proliferated across multiple continents. Yelling “pandemic” in a crowded world focuses public attention quickly and dramatizes the need for a basic public understanding of personal hygiene and self-quarantine principles—concepts that are of far greater importance than ever before.³⁴ None of us can afford to rely on public health bureaucrats, physicians without vaccine resources, or pharmacists lacking an appropriate prescription when the next pandemic emerges. The lessons of the past prove that self-protection strategies rise to the top of the list of human priorities when government bureaucracies and pharmaceutical countermeasures and plans fall short of the mark.³⁵

Measuring Quarantine by the “Least Harm” Theory

In the search for the “least harmful” remedy, four major alternatives should be considered before we select mass quarantine as the solution to a pandemic (see appendix D for the quarantine decision tree). As a first step, we must ask, “Can the presumed exposure be remedied by an antibiotic or antiviral treatment?” Many diseases continue to pose a threat to humanity but do not rise to the level of requiring a mass quarantine strategy. If an antibiotic exists it should always be selected as a preferred countermeasure. However, if an antibiotic does not exist or is in short supply, we must also

consider the feasibility of preventive strategies relying on immunization through vaccination. Boston's men of medicine made substantial contributions to immunology and to developing alternatives to quarantine. The works of Boylston and Waterhouse dramatically transformed the principles of quarantine, yet even their discoveries were not rapidly disseminated throughout the world and resulted in many years of substandard care simply because of human fear of vaccination.

Similarly, vaccines may exist yet not be available or inexpensive enough to meet the needs in a pandemic. For this reason, we must also determine if sufficient supplies of a vaccine are available to meet the needs of all those who have been exposed. The selection of an appropriate pharmaceutical solution is normally fairly straight forward for known communicable diseases but may be quite challenging for novel pathogens. Rapid diagnostic techniques and laboratory assessments to verify appropriate pharmaceutical interventions for novel pathogens are dependent upon time, money, and the vicissitudes of disease transmission and fatality rates as to whether emergency response measures will be feasible.

Inevitably, after we have considered these more humane alternatives we must also consider other behavioral measures to replace or supplement the use of pharmaceutical strategies. For example, other protective measures such as social distancing, "snow days" and liberal public health insurance policies that provide discretionary coverage to citizens wishing to take days off to avoid exposure need to be considered if they can limit exposure.³⁶ If after evaluating these alternative interventions we judge them to be unavailable or ineffective quarantine, in the form of mandatory confinement, may then be the most appropriate. While these multiple decision steps could result in significant delay to a rapid quarantine response, such delays are only a reflection of an unprepared society that neither trained, budgeted or rehearsed the rapid response skills required for an epidemic intelligence cadre capable of providing charismatic leadership required by the "pandemic pied piper."

Quarantine as a Tool for Emerging Pathogens

Based on experience in early America, large-scale applications of quarantine will be uncommon but virtually certain to reoccur once every four generations—if not sooner based on emerging trends in the twenty-first century. Like smallpox in the eighteenth century, yellow fever, tuberculosis, and cholera in the nineteenth century and tuberculosis and AIDS in the twentieth century, highly lethal pathogens will continue to threaten the survival of our species. Some of these pathogens may create the perfect pandemic—a highly lethal disease without remedy, transmitted through the social, sexual, educational, and transportation networks, through which we live our daily lives.

It is important to reemphasize that many prominent applications of quarantine have been associated with emerging pathogens for which there are no pharmaceutical interventions and for which we poorly understand the etiologic basis for the disease. Surprising as it may seem, this has almost always been the primary cause of the most draconian use of quarantine in American history. Inevitably, we can expect a more refined form of quarantine to remain a critical public health tool since pathogens that pose the risk of generating pandemics are increasing at a rate never seen before. Microbiologists and field biologists have identified about fourteen hundred new or emerging pathogens, including eighty-seven discovered since 1980, each of which poses a risk to public health.³⁷ Zoonotic diseases pose the greatest threat to mankind and this threat will continue as cross-species transmission of bacterial and viral pathogens becomes more frequent with the widespread devastation of ecosystems that bring humans into greater contact with species that had hitherto remained isolated.

Given these realities, what types of quarantine strategies make most sense? Island isolation is certainly the last thing that anyone would consider today even though there are a number of countries that still use such strategies to curtail immigration and its attendant disease related impacts.³⁸ Radical as it may seem our first priority must be to establish more sustainable societies that minimize the rampant destruction of the environment and other species of life. At the root of the crisis is our imbalance with natural resources and the massive disequilibria in wealth and basic health resources throughout the world.³⁹ Yet, despite the broader concerns with creating more sustainable social systems, we still need to apply quarantine as long as novel pathogens continue to emerge that pose international threats to public health. The World Health Organization has endorsed the use of quarantine as a necessary public health measure that has an appropriate role in response to over half dozen highly communicable diseases. Yet, such policies fall far short of the mark in addressing the root causes of these diseases.

We remain in a crisis mode in combating the world's greatest communicable diseases despite public health, international sanitary treaties and medical advances of the twenty-first century. The fact that quarantine remains a necessary tool in fighting pandemics is a measure of the limited progress we have made in fighting the most ancient of our enemies—pestilence.⁴⁰ Its causes, famine, war, and the failure to provide basic human needs will continue to stymie our progress toward reducing morbidity and mortality. Our reliance on the most coercive of all public health tools to intercede during epidemics suggests our public health priorities need to be revamped. We need a vision of common good for the average person, where all of us can have adequate access to food, clothing shelter and meaningful and sustainable work. We also need a new vision for our diet based on plant protein, which stops the wholesale killing of domestic and wild animals that have

been one of the root causes of the last three pandemics—SARS was a zoonotic disease that came from the sale of civet cats for food in Chinese wet markets just as COVID-19 has come from the same wet markets but is believed to have originated from wild pangolins. Similarly, Ebola originated from the killing of monkeys, which enabled this close contact to let the virus jump to humans. Let's not kid ourselves about the challenges we face with emerging novel pathogens but if we intend to quarantine germs rather than people we must focus on where these pandemics are originating and find solutions that will minimize opportunities for these zoonotic diseases to jump to us.

Without a shared vision that addresses sustainability, plant-based diets, the elimination of public health disparities across the world, and the need for internationally sanctioned rapid response teams to address disease outbreaks at their incipient stage, we may see public health tools that were intended for use in the last resort applied as a routine response.⁴¹ In this sense, traditional quarantine is a symptom of our misdirected public health policies caused by massive investments in war and unchecked consumer consumption that continues to devastate the environment and opens the Pandora's Box of pestilential diseases, each seeking their revenge on our profligate ways.

The synthetic balances we have created with nature are not truly within our control nor have they checked worldwide spread of pathogens that now move at speeds never before imagined. While twenty-first century physicians have dismissed disease as the spiritual revenge for our misbehaviors, it is clear humans are the cause of ecological disruptions that foster the next pandemic. Moralistic theories explaining the origins of pestilence predominated in the seventeenth century and still exist among doctrinaire conservative thinkers even today. Yet, surprisingly, the moralistic principles of past generations have come home to roost. We now find the most lethal diseases emerging from ecosystem disruptions where humans have adversely impacted other forms of life. Coming into contact with novel species, they are indeed biting us back—whether it is for survival or convenience. In the last resort quarantine is not a solution to the next pandemic but a symptom of the ecological imbalances we have created that leave our species more vulnerable to pestilence than it ever has been before.

We can take comfort in knowing our early public health officials wielded quarantine with surprising precision and effectiveness and proved basic principles of exclusion, social distancing, and isolation can be used for our survival as individuals and as a social collective. The lessons they have left us have never been more relevant than in today's rapidly degrading environment where cross species contact has increased human exposure to biological forms of life that had remained relatively isolated for thousands of years. Pull

out your antibiotics if you can find them. Otherwise, we must learn the wide range of lessons offered by old and new concepts of quarantine and how they can serve as a prophylactic measure against novel pathogens.

The Future of Quarantine

Traditional command and control systems for isolating infected persons from society are not the complete answer. Our resources are simply too limited to respond to a pandemic. Similarly, hospital or island quarantine strategies are also incapable of fully meeting mega-pathogen transmission. The scale of our society has simply exceeded the bounds of traditional institutional solutions to large-scale quarantine events. We must rely on greater self-directed behavior to achieve the societal objectives of reduced disease transmission. Self-tethering of less communicable diseases and public surveillance of highly lethal diseases with longer incubation periods, where pharmaceutical remedies exist, will inevitably become important elements of such strategies. These concepts, rather than being subordinate elements of quarantine, represent a new paradigm for disease control that should alter the nuances of epidemic response measures.

Quarantine, while still needed for severe threats to public health (i.e., a disease is highly transmissible, has a short incubation period and a high fatality rate), no longer needs to be applied to all communicable disease. Where it is used, governmental powers must be carefully exercised to achieve desired social ends.⁴² Yet, such decisions must be made in consultation with the affected communities and key stakeholder groups to ensure public opinion is incorporated into epidemic response plans. The principles of transparency, trust and triage demand nothing less. These concepts have already emerged in state-level responses to COVID-19 and we can expect refinements of these ideas as telemedicine reaches maturity.

The theory and practice of quarantine has subtly shifted from governmental controls to self-directed behavior reflecting the dramatic increases in public understandings of disease transmission, and the limited value of constraining personal liberty when personal hygiene, public sanitary measures and pharmaceutical solutions offer viable alternatives. There has been a revolution in the diagnostic capabilities offered by modern medicine and still these new technologies have not resulted in a commensurate change to the traditional legal definitions of quarantine and isolation practices. Yet, despite these developments, the countervailing centralization of public health powers in America has increased government controls over epidemics and disabled the tendency toward self-enabled behaviors. A balance can be struck by sanctioning the concepts of supervised home quarantine and “self-tethering” in public health policy as viable alternatives to traditional quarantine.

Basic public health policy on quarantine needs to be revised to reflect the current social values in America, modern understandings of disease etiology and transmission characteristics and the waning virulence of numerous diseases for which humans have acquired a degree of symbiotic accommodation. Rather than a one-dimensional presentation of quarantine as one size fits all, we need to adopt the four-tier principles of quarantine, public surveillance, self-tethering, and Wu-Wei as approaches to isolation and freedom appropriate to the gradations of risk. APHA should undertake this work in consultation with other key stakeholders, and public interest groups to ensure decisions of this magnitude address a range of considerations that will influence the scope of a newly defined national quarantine program that reflects the disease threats of the twenty-first century.

APPENDIX A

Chronology of Key American Quarantine Events, 1647–2020

March 1647

The First American Maritime Quarantine: Massachusetts General Court imposes quarantine on vessels coming from the West Indies.¹ Order repealed May 2, 1649.² This was the first quarantine order in America.

October 11, 1665

Maritime Quarantine Imposed to Thwart English Plague: Massachusetts Bay Colony issues its second quarantine order this time against ships coming from England suspected of carrying plague.³ This order was repealed on October 9, 1667.⁴

May 6, 1678

Quarantines without Law: The provincial government enforced at least two quarantines in the seventeenth century without the support of any written law. Boston's selectmen enforced a quarantine in the summer of 1678.⁵ The Governor's Council ordered an eight-day quarantine before passengers could enter Boston. The Council imposed a sixty-pound penalty on anyone violating this order. Rules for women in labor were relaxed but others were left on an uninhabited island until the quarantine was lifted.

July 18, 1699

First American Quarantine Law: The first permanent American quarantine law was enacted by the Massachusetts General Court to control the spread of smallpox, plague, and pestilential fevers. It authorized island quarantine for immigrants and seamen and landside isolation of the sick.⁶

June 25, 1701

Revised Quarantine Law: The Massachusetts General Court issues a revised quarantine law acceptable to the King's Privy Council. This version addressed contagious diseases such as smallpox, plague, or pestilential fever by allowing selectmen to isolate the sick in separate houses. It also allowed the justice of the peace to issue a warrant to impress housing for the sick and to restrain those with contagious diseases from coming ashore.⁷

February 14, 1718

Quarantine Hospital: The town of Boston, to quarantine smallpox patients, constructs Spectacle Island quarantine hospital as authorized by the General Court.⁸ The hospital lasts until June 28, 1738, when this activity was transferred to Rainsford Island.⁹

June 6, 1721

First American Application of Inoculation: Cotton Mather convinces Dr. Zabdiel Boylston to try inoculation as a means to avert a Boston smallpox epidemic.¹⁰

February 2, 1732

Required Public Disclosure of Disease: Families with smallpox are required to hang a red flag on the most public part of their house until the house is thoroughly aired and cleansed.¹¹

January 30, 1745

First Law to Separate Smallpox Suspected Cases from the Infected: The Province of Massachusetts Bay allocates funds for a separate building to accommodate those suspected of smallpox from the sick. This is the first ever attempt to protect suspected cases from potential exposure to actual disease while quarantined on Rainsford Island.

June 15, 1764

Legal Restrictions Imposed on the Use of Inoculation: Because of the danger of accidental transmission of smallpox, the Massachusetts General Court declared it illegal to travel from one's home or hospital during the time of inoculation. The General Court also declared it illegal to establish an inoculation hospital without the consent of the town.¹²

July 13, 1775

Protection of Patient's Health: Where a smallpox patient is located could be declared a "hospital" if removal would endanger their life. First instance where quarantine laws were modified to consider the needs of the patient.¹³

March 15, 1793

Intermunicipal Considerations Affecting Hospital Locations: Smallpox isolation hospitals required town approval, and if within hundred rods of an adjoining town, their approval as well.¹⁴

October 7, 1793

House-to-House Inspections to Control Yellow Fever: The Boston Board of Selectmen implements house-to-house inspections to identify all nonresidents who might be potential carriers of yellow fever. A thirty-day quarantine was imposed on vessels arriving with yellow fever. Rainsford Island was the place of quarantine or the hospital ship.¹⁵

April 3, 1794

President Authorized to Move Congress in Case of Contagious Diseases: Congress authorizes the president to move the seat of government if he determines prevalence of contagious sickness would be hazardous to the lives or health of its members. This remains the law of the land.¹⁶

May 27, 1796

Federal Government to Support State Quarantine Laws: Congress directs revenue cutters to aid in the execution of state quarantine laws.¹⁷

June 22, 1797

Comprehensive Quarantine Regulations: Commonwealth of Massachusetts issues comprehensive quarantine regulations governing disinfection of contaminated baggage, warning out of outsiders with smallpox, and the creation of town health committees.¹⁸ This law repeals most of the Commonwealth's quarantine laws of the colonial era.

February 25, 1799

Congress Authorizes Secretary of the U.S. Treasury to Oversee Quarantine: Officers of the customs revenue were to duly observe state quarantine regulations and, where necessary, to prolong quarantines to meet the requirements of state quarantine laws.¹⁹

June 20, 1799

Boston Board of Health Created: The board is established with Paul Revere as its first president. It was one of the first such boards in America with broad authority to regulate quarantine, nuisances, and filth.²⁰

August 16, 1802

First Government-Sponsored Cow Pocks Experimentation on Humans in America: The Boston Board of Health authorizes an experiment to determine if cowpox provides immunity to smallpox. Nineteen boys were inducted into an experiment to test the efficacy of cowpox.²¹

December 24, 1802

First Public Vaccination Program in America: Boston physicians initiate the first free cowpox vaccination program in America under the sponsorship of the Boston Board of Health. The city's poor are given free vaccinations and all others are requested to make liberal donations.²²

June 18, 1803

Boston Board of Health Authorized to Conduct Landside Quarantine: The General Court declares prisoners can be removed to quarantine hospital on Rainsford Island if they contract a contagious disease. The board of health is also authorized to close streets if quarantine is required within Boston.²³

March 8, 1810

First American Inoculation Law: The Massachusetts General Court authorized towns to establish committees to supervise inoculation with cowpox. No financial penalties were imposed for noncompliance.²⁴

March 2, 1824

U.S. Supreme Court Upholds State Authority over Quarantine: In the landmark case, *Gibbons v. Ogden* (22 US 1 (1824)), the Court declared the power of the state to provide for the health of its citizens using the powers of quarantine but those powers did not govern interstate commerce.²⁵

April 21, 1824

Consulting Physicians Assume Expert Role over Quarantine: Boston's City Council authorizes a group of expert physicians to serve as consulting physicians on infectious diseases and quarantine matters. For fifty years, these largely Harvard-educated physicians determine public health policy and exert substantial influence on the policies of other quarantine stations along the eastern seaboard.²⁶

March 12, 1828

Physicians Are Required to Report Smallpox Cases: Massachusetts' physicians must report all cases of smallpox or risk a fine of \$100.²⁷

Summer of 1832

Cholera Fears Prompt Public Health Planning: Fear of a cholera epidemic prompts Boston's city government to undertake a massive sanitation program.²⁸

June 8, 1847

Criminals, the Poor, and Immigrants “Quarantined” with the Sick: Deer Island assumes role of Boston's quarantine island,²⁹ while also serving as the home for the House of Corrections and House of Industry where Boston's criminal class and poor are “integrated” with the sick, orphans, and immigrants as a government cost-saving measure.³⁰

May 19, 1855

First Mandatory American Vaccination Law: Vaccination is required in Massachusetts for all children by the age of two. Revaccination of the population is authorized as deemed necessary by chief elected officials.³¹

May 13, 1857

First American Quarantine Convention Held in Philadelphia: Responding to concerns raised by the merchant class, public health officials and chief elected officials from many different seaboard states met in Philadelphia to rationalize

quarantine practices. Specific objectives were to improve the safety of people and the movement of goods and to establish a “uniform and improved system of external health laws” in view of the lack of a national quarantine strategy consistently applied across all states.³² The success of this convention spawned three subsequent conventions held in Baltimore (1858), New York (1859), and Boston (1860).³³

May 24, 1864

Boston City Hospital Opened to Meet the Needs of All City Residents: Boston City Hospital opens and is authorized to accept smallpox patients.³⁴

June 1, 1866

Gallop's Island Chosen as the City's Quarantine Station: Gallop's Island is chosen as the city's maritime quarantine station to handle an anticipated cholera outbreak that never occurred. It would be the city's last island quarantine station.³⁵

June 21, 1869

Massachusetts Establishes a State Board of Health: This landmark law authorized the Commonwealth to investigate the causes of disease and epidemics and their impact on public health.³⁶

April 12, 1872

Physicians Authorized to Remove Patients from Boarding Houses: Smallpox patients in boarding houses, hotels, and dwellings with two or more families may be removed under a physician's orders. Removal of smallpox patients could also be accomplished in other circumstances if it was determined that the patient could not be isolated.³⁷

January 15, 1873

Boston's Second Independent Board of Health Takes Office: Board assumes control in the middle of the city's worst smallpox epidemic. A classic case of the value of quarantine when applied in tandem with medical inspections.³⁸

April 1876

Germ Theory of Disease Emerges: Robert Koch, a German scientist, discovers that *Bacillus anthracis* bacterium is the cause of anthrax. Koch develops postulates used to test causative link between germs and disease.³⁹

April 23, 1878

Massachusetts Requires Cause of Death on Death Certificates: In an effort to improve the value of vital statistics, the General Court mandates local boards of health to list on death certificates instances of death by dangerous contagious disease—when an attending physician is not available to do so in a timely fashion.⁴⁰

April 29, 1878

Congress Creates First Law to Control Entry of Infectious Disease into America: Congress authorizes the supervising surgeon general of the U.S.

Marine-Hospital Service to create quarantine regulations and monitor ports and vessels to avoid the spread of infectious diseases. The law also authorizes state and local quarantine stations to act on behalf of the national quarantine system.⁴¹

June 2, 1879

Congress Creates National Board of Health: For the first time, Congress creates the National Board of Health to inspect foreign ports and authorizes the creation of bills of health for all vessels arriving in the United States.⁴²

January 5, 1881

First International Sanitary Conference Convened in Washington: Based on concerns with the uncoordinated response to cholera epidemics around the world, the United States convenes its first international sanitary conference in Washington, DC, to establish lines of communication among nations concerning the prevalence of contagious diseases, including routine reporting of the health of port cities. American delegates call for the adoption of bills of health to be issued to vessels before departure, and that such clearances be the responsibility of the public health officials from the port of destination.⁴³

March 21, 1884

Mandatory Reporting of Communicable Diseases: Physicians and householders in Massachusetts are mandated to report smallpox, diphtheria, scarlet fever, or any other disease dangerous to public.⁴⁴

March 16, 1888

First American Hospital with an Infectious Disease Ward: Boston City Hospital opens its first wards for contagious diseases to isolate diphtheria and scarlet fever cases. These were the only infectious disease wards in Massachusetts and prompted an immediate demand for these services.⁴⁵

February 15, 1893

National Quarantine Act Enables Uniform Approach: Congress authorizes U.S. Marine-Hospital Service to develop the first national uniform and systematic approach to quarantine working cooperatively with state and local boards of health. This law also authorized collection of epidemiological and sanitary data on the health of foreign and domestic ports and to require bills of health for all vessels. For the first time in American history, the president is authorized to prohibit entry of any person who poses a risk to public health. This law also requires states to comply with federal maritime quarantine where it has sovereign jurisdiction. This law signaled the beginning of the end of state-managed maritime quarantine stations.⁴⁶

May 21, 1895

Mandatory Care of Persons with Infectious Diseases: Massachusetts General Court requires all cities to provide for the treatment of persons from contagious diseases either in a hospital or as an outpatient.⁴⁷

June 5, 1895

Massachusetts Mandates Local Boards of Health Statewide: Responding to the need for a comprehensive approach local public health issues, the General Court mandates the creation of local boards of health; if not acted upon, the selectmen shall constitute the board of health.⁴⁸

August 31, 1895

First American Isolation Hospital: Boston City Hospital establishes South Department, a separate hospital dedicated to infectious diseases that expands services offered to Boston residents.⁴⁹

March 19, 1902

Vaccination Becomes Compulsory in Massachusetts: In an effort to control the smallpox epidemic, the Massachusetts General Court makes vaccination compulsory for all inhabitants unless, in the case of children under twenty-one years of age, a physician certifies that it would endanger the health of the child. Vaccination was considered far preferable to the burdens of large-scale quarantines.⁵⁰

1901–1903

Boston's Last Smallpox Epidemic Relies on Island Quarantine and Vaccination: More than 400,000 persons are vaccinated during a two-year period. Despite valiant efforts to quarantine on Gallop's Island and mandating vaccination, there were 1,596 cases of smallpox and 270 deaths.⁵¹

March 8, 1907

Massachusetts Department of Public Health Authorized to Determine Diseases Dangerous to Public Health: The Massachusetts legislature authorizes the department to determine diseases dangerous to public health without requiring legislation. This results in a rapid expansion of the list of communicable diseases that require public notification.⁵²

May 24, 1907

Reimbursement of Worker Wages When under Quarantine: Massachusetts is believed to be the first state to provide for compensation of workers' lost wages when restrained under quarantine orders.⁵³

June 1, 1915

Federal Government Controls Boston's Maritime Quarantine Station: Boston agrees to sell its quarantine station to the U.S. Public Health Service (USPHS).⁵⁴ USPHS takes over control over the city's quarantine station on Gallop's Island, including retaining the existing employees, buildings, equipment, and vessels.⁵⁵

November 2, 1916

Lethal Fumigant Creates International Controversy: Three British carpenters are overcome by the fumes released after the USPHS fumigates the steamship *Devonian* in Boston Harbor.⁵⁶ This event triggers a long debate on the dangers of hydrocyanic acid as a fumigant for ships suspected of carrying rats.⁵⁷ As a result,

Zyklon B, an even more powerful fumigant, is selected as the fumigant of choice in Boston Harbor.

October 12, 1917

American Public Health Association Defines Quarantine: The modern definitions of quarantine and isolation are established by an APHA Committee on Standard Regulations, chaired by Dr. Haven Emerson. These definitions remain the standard public health terminology used throughout the United States.⁵⁸

March 21, 1921

Federal Government Takes Control of Maritime Quarantine: After some forty years of incremental efforts to establish control over maritime quarantine from state and local governments, the USPHS purchases the remaining major port quarantine stations from Baltimore (\$176,775) and New York City (\$1,395,275).⁵⁹ Funds for these purchases were allocated by Sixty-Sixth Congress on June 5, 1920.⁶⁰

September 16, 1936

Gallop's Island "Mothballed" as a Quarantine Station: To save costs, the USPHS closes Gallop's Island. Gallop's Island medical staff inspected over five million immigrants and quarantined over ten thousand immigrants and city residents during its seventy-year history.

February 14, 1937

Boston and New York Are First to Eliminate Quarantine Inspections: To qualify for radio pratique, vessels must be free of disease, have a full-time ship's doctor, not have been in an infected port, be relatively rat free, and in good sanitary condition as long as they make radio contact with the USPHS twelve to twenty-four hours prior to arrival in port.⁶¹

July 1, 1944

Congress Enacts the Public Health Service Act of 1944: This law authorizes the president of the United States to issue Presidential Executive Orders identifying what diseases are communicable in nature. It also authorizes the president to halt immigration into America if it poses a risk to public health.⁶²

February 15, 1945

Bills of Health No Longer Required for Aircraft and Vessels: The U.S. surgeon general eliminates the requirements for bills of health at all ports under the control of the United States. This was a major change in the surveillance net for American public health triggered by remarkably limited incursions of communicable diseases.⁶³

January 15, 1946

U.S. Public Health Service Vacates Gallop's Island: As a result of declining levels of infectious diseases among immigrants and Boston residents, the USPHS relinquishes ownership of Gallop's Island.

May 25, 1951

International Sanitary Regulations Adopted: The World Health Organization's quarantine regulations are adopted by the United States and numerous other nations to govern six major communicable diseases.⁶⁴ The U.S. surgeon general is authorized to administer these responsibilities under Executive Order 10399 signed by President Truman on September 27, 1952.

June 25, 1966

Federal Quarantine Authority Transferred: Amendments to the U.S. Public Health Service Act transfer the authority to quarantine from the U.S. surgeon general to the Centers for Disease Control and Prevention (CDC).⁶⁵

April 4, 2003

SARS Declared a Communicable Disease: President Bush issues Executive Order 13295 declaring SARS a communicable disease.⁶⁶

April 10, 2003

New Federal Communicable Disease Regulations: The Public Health Service Act authorizes secretary of Department of Health and Human Services to make regulations to prevent the introduction, transmission, or spread of communicable diseases from foreign countries or between states.⁶⁷

November 10, 2003

Boston Enacts Quarantine Regulations for SARS: In response to the 2003 SARS epidemic in Asia, the city of Boston resuscitates quarantine regulations to address the potential for an epidemic from the spread of SARS.⁶⁸

April 1, 2005

Novel or Reemergent Influenza Declared a Communicable Disease: President Bush revises Presidential Executive Order 13295 to make novel forms of influenza communicable diseases if they have the potential to cause a pandemic. The hypothesis that transmission of avian flu from human to human could occur is the first use of a Presidential Executive Order as a tool to *anticipate the mutation of a virus*—instead of waiting for the mutation to occur.⁶⁹

October 6, 2008

New Medical Screening for Aliens: The CDC issues a new risk-based approach to medical exams for aliens due to widespread outbreaks in other parts of the world.⁷⁰

March 21, 2017

Major Revisions to Federal Quarantine Regulations: In light of numerous new and emerging pathogens, CDC makes major changes to its quarantine regulations affecting international and interstate quarantine policies.⁷¹

February 2, 2020

Immigration into the United States Halted Due to Pandemic: For the first time in over 120 years, the federal government halts immigration due to a public health crisis with COVID-19.⁷²

February 7, 2020

Airlines Ordered to Collect Detailed Passenger Data for COVID-19: With COVID-19 declared a pandemic, CDC rules that more detailed passenger data, namely, e-mail addresses, is needed if contact tracing is to be a viable option due to its rapid spread.⁷³

February 18, 2020

CDC Orders Airlines to Provide Chinese Passenger Data: Airlines are required to disclose data on passengers who departed from China within fourteen days of their entry into the United States. Concern with the spread of COVID-19 forces the CDC to pressure airlines to cooperate during the unprecedented national public health emergency.⁷⁴

March 13 and 14, 2020**Proclamations 9994 and 9996**

President Trump Declares National Emergency Due to COVID-19: President Trump takes sweeping action to control the spread of the virus in the United States, including suspending entry of foreign nationals seeking entry if they were previously in virus hot spots in the last fourteen days. The following day, he extended the suspension of travel to foreign nationals coming from the United Kingdom.⁷⁵

March 14, 2020

Federal Government Halts Embarkation of Cruise Ships: With enormous numbers of COVID-19 cases arising on highly confined cruise ships, CDC orders halt to the sailing of all cruise ships.⁷⁶

March 26, 2020

CDC Suspends Entry from Countries with Disease Outbreaks: With pandemic conditions prevailing, the CDC orders a stop to entry into United States.⁷⁷

May 28, 2020

President Trump Suspends Entry of Immigrants and Nonimmigrants Who Pose Health Risk: In an unprecedented use of the Immigration and Nationality Act, the president suspends travel from the Peoples Republic of China, Iran, the United Kingdom, and twenty-six European nations falling in the Schengen Area.⁷⁸

September 11, 2020

CDC Issues Final Rules Governing Suspension of Entry into the United States from Designated Foreign Countries: In response to the COVID-19 pandemic, the CDC issues streamlined procedures concerning the suspension of travel from any nation that may pose a public health threat to the United States.⁷⁹

APPENDIX B

Chronology of Nineteenth-Century Boston Quarantine Ordinances, 1822–1873

February 23, 1822

Boston City Council Charged with Public Health Duties: The General Court passes “An Act establishing the City of Boston” that vests the authority of the Boston Board of Health, including quarantine, with the Boston City Council. The act enables the city council to appoint health commissioners.

November 4, 1822

City Council Delegates Its Public Health Duties: Boston City Council transfers its public health authority to a subordinate group, known as the health commissioners.

April 21, 1824

Medical Guidance Authorized: The Boston City Council authorizes three consulting physicians to provide advice on infectious diseases and quarantine and assigns a physician to reside on Rainsford Island during the quarantine season for as many months as the mayor and board of aldermen deem necessary.

May 31, 1824

Health Commissioners Replaced with a Single Health Commissioner: The volunteer health commissioners are replaced by one individual with public health authority delegated from the city council.

June 3, 1824

Boston Adopts Quarantine Ordinance against Imported Disease: The ordinance establishes and regulates the quarantine of vessels.

June 27, 1826

The Resident Physician Position Is Established for Rainsford Island: Dr. Jerome Van Crowninshield Smith is selected as the first resident physician.

December 25, 1826

Quarantine Authority Is Shifted to Ward Politicians: The duties of quarantine are taken from the health commissioner and transferred to the mayor and board of aldermen.

August 10, 1833

Quarantine of Vessels Assigned to Resident Physician: A city council ordinance places responsibility for quarantine with the mayor and board of aldermen and care for the sick and cleaning of vessels with the resident physician.

June 17, 1841

Port Physician Given Broad Public Health Responsibilities: The Boston City Council establishes the position of port physician to replace that of the resident physician. Expanded duties include administering vaccination, cleansing of vessels, providing quarantine regulations, and giving the red flag to incoming vessels. Revisions to the city's ordinance, made on December 10, 1841, address the health needs of those in jail.

April 23, 1847

The General Court Removes the Requirement That Boston City Council Perform Board of Health Duties: This law does not change the day-to-day management of quarantine in Boston but does enable the city to simplify its quarantine oversight function.

June 8, 1847

Deer Island Replaces Rainsford Island as the City's Quarantine Station: To address the enormous influx of Irish immigrants, the anchorage ground on the south side of Deer Island is chosen as the site where vessels must stay in quarantine for twenty days.

May 10, 1849

The Boston City Council Establishes the Position of City Physician: Among the numerous duties of this position are caring for the city's sick, attending to those in jail, providing vaccinations at no charge, and assisting the medical profession and the Overseers of the Poor with a supply of vaccine.

May 17, 1849

Port Physician Is Moved to Deer Island: With the shift in the quarantine station, the resident physician is relocated to Deer Island. This decision, among others, prompts Dr. Jerome Van Crowninshield Smith to resign as the city's longest-serving port physician.

June 18, 1849

Mayor and Board of Aldermen Are Designated the City's Board of Health:

This decision, coming before the 1849 cholera epidemic and the mass arrival of poor and downtrodden Irish immigrants, compels the city council to simplify the administration of public health.

December 23, 1862

Smallpox Patients Allowed in Boston: Boston City Council authorizes the Boston City Hospital to accept smallpox patients as part of their hospital mission. This represents an important step in a more humane treatment of smallpox-infected Bostonians and a recognition that island quarantine is "bad medicine."

April 1, 1867

Gallop's Island Replaced Deer Island as City's Quarantine Station: With an insufficient amount of space for the large number of smallpox patients, the Deer Island quarantine station is shifted to Gallop's Island.

August 26, 1867

Boston Turns Quarantine Station over to Board of Directors of Public Institutions: This move coincides with the lack of adequate hospital accommodations on Deer Island for those ill with communicable diseases.

February 12, 1872

Boston City Hospital Activated for Smallpox: Boston Board of Aldermen authorize smallpox cases to be sent to the Boston City Hospital.

March 28, 1872

Board of Aldermen's Committee on Health Is Reauthorized to Control the Quarantine Station: Effective May 1, 1872, responsibility for quarantine reverts back to the city's Committee on Health, a subgroup of the city's board of aldermen.

August 5, 1872

Board of Aldermen Rescind Approval for Placing Smallpox Cases at Boston City Hospital: Patients are shifted to Gallop's Island after thousands of South Boston residents oppose smallpox patients in their neighborhood.

December 2, 1872

An Ordinance Creating an Independent Board of Health Is Adopted: A three-member board, appointed by the mayor, is staffed by physicians.

January 15, 1873

Independent Board of Health Assumes Control of Quarantine: Under a new mayor, with medical professionals in charge, the city promptly responds to the smallpox epidemic, bringing it under control in a matter of months.



APPENDIX C

History of Boston's Port Physicians, 1779–1915

Port Physicians	Life Span	Years of Service	Age at Appointment	Years of Service	Harvard University Graduate?
Dr. Joseph Whipple	1756-1804	1779-1787	23	9	No
Dr. Nathaniel Walker Appleton	1755-1795	1787-1789	33	2	Yes
Dr. Thomas Welsh	1752-1831	1790-1825	38	37	Yes
Theodore Dexter	1791-1849	1825-1826	34	1	No
Jerome V. C. Smith	1800-1879	1826-1849	26	24	No
John M. Moriarity	1807-1865	1849-1863	42	15	Yes
Silas E. Stone	1838-1887	1863-1865	25	3	Yes
Edward A. Whiston	1838-1909	1865-1867	27	3	Yes
Samuel H. Durgin	1839-1931	1867-1872	28	6	Yes
C. Irving Fisher	1846-1924	1873-1875	27	3	Yes
Alonzo S. Wallace	1847-1930	1875-1879	28	5	No
John B. Swift	1853-1913	1879-1880	26	1	Yes

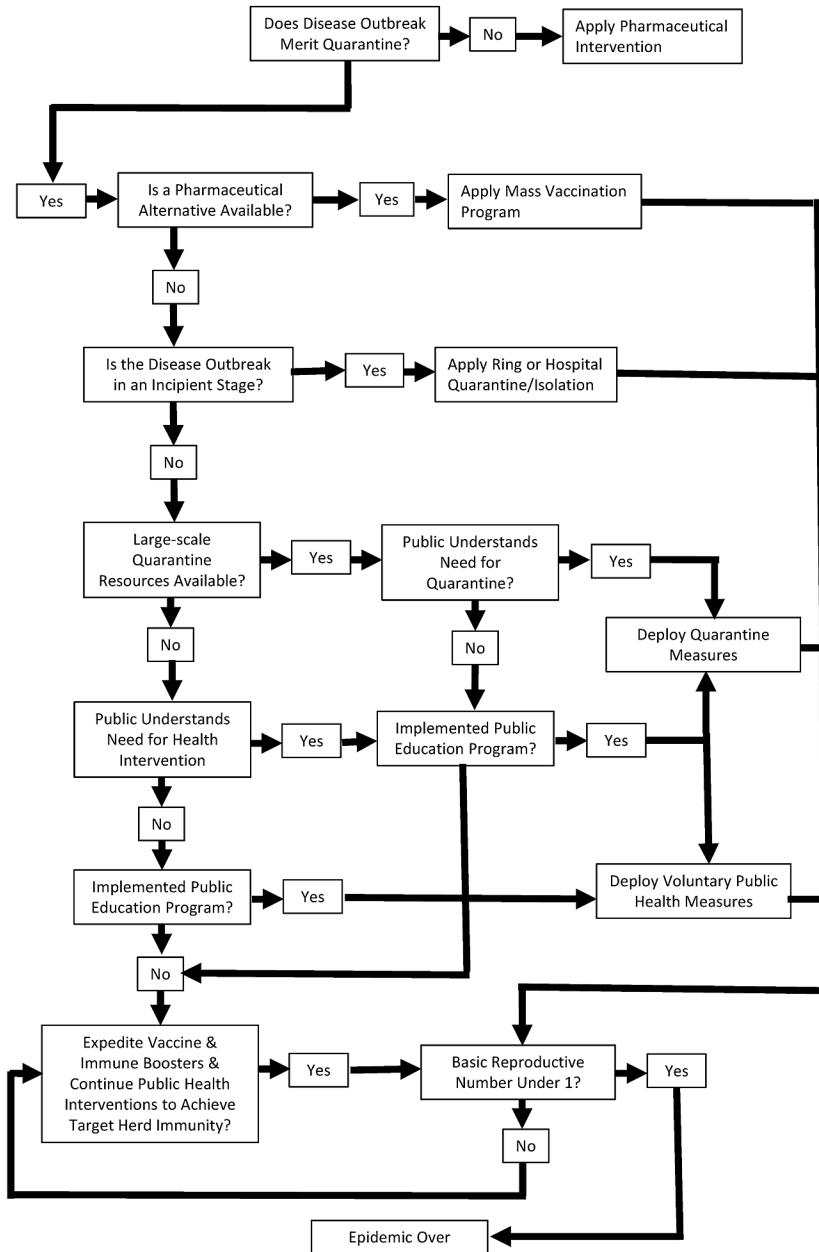
Charles E. Woodbury	1845-1936	1880	35	1	No
Alfred B. Heath	1857-1932	1880-1883	21	4	No
Arthur G. Griffin	1853-1930	1883-1887	30	5	Yes
Charles H. Cogswell	1859-UNK	1887-1893	28	7	Yes
Francis A. Lane	1866-1918	1893-1895	27	3	Yes
David D. Brough	1866-1921	1895-1896	30	1	Yes
Paul Carson	1869-1923	1897-1911	27	15	No
William M. Gay	1873-1933	1911	38	1	No
Francis X. Crawford	1872-1944	1911-1915	39	5	Yes
Average Age and Years of Service		29.7	7.2		
Harvard University Graduates				13	

Source: <http://portphysicians.blogspot.com/>



APPENDIX D

Quarantine Decision Tree



Quarantine Decision Tree

Glossary

Carrier

A person, who with or without symptoms of a communicable disease, harbors and disseminates the specific microorganisms. Distinct from a carrier, an infected person means a person in whose tissues the etiological agent of a communicable disease is lodged and produces symptoms.

Cholera

A dangerous infectious disease endemic in Asia, which is caused by intestinal infection with the bacterium *Vibrio cholerae* and is characterized by severe vomiting and diarrhea leading to dehydration and “tending to run a rapidly fatal course.”¹ This disease was also known as Asiatic cholera during the nineteenth century to distinguish it from cholera infantum (an often fatal form of gastroenteritis) and cholera morbus (acute gastroenteritis)—two diseases for which doctors of that era had already applied the term “cholera.”

City Physician

A physician whose duty it was to attend to all cases of disease and to perform all the professional services that may be required in the jail, city prison, and several police stations in the city. The city physician was responsible, when requested by the city registrar, to report the causes of death of all persons dying with no physician in attendance.

Communicable Disease

“An illness due to a specific infectious agent or its toxic products that arises through transmission of that agent or its products from an infected person, animal, or reservoir to a susceptible host, either directly or indirectly through an intermediate plant or animal host, vector, or the inanimate environment.”²

Consumption

Wasting of the body by disease; formerly, a waste disease; now specifically, severe pulmonary tuberculosis. This term was commonly used to describe tuberculosis during the nineteenth century.

Contagion

The spread of disease from body to body by direct or indirect contact. This term was often used in opposition to the miasma theory of disease. See definition of miasma below.

Contagionist

One who maintains that diseases such as yellow fever, plague, and cholera are communicable by contagion.

COVID-19

The name of the coronavirus disease established by the International Committee on Taxonomy of Viruses to reflect the genetic structure of the virus and facilitate development of diagnostic tests. This novel coronavirus exhibits a wide range of symptoms during an incubation period that generally falls between two to fourteen days. Common symptoms include fever, cough, shortness of breath, chills, muscle pain, sore throat, new loss of taste or smell, and headaches.³

Curfews

Restrictions on specific times of day, typically nighttime mobility,—often from sunset to sunrise—to minimize social gatherings and crowded public events likely to increase the risk of disease transmission. Curfews are in fact a form of time-based quarantines with enforcement oversight.

Dangerous Diseases

The Massachusetts General Court declared these diseases to include the plague or other sickness dangerous to the public health that triggered interventions such as removal of the infected person to a hospital or a place of reception for the sick as the board of health judged best. After March 8, 1907, the authority to determine which diseases were considered dangerous was delegated to the Massachusetts Board of Health.

Delousing

The process by which a person and his personal apparel are treated so that neither the adults nor the eggs of lice, *Pediculus corporis* or *Pediculus capitis*, survive.

Directly Observed Treatment

An alternative to full quarantine of patients with communicable disease whose infectivity can be controlled by directly observing treatment with pharmaceutical therapies, thereby protecting the public from exposure.

Disinfection

The act of destroying the vitality of the pathogenic microorganisms by chemical or physical means.

Distemper

Disturbed condition of the body or mind, ill health, illness, a mental or physical disorder, and a disease or an ailment. A term commonly used to describe epidemic diseases of the eighteenth century.

Endemic Disease

The constant presence of a disease or infectious agent within a given geographic area or population group; may also refer to the usual prevalence of a given disease within such area or group.⁴

Expulsion

The removal of individuals or groups of individuals from a city, state, or country due to their potential threat to public health as carriers of communicable disease. Historically, expulsion of individuals or groups, presumed infected with smallpox, occurred routinely in colonial times. Similar expulsion orders were also given for those entering without authorization into yellow fever-infected areas during the nineteenth century when such individuals were presumed to be carriers of the disease. See shotgun quarantines.

Fumigation

The process by which the destruction of insects, such as mosquitoes and body lice, and animals, such as rats, is accomplished by the use of gaseous agents.

Harbor Master

The person responsible for meeting all incoming vessels and guiding them to designated places for health and custom inspections and docking in port cities. Masters and commanders were required to declare to the harbor master any and all diseases that may have manifested on the ship during its passage to America. Harbor masters were also responsible for ensuring masters and commanders adhered to maritime regulations and complied with certain quarantine regulations as well. In the nineteenth century, some of the public health duties of harbor masters were shifted to port physicians in cities that established this position.

Incubation

The time between when a pathogen enters the body until signs or symptoms of infection first appear.

Infected Person

A person who has contracted a communicable disease. If it is a quarantinable disease, the infected person is removed to a place of quarantine or, if removal is too dangerous, then the neighbors may be removed to protect them from disease.

Inoculation

The introduction of a foreign substance (an antigen) into the body as a means to produce or boost immunity. This practice was first introduced into the United States in 1721 when Dr. Zabdiel Boylston, a Boston physician, inoculated his children with smallpox and then extended this practice to hundreds of Bostonians seeking to escape exposure to smallpox the natural way.

International Classification of Disease

The International Classification of Diseases (ICD) has the responsibility for naming diseases. One of the purposes of the naming system is to avoid the negative impacts

of diseases associated with places, countries, ethnic, social or religious groups, or classes of food that might be stigmatized by inappropriate naming conventions.⁵

Island Keeper

The person responsible for managing the affairs of island hospitals where immigrants and town residents were quarantined. Duties included providing boat transportation to the mainland, supplying patients with food, clothing, and shelter, and notifying local authorities whenever vessels arrived with contagious diseases to ratify government support for quarantine.

Island Quarantine

The traditional practice of removing the sick to offshore islands to ensure the greatest possible separation of the sick from the healthy population. Toward the end of the nineteenth century, with the advent of isolation hospitals on the mainland in most major American port cities, island quarantines lost favor as a means to limit communicable diseases. However, island quarantine remained an important element of maritime disease control until travel by airplane led to its demise in the early 1960s.

Isolation

The complete separation of patients with a contagious or infectious disease from contact with other people; the prevention of access to a place so infected. The Centers for Disease Control and Prevention (CDC) defines it as the separation of sick people with a contagious disease from people who are not sick.⁶

Isolation Hospitals

Sometimes called an infectious disease pavilion before the term “isolation hospital” came into vogue. Both terms were intended to replace the pejorative term “pest house.” Boston established several smallpox isolation hospitals after the 1872–1873 smallpox epidemic. In 1888, Boston City Hospital established separate wards for infectious diseases. Isolation hospitals eventually established specialized communicable disease control practices depending upon the mode of disease transmission and the level of nursing care required. By the early twentieth century, isolation hospitals were generally separate buildings with specific room ventilation requirements, personal protective equipment for nurses and physicians, hand-washing protocols, linen cleaning, and room disinfection procedures.

Kine Pox

A nineteenth-century term that was interchangeable with cowpox. Cowpox is a viral disease less lethal than smallpox, exposure to which provided a high degree of immunity to smallpox. For cowpox vaccine to work, arm-to-arm transfer of the live virus to patients seeking smallpox immunity was required. This method was later discarded in the 1870s when it was determined that heifer-derived cowpox vaccine was safer and more effective.

Lazaretto

This term was used before the twentieth century for a building or hospital used to quarantine those with contagious diseases, often located on islands or

locations far removed from urban centers. It was often associated with hospitals used for those with leprosy. The word is no longer in common use, replaced by “isolation hospitals” as the most appropriate term to describe communicable disease containment within a hospital setting.

Loathsome Disease Quarantine

Starting in 1891, the U.S. Immigration Service prohibited admission of immigrants who had diseases termed “loathsome” such as leprosy, tuberculosis, venereal diseases, and trachoma. Rather than accepting such individuals into America, the Immigration Service regulations called for these immigrants to be returned to their home country unless they appealed the decision to the Immigration Service’s Board of Special Inquiry—a very infrequent event with less than 1.6 percent of the medically certified ever appealing their exclusion decision.

Malignant Fever

Refers to a disease liable to become progressively more severe, extremely virulent, and very infectious. It is no longer in common usage.

Miasma

An infectious or noxious vapor specifically from putrescent organic matter that pollutes the atmosphere; a polluting or oppressive atmosphere.

Notifiable Disease

Any disease considered dangerous to the public health that must be immediately reported to the state board of health. In 1883, the number of notifiable diseases in Massachusetts was initially limited to smallpox. However, by 1930, a total of thirty-nine diseases required immediate notification. At the national level, the list of notifiable diseases was first published in October 1917 in the Public Health Reports of the U.S. Public Health Service and, subsequently, in the Control of Communicable Disease Manuals.⁷

Occupational Quarantine

Prohibition of employment of individuals who are carriers of specific communicable diseases in professions that pose a threat to public health of vulnerable populations. In the twentieth century, many state government health regulations prohibited typhoid carriers from working in restaurant and other food service enterprises. Typhoid Mary, an asymptomatic carrier of typhoid who infected many people while working as a cook, was largely responsible for this innovative application of quarantine—or what might be called quarantine by exclusion.

Pandemic

The International Epidemiological Association (IEA) defines it as “an epidemic occurring worldwide, or over a very wide area, crossing international boundaries, and usually affecting a large number of people.”⁸ In contrast, the World Health Organization (WHO) in its 2005 Pandemic Preparedness Checklist has stated, “An influenza pandemic (or global epidemic) occurs when a new

influenza virus subtype appears, against which no one is immune. This may result in several simultaneous epidemics worldwide with high numbers of cases and deaths.”⁹ The WHO has since indicated that the last sentence of the above definition is no longer sanctioned—making its definition similar to that of the IEA. Neither definition addresses the severity of the pathogen, which is often the most significant variable that coalesces international decision makers to declare any given pathogen a pandemic event. These definitions remain controversial, since the underlying purposes of declaring a pathogen a pandemic event is to muster the political and economic resources to mount a preparedness response.

Pest

A fatal epidemic disease, especially bubonic plague. This term is no longer in common use to describe disease.

Pest House

A hospital for people with infectious diseases, especially the plague. This term lost favor toward the end of the eighteenth century.

Pestilential Fever

A nineteenth-century term to describe fever of the nature of or pertaining to pestilence or epidemic disease, specifically bubonic plague.

Plague

A highly infectious and, if untreated with antibiotics, usually fatal disease transmitted to humans by rat fleas. This disease was responsible for the black death of fourteenth-century Europe. It was not until 1900 that plague entered America through the port city of San Francisco. Plague is now an endemic disease among rodents in the southwestern part of the United States.

Port Physician

A physician whose duty it was to supervise the quarantine station in the harbor. The position of port physician existed in most seacoast cities of colonial and post-colonial America. In the case of Boston, the port physician’s duties were assigned by the board of selectmen before 1822 and by the mayor from 1822 until January 15, 1873, when the Boston Board of Health assumed responsibility for supervising his work. The Boston port physician resided at the quarantine station until this station was transferred to the U.S. Public Health Service in 1915.

Pratique

Permission granted to a ship to enter port after quarantine or on showing a clean bill of health. See definition for radio pratique.

Quarantinable Disease

Diseases identified by the president of the United States through Presidential Executive Orders based on guidance from the CDC, as requiring federal quarantine. Similarly, state public health departments establish their own lists of quarantinable diseases that require the imposition of hospital or home isolation for infected persons and quarantine for those presumed or known to be exposed.

Quarantine

The modern definition of quarantine, established in 1917, is the separation and restriction of movement of people exposed to a contagious disease to see if they become sick.¹⁰ This definition emerged in the United States as contact tracing of communicable disease became an important component of modern public health practice. In earlier periods, as discussed in this book, quarantine practice did not always distinguish between those who were infected or sick and who were merely exposed or in close proximity to the infected. Historically, it was considered a period of isolation, originally of forty days, imposed on a person, animal, or thing that might otherwise spread a contagious disease. In nineteenth-century Massachusetts, quarantine regulations extended to all persons, goods, and effects arriving in vessels and to all persons who may visit or go on board the same.

Quarantine Grounds

In the context of Boston, the islands in Boston Harbor were designated as places of quarantine for those arriving by vessel from ports suspected of having communicable diseases or for infected Bostonians sent there by the city physician. After 1885, the definition of quarantine grounds was revised to refer to that portion of the harbor known as “President Roads,” which lies between Long, Deer, and Spectacle Islands. Although the quarantine grounds were originally limited to smallpox or other infectious distempers, the list of quarantinable diseases expanded after 1883. In Massachusetts, a quarantine ground could be established within or without municipal limits. However, when established outside of the municipal limits, the town within whose limits it may be established must assent to such action.

Quarantine Season

The period of the year during which infectious diseases were anticipated to arrive in port. Generally, this ranged from June 1 to October 1 of each year but could be established for shorter or longer periods depending upon the level of concern expressed by local or state health officials. An important influence for creating time-sensitive quarantines was the seasonal nature of yellow fever outbreaks along the east and southeast coasts of the United States. Virtually, all port cities along these coastlines adopted a quarantine season as a defensive measure against the saffron scourge.

Radio Pratique

A procedure that granted permission for a vessel to dock in certain specified U.S. ports without quarantine inspection if the vessel had a satisfactory health and sanitary status. Radio pratique is a twentieth-century U.S. Public Health Service revision to the ancient practice of vessel disinfection. It involved radio clearance of vessels based on preestablished disinfection and disease control protocols carried out by the ship physician and commander.¹¹

Red Flag

The Massachusetts Bay Colony required red flags to be placed on any house where persons infected with smallpox lived. This law took effect in 1732 and

lasted until 1872 when it was replaced by quarantine notices posted on the front of houses warning neighbors of the presence of infected persons.

Reverse Quarantine

Typically, this applies to the protection of immunocompromised or immunoincompetent individuals or groups, such as those living in nursing homes, individuals undergoing chemotherapy, and anyone with underlying health limitations. Under reverse quarantine, all persons—whether exposed to a communicable disease or not—are kept away from the vulnerable population.

Reverse Sanitary Cordon

A technique used by healthy communities attempting to thwart the incursion of a communicable disease through the use of road blocks and other barriers restricting the entry of outsiders into a community. The success of this practice was limited by the community's dependence on outside resources—whether food supplies or other essential goods—for survival. The delivery of goods and services from outside sources was a critical vulnerability of reverse sanitary cordons. See the definitions for reverse quarantine and shotgun quarantine.

Ring Quarantine

The isolation of neighborhoods, businesses, or geographic areas where there is a concentration of communicable disease. Ring quarantines require significant resources when the size of the affected geographic area or buildings requires extensive public health oversight to eliminate unauthorized entry or exit into the containment zone. This application of quarantine was used to eradicate smallpox in India in conjunction with a ring vaccination program where susceptible villagers were vaccinated during the period infected villagers were held in quarantine. Ring quarantine is also an effective strategy to contain an epidemic in its incipient state when applied with the requisite resources to meet the basic needs of the quarantine population.

Sanitary Cordons

This concept, also known as cordon sanitaire, is similar to ring quarantine. It is based on the notion of restricting the movement of people into or out of a given geographic area where a communicable disease is known to exist. During the great European plague epidemic of the fourteenth century, walls or barriers around infected cities were patrolled by armed guards posted to keep travelers from entering and city dwellers from leaving.¹² This concept does not address restrictions on the movement of microorganisms and higher forms of life that may also play a role as vectors for zoonotic disease transmission. Also see reverse sanitary cordon.

Self-quarantine

The voluntary confinement of an individual exposed or suspected of exposure to a communicable disease. Self-quarantine became vogue with the COVID-19 pandemic when more than half of all states in America imposed restrictions on travel for individuals coming from COVID-19 hot spots. Some state

self-quarantine orders imposed penalties for violating restrictions on travel during the period of the declared pandemic emergency.

Sequestration

A term of art used in this book to describe the isolation of those undergoing a voluntary inoculation with the smallpox virus, a vaccination by cowpox, or other antiviral vaccination modalities to ensure the pathogen is not communicated to others during the incubation period of the inoculation/vaccination.

Shelter in Place

A strategy primarily used during chemical, biological, radiological, nuclear, or explosive (CBRNE) releases to the environment. It also is used as a means to protect people during extreme weather events such as tornadoes and hurricanes. Shelter in place is not normally applied to communicable disease control strategies except in cases of bioterrorism events that require short-term, self-imposed quarantines to avoid environmental exposure. However, during the COVID-19 pandemic, numerous governors in the United States chose to refer to voluntary home-based self-quarantines as “shelter in place” to avoid the use of the word “quarantine.”

Shotgun Quarantine

A term used in the southern states during nineteenth-century yellow fever epidemics that devastated many port cities like New Orleans and Biloxi. Shotgun quarantine refers to the practice of stopping travelers from infected cities from entering other cities using force if necessary. Prior to Dr. Walter Reed’s discovery of yellow fever as a vector-borne disease transmitted through the bite of a mosquito, it was believed to be contagious and transmitted by humans.

Smallpox

An acute and sometimes fatal contagious viral disease (now eradicated by vaccination) characterized by fever, scarring, and rash of spots, which develop into vesicles and then pustules, also called “variola.”

Smallpox Hospitals

During the nineteenth century, the Massachusetts General Court authorized the establishment of hospitals dedicated to those infected with smallpox or other diseases dangerous to public health. Such hospital had to be at least one hundred rods away from an inhabited dwelling.

Social Distancing

The Centers for Disease Control and Prevention adopted the term “social distancing” to mean “keeping space between yourself and other people outside of your home. To practice social or physical distancing: Stay at least 6 feet (2 meters) from other people; do not gather in groups; Stay out of crowded places and avoid mass gatherings.”¹³ Despite the value of the CDC guidance as a disease containment strategy, the appropriate separation distance between two or more people is only one of the many factors that influence the spread of a disease. For example, aerosol transmission of certain viral or bacterial pathogens increases the

separation distances required to avoid exposure beyond those recommended by CDC. In addition, as infection is based on dose–response principles, the duration of exposure, the viral load transmitted by an infected person, the susceptibilities of the exposed person, and the degree to which personal protective equipment are used all influence the value of social distancing. Social distancing is most useful when highly communicable pathogens cannot be quickly contained through contact tracing followed by isolation of the infected and quarantine of the exposed. It works best in combination with other voluntary nonpharmaceutical strategies such as the use of personal protective equipment and imposition of reverse quarantines for immunocompromised groups (e.g., nursing home patients).

Susceptibles

A person or animal not known to be immune to a particular communicable disease.

Tuberculosis

Any disease characterized by the formation of tubercles. Now, specifically, a disease caused by the bacillus *Mycobacterium tuberculosis* and characterized by the formation of nodular lesions or tubercles in the tissues.

Vaccination

The inoculation of an individual with a vaccine to induce or increase immunity; originally, specific inoculation with a preparation of vaccinia as a protection from smallpox. The term “vaccination” is now applied as a technique to boost immunity to a wide range of diseases. Immunity may be achieved through injection of killed or attenuated microorganisms against specific diseases.

Vaccine

Designating, appearing in, or characteristic of the disease of cowpox; designating or pertaining to the causative agent of cowpox. Today, the term applies to any disease for which a pharmaceutical treatment is available to boost immunity.

Vector

An agent that carries or transmits a communicable disease pathogen to other organisms.

Yellow Fever

An infectious tropical disease caused by an arbovirus transmitted by mosquitoes of the genera *Aedes*, especially *A. aegypti* and *A. Haemagogus* and characterized by high fever, jaundice, and vomit that is dark in color as a result of gastrointestinal hemorrhaging.

Zoonosis

The IEA defines it as “an infection or infectious disease transmissible under natural conditions from vertebrate animals to humans.”¹⁴

About Sources

The completion of this book required an extensive amount of research in more than forty libraries in the greater Boston area as well as in Washington, DC, San Francisco, New Orleans, South Carolina, Georgia, Germany, Italy, Australia, and South America. The subjects of quarantine, in general, and Boston quarantine, in particular, are topics that have been very difficult to research due to a dearth of basic historical literature on these topics. To a large extent, the materials in this study relied on primary source materials from various locations each of which provided a piece of information that helped map out the larger “puzzle” of the historical evolution of quarantine in Boston and America over the last four hundred years. The primary sources that have proved to be the most valuable have included newspapers; federal, state, and local legislation; board of selectmen meeting minutes; Boston Board of Health annual reports; Boston city documents covering municipal activities during the nineteenth and twentieth centuries; the *Boston Medical and Surgical Journal* (later called the *New England Journal of Medicine*); USPHS archives; and contemporary accounts of epidemics.

Newspapers

The most valuable eighteenth-century accounts of smallpox epidemics and the use of quarantine can be found in the *Boston News-Letter* (especially during the years 1716, 1717, 1718, 1721, 1722, and 1764). Toward the end of the eighteenth century, and for the first thirty years of the nineteenth century, the *Columbian Centinel* provided excellent coverage of smallpox, yellow fever, and other “pestilential distempers” that emerged during the period 1790–1830. The Boston Board of Health regulations and notices for the period 1799–1822 were routinely carried in the *Columbian Centinel*, thereby providing a complete record of the application of quarantine—both

maritime and landside quarantines—within the city and its harbor. The National Board of Health, created in 1878, issued the *National Board of Health Bulletin* for several years. This newspaper provided excellent historical information on the use of quarantine across the United States, including a concise summary of the history of quarantine laws in Massachusetts.

From 1872 onward, the *Boston Daily Globe* provided excellent coverage of smallpox epidemics and the struggle to create Boston's first independent board of health in 1872. The *Boston Globe* also provided excellent coverage of the cholera quarantine of 1892. The *Boston Daily Advertiser* and *Boston Herald* also provided excellent coverage of the 1872 smallpox epidemic. The *New York Times* provided periodic coverage of Boston's epidemics, including the application of quarantine. Ironically, the *New York Times* often provided better coverage of breaking news stories in Boston than local newspapers that appeared to be under pressure to minimize “bad” news stories about the city. Identifying epidemics and quarantine events through the *New York Times* online service facilitated the identification of follow-up newspaper stories in local Boston papers.

Bowen's Boston Newsletter and City Record, issued for a brief two-year period from 1826 to 1827, provides a rare glimpse at the life and activities occurring on Boston Harbor islands. It is worth noting that the editor of the *Boston News-Letter*, Dr. Jerome Van Crowninshield Smith, was also the city's port physician for over twenty years. His personal accounts of the harbor islands and the sufferings of those who were forced to undergo quarantine on these islands are priceless. There are very few firsthand accounts of life on quarantine stations. Dr. Smith's occasional articles in *Bowen's Boston Newsletter* and *City Record* provided valuable insights on the day-to-day activities on Rainsford Island during the 1820s.

Boston Records

Boston's history has determined the location of its historical records. Documents relating to the period when it was a town (i.e., from 1630 and 1822) are contained in the *Reports of the Record Commissioners* and the *Records Relating to the Early History of Boston*. These records provide detailed histories of the town's response to various smallpox epidemics of the seventeenth and eighteenth centuries. For most of this period of time (i.e., 1630–1799) the selectmen were responsible for all quarantine and public health affairs. As a result, the minutes of the town's selectmen provides a valuable summary of quarantine actions taken over a period of nearly 150 years.

After 1822, Boston became a city, and its records were kept in a new format. From 1822 to 1915, the city operated the Boston Quarantine Establishment on various islands in the harbor. For this period, the minutes of the board of aldermen and common council provides a rich resource of

information on the motivations for the establishment and use of quarantine. There is no overall index to these records from 1822 to 1868. However, it was discovered that an index exists at the back of each year's minutes that addresses quarantine and disease outbreaks that occurred during the year. The political considerations associated with the deployment of quarantine are well documented in these minutes, particularly those in the 1820s and 1872.

The Boston documents for the city physician (1849–1872), the superintendent of health (1853–1872), the board of health (1873–1945), and the Board of Directors for Public Institutions (1857–1872) provided a wealth of information on the disease outbreaks, sanitation control measures, port quarantine, and local public health legislation and policies. Other important Boston documents include the inaugural addresses of Boston's mayors from 1822 to 1915. These addresses provide a summary of important public health and quarantine activities as viewed by the city's chief elected official. During the nineteenth century, public health, sanitation, and quarantine were frequently mentioned topics in the mayor's inaugural address.

Another important source of information on the Boston Quarantine Establishment were the published quarantine regulations of the Boston Board of Health (1799–1822) and later on the quarantine ordinances issued by the city of Boston (1823–1948). The city of Boston periodically issued *The Charter of the City Council of Boston and Ordinances made and Established by the Mayor, Aldermen and Common Council* (e.g., 1827, 1834, 1850, 1856, 1866, 1869, 1885, 1887, 1890, 1895, 1908, 1915, and 1925). In addition, toward the end of the nineteenth century, Boston also issued the *Digests of the Statutes and Ordinances relating to Public Health* (e.g., in 1873 and 1890 and periodically thereafter). These summaries of Boston ordinances and health digests provide a great amount of information concerning the historical evolution of Boston's public health laws, in general, and quarantine laws, in particular.

The *Annual Audit of Receipts and Expenditures* from 1867 to 1915 provided detailed financial information concerning the cost of managing the Boston Quarantine Establishment and responding to the smallpox epidemics of 1872–1873 and 1901–1903. The city's financial priorities with respect to quarantine and public health were well documented and provided the data to determine the overall costs for managing a maritime quarantine program, as well as helped to explain why the city was so eager to divest itself of quarantine in 1915.

The city's *Municipal Register* from 1840 to 1915 provided a complete list of the city physicians, port physicians, consulting physicians, island keepers, harbormasters, and the captains of the quarantine vessels. The tenure in office for these positions helped to establish the relative stability of the Boston Quarantine Establishment and determine who the key players were

during the nineteenth and early twentieth centuries. In addition, the annual municipal register provided an invaluable summary of all public health and quarantine legislation that had been enacted in previous years. With this municipal legislation, it was possible to compile an historical chronology of Boston ordinances pertinent to quarantine and public health measures.

Periodic committee reports on specialized topics such as Rainsford Island, Gallop's Island, the 1849 cholera outbreak, the management of Deer Island by the Board of Directors for Public Institutions, and special communications by the consulting physicians or the city physician were invaluable in establishing the motivations for the use or abstinence from using quarantine during the nineteenth century.

State Records

The state's records were important but not as central to the history of the Boston Quarantine Establishment as city records. Nevertheless, the acts and resolves passed by the Massachusetts General Court (the legislative body for the Commonwealth of Massachusetts) were a fundamental information source for the history of quarantine in Boston. Because virtually all quarantines ever enacted were enabled by state legislation, it is essential to understand the limits of the quarantine authority established by the General Court. Fortunately, the Massachusetts State House has kept excellent legislative records from the founding of Massachusetts Bay in 1636 until present. Each of the annually published acts and resolves of the General Court were reviewed from 1701 to 2005 to determine which laws pertained to quarantine and/or communicable disease. A complete listing of all the pertinent laws was compiled including a brief summary of each law to establish the legislative history supporting the use of quarantine from 1636 to the present. This part of the research was not only the most interesting it was also one of the most complex aspects of the study. Hundreds of laws were enacted over this more than three-hundred-year period that pertained to quarantine and communicable disease. In many cases, it was not possible to understand the purpose of many laws without comparing the law to the statutes that were currently in effect at any given time. In many cases, this rather time-consuming effort revealed the real reasons why laws were enacted. However, where the reason for legislative change was not obvious, recourse was made to the legislative histories for individual laws as contained in Senate and House reports for the nineteenth and twentieth centuries. In almost all cases, it was possible to determine what prompted new quarantine legislation. There were some exceptions, including why legislators were unduly influenced by nineteenth-century physicians to relieve them of fines and penalties for not reporting epidemic diseases such as smallpox.

The Massachusetts State Archives were also an invaluable source of information on the early history of quarantine in Boston Harbor, including the

history of many of the quarantine islands. The archives also provided mortality data on the number of smallpox deaths in Boston during the epidemic of 1872–1873, including their geographic distribution throughout the city. This data was essential in determining the extent to which the Irish were disproportionately affected by this epidemic.

Federal Records

From 1915 to 1945, the federal government played a significant role in managing quarantines in Boston Harbor. The records of the U.S. Public Health Service (USPHS) (known as the U.S. Marine-Hospital Service prior to 1912) provided very detailed records of the administration of the Boston Quarantine Establishment during the post-World War I era. The National Archives and Records Administration (NARA) has detailed records of USPHS activities on Gallop's Island. There is a massive volume of internal correspondence between the acting surgeons in charge on Gallop's Island and the U.S. surgeon general. The surgeons in charge of Gallop's Island did an excellent job of documenting the political, financial, and medical aspects of running the island quarantine station. Their records are held in the archives at College Park, Maryland, Waltham, Massachusetts as well as in the suburbs of Atlanta, Georgia. The records in College Park include medical, public health, financial, and administrative documents, including the annual reports of the Boston Quarantine Station from 1915 to 1940. In contrast, the records in Waltham, Massachusetts are primarily real estate documents that cover the purchase, management, and sale of Gallop's Island. The NARA records in College Park include a unique photographic and map collection of the Gallop's Island quarantine station.

Federal quarantine laws dating from 1796 to 1940 were reviewed to determine their impact on the Boston Quarantine Station. Congress enacted federal legislation as early as 1796. However, it was not until the 1870s that federal legislation began to influence the quarantine activities in Boston Harbor. All of the federal quarantine legislation enacted between 1796 to the present was reviewed to determine its potential impact on the Boston Quarantine Establishment, in particular, and American quarantine practice, in general. The Boston Public Library, Harvard's Widener and Law School Libraries, and online Nexus-Lexis and HeinOnline searches were the primary sources for this historical legislation.

Medical Journals

A wide range of medical journals were reviewed to determine medical perspectives on the smallpox, cholera, yellow fever, and plague epidemics that occurred in Boston during the eighteenth, nineteenth, and twentieth centuries. By far, the *Boston Medical and Surgical Journal* (BMSJ) provided the

most detailed accounts of smallpox, cholera, and tuberculosis epidemics in nineteenth and twentieth-century Boston. Indeed, at least one of the nineteenth-century editors of the BMSJ had also served as the city's port physician. In addition, many of the city's consulting physicians were regular contributors to the BMSJ providing detailed accounts of contemporary epidemics from their official vantage point as spokesmen for the city of Boston. The BMSJ carried several important articles on the smallpox epidemics of 1872–1872 and 1901–1903 that were essential to a proper understanding of these outbreaks.

There were several other important nineteenth-century medical journals that covered activities in Boston or provided an overall assessment of epidemics of national or international significance. The journals that have proven to be most useful include: the *American Journal of the Medical Sciences* (AJMS); the *British Medical Journal* (BMJ); the *Annals of Medical History*; the *Journal of the History of Medicine and Allied Sciences*; the *Journal of the American Medical Association*; the Public Health Reports and Papers of the American Public Health Association (especially those published before 1910); the *Bulletin of the History of Medicine*; and the *Journal of Infectious Diseases*. The AJMS provided exceptionally detailed accounts of the cholera epidemic of 1831–1832. Since this was one of the most well-read medical journals of that time, its articles on cholera carried considerable influence in the medical and public health communities.

Biographies and Diaries

History is the story of exceptional individuals who have left their mark on society. Without question, this study would not have been able to provide personal details on the lives of public health and medical personnel without reliance on several important nineteenth-century biographies. Because Jacob Bigelow was a major player at Harvard Medical School during its first fifty years, as well as one of the most respected consulting physicians in nineteenth-century Boston, his writings and biography have proved useful in the preparation of several chapters. George Ellis wrote *Memoir of Jacob Bigelow MD* in 1880. This biography places Dr. Bigelow's life and contributions within the context of eighteenth-century Puritanism and the emerging miasmatic theory of disease. Similarly, Howard Arnold's *Memoir of Jonathan Mason Warren MD* provides insights into various members of the Warren family all of whom contributed greatly to nineteenth-century medicine. A third important physician who not only influenced nineteenth-century quarantine practice but medical practice as well was Dr. James Jackson. His biography, titled *A Memoir of Dr. James Jackson*, authored by James Jackson Putnam, provides insights on how physicians personally responded to epidemic events in the early nineteenth century.

Physicians were not the only players within the Boston Quarantine Establishment. Several mayors played crucial roles in the evolution of quarantine and public health policy, including majors Josiah Quincy and William Gaston. The city of Boston posthumously published *A Memorial of William Gaston* in 1895. This document provides valuable background on the life of Mayor Gaston during the period when he established Boston's first independent board of health. Several other physicians played central roles in the development of quarantine controls in nineteenth-century Boston, including Dr. Samuel Green, Dr. Samuel Durgin, and Dr. Jerome V.C. Smith. While very little is published on their lives, their contributions are well documented in the annual reports of the Boston Board of Health and the port physician. Moreover, obituaries and published articles by these physicians have provided valuable additional information on their quarantine and public health philosophies.

Local officials and military leaders also left important records documenting the impact of smallpox on Boston and its surrounding towns. Ezekiel Price, a Boston selectman, kept a diary during the Revolutionary War. It provides astonishing glimpses into the life of Boston's refugees and the battles to contain the smallpox epidemic immediately following the British army's departure from Boston. Similarly, *The Papers of George Washington*, chronicle the daily musings and orders of General Washington during his siege of Boston and, subsequently, when he corresponded with Major General Artemas Ward, the commander left in charge of Boston during the summer of 1776.

Secondary Sources

Although primary works were the major source for this study, there were various secondary sources that provided important overviews of the public health, quarantine, political, and social developments of the last three hundred years. Perhaps the most important of these secondary sources is John Blake's classic study, *Public Health in the Town of Boston: 1630–1822*. This book provides a valuable overview of public health developments in the town of Boston including an excellent description of the smallpox epidemic of 1721 and the emergence of inoculation under the guidance of Zabdiel Boylston. Blake also covers the early stages of Boston's sanitation movement that was inextricably linked to the miasma theory of disease. While Blake did not address nineteenth or twentieth-century quarantine history, these issues are partly addressed by Barbara Rosenkrantz in *Public Health and the State: Changing Views in Massachusetts, 1842–1936*. Rosenkrantz provides a useful overview of the public health movement in Massachusetts and the emergence of the state board of health. The social and political issues associated with quarantine controls and the massive nineteenth-century immigration of the

Irish to Boston is best understood through Oscar Handlin's classic study, *Boston's Immigrants: 1790–1880*.

The best and only book on the history of international quarantine during the last 150 years is Oleg Schepin's *International Quarantine*. Schepin provides an excellent historical perspective on how quarantine controls became international in character as a result of the numerous sanitary conferences that were convened in the nineteenth and twentieth centuries. Between 1851 (the date of the first International Sanitary Conference) and 1933 (the date of the International Sanitary Convention for Aerial Navigation), there were over thirteen international conferences that attempted to achieve universal quarantine standards among the key maritime nations of the world. It is not possible to appreciate the evolution of the Boston Quarantine Establishment, in particular, or American quarantine controls, in general, without understanding these international conferences and their impact on quarantine policy and practice.

Because the history of quarantine in Boston intersects with the American Revolution, several treatises on that war have proven to be indispensable in compiling a complete picture of how military operations impacted quarantine strategy and, in turn, how quarantine strategy influenced military actions. Of particular importance in this regard are Richard Frothingham's *History of the Siege of Boston*, Sir William Howe's *Orderly Book: 1775–1776*, Philip Cash's *Medical Men at the Siege of Boston*, and Elizabeth Fenn's *Pox Americana: The Great Smallpox Epidemic of 1775–82*. These studies provide valuable insights as to why quarantine controls were imposed in 1775 and 1776. Of course, some of the most valuable primary source materials come from the personal correspondence of George Washington and his orderlies, the minutes of the Boston Board of Selectmen, and the resolves of the Massachusetts General Court.

Boston's post–Revolutionary War period cannot be understood without a review of maritime commerce and developments in the New England shipbuilding industry. One of the classic studies in that arena is Samuel Eliot Morison's *The Maritime History of Massachusetts: 1783–1860*. At the turn of the eighteenth century, Boston was the nation's premier port city playing a greater role in maritime commerce than any other American city. The imposition of quarantine controls in 1799 came at a time when business and political leaders were attempting to recover from the post–Revolutionary War depression. Public health measures such as quarantine cannot be properly understood without an understanding of the economic pressures for expanded maritime trade that emerged at the beginning of the nineteenth century.

The topography and geography of Boston and its harbor have strongly influenced the way Bostonians have planned the location of undesirable land uses such as quarantine stations, hospitals, pest houses, disinfection facilities, and smallpox hospitals. Because early Boston was confined to a relatively small geographic area (i.e., an area of less than one square mile), many of the public

health and medical intervention strategies were strongly influenced by available land and neighborhood concerns with the spread of infection in their backyards. Several studies provide excellent overviews of Boston's historical growth through land making and annexation activities. The most valuable include Nancy Seasholes' *Gaining Ground: A History of Landmaking in Boston*, Walter Muir Whitehill's *Boston: A Topographical History*, Charles Shaw's *A Topographical and Historical Description of Boston*, Edward Rowe Snow's *The Islands of Boston Harbor*, Carl Ernst's *Constitutional History of Boston Massachusetts*, and Annie Haven Twing's *The Crooked & Narrow Streets of the Town of Boston: 1630–1822*. In many ways, the story of quarantine is a story of the battle for disease-free territories within the city and the forces that emerged on both sides of this battle. Isolation and quarantine strongly influenced how the infected lived and where they died in Boston. The topography of quarantine emerges from the pressure points of disease, politics, neighborhood opposition to pest houses, and the constraints caused by development on an overcrowded peninsula.

There are numerous historical descriptions of major smallpox, yellow fever, and cholera outbreaks of the eighteenth and nineteenth century. Several that have been most useful in the preparation of this study include Charles Rosenberg's *The Cholera Years*, C.W. Dixon's *Smallpox*, Fenner's *Smallpox and its Eradication*, John Blake's study of *Benjamin Waterhouse and the Introduction of Vaccination*, and Derrick Baxby's *Jenner's Smallpox Vaccine*.

Chronologies of Boston Harbor Islands

The quarantine histories of Boston's harbor islands is fascinating and deserves its own special treatment. After nearly twenty years of researching these islands and their history, an enormous amount of new information has been uncovered that sheds light on quarantine, public health, and medical practices in the eighteenth, nineteenth, and twentieth centuries. To provide interested readers and researchers with greater detail on the quarantine histories of these islands, four separate blog sites can be accessed. The chronology of each of the quarantine islands can be accessed at the following blog sites:

- <http://rainsfordisland.blogspot.com/>
- <http://gallopsisland.blogspot.com/>
- <http://spectacleislandhistory.blogspot.com/>
- <http://deerislandchronology.blogspot.com/>

Profiles of Boston's Port Physicians and Island Keepers

Fourteen men served as island keepers on Spectacle and Rainsford Islands from 1738 to 1852. Their role in managing epidemics and quarantine response measures has been a well-kept secret until the release of this book.

Brief biographies of the principal island keepers can be accessed at <http://islandkeepers.blogspot.com/>.

Similarly, Boston's twenty-one port physicians played a key role in responding to nineteenth and twentieth-century epidemics and their lives and contributions to public health have been little chronicled. Port physicians were assigned to control quarantine affairs from 1779 all the way to 1915 when the USPHS assumed responsibility for maritime quarantine affairs in Boston. A brief account of the lives and contributions of a selected number of these port physicians can be accessed at <http://portphysicians.blogspot.com/>.

Federal and Commonwealth Quarantine Laws

A detailed study of quarantine would not be complete without an analysis of the local, Commonwealth and federal laws that have governed landside and maritime quarantine over the last four hundred years. A summary of the major Commonwealth quarantine laws that have been enacted between 1647 and the present can be accessed at <http://massachusettsquarantine.blogspot.com/>.

Federal quarantine laws, while less developed and less significant in the overall history of American quarantine, continue to play an important role in national and international quarantine response measures. A summary of the twenty-six major federal quarantine laws can be accessed at <http://fedquarantine.blogspot.com/>.

Notes

Abbreviations

Acronyms are used for commonly cited notes to refer to archives, newspapers, journals, and government documents.

AJMS	<i>American Journal of Medical Sciences</i>	BMSJ	<i>Boston Medical and Surgical Journal</i>
ARLM	Acts and Resolves Passed by the Legislature of Massachusetts	BNL	<i>Boston News-Letter</i>
ARPMB	Acts and Resolves, Public and Private, of Province of Massachusetts Bay	BPB	<i>Boston Post Boy</i>
		BRC	<i>Boston Record</i>
ARRE	<i>Annual Report of the Receipts and Expenditures of the City of Boston</i>	BWR	<i>Boston Weekly Report</i>
		CJWA	<i>Continental Journal and Weekly Advertiser</i>
ARSG	<i>Annual Report of Surgeon General of the U.S. Public Health Service</i>	COL	<i>Columbian Centinel</i>
		INDC	<i>Independent Chronicle</i>
BBH	Boston Board of Health	MGC	Massachusetts General Court
BBPI	Boston Board of Directors of Public Institutions	MGCHOR	Massachusetts General Court House of Representatives
BCA	Boston City Auditor	MHS	Massachusetts Historical Society
BCC	Boston City Council	NARA	National Archives and Records Administration
BCD	Boston City Documents	NEC	<i>New-England Courant</i>
BCP	Boston Consulting Physicians	NYT	<i>New York Times</i>
BDA	<i>Boston Daily Advertiser</i>	USGPO	U.S. Government Printing Office
BEP	<i>Boston Evening Post</i>	USPHS	U.S. Public Health Service
BG	<i>Boston Gazette</i>		
BHD	Boston Health Department		

Introduction

1. A. N. Bell, "Contagiousness of Phthisis," *Sanitarian* 6, no. 65 (1878): 358–359. While reports of European experiments on the contagious character of tuberculosis were published in America as early as 1878, they did not alter public health practices or laws for years to come.
2. Massachusetts General Court, "Records of the Governor and Company of the Massachusetts Bay in New England," in *Quarantine Order of 1647*, ed. Nathaniel Bradstreet Shurtleff (Boston: The Press of William White, 1853), 237–238; Province of Pennsylvania, "An Act to Prevent Sickly Vessels Coming into This Government," ed. Province of Pennsylvania (Philadelphia: Peter Miller and Co., 1762), 9; Delaware Counties, "An Act to Prevent Sickly Vessels Coming into This Government," ed. Kent and Sussex Delaware Counties of New Castle (Philadelphia: B Franklin and D. Hall, New Printing Office, 1752), 67.
3. H. Feldmann et al., "Emerging and Re-emerging Infectious Diseases," *Medical Microbiology and Immunology* 191, no. 2 (2002): 63–74; M. E. Woolhouse, "Population Biology of Emerging and Re-emerging Pathogens," *Trends in Microbiology* 10, no. 10 Suppl (2002): S3–S7.
4. U.S. Department of Health and Human Services, "Notice of Order Under Sections 362 and 365 of the Public Health Service Act Suspending Introduction of Certain Persons From Countries Where a Communicable Disease Exists," *Federal Register* 85, no. 59 (March 26, 2020): 17060.
5. John Duffy, *Epidemics in Colonial America* (Baton Rouge: Louisiana State University Press, 1971).
6. General Board of Health Great Britain, *Report on Quarantine* (London: Printed by W. Clowes & Sons for H.M.S.O., 1849); P. Oleg Schepin and Waldeimar V. Yermakov, *International Quarantine* (Madison, CT: Internaitonal Universities Press, Inc., 1991); Howard Markel, *Quarantine; East European Jewish Immigrants and New York City Epidemics of 1892* (Baltimore: The Johns Hopkins University Press, 1997); John Booker, *Maritime Quarantine: The British Experience, c. 1650–1900 (The History of Medicine in Context)* (Hampshire, England: Ashgate Publishing Limited, 2007).
7. Institute of Medicine, *Sustaining Global Surveillance and Response to Emerging Zoonotic Diseases* (Washington, DC: National Academies Press, 2009), 83–95.
8. Nathan D. Wolfe, *The Viral Storm* (New York: Henry Holt & Co., 2011), 15–16.
9. Ibid.
10. Centers for Disease Control and Prevention, *Isolation Techniques for Use in Hospitals* (Washington, DC: USGPO, 1975).
11. Geddes Smith, *Plague On Us* (New York: Commonwealth Fund, 1941), 177–180; Sheri Fink, "Signs Ebola Spreads in Sex Prompt a CDC Warning," *New York Times*, April 20, 2015, A-6.
12. Ibid.

Chapter 1: The Quarantine Grab Bag

1. United States Public Health Service, *The Control of Communicable Diseases*, ed. U.S. Public Health Service (Washington, DC: Government Printing Office, 1917), 5.
2. Barron H. Lerner, "New York City's Tuberculosis Control Efforts: The Historical Limitations on the War on Consumption," *American Journal of Public Health* 83, no. 5 (1993): 758–766.
3. C. DiGiovanni et al., "Quarantine Stressing Voluntary Compliance," *Emerging Infectious Disease* 11, no. 11 (2005): 1778–1779.
4. Quarantine has long been identified with many pejorative terms, including banishment, ostracism, exile, detention, confinement, imprisonment, etc. The language of quarantine must change in parallel with changes in its applications.
5. D. M. Bell, "Non-pharmaceutical Interventions for Pandemic Influenza, National and Community Measures," *Emerging Infectious Disease* 12, no. 1 (2006): 88–94.
6. Woolhouse, "Population Biology of Pathogens," S3–S7.
7. Ibid. The classic examples of the expulsion rite is the U.S. law prohibiting entry of those with loathsome disease found at: U.S. Treasury Department, "An Act in Amendment to the Various Acts Relative to Immigration and the Importation of Aliens under Contract or Agreement to Perform Labor," in *Immigration Laws and Regulations*, ed. U.S. Treasury Department (Washington, DC: USGPO, 1893), 11–14.
8. Kathleen S. Swendiman and Jennifer K. Elsea, *Federal and State Quarantine and Isolation Authority* (Washington, DC: American Law Division, CRS, 2006).
9. The national response to the tuberculosis epidemic of the early twentieth century and the AIDS epidemic at the end of the twentieth century are classic examples of how large-scale epidemics have overwhelmed hospital resources.
10. The best examples of humanitarian approaches to quarantine took place in Boston in 1764 and once again in 1776 and are discussed in detail within this book.
11. The most relevant research has been conducted by Howard Markel on the 1918 flu pandemic. Howard Markel, Alexandra M. Stern, and Martin S. Cetron, "Non-Pharmaceutical Interventions Employed by Major American Cities during the 1918–1919 Influenza Pandemic," *Transactions of the American Clinical and Climatological Association* 119 (2008): 644–654.
12. N. M. Ferguson et al., "Strategies for Containing an Emerging Influenza Pandemic in Southeast Asia," *Nature* 437, no. 7056 (2005): 209–214.
13. Cass R. Sunstein and Richard H. Thaler, *Nudge: Improving Decisions about Health, Wealth and Happiness* (New York: Penguin Books, 2008).

14. Alexander Fleming, *Penicillin* (London: Butterworth & Co., 1946), 1–24. Antiviral drugs are an even more recent discovery dating back to the 1960s. Accessed August 28, 2020: <http://bmb.oxfordjournals.org/content/41/4/309.abstract>
15. Frederic Gorham, “The History of Bacteriology and Its Contribution to Public Health Work,” in *A Half Century of Public Health*, ed. Mazyck P. Ravenel (New York: American Public Health Association, 1921), 66–93.
16. U.S. Treasury Department, “Laws and Regulations for the Maritime Quarantines of the United States,” ed. U.S. Treasury Department (Washington, DC: USGPO, 1893), 10.
17. Leland E. Cofer, “A Word to Ship Captains about Quarantine: An Open Letter to Ship Captains,” ed. U.S. Treasury Department, Public Health Bulletin (Washington, DC: USGPO, 1912).
18. Ralph Chester Williams, *The United States Public Health Service: 1798–1950* (Washington, DC: Commissioned Officers Association of the United States, 1951), 113–175.
19. Daniel Charles, *Between Genius and Genocide* (London: Jonathan Cape, 2005), 245–246.
20. Ibid.
21. Tom Jefferson et al., “Physical Interventions to Interrupt or Reduce the Spread of Respiratory Viruses: Systematic Review,” *British Medical Journal* 339 (2009): 339–348; Thomas McKeown, *The Origins of Human Disease* (Oxford: Basil Blackwell Ltd, 1988), 84–89.
22. C. E. A. Winslow, *The Life of Hermann M. Biggs* (Philadelphia: Lea & Febiger, 1929), 140–143. New York led the way on controlling spitting but Boston followed soon afterwards.
23. Wilbur A. Sawyer, “Typhoid Carrier on Shipboard,” *Journal of the American Medical Association* 58, no. 18 (1912): 1336–1339; Judith Walzer Leavitt, *Typhoid Mary: Captive to the Public’s Health* (Madison, WI: Beacon Press, 1996).
24. Jefferson, “Physical Interventions with Respiratory Viruses,” 339–348.
25. M. Woolhouse and E. Gaunt, “Ecological Origins of Novel Human Pathogens,” *Critical Reviews in Microbiology* 33, no. 4 (2007): 231–242.
26. H. Markel and A. M. Stern, “All Quiet on the Third Coast: Medical Inspections of Immigrants in Michigan,” *Milbank Quarterly* 80, no. 4 (2002): 757–788.
27. Nayan Shah, *Contagious Divides; Epidemics and Race in San Francisco’s Chinatown* (Berkeley: University of California Press, 2001).
28. The Johns Hopkins University Press, “The Siracusa Principles on the Limitation and Derogation Provisions in the International Covenant on Civil and Political Rights,” *Human Rights Quarterly* 7, no. 1 (1985): 3–14.
29. R. J. Blendon et al., “Attitudes Toward the Use of Quarantine in a Public Health Emergency in Four Countries,” *Health Affairs* 25, no. 2 (2006): 15–25.

30. Judith Walzer Leavitt, "Politics and Public Health: Smallpox in Milwaukee, 1894–1895," in *Sickness and Health in America*, ed. Judith Walzer Leavitt and Ronald L. Numbers (Madison: The University of Wisconsin Press, 1985), 372–382; Guenter B. Risse, "A Long Pull, A Strong Pull, and All Together": San Francisco and Bubonic Plague, 1907–1908," *Bulletin of the History Medicine* 66, no. 2 (1992): 260–282; Charles McClain, "Of Medicine, Race and American Law: The Bubonic Plague Outbreak of 1900," *Law and Social Inquiry* 13, no. 3 (1988): 447–513.
31. McClain, "Medicine, Race and American Law," 447–513.
32. Andrea Bogio et al., "Limitations on Human Rights: Are They Justifiable to Reduce the Burden of TB in the Era of MDR and XDR-TB?" *Health and Human Rights* 10, no. 2 (2008): 121–126.
33. American Association for the International Commission of Jurists, *Siracusa Principles—on the Limitation and Derogation Provisions in the International Covenant of Civil and Political Rights* (Geneva: Author, April 1985), 18.
34. Lisa F. Berkman, "The Role of Social Relations in Health Promotion," *Psychosomatic Medicine* 57, no. 3 (1995): 245–254; J. Gammon, "The Psychological Consequences of Source Isolation: A Review of the Literature," *Journal of Clinical Nursing* 8, no. 1 (1999): 13–21; Janice K. Kiecolt-Glaser et al., "Emotions, Morbidity and Mortality: New Perspectives from Psychoneuroimmunology," *Annual Review of Psychology* 53 (2002): 83–107.
35. G. Huang and Khai Lin, "Back to Basics: Hand Hygiene and Isolation," *Current Opinion in Infectious Diseases* 27, no. 4 (2014): 379–389.
36. Jon Kamp and Anna Wilde Matthews, "As U.S. Nursing-Home Deaths Reach 50,000, States Ease Lockdowns," *Wall Street Journal*, June 15, 2020.
37. Gorham, "The History of Bacteriology," 66–93; WHO, *WHO Expert Committee on Smallpox Eradication*, Technical Report Series, No 493 (Geneva: World Health Organization, 1972), 32; P. F. Wherle et al., "An Airborne Outbreak of Smallpox in a German Hospital and Its Significance with Respect to Other Recent Outbreaks in Europe," *Bulletin of the World Health Organization* 43, no. 5 (1970): 669–679; Derek K. Chu et al., "Physical Distancing, Face Masks, and Eye-Protection to Prevent Person to Person Transmission of SARS-CoV-2 and COVID-19: A Systematic Review and Meta-Analysis," *Lancet* 395 (2020): 1973–1987.
38. Ronald Bayer, A. L. Fairchild, and James Colgrove, *Searching Eyes: Privacy, The State and Disease Surveillance in America* (Berkeley: University of California Press, 2007), 1–29.
39. Massachusetts, "ARPMB," in *An Act in Addition to an Act Intititled "An Act Providing in Case of Sickness," Chapter 14*, ed. Massachusetts General Court (Boston: Wright & Potter, 1874), 91–92.
40. Duffy, *Epidemics Colonial America*, 103.
41. Gordon G. Heiner, "A Study of Inapparent Infection in Smallpox," *American Journal of Epidemiology* 94, no. 3 (1971): 266–267; Aaron A. King et al., "Inapparent

Infections and Cholera Dynamics," *Nature* 454, no. 14 (2008): 877–880; Frank J. Fenner et al., *The Biology of Animal Viruses*, 2nd ed. (London: Academic Press, 1974), 612–615; D. Beyene et al., "Nasal Carriage of Mycobacterium Leprae DNA in Healthy Individuals in Lega Robi Village, Ethiopia," *Epidemiology and Infection* 131, no. 2 (2003): 841–848. Accessed August 28, 2020: http://en.wikipedia.org/wiki/Subclinical_infection

42. Bayer, Fairchild, and Colgrove, *Searching Eyes*, 12.

43. *Ibid.*, 2.

44. Charles Vidich, *Summary of Disease Reporting Laws Requiring Physicians to Report: 1764–1919* (Ashford, CT: Vidich Associates, 2012).

45. Luther Halsey Gulick and Leonard P. Ayres, *Medical Inspection of Schools* (Philadelphia: Survey Associates Inc., 1913), 15–17.

46. The first newspaper ever published in America, *Publick Occurrences*, covered the 1690 smallpox epidemic in Boston. It was banned from further publication after the first issue, and this decision was probably influenced, in part, by the incendiary nature of the epidemic reporting.

47. M. A. Rothstein and M. K. Talbott, "Encouraging Compliance with Quarantine: A Proposal to Provide Job Security and Income Replacement," *American Journal of Public Health* 97, no. Suppl 1 (2007): S49–S56.

48. U.S. Census Bureau, *American Community Survey, 2017 ACS 5-Year Estimates*, Table S1702. Accessed September 1, 2020: <https://data.census.gov/cedsci/table?q=2017%202000%25%20of%20poverty%20level%20&tid=ACSST1Y2017.S1702&hidePreview=false>

49. Kelsey Snell, "Here's How Much Congress Has Approved for Coronavirus Relief So Far and What It's For," National Public Radio, May 15, 2020. Accessed online June 20, 2020: <https://www.npr.org/2020/05/15/854774681/congress-has-approved-3-trillion-for-coronavirus-relief-so-far-heres-a-breakdown>. During the first three months of the COVID-19 pandemic, the federal government allocated about \$3 trillion for economic relief and the public health response—unprecedented levels of financial support for an epidemic.

50. Daniel Gardner, *The Science of Fear* (New York: Penguin Group, 2009), 138–143.

51. *Ibid.*, 59–86.

Chapter 2: Quarantine through the Generations: Five Stages of Practice

1. Susan Wade Peabody, "Historical Study of Legislation Regarding Public Health in the States of New York and Massachusetts," *Journal of Infectious Diseases* 6, no. Suppl 4 (February 1909): 40–43.

2. Josiah Henry Benton, *Warning Out in New England* (Boston: W.B. Clarke Co., 1911); Massachusetts, *The Overseer's Guide: Or A History of the Laws of Massachusetts Respecting the Settlement, Support, Employment and Removal of Paupers* (Brookfield: E. Merriam & Co., 1815).

3. Massachusetts, "ARPMB," in *An Act to Prevent the Spreading of the Smallpox or Other Infectious Sickness, Chapter 1*, ed. Massachusetts General Court (Boston: Wright & Potter, 1874), 987–988.
4. Donald R. Hopkins, *Princes and Peasants: Smallpox in History* (Chicago: University of Chicago Press, 1983), 183, 187, 237. Hopkins notes that case fatality rates as high as 90 percent were not uncommon for races or ethnic groups without previous exposure.
5. Jerome Van Crowninshield Smith, ed., *Rainsford Island*, vol. 2, *Bowen's Boston Newsletter and City Record* (Boston: Abel Bowen, 1826).
6. Massachusetts established Spectacle Island as its quarantine station in 1717. Similarly, quarantine stations were established in Charleston, South Carolina, on Sullivan's Island (1712); Philadelphia, Pennsylvania, on Province Island (1742); New York City on Bedlow's island (1755); Savannah, Georgia, on Tybee Island (1750); Portsmouth, New Hampshire, on Anthony's Island (1721); New Haven, Connecticut, on Oyster Point (1752); Newport, Rhode Island, on Coaster's Island (1716); and Cape Hatteras, North Carolina, on Ocracoke Inlet (1755).
7. Bernard Bailyn, *Voyagers to the West* (New York: Vintage Books, 1986), 260–262.
8. Charles Vidich, Unpublished research on colonial seaboard quarantine stations, April 2015.
9. Compilation of quarantine statistics derived from the Minutes of the Boston Selectmen, 1721–1775.
10. Duffy, *Epidemics Colonial America*, 101–103; Peabody, "Historical Study of Public Health Legislation," 114.
11. Minutes of the Boston Board of Aldermen, May 7, 1832, 167.
12. BCC, "Port Physician," ed. Boston City Council, *An Ordinance in Addition to an Ordinance to Establish the Office of Port Physician* (Boston: Author, 1841), 1–3.
13. Smith, *Rainsford Island*.
14. Kunal M. Parker, ed. *Citizenship and Immigration Law: 1800–1924*, vol. 2, *The Cambridge History of Law in America* (New York: Cambridge University Press, 2008); Michael Grossberg and Christopher Tomlins, eds., *The Cambridge History of Law in America*, vol. 2 (New York: Cambridge University Press, 2008), 181–183.
15. Leonard Dinnerstein, "The Supreme Court and the Rights of Aliens," ed. American Political Science Association and American Historical Association (Fall 1985), Reprinted in, *This Constitution: A Bicentennial Chronicle*, 420–431. Accessed September 4, 2020: <https://files.eric.ed.gov/fulltext/ED282814.pdf>
16. John Walter Kerr, *Communicable Diseases: An Analysis of the Laws and Regulations for the Control Thereof in Force in the United States*, 1 vol. (Washington, DC: USGPO, 1914), 10; Brock C. Hampton, "Development of the National Maritime Quarantine System of the United States," *Public Health Reports* 55, no. 28

(1940): 1241–1257; Surgeon General, “Annual Report of the Surgeon General,” ed. U.S. Treasury Department (Washington, DC: USGPO, 1921), 170.

17. Victoria Bennett, “Medical Examination of Aliens: A Policy with Ailments of Its Own,” *UALR Law Journal* 12 (1989): 739–753.

18. U.S. Treasury Department, “Immigrations Laws and Regulations,” ed. U.S. Treasury Department (Washington, DC: USGPO, 1893).

19. This was certainly true for Boston, Philadelphia, Savannah, Charleston, and many smaller eastern seaboard ports.

20. Walter Wyman, “The Quarantine System of the United States,” *Sanitarian* 39 (1897): 418–427; Edwin Maxey, “Federal Quarantine Laws,” *Political Science Quarterly* 23, no. 4 (1908): 617–636; E. P. Lowe, “The Necessity for Quarantine,” *New Orleans Medical and Surgical Journal* 58 (1905): 537–544; Hampton, “Development of Maritime Quarantine,” 1254–1255.

21. Schepin and Yermakov, *International Quarantine*, 63–77.

22. Annual Reports of the U.S. Surgeon General 1900 to 1941.

23. Surgeon General, “Annual Report of the Surgeon General,” 1921; “Annual Report of the Surgeon General,” ed. U.S. Treasury Department (Washington, DC: USGPO, 1931).

24. Schepin and Yermakov, *International Quarantine*, 159–269.

25. BCC, “Proceedings and Debates of the Fourth National Sanitary Quarantine and Sanitary Convention” (paper presented at the Fourth National Sanitary Quarantine and Sanitary Convention, Boston, MA, June 14, 15, 16, 1860).

26. Schepin and Yermakov, *International Quarantine*; O. Aginam, “International Law and Communicable Diseases,” *Bulletin of the World Health Organ* 80, no. 12 (2002): 946–951; A. M. Stern and H. Markel, “International Efforts to Control Infectious Diseases, 1851 to the Present,” *JAMA* 292, no. 12 (2004): 1474–1479.

27. Nikolai Nikitin et al., “Influenza Virus Aerosols in the Air and Their Infectiousness,” *Advances in Virology* 2014 (2014): 2.

28. Aaron Fernstrom and Michael Goldblatt, “Aerobiology and Its Role in the Transmission of Infectious Diseases,” *Journal of Pathogens* (2013). Accessed September 4, 2020: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3556854/pdf/JPATH2013-493960.pdf>.

29. Richard Horton, *The COVID-19 Catastrophe* (Medford, MA: Polity Press, 2020), 102–105.

30. N. M. Ferguson et al., “Strategies for Mitigating an Influenza Pandemic,” *Nature* 442, no. 7101 (2006): 448–452.

31. Ibid.; Joel K. Kelso et al., “Simulation Suggests That Rapid Activation of Social Distancing Can Arrest Epidemic Development Due to a Novel Strain of Influenza,” *BMC Public Health* 9 (2009): 117. <https://doi.org/10.1186/1471-2458-9-117>

32. The prime example of this emerging role is Doctors without Borders and the increasing public health consciousness of numerous billionaires who have taken on epidemic disease as a personal challenge. Bill and Melinda Gates are

the examples of this new philanthropy transforming past governmental approaches to quarantine and disease surveillance.

Chapter 3: Quarantine in the Colony

1. Only the 1647 and 1665 epidemics relied on provincial legislation to achieve their ends. Subsequent seventeenth-century quarantines in Boston relied on police powers of the Town's selectmen who ordered watchmen to guard the infected so they would not escape and spread the disease.

2. Larry Lee Burkhart, *The Good Fight: Medicine in Colonial Pennsylvania, 1681–1765* (Ann Arbor, MI: University Microfilms International, 1982), 55; Ernest Caulfield, "A History of the Terrible Epidemic, Vulgarly Called the Throat Distemper, as It Occurred in His Majesty's New England Colonies Between 1735–1740," *Yale Journal of Biology and Medicine* 11 (January/March 1939): 222–223, 258–260; Eric H. Christianson, "Medicine in New England," in *Medicine in the New World*, ed. Ronald L. Numbers (Knoxville: University of Tennessee Press, 1987), 102–103; Richard Harrison Shryock, "Eighteenth Century Medicine in America," in *Proceedings of the American Antiquarian Society* (Worcester: American Antiquarian Society, 1950), 277. Many physicians failed to distinguish between diphtheria and scarlet fever during the throat distemper epidemic of 1735 to 1740. Similarly, Burkhart found Pennsylvania physicians failed to distinguish between these diseases and were ignorant of the communicability of some diseases, including tuberculosis.

3. Johns Hopkins Historical Club, "The History of Typhoid Fever," *Medical News* 87, no. 25 (1905): 1195.

4. Francis H. Brown, "The Practice of Medicine in New England Before The Year 1700," in *The Bostonian Society Publications* (Boston: T.R. Marvin & Sons Printers, 1911), 95–120; Burkhart, *The Good Fight*, 104, 117; Walter L. Burrage, "Medicine in Massachusetts (1620–1930)," in *Commonwealth History of Massachusetts*, ed. Albert Bushnell Hart (Boston: The States History Company, 1930), 540–541; Shryock, "Eighteenth Century Medicine," 280–286; G. B. Warden, "The Medical Profession in Colonial Boston," in *Medicine in Colonial Massachusetts: 1620–1820* (Boston: The Colonial Society of Massachusetts, 1980), 145–157. Burrage, Shryock, Christianson, and Brown all point to the lack of professional credentials in the medical profession prior to 1700. Burkhart points to a similarly strong self-help movement in Pennsylvania: "When colonial Pennsylvanians got ill, they most frequently tried to treat themselves."

5. Patricia A. Watson, *The Angelical Conjunction: The Preacher-Physicians of Colonial New England* (Knoxville: University of Tennessee Press, 1991), 7–35.

6. Christianson, "Medicine in New England," 139–142; Duffy, *Epidemics Colonial America*, 8. Duffy states "Prescriptions were compounded in a haphazard fashion, and no one thought of measuring the amount of drugs with any degree of accuracy."

7. BRC, *A Report of the Record Commissioners of the City of Boston, Boston Records 1770 to 1777*, vol. 18, BCD#91 (Boston: Rockwell and Churchill City Printers, 1887), Records of the town of Boston, 246; *A Report of the Record Commissioners of the City of Boston Selectmen, 1764–1768*, vol. 20, BCD#55 (Boston: Rockwell and Churchill City Printers, 1889), Records of the town of Boston, 80; Boston Registry Department, *Records of the Early History of Boston, Boston Town Records, 1784–1796*, vol. 31, BCD#101 (Boston: Rockwell and Churchill City Printers, 1903), Records of the town of Boston, 307. These documents detail the flight of wealthy Bostonians to the country in smallpox epidemics of 1764, 1776, and 1792.
8. Burkhart, *The Good Fight*.
9. Francis Randolph Packard, *The History of Medicine in the United States* (Philadelphia: J.B. Lippincott Co., 1901), 64–155.
10. John B. Blake, *Public Health in the Town of Boston* (Cambridge: Harvard University Press, 1959), 28–30; Duffy, *Epidemics Colonial America*; Edward G. Huber, “The Control of the Communicable Diseases Prevalent in Massachusetts,” *Boston Medical and Surgical Journal* 195, no. 2–14, 20 (1926); Noah Webster, *A Brief History of Epidemic and Pestilential Diseases; with the Principal Phenomena of the Physical World, Which Precede and Accompany Them, and Observations Deduced from the Facts Stated*, 2 vols. (Hartford: Printed by Hudson & Goodwin, 1799); Ola Elizabeth Winslow, *A Destroying Angel; the Conquest of Smallpox in Colonial Boston* (Boston: Houghton Mifflin Co., 1974); Samiel Bayard Woodward, “The Story of Smallpox in Massachusetts,” *New England Journal of Medicine* 206, no. 23 (1932), 1181–1191. These authors summarize the extensive number of epidemics affecting Boston.
11. Charles Vidich, *17th Century Epidemics in Boston Including Fatality Rate and Sources* (Ashford, CT: Vidich Associates, 2016).
12. Jay Mack Holbrook, *Boston Beginnings: 1630–1699* (Oxford, MA: Holbrook Research Institute, 1980). Population estimate for 1677 reflected interpolated data presented in tables 2 and 6.
13. Carl Bridenbaugh, *Cities in the Wilderness: The First Century of Urban Life in America, 1625–1742* (New York: Capricorn Books, 1938), 143; BCC, “Municipal Register for 1915,” *Documents of the City of Boston for the Year 1915* (Boston: Boston Printing Department, 1916), 252. Bridenbaugh’s 1700 population estimate is considered more realistic than that of the 1915 Municipal Register.
14. Charles Vidich, *Comparison of Major Quarantines Imposed in Boston: 1721 to 1922* (Ashford, CT: Vidich Associates, 2010).
15. Samuel Eliot Morison, *The Maritime History of Massachusetts* (Boston: Northeastern University Press, 1961), 31–36; James Truslow Adams, *New England in the Republic, 1776–1850* (Gloucester, MA: Little, Brown, and Co., 1960), 30–59, 183–203.
16. Benton, *Warning Out*. Quarantine practice paralleled the warning out of strangers in eighteenth-century Boston. Indeed, Massachusetts quarantine law had its origin in English Poor law based on “warning out” principles.

17. See discussion in chapter 8 on Boston's experience compared with Philadelphia.
18. Charles Vidich, *Quarantine Orders Protecting the Port of Boston: A Summary* (Ashford, CT: Vidich Associates, 2005). A summary of these quarantine orders and their sources is posted at: Accessed August 28, 2020: <http://18thcenturybostonquarantineorders.blogspot.com/>
19. Warden, "Medical Profession in Colonial Boston," 145–157.
20. Blake, *Public Health in Boston*, 30; Karl Wilhelm Ernst, *Constitutional History of Boston, An Essay* (Boston: Boston Historical Co., 1894), 36.
21. Blake, *Public Health in Boston*, 28–30.
22. Christianson, "Medicine in New England," 120–124; Duffy, *Epidemics Colonial America*, 4. Christianson claims the low level of medical training in Colonial Massachusetts was "threatening the health of Massachusetts' inhabitants." Only 399 of the nearly 1,370 doctors who practiced medicine in Massachusetts during the eighteenth century had a BA degree. Prior to 1700, few Massachusetts physicians were apprentice trained based on research conducted by Christianson. Contributing to physician's relative low standing in colonial society was an inordinate number of epidemics of smallpox, diphtheria, and scarlet fever that taxed their ability to provide palliative care. Prior to 1721, there were no antidotes for smallpox, and only limited palliative care for those sick from measles or scarlet fever. Duffy's classic treatise references the aphorism of William Douglass, "More die of the practitioner than of the natural course of the disease," revealing the average person's hesitation to use their services.
23. Burkhart, *The Good Fight*, 72–118.
24. Ibid.
25. John Tennent, *Every Man His Own Doctor: or, The Poor Planter's Physician: Prescribing, Plain and Easy Means for Persons to Cure Themselves of All, or Most of the Distempers, Incident to This Climate, and with Very Little Charge, the Medicines Being Chiefly of the Growth and Production of This Country. [Eight Lines from Milton]*, 3rd ed. (Philadelphia: Re-printed and sold by B. Franklin, near the market, 1734). The author of this popular treatise provided the "poorer sort" with tips on appropriate treatments for a wide range of ailments that could be cheaply administered without physicians. Such a "do-it-yourself" approach was a virtual necessity in rural New England, where knowledgeable medical men were few and far between.
26. Eric H. Christianson, "The Medical Practitioners of Massachusetts, 1630–1800: Patterns of Change and Continuity," in *Medicine in Colonial Massachusetts, 1620–1820*, ed. Frederick S. Allis Jr. (Boston: Colonial Society of Massachusetts, 1980), 54. There were about one thousand people per physician in the seventeenth and eighteenth century making bedside care a tall challenge during epidemics.
27. John B. Blake, "The Inoculation Controversy in Boston: 1721–1722," *New England Quarterly* 25, no. 4 (1952): 492.
28. Charles Vidich, *Summary of Major Quarantine Island Stations in Early America: 1700–1937* (Ashford, CT: Vidich Associates, 2012).

29. J. C. McDonald, "The History of Quarantine in Britain During the 19th Century," *Bulletin of the History of Medicine* 25, no. 1 (1951): 22. One of those exceptions was the plague in Netherlands in 1663. Two years prior to its arrival in London, the Privy Council imposed a thirty-day quarantine, later extended to forty days in the hopes of preventing the plague from reaching English shores. These measures were ineffective for the plague reached London in 1665. McDonald also discusses the first English use of maritime quarantine.
30. Booker, *Maritime Quarantine*, 12.
31. Ibid.
32. BRC, *A Report of the Record Commissioners of the City of Boston, Records 1700 to 1728*, vol. 8, BCD#137 (Boston: Rockwell and Churchill City Printers, 1883), Records of the town of Boston, 7, 145, 152, 213.
33. BRC, *A Report of the Record Commissioners of the City of Boston, Boston Records from 1660 to 1701*, vol. 7, BCD#50 (Boston: Rockwell and Churchill City Printers, 1881), Records of the town of Boston, 113. The town began closing the town gate every night starting as early as 1677. By 1679, the town retained eight watchmen to watch the city and its gates.
34. Jacob Bailey Moore, *Memoirs of American Governors*, vol. 1 (New York: Gates and Stedman, 1846), 238.
35. Darrett B. Rutman, *Winthrop's Boston: Portrait of a Puritan Town 1630–1649* (Chapel Hill: University of North Carolina Press, 1965), 180–183.
36. Ibid., 98.
37. Charles McLean Andrews, *The Colonial Period of American History*, vol. 1 (New Haven: Yale University Press, 1934), 372.
38. Perry Miller and Thomas Herbert Johnson, *The Puritans* (Boston: American Book Co., 1938), 43.
39. Andrews, *Colonial Period of American History*, 372; Francis J. Bremer, *John Winthrop, America's Forgotten Founding Father* (Oxford: Oxford University Press, 2003), 179.
40. Kai T. Erickson, *Wayward Puritans: A Study in the Sociology of Deviance* (New York: John Wiley & Sons, 1966). Erickson analyzed how Puritan society created a heightened awareness of deviant behavior, whether it be religious, political, or disease driven.
41. Kenneth Silverman, *The Life and Times of Cotton Mather*, 1st ed. (New York: Harper & Row, 1984), 59–60.
42. George Edward Ellis, "Treatment of Intruders and Dissenters by the Founders of Massachusetts," in *Early History of Massachusetts* (Boston: Massachusetts Historical Society, 1869), 75–126. Ellis emphasizes the founding fathers were intolerant of any deviant views of Puritanism and held to the letter of the Bible (see pages 80–81), viewing "eccentricity of opinion" as a threat to their way of life.
43. Josiah Quincy, *A Municipal History of the Town and City of Boston During Two Centuries* (Boston: Little, Brown, and Co., 1852), 3–4.
44. Ibid., 5. Benton, Warning Out, 9; Massachusetts, "ARPMB," in *An Act in Explanation of Sundry Acts Heretofore Made Referring to the Admission of Town*

Inhabitants, Chapter 9, ed. Massachusetts General Court (Boston: Wright & Potter, 1874). In 1637, the Massachusetts Bay Colony promulgated a “Strangers Act,” requiring constables to inform the courts of newcomers admitted without a license. Subsequent amendments to this law, issued in 1672 and 1701, required disclosure of passengers over sixteen years of age (1672 law) and the removal of the lame, indigent, or likely to be a charge to the community within two months of arrival (1701 law). Amendments made in 1723, 1726, 1731, 1737, and 1740 shortened the time in which strangers were required to disclose their presence from sixty to forty days (1723 law) and then from forty to twenty days (1726 law). By 1740, the law required town meeting acceptance of strangers to avoid individuals becoming wards of the state.

45. Benton, *Warning Out*, 45–52. Provincial warning out laws were modified on six occasions in the eighteenth century (i.e., 1701, 1723, 1726, 1731, 1737, and 1740) in response to the arrival of poor immigrants from abroad. Neuman offers an excellent analysis of how English Poor laws were applied in colonial America.

46. John Cotton, *The Way of Life* (Oswestry, England: Quinta Press, 2010), 97–103; Cotton Mather, *The Angel of Bethesda* (Barre, MA: American Antiquarian Society and Barre Publishers, 1972), 97–98.

47. Cotton Mather, *A Pastoral Letter, to Families Visited with Sickness: From Several Ministers of Boston, at a Time of Epidemical Sickness Distressing of the Town*, The third impression ed. (Boston: Printed by B. Green, for S. Gerrish, at his shop near the Brick Meeting-House in Cornhill, 1721), 4–5. Mather notes, “Every disease, whatever be the next cause of it, must be looked upon as proceeding from God, the first cause of all.” He also urged his parishioners to see sick within the family as opportunity for a “suitable humiliation,” by which he urged an acceptance of their condition as a “cross of His laying upon us.” The purification process Mather described in this famous pamphlet took place in hundreds of different houses in Boston during the self-imposed house quarantines of 1721.

48. Ibid., 4.

49. Cotton Mather, *Perfect Recovery: The Voice of the Glorious God unto Person for Whom His Mercy Has Recovered from Sickness* (Boston: Samuel Gerrish, 1714), 24–25.

50. Edward Rawson, “Ordered that for Prevention of Infection,” in *Massachusetts State Archives Collection, Maritime 1671–1694*, ed. Office of the Secretary of the Commonwealth, vol. 61 (Boston: Boston Massachusetts Archives Collection, 1677), 166. For example, when an infected vessel arrived in Boston in 1677, passengers were required to stay on board, or live on uninhabited islands, until the disease had abated.

51. Bernard Bailyn, *The New England Merchants in the Seventeenth Century* (Cambridge: Harvard University Press, 1955), 10–11; Ernst, *Constitutional History of Boston*, 27. Bailyn notes there was a thin flow of traffic to New England, most of which was driven by the fisheries off its coast and to a lesser extent trade with the fledgling Massachusetts Bay colony.

52. T. H. Breen et al., "The Character of Early Massachusetts Immigration," *William and Mary Quarterly* 30, no. 2 (1973): 199; Massachusetts Historical Society, "Anonymous Letter to John Winthrop," in *Collections of the Massachusetts Historical Society* (Boston: Massachusetts Historical Society, 1863), 448. The impact of this epidemic was also noted in an undated letter to Governor John Winthrop from an unknown correspondent in England circa 1636.

53. A rod is equal to 16.5 feet. A four-rod separation was equivalent to 66 feet.

54. Alan Taylor, *American Colonies: The Settling of North America* (New York: Penguin Books, 2001), 175.

55. Henry R. Viets, *A Brief History of Medicine in Massachusetts* (Boston: Houghton Mifflin Co., 1930), 43–44; Blake, *Public Health in Boston*, 18–19.

56. John Winthrop, *The History of New England from 1630 to 1649*, ed. James Kendall Hosmer, 2 vols., vol. 2 (New York: Charles Scribner & Sons, 1908), Diary, 329; Andrews, *Colonial Period of American History*, 365–374.

57. Rutman, *Winthrop's Boston: Portrait of a Puritan Town 1630–1649*, 12–13, 165–166.

58. Bremer, *John Winthrop*, 478.

59. Peabody, "Historical Study of Public Health Legislation," 41.

60. Rutman, *Winthrop's Boston: Portrait of a Puritan Town, 1630–1649*, 273.

61. John B. Blake, "Yellow Fever in Eighteenth Century America," *Bulletin of the New York Academy of Medicine* 44, no. 6 (1968): 673–674; Burrage, "Medicine in Massachusetts," 540–541; Duffy, *Epidemics Colonial America*, 140; Henry R. Viets, "Smallpox in Colonial America," in *A Brief Rule to Guide the Common-People of New England* (New York: Arno Press, 1977), xxxiii. Blake makes a convincing case that the 1647 epidemic in the West Indies was the same epidemic as that identified as yellow fever in Yucatan the following year. He cites this epidemic as the first generally accepted instance of yellow fever in the New World.

62. Samuel A. Green, "Medicine in Boston," in *The Memorial History of Boston, 1630–1880*, ed. Justin Winsor (Boston: James R. Osgood, 1881), 532.

63. Elmer Beecher Russell, "The Review of American Colonial Legislation by the King in Council," *Studies in History, Economics and Public Law* 64, no. 2 (1915): 33–36. The Massachusetts General Court operated with relative autonomy prior to 1692. The English Parliament, a legislative body, had little time to review colonial legislation. Even the King's Privy Council paid little attention to colonial affairs, leaving this duty to its committee for Trade and Plantations (1675–1695) and its successor the Board of Trade (1696 onward). Russell discusses its oversight function for colonial legislation.

64. Winthrop, *History of New England*, 2, 313.

65. Peabody, "Historical Study of Public Health Legislation," 41–42; Winthrop, *History of New England*, 2, 312; Peabody, "Historical Study of Public Health Legislation," 41–42; Russell, "Review of Colonial Legislation," 34–46.

66. Peabody, "Historical Study of Public Health Legislation," 42.

67. Winthrop, *History of New England*, 2, 329–330.

68. Ibid.

69. Massachusetts General Court, “Records of the Governor and Company of the Massachusetts Bay in New England,” 237.

70. Winthrop, *History of New England*, 2, 330.

71. Joseph M. Toner, *Contributions to the Annals of Medical Progress and Medical Education in the United States* (Washington, DC: USGPO, 1874), 12–14; Henry R. Viets, “Some Features of the History of Medicine in Massachusetts during the Colonial Period (1620–1770),” *Isis* 23, no. 2 (1935): 391–392. Governor Winthrop never mentions a role for physicians in the town’s first two quarantine incidents. Similarly, the General Court’s 1647 quarantine law does not include a medical role in maritime quarantine. The nineteenth-century medical historian, Joseph M. Toner, identified five physicians working in Boston in 1647: William Gager, Comfort Starr, John Clarke, Thomas Oliver, and Samuel Bellingham. The decision to administer quarantine without advice from physicians was not due to the lack of physicians. Nevertheless, Viets documents the limited availability of physicians after 1633, a time when the colony relied on magistrates and teachers for medical advice. Indeed, even two of Governor Winthrop’s sons sought medical information from London to compensate for its limited availability in Boston.

72. Winthrop, *History of New England*, 2, 330. Winthrop secretly confirmed his authority to govern maritime affairs in his instructions to one of his commissioners, Edward Winslow, sent to England to negotiate a settlement concerning powers granted to Massachusetts Bay Colony.

73. Reginald Pelham Bolton, *A Woman Misunderstood: Anne Wife of William Hutchinson* (New York: Schoen Printing Co., 1931), 74–85.

74. Erickson, *Wayward Puritans*; William Whitmore, *Colonial Laws of Massachusetts, 1649–1686* (Boston: Rockwell and Churchill City Printers), 60.

75. Bailyn, *Voyagers to the West*, 260–262; James Davie Butler, “British Convicts Shipped to American Colonies,” *American Historical Review* 2, no. 1 (1896): 292–295.

76. Winthrop, *History of New England*, 2, vol. 2, 225–226.

77. Warning out laws were enacted as early as 1637 when the General Court passed a “Strangers Act,” requiring constables to identify strangers admitted without a license. By 1701, this law was modified to force the removal of anyone who might become a charge to the community within two months of arrival.

78. While John Winthrop believed in Christian compassion and care for ones fellow humans, these laudable virtues held no sway in an epidemic. In such instances, the governor and his council kept vessels at bay rather than risk the lives of the entire colony. For those totally at peace with the will of God, sickness might be a gift for one’s spiritual betterment but this was certainly not the path taken by the average working-class Bostonian. For a true spiritual seeker quarantine when applied to one’s family might reflect acceptance of the gift of sickness—but few were as exalted to place theology above the basic instincts of survival.

79. Erickson, *Wayward Puritans*.

80. Ibid.; Edward Johnson, *Wonder-Working Providence of Sions Saviour in New England*, 2 vols., vol. 2 (Andover, MA: Warren F. Draper, 1867), 8.

81. Rutman, *Winthrop's Boston: Portrait of a Puritan Town 1630–1649*, 196–197.
82. Almon Wheeler Lauber, *Indian Slavery in Colonial Times within the Present Limits of the United States*, ed. Faculty of Political Science of Columbia University, vol. 54, Studies in History, Economics and Public Law (New York: Columbia University, 1913), 109–110.
83. BRC, *A Report of the Record Commissioners of the City of Boston Selectmen, 1716–1736*, vol. 13, BCD# 77 (Boston: Rockwell and Churchill City Printers, 1885), Records of the town of Boston, 82–83.
84. Thomas H. O'Connor, *The Boston Irish, A Political History* (Boston: Back Bay Books, 1995), 9–12. O'Connor covers how caste system affected early Irish immigrants to Boston.
85. MSBH, "Acts Relating to the Establishment of Quarantine of Massachusetts, from the Settlement of the Colony of Massachusetts Bay to the Present Time," ed. Massachusetts State Board of Health (Boston: Rockwell and Churchill City Printers, 1881), 7.
86. Very little trade went by road prior to the Revolutionary War. Early eighteenth-century roads were often impassable in the rainy season and in the darkest days of winter. Most intercolonial trade occurred via sea.
87. Rutman, *Winthrop's Boston: Portrait of a Puritan Town 1630–1649*, 180–190.
88. Christopher Duncan et al., *Biology of Plagues: Evidence from Historical Populations* (Cambridge, England: Cambridge University Press, 2001), 81, 208–209. Plague epidemics occurred on a regular basis in the late sixteenth and early seventeenth century, so Bostonians would have been familiar with the symptoms and mortality of plague. Plague orders were published in 1609, 1630, 1636, 1646, and 1666.
89. Paul Slack, *The Impact of Plague in Tudor and Stuart England* (Oxford: Clarendon Press, 1985), 7.
90. Thomas Sydenham, *The Works of Thomas Sydenham MD*, ed. George Wallis, 2 vols., vol. 1 (London: Robinson, Otridge, & Newbery, 1788), 119.
91. Nathaniel Shurtleff, *A Topographical and Historical Description of Boston*, 2 vols. (Boston: Rockwell and Churhill City Printers, 1891), History, 478–479.
92. Robert Nixon Toppan, ed. *Edward Randolph*, vol. 2 (Boston: Prince Society, 1898), 237. Randolph provides one of the only detailed assessments of seventeenth-century customs activities in Boston. His memoirs and papers reveal seventeenth-century Boston was operating almost entirely independently of the laws of England. Randolph's mission was to tame the colonists and bring them under English navigation and custom laws. Ebenezer Clapp, *Clapp Memorial Record of the Clapp Family in America* (Boston: David Clapp & Son, 1876), 3–8.
93. Shurtleff, *Topographical Description of Boston*, 585.
94. State Street Trust Company, *Some Events of Boston and Its Neighbors* (Boston: State Street Trust Company, 1917), 9–10.
95. The provincial military assigned to monitor incoming vessels were a motley group of men who were not selected to serve based on their public health credentials.

96. Duncan, *Biology of Plagues*, 215–217; Sydenham, *Works of Thomas Sydenham*, 1, 111–122.
97. While the quarantine order lasted for two years, commerce did not halt, they anchored on off shore islands until they received a clean bill of health.
98. John Hull, *The Diaries of John Hull, Mint-Master and Treasurer of the Colony of Massachusetts Bay*, vol. 3 (Boston: Printed by J. Wilson and Son, 1857), 221. Captain John Hull noted that on June 9, 1666, Master Clarke's ship arrived in Boston with mixed blessings. Clarke brought word of the cessation of plague at London but he noted England was at war with France and Holland.
99. Taylor, *American Colonies*, 159.
100. The epidemic history of Boston would have been lost if not for the diaries and letters of Samuel Sewall, Samuel Danforth, Cotton Mather, Simon Bradstreet, and John Winthrop.
101. Huber, "Control of the Communicable Diseases in Massachusetts," 169.
102. Duffy, *Epidemics Colonial America*, 43–52.
103. John Foster, *An Almanack of Coelestial Motions for the Year of the Christian Epoch, 1679*, Early American Imprints No. 268 (Boston: Henry Phillips, 1679), 14.
104. Slack, *Impact of Plague in England*, 151. The percentage of the Boston population that died from smallpox from 1676 to 1678 was slightly higher than for Londoners who died of the plague thirteen years earlier. Slack presents a summary of the case fatality rate for the London plague of 1665.
105. Rawson, "Ordered that for Prevention of Infection," 166.
106. In an apparent gesture of compassion, they relaxed the quarantine rules for women in labor to accommodate them on the mainland. This is the only known example of a breakdown in the quarantine principles of the day.
107. Massachusetts Governor's Council, "Petition of Thomas Barrister," in *Order of Council*, ed. Massachusetts State Archives (Boston: Massachusetts State Archives, 1685). In the summer of 1685, the Governor's Council placed another smallpox-infected vessel under a six-week quarantine.
108. BRC, *Boston Records 1660 to 1701*, 7, 119.
109. A. W. Downe et al., "The Recovery of Smallpox Virus from Patients and Their Environment in a Smallpox Hospital," *Bulletin World Health Organization* 33 (1965): 615–622.
110. The Navigation Act required the majority of sailors to be English to be called an English vessel.
111. Herbert Levi Osgood, *The American Colonies in the Seventeenth Century*, vol. 3 (New York: MacMillan Co., 1907), 205.
112. Douglas Burgess, *The Pirates' Pact: The Secret Alliances between History's Most Notorious Buccaneers and Colonial America* (New York: McGraw Hill, 2008), 168–185.
113. Alfred Thomas Scrope Goodrick, ed. *Edward Randolph*, vol. 6 (Boston: Prince Society, 1909), 1–67.
114. American Council of Learned Societies, "Edward Randolph," *Directory of American Biograph Base Set 15* (1936): 356–358.

115. Goodrick, *Edward Randolph*. Randolph's battles with the deputy governor of Massachusetts Bay Colony are discussed with respect to their feud over the jurisdiction of the Navigation Acts.

116. Ibid., 112–113. The hostilities between Randolph and ship owners are described.

117. Charles M. Andrews, *Colonial Self Government, 1652–1689*, vol. 5, *The American Nation: A History* (New York: Harper & Brothers Publishers, 1904).

118. Massachusetts, "ARPMB," in *An Act for the Better Preventing of the Spread of Infectious Sickness, Chapter 7*, ed. Massachusetts General Court (Boston: Wright & Potter, 1869), 376.

119. BCC, "Municipal Register for 1915," 252; Lemuel Shattuck, "Census of Boston for the Year 1845," ed. Joint Committee of the Census, Report to the Committee of the City Council (Boston: John H. Eastburn City Printer, 1846), 142. With a 1678 population of forty-two hundred and one thousand deaths, the percentage of residents affected may have reached 70 percent.

120. Russell, "Review of Colonial Legislation."

121. Peabody, "Historical Study of Public Health Legislation," 42.

122. Massachusetts, "ARPMB," *Chapter 7*, 376; "ARPMB," in *An Act Providing in Case of Sickness, Chapter 9*, ed. Massachusetts General Court (Boston: Wright & Potter, 1869), 469–470. The English Privy Council disallowed this legislation on October 22, 1700, because it usurped the authority of the English government. It suggested if the law were issued as an "order from the Governor and Council from time to time than by any standing act of the General Assembly," it would be acceptable. The adoption of temporary laws, rather than permanent quarantines against English commerce, met the Privy Council's concerns and enabled the General Court to continue managing threats to the public health in a timely manner.

123. Huber, "Control of the Communicable Diseases in Massachusetts," 169.

124. Blake, *Public Health in Boston*, 247; Ernst, *Constitutional History of Boston*, 17.

125. British Privy Council takes blame for these ineffectual regulations after gutting their enforcement provisions.

126. Peabody, "Historical Study of Public Health Legislation."

127. Krista Maglen, "The First Line of Defence: British Quarantine and the Port Sanitary Authorities in the Nineteenth Century," *Social History of Medicine* 15, no. 3 (2002): 413–428. British Parliament, "Statutes at Large from the tenth year of King William the Third to the end of the reign of Queen Anne," in *An Act to Oblige Ships Coming from Places Infected more Effectually to Perform Their Quarantine*, ed. British Parliament (London: Mark Basket Printer, 1769), 420; McDonald, "History of Quarantine in Britain," 22.

128. BRC, *Boston, Records 1700 to 1728*, 8, 81.

129. Ibid., 84.

130. Ibid., 111.

131. Ibid., 152; Lucius R. Paige, *History of Cambridge, Massachusetts, 1630–1877* (Boston: H. O. Houghton & Co., 1877), 195. While residents of Cambridge and

Charleston might reach Boston via sailboat, these visitations posed relatively inconsequential threats to Boston, since virtually all travel between Cambridge and Boston was via the Great Bridge over the Charles River near Dunster Street. Built before 1663, the Great Bridge was the only crossing point between Cambridge and Boston Neck via Brookline and Roxbury. Boston could also be reached via the Charleston ferry, but these passengers were not considered a public health threat—access could be stopped during epidemics. Paige provides details of these standard means of travel.

132. BRC, *A Report of the Record Commissioners of the City of Boston, Records 1729 to 1742*, vol. 12, BCD#66 (Boston: Rockwell and Churchill City Printers, 1885), Records of the town of Boston, 302.

133. "The Town of Boston in New England, Captain John Bonner, 1722," Massachusetts Historical Society Collections. Accessed online August 16, 2015: http://www.masshist.org/database/viewer.php?item_id=1733&img_step=1&mode=large#page1

134. BRC, *Boston, Records 1700 to 1728*, 8, 214.

135. Erickson, *Wayward Puritans*. This is consistent with Erickson's theory of tolerance of deviance as a tool to strengthen intolerance.

136. BRC, *A Report of the Record Commissioners of the City of Boston Selectmen, 1701–1715*, vol. 11, BCD# 75 (Boston: Rockwell and Churchill City Printers, 1884), Records of the town of Boston, 25.

137. Blake, *Public Health in Boston*, 34.

138. When costs for guards and nurses became too great, it was not uncommon for the selectmen to request financial reimbursement from the governor. On November 27, 1710, the Boston town clerk requested reimbursement for the expenses associated with treating Robert Cogswell, who died of smallpox six months earlier at the town's military garrison on Fort Hill, near present-day South Station. The garrison became the town's first temporary pest house, like many others that followed.

139. Cotton Mather, *Diary of Cotton Mather*, vol. 1, American Classics (New York: F. Ungar Publishing Co., 1957).

140. Ibid., 451.

141. BRC, *Boston Selectmen 1701–1715*, 11, 23–28.

142. James Copland, *Dictionary of Practical Medicine*, vol. 3 (New York: Harper & Brothers Publishers, 1859), 918.

143. Gary M. Walton and James F. Shepherd, *Shipping, Maritime Trade and the Economic Development of Colonial North America* (Cambridge, England: Cambridge University Press, 1972).

144. There was a strong belief that pest houses harbored and indeed spread disease. Not surprisingly, Boston's Fort Hill pest house was discontinued and replaced with Spectacle Island hospital.

145. Blake, *Public Health in Boston*, 35.

146. MGCHOR, *Journals of the House of Representatives, 1715–1717*, ed. Massachusetts Historical Society, vol. 1 (Cambridge: Riverside Press, 1919), 104.

Indeed, two days before the committee began its search, the House of Representatives received a petition from Bill to cover damages sustained from persons quarantined on his island. Bill was reimbursed 20 pounds to cover his losses or the equivalent of \$550 in 2015 currency.

147. MSBH, "Acts Relating to the Establishment of Quarantine of Massachusetts," 12.

148. MGCHOR, *Journals of the House of Representatives, 1715–1717*, 1, 170.

149. William Richard Cutter, *Genealogical and Personal Memoirs Relating to the Families of the State of Massachusetts*, vol. 1 (New York: Lewis Historical Publishing Co., 1910), 561–562.

150. MGCHOR, *Journals of the House of Representatives, 1715–1717*, 1, 229.

151. After several years of negotiations, the House of Representatives settled Bill's damages for the de facto use of his property as a quarantine station.

152. Massachusetts, "ARPMB," *Chapter 14*, 91–92.

153. Long Island in Boston Harbor is not to be confused with Long Island, New York. Long Island in Boston Harbor is a 225-acre island located immediately south of historic Boston and is now connected to the mainland by a bridge.

154. James Stark, *Illustrated History of Boston Harbor* (Boston: Photo-Electrotype Co., 1880), 62. For years, the selectmen allowed residents to use the island for various activities including woodcutting. In 1649, after much wood had been cut, the town rented it to residents for planting with the proceeds used for the town's free school. Ten years later, residents began to fall in arrears on their rents. The town relinquished rights to the ownership for residents who paid their back rent. One sharp lighterman by the name of Thomas Bill quickly bought up the rights to the use of the land, acquiring ownership of thirty-five acres and then sold it to his son Samuel Bill, a butcher by trade. After settling an Indian claim to the island made by Charles Josiah, son of Wampatuck, late sachem of the Massachusetts Indian tribe, Bill owned the whole island. It remained in his possession until 1717 when the selectmen took possession of its southern end for a pest house.

155. MSBH, "Acts Relating to the Establishment of Quarantine of Massachusetts," 14; MGCHOR, *Journals of the House of Representatives, 1718–1720*, ed. Massachusetts Historical Society, vol. 2 (Cambridge: Riverside Press, 1921), 172.

156. Massachusetts, "ARPMB," *Chapter 14*, 91–92.

157. George Glover Crocker, *From the Stage Coach to the Railroad Train and Street Car* (Boston: W. B. Clark Co., 1900), 1–2.

158. Blake, *Public Health in Boston*, 248.

Chapter 4: The Inoculation Controversy

1. Zabdiel Boylston, *Historical Account of the Smallpox Inoculated in New-England*, 2nd ed., corrected ed. (Boston: Samuel Gerrish, 1730), 44–45.

2. Sydenham, *Works of Thomas Sydenham*, 1, 116.

3. Clifford Kenyon Shipton, *Biographical Sketches of Graduates of Harvard University, in the Classes of 1690–1700*, vol. 4 (Boston: Massachusetts Historical Society, 1933), 356.
4. BRC, *Boston Selectmen 1716–1736*, 13, 82.
5. *Ibid.*, 82–83.
6. Reginald Heber Fitz, “Zabdiel Boylston, Inoculator, and the Epidemic of Smallpox in Boston in 1721,” *Johns Hopkins Hospital Bulletin* 22, no. 247 (1911): 9.
7. Silverman, *Life of Cotton Mather*, 261–275.
8. Fitz, “Zabdiel Boylston, Inoculator,” 8.
9. Blake, *Public Health in Boston*, 56.
10. Zabdiel Boylston, “Have Patiently Born with Abundance of Clarmour,” *Boston Gazette*, July 17, 1721, 2.
11. Blake, *Public Health in Boston*, 62.
12. NEC, “A Continuation of the History of Inoculation in Boston,” *New England Courant*, August 7, 1721, 1; “A Project to Reduce the Eastern Indians by Inoculation,” *New England Courant*, August 14, 1721, 1; “The History of Inoculation Continued,” *New England Courant*, August 21, 1721, 1; “The Story of Inoculation,” *New England Courant*, August 28, 1721, 1; Dr. William Douglass is believed to be the author of the articles on the history of inoculation.
13. William Cooper, *A Reply to the Objections Made Against Taking the Smallpox in the Way of Inoculation from Principles of Conscience: In a Letter to a Friend in the Country*, The third impression ed. (Boston: Samuel Gerrish, 1730), 14. William Cooper stood in support of Mather’s inoculation strategy.
14. Perry Miller, *The New England Mind from Colony to Province* (Cambridge: Harvard University Press, 1953), 324–343.
15. Mather, *A Pastoral Letter, to Families Visited with Sickness*, 1–24.
16. The conflict between the religious belief in the acceptance of disease as a gift of God and personal belief in inoculation as an antidote to smallpox was a topic of public interest for nearly ten years following the epidemic of 1721. Cooper, *Reply to Objections Against Smallpox*, 14; Cotton Mather, *A Vindication of the Ministers of Boston, from the Abuses and Scandals, Lately Cast upon Them, in Diverse Printed Papers* (Boston: Printed by B. Green, for Samuel Gerrish, 1722), 14.
17. Robert Middlekauff, *The Mathers, Three Generations of Puritan Intellectuals, 1596–1728* (Berkeley: University of California Press, 1999), 357.
18. Boylston, *Historical Account of Smallpox Inoculated*.
19. MSBH, “Acts Relating to the Establishment of Quarantine of Massachusetts,” 17–19. Seventeenth-century quarantine legislation never specified the length of quarantine to be imposed on infected vessels.
20. Massachusetts, “ARPMB,” in *An Act to Oblige All Ships and Other Vessels Coming from France and Other Parts of the World Infected with the Plague to Perform Quarantine, Chapter 3*, ed. Massachusetts General Court (Boston: Wright & Potter, 1874), 228–229.
21. Huber, “Control of the Communicable Diseases in Massachusetts,” 170.
22. Massachusetts, “ARPMB,” *Chapter 3*, 228–229.

23. To show it was serious, the provincial government established monetary penalties for violating the law. Any master or commander unloading goods before quarantine was completed had to pay a 500-pound penalty, an unprecedented sum. Similarly, those unloading such goods paid a 100 pound penalty. Passengers or sailors who jumped ship before completing quarantine faced three years imprisonment without bail. For the first time, the master of the harbor lighthouse had an affirmative responsibility to notify masters and commanders of provincial quarantine requirements. This legislation can be read as an indictment of the way the smallpox epidemic was managed in Boston. There had been no public disclosure of disease in the 1721 smallpox epidemic, nor was there any expectations for such disclosure. The General Court affirmed the need to notify masters and commanders of public health requirements, suggesting they also believed this was a cause of the smallpox epidemic.

24. G. B. Warden, "The Caucus and Democracy in Colonial Boston," *New England Quarterly* 43, no. 1 (1970): 19–45.

25. John Pickering, *A Vocabulary* (Boston: Cummings & Hilliard, 1816), 55–57; Samuel L. Knapp, *Biographical Sketches of Eminent Lawyers, Statesmen and Men of Letters* (Boston: Richardson & Lord, 1821), 287–289.

26. Shipton, *Biographical Sketches of Graduates*, 4, 349–353.

27. BRC, *Boston, Records 1700 to 1728*, 8, 159.

28. BRC, *Boston Selectmen 1716–1736*, 13, 91.

29. Clifford Kenyon Shipton, *Biographical Sketches of Graduates of Harvard University, in the Classes of 1678–1689*, vol. 3 (Cambridge: Massachusetts Historical Society, 1885), 376.

30. Ibid.

31. This debate also reflected the conflicts that emerged when flawed or incomplete scientific experiments are published and then used to make public policy. Boylston's grand experiment never accounted for the unintended consequences of inoculation performed without sequestration.

32. Boylston, *Historical Account of Smallpox Inoculated*, 28, 38.

33. Over twenty-five articles and book chapters have pored over the 1721 inoculation controversy, including those of John Blake, Reginald Fitz, Maxine Van De Wetering, Henry Viets, John Burton, Patricia Watson, Perry Miller, John Duffy, Albert Deutsch, Laurence Farmer, and Richard Shryock. While a review of these dissertations on the inoculation controversy would provide a comprehensive perspective on a wide range of medical theories, such an endeavor would not shed much light on the principles and practices of quarantine as practiced or understood in 1721. Glaringly absent from virtually all of the published literature of the nineteenth and twentieth century is a focus on quarantine. This unique event in American public health history has been a springboard for discussions of inoculation, public health practice, and principles of informed consent. This history will not rehash those issues as they bear few, if any, insights into the principles of eighteenth-century quarantine practice. For a discussion of the inoculation controversy, see John B. Blake, "The Inoculation Controversy in

Boston: 1711–1722,” *New England Quarterly* 25, no. 4 (December 1952), 489–506. For a discussion of how the Boston inoculation influenced European views, see Genevieve Miller, “Smallpox Inoculation in England and America: A Reappraisal,” *William and Mary Quarterly, 3rd Series* 13, no. 4 (October 1956), 476–492. For a discussion of the role of race in modulating the acceptance of inoculation during the 1721 epidemic, see Margot Minardi, “The Boston Inoculation Controversy of 1721–1722: An Incident in the History of Race,” *William and Mary Quarterly* 61, no. 1 (2004): 47–76. For a discussion on how Mather’s spiritual beliefs formed the basis for the promotion of inoculation, see L. A. Breen, “Cotton Mather, the ‘Anglican Ministry’, and Inoculation,” *Journal of the History of Medicine and Allied Sciences* 46, no. 3 (1991): 333–357. For a discussion of the impact of Mather’s inoculation of his slave Onesimus and the public’s opposition to the views of his slave, see Thomas H. Brown, “The African Connection. Cotton Mather and the Boston Smallpox Epidemic of 1721–1722,” *JAMA* 260, no. 15 (1988): 2247–2249. For a discussion of how the common knowledge of the layperson influenced the acceptance of inoculation without regard to the views of physicians, see S. S. Gronim, “Imagining Inoculation: Smallpox, the Body, and Social Relations of Healing in the Eighteenth Century,” *Bulletin of the History of Medicine* 80, no. 2 (2006): 247–268. For a discussion of the conflict of values between preachers and physicians with respect to each profession’s role in serving the public health, see Maxine Van De Wetering, “A Reconsideration of the Inoculation Controversy,” *New England Quarterly* 58, no. 1 (1985): 46–67. For an important discussion of how the newspapers contributed to the inoculation controversy see, Laurence Farmer, “The Smallpox Inoculation Controversy and the Boston Press 1721–1722,” *Bulletin of the New York Academy of Medicine* 34, no. 9 (1958): 599–608. For a discussion of William Douglass’ role in the controversy and the influence of European medicine see, John T. Barrett, “The Inoculation Controversy in Puritan New England,” *Bulletin of the History of Medicine* 12 (1942): 169–190. For a brief review of the history of eighteenth-century inoculation after the 1721 epidemic, see, Whitman M. Reynolds, “Inoculation for the Smallpox in Colonial America,” *Bulletin of the History of Medicine* 22 (1948): 273–276.

34. Breen, “Cotton Mather, the ‘Anglican Ministry’, and Inoculation,” 333–357. Breen’s recent article discusses the dangers of uncontrolled inoculation and acknowledges the weakness of Mather’s stance. She argues Mather focused on inoculation as a metaphor for “spiritual conversion” and did not see a role for government in this process (p. 345). Mather’s failure to promote quarantine during inoculation reflected his belief that sickness was part of the spiritual “conversionary analogue.”

35. Middlekauff, *Mathers, Three Generations*, 355–356. Middlekauff points out most Bostonians feared inoculation.

36. Blake, *Public Health in Boston*, 56–73.

37. Boylston, *Historical Account of Smallpox Inoculated*.

38. Duffy, *Epidemics Colonial America*, 5; Hopkins, *Princes and Peasants*, 3.

39. Massachusetts General Court, "Records of the Governor and Company of the Massachusetts Bay in New England," 237.
40. Boylston, *Historical Account of Smallpox Inoculated*, 6, 19, 38.
41. Ibid., 48.
42. Ibid.
43. David P. Harper, "Angelic Conjunction: Religion, Reason, and Inoculation in Boston, 1721–1722," *Pharos of Alpha Omega Alpha-Honor Medical Society* 63, no. 1 (2000): 37–41; Brown, "The African Connection"; Ross Rudolph and Daniel M. Musher, "Inoculation in the Boston Smallpox Epidemic of 1721," *Archives of Internal Medicine* 115 (1965): 692–696; John B. Blake, "Smallpox Inoculation in Colonial Boston," *Journal of the History of Medicine and Allied Sciences* 8, no. 3 (1953): 284–300; Barrett, "The Inoculation Controversy in Puritan New England". These articles lauded inoculation.
44. Toner, *Contributions to Annals of Medical Progress*, 22. Within ten years of the 1721 smallpox epidemic, Boston adopted regulations governing how physicians applied smallpox inoculations. By 1764, these municipal efforts eventually led the General Court to adopt similar controls over smallpox inoculation hospitals and the practices of physicians working in such facilities. Medical scholars of the nineteenth and twentieth centuries recognize Boylston as part of the Boston medical profession.
45. Wetering, "A Reconsideration of the Inoculation Controversy," 53.
46. Rudolph and Musher, "Inoculation in Boston Smallpox Epidemic," 693.
47. Increase Mather and Joseph Edwards, *Some Further Account from London, of the Smallpox Inoculated*, 2nd ed. (Boston: J. Edwards, 1721), 6; Mather, *Vindication of Ministers*, 10; John D. Burton, "'The Awful Judgments of God upon the Land': Smallpox in Colonial Cambridge, Massachusetts," *New England Quarterly* 74, no. 3 (2001): 496. Boston's ministers accepted Boylston as a physician just as they accepted the right of ministers to practice medicine as a sideline of their trade. He was also accepted by the faculty at Harvard, where he inoculated thirteen students and one professor.
48. Richard Harrison Shryock, *Medical Licensing in America, 1650–1965* (Baltimore: The Johns Hopkins University Press, 1967), 3–42; Wetering, "Reconsideration of Inoculation Controversy," 50–53.
49. Josiah Bartlett, "An Historical Sketch of the Progress of Medical Science in the Commonwealth of Massachusetts, Being the Substance of a Discourse Read at the Annual Meeting of the Medical Society, June 6, 1810 with Alterations and Additions to January 1, 1813," in *Collections of the Massachusetts Historical Society* (Boston: John H. Eastburn, Printer, 1838), 109.
50. As the epidemic ended, the selectmen restricted Boylston's inoculation practice by requiring his patients to complete their treatment under quarantine—a direct rebuke of his unauthorized inoculation practices.
51. Blake, *Public Health in Boston*, 244.
52. Ibid., 66.
53. William Douglass, "Letters from Dr. William Douglass to Cadwallader Colden of New York, May 1, 1722," in *Collections of the Massachusetts Historical Society* (Boston: Massachusetts Historical Society, 1854), 168.

54. Cooper, *Reply to Objections Against Smallpox*, 13; Thomas James Holmes, *Increase Mather, A Bibliography of His Works*, 2 vols., vol. 1 (Cleveland, OH: Harvard University Press, 1931), Bibliography, 502–503.

55. *New England Courant*, December 18, 1721, 4; *New England Courant*, December 25, 1721, 2; *New England Courant*, November 13, 1721, 2; *New England Courant*, December 11, 1721, 2.

56. Charles J. Hoadly, “An Act for Preventing the Smallpox Being Spread in this Colony by Pedlars, Hawkers and Petty Chapmen,” in *The Public Records of the Colony of Connecticut*, ed. Connecticut General Assembly (Hartford: Press of Case, Lockwood & Brainard, 1721), 276–277; Thomas Cooper, “An Act for Preventing as Much as May Be, the Spreading of Contagious Disease,” in *The Statutes at Large of South Carolina*, ed. South Carolina Legislature, vol. 3 (Columbia, SC: A.S. Johnston, 1838), 127–130; Colony of Rhode Island and Providence Plantations, “An Act to Prevent the Smallpox from Being Brought into This Colony from the Town of Boston,” in *Acts and Laws of His Majesties Colony of Rhode Island and Providence Plantations*, ed. Colony of Rhode Island and Providence Plantations (Newport: Rhode Island State Archives, 1721), 266–270.

57. Douglass’ views of the contagious nature of smallpox would soon be forgotten by Boston’s nineteenth-century medical practitioners.

58. Duffy, *Epidemics Colonial America*, 205. While Duffy indicates miasmic diseases were known in the sixteenth and seventeenth centuries, the author’s own research revealed their existence did not dampen quarantine use in seventeenth and eighteenth-century Boston—especially as a response to smallpox epidemics.

59. Ibid., 101–103. Duffy even opined that quarantine worked effectively in reducing the frequency of smallpox outbreaks.

60. Charles Vidich, *Quarantine Laws Enacted in the 13 American Colonies: 1700–1799* (Ashford, CT: Vidich Associates, 2014). The thirteen British colonies passed 111 quarantine laws in the eighteenth century.

61. BRC, *A Report of the Record Commissioners of the City of Boston Selectmen, 1754–1763*, vol. 19, BCD#147 (Boston: Rockwell and Churchill City Printers, 1887), Records of the town of Boston, 220, 264.

62. Boston’s Selectmen imposed two types of quarantine: (1) the isolation of the *HMS Seahorse* near Bird Island (now located under the Logan Airport runway) and (2) the isolation of individual cases of smallpox within the homes of Bostonians. While the quarantine of the *Seahorse* and its crew did not stop the epidemic, its eventual removal from the town docks limited its continued contribution to its spread.

63. Blake, *Public Health in Boston*, 61.

64. Douglass, “Letters from Dr. William Douglass,” 169. Quarantine was key in the early stages of the epidemic when house quarantine was imposed on those with smallpox. Unfortunately, this strategy was soon discarded when the selectmen determined there were insufficient guards to watch all houses where cases had been identified.

65. Boylston, *Historical Account of Smallpox Inoculated*, 18–34. Boylston explains away these six deaths as caused by other underlying conditions, but this was a disingenuous argument failing to acknowledge the dangers of inoculation.

66. Wetering, “Reconsideration of Inoculation Controversy,” 52–53.

67. The colonies of Massachusetts (1764), New Hampshire (1773), New York (1763), Connecticut (1760), South Carolina (1738), and Virginia (1769) regulated inoculation under specific restrictions governing its use, location, application, and approval. In Virginia, the practice was illegal unless approval was granted by the majority of magistrates; in Massachusetts, the practice was initially only authorized under epidemic conditions defined as the presence of thirty or more infected families; in Connecticut, the practice was illegal unless authorized by the majority of selectmen with specific rules identifying the location, duration of isolation, and procedures for cleansing; in New Hampshire, the practice was illegal unless authorized by the governor and his council and was limited to the Province’s pest house; in South Carolina, its first law prohibited its use in Charleston after a serious epidemic in which this practice exacerbated the spread of the disease.

68. Joseph Ioor Waring, “James Killpatrick and Smallpox Inoculation in Charlestown,” *Annals of Medical History* 10 (1938): 301–308.

Chapter 5: Branding the Outcasts: Warning Out and Red Flags

1. William Edward Hartpole Lecky, *A History of Ireland in the Eighteenth Century* (New York: AMS Press, 1892).

2. *Ibid.*, 136–247.

3. The number of vessels arriving from Ireland was five in 1720, two in 1721, and one in 1725. The dramatic increase in Irish immigrants in 1729 reflected unfavorable political and economic conditions of the Irish. Only desperate conditions in the homeland motivated the Irish to leave on a dangerous voyage to the new world. The data on Irish vessels is derived from weekly reports of Boston customs office published in the *Boston News-Letter*. These records did not include estimates of the total number of immigrants on board.

4. MGCHOR, *Journals of the House of Representatives, 1729–1731*, ed. Massachusetts Historical Society, vol. 9 (Boston: Wright & Potter, 1928), 98–99.

5. Massachusetts, “ARPMB,” in *An Act in Further Addition to an Act Entituled “An Act Directing the Admission of Town Inhabitants” Made and Passed in the Thirteenth Year of the Reign of King William the Third, Chapter 2*, ed. Massachusetts General Court (Boston: Wright & Potter, 1874), 283–284; “ARPMB,” in *An Act in Further Addition to an Act Entituled “An Act Directing the Admission of Town Inhabitants” Made and Passed in the Thirteenth Year of the Reign of King William the Third, Chapter 6*, ed. Massachusetts General Court (Boston: Wright & Potter, 1874), 386.

6. Eric Guest Nellis and Anne Decker Cecere, *The Eighteenth-Century Records of the Boston Overseers of the Poor*, vol. 69, Publications of the Colonial Society of

Massachusetts (Boston: The Colonial Society of Massachusetts; Distributed by the Charlottesville: University of Virginia Press, 2007), 19–20. Nellis provides an exhaustive analysis of the social services offered to Boston's Poor.

7. Smith, *Rainsford Island*, 222.
8. Vidich, *Comparison of Major Quarantines Imposed in Boston: 1721 to 1922*.
9. Russell, “Review of Colonial Legislation,” 1–227.
10. Massachusetts, “ARPMB,” *Chapter 3*, 228–229; Charles Vidich, *Summary of Maritime Quarantine Activities in Boston Harbor: 1725–1763* (Ashford, CT: Vidich Associates, 2005). Three out of the four maritime quarantines between 1725 and 1733 were for smallpox-infected vessels.
11. Warden, “Caucus and Democracy,” 22–23.
12. Clifford Kenyon Shipton, *Biographical Sketches of Graduates of Harvard University, in the Classes of 1736–1740*, vol. 10 (Boston: Massachusetts Historical Society, 1958), 420–423.
13. BRC, *Boston Selectmen 1716–1736*, 13.
14. MGCHOR, *Journals of the House of Representatives, 1729–1731*, 9, 98–99.
15. The Irish were implicated in the smallpox outbreaks of 1718 and 1729.
16. MGCHOR, *Journals of the House of Representatives, 1721–1722*, ed. Massachusetts Historical Society, vol. 3 (Cambridge: Riverside Press, 1922), 185. In 1721, Elisha Cooke Jr. was tasked with preparing a bill to regulate inoculation. The bill was passed on March 21, 1721 (old calendar date meant the modern date would be 1722 since each New Year began on April 1) and sent up for concurrence but there is no surviving record of this law. However, George Austin, a nineteenth-century historian contends the House of Representative did prohibit inoculation. George Lowell Austin, *The History of Massachusetts: From the Landing of the Pilgrims to the Present Time* (Boston: B. B. Russell, 1876), 180.
17. Smallpox had not been a significant concern for Boston residents for the previous eight years.
18. BRC, *Boston Records 1729 to 1742*, 12, 14–15.
19. John C. Miller, *Sam Adams: Pioneer in Propaganda* (Boston: Little, Brown, and Co., 1936), Biography, 38–39. Miller discusses how the Boston caucus operated during the days of Samuel Adams' son, the Revolutionary War hero. The description of backroom deals and staging of municipal elections was as true for the father as it was for the son.
20. As mentioned earlier, the term sequestration was never used to describe eighteenth-century procedures for isolating those undergoing inoculation. It is used throughout this book to clarify the distinctly different laws and procedures it engendered.
21. BNL, “Whereas It Is Lately Published,” *Boston News-Letter*, March 5, 1730, 2; “Boston March 25, 1730,” *Boston News-Letter*, March 26, 1730, 1; “Dr Douglass Testimony in Favor of Inoculation,” *Boston News-Letter*, February 26, 1730, 1. A selectmen's notice issued in the March 26 *Boston News-Letter* indicates a great demand existed for inoculation. As of this date, residents of surrounding towns were prohibited from seeking inoculation under the penalty of “prosecution according to law.”

22. William Douglass, *A Summary, Historical and Political, of the First Planting, Progressive Improvements, and Present State of the British Settlements in North-America*, 2 vols., vol. 2 (Boston: Printed and Sold by Rogers and Fowle in Queen-Street, 1755), 396–397.
23. BRC, *Boston Records 1729 to 1742*, 12, 15.
24. Ibid.
25. Hopkins, *Princes and Peasants*, 256–257; Vidich, *17th Century Epidemics in Boston Including Fatality Rate and Sources*.
26. Leonard W. Labaree, ed., *The Papers of Benjamin Franklin, January 1, 1735 through December 31, 1744*, vol. 2 (New Haven: Yale University Press, 1960), 12–15. Franklin's famous dictum was published on February 4, 1734/1735 in the *Pennsylvania Gazette* as part of his advice on how Philadelphians could reduce the threat of fire.
27. While the selectmen required physicians to adhere to quarantine (or as we call it sequestration) during inoculation, no records survive to determine how this policy was carried out in the 1729/1730 epidemic.
28. With the exception of Blake's book, *Public Health in the Town of Boston: 1630–1822*, there is no literature that comprehensively addresses eighteenth-century use of quarantine in Boston. Modern literature on eighteenth-century public health practices in Boston has focused on inoculation practices, the evolution of the medical profession, and the social and economic factors that affected public health. Douglass indicated four hundred persons were inoculated in 1730. The March 26, 1730 issue of the *Boston News-Letter* published a selectmen notice prohibiting residents of nearby towns from entering Boston to get inoculated. Similar prohibitions were enacted in 1764, when the number of physicians and quarantine facilities were inadequate to meet public demand.
29. BRC, *The Statistics of the United States' Direct Tax of 1798 as Assessed on Boston and the Names of the Inhabitants of Boston*, vol. 22, A Report of the Record Commissioners (Boston: Rockwell and Chuchill City Printers, 1890), Population estimates, iv. This municipal document provides estimates of Boston's population during the seventeenth and eighteenth centuries.
30. Nellis and Cecere, *Records of Boston Overseers of Poor*, vol. 69, 29–37, 20–24.
31. The author compiled this data from weekly newspaper reports of vessel arrivals to Boston.
32. Charles Vidich, *Total Incoming Vessels to Boston: 1720–1774* (Ashford, CT: Vidich Associates, 2007).
33. The most frequented ports were those in the sister colonies, Canada, the Caribbean, Central and South America, Europe, Great Britain, Ireland, and, occasionally, Africa.
34. Massachusetts, "ARPMB," in *An Act to Prevent Persons Concealing the Smallpox, Chapter 13*, ed. Massachusetts General Court (Boston: Wright & Potter, 1874), 621–622.
35. Cases where families failed to report the presence of smallpox were common. One of the reasons the town's selectmen undertook comprehensive inventories of smallpox cases after epidemics (e.g., the epidemics of 1752, 1764, 1775,

and 1792) was to ensure an accurate count. There is no record of the number of offenders of the “red flag” legislation—perhaps because physicians were not required by law to report cases of smallpox until 1828.

36. Esther Forbes, *Paul Revere and the World He Lived In* (Boston: Houghton Mifflin Co., 1942), Biography, 75–80. For example, during the epidemic of 1764, Revere faced significant financial hardships from having a home occupation closed as a result of a quarantine on his abutting home.

37. Red flags were abandoned in the smallpox epidemic of 1872—reflecting concerns about their impact on those stigmatized by the disease and rampant efforts to rip them down.

38. Thomas C. Barrow, *Trade and Empire: The British Customs Service in Colonial America 1660–1775* (Cambridge: Harvard University Press, 1967), 134–136.

39. John J. McCusker, *Rum and the American Revolution*, vol. 1 (New York: Garland Publishing, Inc., 1989), 132–133.

40. BRC, *Boston Records 1729 to 1742*, 12, 121. The charge for maintenance of poor was 944 pounds in 1728. By 1734, it amounted to 2,069 pounds, and by 1736 it skyrocketed to 8,600 pounds. These maintenance costs did not explicitly include medical services but did include food, clothing, and shelter.

41. Nellis and Cecere, *Records of Boston Overseers of Poor*, vol. 69, 20–23.

42. Allan Kulikoff, “The Progress of Inequality in Revolutionary Boston,” *William and Mary Quarterly* 28, no. 3 (1971): 400; Nellis and Cecere, *Records of Boston Overseers of Poor*, vol. 69, 33. Over eight thousand transients were warned out of Boston between 1745 and 1792. Similar statistics are to be found in Kulikoff’s article.

43. Nellis and Cecere, *Records of Boston Overseers of Poor*, vol. 69, 22.

44. Billy G. Smith, *The Lower Sort: Philadelphia’s Laboring People, 1750–1800* (Ithaca, NY: Cornell University Press, 1990), 94. Many historians have dismissed poverty as playing any role in the American Revolution. Smith provides a counter argument.

45. Kulikoff, “Progress of Inequality,” 375–412. Kulikoff identifies income inequalities in Boston prior to the Revolutionary War but never makes the connection to disease and smallpox epidemics as a contributing factor to income inequality.

46. Gary B. Nash, “Social Change and the Growth of Pre-Revolutionary Urban Radicalism,” in *The American Revolution: Explorations in the History of American Radicalism*, ed. Alfred F. Young (DeKalb: Northern Illinois University Press, 1976), 5–36.

47. BRC, *Boston Records 1729 to 1742*, 12, 86, 110, 115, 122, 178, 207, 235. The town meetings reveal the degree to which poor relief, alien immigration, and unemployment created crushing debt for Bostonians.

48. Caulfield, “A History of the Terrible Epidemic of Throat Distemper,” 246–262.

49. Ibid.

50. Ibid.

51. MGCHOR, *Journals of the House of Representatives, 1735–1736*, ed. Massachusetts Historical Society, vol. 13 (Boston: Massachusetts Historical Society, 1932), 233.
52. BRC, *Statistics of Direct Tax of 1798 Assessed on Boston*, 22, iv.
53. MGCHOR, *Journals of the House of Representatives, 1736–1737*, ed. Massachusetts Historical Society, vol. 14 (Boston: Massachusetts Historical Society, 1933), 127–128. The House of Representatives authorized the sale of the land and buildings on Spectacle Island to Richard Bill for 130 pounds. The profit from this transaction defrayed the cost of purchasing Rainsford Island.
54. MSBH, “Acts Relating to the Establishment of Quarantine of Massachusetts,” 21.
55. Smith, *Rainsford Island*, 223.
56. Ibid., 222.
57. Blake, *Public Health in Boston*, 79.
58. Massachusetts, “ARPMB,” in *An Act for Regulating the Hospital on Rainsford Island, and Further Providing in Case of Sickness, Chapter 8*, ed. Massachusetts General Court (Boston: Wright & Potter, 1874), 943. On June 29, 1738, the General Court revised its quarantine laws removing the station from Spectacle Island.
59. Massachusetts, “ARPMB,” in *Notes of the General Court on the Management of Rainsford Island and the Hiring of a Hospital Keeper*, ed. Massachusetts General Court (Boston: Wright & Potter, 1874), 984. The position of island keeper was authorized by law on June 21, 1738. However, there is evidence this position existed a year prior (i.e., November 1737) when the Rainsford Island hospital opened for business.
60. J. W. Estes, “Colonial Medicine,” in *Encyclopedia of the North American Colonies*, ed. Jacob Ernest Cooke (New York: C. Scribner’s Sons, 1993), 214. Estes notes fewer than 10 percent of colonial physicians were thought to have a professional degree.
61. BRC, *Boston Selectmen 1736–1742*, 15, 251.
62. Vidich, *Summary of Maritime Quarantine Activities in Boston Harbor: 1725–1763*.
63. Rebecca Fraser, *The Story of Britain, From the Romans to the Present* (New York: Norton, 2003), 429–430.
64. Gerald L. Neuman, “The Lost Century of American Immigration Law: 1776–1875,” *Columbia Law Review* 93, no. 8 (1993): 1861; Massachusetts, “ARPMB,” *Chapter 1*, 987. Neuman discusses the unique impact of this law on early immigration policy.
65. New York State Legislature, “An Act to Amend the Act Entitled, ‘An Act to Prevent the Bringing in and Spreading of Infectious Distempers in This State’” in *Laws of the State of New York*, ed. New York State Legislature, vol. 1 (New York: Hugh Caine, 1794), 525–526.
66. Walter L. Treadway, *Mental Hygiene with Special Reference to the Migration of People*, Public Health Bulletin No. 148 (Washington, DC: USGPO, 1925), 12–19.

67. Sidney Webb and Beatrice Webb, *English Poor Law History; Part 1: The Old Poor Law*, vol. 1 (Hamden: Anchor Books, 1963), 314–349.
68. Huber, “Control of the Communicable Diseases in Massachusetts,” 170.
69. BRC, *Boston Selectmen 1736–1742*, 15, 183.
70. Ibid., 187.
71. Ibid., 188.
72. *A Report of the Record Commissioners of the City of Boston Selectmen, 1736–1742*, vol. 15, BCD#87 (Boston: Rockwell and Churchill City Printers, 1886), Records of the town of Boston, 216.
73. Ibid., 252.
74. Ibid., 299.
75. His contract was ratified on September 16, 1741, and made retroactive to June 21, 1741. Waters’ success in renegotiating his contract represents one of the earliest examples of the power of organized labor (albeit a party of one) against municipal government.
76. BRC, *Boston Selectmen 1736–1742*, 15, 352.
77. Waters was a sea captain who traveled the Caribbean prior to his stint as island keeper.
78. The concept that masters could be trusted to self-declare the health status of their vessels was reactivated in the twentieth century. Under entirely different circumstances, in the 1930s, masters could self-declare the health of their vessel to improve the efficiency of medical inspections. Such self-declarations were only authorized for vessels with physicians that met predetermined public health criteria.
79. The unbridled authority of this position would eventually lead to a host of human rights violations in the early nineteenth century when victims of smallpox were made to perform domestic and agricultural chores at the pleasure of the island keeper. No evidence of such violations of human rights were ever found in the selectmen’s minutes of the eighteenth century. However, eighteenth-century island keepers were not subjected to inspections and annual island visitations that became the custom in the nineteenth century.
80. Robert Francis Seybolt, *The Town Officials of Colonial Boston 1634–1775* (Cambridge: Harvard University Press, 1939), Directory, 209, 245.
81. The eighteenth-century historical record for Boston’s island keepers is derived from three major sources: (1) news stories of the island keepers found in the *Boston News-Letter*; (2) descriptions of the island keeper’s activities contained in the journals of the House of Representatives of Massachusetts (1735 to 1799); and (3) descriptions of their activities in minutes of town annual meetings and meetings of the selectmen. None of the eighteenth-century island keepers left any diaries or journals of their activities.
82. Massachusetts, “ARPMB Resolves 1741–1746,” in *Order Appointing a Committee on the Memorial of the Selectmen of Boston About Ye Hospital on Rainsford Island, Chapter 170*, ed. Massachusetts General Court (Boston: Wright & Potter, 1905), 429.

83. Ibid.
84. Massachusetts, "ARPMB Resolves 1747–1753," in *Order Empowering the Town of Boston to Purchase a Boat for the Use of the Hospital on Rainsford Island, Chapter 312*, ed. Massachusetts General Court (Boston: Wright & Potter, 1907), 385.
85. Board of Directors for Public Institutions, "Annual Report of the Board of Directors for Public Institutions," ed. Department of Public Institutions (Boston: Author, 1871), 55; S. T. Armstrong, "An Inquiry into the Mortality Among Passengers on Vessels Arriving in U.S. Ports, Read at the Thirtieth Eighth Annual Meeting of the American Medical Association," *Journal of the American Medical Association* 9 (1887): 557–558; BCC, "Report of the Committee on Health of the Common Council on the Orders for the Erection of a Smallpox Hospital at Gallop's Island," ed. Boston City Council (Boston: Author, 1872), 6; Massachusetts, "ARPMB Resolves 1757–1760," in *Chapter 335, Resolve Empowering the Province Treasurer to Purchase a Messuage and Land for a Hospital in Boston*, ed. Massachusetts General Court (Boston: Wright & Potter, 1909), 493–494. There are numerous documented cases of patients dying in route from Boston to Gallop's Island quarantine station. Prior to the purchase of a closed quarantine vessel, passengers traveling to Gallop's Island were directly exposed to the elements (see 1871 Board of Public Institutions report). A 1756 law explicitly mentions numerous patients who died while visiting the quarantine hospital; Similarly the 1872 Boston City Council report includes the dissenting opinion of the committee's minority that emphasized transportation of patients "is always attended with risk and is sometime impracticable where patient is too sick to undergo the exposure." On a broader level, the U.S. Marine-Hospital Service began documenting such incidents on passenger vessels between 1883 and 1887. During that five-year period, 526 immigrants died in travel to the United States.
86. Letter to Governor William Shirley from Boston's Selectmen, April 1749, Massachusetts Archives, vol. 12: 655.
87. Order of Governor William Shirley, April 22, 1749, Massachusetts Archives, vol. 12: 657.
88. Massachusetts, "ARPMB Resolves 1747–1753," *Chapter 312*, 385; "ARPMB," in *Order Allowing 21 Pounds, 13 Shillings, 4 Pence to the Selectmen of Boston, Chapter 122*, ed. Massachusetts General Court (Boston: Wright & Potter, 1907), 458. After over thirty-three years without a government-owned boat, the General Court decided it was time for a change. However, the allotted funds proved inadequate to buy the desired boat. Hamilton wanted a boat to meet the needs of the sick. He knew returning to the General Court to seek permission for anything more than bare necessities was unlikely to pass legislative scrutiny. Instead, he bought the needed boat and then asked for reimbursement. This was a bold and risky move but the General Court was not in a position to negotiate. On January 15, 1751, an additional twenty-one pounds thirteen shillings and four pence was paid out of the public treasury for Hamilton's vessel.
89. Vidich, *Summary of Maritime Quarantine Activities in Boston Harbor: 1725–1763*.

90. There is no evidence the public was notified of the statistics generated by the author from the original minutes of the Boston Selectmen in the eighteenth century. Comparing the discussion of smallpox-infected vessels in the minutes of the selectmen to the news stories in *Boston News-Letter* and *Boston Gazette*, very little public news coverage was ever given to smallpox incidents onboard ships. Citizens learned about smallpox from sailors, commodity brokers, and the merchant class at taverns near the town docks.

91. The General Court also targeted those making unauthorized visits or departures from the island. Anyone caught in such acts received a forty-pound fine. In contrast, the previous law limited the fine to ten pounds. Eight years later, a hundred-pound fine was imposed on those refusing to promptly follow the selectmen's quarantine orders. "Prompt" was defined as reaching Rainsford Island in six hours or less. One might guess anyone who got to the town wharf and shoved off at exactly six hours from notice to depart (still leaving the person with at least two more hours of rowing to the island) would not be ostracized from the island even if he or she arrived late.

Chapter 6: Large-Scale Sequestration

1. William Douglass, *A Dissertation Concerning Inoculation of the Smallpox* (Boston: Printed for D. Henchman in Cornhill, and T. Hancock at the sign of the Bible and Three Crowns in Ann Street, 1730), 7.
2. BNL, "The Public Are Hereby Notified," *Massachusetts Gazette and Boston Newsletter*, January 19, 1764, 3.
3. BNL, "Public Information Is Hereby Given," *Massachusetts Gazette and Boston Newsletter*, February 9, 1764, 3.
4. BNL, "Public Information Are Hereby Informed," *Massachusetts Gazette and Boston Newsletter*, March 1, 1764, 3.
5. Public interest in taking inoculation was unprecedented in Boston history.
6. BNL, "Those Physicians of the Town of Boston," *Massachusetts Gazette and Boston Newsletter*, March 22, 1764, 3.
7. The historical record provides no guidance on what might be an "absolutely necessary" reason to visit a smallpox hospital—though one would presume mothers would be allowed to visit their children.
8. *Boston Post Boy & Advertiser*, "By a Vote of the Town," *Boston Post Boy & Advertiser*, March 19, 1764, 1.
9. Nathaniel Adams, *Annals of Portsmouth, Comprising a Period of Two Hundred Years from the First Settlement of the Town with Biographical Sketches* (Portsmouth: C. Norris, 1825), 207.
10. Charles W. Brewster, *Rambles About Portsmouth* (Portsmouth: Lewis W. Brewster, 1869), 187–189. According to Brewster stagecoach service began only three years before the epidemic of 1764 (i.e., an advertisement from April 1761

indicates the start of the Portsmouth to Boston stagecoach service was April 20, 1761).

11. Lynne Whithey, *Dearest Friend, A Life of Abigail Adams* (New York: The Free Press, 1981), 19.

12. BNL, "As the Time Limited for Inoculating in the Town," *Massachusetts Gazette and Boston Newsletter*, April 26, 1764, 1. The *Newsletter* editors report was prematurely optimistic. By the end of the epidemic, some four months after the *Newsletter* issued its report of April 26th, forty-six persons had died from inoculation.

13. Edward Jacob Forster, "Medical Profession of Suffolk County," in *Professional and Industrial History of Suffolk County, Massachusetts*, ed. William T. Davis (Boston: Boston History Co., 1894), 180; BNL, "It Having Been Reported by the Overseers," *Massachusetts Gazette and Boston Newsletter*, May 31, 1764, 2.

14. BRC, *A Report of the Record Commissioners of the City of Boston, Selectmen's Minutes from 1742-3 to 1753*, vol. 17, BCD#90 (Boston: Rockwell and Churchill City Printers, 1887), Minutes of Selectmen's meetings, 66-67; Forster, "Medical Profession of Suffolk County," 180.

15. BEP, "It Having Been Reported by the Overseers," *Boston Evening Post*, May 28, 1764, 2.

16. Frank L. Dewey, "Thomas Jefferson's Law Practice: The Norfolk Anti-Inoculation Riots," *Virginia Magazine of History and Biography* 91 (January 1983): 39-53.

17. Ibid.

18. BNL, "The Publick are Hereby Informed," *Massachusetts Gazette and Boston Newsletter*, July 5, 1764, 1.

19. BRC, *Boston Selectmen 1764-1768*, 20, 80. The selectmen confirmed 4,977 persons were inoculated when they conducted a census of the town during the last week of June 1764.

20. BEP, "As the Time for Inoculating," *Boston Evening Post*, April 23, 1764, 1; "In Order to Enlarge the Conveniences," *Boston Evening Post*, February 27, 1764, 3. The hospital capacities of Castle Williams and Point Shirley are listed in these issues.

21. Copland, *Dictionary of Practical Medicine*, 3, 918. According to Copland, there were 5,646 cases of smallpox in Boston during 1764, including 4,988 who were inoculated.

22. BNL, "The Publick are Hereby Informed," July 5, 1764, 1.

23. BRC, *Boston Selectmen 1764-1768*, 20, 65. The selectmen requested Draper not to publish anything on the epidemic unless they authorized it. He was also instructed to make their edict known to all other printers in town.

24. BNL, "Publick Information Is Hereby Given," *Massachusetts Gazette and Boston Newsletter*, February 2, 1764, 3.

25. William T. Baxter, *The House of Hancock, Business in Boston 1724-1775* (New York: Russell & Russell, Inc., 1965), 195.

26. Ibid., 194-195.

27. BRC, *Boston Selectmen 1764–1768*, 20, 65. The May 12, 1764, meeting of Draper with the selectmen represents the classic example of government control of eighteenth-century newsprint.

28. Douglass, *Summary of Present State of British Settlements* 2, 410–412.

Chapter 7: The Revolutionary War and Its Aftermath: A New Perspective

1. BG, “The Publick Are Hereby Informed,” *Boston Gazette*, December 19, 1774, 3.

2. Edmund S. Morgan, *The Stamp Act Crisis: Prologue to Revolution* (Chapel Hill: University of North Carolina Press, 1995), 28–33.

3. Benjamin Woods Labaree, *The Boston Tea Party* (New York: Oxford University Press, 1964), 335.

4. G. B. Warden, *Boston, 1689–1776* (Boston: Little, Brown, and Co., 1970), 288–293.

5. John R. Alden, *A History of the American Revolution* (New York: Da Capo Press, 1969), 141–157.

6. Quarantine controls were subverted with the enactment of the Boston Port Act taking government responsibilities out of the hands of the people.

7. This was more than a hypothetical issue. The index case for the 1774 smallpox epidemic was thought to be a British soldier or his family.

8. BEP, “A Proclamation,” *Boston Evening Post*, May 23, 1774, 4.

9. David Hackett Fischer, *Paul Revere’s Ride* (New York: Oxford University Press, 1994), 31.

10. Alden, *American Revolution*, 141–157.

11. Labaree, *Boston Tea Party*, 224.

12. Wesley S. Griswold, *The Night the Revolution Began; The Boston Tea Party, 1773* (Brattleboro: The Stephen Greene Press, 1972), 59–60.

13. BEP, “List of Squadron in North America under the Command of Adm. Graves,” *Boston Evening Post*, January 2, 1775, 3.

14. Nellis and Cecere, *Records of Boston Overseers of Poor*, vol. 69, 22, 57.

15. Peter Force, *American Archives: A Documentary History of the English Colonies in North America*, 9 vols., vol. 1, Fourth Series (Washington, DC: M. St. Clair Clarke and Peter Force, 1837), 451, 776.

16. Ibid., 991–992.

17. William Howe, 5th Viscount Howe, and Edward Everett Hale, eds. *General Sir William Howe’s Orderly Book* (London: B.F. Stevens, 1890), 147, 156.

18. BEP, “As the Appearance of the Smallpox,” *Boston Evening Post*, November 28, 1774, 2.

19. BRC, *A Report of the Record Commissioners of the City of Boston Selectmen, 1769–1775*, vol. 23, BCD#42 (Boston: Rockwell and Churchill City Printers, 1893), Records of the town of Boston, 238.

20. BRC, *Boston Records 1770 to 1777*, 18, 223–224. Because the meeting was a continuation of previous meetings that had never been adjourned, the selectmen

believed they were not technically in violation of the British Act that closed all local government activities. This ruse enabled Boston's Selectmen to continue making important decisions despite Gage's orders to the contrary.

21. BEP, "The Public Are Hereby Informed," *Boston Evening Post*, March 27, 1775, 3. A public notice issued by William Cooper, Boston's town clerk, revealed civilians were placed in the Provincial Hospital in West Boston and military families placed on board the hospital ship.

22. BPB, "Extracts from an Act of This Province to Prevent the Spreading of the Smallpox," *Boston Post Boy*, March 27, 1775, 1.

23. BEP, "At a Meeting of Freeholders and Other Inhabitants," *Boston Evening Post*, April 3, 1775, 1.

24. Ibid.

25. Force, *American Archives*, 1, 96–112.

26. BRC, *Boston Selectmen 1769–1775*, 23, 224–225. While further town meetings were disbanded, the selectmen evaded this rule claiming their meetings were a continuation of previous meetings called by the townspeople themselves prior to the Intolerable Acts and therefore not subject to Gage's edict.

27. Ibid., 123.

28. Richard Frothingham, *History of the Siege of Boston* (Boston: Little, Brown, and Co., 1873), 45–90.

29. Force, *American Archives*, 1, 776–779.

30. A total of 4,977 persons were inoculated in 1764 and another 699 received smallpox the natural way. Assuming all of those individuals were still alive in 1774, only 44 percent of the population was immune to smallpox prior to the American Revolution.

31. Elizabeth A. Fenn, *Pox Americana* (New York: Farrar, Straus and Giroux, 2001), 47. Fenn quotes the original work of Christopher Marshall, *Passages from the Remembrances of Christopher Marshall*, ed. William Duane Jr. (Philadelphia: James Crissy, 1839), 38.

32. New England Chronicle, "In Provincial Congress," *New England Chronicle*, May 12, 1775, 4.

33. Richard Frothingham, *History of the Siege of Boston* (Boston: Charles C. Little & James Brown, 1851), 94–95.

34. Ibid., 96.

35. Ibid.

36. Thomas Gage, *General Orders by His Excellency the Honorable Thomas Gage: December 10, 1774 to June 6, 1775* (Boston: Boston Public Library, 1775). Orders for May 30, 1775 and June 5, 1775.

37. Washington Irving, *George Washington: A Biography* (New York: Da Capo Press, 1994), 21.

38. Frothingham, *Siege of Boston*, 215.

39. Jared Sparks, *The Writings of George Washington: Being His Correspondence, Addresses, Messages, and Other Papers, Official and Private*, 12 vols., vol. 3 (Boston: American Stationers' Company, John B. Russell, 1834), 239–245; Ann M. Becker,

"Smallpox in Washington's Army: Strategic Implications of the Disease During the American Revolutionary War," *Journal of Military History* 68, no. 2 (2004): 394; Hugh Thrusfield, "Smallpox in the American War of Independence," *Annals of Medical History* 2, no. 4 (1940): 313–314.

40. William Lincoln, ed., *Journals of the Provincial Congress of Massachusetts* (Boston: Dutton and Wentworth Printers, 1838), 474–477.

41. Massachusetts, "ARPMB Resolves 1775–1776," in *Resolve in Regard to the Poor of Boston Being Removed to Salem, Chapter 2*, ed. Massachusetts General Court (Boston: Wright & Potter, 1918), 9–10.

42. Philip Cash, *Medical Men at the Siege of Boston* (Philadelphia: American Philosophical Society, 1973), 156.

43. Fenn, *Pox Americana*, 48.

44. Massachusetts, "ARPMB Resolves 1775–1776," in *Resolve Appointing a Committee to Inspect the People Coming out of Boston on Account of Ye Smallpox, Chapter 17*, ed. Massachusetts General Court (Boston: Wright & Potter, 1918), 15.

45. Frederick Clifton Pierce, *Foster Genealogy, Being the Record of the Posterity of Reginald Foster* (Chicago: Press of W.B. Conkey Co., 1899), 160; Clifford Kenyon Shipton, *Biographical Sketches of Graduates of Harvard University, in the Classes of 1741–1745*, vol. 11 (Boston: Massachusetts Historical Society, 1960), 395–398.

46. Massachusetts, "ARPMB Resolves 1775–1776," in *Resolve Forbidding Boats to Passs and Repass the Chelsea Ferry, Chapter 226*, ed. Massachusetts General Court (Boston: Wright & Potter, 1918), 95.

47. Frothingham, *Siege of Boston*, 194; Cash, *Medical Men at Siege*, 60. Casualties are reported slightly differently by Frothingham and Cash. Figures used are those of Cash based on his more detailed analysis.

48. Cash, *Medical Men at Siege*, 60.

49. Peter Force, *American Archives: Consisting of a Collection of Authentick Records, State Papers, Debates, and Letters and Other Notices of Publick Affairs*, 9 vols., vol. 3 (Washington, DC: Peter Force, 1840), 1516.

50. Fenn, *Pox Americana*, 50.

51. Howe, *Howe's Orderly Book*, 147, 156.

52. Ibid., 156.

53. Ibid., 169.

54. Sparks, *Writings of George Washington*, 3, 176–188; William B. Reed, *Life and Correspondence of Joseph Reed: Military Secretary of Washington, at Cambridge; Adjutant-General of the Continental Army; Member of the Congress of the United States; and President of the Executive Council of the State of Pennsylvania* (Philadelphia: Lindsay and Blakiston, 1847), 134; Ezekiel Price, *Diary of Ezekiel Price, Proceedings of the Massacxhusetts Historical Society* (Boston: John Wilson & Son, 1864), 220.

55. Massachusetts, "ARPMB Resolves 1775–1776," in *Resolve Appointing a Committee to Dispose of Ye Inhabitants of Boston Now Coming Out and Granting to Them 100 Pounds, Chapter 399*, ed. Massachusetts General Court (Boston: Wright & Potter, 1918), 157.

56. Fenn, *Pox Americana*, 47.
57. Peter Force, *American Archives: Consisting of a Collection of Authentick Records, State Papers, Debates, and Letters and Other Notices of Publick Affairs*, 9 vols., vol. 4 (Washington, DC: Peter Force, 1843); Letter to the Council President from Robert H. Harrison, Aide De Camp to General Washington, December 3, 1775, 168, 1229.
58. Fenn, *Pox Americana*, 50.
59. Cash, *Medical Men at Siege*, 115.
60. Force, *American Archives*, 4, 168.
61. BG, "Testimony of Thomas Francis," *Boston Gazette*, February 6, 1776, 4.
62. Force, *American Archives*, 4, 168.
63. James E. Gibson, *Dr. Bodo Otto and the Medical Background of the American Revolution* (Baltimore: George Banta Publishing Co., 1937), 89.
64. Susan I. Lesley and Nina Moore Tiffany, eds., *Letters of James Murray, Loyalist* (Boston: printed: not published, 1901), 231. The remarkable revelations concerning mass inoculations in Boston remained relatively inaccessible to historians of the Boston siege until the early twentieth century when the letters of James Murray were published. As a result, nineteenth-century historians knew little of the details of General Howe's inoculation program during the siege of Boston.
65. While Philip Cash, author of *Medical Men at the Siege of Boston* argues against the view that Howe tried bioterrorism in the war against the Continental Army, Howe's diary documents his benign support of lackadaisical quarantine controls, and this is corroborated by the letters of James Murray that reveal Howe allowed infected residents to roam the streets of Boston.
66. Gibson, *Dr. Bodo Otto*, 89.
67. Force, *American Archives*, 4, 1325.
68. Ibid.
69. Massachusetts, "ARPMB Resolves 1775–1776," in *Resolve Providing for the Poor of Boston Sent out to Point Shirley, Chapter 418*, ed. Massachusetts General Court (Boston: Wright & Potter, 1918), 165.
70. Jonathan Engel, *The Force of Nature: The Impact of Weather on Armies During the American War of Independence: 1775–1781* (Florida State University, 2011), 5–9.
71. James Warren, ed. *Warren-Adams Letters, 1778–1814*, 2 vols., vol. 2, Collections of the Massachusetts Historical Society (Cambridge: Massachusetts Historical Society, 1925), 428.
72. Massachusetts, "ARPMB Resolves 1775–1776," in *Resolve Relating to the Sick at Point Shirley, Chapter 438*, ed. Massachusetts General Court (Boston: Wright & Potter, 1918), 172.
73. Massachusetts, "ARPMB Resolves 1775–1776," in *Resolve Granting 200 Pounds to Thomas Crafts Junior and Others, Chapter 584*, ed. Massachusetts General Court (Boston: Wright & Potter, 1918), 239.
74. Peter Force, *American Archives: A Documentary History of the English Colonies in North America*, 9 vols., vol. 2, Fourth Series (Washington, DC: Peter Force, 1837), 1373–1374, 1381.

75. Massachusetts, "ARPMB," in *An Act for Reviving and Continuing Sundry Laws that Are Expired and Near Expiring, Chapter 14*, ed. Massachusetts General Court (Boston: Wright & Potter, 1886), 457–462.
76. Sparks, *Writings of George Washington*, 3, 481–482.
77. BNL, "Jan. 25—Last Week Four Men Belonging to Marblehead," *Massachusetts Gazette and Boston Newsletter*, January 27, 1774, 3.
78. Ibid.
79. Peter Force, *American Archives: Consisting of a Collection of Authentick Records, State Papers, Debates, and Letters and Other Notices of Publick Affairs*, 9 vols., vol. 5 (Washington, DC: Peter Force, 1844), 1649–1650. Congress authorized taking British vessels on March 23, 1776, but pillaging occurred even before authorization.
80. Frothingham, *Siege of Boston*, 305–306.
81. Price, *Diary of Ezekiel Price*, 244.
82. William Bell Clark, ed. *Naval Documents of the American Revolution*, vol. 4, *American Theatre: Feb. 19, 1776–Apr. 17, 1776* (Washington, DC: USGPO, 1969), 379–380.
83. Eldad Taylor, "Evacuation of Boston, 1776, By an Eye Witness," *New England Historical and Genealogical Register* 8 (1854): 231–232.
84. Cash, *Medical Men at Siege*, 146.
85. Clark, *Naval Documents*, 405–407.
86. Ibid., 433–434.
87. John Clement Fitzpatrick and David Maydole Matteson, eds., *The Writings of George Washington from the Original Manuscript Sources, 1745–1799*, 39 vols., vol. 4 (Washington, DC: USGPO, 1931), 411.
88. Charles Martyn, *The Life of Artemas Ward, the First Commander-in-Chief of the American Revolution* (New York: A. Ward, 1921), 227.
89. MGCHOR, *Journals of the House of Representatives, 1776*, 2 vols., vol. 52 (Boston: Printed by Green and Russell, printers to the Honourable House of Representatives., 1985), 55.
90. Massachusetts, "ARPMB," in *An Act Empowering the Justices of the Court of General Sessions of the Peace in the Several Counties in This Colony to Permit one or more Inoculating Hospitals to be Erected in Each of the Said Counties, Chapter 5*, ed. Massachusetts General Court (Boston: Wright & Potter, 1886), 552.
91. Massachusetts, "ARPMB," in *An Act Empowering the Justices of the Court of General Sessions of the Peace in the Several Counties in This Colony to Permit one or more Inoculating Hospitals to Be Erected in Each of the Said Counties, Chapter 7*, ed. Massachusetts General Court (Boston: Wright & Potter, 1886), 554.
92. Gibson, *Dr. Bodo Otto*, 91–92.
93. Massachusetts, "ARPMB," in *An Act to Prevent the Continuance of the Smallpox in the Town of Boston, and to License Inoculation There for a Limited Time, Chapter 8*, ed. Massachusetts General Court (Boston: Wright & Potter, 1886), 555.
94. Price, *Diary of Ezekiel Price*, 260.
95. Charles Francis Adams, ed. *Familiar Letters of John Adams and His Wife Abigail Adams: During the Revolution* (New York: Houghton Mifflin Co., 1875), 200.
96. Fenn, *Pox Americana*, 54.

97. Massachusetts, “ARPMB,” *Chapter 8*, 556.
98. William Francis Crafts, *The Crafts Family: A Genealogical and Biographical History of the Descendants of Griffin and Alice Craft, of Roxbury, Mass. 1630–1890* (Boston: Gazette Printing Company, 1893), 114–120.
99. Fenn, *Pox Americana*, 53–54.
100. BRC, *A Report of the Record Commissioners of the City of Boston Selectmen, 1776–1786*, vol. 25, BCD#150 (Boston: Rockwell and Churchill City Printers, 1894), Records of the town of Boston, 3.
101. Ibid., 4.
102. Ibid., 3–4.
103. Massachusetts, “ARPMB Resolves 1777–1778,” in *Resolve Providing for the Erection of Smoke Houses in Boston, Roxbury and Charlestown, Chapter 919*, ed. Massachusetts General Court (Boston: Wright & Potter, 1918), 348.
104. Massachusetts Historical Society, “Anecdote of Quincy on Smoke Houses,” in *Proceedings of the Massachusetts Historical Society, 1855–1858* (Boston: The Society, 1859), 261–262.
105. W. W. Abbot and Dorothy Twohig, eds., *The Papers of George Washington*, Digital ed., vol. 5 (Charlottesville: University Press of Virginia, 1993), 276–277.
106. Ibid., 332.
107. Fenn, *Pox Americana*, 19. Fenn’s chart identifies the degrees of communicability of smallpox from the date of exposure and provides evidence of the dangers posed by the premature departure of Washington’s troops.
108. Ibid., 677–679.
109. CJWA, “Extracts from An Act to Prevent the Continuance of the Smallpox in Boston,” *Continental Journal Weekly Advertiser*, July 18, 1776, 2. Continental Journal, Extracts from An Act to Prevent the Continuance of the Smallpox in Boston.
110. Ibid.
111. Cash, *Medical Men at Siege*, 148.
112. BRC, *Boston Selectmen 1776–1786*, 25, 6–9.
113. Cash, *Medical Men at Siege*, 148. Cash provides no comparative statistics to support his claim inoculation efforts conducted in the summer of 1776 were superior to previous efforts. A few statistics published by the selectmen may clarify the relative ranking of past epidemic responses. In 1776, there were fifty-seven deaths from smallpox caught in the natural way compared to 170 deaths in 1764. In 1776, 5,292 persons were held in quarantine, and 4,988 received inoculation. In contrast, in 1764, there were 5,646 persons quarantined, and 4,977 received inoculation. With such similar statistical performances, there is very little quantitative basis for ranking the epidemic response of 1776 as better than 1764.
114. Charles Vidich, Unpublished estimate of smallpox deaths based on calculations of at least five deaths a week over the ten-month siege.
115. Huber, “Control of the Communicable Diseases in Massachusetts,” 367.
116. Massachusetts, “ARPMB Resolves 1777–1778,” in *Resolve Respecting the Inoculating Hospitals in and About the town of Boston, Chapter 21*, ed. Massachusetts General Court (Boston: Wright & Potter, 1918), 15–16.

117. Massachusetts, “ARPMB Resolves 1777–1778,” in *Resolve Empowering General Heath to use the Barracks at Sewall’s Point for Inoculating Hospitals, Chapter 741*, ed. Massachusetts General Court (Boston: Wright & Potter, 1918), 281.
118. Crafts, *The Crafts Family*, 114–120.
119. Massachusetts, “ARPMB Resolves 1777–1778,” in *Resolve Empowering Colonel Crafts to Send Soldiers to the Barracks at Sewall’s Point for Inoculation, Chapter 820*, ed. Massachusetts General Court (Boston: Wright & Potter, 1918); “ARPMB Resolves 1777–1778,” in *Resolve Empowering Dr. Joseph Gardner to Improve the Hospital at West Boston, Chapter 875*, ed. Massachusetts General Court (Boston: Wright & Potter, 1918), 308, 328.
120. Philip Cash, “The Phoenix and the Eagle,” *New England Journal of Medicine* 305, no. 18 (1981): 1036.
121. Massachusetts, “ARPMB Resolves 1777–1778,” in *Resolve on the Petition of Dr. John Warren, Chapter 883*, ed. Massachusetts General Court (Boston: Wright & Potter, 1918), 332.
122. BRC, *A Report of the Record Commissioners of the City of Boston, Boston Records 1778 to 1783*, vol. 26, BCD#180 (Boston: Rockwell and Churchill City Printers, 1895), Records of the town of Boston, 15.
123. BRC, *Boston Selectmen 1776–1786*, 25, 67.
124. Massachusetts, “ARPMB Resolves 1777–1778,” in *Resolve Discontinuing the Hospital at Sewall’s Point, Chapter 1073*, ed. Massachusetts General Court (Boston: Wright & Potter, 1918), 413.
125. Walter L. Burrage, *A History of the Massachusetts Medical Society* (Norwood, MA: Plimpton Press, 1923), 31.
126. Massachusetts, “ARPMB Resolves 1777–1778,” in *Resolve Authorizing Towns to Erect Inoculating Hospitals, Chapter 930*, ed. Massachusetts General Court (Boston: Wright & Potter, 1918), 352. Acts and Resolves of the Province of Massachusetts Bay, 1777–1778, Chapter 930.
127. The selectmen repaired the damage caused by the British in 1780, almost five years later. This delayed construction work revealed the degree to which Boston remained in financial distress from the British siege.
128. Duffy, *Epidemics Colonial America*; Joseph I. Waring, *A History of Medicine in South Carolina* (Charleston: South Carolina Medical Association, 1964); Gilda Marie Anroman, *Infectious Disease in Philadelphia, 1690–1807: An Ecological Perspective* (College Park: University of Maryland, 2006). There are no known accounts of citywide quarantines in colonial ports, other than Boston.
129. Fenn, *Pox Americana*. Fenn offers a comprehensive history of the impact of smallpox on later phases of the war.
130. Mary C. Gillett, *The Army Medical Department, 1775–1818*, United States Army historical series (Washington, DC: Center of Military History, United States Army, 1981), 74–75.
131. Credit goes to John Freitas for these sage remarks.

Chapter 8: Yellow Fever and the Emergence of Boards of Health

1. Charles E. Hill, *Leading American Treaties* (New York: The MacMillan Co., 1922), 45–59.
2. Adams, *New England in the Republic*, 183–254.
3. W. W. C. Toppley and G. S. Wilson, “The Spread of Bacterial Infection the Problem of Herd-Immunity,” *Journal of Hygiene* 21, no. 3 (May 1923): 243–249.
4. The first quarantine laws in Connecticut, Massachusetts, New Hampshire, Pennsylvania, Rhode Island, South Carolina and Virginia controlled smallpox or plague, not yellow fever. However, quarantine legislation enacted after the Revolutionary War focused on yellow fever epidemics.
5. Richard Harrison Shryock, *Medicine and Society in America, 1660–1860*, Anson G. Phelps Lectureship on Early American History (New York: New York University Press, 1960), 25–38.
6. James Tilton, *Economical Observations on Military Hospitals and the Prevention and Cure of Diseases Incident to an Army* (Wilmington, DE: J. Wilson, 1813), 49; James Carmichael Smyth, *The Effects of Nitrous Vapour in Preventing and Destroying Contagion* (Philadelphia: Budd & Bartram, 1799), 29–34. Very little literature exists on the efficacy of smokehouses as a tool to decontaminate those exposed to smallpox. The most exhaustive discussion of eighteenth-century decontamination strategies is in James Carmichael Smyth’s treatise on the effects of nitrous vapor for disinfecting hospitals where jail fever was prevalent. Smyth claimed “next to the smoke of wood for purifying a tainted air, I esteem that of gunpowder.” A wide range of fumigants were used in the eighteenth century, including burning of (1) tar, (2) sulfur, (3) tobacco, (4) wood, and (5) portfire (a mixture of one-half sulfur, one-quarter nitre, and one-quarter charcoal). Disinfection techniques included boiling vinegar, vinegar with camphire, and tar.
7. Massachusetts, “Acts and Laws of the Commonwealth of Massachusetts,” in *An Act Providing Hospitals for Inoculation and Preventing Infection from the Smallpox and for Repealing Several Acts Heretofore Made for That Purpose, Chapter 58* (Boston: Wright & Potter Printing Co., State Printers, 1895), 85–88. This law was modified four months later to allow selectmen to establish regulations governing such hospitals to ensure they were not located within one hundred rods of a dwelling in an adjacent town without such town’s consent. It also resuscitated disease reporting laws of the colonial era requiring anyone with smallpox to report their sickness. Failure to comply resulted in a fine of up to thirty pounds.
8. BRC, *A Report of the Record Commissioners of the City of Boston Selectmen, 1787–1798*, vol. 27, BCD#81 (Boston: Rockwell and Churchill City Printers, 1896), Records of the town of Boston, 193.
9. Data derived on infected vessels was compiled from the Boston Selectmen’s minutes, 1721–1775.
10. James Tyler, *A Treatise on the Plague and Yellow Fever* (Salem: Printed by Joshua Cushing, 1799), Published according to act of Congress, 383–386. Tyler

describes the symptomatology of yellow fever in its various stages with the aim of increasing public knowledge of this dreaded disease.

11. Elihu H. Smith, "An Account of the Yellow Fever in New York in 1795," in *A Collection of Papers on the Subject of Bilious Fevers*, ed. Noah Webster (New York: Hopkins, Webb & Co., 1796), 34–38.

12. Blake, "Yellow Fever in America," 678.

13. Benjamin Rush, *An Account of the Bilious Remitting Yellow Fever, as It Appeared in the City of Philadelphia, in the Year 1793* (Philadelphia: Thomas Dobson, at the Stone-House, 1794), 193–243; Samuel Brown, *A Treatise on the Nature, Origin and Progress of the Yellow Fever: With Observations on Its Treatment; Comprising an Account of the Disease in Several of the Capitals of the United States; But More Particularly as It Has Prevailed in Boston* (Boston: Manning & Loring, 1800), 63–72; Chris Holmes, "Benjamin Rush and the Yellow Fever," *Bulletin of the History of Medicine* 40, no. 3 (1966): 252–255; Jean Devèze, *An Enquiry into, and Observations upon the Causes and Effects of the Epidemic Disease, Which Raged in Philadelphia from the Month of August Till Towards the Middle of December, 1793* (Philadelphia: Parent, 1794), 54–57; John Warren, *A View of the Mercurial Practice in Febrile Diseases* (Boston: Printed by T.B. Wait and Co., 1813), 6–7; COL, "Extract of a Letter from a Gentleman in Philadelphia to His Friend in Baltimore," *Columbian Centinel*, September 25, 1793, 2. These authors discuss various treatments recommended during the yellow fever epidemics of the 1790s.

14. Charles E. Rosenberg, *The Care of Strangers, The Rise of America's Hospital System* (Baltimore: The Johns Hopkins University Press, 1987), 5.

15. Rush, *Account of the Bilious Remitting Yellow Fever*, 12.

16. Simon Finger, *The Contagious City, The Politics of Public Health in Early Philadelphia* (Ithaca, NY: Cornell University Press, 2012), 69–72, 127–129; Rush, *Account of the Bilious Remitting Yellow Fever*, 19–20.

17. Rush, *Account of the Bilious Remitting Yellow Fever*, 15; Wikipedia, "Thomas Mifflin." Accessed online August 29, 2020: http://en.wikipedia.org/wiki/Thomas_Mifflin

18. Nathan G. Goodman, *Benjamin Rush, Physician and Citizen, 1746–1813* (Philadelphia: University of Pennsylvania Press, 1934), 172.

19. Rush, *Account of the Bilious Remitting Yellow Fever*, 138–143.

20. L. H. Butterfield, ed. *Letters of Benjamin Rush*, 2 vols., vol. 2 (Princeton: Princeton University Press, 1951), 816.

21. Rush, *Account of the Bilious Remitting Yellow Fever*.

22. William Currie, *A Sketch of the Rise and Progress of the Yellow Fever: And of the Proceedings of the Board of Health, in Philadelphia, in the Year 1799* (Philadelphia: Printed by Budd and Bartram, 1800), 55.

23. Ibid., 56.

24. Ibid., 68.

25. Blake, "Yellow Fever in America," 675–676.

26. Ibid., 678–679; COL, “Health Office Notice Concerning Quarantine,” *Columbian Sentinel*, May 16, 1804, 1.
27. Federal Gazette, “Boston,” *Boston, Federal Gazette*, October 14, 1793, 2; “Baltimore,” *Boston, Federal Gazette*, September 18, 1793, 2. These articles illustrate the quarantines imposed by Boston and Baltimore on the port of Philadelphia during the yellow fever epidemic of 1793.
28. Hill, *Leading American Treaties*, 51.
29. Morison, *Maritime History of Massachusetts*, 165.
30. Hunter Miller, ed., *Treaties and Other International Acts of the United States of America*, 8 vols., vol. 2, Publications of the Department of State, No. 175 (Washington, DC: USGPO, 1931), 245–274; Robert R. Livingston, *Examination of the Treaty of Amity, Commerce, and Navigation, between the United States and Great-Britain* (New York: Thomas Greenleaf, 1795), 1–96; George Washington, *A Proclamation* (Philadelphia: Pierce W. Gaines, 1796), 1–30.
31. U.S. Registry of the Treasury, *Exports of the United States, from the First of October 1798, to the Thirtieth of September 1799* (Philadelphia: U.S. Treasury Department, 1800), 1.
32. The Jay Treaty, November 19, 1794. Accessed online August 29, 2020: http://avalon.law.yale.edu/18th_century/jay.asp
33. Edward M. Riley, “Philadelphia the Naiton’s Capital: 1790–1800,” *Pennsylvania History* 20, no. 4 (1953): 374–375. Riley argues yellow fever was a factor that led to the relocation of the nation’s capital from Philadelphia to Washington, DC.
34. BRC, *Boston Selectmen 1787–1798*, 27, 212. Young Dr. Rand was sent onboard by the older physician, James Lloyd, who apparently did not wish to be exposed to the disease.
35. Ibid., 213; Samuel Laha held the island keeper post from 1779 to 1796. He was succeeded by Thomas Spears.
36. COL, “Legislature of Massachusetts,” *Columbian Sentinel*, September 25, 1793, 1.
37. Annie Haven Thwing, *The Crooked and Narrow Streets of the Town of Boston, 1630–1822* (Boston: Marshall Jones Co., 1920), 207.
38. Rush, *Account of the Bilious Remitting Yellow Fever*, 1–20; BMSJ, “An Essay on the Disease Called Yellow Fever,” *Boston Medical and Surgical Journal* 1, no. 2 (1812): 186. Typhus and yellow fever were often treated as one disease.
39. Ibid.
40. BRC, *Boston Selectmen 1787–1798*, 27, 213; Oliver Ayer Roberts, *History of the Military Company of the Massachusetts, Now Called the Ancient and Honorable Artillery Company of Massachusetts, 1637–1888*, vol. 2: 1738 to 1821 (Boston: Alfred Mudge & Son City Printer, 1897).
41. For example, in November 1792, during the midst of the Philadelphia yellow fever scare, the General Court sunset the smallpox laws of 1776 that authorized inoculation hospitals in several counties of the colony. Previous quarantine laws were so focused on smallpox they provided inadequate guidance to manage yellow fever cases.

42. COL, "Legislature of Massachusetts," *Columbian Centinel*, September 25, 1793, 1.
43. COL, "Letter from a Gentleman in Philadelphia," *Columbian Centinel*, September 25, 1793, 2.
44. Vidich, *Summary of Maritime Quarantine Activities in Boston Harbor: 1725–1763*.
45. BRC, *Boston Selectmen 1787–1798*, 27, 215.
46. William Cooper, "The Selectmen," *Boston Gazette and the Country Journal*, October 7, 1793, 4.
47. COL, "From Philadelphia, October 1—Through Favour of Heaven We Are Not Yet in the Land of the Living," *Columbian Centinel*, October 9, 1793, 2.
48. Caleb H. Snow, *A History of Boston* (Boston: Abel Bowen, 1825), 315–318.
49. Roberts, *History of Military Company of Massachusetts*, 2: 1738 to 1821, 47, 148, 161; Becky 2641, "Ancestry of Thomas Dawes," in *Ancestry.com* (Online: Ancestry.com, 2013).
50. BRC, *Boston Selectmen 1787–1798*, 27, 216.
51. Cooper, "The Selectmen," 4.
52. COL, "From Philadelphia, October 1—I Am Now So Happy," *Columbian Centinel*, November 1, 1793, 2.
53. BRC, *Boston Selectmen 1787–1798*, 27, 224.
54. Boston Registry Department, *Boston Town Records 1784–1796*, 31, 360.
55. COL, "By Order of the Town of Boston to Be Sold," *Columbian Centinel*, December 14, 1799, 4.
56. During normal times, municipal news would have been relegated to page two of the newspaper.
57. Geographical Distribution of Yellow Fever Mosquitoes. Accessed online August 29, 2020: http://entnemdept.ufl.edu/creatures/aquatic/aedes_aegypti.htm
58. J. H. Powell, *Bring Out Your Dead: The Great Plague of Yellow Fever in Philadelphia in 1793* (New York: Time Inc., 1948), 241.
59. *An Act Relative to Quarantine*, Fourth Congress, Session 1 (May 27, 1796).
60. Gordon S. Wood, *The Creation of the American Republic: 1776–1787* (Chapel Hill: University of North Carolina Press, 1969), 527–532.
61. Annals of Congress, *The Debates and Proceedings of the Congress of the United States* (Washington, DC: Gales & Seaton, 1796), 1353. History of Congress, House of Representatives May 1796.
62. Ibid., 1356. History of Congress, House of Representatives May 1796.
63. Bridenbaugh, *Cities in the Wilderness*, 240–242; David King, "Origin and Growth of the Quarantine System in Rhode Island," ed. National Board of Health, Annual Report of the National Board of Health, 1881 (Washington, DC: USGPO, 1882), 268–273. Rhode Island transferred quarantine oversight to the city of Newport by an act of 1743. Florida authorized its cities and towns to manage quarantine by an act of 1853. Stephen Smith, "Origin and Growth of the Quarantine System of the United States: Florida," *National Board of Health Bulletin* 3, no. 5 (1881): 31–32; Connecticut authorized its town's selectmen to manage quarantine

by acts of 1711 and 1732; Connecticut General Assembly, "An Act Providing in Case of Sickness," in *Public Statute Laws of the State of Connecticut*, ed. Connecticut General Assembly (Hartford: Hudson & Goodwin Printers, 1808), 609–620; Charles J. Hoadly, "An Act Providing in Case of Sickness," in *The Public Records of the Colony of Connecticut, May 1726 to May 1735*, ed. Connecticut General Assembly (Hartford: Press of Caise, Lockwood & Brainard, 1873), 371–374. New Hampshire authorized local justices of the peace to manage maritime quarantine by an act of 1714. Albert Stillman Batchellor, "An Act Providing in Case of Sickness," in *Laws of New Hampshire Province Period: 1702–1745*, ed. New Hampshire Legislature (Concord, NH: Rumford Printing Co., 1913), 129–130. Georgia authorized its cities and towns to manage quarantine by an act of 1793. Robert Watkins and George Watkins, "An Act to Oblige Vessels and Persons Coming from Placed Infected with Epidemical Distempers to Perform Quarantine, and to Prevent the Bringing into, and Spreading Malignant and Contagious Disorders in this State," in *A Digest of the Laws of the State of Georgia from Its First Establishment as a British Colony Down to 1798* (Philadelphia: R. Aitken, 1800), 514–518.

64. Vessel travel times in the colonial era are well described J. M. Hochstetler's blogsite. Accessed online August 28, 2020: <http://americanpatriotseries.blogspot.com/2013/06/18th-century-travel-speeds-by-ship.html>

65. Vidich, *Summary of Maritime Quarantine Activities in Boston Harbor: 1725–1763*.

66. Ibid.

67. Smallpox epidemics hit Boston during 1701, 1721, 1730, 1752, 1764, and 1774.

68. Roslyn Stone Wolman, "A Tale of Two Colonial Cities: Inoculation Against Smallpox in Philadelphia and in Boston," *Transactions of the College of Physicians of Philadelphia* 45, no. 6 (1978): 338–347.

69. Ibid., 344.

70. Anroman, *Infectious Disease in Philadelphia*, 57.

71. Bridenbaugh, *Cities in the Wilderness*, 240; John Duffy, "Yellow Fever in the Continental United States during the Nineteenth Century," *Bulletin of the New York Academy of Medicine* 44, no. 6 (1968).

72. Yellow fever struck Boston in 1799.

73. Wolman, "A Tale of Two Colonial Cities," 344.

74. Ibid., 13–14, 35–38.

75. BRC, *Boston Records 1729 to 1742*, 12, 14–15; Philadelphia Common Council, *Minutes of the Common Council of the City of Philadelphia 1704 to 1776* (Philadelphia: Crissy & Markley Printers, 1847); Wolman, "A Tale of Two Colonial Cities," 338–347; Joseph M. Toner, *Inoculation in Pennsylvania*, *Transactions of the Medical Society of the State of Pennsylvania* (Philadelphia: Medical Society of the State of Pennsylvania, 1865), 177.

76. Wolman, "A Tale of Two Colonial Cities," 344.

77. Susan E. Klepp, "Demography of Early Philadelphia: 1690–1860," *Proceedings of the American Philosophical Society* 33, no. 2 (1989): 95–96.

78. Pennsylvania General Assembly, "An Act to Prevent Sickly Vessels Coming into This Government," June 7, 1700, *The Charters and Acts of Assembly of the Province of Pennsylvania*, vol. 1 (Philadelphia, 1762), 9.
79. Pennsylvania General Assembly, "The Statutes at Large of Pennsylvania: 1682 to 1801," in *An Act for Vesting the Province Island and the Buildings Thereon Erected and to be Erected in Trustees and Providing a Hospital for such Sick Passengers as Shall Be Imported into This Province and to Prevent the Spreading of Infectious Distempers*, ed. Pennsylvania General Assembly (Philadelphia: Clarence M. Busch, 1897), 382–387; "The Statutes at Large of Pennsylvania: 1682 to 1801," in *A Supplement to an Act Entitled "An Act for the Prohibiting the Importation of Germans or Other Passengers in too Great Numbers in Any One Vessel"*, ed. Pennsylvania General Assembly, vol. 6, 1759–1765 (Philadelphia: Wm Stanley Ray, 1899), 432–440.
80. Roslyn Stone Wolman, *Some Aspects of Community Health in Colonial Philadelphia* (Philadelphia: University of Pennsylvania Press, 1974), 35, 42, 51.
81. Russell, "Review of Colonial Legislation."
82. Jonathan E. Henry, "Experience in Massachusetts and a Few Other Places with Smallpox and Vaccination," *Boston Medical and Surgical Journal* 185, no. 8 (1921): 221–228.
83. Ibid.
84. Klepp, "Demography of Early Philadelphia," 90.
85. Ibid., 102; Wolman, "Aspects of Community Health," 340–345.
86. Gary B. Nash, *Quakers and Politics: Pennsylvania 1681–1726* (Boston: Northeastern University Press, 1968), 180.
87. Anroman, *Infectious Disease in Philadelphia*, 7–8.
88. Ibid., 77–78.
89. Blake, *Public Health in Boston*, 247–249.
90. Anroman, *Infectious Disease in Philadelphia*, 58, 110. Philadelphia's crude death rate were consistently higher than those of Boston during every decade prior to the Revolutionary War. The only exception was the period 1720–1729 when Boston's crude death rate was only slightly higher than that Philadelphia (i.e., forty-five deaths per thousand versus forty-four for Philadelphia). Anroman emphasizes that endemic disease was the primary cause of Philadelphia's high mortality, not epidemics.
91. Heiner, "Inapparent Infection in Smallpox," 252–268. Heiner's research demonstrates that subclinical infections do serve as a potential source of smallpox infection and could influence herd immunity and the severity of infections.
92. Charles Vidich, *Comparison of 18th Century Smallpox Mortality in Boston and Philadelphia* (Bears Island, SC: Vidich Associates, 2015).
93. E. Digby Baltzell, *Puritan Boston and Quaker Philadelphia* (New Brunswick: Transaction Publishers, 1996), 92–106.
94. Wolman, "Aspects of Community Health," 16–17.
95. Ibid., 39–40.
96. Finger, *The Contagious City*, 48.

97. George W. Norris, *Early History of Medicine in Philadelphia* (Philadelphia: W. F. Norris, 1886), 283.
98. Wolman, "Aspects of Community Health," 22, 44. Merchants would often drop off passengers at New Castle to avoid duty on imported Irish servants in Philadelphia.
99. Anroman, *Infectious Disease in Philadelphia*, 109–110.
100. Finger, *The Contagious City*, 37.
101. In Boston, physicians were assigned specific tasks as needed, whereas in Philadelphia they were given multiyear appointments with less accountability to elected officials.
102. Wolman, "Aspects of Community Health," 34.
103. Finger, *The Contagious City*, 42; Wolman, "Aspects of Community Health," 31.
104. BRC, *Boston Selectmen 1764–1768*, 20, 1–95. The selectmen's minutes for the period January to June 1764 reveal the degree to which they directly managed smallpox epidemics.
105. Wolman, "A Tale of Two Colonial Cities," 344.
106. Philadelphia Common Council, *Minutes of the Common Council of the City of Philadelphia 1704 to 1776*.
107. Nash, *Quakers and Politics*, 233.
108. Wolman, "Aspects of Community Health," 30.
109. Powell, *Bring Out Your Dead*, 302–303; Wolman, "Aspects of Community Health," 172.
110. Pennsylvania General Assembly, "Act for Establishing an Health Office 1803," ed. Pennsylvania General Assembly (Philadelphia: William Duane, 1803), 1–29.
111. United States Congress, *The Debates and Proceedings of the Congress of the United States* (Washington, DC: Gales & Seaton, 1796). U.S. Senate, History of Congress, Senate Proceedings, May 1796.
112. A. W. Woodruff, "Benjamin Rush, His Work on Yellow Fever and His British Connections," *American Society of Tropical Medicine and Hygiene* 26, no. 5 Pt 2 Suppl (1977): 1056.
113. K. D. Patterson, "Yellow Fever Epidemics and Mortality in the United States, 1693–1905," *Social Science and Medicine* 34, no. 8 (1992): 857.
114. Ibid.
115. Ibid.
116. Annals of Congress, *The Debates and Proceedings of the Congress of the United States* (Washington, DC: Gales & Seaton, 1798), 2420–2421. History of Congress, President's Speech, December 8, 1798.
117. Stephen Smith, "The Origin and Growth of the Quarantine System of the United States," *National Board of Health Bulletin* 2, no. 24 (1880): 621.
118. Ibid., 622.
119. *An Act Respecting Quarantine and Health Laws*, Session 3 Fifth Congress (February 25, 1799), 620.

120. Ibid.
121. Butterfield, *Letters of Rush*, 1211.
122. Goodman, *Benjamin Rush, Physician and Citizen*, 213–214.

Chapter 9: Boston Board of Health

1. Blake, “The Inoculation Controversy,” 171; William Travis Howard, *Public Health Administration and the Natural History of Disease in Baltimore, Maryland, 1797–1920* (Washington, DC: Carnegie Institution of Washington, 1924), 47–48. Baltimore was the first American city to establish a board of health. Details on the founding of the Boston and Baltimore boards of health are provided by Blake and Howard. The first reference to the newly created Boston Board of Health appeared in the March 13, 1799 issue of the *Columbian Centinel*.
2. Blake, “Yellow Fever in America,” 679.
3. Patterson, “Yellow Fever Epidemics and Mortality,” 857.
4. Philip Cash, “The Professionalization of Boston Medicine: 1760–1803,” in *Medicine in Colonial Massachusetts: 1820–1820* (Boston: The Colonial Society of Massachusetts, 1980), 69–100.
5. Massachusetts, “The Laws of the Commonwealth of Massachusetts, Passed from the Year 1780, to the End of the Year 1800,” in *An Act in Addition to an Act Entitled “An Act to Empower the Town of Boston to Choose a Board of Health, and for Removing and Preventing Nuisances”* (Boston: Printed by Manning & Loring, 1801), 161–162.
6. COL, “Board of Health,” *Columbian Centinel*, March 30, 1799, 1.
7. Ibid.
8. Minutes of the Boston Board of Health, April 29, 1799, 29. Boston Rare Book Collection. The “blowing meat with the foul breath” may seem far-fetched but was part of eighteenth-century human behavior. This graphic description was summarized in the minutes of the Boston Board of Health. Blowing into meat was a technique to improve the appearance of dried-out meat.
9. Conrad Edick Wright and Edward W. Hanson, *Biographical Sketches of Graduates of Harvard University, in the Classes of 1772–1774* (Boston: Massachusetts Historical Society, 1999), 183–188.
10. Minutes of the Boston Board of Health, April 29, 1799, 33. Boston Rare Book Collection.
11. BBH, “Minutes of the Boston Board of Health,” ed. Boston Board of Health (Boston: Boston Public Library, Rare Manuscripts Section: Boston Board of Health, 1799–1822).
12. Ibid.
13. Ibid., 234, April 13, 1803.
14. Ibid., May 13, 1803.
15. Ibid.
16. COL, “Board of Health,” *Columbian Centinel*, June 22, 1799, 3.

17. COL, "Board of Health—At a Meeting of the Board of Health," *Columbian Centinel*, June 29, 1799, 2; J. H. Powell, *Bring Out Your Dead* (Philadelphia: University of Pennsylvania Press, 1949), 89; Martin Pernick, "Politics, Parties, and Pestilence: Epidemic Yellow Fever in Philadelphia and the Rise of the First Party System," *William and Mary Quarterly* 29, no. 4 (1972): 559–586. Pernick provides an insightful assessment of the politics of the Philadelphia yellow fever epidemic.
18. COL, "Board of Health," *Columbian Centinel*, June 29, 1799, 2–3.
19. BBH, "Minutes, Boston Board of Health," Minutes of April 21, 1804; COL, "Board of Health," *Columbian Centinel*, April 2, 1806, 2.
20. COL, "Board of Health to their Constituents," *Columbian Centinel*, June 15, 1799, 3.
21. Charles Vidich, *List of Citizens Serving as Members of the Boston Board of Health: 1799–1822* (Ashford, CT: Vidich Associates, 2004).
22. In their haste to issue the quarantine regulations during the summer of 1799, the board overlooked the fact that smallpox was not a tropical disease. On May 3, 1800, the board corrected this oversight. Any vessel with a case of smallpox during its passage was inspected by the visiting physician and, if necessary, sent to quarantine.
23. Blake, *Public Health in Boston*, 175.
24. David L. Heymann, *Control of Communicable Diseases Manual*, 20th ed. (Washington, DC: American Public Health Association, 2015), 684. The isolation of vessels for twenty-five days from their port of departure or three days after arrival was intended to stop diseases that might still be in their incubation phase. Since these isolation procedures were not normally applied to short trips known as "coastal trade" that plied the eastern seaboard, the net effect on delay of trade from Europe and the tropics was minimal. Today, it is known that the latency period for yellow fever is three to six days.
25. Blake, *Public Health in Boston*, 200.

Chapter 10: Vaccination

1. Samuel A. Green, "Centennial Address Delivered in the Sanders Theatre at Cambridge, June 7, 1881, before the Massachusetts Medical Society," *Medical Communications (1790–1913)* (1881): 543–671.
2. Butterfield, *Letters of Rush*, 835–836; John J. Holder Jr., "The Political and Educational Philosophy of Benjamin Rush," *Transactions of the Charles S. Peirce Society* 24, no. 3 (1988): 409–422. Benjamin Rush opposed quarantine, preferring a more humanitarian approach.
3. Derrick Baxby, *Jenner's Smallpox Vaccine: The Riddle of Vaccinia Virus and Its Origin* (London and Exeter, NH: Heinemann Educational Books, 1981), 52.
4. Benjamin Waterhouse and Thomas Jefferson, *A Prospect of Exterminating the Small Pox: Part 2, Being a Continuation of a Narrative of Facts Concerning the*

Progress of the New Inoculation in America (Cambridge, MA: University Press, 1802), 5; Philip Cash, *Dr. Benjamin Waterhouse; A Life in Medicine and Public Service* (1745–1846) (Sagamore Beach, ME: Science History Publications, 2006), Biography, 124.

5. COL, “A Vaccine Institution,” *Columbian Centinel*, April 1, 1801, 1.
6. Cash, *Dr. Benjamin Waterhouse*, 135.
7. Blake, *Public Health in Boston*, 180.
8. Cash, *Dr. Benjamin Waterhouse*, 146–149.
9. INDC, “Smallpox, William Aspinwall, Inoculator,” *Independent Chronicle*, November 9, 1801, 4.
10. Clifford Kenyon Shipton, *Biographical Sketches of Graduates of Harvard University, in the Classes of 1764–1767*, vol. 16 (Boston: Massachusetts Historical Society, 1972), 8–12. Waterhouse soon convinced Aspinwall of the merits of the cowpox vaccine. His acceptance of the new procedure in 1800 was a costly personal decision, resulting in the abandonment of his inoculation hospital in 1802, a significant source of income.
11. John B. Blake, *Benjamin Waterhouse and the Introduction of Vaccination; A Reappraisal*, Yale University Department of the History of Medicine Monograph Series no. 33 (Philadelphia: University of Pennsylvania Press, 1957), 62–64.
12. Thomas F. Harrington and James Gregory Mumford, *The Harvard Medical School. A History, Narrative and Documentary, 1782–1905* (New York and Chicago: Lewis Publishing Company, 1905), 319–326.
13. Cash, *Dr. Benjamin Waterhouse*, 76.
14. Ibid., 188–194.
15. COL, “Medical Micellany,” *Columbian Centinel*, July 28, 1802, 1.
16. BBH, “Minutes, Boston Board of Health,” 222, August 26, 1802.
17. Fred B. Rogers, “Pioneer Inoculators on Cape Cod,” *New England Journal of Medicine* 270, no. 13 (1964): 664–666.
18. COL, “Report of the Boston Board of Health,” *Columbian Centinel*, December 18, 1802, 1.
19. COL, “General Miscellany—Vaccination or Cow Pocks,” *Columbian Centinel*, December 22, 1802, 1.
20. COL, “A Comparative View of the Natural Smallpox and Inoculated Smallpox and Vaccination,” *Columbian Centinel*, June 25, 1803, 2.
21. COL, “Vaccination or Cow Pocks,” December 22, 1802, 1; *Columbian Minerva*, “Kine Pox Communication to the Inhabitants of the Town of Wrentham,” *Columbian Minerva*, September 13, 1803, 2.
22. Cash, *Dr. Benjamin Waterhouse*, 80, 145, 230–232.
23. John Warren and Society Massachusetts Medical, *Report on Vaccination: Presented and Accepted at the Annual Meeting of the Massachusetts Medical Society, June 1, 1808 and Ordered to be Printed in an Appendix to the Second Part of the Second Number of the Medical Papers of the Society* (Boston: Printed by Greenough and Stebbins, 1808), 89–138.
24. Ibid.

25. Harrington and Mumford, *Harvard Medical School*, 332.
26. Blake, *Public Health in Boston*, 186; Massachusetts, "The General Laws of Massachusetts," in *An Act to Diffuse the Benefits of Inoculation for the Cow Pox, Chapter 117* (Boston: Wells & Lilly and Cummings & Hilliard, 1822), 253.
27. COL, "General Inoculation for the Cow-Pock," *Columbian Centinel*, April 3, 1811, 1.
28. Blake, *Public Health in Boston*, 188. Tools to convert prices of the early nineteenth century to present values are found on the "measuring worth" website. Samuel H. Williamson, "Seven Ways to Compute the Relative Value of a U.S. Dollar Amount, 1790 to Present," *MeasuringWorth* (2020). Accessed August 28, 2020: <http://www.measuringworth.com/growth/>
29. COL, "To the Ladies of Boston," *Columbian Centinel*, April 20, 1811, 1.
30. COL, "General Inoculation for the Cow-Pock—Reissued," *Columbian Centinel*, April 24, 1811.
31. Blake, *Public Health in Boston*, 191. In 1816, smallpox revisited Boston. The city canvassed its wards to determine how many residents were vulnerable. To their surprise, 5,453 residents had not had either smallpox or cowpox. This prompted the board of health to recommend that each ward employ three physicians to vaccinate susceptible persons, with the town reimbursing those unable to pay. Fortunately, the Boston Medical Association agreed to suspend its fees for the poor and offered to provide house calls. This action resulted in the vaccination of a reported 3,832 of the 5,384 susceptible persons. These efforts, like those in 1806, resulted in not a single death from 1816 to 1824.
32. Louis C. Duncan, "The Days Gone By: Sketches of the Medical Service in the War of 1812," *Military Surgeon* 71 (1932): 439.
33. Whitfield J. Bell Jr., "Dr James Smith and the Public Encouragement for Vaccination for Smallpox," *Annals of Medical History*, Series 3, 2 (1940): 500–517.
34. Martin Kaufman, "The American Anti-vaccinationists and Their Arguments," *Bulletin of the History of Medicine* 41, no. 5 (1967): 463.
35. Robit K. Singla, "Missed Opportunities: The Vaccine Act of 1813" (Third Year Law Paper, Harvard University, 1998), 66–77.
36. Duffy, *Epidemics Colonial America*, 101–103.
37. Blake, *Public Health in Boston*, 192–193.
38. COL, "Board of Health of Boston to Their Constituents," *Columbian Centinel*, January 30, 1808, 1. According to the board, any vessel that spent more than twenty-five days at sea after departure from a yellow fever-infected port was only detained for seventy-two hours to complete the examination and purification of the vessel and its passengers.
39. U.S. Treasury Department, "Letter from the Secretary of the Treasury Transmitting a Summary Statement of the Value of the Exports from the Several States and Territories: 1790 to 1810," ed. U.S. Treasury Department (Washington, DC: USGPO, 1812), Table A & B.
40. Morison, *Maritime History of Massachusetts*, 151–212.

41. Ibid., 187.
42. Morison, *Maritime History of Massachusetts*, 191.
43. Accessed August 28, 2020: <https://uschs.wordpress.com/2012/06/15/june-1812-congress-declares-war-on-great-britain/>
44. COL, "Health Office," *Columbian Centinel*, August 8, 1812, 1.
45. Ibid.
46. Following the war, Benjamin Whitman, president of the Boston Board of Health from 1811 to 1819, continued the long tradition of using Rainsford Island as the town's quarantine station under a physician's supervision. Whitman and his fellow board members also maintained the eighteenth-century use of the red flag as a sign quarantine was being performed. A red flag of at least two yards in length had to be hoisted on infected vessels within the port of Boston, as well as on a flagstaff located on Rainsford Island. No captain could remove a sick passenger without board approval.
47. BBH, "Minutes, Boston Board of Health." The inventory was presented to the board of health on May 27, 1811.

Chapter 11: Yellow Fever Outbreak of 1819 and the Excesses of Quarantine

1. Committee of Commerce and Manufactures, "Statistical Accounts of Commerce and Navigation," *Documents Legislative and Executive of the Congress of the United States* (Washington, DC: Gales & Seaton, 1834), 391.
2. René De La Pedraja Tomán, *A Historical Dictionary of the U.S. Merchant Marine and Shipping Industry: Since the Introduction of Steam* (Westport, CT: Greenwood Press, 1994), 669–684; Jonathan Chapman, *Address of the Mayor to the City Council of Boston* (Boston: John H. Eastbrn, City Printer, 1841), 3–4.
3. This topic is more thoroughly discussed in the next chapter. The common social and economic class interests of the physicians and the merchant class politicized quarantine practice.
4. BCC, "Report of the Joint Special Committee on the Establishment of a Free City Hospital," ed. Boston City Council (Boston: Author, 1857). This is the classic case for why the poor feared physicians.
5. COL, "Health of the Cities," *Columbian Centinel*, August 14, 1819, 2.
6. BDA, "Marine Journal," *Boston Daily Advertiser*, July 22, 1819, 2; COL, "Health of the Cities," *Columbian Centinel*, August 14, 1819, 2.
7. NEJMCBS, "The Late Fever in Boston," *New England Journal of Medicine and Surgery, and Collateral Branches of Science* 8, no. 4 (1819): 380.
8. Ibid., 382.
9. COL, "Board of Health," *Columbian Centinel*, December 8, 1819, 1.
10. COL, "Boston," *Columbian Centinel*, August 14, 1819, 2.
11. NEJMCBS, "Case of the Ship Ten Brothers," *New England Journal of Medicine and Surgery, and Collateral Branches of Science* 9, no. 1 (1820): 98.
12. COL, "Health Office," *Columbian Centinel*, August 25, 1819, 3.

13. Boston Patriot and Daily Chronicle, "The Ship Ten Brothers," *Boston Patriot and Daily Chronicle*, September 1, 1819, 2.
14. COL, "Board of Health: Case of the Ship Ten Brothers," *Columbian Centinel*, December 8, 1819, 1.
15. Ibid.
16. NEJMCBS, "Case of the Ship Ten Brothers," 98.
17. BWR, "News—Boston Ten Brothers Sale," *Boston Weekly Report*, September 11, 1819, 4.
18. COL, "Quarantine Regulations," *Columbian Centinel*, May 10, 1820, 1; William Ingalls, "The Malignant or Yellow Fever in Boston, 1819," *Medical Repository of Original Essays and Intelligence Relative to Physic, Surgery, Chemistry, and Natural History* 20, no. 3 (1820): 256; BBH and Benjamin Whitman, *Quarantine Regulations of the Boston Board of Health* (Boston: Early American Imprints, S40287, 1817). During this three-year period, the only change to the regulations was found in Article 1, Quarantine of Vessels. Section 2 of Article I was modified to acknowledge the need for an extended quarantine period lasting twenty-five days from a death caused by a malignant disease during the voyage. Previously, quarantines were limited to twenty-five days from when the vessel left her last port and only seventy-two hours for those that had twenty-three or more days in passage. If this regulation had existed at the time *Ten Brothers* arrived in Boston, the vessel would have been quarantined until August 5th not August 1st. This extra time would have caught the three yellow fever cases among the crew of the *Ten Brothers* identified by Dr. William Ingalls on August 2, 1819.
19. Ingalls, "Malignant or Yellow Fever," 256.
20. Don E. Eyles, "A Critical Review of the Literature Relating to the Flight and Dispersion Habits of Anopheline Mosquitoes," ed. U.S. Public Health Service, Public Health Bulletin No. 287 (Washington, DC: USGPO, 1944), 29. Eyles prepared a review of all published investigations concerning the flight patterns of various mosquitoes. The maximum observed range of the anopheles vectors was anywhere from half to eight miles depending upon mosquito type, wind conditions, and other factors.
21. Usher Parsons, "Remarks on the Quarantine System," *Naval Magazine* 1, no. 4 (1836): 356; American Journal of Medical Sciences, *American Intelligence—on the Quarantine Regulations of Boston*, vol. 4, American Periodical Series Online (1828), 484–485; Review, vol. 1, American Periodical Series Online (1827), 174. An extensive literature emerged soon after the *Ten Brothers* debacle that inveighed against the application of quarantine to yellow fever.
22. COL, "Boston—Letter to Editor," *Columbian Centinel*, August 21, 1819, 2.
23. COL, "Board of Health—New York," *Columbian Centinel*, August 28, 1819, 2.
24. COL, "Health of Our Cities," *Columbian Centinel*, September 8, 1819, 2.
25. COL, "Boston—Health of the Town," *Columbian Centinel*, September 15, 1819, 2.
26. COL, "Health Office," *Columbian Centinel*, October 13, 1819, 2.

27. COL, "Arrived at Quarantine," *Columbian Centinel*, October 23, 1819, 2.
28. COL, "Board of Health: Case of the Ship Ten Brothers," *Columbian Centinel*, December 8, 1819, 1; Ingalls, "Malignant or Yellow Fever," 256–265. Dr. Ingalls also believed yellow fever was not contagious based on his observations of sailors on the *Ten Brothers*.

Chapter 12: Miasma Theory, Maritime Commerce, and Quarantine Restraints

1. Blake, *Public Health in Boston*, 251.
2. John Koren, *Boston, 1822 to 1922. The Story of Its Government and Principal Activities During One Hundred Years*, [Boston] Document 39-1922 (Boston: Boston Printing Department, 1922), 161.
3. Morison, *Maritime History of Massachusetts*, 232–233.
4. Ian K. Steele, *The English Atlantic 1675–1740* (New York: Oxford University Press, 1986), 274–275.
5. Eric Jay Dolin, *Political Waters* (Boston: University of Massachusetts Press, 2004), 6–20.
6. BCC, "Municipal Register for 1868," ed. Boston City Council (Boston: Alfred Mudge & Son City Printer, 1868), 19–20.
7. Ernst, *Constitutional History of Boston*, 101–102.
8. Koren, *Boston, 1822 to 1922*, 67–74; Ernst, *Constitutional History of Boston*, 124–126, 138–140.
9. BCC, "Report of the Joint Special Committee Rainsford Island," ed. Boston City Council (Boston: Author, 1841), 3.
10. Massachusetts, "Laws of the Commonwealth of Massachusetts: Passed by the General Court," in *An Act to Empower the Town of Boston to Choose a Board of Health and to Prescribe Their Power and Duty, Chapter 44* (Boston: Printed by Russell, Cutler and Co. for Benjamin Russell, Printer to the State, 1818), 261.
11. Ernst, *Constitutional History of Boston*, 139.
12. Eliot C. Clarke, *Main Drainage Works of the City of Boston*, 3rd ed. (Boston: Rockwell and Churchill City Printers, 1888), 13–17; Koren, *Boston, 1822 to 1922*, 67–74.
13. BCC, "Charter and Ordinances of the City of Boston Together with the Acts of the Legislature," in *An Ordinance Establishing and Regulating the Quarantine of Vessels*, ed. Boston City Council (Boston: John H. Eastburn City Printer, 1834), 183–187.
14. BCC, "An Ordinance Constituting the Board of Health of the City," ed. Boston City Council (Boston: Author, 1849), 3.
15. BBA, "Minutes of the Boston Board of Aldermen," ed. Boston Board of Aldermen (Boston: Boston Public Library, Microfilm Division, 1832), 170. On this date, the Quarantine Committee of the Boston Board of Aldermen ordered a fence be placed around the Island's burying ground.

16. Jerome Van Crowninshield Smith, ed., *Bowen's Boston Newsletter and City Record*, 2 vols., vol. 2 (Boston: Abel Bowen, 1826), 232–233.
17. Smith, *Rainsford Island*, 247.
18. While Rainsford Island was routinely used for quarantine during the eighteenth century, the number of cases was relatively small compared to the number of immigrants arriving in Boston in the early nineteenth century. There were several reasons for the demands placed on the quarantine station: (1) communicable disease increased as overcrowded tenements became more common, and (2) thousands of poor immigrants arrived in Boston as the cost and speed of a voyage between Europe and Boston dramatically dropped with steam-powered, steel-hulled vessels.
19. COL, “Quarantine Regulations,” *Columbian Sentinel*, May 10, 1809, 1, Article IX
20. BCC, “The Charter of the City Council of Boston and Ordinances Made and Established by the Mayor, Aldermen, and Common Council,” ed. Boston City Council (Boston: True and Greene, City Printers, 1827), 181.
21. A. Forbes and J. W. Greene, *Our First Men: A Calendar of Wealth, Fashion and Gentility* (Boston: Boston All Booksellers, 1846), 13, 27, 41, 47.
22. James Jackson Putnam, *A Memoir of Dr. James Jackson* (Cambridge: Houghton Mifflin Co., 1905), Biography, 297.
23. Harvard Medical School was founded in 1782. With very few exceptions, the faculty and graduates of other nearby medical schools, including those at Dartmouth (1798), Brown, Yale (1813), and Berkshire (1823), had a limited influence on nineteenth-century public health practice in Boston.
24. Rhoda Truax, *The Doctors Warren of Boston: First Family of Surgery* (Boston: Houghton Mifflin Co., 1968), 140–157; National Cyclopaedia, *The National Cyclopaedia of American Biography. Being the History of the United States* (New York: James T. White, 1929), 426–427.
25. Erwin H. Ackerknecht, “Anticontagionism between 1821 and 1867,” *Bulletin of the History of Medicine* 22 (1948): 562–593. From 1820 to 1850, the literature on quarantine was highly skewed toward abstinence from this practice. Ackerknecht provides an excellent assessment of the rise of anticontagionism within the medical profession and how it aligned with liberal political reform movements.
26. Jacob Bigelow, *Nature in Disease*, 2nd enlarged ed. (Boston: Phillips, Sampson and company, 1859), 11.
27. George Edward Ellis, *Memoir of Jacob Bigelow* (Cambridge, MA: John Wilson & Son, 1880), 77.
28. Bigelow, *Nature in Disease*, 1–39.
29. Ellis, *Memoir of Jacob Bigelow*, 56–59.
30. COL, “City of Boston,” *Columbian Sentinel*, January 31, 1827, 1.
31. Ibid.
32. COL, “City of Boston,” *Columbian Sentinel*, February 17, 1827, 1.
33. COL, “City Affairs,” *Columbian Sentinel*, May 23, 1827, 2.

34. Josiah Quincy, *Memoir of the Life of Josiah Quincy* (New York: Da Capo Press, [1971] 1825), Reprint.
35. Massachusetts, "Laws of the Commonwealth of Massachusetts," in *An Act in Addition to "An Act for Providing Hospitals for Inoculation and Preventing Infection from the Smallpox and for Repealing Several Acts Heretofore Made for that Purpose, Chapter 129*, vol. 10 (Boston: Wells & Lilly and Cummings & Hilliard, 1828), 869.
36. Boston Courier, "The Secret Out," *Boston Courier*, February 3, 1840, 1. The Boston Board of Health requested disease reporting as early as September 24, 1802. In 1840, the Massachusetts Medical Society opposed the actions of the General Court when it restored the earlier reporting requirements.
37. Jerome Van Crowninshield Smith, "The Health Law," *Boston Medical and Surgical Journal* 18, no. 9 (1838): 146.
38. James Jackson, "City Vaccination," *Boston Medical and Surgical Journal* 3 (1831): 754.
39. NEJMCBS, "City Vaccination," *New England Journal of Medicine and Surgery, and Collateral Branches of Science* 3, no. 47 (1831): 753.
40. The concept of "herd immunity," as it is known today, is understood as a disease-specific threshold of immunity within the population that halts an epidemic. No herd immunity threshold existed in the nineteenth century. Nevertheless, Boston's city physician knew that vaccination on a broad scale was essential to avert an epidemic.
41. Paul E. M. Fine, "Herd Immunity: History, Theory, Practice," *Epidemiologic Reviews* 15, no. 2 (1993): 265–290.
42. BMSJ, "City Vaccination," *Boston Surgical and Medical Journal* 3, no. 47 (1831): 759.
43. BBA, "Minutes of the Boston Board of Aldermen," ed. Boston Board of Aldermen (Boston: Boston Public Library, Microfilm Division, 1836), 291.
44. In 1836, Physicians were not required to take the Hippocratic Oath, nor were they bound to any professional code of ethics. It would take another eleven years before the American Medical Association adopted a code of ethics.
45. BMSJ, "Smallpox in Boston," *Boston Medical and Surgical Journal and Collateral Branches of Science* 15, no. 22 (1837): 354. See glossary for a definition of quarantine grounds.
46. Boston Daily Times, "Municipal," *Boston Daily Times*, 1837, 2.
47. BMSJ, "Public Health—Boston Board of Health," *Boston Medical and Surgical Journal* 16, no. 11 (1837): 1–5.
48. Lemuel Shattuck, "The Vital Statistics of Boston," *American Journal of the Medical Sciences* 2 (1841): 369–401.
49. John C. Warren, "Public Health—Boston Board of Health," *Boston Medical and Surgical Journal* 16, no. 2 (1837): 166.
50. Ibid., 168.
51. Ibid.
52. Warren, "Boston Board of Health," 168.

53. Ibid.
54. BCC, "City of Boston Joint Committee on Another Smallpox Hospital," ed. Boston City Council (Boston: Author, 1837), 10. The consulting physicians had not done their homework. At that time, seven states operated quarantine stations on offshore islands, including Charleston, South Carolina; Philadelphia, Pennsylvania; Baltimore, Maryland; New York, New York; Savannah, Georgia; Cape Hatteras, North Carolina; and Portsmouth, New Hampshire.
55. Lemuel Shattuck, *Memorial in Relation to Smallpox* (Boston: George C. Rand, City Printers, 1856), 7.
56. BCC, "City of Boston Joint Committee on Another Smallpox Hospital," 11.
57. House of Representatives of the Commonwealth of Massachusetts, "Report and Bill Relating to the Smallpox" (Boston: Massachusetts Legislature Library Special Collection, 1838).
58. A total of sixteen of the twenty lobbyists were Harvard graduates, a connection reflecting their shared social, economic, and political values. This was an era when Boston was increasingly dominated by immigrant populations arriving from Ireland, Italy, and other European nations. These lobbyists were part of the social and political aristocracy, or what has been called Boston's Brahmins.
59. Shattuck, *Memorial in Relation to Smallpox*, 7.
60. House of Representatives of the Commonwealth of Massachusetts, "Report and Bill Relating to the Smallpox."
61. Massachusetts, "Laws of the Commonwealth of Massachusetts Passed by the General Court in the Years 1837–1838," in *An Act to Repeal Certain Provisions of Law in Relation to the Smallpox, Chapter 158*, vol. 14 (Boston: Dutton and Wentworth, 1839), 443.
62. House of Representatives of the Commonwealth of Massachusetts, "Report and Bill Relating to the Smallpox," 6.
63. J. T. Buckingham, "Smallpox," *Boston Courier*, December 16, 1839, 3. The editor of the *Boston Courier* released a report issued by Jacob Bigelow, Chairman of a Boston Medical Association Committee investigating the efficacy of cowpox vaccinations. The committee concluded that 168 of 248 persons with smallpox had previously been vaccinated. The committee was unable to determine if the cause of the ineffective vaccine was due to its inappropriate application or to the attenuation of the vaccine's immunity-boosting ability.
64. *Boston Courier*, "The Secret Out," *Boston Courier*, February 3, 1840, 1. The author of this article stated the real reason the disease reporting law was repealed in 1838 was only made known to the state legislature in January 1840.
65. *Boston Courier*, "Smallpox," *Boston Courier*, February 13, 1840, 2.
66. The medical community still strongly supported vaccination without recognizing the complementary role played by hospital isolation. Unfortunately, the legislative committees responsible for resolving the disease reporting requirements were composed of physicians, who by disposition and training were opposed to quarantine.

67. Theron Metcalf and Horace Mann, "Revised Statutes of the Commonwealth of Massachusetts," in *Inoculation with the Cowpox* (Boston: Dutton & Wentworth, State Printers, 1836), 214; Massachusetts, "Laws of the Commonwealth of Massachusetts Passed at the Several Sessions of the General Court, Beginning January 1834 and Ending April 1836," in *An Act to Repeal Expressly all the Acts which Are Consolidated in the Revised Statutes, Chapter 7* (Boston: Dutton & Wentworth, Printers to the State, 1836), 582–651. See page 610. On February 4, 1832, the Commonwealth charged three commissioners with codifying the welter of statutes passed since its founding. After eighty-one days of reviewing the proposed revisions, consolidations, and deletions, on November 4, 1835, the legislature issued revised statutes—published in 1836—that interpreted previous laws in light of case law, competing laws, and the opinions of the sitting legislature. Commissioners concluded and the legislature concurred the original law known as "An Act to diffuse the benefits of inoculation for the Cow Pox" was not mandatory in nature. The revised statute states, "Each town may, at any meeting, make suitable provision for the inoculation of the inhabitants with the cow pox under the direction of the board of health."

68. Boston City Auditor, 1842–1850. The audit reports for these eight financial years reveal the lack of revenue generated from quarantine. Many of the port physician's reports were published in the *Boston Daily Atlas* and *Boston Courier* and reveal quarantine ship inspections were substantially less than those in earlier years.

69. Boston City Council, "Quarantine," ed. Special Committee on Quarantine (Boston: Author, 1841), 3–4.

70. American Medical Association, "Code of Ethics of the American Medical Association," in *Transactions of the American Medical Association* (Philadelphia: Collins Printer, 1868), 473–486. The AMA's first code of ethics, adopted in May 1847, established seven obligations every physician should have to their patients, including kindness, maintaining the patient's privacy, providing ongoing support, keeping the patient's sense of hope, providing uplifting support to terminal cases, offering consultation, and caring for the patient's welfare. Disease reporting requirements clearly conflicted with two or three of these seven obligations.

71. Boston City Council, "Quarantine," 10–15.

72. Ibid.

73. Ackerknecht, "Anticontagionism"; Charles E. Rosenberg, *The Cholera Years* (Chicago: University of Chicago Press, 1987), History; BCP, *Records of the Committee 1827–1854* (Boston: Countway Medical Library, 1827). The extensive literature on miasma theory is closely linked to cholera and yellow fever epidemics of the nineteenth century.

74. Boston City Council, "Quarantine," ed. Consulting Physicians (Boston: Author, 1841), 10–15.

75. Ibid.

76. BCP, "Quarantine," ed. Boston City Council (Boston: Author, 1841), 10–25.

77. BCC, "Rainsford Island," ed. Committee on External Health (Boston: Author, 1843), 4.

78. Ibid.

79. These theories were in direct opposition to those of eighteenth century—reflecting the weakness of medical science in America during the pre-Civil War era. These theories emerged at a time when limited direct experience with smallpox existed in the Boston area due to the success of earlier vaccination programs.

80. Shryock, *Medicine and Society in America*, 117–166; Henry K. Beecher and Mark D. Altschule, *Medicine at Harvard: The First Three Hundred Years* (Hanover, NH: The University Press of New England, 1977), 62. While Harvard physicians tried to keep abreast of medical and scientific developments in Europe—especially in France—they were less advanced in their scientific and medical research practices, and this was especially true for communicable disease.

81. Based on unpublished research by the author completed in 2006.

82. Rainsford Island was originally served by a visiting physician, a position created by the Massachusetts General Court on June 20, 1799. This position was named the physician for Hospital Island on April 18, 1824, and then renamed resident physician on December 25, 1826.

83. For a complete listing of Boston's Port Physicians. Accessed August 30, 2020: <http://portphysicians.blogspot.com/>

84. Howard A. Kelly and Walter L. Burrage, *Dictionary of American Medical Biography: Lives of Eminent Physicians of the United States and Canada, from the Earliest Times* (New York: D. Appleton, 1928), 1128.

85. Smith, *Rainsford Island*, 246, 247, 249. Prior to June 3, 1824, quarantine ran from May to October.

86. Ibid., 247–249. Vessel inspection data is based on the year 1824.

87. Massachusetts, "ARPMB Resolves 1747–1753," *Chapter* 312, 385.

88. Smith, *Small Steamboats*, 223.

89. Boston Committee on Public Buildings, "Report on the Removal of the House of Industry and Other Public Institutions at South Boston to Deer Island," ed. Committee on Public Buildings (Boston: John H. Eastburn Printer, 1847), 18.

90. Ibid.

91. Boston City Council, "Quarantine," 3.

92. BCA, "ARRE," ed. Audit Department (Boston: John H. Eastburn City Printer, 1840); "ARRE," ed. Audit Department (Boston: John H. Eastburn City Printer, 1841).

93. BCC, "Proceedings, Summary Minutes of the Board of Aldermen for the Year 1841," ed. Boston City Council (Boston: Boston Microfilm Division, 1841), 156–159.

94. BCA, "Annual Appropriations," ed. Boston City Council (Boston: Author, 1838), 12; "ARRE," ed. Audit Department (Boston: John H. Eastburn City Printer, 1846), 34.

95. BCC, "Rainsford Island," 1843, 4.

96. *BMSJ*, "Quarantine Laws," *Boston Medical and Surgical Journal* 28, no. 25 (1843): 506.
97. Chapman, *Address of the Mayor*, 3–4.
98. U.S. Bureau of Statistics, "Arrivals of Alien Passengers and Immigrants in the United States from 1820 to 1892," ed. U.S. Treasury Department (Washington, DC: USGPO, 1893), 86. Accessed August 29, 2020: <http://nrs.harvard.edu/urn-3:HUL.FIG:006787809>
99. Fern L. Nesson, *Great Waters: A History of Boston's Water Supply* (Hanover: University Press of New England, 1983), 1–14; Dolin, *Political Waters*, 27–29.
100. Boston City Council, "Quarantine," 11–12. The best description of the miasma theory can be found in this report.
101. See appendix B for key milestones in the history of Boston's island quarantine program and the various boards of health that administered this function.
102. Koren, *Boston, 1822 to 1922*, 94–101, 152–171.

Chapter 13: Deer Island Quarantine Station

1. Cecil Woodham-Smith, *The Great Hunger* (New York: Old Town Books, 1962), 246–252.
2. Oscar Handlin, *Boston's Immigrants, 1790–1880* (Cambridge: The Belknap Press of Harvard University Press, 1991), 44–46.
3. Massachusetts, "Public Documents of Massachusetts Being the Annual Reports of Various Public Officers and Institutions for the Year 1873" (Boston: Author, 1874), Table I.
4. Handlin, *Boston's Immigrants*, 242.
5. Christian Reflector and Christian Watchman, "The Emigrants Hospital," *Christian Reflector and Christian Watchman*, August 10, 1848, 32.
6. BET, "Weekly Report of Deer Island Hospital," *Boston Evening Transcript*, October 24, 1848. The quarantine on Deer Island was an unprecedented action that dwarfed all previous island quarantines of the seventeenth, eighteenth, and nineteenth centuries.
7. BCC, "Report of the Removal of the House of Industry and Other Public Institutions at South Boston to Deer Island," ed. Committee on Public Buildings (Boston: John H. Eastburn City Printer, 1847), 3.
8. Ibid., 13.
9. Deer Island is part of the mainland because of land making activities that occurred during the twentieth century. However, in the nineteenth century, it was a treacherous swim from the island to the mainland.
10. BCC, "Report of the Removal of the House of Industry and Other Public Institutions at South Boston to Deer Island," 14.
11. Boston Daily Atlas, "Special Notices—Notice to Pilots and Masters of Vessels," *Boston Daily Atlas*, October 20, 1848, 3.

12. Handlin, *Boston's Immigrants*. This is the classic study of Boston immigrants and their impact on the city.
13. *BMSJ*, "A City Almshouse and Hospital," *Boston Medical and Surgical Journal* 40, no. 22 (1849): 444; Board of Directors for Public Institutions, "Report of the Board of Directors for Public Institutions," ed. Boston Public Institutions (Boston: Author, 1858), 1; Boston Committee on Public Buildings, "Report on the Removal of the House of Industry and Other Public Institutions at South Boston to Deer Island" (Boston: 1847), 1–26; Christian Inquirer, "Deer Island," *Christian Inquirer*, August 11, 1849, 3, 44. The Board of Directors for Public Institutions took charge on November 12, 1857.
14. "Report on the Removal of the House of Industry," 12.
15. O'Connor, *Boston Irish*, 59–94.
16. Christian Inquirer, "Deer Island," 3, 44.
17. MPNEJA, *Massachusetts Ploughman and New England Journal of Agriculture* 6 (1847): 2.
18. Annual Reports of the Board of Public Institutions of the city of Boston, 1857–1867. Accessed August 29, 2020: https://books.google.com/books?id=tO1-AAAAIAAJ&pg=RA3-PA21&dq=Boston+annual+report+of+directors+for+public+institutions,+1860&hl=en&sa=X&ei=_JYyVcyRHojmgwTvoYGACA&ved=0CCsQ6AEwAg#v=onepage&q=Boston%20annual%20report%20of%20directors%20for%20public%20institutions%2C%201860&f=false
19. MPNEJA, 2; BET, "Pauper Riot," *Boston Evening Transcript*, March 21, 1848, 2.
20. Green, "Medicine in Boston," 533.
21. BCC, "Rainsford Island," 1843, 3.
22. John Prescott Bigelow, *Inaugural Address to the Aldermen and Common Council by John Prescott Bigelow, Mayor of the City of Boston* (Boston: John H. Eastburn City Printer, 1849), 13–16.
23. Isaac Hays, "Epidemic Cholera," *American Journal of the Medical Sciences* 15 (1848): 311.
24. Jesse Chickering, *State Census of Boston, May 1, 1850* (Boston: John H. Eastburn, City Printer, 1850), 32.
25. Ibid., 38. Provides a description of their deplorable conditions.
26. Boston City Council and Boston Consulting Physicians, "Report on Cholera," ed. Boston City Council (Boston: Author, 1848), 5.
27. Ibid., 6–7.
28. BCP, *Records of the Committee*, 127. Letter dated October 31, 1854.
29. Boston City Council and Boston Consulting Physicians, "Report on Cholera," ed. Boston City Council (Boston: Author, 1848), 7.
30. John Prescott Bigelow, *Inaugural Address to the Aldermen and Common Council by John Prescott Bigelow, Mayor of the City of Boston* (Boston: John H. Eastburn City Printer, 1851). Mayor Bigelow's 1851 inaugural speech notes the city's burdens are, in part, attributable to the dumping of lunatics, imbeciles, and paupers. However, deaths from cholera declined compared to their peak in 1849.

31. BCP, *Records of the Committee*, Diary for July 25, 1850.
32. BCP, "Quarantine Regulations: Opinion of the Consulting Physicians," ed. Consulting Physicians (Boston: Author, 1857), 1–4.
33. BCP, "Communication from the Consulting Physicians Respecting Quarantine Regulations," ed. Boston Consulting Physicians (Boston: Author, 1850).
34. Committee on Internal Health, "Report of the Committee on Internal Health on the Asiatic Cholera together with a Report of the City Physician on the Cholera Hospital" (Boston: John H. Eastburn City Printer, 1849). No name was provided to identify this first Irish victim of cholera.
35. Bowdoin College, *Bowdoin College Library Bulletin*, 4 vols. (Brunswick, ME: Printed for the Library, 1895), 150–151. Dr. Clark's obituary declares him to be the first physician to define the difference between cholera and typhus fever. His cholera report for the city of Boston represents one of the finest nineteenth-century case studies of cholera's symptomatology and of the Boston outbreak.
36. Boston Committee of Internal Health and Henry G. Clark, *Report of the Committee of Internal Health on the Asiatic Cholera: Together with a Report of the City Physician on the Cholera Hospital* (Boston: John H. Eastburn City Printer, 1849), 164–176.
37. Charles Clarke, "On Cholera, Its Nature and Treatment," *Boston Medical and Surgical Journal* 35, no. 1 (1846): 10.
38. John Warren and Jacob Bigelow, "Cholera Report," *Boston Medical and Surgical Journal* 39 (1849): 451–454. Bigelow admitted he was unsure of how cholera was transmitted from one city to another. More importantly, while personal hygiene was encouraged, Bigelow and his colleagues never made the connection between handwashing and the interception of hand-to-mouth transfer of germs to oneself or others. Prior to the Civil War, personal hygiene was not based on germ theory. That concept would only emerge in the late 1870s.
39. Henry G. Clark, "Report of the Committee of Internal Health on the Asiatic Cholera," ed. City Physician (Boston: Author, 1849); William Read, "A Communication from the City Physician on Asiatic Cholera, Is It a Contagious Disease?," ed. City Physician (Boston: Author, 1866). A comparison of the 1849 Asiatic Cholera Report issued by the city physician Henry Clark to the 1866 Asiatic Cholera Report of his successor, William Read reveals a wide divergence in opinion on how cholera was transmitted. This was a watershed moment in the city's readoption of quarantine.
40. Boston Evening Transcript, "Cholera," *Boston Evening Transcript*, June 29, 1849, 2.
41. Henry G. Clark, "Report of the Committee of Internal Health on the Asiatic Cholera," ed. City Physician (Boston: Author, 1849), 21.
42. Dr. Smith's diary for the late 1840s is held at the New England Historical and Genealogical Society in Boston. It reveals the wide range of extracurricular activities and public speaking engagements that consumed much of his personal time in later years. If he were to return to the solitary island existence of a port physician, all of his personal and professional activities would have come to an

end. His decision to resign was a logical move for a forty-nine-year-old physician who had already spent twenty-three years in this post.

43. *BMSJ*, “Boards of Health,” *Boston Medical and Surgical Journal* 41, no. 6 (1849): 124.

44. Committee on Internal Health, “Report of the Committee on Internal Health on the Asiatic Cholera together with a Report of the City Physician on the Cholera Hospital,” 180.

45. *Ibid.*, 9, 180.

46. *Ibid.*, 9. This hospital remained operational for the next ten years as the city physician anticipated recurring outbreaks of cholera. Ironically, cholera struck so infrequently it had very little impact on the city’s mortality rate.

47. Chickering, *State Census of Boston*, May 1, 1850, 30–37.

48. G. Andrews Moriarty, “The Moriarty Family of Salem, Mass.” *New England Historical and Genealogical Register* 101, no. 3 (1947): 226–228. Accessed August 29, 2020: <http://portphysicians.blogspot.com/2010/08/john-m-moriarty.html>

49. Samuel H. Durgin, “Vaccination and Smallpox,” *Boston Medical and Surgical Journal* 146, no. 5 (1902): 114–115.

50. John Clough, “Legalized Vaccination,” *Boston Medical and Surgical Journal* 33 (1845): 258.

51. Henry G. Clark et al., *Communication of Dr. Henry G. Clark, Late City Physician, Transmitting Certain Documents to the City Council* (Boston: J.E. Farwell & Company, Printers to the City, 1861), 30. While Dr. Clark’s report was issued in 1861, the views expressed in that report reflect the medical opinions extant throughout the decade prior to the Civil War.

52. *BMSJ*, “On the Value of Vaccination and Revaccination,” *Boston Medical and Surgical Journal* 33, no. 2 (1845): 41.

53. BCP, “Communication from the Consulting Physicians Respecting Quarantine Regulations,” ed. Boston Consulting Physicians (Boston: John H. Eastburn, City Printer, 1850), 6.

54. *Ibid.*, 7.

55. Boston City Registrar, “Report by the City Registrar of the Births, Marriages and Deaths in the City of Boston in the Year 1850” (Boston: John H. Eastburn City Printer, 1851), 21.

56. BCP, *Records of the Committee*, 98, March 30, 1850

57. Massachusetts, “ARLM in the Years, 1846, 1847, 1848,” in *An Act to Repeal Certain Provisions of Law in Relation to the Smallpox, Chapter 119* (Boston: Dutton & Wentworth, Printers to the State, 1848), 671. The General Court removed the authority to establish smallpox hospitals on April 18, 1848.

58. Directors of the House of Industry and Reformation, “Annual Report of the Directors of the House of Industry and Reformation,” ed. Boston House of Industry and Reformation (Boston: John H. Eastburn City Printer, 1851), 8.

59. BCP, “Quarantine Regulations: Opinion of the Consulting Physicians,” 1857, 4.

60. As noted in an earlier chapter, Dr. Jacob Bigelow and his colleagues were some of the wealthiest men of their generation with close ties to the ruling political and merchant class of Boston. While the consulting physicians shared a great passion for serving the poor, their medical theories were consistent with doing the least harm possible to the economic interests of the merchant class—not necessarily the interests of foreign paupers.

61. Charles Vidich, *Chronology of Quarantine Activities of the Boston Board of Aldermen: 1822 to 1870* (Ashford, CT: Vidich Associates, 2011). Starting in 1847, Boston imposed seasonal quarantines, generally lasting from mid-June to the end of October designed to capture yellow fever infected vessels. This practice became such an accepted tradition its basic value was never questioned throughout the remainder of the nineteenth century.

62. The only exception to this general silence on the value of quarantine can be found in the writing of Lemuel Shattuck, one of the principal nineteenth-century architects of public health who emphasized the importance of statistically driven evaluations of disease trends.

63. BCP, "Quarantine," 1841.

64. Boston Evening Transcript, "Inauguration of Mayor Smith," *Boston Evening Transcript*, January 2, 1854, 2.

65. State Street Trust Company, *Mayors of Boston* (Boston: State Street Trust Company, 1914), 23.

66. Massachusetts, "ARLM in the Year 1855," in *An Act to Secure General Vaccination, Chapter 414* (Boston: William White, Printers to the State, 1855), 812.

67. Ibid., 813.

68. Arthur Allen, *Vaccine: The Controversial Story of Medicine's Greatest Lifesaver*, 1st ed. (New York: Norton, 2007), 60.

69. Vidich, *Chronology of Quarantine Activities of the Boston Board of Aldermen: 1822 to 1870*. Boston adopted mandatory vaccination for school children on March 12, 1827, as a result of a smallpox outbreak. The Boston School Committee required certificates of vaccination for school children. This requirement, while completely lost in the annals of Boston's medical history, is one of the great unsung public health achievements of the nineteenth century. The 1855 legislation was triggered by the 1854–1855 smallpox epidemic, the largest, at that point, in the nineteenth century.

70. Henry G. Clark, "Quarterly Report of the City Physician, January 1853," ed. City Physician (Boston: Author, 1853), 2. The 1853 report of the city physician illustrates his work as a vaccinator.

71. BCC, "Report of the Joint Special Committee on the Establishment of a Free City Hospital," Appendix A.

72. Massachusetts General Hospital was established as a public hospital in 1811. By the 1850s, demand for its services outstripped its ability meet the needs of Boston's poor. This prompted many physicians to call for the establishment of a city-sponsored free public hospital. It took at least ten years of public pressure

from physicians and concerned citizens before Boston City Hospital opened in south Boston.

73. Boston Dispensary and Robert Willard Greenleaf, *An Historical Report of the Boston Dispensary for One Hundred and One Years; 1796–1897* (Brookline, MA: Riverdale Press, 1898), 11, 48–56. Charles Vidich, *History of Boston's Consulting Physicians: 1824–1872* (Ashford, CT: Vidich Associates, 2007). Despite the fears of the poor, the Boston Dispensary, founded in 1796, provided free medical services to the city's poor. Donations from wealthy Bostonians and the goodwill of city physicians covered their travel and incidental expenses. Nearly half of the consulting physicians had served as district physicians for the Boston Dispensary, experiencing firsthand the poverty and disease of the poor. Physicians such as Jacob Bigelow, James Jackson John Ware, John Gorham, and George Hayward had not only devoted their time to public health policy they each spent several years of their lives devoted to caring for the poor. They knew the poor felt intimidated by island quarantine, preferring a free city hospital.

74. BCC, "Report of the Joint Special Committee on the Establishment of a Free City Hospital," 8.

75. Ibid.

76. David W. Cheever, *A History of the Boston City Hospital* (Boston: Municipal Printing Office, 1906), 110, 114.

77. As early as 1857, the city recognized the importance of the new hospitals to control smallpox and other infectious diseases. Knowing the problems posed by a lack of landside hospital space, the board of aldermen ordered an ordinance prepared to govern the activities of the planned City Hospital.

78. BCC, "An Ordinance in Relation to the City Hospital," ed. Boston City Council (Boston: Author, 1857), 5.

79. BCC, "An Ordinance in Relation to the City Hospital," ed. Boston City Council (Boston: Author, 1862), 5. The ordinance, adopted on December 23, 1862, authorized the trustees of the city hospital to oversee any buildings used for patients having smallpox or infectious diseases.

80. The History of Boston's Consulting Physicians: 1824–1872, a tabular history compiled by the author.

Chapter 14: Cholera Contagion and the Resurrection of Quarantine

1. Schepin and Yermakov, *International Quarantine*, 70–73.

2. New York Academy of Medicine, "Quarantine in the Maritime Cities of the United States," *JAMA* 60, no. 3 (1913): 194–200.

3. BCC, "Proceedings and Debates of the Fourth National Quarantine and Sanitary Convention" (paper presented at the National Quarantine Sanitary Convention, Boston, 1860), 8, 157–160. There was a link between the 1860 Boston Convention and the Paris Convention of 1850.

4. While Bigelow had long opposed quarantine, he believed a sound medical inspection program, coupled with shipboard sanitation, could be used to minimize its use. After over twenty years of managing the city's quarantine policies, he took pride in having the most efficient and least burdensome approach of any city along the eastern seaboard. For Bigelow, the best quarantine program was that which created the least burden on commerce and the needs of the sick.

5. L. R. Sheldon et al., "Report of a Committee of the Suffolk District Medical Society on Cholera in Boston and Vicinity During the Year 1866," *Boston Medical and Surgical Journal* 76, no. 2, 3 (1867): 29–37, 49–61. While no cholera statistics were reported by the city's Health Department, the Boston Board of Health reported there had only been eleven reported deaths from cholera in 1866. Presumably, this data was derived from a review of the annual vital statistics for the city of Boston. This reported mortality accounted for 58 percent of the true mortality reported by the city's physicians in their survey of 1866. Since cholera was not a reportable disease at the time, underreporting would be expected.

6. John Ross Cormack, "Treatment of Cholera," *American Journal of Medical Sciences* 27 (1854): 221–227; Clarke, "On Cholera, Its Nature and Treatment," 9–11; AJMS, "Cholera, Its Pathology and Treatment," *American Journal of the Medical Sciences* 52 (1866): 185–191; S. P. Hubbard, "Treatment of Cholera," *Boston Medical and Surgical Journal* 74, no. 1 (1866): 16–17; AJMS, "Cholera," *American Journal of the Medical Sciences* 10 (1832): 497–515; BCP, "Opinion of the Consulting Physicians of Cholera, 1866," ed. Consulting Physicians (Boston: Author, 1866), 8–9; C. B. Coventry, *Epidemic Cholera: Its History, Causes, Pathology, and Treatment* (Buffalo: George H. Derby & Co., 1849).

7. BMSJ, "Communicability of Cholera—Quarantine—Necessity of Congressional Action," *Boston Medical and Surgical Journal* 74, no. 1 (1866): 23–27.

8. Ackerknecht, "Anticontagionism," 562–593. Ackerknecht provides support for the view that many anticontagionist nineteenth-century physicians aligned with the liberal political reform movement and with the merchant class to strengthen the relevance of their medical theories.

9. BMSJ, "Communicability of Cholera," 23.

10. BMSJ, "The Cholera—The Question of Quarantine," *Boston Medical and Surgical Journal* 73, no. 16 (1865): 384.

11. BCD#32, Report of the City Physician, 1867, 39–42.

12. Read, "A Communication from the City Physician on Asiatic Cholera, Is it a Contagious Disease?" 1866. Dr. Read, the city physician clearly knew that cholera was a communicable disease after he issued this report to the board of aldermen.

13. William Read, *A Letter to the Consulting Physicians of Boston* (Boston: Alfred Mudge & Son City Printer, 1866), 1–29.

14. Henry R. Viets, "William Read and His Books," *New England Journal of Medicine* 269, no. 11 (1963): 562–565.

15. The erosion of the miasma theory did not occur overnight. The theory began to lose strength with the First International Sanitary Convention of 1851,

which improved the sharing of information on the etiology of diseases considered epidemical during the nineteenth century. The Semmelweiss' discovery of the importance of handwashing, John Snow's brilliant deduction of how contaminated drinking water could spread cholera, and the development of scientific approaches to disease isolation in American ports spawned alternative approaches to managing so-called miasmatic diseases. Yet, none of these discoveries, by themselves, led to the death kneel of the miasma theory. Like any theory without an evidentiary basis, many of the miasma theories greatest supporters continued to find reasons to question quarantine principles and the validity of the germ theory. Miasma as a causative factor of disease was finally eliminated from the international nosological classification system in the early twentieth century.

16. *BMSJ*, "Boards of Health," *Boston Medical and Surgical Journal* 41 (September 12, 1849), 124–125.

Chapter 15: Gallop's Island

1. Indeed George Gallup, the founder of the Gallup poll was a direct descendant (i.e., seventh great grandson) of Captain John Gallop whose name was given to a sixteen-acre island in Boston Harbor.

2. H. A. Rasmussen, "December 7, 1945 Letter from H.A. Rasmussen, Senior Surgeon at the Boston Quarantine Station to The Surgeon General," Folder RG-291, GSA, Gallup Isl. Quarantine Station 1940–50 and RG-291, Gallup's Island, 1950–1963 (Waltham, MA: NARA, 1945). Thomas Mahlstedt, March 9, 2006. Rasmussen indicates there were 248 graves on Gallop's Island during the period 1871 to 1872. The last island burial occurred in 1913. In addition, according to documentation in the National Archives, a total of thirteen Civil War soldiers died on Gallop's Island during the spring of 1864. By the time the surgeon general was notified of this gravesite in December 1945, none of the markers or headstones for these graves remained. The author had the opportunity to view the smallpox cemetery during the summer of 2005 after five of the graves had recently been exposed by the ravages of the sea. The tops of five coffins were painted in brilliant red paint according to Thomas Mahlstedt, archaeologist for the Massachusetts Department of Conservation and Recreation. Like the red flag of quarantine, the red-colored coffin was undoubtedly intended to announce that the victim had died from smallpox.

3. Darwin C. Gallup and Josephine Middleton Peck, *Gallup Genealogy* (Portland, ME: Gallup Family Association, Inc., 1966), 5. The name is variously spelled: Gallop, Galloupe, and Gallupe.

4. BCA, "ARRE," ed. Audit Department (Boston: John H. Eastburn City Printer, 1861), 65. The auditor's report indicates the city purchased the island to prevent its being carried off or washed away, and thereby injuring the harbor.

5. The American Civil War dampened the pace of immigration to Boston during the period 1860 to 1865.

6. State Board of Charities, "Tenth Annual Report of the Board of State Charities," ed. State Board of Charities (Boston: Wright & Potter State Printers, 1874), 184–185.
7. Francis A. Walker, "The Ninth Census—The Vital Statistics of the United States," ed. Department of the Interior, Ninth Census (Washington, DC: USGPO, 1872), 167.
8. BMSJ, "Smallpox in Boston," *Boston Medical and Surgical Journal* 28, no. 4 (1843): 82.
9. American Medical Association, "Code of Ethics," 485.
10. BCP, "Communication from the Consulting Physicians Respecting Quarantine Regulations," 1850.
11. BCC, "Report of Committee on Purchase of Barracks at Gallop's Island" (Boston: Author, 1866), 5.
12. Ibid., 5.
13. BCC, "Reports of Proceedings of the City Council for the Year 1866," ed. Boston City Council (Boston: Boston Microfilm Division, 1866), 380–381.
14. Board of Directors for Public Institutions, "Annual Report of the Board of Directors for Public Institutions," ed. Department of Public Institutions (Boston: Author, 1870), 29.
15. It is noteworthy that in 1870 the port physician, Dr. Durgin, declared there were insufficient buildings to provide for "epidemics of any degree of intensity" on Gallop's Island. His fears would be realized two years later when the city experienced its worst epidemic of smallpox and no additional facilities had been built.
16. AJPH, "Retirement of Dr. Samuel H. Durgin from the Boston Board of Health," *American Journal of Public Health* 2, no. 5 (1912): 384–385. Durgin was a feisty public health warrior with the courage to stand up against mayors and ward politicians when his public health programs were in jeopardy. His courage and power over quarantine affairs was glorified by his admirers in his later years in office. A local newspaper reporter pointed to his ability to stand his ground against belligerent mayors knowing the medical community was squarely on his side. This article discusses his character.
17. National Cyclopaedia, "The National Cyclopaedia of American Biography: Being the History of the United States" (New York: James T. White, 1906), 574; Annual Reports of the Boston Board of Health, 1873–1915.
18. Board of Directors for Public Institutions, "Annual Report of the Board of Directors for Public Institutions," ed. Department of Public Institutions (Boston: Author, 1868), 44.
19. Board of Directors for Public Institutions, "Annual Report of the Board of Directors for Public Institutions," ed. Department of Public Institutions (Boston: Author, 1869), 51–52. In 1868, the board of aldermen ordered quarantine rules be in effect from June 22, 1868, to December 1, 1868. The regulations called for the inspection of vessels arriving from ports suspected of harboring disease.

20. Nathaniel Shurtleff, *Inaugural Address of Nathaniel B. Shurtleff Mayor of Boston the City Council, January 3, 1870* (Boston: Alfred Mudge & Son City Printers, 1870), 84.
21. Board of Directors for Public Institutions, "Annual Report of the Board of Directors for Public Institutions," 1868, 23.
22. Board of Directors for Public Institutions, "Annual Report of the Board of Directors for Public Institutions," 1869, 34.
23. State Street Trust, *Mayors of Boston*, 26.
24. Board of Directors for Public Institutions, "Annual Report of the Board of Directors for Public Institutions," 1869, 9–10.
25. Jerome Van Crowninshield Smith, "A History of the Smallpox and Varioloid in Boston and Its Vicinity," *Boston Medical and Surgical Journal* 1, no. 9 and 11 (1828): 1–4; Melville Webb, "On the Smallpox Epidemic in Boston in 1872–73," *Boston Medical and Surgical Journal* 89, no. 10 (1873): 231–232.
26. BCC, "Reports of Proceedings of the City Council for the Year 1870," ed. Boston City Council (Boston: Rockwell and Churchill City Printers, 1870), 150.
27. BCC, "Report on Purchasing a Steamboat for Quarantine Service," ed. Committee on Health (Boston: Author, 1871), 5.
28. BCA, "ARRE," ed. Audit Department (Boston: Alfred Mudge & Son City Printers, 1870), 139.
29. Boston City Council, *Proceedings of the City Council of Boston*, December 14, 1871, 375, and July 30, 1872, 223.
30. Massachusetts, "An Act for the Regulation of Tenement and Lodging Houses in the City of Boston," Chapter 281, June 4, 1868, Acts and Resolves passed by the General Court of Massachusetts in the year 1868, Boston, 1868.
31. BMSJ, "Resignation of Consulting Physicians," *Boston Medical and Surgical Journal* 6, no. 23 (1870): 382–384.
32. BCC, "Reports of Proceedings of the City Council for the Year 1871," ed. Boston City Council (Boston: Rockwell and Churchill City Printers, 1871), 320.
33. Boston Herald, "The Sanitary Needs of Boston," *Boston Herald*, December 8, 1870, 2.
34. George P. Rowell, *American Newspaper Directory* (New York: George P. Rowell & Co., 1870), 663. While the *Boston Medical and Surgical Journal* only had a circulation of two thousand in 1870, it was widely read by physicians throughout the United States, especially along the eastern seaboard.
35. BMSJ, "Resignation of Consulting Physicians," 383.

Chapter 16: The Evolution of the Cowpox Vaccine

1. Samuel L. Abbott, "Uses and Abuses of Animal Vaccination," *Public Health Papers and Reports* 8 (1882): 114–122; Eugene Foster, "Report of the Committee on Compulsory Vaccination; also a Supplementary Report on the Efficiency and Safety of Vaccination," *Public Health Papers and Reports* 9 (1883): 238–289; Elisha Harris, "A Report on Laws, Sanitary Provisions, and Methods for Securing the

Benefits of General Vaccination Throughout the Country," *Public Health Papers and Reports* 3 (1875): 140–153.

2. Abbott, "Uses and Abuses of Animal Vaccination," 114; Ephraim Cutter, "Partial Report on the Production of Vaccine Virus in the United States," *Transactions of the American Medical Association* 23 (1872): 199–200. Retrovaccination, the practice of taking smallpox lymph from a human arm and applying it to a cow, had been practiced in the Boston area from as early as 1836 when a Dr. John C. Martin of Attleborough, Massachusetts inserted variola virus into the udder of a cow and then subsequently took this matter and vaccinated fifty persons. Unfortunately, this episode led to the transmission of true smallpox, and Dr. John C. Martin lost his reputation and became one of the most unpopular of men. Numerous physicians had the misconception that cowpox and smallpox were the same disease, and therefore, thought that a purer form of cowpox could be obtained through the retrovaccination process. Cutter provides an account of some of these early retrovaccination efforts.

3. Surgeon General's Office, "Reports on the Extent and Nature of the Materials Available for the Preparation of a Medical and Surgical History of the Rebellion," ed. War Department (Philadelphia: J.B. Lippincott & Co., 1865), 126–127.

4. Henry A. Martin, "Report on Animal Vaccination," *Transactions of the American Medical Association* 228 (1877): 187–248; Franco Maria Bounaguro, "The 19th Century Smallpox Prevention in Naples and the Risk of Transmission of Human Blood Related Pathogens," *Journal of Translational Medicine* 13, no. 33 (2015): 1–4.

5. Ernest Hart, "Preliminary Report on Animal Vaccination in Its Relation to Proposed Legislation," *British Medical Journal* 2 (1879): 843–852. While Martin secured his heifer-derived vaccine supply from Depaul in France, the origin of the concept can be traced to M. Negri in Naples, Italy. His seminal work proved cowpox vaccines derived from heifers were an effective antidote to smallpox. Based on his treatment of thousands of patients, Dr. Lanoix, a French physician, was inspired by Negri's work and brought back a vaccinated calf to start a vaccination program in Lyons and then eventually in Paris under the direction of M. Depaul. As a result of Negri's research, heifer-derived vaccines were adopted in France (1864), Belgium (1865), Holland (1868), Germany (1865), Russia (1869), and Austria (1877). Hart provides a detailed history of the adoption of heifer-derived vaccines.

6. *BMSJ*, "Obituary—Henry Martin," *Boston Medical and Surgical Journal* 112 (1885): 47–48.

7. John Simon, *Progress Relating to the History and Practice of Vaccination, Presented to Both Houses of Parliament by Command of Her Majesty* (London: George Edward Eyre & William Spottiswoode, 1857), 32–38.

8. Martin, "Animal Vaccination," 199.

9. B. E. Cotting, "Vaccination and Re-Vaccination," *Boston Medical and Surgical Journal* 77, no. 4 (1867): 72.

10. H. Warren White, "Benjamin E. Cotting, MD," *Boston Medical and Surgical Journal* 174, no. 24 (1916): 874–876. Accessed September 4, 2020: <https://babel.hathitrust.org/cgi/pt?id=pst.32239000861860&view=1up&seq=882&ql=cotting>. This celebrated debate had a personal flavor. They were neighbors and had personalities that reveled in conflict and debate. Many years after Cotting's death, his friend H. Warren White noted, "Dr. Martin was big, pompous and blustering, red-faced and apoplectic when exasperated. Dr. Cotting, thin, a trifle more pale, keenly sarcastic but triumphant in such wordy controversy. Our doctor [Cotting], with great glee, would rise on such occasions to wonderful acuteness. Nothing he liked better than to smother brag and bluster with delightful wit. Like an expert swordsman he had chopped off the opponent's head without his being conscious almost of his defeat. He did like an argument, and enjoyed the game immensely."
11. Letters of Henry A. Martin to Dr. T. F. Wood, dated December 23, 1877, 36, Countway Library of Medicine, Rare Books collection.
12. Letters of Henry A. Martin to Dr. T. F. Wood, dated December 23, 1877, 41, Countway Library of Medicine, Rare Books collection.
13. Martin, "Animal Vaccination," 208.
14. Ibid., 211.
15. Boston Herald, "The City Shame: The Smallpox Scourge," *Boston Herald*, January 6, 1873.
16. Ibid.
17. Martin, "Animal Vaccination," 199.
18. Frank P. Foster, "Animal Vaccination," *American Journal of Obstetrics and Diseases of Women and Children* 4, no. 3 (1871): 574–575. The October 1872 issue of the *Boston Medical and Surgical Journal* carried an article on his activities, which increased medical interest in his work.
19. Martin, "Animal Vaccination," 248.
20. Ibid., 237.
21. Henry G. Clark, "Quarterly Report of the City Physician, July 1858," ed. City Physician (Boston: Author, 1858), 3. Prior to Martin's distribution of bovine-derived cowpox, the city physician got his supply from regularly mining the scabs of vaccinated patients. Lymph was removed on the eighth day and scabs on the twelfth or thirteenth day after the initial cowpox vaccination was provided. After the passage of the mandatory vaccination law in 1855, the city physician had little constraint in mining large quantities of cowpox from school-age children.
22. Massachusetts Medical Society, *Triennial Catalogue of the Massachusetts Medical Society* (Boston: David Clapp & Son Printers, 1875), 66–72. For example, two years earlier, only 188 physicians were supplied with vaccine material by the city physician. Undoubtedly, many of these were repeat requests made by a limited number of physicians.
23. Joseph S. Jones, "Annual Report of the City Physician," ed. City Physician (Boston: Author, 1863), 5–6.

24. Henry A. Martin, Thomas Fanning Wood, and John Joseph Buder, *Letters of Henry Austin Martin: The Vaccination Correspondence to Thomas Fanning Wood, 1877–1883* (unpublished master's thesis, University of Texas of Austin, 1991), 41. Based on his own published advertisements appearing in the *Boston Medical and Surgical Journal* of January 14, 1875, he declared that the cost for a packet of ten large ivory lancet points was \$2. Assuming that this supply was enough to vaccinate ten persons, Martin earned an estimated \$160,000 over seven years or close to \$23,000 a year from his mail order vaccination services. Costs for mailing lancet points and other vaccine storage devices, advertisements, and animal husbandry undoubtedly reduced his profit margin considerably but still made him a wealthy man.
25. Martin, "Animal Vaccination," 222.
26. Ramunas Kondratas, "Biologics Control Act of 1902," in *The Early Years of Federal Food and Drug Control*, ed. James Harvey Young (Madison, WI: American Institute of the History of Pharmacy, 1982), 8.
27. Henry A. Martin, "Dr. Martin on Vaccination," *Observer* 43 (1873): 1.
28. Prior to the 1872 smallpox epidemic, mandatory vaccination was recognized as a public health success story, but few politicians or physicians saw the need for revaccination or understood the limited immunity offered by cowpox vaccine.
29. BDG, "The Doctors," *Boston Daily Globe*, September 9, 1872, 4.
30. BCA, "ARRE," ed. Audit Department (Boston: Rockwell and Churchill City Printers, 1873), 91–151. Vaccination and quarantine were only four-tenth of 1 percent of the total city expenditures in fiscal year 1873 even though this year had seen the worst smallpox epidemic in nineteenth-century Boston.
31. Massachusetts, "The General Statutes of the Commonwealth of Massachusetts," in *Chapter 26, Of the Preservation of the Public Health* (Boston: William White State Printer, 1860), 191–192.
32. Boston Herald, "The City Shame," January 6, 1873, 1.
33. Foster, "Report of Committee on Compulsory Vaccination," 283.
34. Handlin, *Boston's Immigrants*, Appendix Table VII; Walker, "The Ninth Census," 386.
35. Walker, "The Ninth Census," 386.
36. R. M. Wolfe and L. K. Sharp, "Anti-vaccinationists Past and Present," *BMJ* 325, no. 7361 (2002): 430–432.
37. J. F. Marson, "Medical Pathology and Therapeutics, and Practical Medicine," *American Journal of the Medical Sciences* 26 (1853): 468–471.
38. *Ibid.*, 469.
39. William Read, "Annual Report of the City Physician," ed. City Physician (Boston: Author, 1870).
40. Webb, "Smallpox Epidemic in Boston," 201–205; "Smallpox Epidemic in Boston," 225–233.
41. BMSJ, "On the Value of Vaccination and Revaccination," *Boston Medical and Surgical Journal* 33, no. 2 (1845): 41–42; "Importance of Revaccinaiton," *Boston*

Medical and Surgical Journal 76, no. 12 (1867): 252; “Revaccination,” *Boston Medical and Surgical Journal* 7, no. 22 (1871): 363–370. A London *Lancet* article held “Vaccination preserves the human species from variola but its preserving power is not absolute.” This article summarized the best intelligence on vaccination according to the British Academy of Sciences. The authors concluded “the propriety of re-vaccination is now fully established” based on the experiences of the German government.

42. Massachusetts, “ARLM in the Year 1855,” 812–813. The city continued to promote vaccination among the poor without access to private medical care.

43. BCP, *Records of the Committee*, March 20, 1850.

Chapter 17: The Smallpox Epidemic of 1872

1. England established a mandatory vaccination law in 1853. This law was refined and reinforced by laws promulgated in 1867 and 1871 aimed at registering compliance with the original law. Ireland and Scotland established mandatory vaccination in 1863.

2. Medical Officer of the Privy Council, “Annual Report to the Local Government Board with Regard to the Year 1874,” Public Health Reports of the Medical Officer of the Privy Council and Local Government Board (London: George E. Eyre & William Spottiswoode, 1875), 55.

3. BMSJ, “Circular on Smallpox Vaccination,” *Boston Medical and Surgical Journal* 7, no. 15 (1871): 252.

4. J. D. B. De Bow, *The Seventh Census of the United States: 1850* (Washington, DC: Robert Armstrong Public Printer, 1853); Walker, “The Ninth Census”.

5. Read, “Annual Report of the City Physician,” 1870, 8. A review of the annual report reveals Boston’s city physician was concerned about a more thorough vaccination program but failed to understand the value of a revaccination strategy.

6. BCC, “Reports of Proceedings of the City Council for the Year 1871,” ed. Boston City Council (Boston: Rockwell and Churchill City Printers, 1872), 65, 101–102.

7. Annual seasonal maritime quarantines against vessels with sick on board began in 1857 and were maintained until 1915 when the USPHS took ownership of the city’s quarantine program.

8. BCC, “Reports of Proceedings of the City Council for the Year 1871,” 101–102.

9. BCC, “Municipal Register for 1921,” Documents of the City of Boston for the Year 1921 (Boston: Boston Printing Department, 1922), 215; John C. Rand, ed., *One of a Thousand: A Series of Biographical Sketches of One Thousand Representative Men Resident in the Commonwealth of Massachusetts* (Boston: First National Publishing Co., 1890), 380.

10. Clark et al., “Communication of Dr. Henry G. Clark, Late City Physician,” 25.

11. Ibid., 32.
12. Prior to 1872, Boston did not maintain morbidity data on smallpox. The Boston Board of Health began tracking case rates in 1872 and has continued doing so ever since. In the absence of morbidity statistics, mortality rates reveal the disease was endemic: 1871, twenty-eight deaths; 1870, thirty-two deaths; 1869, six deaths; 1868, eight deaths; 1867, one hundred and forty-four deaths.
13. William Read, "Annual Report of the City Physician," ed. City Physician (Boston: Author, 1865), 7. As a result of the smallpox legislation of 1838, the Commonwealth's laws did not authorize the removal of smallpox patients from their homes. The city physician explained it eloquently: "Under the present provisions of the statute the sick person cannot be removed from his domicile, against his own consent, to a hospital or other place of security, as to infecting others, without being presented to the Board as a nuisance, and special action being taken by them, acting in their official capacity." In effect, because of the administrative requirements imposed upon the board of health, the city physician was unable to respond quickly in an emergency where the health of the neighbors might be jeopardized by the continued presence of a smallpox case within a tenement.
14. Massachusetts, "ARLM in the Years 1872, 1873," in *An Act Relating to Smallpox, Chapter 189* (Boston: Wright & Potter, State Printers, 1873), 970. Persons who succumbed to smallpox in a single-family dwelling would not be moved unless they could not be properly isolated.
15. BCC, "Reports of Proceedings of the City Council for the Year 1872," ed. Boston City Council (Boston: Rockwell and Churchill City Printers, 1873), 49.
16. John William Leonard, ed. *Who's Who in America, 1901–1902*, vol. 2 (Chicago: A.N. Marquis & Co, 1901), 458.
17. G. Andrews Moriarty, "Honorable Samuel Abbott Green," *New England Historical and Genealogical Register* 74, no. 4 (1920): 243–245.
18. Over a dozen major stories chronicled the dilatory approach of the Boston City Council with stories on August 1, 3, 5, 14, and 19, 1872; September 10 and 20, 1872; October 2 and 8, 1872; December 9 and 14, 1872; and then again on January 10, 14, and 16, 1873. Most of the coverage was provided by the recently established *Boston Globe*.
19. BDG, "The Pest House-A Disgraceful State of Affairs," *Boston Daily Globe*, July 29, 1872, 8.
20. BDG, "A Board of Health," *Boston Daily Globe*, July 29, 1872, 4.
21. Ibid.
22. BDG, "The Smallpox Question: Its Legal and Official Aspects," *Boston Daily Globe*, July 30, 1872, 8.
23. BDG, "The Pest House-Official Action Finally Taken," *Boston Daily Globe*, August 5, 1872, 8.
24. BCC, "Report of Special Committee on Location for Smallpox Hospital in City of Boston," ed. Committee on City Hospital (Boston: Author, 1872), 1–5.

25. BDG, "Local Intelligence: The Pestilence," *Boston Daily Globe*, July 26, 1872, 8; "Whence the Delay," *Boston Daily Globe*, October 11, 1872, 4; Rosenberg, *Care of Strangers*, 117–118. For a discussion of the causes of antihospital protests, see Rosenberg, *Care of Strangers*.
26. BCC, "Reports of Proceedings of the City Council for the Year 1872," 231.
27. While case fatality rates were not computed at this time, it is instructive that one of the lessons learned from the 1872 epidemic was the need to track cases to determine the severity of the epidemic.
28. BBH, "First Annual Report of the Board of Health," ed. Boston Board of Health, BCD#84 (Boston: Author, 1873), 6.
29. NYT, "The New Barge Office," *New York Times*, January 3, 1883, 3; Health Department of the City of New York, "Second Annual Report of the Health Department of the City of New York," ed. Health Department of the City of New York (New York: David Gildersleeve Printer, 1872), 314–315. New York's Police Department used telegraph services in 1864 when New York State's Legislature authorized its use for police services. In contrast, Boston used telegraph service for summoning ambulances during its smallpox epidemics—not as a disease reporting tool. Maritime quarantine related telegraph service was adopted somewhat later in New York City. According to the *New York Times*, telegraph service was installed between the New York City office of the quarantine inspectors located on Battery Park and the island quarantine stations in May 1883. This service was installed to facilitate communication between inspectors and quarantine personnel.
30. BDG, "Smallpox Hospital Site," *Boston Daily Globe*, October 18, 1872, 8.
31. NYT, "Sanitary Measures in Boston," *New York Times*, September 29, 1872, 1.
32. Webb, "Smallpox Epidemic in Boston," 202.
33. BDG, "Local Intelligence: Board of Aldermen," *Boston Daily Globe*, January 14, 1873, 8. The Globe's reporter documented Dr. Green's view that red flags were only to be raised at houses declared to be hospitals. Green's report to the Boston Board of Aldermen was not well received. He was directed to place flags or cards on houses where smallpox exists to warn people of their exposure to a contagion. This decision, made at the first meeting of the new board of aldermen in January 1873, is believed to be the first instance in which "cards" were declared an appropriate means of communicating the presence of communicable disease. Red flags disappeared after the 1873 epidemic—replaced by small three-by-five-inch cards placed on the doors of infected houses.
34. Samuel H. Williamson, "Seven Ways to Compute the Relative Value of a U.S. Dollar Amount, 1790 to Present," *MeasuringWorth* (2020). Accessed September 5, 2020: <https://www.measuringworth.com/calculators/uscompare/index.php>
35. Research conducted by the author based on 1872 and 1873 vital records available at the Massachusetts State Archives, 2003.
36. Franklin E. Frothingham, *The Boston Fire, November 9 & 10, 1872* (Boston: Lee & Shepard Publishers, 1873), 16.
37. BDG, "How the Great Boston Fire Was Fought," *Boston Globe*, November 10, 1912, 39.

38. BDG, "Devastation," *Boston Daily Globe*, November 11, 1872, 1. For an overview of the great fire see Boston Fire Historical Society, "Boston Great Fire." Accessed July 5, 2011: <https://bostonfirehistory.org/fires/great-boston-fire-of-1872/>

39. Henry A. Martin, "Communication: Public Vaccination," *Boston Daily Globe*, December 9, 1872, 4.

40. George Derby, "Unreliable Vaccination," *Boston Herald*, January 3, 1873, 1.

41. Ibid., 1.

42. Ibid.

43. The Boston City Council, composed of the board of aldermen and common council, was an unwieldy government mechanism for responding to public health emergencies. Its bicameral structure meant that all decisions required approval of two separate bodies (just like the division of power between the Senate and House of Representatives at the federal level), and invariably these two bodies referred important matters to committees composed of members from one or both branches of the city council. Since the Boston City Council functioned as the board of health prior to January 1873, important public health decisions almost always took a back seat to other pressing demands, including street cleaning, road repairs, park improvements, and neighborhood crime. City council form of government was inefficient in managing routine needs of local constituents. Making matters worse, elected leaders had either ignored or insulted their appointed consulting physicians on numerous occasions causing their resignations and a rift in relations, which led to the crisis of public health leadership in 1872.

44. See Chapter 4, The Inoculation Controversy.

45. Dorothy Therese Scanlon, *The Public Health Movement in Boston, 1870–1910* (Boston: Boston University, 1956), 42.

46. The *Boston Globe* published thirteen editorials urging an independent board of health during the two months before the fall election.

47. The fact that Boston's great fire occurred in the midst of a smallpox epidemic suggests many parallels with the great fire of London and its concurrent bubonic plague. Events of this magnitude create tragedies that make ordinary epidemics pale into insignificance. While the loss of life and property was significant (i.e., there were 776 destroyed buildings), arguably, the fire had a salutary effect on dampening the smallpox epidemic in the affected area of Boston.

48. BDA, "The Municipal Election," *Boston Daily Advertiser*, December 25, 1872, 1.

49. Ibid.

50. BDA, "Municipal Election," *Boston Daily Advertiser*, December 25, 1872, 1; BCC, "Reports of Proceedings of the City Council for the Year 1871," 375. A total of eight of twelve aldermen in office during 1872 either lost their reelection bid (four lost) or chose not to run for office again (four failed to run).

51. BCC, "Report on Establishing a New Board of Health," ed. Boston City Council (Boston: Author, 1872), 12. Section 26 of the 1869 city ordinance was, repealed thereby eliminating the role of the five consulting physicians.

52. BDG, "Small-Pox Hospital Fire," *Boston Daily Globe*, December 28, 1872, 8.
53. BDA, "Fires," *Boston Daily Advertiser*, December 27, 1872, 1.
54. BDG, "Local Intelligence: City Hall Matters," *Boston Daily Globe*, January 4, 1873, 8; BCC, "Reports of Proceedings of the City Council for the Year Commencing January 6, 1873 and Ending January 5, 1874," ed. Boston City Council (Boston: Rockwell and Churchill City Printers, 1874), 13.
55. Boston Herald, "Affairs About Home," *Boston Herald*, January 4, 1873, 1.
56. BDG, "Local Intelligence: City Hall Matters," *Boston Daily Globe*, January 4, 1873, 8.
57. BCC, "Reports of Proceedings of the City Council for the Year Commencing January 6, 1873 and Ending January 5, 1874," 4.
58. Ibid.
59. Boston Herald, "Affairs About Home," *Boston Herald*, October 8, 1872, 1.
60. Boston Herald, "The City Shame," *Boston Herald*, January 9, 1873, 1.
61. BCC, "Ordinances and Rules and Orders of the City of Boston," ed. Boston City Council (Boston: Rockwell and Churchill City Printers, 1874), 59.
62. Koren, *Boston, 1822 to 1922*, 68–69.
63. In 1872, the three members who composed the Boston Board of Health were Samuel Little, George Ricker, and William Sayward. With the exception of Mr. Little who had held the ad-hoc position since 1871, the other two members were appointed in 1872 and had no previous experience with public health matters. Perhaps, more importantly, their authority was purely advisory in nature, since all decisions were made by the Boston City Council as a whole. The city council, composed of the board of aldermen and common council, had to approve public health regulations before approval by the mayor. This complicated system for adopting local legislation would eventually be abolished in the early twentieth century after years of "do nothing" politics.
64. BBH, "First Annual Report of the Board of Health," 8.
65. State Board of Charities, "Tenth Annual Report of the Board of State Charities," xlvi–xlvii.
66. BBH, "Second Annual Report of the Board of Health," ed. Boston Board of Health, BCD#63 (Boston: Author, 1874), 9.
67. MSBH, "Fourth Annual Report of the State Board of Health of Massachusetts," ed. Massachusetts State Board of Health (Boston: Wright & Potter, State Printers, 1873), 468–473. While direct exposure to Bostonians with the pox was seen as the cause for smallpox outbreaks in 125 of 197 towns reporting cases in 1872, this data underrepresents the impact of the Boston epidemic. Some towns were indirectly exposed to the Boston epidemic by persons who first infected other Massachusetts towns before the contagion traveled to their town. Fourteen towns did not know how smallpox infected their community, but based on their proximity to Boston, it most likely was brought from Boston, meaning at least 70 percent of the cases in Massachusetts originated in Boston.

68. BBH, "Third Annual Report of the Board of Health," ed. Boston Board of Health, BCD#85 (Boston: Author, 1875), 4.
69. Massachusetts Public Documents, 1873, vol. 3, Public Document No. 17, lix and lx.
70. BBH, "First Annual Report of the Board of Health"; Philadelphia Board of Health, "Report of the Board of Health of the City and Port of Philadelphia to the Mayor for the Year 1872," ed. Philadelphia Board of Health (Philadelphia: King & Baird Publishers, 1873), 118, 121; New York Board of Health, "Fourth Annual Report of the Board of Health of the City of New York," ed. New York Board of Health (New York: D. Appleton, 1874), 51.
71. Webb, "Smallpox Epidemic in Boston," 227.
72. Ibid., 13.
73. Webb, "Smallpox Epidemic in Boston," 229.
74. BDG, "Vaccination," *Boston Daily Globe*, October 2, 1872, 4. For example, the *Boston Globe* carried an editorial on vaccination in its October 2, 1872, edition. The *Boston Globe* emphasized cowpox vaccine was safe based on medical experience with the vaccine in England.
75. BDG, "Cowpox Vaccination," *Boston Daily Globe*, October 5, 1872, 8.
76. BBH, "First Annual Report of the Board of Health," 27–31.
77. BCC, "Ordinances and Rules and Orders of the City of Boston," ed. Boston City Council (Boston: A. Mudge & Son, Printers, 1869), 345.
78. Chester Irving Fisher married Clara F. Leonard on September 28, 1875, in Bridgewater, Massachusetts less than two week after resigning from his position as port physician. His case was typical of many young port physicians who sought an opportunity to take on a challenging and prestigious post as a stepping stone to a lucrative private practice.
79. Board of Directors for Public Institutions, "Annual Report of the Board of Directors for Public Institutions," ed. Department of Public Institutions (Boston: Author, 1872), 29; BCC, "Reports of Proceedings of the City Council for the Year 1872," 125; Proceedings of the Board of Aldermen, April 127, 1872.
80. Ship fever was a more common term for the disease known as typhoid.
81. Barbara Gutmann Rosenkrantz, *Public Health and the State: Changing Views in Massachusetts, 1842–1936* (Cambridge: Harvard University Press, 1972), 67–73.

Chapter 18: Germ Theory Reframes Quarantine

1. John Duffy, *The Sanitarians: A History of American Public Health* (Urbana: University of Illinois Press, 1990), 196.
2. Gorham, "The History of Bacteriology," 70; John Waller, *The Discovery of the Germ* (New York: Columbia University Press, 2002), 105–111.
3. Robert Koch, *Investigations into the Etiology of Traumatic Infective Diseases* (London: The New Sydenham Society, 1880), 69–74.

4. Gorham, "The History of Bacteriology," 72; William Bulloch, *The History of Bacteriology* (New York: Oxford University Press, 1938), 237–238.
5. Henry P. Bowditch, "Reform in Medical Education," *Boston Medical and Surgical Journal* 149, no. 26 (1898): 643–646.
6. Duffy, *The Sanitarians*, 128. Duffy provides a good discussion of this delayed acceptance of the germ theory of disease.
7. Gorham, "The History of Bacteriology," 77.
8. Ibid.
9. Phyllis Allen Richmond, ed., *American Attitudes Toward Germ Theory of Disease (1860–1880)*, Theory and Practice in American Medicine (New York: Science History Publications, 1976), 66.
10. Francis H. Harris, "Fifty Ninth Report of Births, Marriages and Deaths Registered in Massachusetts for the Year Ending 1900," ed. Massachusetts Office of the Secretary of State, Annual Report on the Vital Statistics of Massachusetts (Boston: Wright & Potter Printing Co., 1901), 60, 263.
11. Ibid., 263.
12. Gorham, "The History of Bacteriology," 77.
13. Richmond, *American Attitudes Toward Germ Theory*, 79.
14. BBH, "Fifth Annual Report of the Board of Health," 79; "Sixth Annual Report of the Board of Health," ed. Boston City Council (Boston: Rockwell and Churchill City Printers, 1878), 39–41.
15. Accessed April 16, 2015: http://portphysicians.blogspot.com/2010_07_01_archive.html
16. BBH, "Ninth Annual Report of the Board of Health," ed. Boston Board of Health, BCD#87 (Boston: Author, 1881), 72.
17. Ibid.
18. Alfred L. Carroll, "The Question of Quarantine: The Nature and Prevention of Communicable Zymotic Diseases," in *Medical Library and Journal Association of New York* (New York: F. Leypoldt, 1872), 5.
19. Ibid., 15.
20. Samuel H. Durgin, "Report of Committee on the Infectious Period of Communicable Diseases," *Public Health Papers and Reports* 30 (1905): 74–85. Durgin's 1905 article provides evidence that the Boston Board of Health was aware of disease incubation periods even if they were not published in its annual reports.
21. Ibid., 74.
22. Ibid., 74–85; BMSJ, "An Epidemic of Measles," *Boston Medical and Surgical Journal* 118, no. 5 (1888): 120–123.
23. State Board of Health of Massachusetts, "Hospitals," *Fifth Annual Report of the State Board of Health* 5 (1874): 315–332.
24. A case in point is the transmission of Ebola through semen.
25. BBH, "Ninth Annual Report of the Board of Health," 1881, 75; "Tenth Annual Report of the Board of Health," ed. Boston Board of Health, BCD#87 (Boston: Author, 1882), 66–67; BHD, "Twenty Second Annual Report of the

Health Department," ed. Boston Health Department, BCD#13 (Boston: Author, 1894), 99. The initiation of vessel fumigation in 1881 marked one of the many turning points in the Boston Board of Health's acceptance of the germ theory. Other signs the germ theory had an upper hand in Boston's quarantine policy included (1) mandatory householder reporting of Scarlet fever (January 9, 1877), diphtheria, and typhus (December 29, 1877); (2) the quarantine order against unvaccinated immigrants (November 14, 1881); (3) the quarantine regulations (issued on January 7, 1882) implementing medical inspection requirements of the National Board of Health; (4) the order requiring disinfection of immigrant clothing (September 1, 1892); and (5) installation and construction of a bath-house and disinfecting chamber for immigrant clothing on Gallop's Island (April 1, 1893).

26. Gorham, "The History of Bacteriology," 79.
27. George M. Sternberg, *Disinfection and Individual Prophylaxis against Infectious Diseases*, ed. Association American Public Health (Columbus, OH: Berlin Printing Company, 1900), 32–45.
28. Gorham, "The History of Bacteriology," 81.
29. Ibid., 81–82.
30. Immunization Action Coalition, "Vaccine Timeline," *Immunization Action Coalition*. Accessed August 31, 2020: <http://www.immunize.org/timeline/>
31. Harold C. Ernst, *Harvard Medical School: 1782–1906* (Boston: Harvard Medical School, 1906), 133.
32. BHD, "Twenty Fourth Annual Report of the Health Department," ed. Boston Health Department, BCD#13 (Boston: Author, 1896), 40.
33. Ibid.
34. Ibid.
35. BHD, "Twenty Second Annual Report of the Health Department," 81.
36. Clarke, *Main Drainage Works*, 99–105.
37. Timothy Doyle, "Completeness of Notifiable Infectious Disease Reporting in the United States: An Analytical Review of the Literature," *American Journal of Epidemiology* 155, no. 9 (2002): 871.
38. BBH, "Eighth Annual Report of the Board of Health," BCD#90 (Boston: Author, 1880), 96–100.
39. BBH, "Seventh Annual Report of the Board of Health," ed. Boston Board of Health, Boston City Document No. 89 (Boston: Author, 1879), 33.
40. Samuel A. Green, *The Sanitary Condition of Boston, The Report of a Medical Commission* (Boston: Rockwell and Churchill City Printers, 1875), 65, 162–176.
41. Ibid., 162–168.
42. Massachusetts, "ARLM in the Year 1891," in *An Act Relating to Notice of Diseases Dangerous to Public Health, Chapter 188* (Boston: Wright & Potter Printing Co., State Printers, 1891), 776; "ARLM in the Year 1890," in *An Act Concerning Notice in Case of Infectious or Contagious Diseases, Chapter 102* (Boston: Wright & Potter Printing Co., State Printers, 1890), 88–89. Legislators left it to the state

board of health to define these terms, since no explanations were contained in the statutes. Further clarification to the notification statute was made the following year when physicians were required to submit written reports of communicable disease over their own signature. Verbal notifications were presumably proving unsatisfactory.

43. Physician notification requirements were disbanded from 1838 to 1840. Legislation enacted on March 18, 1840, restored the physician notification requirements for diseases dangerous to the public health.

44. Nathan Matthews Jr., *The City Government of Boston, A Valedictory Address to the Members of the City Council* (Boston: Rockwell and Churchill City Printers, 1895), 54.

45. Massachusetts, "Acts and Resolves of the Generral Court of Massachusetts," in *An Relating to Boards of Health in Several Cities of the Commonwealth, Chapter 133* (Boston: Alberet J. Wright Staate Priinters, 1877), 493–495.

46. Massachusetts, "ARLM in the Year 1907," in *An Act to Authorize the State Board of Health to Define what Diseases Are to be Deemed Dangerous to the Public Health, Chapter 183* (Boston: Wright & Potter Printing Co., State Printers, 1907), 139.

47. Amalie M. Kass, "Infectious Diseases at the Boston City Hospital: The First 60 Years," *Clinical Infectious Diseases* 17, no. 2 (1993): 278.

48. BHD, "Thirty Second Annual Report of the Board of Health," ed. Boston Health Department, BCD#17 (Boston: Author, 1904), 13, Table XII.

49. Trustees of the City Hospital, "Twenty Fifth Report of the Trustees of City Hospital, Boston," ed. Trustees of City Hospital (Boston: Rockwell and Churchill City Printers, 1889), 8–11.

50. Leslie Phillips, "On the Identity of Membranous Croup and Diphtheria," *British Medical Journal* 1, no. 1327 (1886): 1061. During the late nineteenth century, the terms diphtheria and membranous croup were often used interchangeably. Klebs' discovery of the diphtheria bacillus in 1883 eventually led to the categorization of diphtheria as a bacterial infection, which distinguished it from membranous croup, a descriptive term that covered a wide range of other potential infectious symptoms.

51. Boston City Auditor, 1882–1895.

52. Trustees of the City Hospital, "Annual Report of the Hospital Department for the Year 1894," ed. Hospital Department (Boston: Author, 1895), 5–7; Grace Whiting Myers, *History of the Massachusetts General Hospital, June, 1872 to December, 1900* (Boston: Griffith-Stillings, 1929), 111; Trustees of the City Hospital, "Thirty Second Report of the Trustees of Boston City Hospital for the Year February 1, 1895 to January 31, 1896," ed. Hospital Department (Boston: Author, 1896), 18–20. While the department was established in 1895, seven years earlier the Boston City Hospital had a ward dedicated to scarlet fever and another for diphtheria.

53. "Thirty Second Report of the Trustees of Boston City Hospital for the Year February 1, 1895 to January 31, 1896," 19.

54. Ibid., 20.

55. Samuel L. Abbott, *The Past and Present Condition of Public Hygiene and State Medicine in the United States*, ed. Herbert B. Adams, Monographs on American Social Economics (Boston: Wright & Potter Printing Company, 1900), 24.

56. Marguerite M. Jackson, "Isolation Practices: A Historical Perspective," *American Journal of Infection Control* 13, no. 1 (1985): 21–31.

Chapter 19: Federal Solutions to Quarantine

1. Stephen Smith, "A History of National Health Legislation and Its Relation to the U. S. Marine-Hospital Service," *Public Health Reports* 16, no. 51 (1901): 2955–2961.

2. Laurence Frederick Schmeckebier and Research Brookings Institution Institute for Government, *The Public Health Service: Its History, Activities and Organization*, Service Monographs of the United States Government no. 10 (Baltimore: The Johns Hopkins University Press, 1923), 10.

3. United States, "Statutes of the United States of America," in *An Act to Prevent the Introduction of Contagious or Infectious Diseases into the United States, Chapter 66* (Washington, DC: USGPO, 1878), 37–38.

4. Ibid.

5. Report of the Commissioner of Immigration to the Secretary of Labor, 1916, 80.

6. Stephen Smith, "Annual Report of the National Board of Health, 1882," *On the Maritime Sanitary Services of the United States and the Relations of National and State Authorities* (Washington, DC: USGPO, 1883), 477–484. The 1879 national quarantine legislation called for medical officers to be stationed in foreign ports. However, serious international objections resulted in a lengthy delay in the full implementation of medical inspections in the ports of departure.

7. John M. Woodworth et al., *Conclusions of the Board of Experts Authorized by Congress to Investigate the Yellow Fever Epidemic of 1878* (Washington, DC: Judd & Detweiler, Printers, 1879), 18.

8. NYT, "The Yellow Fever Plague," *New York Times*, January 31, 1879, 3.

9. BBH, "Annual Reports, 1865 to 1898."

10. BBH, "Eighth Annual Report of the Board of Health," 96–100. While a six-month quarantine period was established, the practical effect of this order was to require the port physician to conduct medical inspections onboard vessels coming from suspected ports. If the vessel had no suspected cargoes or passengers, it could pass through quarantine after completing an appropriate fumigation. Such orders did not automatically trigger quarantine—they only guaranteed an inspection.

11. BBH, "Tenth Annual Report of the Board of Health," 66–67.

12. Ibid., 80. Specifically, the board of health said persons entering Boston under ten years of age who were not successfully vaccinated and those over ten years of age who were not recently successfully vaccinated or revaccinated were considered unprotected, excluding those having had smallpox.

13. See previous chapter for Boston's past efforts to vaccinate immigrants.
14. BBH, "Ninth Annual Report of the Board of Health," 83.
15. BBH, "Tenth Annual Report of the Board of Health," 35. Unfortunately, there was a resurgence of smallpox within the city in 1881. Forty cases were reported that year resulting in six deaths. The low fatality rate reflected the city's quick vaccination program. Ten convenient locations were used to provide free vaccinations for city residents costing the city \$10,000. These costs were worth it. In a six-month period starting October 1, 1881, the city vaccinated or revaccinated 25,340 persons. The lessons learned from the 1872 epidemic were still strongly felt. The Boston Board of Health believed prevention through medical prophylaxis was its top public health priority.
16. BBH, "Ninth Annual Report of the Board of Health," 72.
17. BBH, "Seventh Annual Report of the Board of Health," 29.
18. Boston, like many other American cities, applied quarantine during the months of June to October when epidemic diseases were thought most prevalent. This policy, driven by early nineteenth-century experience with yellow fever, coincidentally reflected the breeding habits and lifespan of mosquitoes.
19. George Halsted Boyland, "The Antiseptic Treatment of Wounds," *Medical and Surgical Reporter* 39, no. 16 (1878): 334–336; Joseph Lister, "On a New Method of Treating Compound Fracture, Abscess, etc.: With Observations on the Conditions of Suppuration," *Lancet* 89, no. 2272, 2273 (1867): 326–329, 357–359; George M. Kober, "The Progress and Achievements of Hygiene," *Science* 6, no. 152 (1897): 789–799.
20. Matthews, *City Government of Boston*, 56.
21. Charles Vidich, *Vessels Fumigated and Passengers Quarantined at Gallop's Island 1863 to 1941* (Ashford, CT: Vidich Associates, 2004).
22. John B. Hamilton, "The U.S. Quarantine Laws and Their Scope," *Journal of American Medical Association* 19, no. 24 (1892): 698–702; Hampton, "Development of Maritime Quarantine," 1249–1251.
23. Jerrold M. Michael, "Public Health Chronicles—The National Board of Health: 1879–1883," *Public Health Reports* 126, no. 1 (2011): 127–128; W. G. Smillie, "The National Board of Health: 1879–1883," *American Journal of Public Health* 33, no. 8 (1943): 926–930.
24. Schmeckebier and Brookings Institution. Institute for Government, *The Public Health Service*, no. 10, 15. In 1884, the Marine Hospital Service was authorized to tax commercial tonnage to cover quarantine administration costs; in 1887, it was funded to establish the nation's first bacteriological laboratory in the port of New York City; and in 1888, it could impose penalties against masters or pilots of vessels entering an American port in violation of the act of April 28, 1878. Congress incrementally expanded its role in response to public health enforcement challengers along the eastern seaboard.
25. Ibid.
26. A. N. Bell, "Quarantine and the United States Marine Hospital Service," *Public Health Papers and Reports* 18 (1892): 349–362.

27. Joseph Holt, "Pestilential Foreign Invasion as a Question of States' Rights and the Constitution," in *Tri State Medical Society of Georgia* (Chattanooga, TN: L. Graham and Sons, 1892), 31.
28. A. E. Fossier, "History of Yellow Fever in New Orleans," *Louisiana Historical Quarterly* 34, no. 3 (1951): 215.
29. Holt, "Pestilential Foreign Invasion as a Question of States' Rights and the Constitution," 5.
30. NYT, "Russian Jew Reach Boston," *New York Times*, September 7, 1892, 2. Recognizing the threat of a cholera epidemic, on January 1, 1891, the Boston Board of Health implemented year-round quarantine inspections on vessels carrying immigrants.
31. Ibid.
32. NYT, "Sweeping Out the Dirt," *New York Times*, September 3, 1892, 1.
33. BDA, "Mayor Prince and the Board of Health," *Boston Daily Advertiser*, December 7, 1877, 1. Durgin faced many political challenges over his career including an 1877 mayoral effort to oust him despite his huge popularity among medical professionals.
34. BDG, "More Deaths: Normanda and Rugia Report 13," *Boston Daily Globe*, September 4, 1892, 3.
35. A. N. Perry, "Letter to Surgeon General on Inspection of Gallop's Island Quarantine Station," ed. U.S. Treasury Department (Washington, DC: NARA, 1915). The USPHS compiled a comprehensive building inventory of the Gallop's Island quarantine station. The inventory was used to negotiate the final purchase price for the island.
36. United States Congress, "An Act Granting Additional Quarantine Powers and Imposing Additional Duties upon the Marine Hospital Service," in *Chapter 114*, ed. United States Congress (Washington, DC: USGPO, 1893), 449.
37. Isidor Rayner, "National Quarantine," ed. U.S. House of Representatives (Washington, DC: USGPO, 1893), 5.
38. Ibid., 4.
39. BDG, "In New York: Two Cases of Cholera in the City," *Boston Daily Globe*, September 2, 1892, 1; "False Alarm: New York Yet Free from Plague," *Boston Daily Globe*, September 3, 1892, 1; "More Deaths: Normanda and Rugia Report 13," September 4, 1892, 1; "Four More: Cholera Rages on Ships in New York," *Boston Daily Globe*, September 5, 1892, 4.
40. Markel, *Quarantine; East European Jewish Immigrants*, 170.
41. United States, "The Statutes at Large, the United States from December 1891 to March 1893," in *An Act Granting Additional Quarantine Powers and Imposing Additional Duties Upon the Marine-Hospital Service, Chapter 114* (Washington, DC: USGPO, 1893).
42. W. E. Walz, "Federal Regulation of Quarantine," *Michigan Law Review* 4, no. 3 (1906): 189–198.
43. S. R. Mallory, "National Quarantine—Views of the Minority," ed. U.S. House of Representatives (Washington, DC: USGPO, 1893), 2.

44. For example, see the conflicting quarantine guidance of the CDC and Northeast states during the 2014 Ebola crisis. Accessed August 31, 2020: <https://www.nytimes.com/2014/10/28/us/new-rules-coming-for-health-care-workers-returning-from-west-africa.html>

45. BHD, "Thirty Sixth Annual Report of the Board of Health," ed. Boston Health Department, BCD#19 (Boston: Author, 1908), 122. The city followed the guidance from the U.S. Treasury Department that called for the quarantine of vessels coming from Puerto Rican ports.

Chapter 20: Boston's Last Epidemics

1. Ernst, *Harvard Medical School*, 110; William Roscoe Thayer et al., "Corporation Records," *Harvard Graduates Magazine*, March 1910, 474.

2. C. V. Chapin, "Doctor Samuel H. Durgin," *American Journal of Public Health* 2, no. 5 (1912): 357–358.

3. BBA, "Revised Ordinances of 1908 of the City of Boston and Revised Regulations of 1898," in *Health Department, Chapter 18*, ed. Board of Aldermen (Boston: Boston Printing Department, 1908), 43. The name Swett Street changed to Southampton Street on February 26, 1901. The name change helped residents forget about this institution's history.

4. Durgin, "Vaccination and Smallpox," 114–115.

5. BHD, "Thirtieth Annual Report of the Health Department of the City of Boston for the Year 1901," ed. Boston Health Department (Boston: Municipal Printing Office, 1902), 43.

6. BHD, "Thirtieth Annual Report of the Board of Health," ed. Boston Health Department, BCD#17 (Boston: Author, 1902), 44.

7. BDG, "Virus Squad Out," *Boston Daily Globe*, November 18, 1901, 7.

8. NYT, "Fighting Smallpox in Boston," *New York Times*, January 27, 1902, 2.

9. Michael Willrich, *Pox: An American History* (New York: Penguin Books, 2012), 249–250.

10. BHD, "Thirtieth Annual Report of the Health Department of the City of Boston for the Year 1901," Municipal Printing Office, 1902, 45.

11. Jacobson v. Massachusetts, 197 US 11: 25 S. Ct 358; 49 L. Ed. 643: 1905 US LEXIS 1232.

12. Lynne Curry, *The Human Body on Trial: A Handbook with Cases, Laws, and Documents*, ABC-CLIO's on Trial Series (Santa Barbara, CA: ABC-CLIO, 2002); Lawrence O. Gostin, *Public Health Law: Power, Duty, Restraint*, Rev. and expanded 2nd ed., vol. 3, California/Milbank Books on Health and the Public 3 (Berkeley and New York: University of California Press and The Milbank Memorial Fund, 2008). This landmark case has spawned numerous books and articles emphasizing its significance to modern public health practice.

13. Michael R. Albert et al., "Smallpox Manifestations and Survival during the Boston Epidemic of 1901 to 1903," *Annals of Internal Medicine* 137, no. 12 (2002): 998.

14. BMSJ, "Smallpox Infection from Isolation Hospital," *Boston Medical and Surgical Journal* 151, no. 16 (1904): 447–448. There is an extensive literature concerning the threat posed by smallpox hospitals in residential neighborhoods. Dr. Waterhouse contended smallpox was communicated via aerial transmission several hundred rods from the hospital in West Boston to residents in the neighborhood. Similar concerns emerged in 1903. The city made substantial use of the smallpox hospital on Southampton Street even though many cases were transferred to Gallop's Island. Despite the relative success of the isolation hospital, inevitably one of the standard outcomes of smallpox epidemics has been neighborhood opposition to smallpox hospitals located in densely populated areas.

15. BCC, "A Catalogue of the City Councils of Boston," ed. Boston Printing Department (Boston: Boston Printing Department, 1909), 292–293.

16. BCC, "Reports of Proceedings of the City Council for the Year Commencing January 6, 1902 and Ending January 3, 1903," ed. Boston City Council (Boston: Boston Printing Department, 1903), 39, 45, 103, 174, 217.

17. United States Public Health and Marine Hospital Service, *Interstate Quarantine Regulations of the United States* (Washington, DC: USGPO, 1894). Conspicuous by its absence from the first federal government quarantine regulation (1894) was any mention of tuberculosis. It was not until the U.S. Treasury Department issued Interstate Quarantine Regulations of the United States in 1909 that pulmonary tuberculosis was first declared a quarantinable disease—clearly, a sign that American medicine was out of step with European science.

18. Charles V. Chapin, "Sources of Infection" (paper presented at the Public Health Papers & Reports, Havana, Cuba, January 9–13, 1905), 86; Henry Pickering Walcott, *State and Preventive Medicine in Massachusetts. The Annual Discourse, Delivered in Boston, before the Massachusetts Medical Society, June 12, 1889*, vol. 14 (Boston: Massachusetts Medical Society, 1889), 319–378. It is not that Boston's physicians failed to recognize tuberculosis as a disease caused by germs. The real issue, according to Charles Chapin, a noted public health professional, was that physicians were not aware of its distribution within the environment and its mode of transmission. As late as 1889, the Massachusetts Medical Society hosted its annual medical discourse in which tuberculosis was raised as a disease that could be transmitted by virtue of ingestion through contaminated meat. The nuances of disease transmission were still years away from being understood.

19. Massachusetts, "ARLM in the Year 1907," in *An Act to Provide for the Compulsory Notification and Registration of Tuberculosis and Other Diseases Dangerous to the Public Health, Chapter 480* (Boston: Wright and Potter Printing Co., State Printers, 1907), 436–443. Tuberculosis is addressed in this chapter reflecting the period when it was understood to be a quarantinable disease. Shocking as it may seem, it was not deemed communicable in Massachusetts until June 6, 1907, when the state board of health was authorized to declare tuberculosis a dangerous and contagious disease. Ignorance of its communicability contributed to its widespread transmission throughout America.

20. MSBH, "Thirty Ninth Annual Report of the State Board of Health of Massachusetts," ed. Massachusetts State Board of Health (Boston: Wright & Potter Printing Co., 1908), 508.
21. BDG, "Danger in Cars: American Public Health Association Points It Out to Travelers," *Boston Daily Globe*, November 29, 1902, 8; S. H. Durgin, "The Notification of Tuberculosis" (paper presented at the Transactions of the British Conference on Tuberculosis for the Prevention of Consumption, London, July 22 to 26, 1901), 42.
22. Henry I. Bowditch, "Tuberculosis Commencing at the Base of the Lungs," *American Journal of Medical Sciences* 29 (1855): 73. Cotting advocated these forms of treatments at a time before tuberculosis was known to be contagious.
23. David L. Heymann, *Control of Communicable Diseases Manual* (Washington, DC: American Public Health Association, 2008), 645.
24. BHD, "Forty Eighth Annual Report of the Health Department," ed. Boston Health Department, BCD#15 (Boston: Author, 1920), 134.
25. BHD, "Thirtieth Annual Report of the Board of Health," 46.
26. Winslow, *Life of Biggs*, 131–152.
27. Edward H. Bradford, "The Expansion of Medicine," *Medical Communications* 18 (1899): 3–46. This discourse provides a classic analysis of the limitations of scientific medical research in America and Boston.
28. Barron H. Lerner, *Contagion and Confinement* (Baltimore: The John Hopkins University Press, 1998), 19. Lerner notes New York City established the first comprehensive program of tuberculosis control in 1893, including a requirement that tuberculosis was a reportable disease. This New York City initiative was at least seven years ahead of those in Boston.
29. MSBH, "Forty-Sixth Annual Report of the State Board of Health of Massachusetts," ed. Massachusetts State Board of Health (Boston: Wright & Potter Printing Co., 1915), 690.
30. Alleyne Adams, "The Segregation of Consumptives," *Boston Medical and Surgical Journal* 157, no. 2 (1907): 37.
31. Heymann, *Control of Communicable Diseases*, 645.
32. MSBH, "The Control of Tuberculosis," ed. Massachusetts State Board of Health, Monthly Bulletin (Boston: Wright and Potter Printing Co., 1912), 198–199. In 1911, the legislature combatted this disease by passing two important pieces of legislation. The first law was known as "An act to provide for the maintenance of tuberculosis dispensaries in cities and towns of ten thousand inhabitants or over." It required larger cities and towns to establish a dispensary for the treatment of tuberculosis. A second law known as "An act to encourage and promote the building and use of tuberculosis hospitals in cities and towns" provided for public subsidies for tuberculosis patients unable to pay for hospital care. More significantly, the second law required isolation hospitals for persons with diseases dangerous to the public health, including a tuberculosis hospital. Despite political resistance, this legislation had a positive impact on the availability of tuberculosis treatment options.

33. MSBH, "The Maintenance of Isolation Hospitals," ed. Massachusetts State Board of Health, *Monthly Bulletin* (Boston: Author, 1912), 50.
34. Ibid., 63.
35. C. T. Callahan, "Control of the Careless and Incorrigible Consumptive," *Boston Medical and Surgical Journal* 168, no. 22 (1913): 794–796; Mark W. Richardson, "The Control of the Careless and Incorrigible Consumptive," *Monthly Bulletin of the State Board of Health* 8, no. 6 (1913): 222–227.
36. MSBH, "The Control of the Careless and Incorrigible Consumptive," ed. Massachusetts State Board of Health, *Monthly Bulletin* (Boston: Author, 1913), 225.
37. Ibid.
38. MSBH, "The Control of Tuberculosis," 189.
39. MSBH, "Forty-Sixth Annual Report of the State Board of Health of Massachusetts," 701.
40. C. Dye et al., "Consensus Statement. Global Burden of Tuberculosis: Estimated Incidence, Prevalence, and Mortality by Country. WHO Global Surveillance and Monitoring Project," *JAMA* 282, no. 7 (1999): 677–688; World Health Organization, *Global Tuberculosis Report 2019* (Geneva: World Health Organization, 2019) 7, 51.
41. World Health Organization, *Global Tuberculosis Report 2019*, 7.
42. René Dubos and Jean-Baptiste Dubos, *The White Plague: Tuberculosis, Man and Society* (New Brunswick: Rutgers University Press, 1952; repr., 1996); Lerner, *Contagion and Confinement*; Charles E. Rosenberg, *Explaining Epidemics and Other Studies in the History of Medicine* (New York: Cambridge University Press, 1992). These are several of the excellent books written on the impact of tuberculosis in the twentieth century.
43. James A. Honeijj, "Leprosy and Its Relation to Massachusetts," *Boston Medical and Surgical Journal* 173, no. 2 (1915): 48–53.

Chapter 21: The End of Boston's Maritime Quarantine Department

1. Vincent Y. Bowditch, "The History of the Growth of the Anti-Tuberculosis Movement in Massachusetts, and the Lessons to Be Learned Therefrom," *Boston Medical and Surgical Journal* 175, no. 24 (1916): 850. Alleyne Adams, "The Segregation of Consumptives," 37. For advanced cases, there were additional facilities at the Channing Home, House of the Good Samaritan, The Cullis Consumptives' Home, The Free Home for Consumptives, St. Monica's Home for Colored Women and Children, the Boston Almshouse and Hospital, and Carney Hospital.
2. Cheever, *History of Boston City Hospital*, 136. This was the first separate hospital for the treatment of infectious disease in the United States.
3. For example, the cost of quarantine was \$21, 121.17 in fiscal year 1896, and by fiscal year 1910 the city only spent \$22, 732.97, or \$1,611.80 more than fourteen

years before. This is in sharp contrast to the dramatic increase in costs for other municipal services. The quarantine station was one of the least patronage impacted departments in Boston. Certainly, stigma of the work and the danger of contracting a communicable disease kept numerous interested jobseekers to a minimum.

4. Boston Finance Commission, *Final Report* (Boston: Author, 1909), 56.
5. Theodore Roosevelt, *Presidential Addresses and State Papers, November 7, 1907 to November 26, 1908*, vol. 7 (New York: The Review of Reviews Co., 1910), 1720–1724.
6. John F. Fitzgerald, “Passage of an Order for the Appointment of a Finance Commission to Examine into All Matters Pertaining to the Finances of the City,” ed. Office of the Mayor (Boston: Allied Printing, 1906), 1–6.
7. BCA, “ARRE,” ed. Audit Department (Boston: Boston Printing Department, 1911), 232; “ARRE,” ed. Audit Department (Boston: Boston Printing Department, 1913), 300.
8. Boston Finance Commission, *Final Report*, 45–55.
9. James J. Connolly, “Reconstituting Ethnic Politics: Boston, 1909–1925,” *Social Science History* 19, no. 4 (1995): 484.
10. Ibid., 479–509.
11. Ibid. Connolly makes the case that Boston’s financial crisis was the central concern for Mayor Fitzgerald and his successor Mayor Curley.
12. BCC, “Reports of Proceedings of the City Council for the Year Commencing February 6, 1911 and Ending February 3, 1912,” ed. Boston City Council (Boston: Boston Printing Department, 1912), 327.
13. Ibid.
14. BCC, “Reports of Proceedings of the City Council for the Year Commencing February 6, 1911 and Ending February 3, 1912,” 413–414.
15. Leland E. Cofer, “Advantages of National Quarantine,” *New York State Journal of Medicine* 12, no. 3 (1912): 128. Cofer’s assessment was not up to date for the city of Providence which turned over its quarantine station to the USPHS in 1912. Baltimore transferred its station to the USPHS in 1916 but federal acquisition was delayed until 1921.
16. BCC, “Reports of Proceedings of the City Council for the Year Commencing February 5, 1912 and Ending February 1, 1913,” ed. Boston City Council (Boston: Boston Printing Department, 1913), 208.
17. Boston Journal, “Curley Sells Gallup’s Island,” *Boston Journal*, March 24, 1914, 1. Dr. Cofer was the first layperson to address the Boston City Council from the Chairman’s roster.
18. BCC, “Reports of Proceedings of the City Council for the Year Commencing February 2, 1914 and Ending January 30, 1915,” ed. Boston City Council (Boston: Boston Printing Department, 1915), 49.
19. Boston Herald, “Mercantile and Shipping Men Protest Quarantine Transfer,” *Boston Herald*, April 22, 1914.
20. BDG, “Oppose Change of Quarantine: Protest by Chamber of Commerce,” *Boston Daily Globe*, April 7, 1914, 8.

21. Passed Surgeon S. B. Grubbs would later receive instructions to maintain a semblance of the class-based medical inspection program found at the Boston quarantine station. The public did not know of the USPHS's tacit support for "class-based" medical inspections as that could have become a political issue during the Progressive Era where consumer and citizen groups were vigilantly monitoring local government for signs of favoritism.
22. BCC, "Reports of Proceedings of the City Council for the Year Commencing February 2, 1914 and Ending January 30, 1915," 283–287.
23. BCC, "Reports of Proceedings of the City Council for the Year Commencing February 1, 1915 and Ending February 5, 1916," ed. Boston City Council (Boston: Boston Printing Department, 1916), 132.
24. Francis X. Mahoney, *Digest of Health Laws, Boston* (Boston: Boston Printing Department, 1923), 62. The agreement was memorialized in a telegram from Assistant Surgeon Victor Safford to Surgeon General Blue, March 31, 1915, RG-90, Box 234, Central File 1897–1923, File 2284(1915) (College Park, MD: NARA, 1915). It was later learned not all quarantine functions were transferred to the USPHS. The city still could impose quarantine if a communicable disease emerged that was not handled by the USPHS.
25. James Michael Curley, *I'd Do It Again* (Englewood Cliffs: Prentice-Hall, 1957), Biography, 126.
26. Rupert Blue, "Memorandum for Assistant Secretary," ed. U.S. Public Health Service (Washington, DC: NARA, 1914).
27. Rupert Blue, "U.S. Surgeon General, Telegram to Irwin, March 31, 1915," RG-90, Box 234, E10, NUCH, HM1999, Central File 1897–1923, File 2284(1915) (College Park, MD: NARA, 1915). This telegram makes it clear Surgeon General Blue used Mayor Curley's decision as leverage to influence public opinion in Philadelphia, as well as the views of the governors of New York and Texas. These three states were still operating quarantine programs at the time Boston ceded its port quarantine authority to the USPHS.
28. Randall G. Holcombe, "The Growth of the Federal Government in the 1920s," *Cato Journal* 16, no. 2 (1996): 175–199. Holcomb provides an excellent analysis of how big government took root in the United States prior to the Great Depression and as an outgrowth of the Progressive Era.
29. "Letter to U.S. Surgeon General, March 28, 1914 from L. E. Cofer, Assistant Surgeon General," RG-90, Box 141, 1960 (1915–1914) (College Park, MD: NARA, 1915–1914). The sale of Gallop's Island revealed the inner workings of the Boston quarantine establishment. For the first time in the city's history, a complete list of its employees, properties, and equipment was compiled and provided to the USPHS. Gallop's Island was managed by fourteen quarantine personnel, including a port physician, an assistant port physician, two farmers, a matron, a nurse, a cook, a laundress, and a supervisor. In addition, the *Steamer Vigilant* was commanded by Marselina Safrino, captain, Fred E. Small, mate, Alonzo Buckman, engineer, Egbert E. Oliver, assistant engineer, Joseph P. Rogers, fireman, Thomas Greenwood, Steward, and Antonio Francis, deckhand. The

property included the superintendent's house built in 1876; two hospitals (one built in 1877 and one in 1873); a barn built in 1873; an ice house built in 1877; carpenter and paint shops built in 1877; the storehouse and wharf built in 1883; two dormitories at the head of the wharf built in 1892; the sterilizing building built in 1892; and the experimental animal barn built in 1895. Aside from two quarantine vessels, the island also had 1 horse, 2 cows, 1 heifer, and 260 chickens. The port physician kept two hundred iron beds in the barn along with cases of blankets and other paraphernalia needed in the event of an epidemic. These beds were above and beyond the sixty-two beds in the two hospitals and the six hundred beds in the east and west detention halls.

30. BCC, "Reports of Proceedings of the City Council for the Year Commencing February 7, 1916 and Ending February 3, 1917," ed. Boston City Council (Boston: Boston Printing Department, 1917), 288.

31. BCC, "Reports of Proceedings of the City Council for the Year Commencing February 2, 1914 and Ending January 30, 1915," 288.

32. Surgeon General, "Annual Report of the Surgeon General," ed. U.S. Treasury Department (Washington, DC: USGPO, 1916), 119–120, 173.

Chapter 22: Quarantine under U.S. Public Health Service

1. U.S. Public Health Service, "Transfer of Boston Quarantine Control Imminent," RG90, Box 141(1975–1914) (College Park, MD: NARA, 1975–1914).
2. William H. Mahoney, "Benevolent Hospitals in Metropolitan Boston," *Publications of the American Statistical Association* 13, no. 102 (1913): 419–448.
3. BDG, "Oppose Change of Quarantine," *Boston Globe*, April 7, 1914, 17.
4. "Report of the Special Committee on Boston's Quarantine Service, Boston Chamber of Commerce, March 22, 1915," RG-90, Central File 1897–1923, File 2284 (1915) Box 232 (College Park, MD: NARA, 1915). The Chamber emphasized the need for federal resources to meet emerging large-scale epidemics.
5. JAMA, "Boston Quarantine Transferred," *JAMA* 64, no. 25 (1915): 2076.
6. Harvard University, "Catalogue & Announcement, 1916–1917," in *Circular of the School for Health Officers* (Boston: Sdchool for Health Officers, 1916), 30.
7. Surgeon General, "Annual Report of the Surgeon General," ed. U.S. Treasury Department (Washington, DC: USGPO, 1915), 128.
8. Surgeon General, "Annual Report of the Surgeon General," 1916, 123.
9. Surgeon General, 1915, 1916, 1917, 1918, 1919.
10. Surgeon General, "Annual Report of the Surgeon General," 1916, 123.
11. Surgeon General, "Annual Report of the Surgeon General," ed. U.S. Treasury Department (Washington, DC: USGPO, 1917), 157. Congress made the work of the port physician even more difficult when on May 1, 1916 it required all arriving alien seamen to undergo a medical examination.
12. Surgeon General, "Annual Report of the Surgeon General," ed. U.S. Treasury Department (Washington, DC: USGPO, 1924), 114.

13. Surgeon General, "Annual Report of the Surgeon General," ed. U.S. Treasury Department (Washington, DC: USGPO, 1928), 136.
14. Surgeon General, "Annual Report of the Surgeon General," ed. U.S. Treasury Department (Washington, DC: USGPO, 1930), 201–202.
15. William Bryan, Memo to Surgeon General dated December 13, 1918, RG-90, Box 234, E10, NUCH, HM1999, Central File 1897–1923, File 2285, (Dec.-Nov.), (1923–1920) (College Park, MD: NARA, 1923–1920).
16. Surgeon General, "Annual Report of the Surgeon General," ed. U.S. Treasury Department (Washington, DC: USGPO, 1918), 170.
17. Surgeon General, "Annual Report of the Surgeon General," ed. U.S. Treasury Department (Washington, DC: USGPO, 1919), 116.
18. BDG, "Influenza Found in Several Cities: Surgeon General Tells How to Treat Disease," *Boston Globe*, September 14, 1918, 1.
19. Markel, Stern, and Cetron, "Non-Pharmaceutical Interventions for Influenza Pandemic," 129–142. Markel found a strong association between "early, sustained and layered application of non-pharmaceutical interventions" and the mitigation of the 1918–1919 influenza pandemic in the United States. Their findings reflect a growing modern interest in nonpharmaceutical responses to viral pandemics that continue to be inadequately addressed solely through pharmaceutical solutions.
20. Alfred W. Crosby, *America's Forgotten Pandemic; the Influenza of 1918* (New York: Cambridge University Press, 2003), 6.
21. M. J. Rosenau, *Experiments upon Volunteers to Determine the Cause and Mode of Spread of Influenza: Boston, November and December, 1918*, Hygienic Laboratory Bulletin No. 123 (Washington, DC: USGPO, 1921).
22. Gina Kolata, *Flu; The Story of the Great Influenza Pandemic of 1918 and the Search for the Virus that Caused It* (New York: Simon & Schuster, 2001), 57–60; Crosby, *America's Forgotten Pandemic*, 280–282; Richard E. Shope, "Influenza," *Public Health Reports* 73, no. 2 (1958): 170–171; Walter Reed, "Etiology of Yellow Fever: A Preliminary Note," *Public Health Papers and Reports* 26 (1900): 37–53. While voluntary medical experimentation had been carried out upon Boston children in 1802 and military personnel in 1900 (yellow fever tests on military personnel in Cuba), the influenza experimentation on Gallop's Island may have been the first example of government "coerced" participation. Navy enlisted men were given a reprieve from dishonorable discharge for crimes they had committed in exchange for participation in the experiment.
23. BDG, "Dr. Donald Currie Pneumonia Victim," *Boston Globe*, December 24, 1918, 10.
24. Rosenau, *Experiments upon Volunteers to Determine the Cause of Influenza*, no. 123.
25. G. W. McCoy and De Wayne Richey, *Experiments upon Volunteers to Determine the Cause and Mode of Spread of Influenza: San Francisco November and December, 1918*, ed. United States Public Health Service, Hygienic Laboratory Bulletin No. 123 (Washington, DC: USGPO, 1921), 42–51.

26. Rosenau, *Experiments upon Volunteers to Determine the Cause and Mode of Spread of Influenza: Boston, February and March 1919*, no. 123, 70.
27. BDG, "Hospital Grew in a Night," *Boston Globe*, September 29, 1918, 23.
28. Marilyn Chase, *The Barbary Plague* (New York: Random House, 2003), 108.
29. William J. Robinson, "Twenty Eight Deaths Reported—Situation Improves," *Boston Globe*, September 23, 1918, 4; "Discuss Removal of Camp Quarantine," *Boston Globe*, October 5, 1918, 7.
30. BDG, "Ask \$1 Million to Fight Epidemic," *Boston Globe*, September 28, 1918, 2.
31. BDG, "Cardinal Offers Use of Seminary," *Boston Globe*, September 29, 1918, 1.
32. Ibid., 10.
33. BHD, "Forty Ninth Annual Report of the Health Department," ed. Boston Health Department, BCD#12 (Boston: Author, 1921), 2.
34. Howard Markel et al., "Non-Pharmaceutical Interventions Implemented by US Cities During the 1918–1919 Influenza Pandemic," *JAMA* 298, no. 6 (2007): 644–654.
35. D. F. Houston, "July 15, 1920 Letter to Andrew J. Peters, Mayor of Boston from, Secretary of the Treasury," RG90, Box 233, E10, NUCH, HM1999, Central file, 1897–1923, file 2284(1920) (College Park, MD: NARA, 1920).
36. Hugh Cumming, "July 15, 1920 Memorandum from Hugh Cumming, Surgeon General to the Secretary of the Treasury," RG90, Box 233, E10, NUCH, HM1999, Central file, 1897–1923, file 2284(1920) (College Park, MD: NARA, 1920).
37. Charles I. Bevans, *Treaties and Other International Agreements of the United States of America, 1776–1949*, vol. 1, Department of State Publication 8407, 8441, 8484, 8521, 8543, 8549, 8566, 8590, 8615, 8642, 8728, 8761, 8830 (Washington, DC: Department of State, 1968), 815–854.
38. Ludwik Gross, "How Charles Nicolle of the Pasteur Institute Discovered that Epidemic Typhus Is Transmitted by Lice: Reminiscences from My Years at the Pasteur Institute in Paris," *Proceedings National Academy of Sciences* 93 (1996): 10539–10540.
39. D. F. Houston, "July 15, 1920 Letter to Andrew J. Peters, Mayor of Boston from D. F. Houston, Secretary of the Treasury," RG90, Box 233, E10, NUCH, HM1999, Central file, 1897–1923, file 2284(1920) (College Park, MD: NARA, 1920).
40. Surgeon General, "Annual Report of the Surgeon General," 1921, 171.
41. BDG, "Conference on Detention Stations," *Boston Daily Globe*, March 20, 1921, 9.
42. BDG, "Detain 125 from Boston," *Boston Globe*, February 18, 1921, 20.
43. M. Bryan, "Letter to Surgeon General on Expenses Associated with Detention of Typhus Cases," ed. U.S. Treasury Department (College Park, MD: NARA, 1921). Worst-case conditions required accommodations for 2,100 persons.
44. William Bryan, "March 16, 1921 Memorandum to the Surgeon General from William Bryan, Surgeon Boston Quarantine Station," RG90, Box 234, E10, NUCH, HM1999, Central file, 1897–1923, file 2285 (Oct–Jan) 1919–1915 (College

Park, MD: NARA, 1921). Inflation factors used were derived from an online calculator. Accessed August 31, 2020: <http://www.westegg.com/inflation/>

45. Surgeon General, "Annual Report of the Surgeon General," ed. U.S. Treasury Department (Washington, DC: USGPO, 1922), 149.

46. Bevans, *Treaties and Other International Agreements*, 1, 814–854.

47. BHD, "Forty Ninth Annual Report of the Health Department," 1921, 4–5. City health officials met with the Surgeon General in February 1921 to urge improved quarantine facilities in Boston Harbor. A major concern was public hysteria concerning the extremely high number of typhus cases. They were also concerned the USPHS had diverted thousands of typhus-infected immigrants to Boston from other eastern seaports.

48. Surgeon General, "Annual Report of the Surgeon General," 1922, 150.

49. Surgeon General, "Annual Report of the Surgeon General," ed. U.S. Treasury Department (Washington, DC: USGPO, 1923), 120.

50. Chase, *The Barbary Plague*, 3–21.

51. French Simpson, "December 12, 1924 Letter from French Simpson, Medical Officer in Charge to the U.S. Surgeon General," RG90, Box 138, E10, NUCH, HM1999, Group 1, Domestic Stations 1921–1935, Box 138 (College Park, MD: NARA, 1924).

52. R. H. Creel and French Simpson, "Rodent Destruction on Ships," ed. U.S. Public Health Service (Washington, DC: USGPO, 1917), 1445–1450; Surgeon General, "Annual Report of the Surgeon General," 1922, 43.

53. Surgeon General, "Annual Report of the Surgeon General," 1922, 141.

54. Cecil Spring Rice, "April 30, 1917 Letter from Cecil Spring Rice, British Ambassador to Secretary of State of the United States," RG90, Box 233, E10, NUCH, HM1999, Central file, 1897–1923, file 2284(1917) (College Park, MD: NARA, 1917). Its most tragic experiment occurred on November 2, 1916, when three carpenters died from exposure to hydrocyanic acid gas (cyanide gas) exposure caused by USPHS fumigation of the British steamship *Devonian*. While the USPHS supported the continued use of this experimental fumigant, this tragic incident would eventually seal its fate. The USPHS immediately undertook an official investigation, concluding "lack of definite knowledge of the behavior of this gas under certain conditions" requires that "fumigation by this method can be safely carried out only when properly controlled and supervised by a competent representative of the service and under conditions which allow ample artificial ventilation or animal control or both." Improved supervision and better ventilation were reasonable recommendations, but the British Ambassador was not convinced. He pressed the American government to reevaluate the use of this fumigant noting that "it must be classed with carbonic oxide as about the most dangerous to human life of the better known fumigants and that its use requires considerable care owing to its lightness and consequent liability to become concentrated in the upper part of a ship's hold."

55. Surgeon General, "Annual Report of the Surgeon General," 1930, 141. Zyklon B was the same chemical used by the Nazis in the gas chambers at Auschwitz during 1941 and 1942. This was an extremely lethal fumigant.

56. Cofer, "A Word to Ship Captains," 3.
57. Ibid.
58. Surgeon General, "Annual Report of the Surgeon General," 1923, 121.
59. Surgeon General, "Annual Report of the Surgeon General," 1924, 115.
60. Surgeon General, "Annual Report of the Surgeon General," ed. U.S. Treasury Department (Washington, DC: USGPO, 1925), 127.
61. NYT, "Our Quarantine Rules Help Europe Cleanup," *New York Times*, October 12, 1924, 11.
62. Ibid.
63. Chase, *The Barbary Plague*, 54, 85–86. The 1900 plague San Francisco was the classic example of how the Service attempted to control newspaper coverage of epidemic disease. Chase provides an excellent discussion of this issue and the media's own role in controlling coverage.
64. Supervising Surgeon General, *Annual Report of the Supervising Surgeon General of the Marine Hospital Service of the United States* (Washington, DC: USGPO, 1896), 456. The telegraphic code covered the major communicable diseases including yellow fever (Fazal), cholera (Axbas), and Leprosy (Dozon).
65. "Telegram from Surgeon Sweeney to U.S. Surgeon General, January 6, 1928," RG90, Box 43, E10, NUCH, HM1999, Group 1, Domestic Stations: MASS; Boston Quarantine 1975-198, Box 43, File 2210-68, Part II (College Park, MD: NARA, 1928).
66. While the telegram clearly mentions the crew were vaccinated, this by itself was apparently not enough to prompt public concerns smallpox was onboard. Vaccination was a routine service provided on many incoming vessels as a precautionary measure even without a smallpox case. Boston's newspapers barely covered this event.
67. "Memorandum from Surgeon Sweeney to U.S. Surgeon General, January 9, 1928," RG90, Box 43, E10, NUCH, HM1999, Group 1, Domestic Stations: MASS; Boston Quarantine 1975-198, Box 43, File 2210-68, Part II (College Park, MD: NARA, 1928). The *New York Times* covered this story on January 7, 1928, on page 33. The brief article was titled "Smallpox on Ship in Boston." A similarly short article appeared in the Boston Evening Transcript on January 6, 1928 on page 4, titled, "Vaccinate Freighter's Crew."
68. Bevans, *Treaties and other International Agreements*, 1, 359–423, 450–463, 814–854. The three treaties signed before World War I were the International Sanitary Treaty of 1903, the Inter-American Sanitary Convention of 1905, and the International Sanitary Convention of 1912.
69. Surgeon General, "Annual Report of the Surgeon General," 1925, 121.
70. Surgeon General, "Annual Report of the Surgeon General," 1928, 136; "Annual Report of the Surgeon General," ed. U.S. Treasury Department (Washington, DC: USGPO, 1929), 125.
71. Schmeckebier and Brookings Institution. Institute for Government, *The Public Health Service*, no. 10, 18. Prior to 1915, when USPHS assumed control of the quarantine station, medical inspection of immigrants was conducted under

the authority of a federal immigration law enacted on April 1, 1891, and not as part of maritime quarantine. After 1915, this dual inspection program remained in place for nearly ten years with one branch of the U.S. Treasury conducting medical inspections under immigration law and the other branch (i.e., the maritime quarantine division) conducting quarantine inspections.

72. Carl Solberg, *Conquest of the Skies: A History of Commercial Aviation* (Boston: Little, Brown and Co., 1979), 13–30.

73. Ibid., 31.

74. Ibid.; Daniel Kusrow, “Inglis M. Uppercu,” Daniel Kusrow & Bjorn Larsson. Accessed August 31, 2020: <http://www.timetableimages.com/ttimages/aerombil.htm#uppercu>

75. Clara Savage, “Woman’s Trip on Mail Plane from New York to Cuba,” *New York Times*, November 7, 1920, 1.

76. Amendment No. 1 to the United States Quarantine Regulations, Public Health Service, October 22, 1920 contained in the Quarantine Laws and Regulations of the United States, Revised Edition: June 1920, U.S. Public Health Service, Washington, DC.

77. Solberg, *Conquest of the Skies*, 9–41.

78. Surgeon General, “Annual Report of the Surgeon General,” 1929, 117.

79. Surgeon General, “Annual Report of the Surgeon General,” 1931, 130.

80. NYT, “Airliners from Abroad Mean Quarantine Problem,” *New York Times*, January 18, 1925, 7.

81. Surgeon General, “Annual Report of the Surgeon General,” 1930, 145; USPHS, “International Sanitary Convention for Aerial Navigation,” ed. U.S. Treasury Department, Supplement No. 120 to the Public Health Reports (Washington, DC: USGPO, 1936).

82. NYT, “Airliners from Abroad Mean Quarantine Problem,” 7.

83. Surgeon General, “Annual Report of the Surgeon General,” 1931, 135.

84. T. H. D. Griffitts, “Mosquitoes Transported by Airplanes,” Public Health Reports (Washington, DC: USGPO, 1931), 2775–2782; Surgeon General, “Annual Report of the Surgeon General,” ed. U.S. Treasury Department (Washington, DC: USGPO, 1932), 96.

85. NYT, “Costs to State High for Aliens with TB,” *New York Times*, January 30, 1953, 11.

86. Surgeon General, “Annual Report of the Surgeon General,” ed. U.S. Treasury Department (Washington, DC: USGPO, 1933), 51.

87. Ibid.; George Rosen, *A History of Public Health* (Baltimore: The Johns Hopkins University Press, 1993), 312–320. The Surgeon General declared that not one case of quarantinable disease entered the United States in 1933.

88. Surgeon General, “Annual Report of the Surgeon General,” 1933, 55; “Annual Report of the Surgeon General,” ed. U.S. Treasury Department (Washington, DC: USGPO, 1934), 67.

89. Surgeon General, “Annual Report of the Surgeon General,” ed. U.S. Treasury Department (Washington, DC: USGPO, 1936), 9–10.

90. Surgeon General, "Annual Report of the Surgeon General," 1934, 14.
91. Surgeon General, "Annual Report of the Surgeon General," ed. U.S. Treasury Department (Washington, DC: USGPO, 1935), 75.
92. *Ibid.*, 75.
93. FAA Historical Chronology, 1926–1996. Accessed August 12, 2014: www.faa.gov/about/media/b-chron.pdf
94. *Ibid.*
95. *Ibid.*
96. Surgeon General, "Annual Report of the Surgeon General," ed. U.S. Treasury Department (Washington, DC: USGPO, 1937), 79–80.
97. Annual Reports of the United States Public Health Service for fiscal years 1941–2 and 1942–3, 10.
98. Griffitts, "Mosquitoes Transported by Airplanes," 2575–2836.
99. USPHS, "Annual Report of the Federal Security Agency," ed. Federal Security Agency (Washington, DC: USGPO, 1945), 72–73.
100. USPHS, "Annual Report of the Federal Security Agency," ed. Federal Security Agency (Washington, DC: USGPO, 1946), 317.
101. American Journal of Public Health, "Transmission of Mosquitoes by Airplanes," *American Journal of Public Health* 22, no. 4 (1932): 397–398; "The Airplane and Yellow Fever," *American Journal of Public Health* 28, no. 9 (1938): 116–118.
102. U.S. Bureau of the Census, "Historical Statistics of the United States from Colonial Times to 1957," ed. U.S. Department of Commerce, *Scheduled Air Transportation, Domestic and International, 1926–1957* (Washington, DC: USGPO, 1960), 467.
103. USPHS, "Annual Report of the Federal Security Agency," ed. Federal Security Agency (Washington, DC: USGPO, 1947), 363.
104. USPHS, "International Sanitary Convention for Aerial Navigation," 1936.
105. C. L. Williams, "January 9, 1937 Letter from C. L. Williams Assistant Surgeon General to the Assistant Surgeon General Draper," RG90, E10, NUCH, HM1999, Group 1, Domestic Stations, Box 3, Boston Quarantine 1910–1960, File 1960 station (College Park, MD: NARA, 1937).
106. C. L. Williams, "September 13, 1937 Letter from C. L. Williams Assistant Surgeon General to the U.S. Surgeon General," RG90, Box 61, E10, NUCH, HM1999, Group 1, Domestic Stations, 1936–1944 (College Park, MD: NARA, 1937).
107. John W. McCormack, "Telegram from John W. McCormack, Congressman to Surgeon General, October 29, 1937," RG90, Box 61, E10, NUCH, HM1999, Group 1, Domestic Stations, 1936–1944 (College Park, MD: NARA, 1937).
108. *Ibid.*
109. C. L. Williams, "September 22, 1937 Letter from C. L. Williams Assistant Surgeon General to the U.S. Surgeon General," RG90, Box 61, E10, NUCH, HM1999, Group 1, Domestic Stations, 1936–1944 (College Park, MD: NARA, 1937).

110. C. L. Williams, "September 15, 1937 Letter from C.L. Williams Assistant Surgeon General to the U.S. Surgeon General," RG90, Box 3, Boston Quarantine 1910–1960, Domestic Stations (College Park, MD: NARA, 1937).
111. Thomas Parran, "May 6, 1938 Letter from Surgeon General Thomas Parran to William J. Barry," RG90, Box 1, 1910 Boston Quarantine (College Park, MD: NARA, 1938). This letter makes no reference to the fact that the USPHS quarantined thirteen hundred persons in Boston Harbor during the spring of 1921. In this context, Surgeon General Parran was probably focusing on the number of quarantinable disease cases that would need to use Boston area hospitals as opposed to the total number of quarantinable diseases actually identified during routine ship inspections in the harbor.
112. Ibid.
113. Robert Olesen, "Ship Hygiene and Sanitation," ed. U.S. Public Health Service (Washington, DC: USGPO, 1940), 15.
114. Surgeon General, "Annual Report of the Surgeon General," 1937, 78.
115. Thomas Parran, "May 6, 1936 Letter from U.S. Surgeon General to Mr. William J. Barry Esq.," RG90, Box 61, E10, NUCH, HM1999, Group 1, Domestic Stations, 1936–1944 (College Park, MD: NARA, 1936).
116. Daniel MaGuire, "September 6, 1936 Letter from Daniel Maguire to U.S. Surgeon General," RG90, Box 61, E10, NUCH, HM1999, Group 1, Domestic Stations, 1936–1944 (College Park, MD: NARA, 1936).
117. Surgeon General, "Annual Report of the Surgeon General," ed. U.S. Treasury Department (Washington, DC: USGPO, 1939), 18.
118. NYT, "Ship Fails to List Fever Cases Here," *New York Times*, August 28, 1937, 17; "U.S. Barriers to Epidemics at Ports is 100% Effective," *New York Times*, August 2, 1953, 64. The one incident where a shipmaster failed to report communicable disease occurred on August 27, 1937, in New York City when the Hamburg American line vessel *Hansa* failed to report twenty-four suspected cases of paratyphoid in her crew. The result was a decertification of the physician and the vessel from radio pratique and the vessel returned to Germany without picking up any passengers. Despite this one unfortunate incident, the USPHS never found another similar case. In part because of this one incident, the USPHS later adopted random inspections of radio pratique vessels to ensure the integrity of this time-saving strategy. The 1953 *Times* article provides a post–World War II retrospective review of the efficacy of radio pratique.
119. Tomas Parran, "Foregin Quarantine: Inspection of Vessels or Aircraft," in *Federal Register*, 10 FR 2407, ed. U.S. Public Health Service (Washington, DC: USGPO, 1945), 2407.
120. Andrea Conti, "Historical and Methodological Highlights of Quarantine Measures: From Ancient Plague Epidemics to Current Coronavirus Disease (COVID-19) Pandemic," *Acta BioMedica* 91, no. 2 (2020): 226–229.
121. Thomas Parran, "Foregin Quarantine Regulations," in 11 FR 2998, ed. U.S. Public Health Service (Washington, DC: USGPO, 1946), 2998, Section 2911.2924. It is unclear why the USPHS waited until after the World War II to

formally adopt radio pratique as an alternative to traditional quarantine practices. While it had been adopted as a best practice in 1937, the vicissitudes of war may have pushed this regulatory change off as a back burner issue.

122. USPHS, "Foregin Quarantine," in *Title 42—Public Health*, ed. U.S. Public Health Service (Washington, DC: USGPO, 1939), 46; Gertrude Seymour, "On Guard at the Port of New York," *Survey* 35, no. 15 (1916): 427. This regulation makes explicit reference to parallel reporting requirements between the USPHS and the Immigration and Naturalization Service (INS). Seymour mentions at least one documented instance where the INS staff identified cases of communicable disease missed by the local quarantine officer.

123. United States Statutes at Large, 1939, 1st Session of the 76th Congress, vol. 53, Reorganization Plan No. 1, U.S. Government Printing Office, Washington, DC, 1423.

124. USPHS, "Annual Report of the U.S. Federal Security Agency for Fiscal Year 1945" (Washington, DC: USGPO, 1945), 266.

125. R. E. Bodet, "August 5, 1940 Letter from R. E. Bodet, Medical Officer in Charge to Assistant Surgeon General M.C. Guthrie," RG90, Box 61, E10, NUCH, HM1999, Group 1, Domestic Stations, 1936–1944 (College Park, MD: NARA, 1940). The transfer of Gallop's Island to the Coast Guard contained an important caveat: the USPHS reserved the right to use Building 27 (the hospital) and Building 39 (the warehouse) if a quarantine emergency emerged. This reservation was later modified by the acting surgeon general in a letter dated May 18, 1942, to the medical officer in charge of the Boston Quarantine Station, allowing the Coast Guard to use the hospital subject to preemption by the USPHS in the event of a quarantine emergency.

126. E.S. Land, "August 30, 1945 Correspondence from E.S. Land, Administrator, War Shipping Administrator to Mr. Paul V. McNutt, Administrator, Federal Security Agency," Folder RD-291, GSA, Gallup Isl. 1916–48 (Waltham, MA: NARA, 1945).

127. Thomas Parran, "September 11, 1945 Correspondence from Thomas Parran, Surgeon General to Mr. W.E. Reynolds, Commissioner of Buildings, Federal Works Agency," Folder RD-291, GSA, Gallup Isl. 1916–48 (Waltham, MA: NARA, 1945).

128. Annual Reports of the Surgeon General, 1915–1945.

129. Charles H. Sassone, "Contract of Sale Dated May 12, 1953 between the United States of America and Charles H. Sassone of 33 Maverick Street, Dedham, MA," RG 291, Gallup Island, 1950–1963 (Waltham, MA: NARA, 1953).

130. John L. Sirois, "June 17, 1964 Memorandum from Regional Appraiser John L. Sirois to Chief Real Property Division, General Services Administration," RG 291, Real Property Division, Boston Harbor, Gallup Islands, 1964–89 (Waltham, MA: NARA, 1964).

131. Prior to the mandatory reporting law of 1884, physicians only reported cases of smallpox. Massachusetts first imposed smallpox reporting on householders in 1732, expanding this requirement to physicians in 1828. No other state has had such a long history of disease reporting.

132. USPHS, “The Control of Communicable Diseases,” ed. U.S. Public Health Service, *Public Health Reports* (Washington, DC: USGPO, 1917), 1706–1733.
133. Heymann, *Control of Communicable Diseases*.
134. USPHS, “The Control of Communicable Diseases,” 1708.
135. Ibid., 1707–1708.
136. Nkuchua M. M’ikanatha et al., ed. *Infectious Disease Surveillance* (West Sussex, England: Blackwell Publishing, 2007), 538; S. Declich, “Public Health Surveillance: Historical Origins, Methods and Evaluation,” *Bulletin of the World Health Organization* 72, no. 2 (1994): 285–304. There is an extensive literature on the history of disease surveillance. While great progress has been made to apply surveillance systems to a wide range of public health issues without stigmatizing the “infected,” such systems have their origins in systems to identify and track epidemic disease. The nineteenth-century surveillance systems were initially reactive in nature (i.e., applied at the time of an epidemic). They have evolved to provide continuous monitoring of disease trends going far beyond epidemic-related illnesses.
137. Massachusetts Department of Public Health, “Minimum Requirements for the Control of Communicable Diseases,” ed. Massachusetts Department of Public Health (Boston: Massachusetts Department of Public Health, 1921), 1.
138. McClain, “Medicine, Race and American Law,” 496–513. A classic case of mixing infected and uninfected citizens within an infected neighborhood occurred in 1900 during the bubonic plague quarantine in San Francisco.
139. By “contact tracing,” we mean one-time or ongoing communication with the network of persons who have been in contact with an infected individual during their period of infectiousness. Contact tracing represents a voluntary cooperative relationship between public health officials and those infected with a communicable disease.
140. Centers for Disease Control and Prevention, “Guideline for Hand Hygiene in Health Care Settings: Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/PIC/IDSA Hand Hygiene Task Force,” *Morbidity and Mortality Weekly Report* 51, no. RR-16 (2002): 1–44.
141. Jonathan Quick, *The End of Epidemics* (New York: St. Martin’s Press, 2018), 194–211.

Chapter 23: Redefining Quarantine for the Twenty-First Century

1. Heymann, *Control of Communicable Diseases*, 708–712.
2. USPHS, “The Control of Communicable Diseases,” 1706.
3. By “self-tethering,” we mean voluntary quarantine by individuals who have been informed of their responsibilities to isolate themselves from others during the infectious period of their disease.
4. Anne Presanis, “The Severity of Pandemic H1N1 Influenza in the United States from April to July 2009: A Bayesian Approach,” *PLoS Medicine* 6, no. 12 (2009): 1–12.

5. For a description of the Taoist concept Wu-Wei. Accessed August 31, 2020: https://en.wikipedia.org/wiki/Wu_wei

6. The CDC has identified twenty-six vaccine-preventable diseases, including twenty-one that are communicable. Hundreds of pathogens exist for which there are no vaccines. See CDC website for the current list of vaccine-preventable diseases. Accessed August 31, 2020: <http://www.cdc.gov/vaccines/vpd-vac/default.htm#newvacc>

7. Joshua Lederberg, "Emerging Infections: An Evolutionary Perspective," *Emerging Infectious Disease* 4, no. 3 (1998): 367.

8. Anthony Hauser et al., "Estimating of SARS-CoV-2 Mortality During the Early Stages of an Epidemic: A Modeling Study in Hubei, China, and Six Regions in Europe," *PLoS Medicine* 17, no. 7 (2020): 1–17. Accessed September 13, 2020: <https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1003189>

9. Data are derived from 1811 to 1963 from annual mortality statistics contained in the bills of mortality from Boston Board of Health (1811–1822); the Annual Report of the Registry Department, 1905; Bills of Mortality 1811–1849, City of Boston with an Essay on the Vital Statistics of the City of Boston, Lemuel Shattuck, 1893; Reports of the City Registrar for 1851, 1854, 1863, and 1878; and Annual Reports of the Health Department of Boston from 1873 to 1960.

10. Lewis Robinson and T. O'Toole, "Critical Care During Epidemics," *Critical Care* 9, no. 4 (2005): 311–313.

11. Jefferson, "Physical Interventions with Respiratory Viruses."

12. As exposure can mean many things to many people, it is essential to define the varied meanings of this term. Exposure to a pathogen requires a pathway of entry into the human body. As a result, modern definitions of exposure focus on the specific routes of entry that are credible biological pathways for each disease. Exposure could occur through inhalation, ingestion, dermal contact, injection, and/or sexual contact. Exposure by itself does not necessarily trigger disease. We must also consider the timing, intensity, and duration of exposure to any given pathogen as the dose and dose frequency influence the potential for disease. Moreover, exposure is a meaningless concept if we fail to review a person's immunity to the disease in question. Exposure as a criterion for quarantine only makes sense for those who are not immune. Historically, public health officials rarely considered immunity when imposing quarantine. The only exception to that rule were cases of smallpox where visible vaccination scars or scars from the disease itself granted one a pass out of quarantine. Should a person be placed in quarantine simply because they were in contact with an infected person? Shouldn't the duration of contact be considered as well as the relative health and vitality of the person presumably exposed? Perhaps even more important than these quasi-rational arguments for disease detention are the more realistic resource limitations we face in quarantining large segments of the population when a highly lethal communicable disease strikes. Which government agency has the resources to apply quarantine to every single potentially exposed individual? A rational allocation of quarantine resources during an

epidemic must rest on greater reliance on self-directed behaviors rather than centralized forms of medical incarceration.

13. George J. Annas, "Bioterrorism, Public Health, and Human Rights," *Health Affairs* 21, no. 6 (2002): 94–97; Jorge F. Galva, Christopher Atchison, and Samuel Levey, "Public Health Strategy and the Police Powers of the State," *Public Health Reports* 120, no. Suppl 1 (2005): 20–27. Annas provides a counterperspective on this issue reflecting the inability of states to address national-scale issues. While his point is well taken for events like anthrax, such events are the exception that prove the rule. Trust is linked to proximity of response and local accountability.

14. The use of military force to support federal quarantines is not a new concept. For example, the USPHS used military force to control mutinous Italian sailors in Boston Harbor suspected of carrying typhus. Similarly, the USMHS employed force to control the movement of Americans trying to leave California during the summer of 1900 when bubonic plague raged in San Francisco. There was a palpable fear this disease would be disseminated to other states if quarantine was not established at border crossings.

15. Nancy M. Baum, Peter D. Jacobson, and Susan D. Goold, "'Listen to the People:' Public Deliberation about Social Distancing Measures in a Pandemic," *American Journal of Bioethics*, 9, no. 11 (2009): 4–14.

16. Ferguson et al., "Strategies for Mitigating an Influenza Pandemic," 448–452.

17. Blendon et al., "Attitudes Toward the Use of Quarantine," 24.

18. Robert Cialdini, *Influence—Science and Practice* (Boston: Allyn & Bacon, 2001), 98–142. An excellent discussion of the principles of peer group support.

19. Baum and Goold, "'Listen to the People,'" 4–14.

20. Philip Alcabes, *Dread: How Fear and Fantasy Have Fueled Epidemics from the Black Death to Avian Flu* (New York: Public Affairs, 2009), 107–108; Leavitt, "Politics and Public Health in Milwaukee," 372–382; William G. Eidson, "Confusion, Controversy and Quarantine: The Muncie Smallpox Epidemic of 1893," *Indiana Magazine of History* 86, no. 4 (1990): 374–398. There are innumerable quarantines in which tall fences and guards were posted to ensure patients did not flee quarantine. Such events occurred in the San Francisco Bubonic Plague of 1900, the Boston smallpox epidemic of 1872, the Muncie smallpox epidemic of 1893, and the Milwaukee smallpox epidemic of 1894–1895. For a recent example of how quarantine prompts the flight response, see Harry F. Hull, "Why Quarantines Won't Stop Ebola from Spreading in the U.S.," *Washington Post*, October 3, 2014.

21. Ferguson et al., "Strategies for Mitigating an Influenza Pandemic," 448–452. Ferguson modeled the role of quarantine in the spread of influenza and determined that border controls are not very effective in stopping its spread—confirming that disease is easily spread by those fleeing the epidemic's epicenter.

22. Arthur J. Viseltear, "The Pneumonic Plague Epidemic of 1924 in Los Angeles," *Yale Journal of Biology and Medicine* 47, no. 1 (1974): 40–54; McClain,

"Medicine, Race and American Law"; BDG, "Commerce Committee Probes Quarantine," *Boston Daily Globe*, April 14, 1921.

23. Blendon et al., "Attitudes Toward the Use of Quarantine," 24. See September 8 to 11, 2008 Gallup Poll of American opinions on trust in the Executive Branch of Government. Accessed through: Roper Center of Public Opinion Archives, March 7, 2010.

24. Matthew Haag, "New Yorkers Flee to Suburbs, Where 'the Demand Is Insane,'" *New York Times*, August 30, 2020, 1.

25. David P. Fidler, Lawrence O. Gostin, and Howard Markel, "Through the Quarantine Looking Glass: Drug-Resistant Tuberculosis and Public Health Governance, Law, and Ethics," *Journal of Law, Medicine and Ethics* 35, no. 4 (2007): 619. Fidler insightfully argues quarantine is affected by the cultural conditions where it is applied.

26. D. Pittet, "Improving Adherence to Hand Hygiene Practice: A Multidisciplinary Approach," *Emerging Infectious Diseases* 7, no. 2 (2001): 234–240. Accessed August 31, 2020: https://wwwnc.cdc.gov/eid/article/7/2/70-0234_article. This article summarizes hand hygiene at hospitals and shows hand-washing compliance rates to be far less than 50 percent.

27. Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Chicago: The University of Chicago Press, 1996), 66.

28. Sidhartha Mukerjee, "How to Quarantine Against Ebola," *New York Times*, October 13, 2014, A-21.

29. See Men in Black Quotations. Accessed August 31, 2020: <http://www.angelfire.com/oh/quotations/movies/meninblack.html>

30. American Community Survey, U.S. Bureau of the Census, Table S2801, Types of Computers and Internet Connections, 2018.

31. Pharmaceutical companies by virtue of their investments in antibiotics and antiviral drug therapies have little interest in nonpharmaceutical interventions as a subject of research. However, their overwhelming influence and support for pharmaceutical intervention studies tend to overshadow and marginalize research conducted on nonpharmaceutical interventions which are generally poorly funded.

32. Jefferson, "Physical Interventions with Respiratory Viruses," 1–10. Jefferson contends physical interventions are highly effective and little evidence exists to support the widespread use of vaccines and antiviral drugs.

33. Jeffrey Taubenberger and David M. Morens, "1918 Influenza: The Mother of All Pandemics," *Emerging Infectious Diseases* 12, no. 1 (2006): 15.

34. Ibid.

35. Classic examples of failed government managed quarantines are the San Francisco plague outbreak (1901); the Boston typhoid outbreak (1921); the Los Angeles pneumonic plague outbreak (1924); the Milwaukee smallpox outbreak (1894–1895); and the New Orleans yellow fever outbreak (1853).

36. Nancy Lee Jones and Jon O. Shimabukuro, *Quarantine and Isolation: Selected Legal Issues Relating to Employment* (Washington, DC: American Law Division, CRS, 2009), 1.

37. Woolhouse and Gaunt, "Origins of Novel Pathogens," 231–242.
38. Normitsu Onishi, "Australia Puts Its Refugee Problem on a Remote Island, Behind Razor Wire," *New York Times*, November 4, 2009, A-6.
39. Institute of Medicine, *Sustaining Global Surveillance and Response to Emerging Zoonotic Diseases*, 84–85. The disequilibrium of wealth and resources has a direct impact on overcrowding, which, in turn, facilitates environmental conditions favorable for propagating a wide range of communicable disease, including cholera, diphtheria, tuberculosis, and sexually transmitted diseases. Population displacement due to wars and natural disasters also facilitate epidemics by creating crowded and unsanitary living conditions.
40. The four Horsemen of the Apocalypse discussed in the Bible (see Chapter 6, verses 1 to 8 of Revelations) are pestilence, war, famine, and death. These four universal principles of destruction, rather than being separate horsemen, in reality, rule the world as part of an interlocking directorate. Pestilence is often triggered by war or famine, and all three are inextricably linked to the fourth horsemen, death. The Biblical metaphor of the four horsemen can also be understood as four facets of the destructive force of epidemics.
41. IPCC, "Food Security," in *Climate Change and Land: An IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems*, ed. P. R. Shukla et al. (2019), 479. Accessed August 31, 2020: <https://www.ipcc.ch/srccl/>. It is noteworthy that the IPCC has concluded that "higher consumption of animal-based foods was associated with higher estimated environmental impacts, whereas increased consumption of plant-based foods was associated with estimated lower environmental impact."
42. Michael Foucault, *Discipline and Punish: the Birth of the Prison* (New York: Vintage Books, 1995). Foucault offers an excellent discussion of the historical challenges of linking the proper punishment to the crime. He argues codes of punishment work best if they are appropriate in severity and duration to the crime and sufficiently transparent to influence potential offender behavior.

Appendix A: Chronology of Key American Quarantine Events, 1647–2020

1. Nathaniel Shurtleff, *Records of the Governor and Company of the Massachusetts Bay*, vol. 2, 1642–1649 (Boston: William White, Printer to the Commonwealth, 1853), 237.
2. Ibid., 280.
3. Nathaniel Shurtleff, *Records of the Governor and Company of the Massachusetts Bay*, vol. 4, Part 2 1661–1674 (Boston: William White, Priinter to the Commonwealth, 1854), 280.
4. Ibid., 345.

5. BRC, *A Report of the Record Commissioners of the City of Boston, Boston Records from 1660 to 1701* (Boston: Author, 1881), 119. Accessed June 22, 2020: <https://play.google.com/books/reader?id=oW1IAAAAYAAJ&hl=en&pg=GBS.PA119>

6. “An Act for the Better Preventing of the Spreading of Infectious Sickness,” Chapter 7, July 18, 1699, in *Massachusetts Province Laws* (1699–1700), 376–377. Accessed June 22, 2020: <https://archives.lib.state.ma.us/bitstream/handle/2452/118886/1699acts0007.pdf>

7. “An Act Providing in Case of Sickness,” Chapter 9, June 25, 1701, in *Massachusetts Province Laws* (1701–1702), 469–470. Accessed June 22, 2020: <https://archives.lib.state.ma.us/bitstream/handle/2452/118939/1701acts0009.pdf>

8. “An Act in Addition to an Act Entitled ‘An Act Providing in the Case of Sickness,’” Chapter 14, in *Massachusetts Province Laws* (1717–1718), 91–92. Accessed June 22, 2020: <https://archives.lib.state.ma.us/bitstream/handle/2452/117561/1717acts0014.pdf>

9. “An Act Regulating the Hospital on Rainsford Island and Further Providing in Case of Sickness,” Chapter 8, in *Massachusetts Province Laws* (1738–1739), 943–944. Accessed June 22, 2020: <https://archives.lib.state.ma.us/bitstream/handle/2452/117938/1738acts0008.pdf>

10. Minardi, “The Boston Inoculation Controversy of 1721–1722,” 47–76.

11. “An Act to Prevent Persons Concealing the Smallpox,” Chapter 13, in *Massachusetts Province Laws* (1731–1732), 621–622. Accessed August 31, 2020: <https://archives.lib.state.ma.us/actsResolves/1731/1731acts0013.pdf>

12. “An Act in Addition to an Act Entitled ‘An Act Providing in the Case of Sickness,’” Chapter 12, in *Massachusetts Province Laws* (1764–1765), 728–729. Accessed August 31, 2020. <https://archives.lib.state.ma.us/bitstream/handle/2452/116700/1764acts0012.pdf?sequence=3&isAllowed=y>

13. “An Act to Prevent the Continuance of the Smallpox in the Town of Boston and to License Inoculation There for a Limited Time,” Chapter 8, in *Acts and Resolves of the Province of Massachusetts Bay*, vol. 5 (Boston, 1886), 555–557. Accessed June 22, 2020: <https://archive.org/stream/actsresolvespass6980mass#page/555/mode/1up/search/pox>

14. “An Act for Providing Hospitals for Inoculation and Preventing Infection from the Smallpox and for Repealing Several Acts Heretofore Made for that Purpose,” Chapter 58, in *Acts and Laws of the Commonwealth of Massachusetts* (Boston, 1895), 85. Accessed June 22, 2020: <https://archive.org/stream/actsresolvespass179293mass#page/84/mode/1up/search/pox>

15. Boston, “Extract of a Letter from a Gentleman in Philadelphia, dated September 25 to His Friend in this Town,” *Boston Gazette*, October 7, 1793, Issue 2036, 4.

16. “An Act to Authorize the President of the United States, in Certain Cases, to Alter the Place for Holding a Session of Congress,” Chapter 17, April 3, 1794, in *Acts of the Third Congress of the United States* (Philadelphia, 1794), 353. Accessed June 22, 2020: <https://www.loc.gov/law/help/statutes-at-large/3rd-congress/c3.pdf>

17. "An Act Relative to Quarantine," Chapter 31, May 27, 1796, in *Acts of the Fourth Congress of the United States* (Washington, DC, 1796), 474. Accessed June 22, 2020: <https://www.loc.gov/law/help/statutes-at-large/4th-congress/session-1/c4s1ch31.pdf>
18. "An Act to Prevent the Spread of Contagious Sickness," Chapter 16, June 22, 1797, in *Acts and Resolves of Massachusetts, 1796–97* (Boston, 1896), 356–365. Accessed June 22, 2020: <https://archive.org/details/actsresolvespass179697mass/page/356/mode/2up>
19. "An Act Respecting Quarantine and Health Laws," Chapter 12, February 25, 1799, in *Acts of the Fifth Congress of the United States* (Washington, DC, 1799), 619–621. Accessed June 20, 2020: <https://www.loc.gov/law/help/statutes-at-large/5th-congress/session-3/c5s3ch12.pdf>
20. "An Act to Empower the Inhabitants of the Town of Boston to Choose a Board of Health," Chapter 47, February 13, 1799, in *Acts and Laws of the Commonwealth of Massachusetts—1798* (Boston, 1897), 57–62. Accessed June 22, 2020: <https://archive.org/details/actsresolvespass179899mass/page/57/mode/1up>
21. COL, "A Few Days Ago," *Columbian Sentinel*, August 25, 1802, 2.
22. Republican Gazetteer, "Vaccination or Cow-Pock," *Republican Gazetteer*, December 29, 1802, 1.
23. "An Act in Addition to an Act Entitled 'An Act to Empower the Town of Boston to Choose a Board of Health and for Removing and Preventing Nuisances,'" Chapter 11, June 18, 1803, in *Acts and Laws of the Commonwealth of Massachusetts—1802* (Boston, 1898), 474–476. Accessed June 22, 2020: <https://archive.org/details/actsresolvespass180203mass/page/474/mode/2up>
24. "An Act to Diffuse the Benefits of Inoculation for the Cow-Pox," Chapter 116, March 6, 1810, in *Acts and Laws of the Commonwealth of Massachusetts—1810* (Boston), 204. Accessed June 22, 2020: <https://archives.lib.state.ma.us/bitstream/handle/2452/107942/1809acts0117.pdf>
25. Gibbons v. Ogden, (22 US 1 (1824). Accessed June 22, 2020: [https://scholar.google.com/scholar_case?case=1173503503763993716&q=Gibbons+v.+Ogden,+%\(22+US+1+\)\(1824\)&hl=en&as_sdt=6,41&as_vis=1](https://scholar.google.com/scholar_case?case=1173503503763993716&q=Gibbons+v.+Ogden,+%(22+US+1+)(1824)&hl=en&as_sdt=6,41&as_vis=1)
26. Josiah Quincy, *Municipal History of Boston* (Carlisle, MA, 2009), 147. Accessed June 22, 2020: https://books.google.com/books?id=AVC_N7zhOGYC&pg=PA148&lpg=PA148&dq=Boston+consulting+physicians+appointed+1824&source=bl&tots=ulXbZf7zbl&sig=ACfU3U3v5pITwI_G9kxkk5kBexl3nsWdxQ&hl=en&sa=X&ved=2ahUKEwjbj9bz4MPpAhVCc98KHY27DqUQ6AEwCnoECAwQAQ#v=onepage&q&f=false
27. "An Act in Addition to an Act for Providing Hospitals for Inoculation and Preventing Infection from the Smallpox and for Repealing Several Acts Heretofore Made for that Purpose," Chapter 129, March 12, 1828, in *Laws of the Commonwealth of Massachusetts, 1825–1828*, vol. 10 (Boston, 1828), 869. Accessed June 22, 2020: <https://archive.org/details/actsresolvespass2528mass/page/869/mode/1up>
28. COL, "Physicians Report," *Columbian Sentinel*, June 23, 1832, 1.

29. Boston Evening Transcript, “Municipal Decision to Make Deer Island Quarantine Station,” *Boston Evening Transcript*, June 8, 1847, 2.
30. Boston House of Industry and Reformation, “Annual Report of the Directors of the House of Industry and Reformation” (Boston, April 1, 1848), 3–6. Accessed June 22, 2020: <https://archive.org/details/annualreportofdi4356hou> /page/n120/mode/1up
31. “An Act to Secure General Vaccination,” Chapter 414, May 19, 1855, in *Acts and Resolves Passed by the General Court of Massachusetts* (Boston, 1854), 812–813. Accessed June 22, 2020: <https://archive.org/details/actsresolvespass185455mass> /page/812/mode/2up
32. Minutes of the Proceedings of the Quarantine Convention: held at Philadelphia by invitation of the Philadelphia Board of Health, May 13–15, 1857. Accessed June 22, 2020: <https://collections.nlm.nih.gov/catalog/nlm:nlmuid-101576524-bk>
33. Report on Registration, presented to the Quarantine and Sanitary Convention, at its fourth annual meeting, held in the city of Boston, June 14, 1860. Accessed June 22, 2020: <https://collections.nlm.nih.gov/catalog/nlm:nlmuid-101512537-bk>
34. Boston City Hospital, Proceedings at the Dedication of the City Hospital, 1865, Boston, 24. Accessed June 22, 2020: <https://archive.org/details/proceedingsatdedbost/page/24/mode/2up>
35. Boston Daily Advertiser, City of Boston—An Ordinance Relating to the Quarantine Grounds Approved June 1, 1866, June 12, 1866, 4.
36. “An Act to Establish a State Board of Health,” Chapter 420, in *Acts and Resolves Passed by the General Court of Massachusetts* (Boston, 1869), 738–739. Accessed June 22, 2020: <https://archive.org/details/actsresolvespass1869mass> /page/738/mode/2up
37. “An Act Relating to Smallpox,” Chapter 189, April 12, 1872, in *Acts and Resolves Passed by the General Court of Massachusetts* (Boston, 1872), 140. Accessed June 22, 2020: <https://archive.org/details/actsresolvespass1872mass> /page/140/mode/1up
38. Boston Daily Globe, “Local Intelligence: The New Board of Health,” *Boston Daily Globe*, January 16, 1873, 8.
39. Steve Blevins and Michael Bronze, “Robert Koch and the Golden Age of Bacteriology,” *International Journal of Infectious Disease* 14, no. 9 (2010), 744–751. Accessed June 22, 2020: <https://www.sciencedirect.com/science/article/pii/S1201971210023143>
40. “An Act to Provide for the more Accurate Registration of Vital Statistics,” Chapter 174, in *Acts and Resolves Passed by the General Court of Massachusetts* (Boston, 1878), 127–128. Accessed June 22, 2020: <https://archive.org/details/actsresolvespass1878mass> /page/127/mode/1up
41. “An Act to Prevent the Introduction of Contagious or Infectious Diseases into the United States,” April 29, 1878, Forty Fifth Congress, Session II, Chapter 66, 37–38. Accessed June 22, 2020: <https://www.loc.gov/law/help/statutes-at-large/45th-congress/session-2/c45s2ch66.pdf>

42. "An Act to Prevent the Introduction of Contagious or Infectious Diseases into the United States, and to Establish a National Board of Health," March 3, 1879, Forty Fifth Congress, Session III, Chapter 202, 484–485. Accessed June 22, 2020: <https://www.loc.gov/law/help/statutes-at-large/45th-congress/session-3/c45s3ch202.pdf>
43. Proceeding of the International Sanitary Conference, Washington, DC, 1881.
44. "An Act Concerning Contagious Diseases," Chapter 98, March 21, 1884, in *Acts and Resolves Passed by the General Court of Massachusetts* (Boston, 1884), 77–78. Accessed June 22, 2020: <https://archive.org/details/actsresolvespass1884mass/page/77/mode/1up>
45. BDG, "Public Safety," *Boston Globe*, March 16, 1888, 1.
46. "An Act Granting Additional Quarantine Powers and Imposing Additional Duties upon the Marine-Hospital Service," February 15, 1893, Fifty Second Congress, Session II, Chapter 114, 449–452. Accessed June 22, 2020: <https://www.loc.gov/law/help/statutes-at-large/52nd-congress/session-2/c52s2ch114.pdf>
47. "An Act to Require Cities to Provide Treatment for Persons Suffering from Contagious Diseases in Certain Cases," Chapter 400, May 21, 1895, in *Acts and Resolves Passed by the General Court of Massachusetts* (Boston, 1895), 443. Accessed June 22, 2020: <https://archive.org/details/actsresolvespass1895mass/page/443/mode/1up>
48. "An Act Relative to the Boards of Health in Towns," Chapter 506, June 5, 1895, in *Acts and Resolves Passed by the General Court of Massachusetts* (Boston, 1895), 625–626. Accessed June 22, 2020: <https://archive.org/details/actsresolvespass1895mass/page/625/mode/1up>
49. David William Cheever, *A History of the Boston City Hospital from Its Foundation until 1904* (Boston, 1906), 41. Accessed June 22, 2020: <https://archive.org/details/historyofbostonc00bost/page/41/mode/1up>
50. "An Act Relative to Vaccination," Chapter 190, March 19, 1902, in *Acts and Resolves Passed by the General Court of Massachusetts* (Boston, 1902), 138. Accessed June 22, 2020: <https://archive.org/details/actsresolvespass1902mass/page/138/mode/2up>
51. Michael R. Albert et al., "The Last Smallpox Epidemic in Boston and the Vaccination Controversy, 1901–1903," *New England Journal of Medicine* 344 (February 1, 2001): 375–379. Accessed June 22, 2020: <https://www.nejm.org/doi/full/10.1056/NEJM200102013440511>
52. "An Act to Authorize the State Board of Health to Define What Diseases Are to be Deemed Dangerous to the Public Health," Chapter 183, March 8, 1907, in *Acts and Resolves Passed by the General Court of Massachusetts* (Boston, 1907), 139. Accessed June 22, 2020: <https://archive.org/details/actsresolvespass1907mass/page/139/mode/1up>
53. "An Act to Provide for Compensating Persons Held in Quarantine by Order of Boards of Health," Chapter 445, May 24, 1907, in *Acts and Resolves Passed by the General Court of Massachusetts* (Boston, 1907), 390. Accessed June

20, 2020: <https://archive.org/details/actsresolvespass1907mass/page/390/mode/1up>

54. "Concerning the Quarantine Service," Chapter 1, Boston City Ordinance of 1915, March 30, 1915. Accessed June 22, 2020: https://cityofboston.access.preservica.com/uncategorized/IO_04945b47-1432-47a8-a070-85feb7b2be54/

55. "Annual Report of the Surgeon General of the Public Health Service of the United States for Fiscal Year 1915," Transfer of the Quarantine at Boston, Washington, DC, 121. Accessed June 22, 2020: https://books.google.com/books?id=1jQ4_uNBdSMC&lpg=PA350&ots=QWMrC5TFbv&dq=annual%20report%20of%20the%20u.s.%20surgeon%20general%20of%20Public%20Health%20Service%2C%20fiscal%20year%201916&pg=PA121#v=onepage&q&f=false

56. Boston Evening Globe, "Three Dead, Three Dying in the Devonian Tragedy," *Boston Evening Globe*, November 2, 1916, 1.

57. S. B. Grubbs, "Ventilation after Fumigation, Public Health Reports," U.S. Public Health Service, vol. 32, Part 2, July to December 1917 (Washington, DC, 1918), 1757–1761. Accessed June 22, 2020: <https://play.google.com/books/reader?id=8hM7AQAAQAAJ&pg=GBS.PA1757>

58. "The Control of Communicable Disease," *U.S. Public Health Service Reports* 32, no. 41 (October 12, 1917), 1706–1733. Accessed June 22, 2020: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1999751/pdf/pubhealthreporig03318-0001.pdf>

59. "Annual Report of the Surgeon General of the Public Health Service of the United States for Fiscal Year 1921," Completion of National Quarantine System, Washington, DC, 159. Accessed June 22, 2020: <https://archive.org/details/annualreportofsu001920/page/159/mode/1up>

60. "An Act Making Appropriations for Sundry Civil Expenses of the Government for Fiscal Year Ending June 30, 1921," Chapter 235, Quarantine Stations, Sixty Sixth Congress, 1920, 874–875. Accessed June 22, 2020: <https://www.loc.gov/law/help/statutes-at-large/66th-congress/session-2/c66s2ch235.pdf>

61. "Annual Report of the Surgeon General of the Public Health Service of the United States for Fiscal Year 1937," Division of Foreign and Insular Quarantine & Immigration, Washington, DC, 78. Accessed June 22, 2020: <https://books.google.com/books?id=XHRTxfb5WYwC&lpg=PA155&ots=fjQMEpjWDd&dq=annual%20report%20of%20the%20surgeon%20of%20the%20Public%20Health%20Service%20for%20fiscal%20year%201937&pg=PA78#v=onepage&q&f=false>

62. "An Act To Consolidate and Revise the Laws Relating to the Public Health Service, and for Other Purposes," Chapter 373, Statutes at Large, 78th Congress, July 1, 1944, 682–720. Accessed June 22, 2020: <https://www.loc.gov/law/help/statutes-at-large/78th-congress/session-2/c78s2ch373.pdf>

63. Parran, "Foreign Quarantine," 2407.

64. World Health Assembly, 4, 1951, WHO Regulations No. 2, International Sanitary Regulations, World Health Organization, 2–79. Accessed June 22, 2020: https://apps.who.int/iris/bitstream/handle/10665/101391/WHA4_60_eng.pdf

65. Reorganization Plan No.3 of 1966, Statutes at Large, 89th Congress, June 25, 1966, 1610. Accessed June 22, 2020: <https://www.govinfo.gov/content/pkg/STATUTE-80/pdf/STATUTE-80-Pg1610.pdf>
66. Revised List of Quarantinable Communicable Diseases, Presidential Executive Order 13295, April 4, 2003. Accessed June 22, 2020: <https://www.govinfo.gov/content/pkg/CFR-2004-title3-vol1/pdf/CFR-2004-title3-vol1-eo13295.pdf>
67. Centers for Disease Control and Prevention, Control of Communicable Diseases, 68 FR 17558, April 10, 2003. Accessed June 22, 2020: <https://www.federalregister.gov/documents/2003/04/10/03-8736/control-of-communicable-diseases>
68. Boston Public Health Commission, *Regulation for the Isolation and Quarantine of Individuals with Infectious Disease Dangerous to the Public Health* (November 5, 2003). Accessed June 22, 2020: https://www.bphc.org/boarchofhealth/regulations/Documents/Isolation_and_Quarantine_Regulation.pdf
69. Amendment to Executive Order 13295 Relating to Certain Influenza Viruses and Quarantinable Communicable Diseases, Presidential Executive Order 13375, April 1, 2005. Accessed June 22, 2020: <https://georgewbush-whitehouse.archives.gov/news/releases/2005/04/20050401-6.html>
70. Centers for Disease Control and Prevention, Medical Examination of Aliens-Revisions to Medical Screening Process, 73 FR 58047, October 6, 2008. Accessed June 22, 2020: <https://www.federalregister.gov/documents/2008/10/06/E8-23485/medical-examination-of-alien-revisions-to-medical-screening-process>
71. Centers for Disease Control and Prevention, Control of Communicable Disease, 82 FR 6890–6978, February 21, 2017. Accessed June 22, 2020: <https://www.federalregister.gov/documents/2017/01/19/2017-00615/control-of-communicable-diseases>
72. Suspension of Entry as Immigrants and Nonimmigrants of Persons Who Pose a Risk of Transmitting 2019 Novel Coronavirus and Other Appropriate Measures to Address This Risk, Proclamation 9984 of January 31, 2020, Executive Office of the President. Accessed June 22, 2020: <https://www.federalregister.gov/documents/2020/02/05/2020-02424/suspension-of-entry-as-immigrants-and-nonimmigrants-of-persons-who-pose-a-risk-of-transmitting-2019>
73. Centers for Disease Control and Prevention, Control of Communicable Diseases; Foreign Quarantine, 85 FR 7874, February 7, 2020. Accessed June 22, 2020: <https://www.federalregister.gov/documents/2020/02/12/2020-02731/control-of-communicable-diseases-foreign-quarantine>
74. Centers for Disease Control and Prevention, Collection of Certain Data Regarding Passengers and Crew Arriving From Foreign Countries by Airlines, 85 FR 10439, February 18, 2020. Accessed June 22, 2020: <https://www.federalregister.gov/documents/2020/02/24/2020-03636/collection-of-certain-data-regarding-passengers-and-crew-arriving-from-foreign-countries-by-airlines>
75. Declaring a National Emergency Concerning the Novel Coronavirus Disease (COVID-19) Outbreak, Proclamation 9994 of March 13, 2020, Executive Office of the President. Accessed June 22, 2020: <https://www.federalregister.gov>

/documents/2020/03/18/2020-05794/declaring-a-national-emergency-concerning-the-novel-coronavirus-disease-covid-19-outbreak

76. Centers for Disease Control and Prevention, No Sail Order and Suspension of Further Embarkation, 85 FR 16628, March 14, 2020. Accessed June 22, 2020: <https://www.federalregister.gov/documents/2020/03/24/2020-06166/no-sail-order-and-suspension-of-further-embarkation>

77. Centers for Disease Control and Prevention, Notice of Order Under Sections 362 and 365 of the Public Health Service Act Suspending Introduction of Certain Persons from Countries Where a Communicable Disease Exists, 85 FR 17060, March 20, 2020. Accessed June 22, 2020: <https://www.federalregister.gov/documents/2020/03/26/2020-06327/notice-of-order-under-sections-362-and-365-of-the-public-health-service-act-suspending-introduction>

78. Executive Office of the President, “Suspension of Entry as Immigrants and Nonimmigrants of Certain Additional Persons Who Pose a Risk of Transmitting 2019 Novel Coronavirus,” in *Proclamation 10041 of May 24, 2020* (May 28, 2020). Accessed September 11, 2020: <https://www.federalregister.gov/documents/2020/05/28/2020-11616/suspension-of-entry-as-immigrants-and-nonimmigrants-of-certain-additional-persons-who-pose-a-risk-of>

79. Centers for Disease Control and Prevention, “Control of Communicable Diseases; Foreign Quarantine: Suspension of the Right To Introduce and Prohibition of Introduction of Persons into United From Designated Foreign Countries or Places for Public Health Purposes,” in 85 FR 56424 (September 11, 2020). Accessed September 12, 2020: <https://www.federalregister.gov/documents/2020/09/11/2020-20036/control-of-communicable-diseases-foreign-quarantine-suspension-of-the-right-to-introduce-and>

Glossary

1. Richard Quain, ed. *Dictionary of Medicine*, vol. 1 (New York: D. Appleton, 1895), 324.
2. John M. Last, *A Dictionary of Epidemiology*, 4th ed. (Oxford: Oxford University Press, 2001), 35. Accessed June 22, 2020: https://pestcontrol.ru/assets/files/biblioteka/file/19-john_m_last-a_dictionary_of_epidemiology_4th_edition-oxford_university_press_usa_2000.pdf
3. Centers for Disease Control and Prevention, “Symptoms of Coronavirus.” Accessed June 22, 2020: <https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>
4. Last, *A Dictionary of Epidemiology*, 59.
5. World Health Organization, “WHO Best Practices for Naming of New Human Infectious Diseases,” 2015. Accessed June 22, 2020: https://apps.who.int/iris/bitstream/handle/10665/163636/WHO_HSE_FOS_15.1_eng.pdf
6. Centers for Disease Control and Prevention, “About Quarantine and Isolation.” Accessed June 22, 2020: <https://www.cdc.gov/quarantine/quarantineisolation.html>

7. "The Control of Communicable Diseases," *Public Health Reports* 50, no. 32 (1935): 1017–1086. Accessed June 22, 2020: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1996271/?report=classic&page=1>
8. Last, *A Dictionary of Epidemiology*, 131.
9. World Health Organization, "WHO Checklist for Influenza Pandemic Preparedness Planning," 2005, 6. Accessed June 22, 2020: <https://www.who.int/csr/resources/publications/influenza/FluCheck6web.pdf>
10. Centers for Disease Control and Prevention, "About Quarantine and Isolation."
11. Brock Hampton, "Development of the National Maritime Quarantine System in the United States," *Public Health Reports* 55, no. 28 (July 12, 1940): 1255. Accessed June 22, 2020: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1996016/pdf/pubhealthreporig02781-0004.pdf>
12. Andrew D. Cliff et al., "Controlling the Geographic Spread of Infectious Disease: Plague in Italy, 1347–1851," *Acta Medico-Historica Adriatica* 7, no. 1 (2009), 197–236. Accessed June 22, 2020: <https://pdfs.semanticscholar.org/7bec/5d4a3beedb9c94ed2dc1ce191f65429f6c63.pdf>
13. Centers for Disease Control and Prevention, "Social Distancing." Accessed April 24, 2020: <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/social-distancing.html>
14. Last, *A Dictionary of Epidemiology*, 189.



Index

Note: Page numbers in italics indicate photos. Page numbers followed by *t* indicate tables and *f* indicate figures.

- Act of Congress (1916) (U.S.), 285
Adams, Abigail, 103, 116, 137
Adams, John, 80, 112, 131–133, 137
Adams, Samuel, 61, 63, 64, 89
Aero Marine West Indies Airways Company, 297
Aerosol-borne epidemics: aerosol particles of less than five microns, 18–19; distancing strategies and, 18–19, 21, 128, 165, 239, 285
African Americans, in colonial Boston, 33, 46
Air Commerce Act (1926), 297
Air transport systems: disease transmission and, 17–18
American Indians, in colonial Boston, 33
American Medical Association (AMA), 170; Code of Ethics adoption (1847), 199
American Public Health Association (APHA), 242; Committee on Standard Regulation, 306, 310; Committee on the Infectious Period of Communicable Diseases, 241; Control of Communicable Diseases Manual, 306, 308
American shipping industry: exports during 1814–1818, 151; national quarantine program and, 275; onboard disease control, 292–293; radio pratique, 303–304. *See also* Trade patterns
An Act to Prevent Persons Concealing the Smallpox (1732) (U.S.), 65–66
Andrews, Charles, 26
Anglican Church, 26
Anroman, Gilda Marie, 125, 127
Anthrax: attacks in U.S. (2001), xiii–xiv; links to *Bacillus anthracis* bacterium, 238–239; vaccine, 242
Antiauthoritarian attitudes, 7, 318
Antibiotic drugs, xiv, xv, 3, 265, 306, 310–312, 323–324
Antibody tests, 308, 321
Antigen tests, 321
Antiviral drugs, 310–312
Armstrong, Samuel, 166
Aspinwall, William, 143
Avian flu, 308
Aviation, age of: bans on passengers with yellow fever, 301; Douglas DC-3 passenger service, 300; Earhart's solo eighteen-hour flight, 300; International Sanitary Convention for Aviation, 299–301; mosquitoes and, 296–299

- Bacteriology, 242, 258, 266
 Bean, Horace, 161
 Bellingham, Richard, 35
 Bigelow, Jacob, 160–161, 162, 183–184, 188, 189, 194
 Bigelow, John Prescott, 183–184, 185, 188
 Bilious fevers, 115, 117, 119
 Bill, Richard, 68–69
 Bill, Samuel, 42, 43
 Bill & Melinda Gates Foundation, 21
 Bills of health, 293, 297–298, 300, 301, 304
 Biologics Control Act (1902) (U.S.), 212
 Bioterrorism events, 308
 Bird Island, 46
 Bloodletting, 34, 132, 151, 162
 Blue, Rupert, 272, 273, 274, 275, 283, 284, 285–286, 290
 Boston: almshouse, 67, 89; Board of Public Institutions, 181, 199, 200; as city charter government (1822), 157–158, 173; Committee on Health, 203, 231–232, 236; comparison of quarantine islands (1643–1945), 201t; comparison with Philadelphia quarantine system, 124–130; deaths due to yellow fever, 131, 135; expansion of hospital beds (1910), 283; expansion of shipping industry, 157–158; hyperresponse to yellow fever outbreak in Philadelphia, 118–123; immigration in, 127–128, 198, 244, 249; investigations into budget deficits, 268–271; Irish immigrant influx, 15, 33, 59–60, 67–68, 157, 179–180, 182, 187; isolated geography of, 25–26; maritime quarantine administration, 177; population growth, 213, 214; public health department authority, 158–160; quarantine laws, 126; quarantined immigrants and sailors, 14; resignation of consulting physicians, 204–206; ship inspections by physicians, 14; shipping industry agreement to federal takeover of Gallop's Island, 284; Tenement House Act (1868), 204; typhus scare (1921), 319; underclass of, 33; warehouse district fire (1872), 223–224. *See also* Miasma theory and maritime commerce/quarantine; Revolutionary War and smallpox; Selectmen, of Boston; Yellow fever (1793) and Boards of Health; specific island quarantine stations
 Boston, last epidemics of, 258–266; mandatory vaccination, 259–261; quarantine fiefdoms, 265–266; tuberculosis as dangerous disease, 261–265
 Boston and Liverpool Packet Company, 157
 Boston Board of Health: abolition of, 158; establishment of visiting physician post, 136–138; issuance of certificates of health, 137; maritime quarantine program, 138–140, 148, 149, 156; regulation of sanitation and quarantine, 134; Revere, Paul's leadership, 135–140, 150, 252; *Ten Brothers* tragedy, 152–155; yellow fever, 134–140. *See also* Vaccinations, of cowpox
 Boston Chamber of Commerce, 271, 272–273, 284
 Boston City Hospital, 190–192, 218, 246–247, 265–266, 275
 Boston Consumptives Hospital, 263
 Boston Dispensary, 190, 191
Boston Evening Post: public health notifications, 91
 Boston Finance Commission, 268–271
Boston Globe: on conditions of Boston City Hospital smallpox facility, 220–221

- Boston Harbor: Boston Neck, 25–26, 128; British blockade and embargo, 88–89, 88, 92–93; maritime quarantine, 8–9, 39–40; selectmen as guards of access, 40, 104; trade declines, 65; typhus outbreak, 288–291
- Boston Herald*: on need for public health reforms, 205
- Boston Long Wharf, 34–35
- Boston Maritime Quarantine Department, end of, 267–282; photos of Gallop's Island facilities, 276–282; sale of Gallop's Island quarantine station, 271–275; Vigilant controversy, 269–271, 285
- Boston Medical and Surgical Journal (BMSJ)*, 173, 175, 187, 194, 195, 205, 209–210, 215
- Boston Medical Association, 146, 147, 164–165
- Boston Medical Intelligencer*, 173
- Boston Medical Society, 55, 68, 120
- Boston News-Letter*: on government control during mass inoculation initiative, 82–84; public health notifications, 79, 80
- Boston Port Act (1774) (Great Britain), 87, 91
- Boston Port Authority, 302
- Boston smallpox epidemic (1872–1873), 217–237, 319–320; community outrage, 221–222; deaths due to, 223, 225, 225t, 226, 227–228f, 233, 235; destruction of smallpox hospital, 229–230; disease reporting, 223, 230–231; do nothing politics and, 221, 226, 228–229; effectiveness of isolation and treatment, 234t; efforts of new board of health, 231–235; impact of isolation and vaccination on, 235–237; impact of warehouse district fire on, 223–224; key events influencing, 227–228f; lack of resources to manage, 218–219, 220; lackluster vaccination program, 224–225; role of news media in, 219–221; spread of, 222–223
- Boston smallpox epidemics (1647–1792), 22, 23–24, 319–320; concurrent with yellow fever outbreaks, 113–115; deaths due to, 23–24, 39, 42, 56–57, 65, 80, 81, 107, 127; governor orders and, 36; morbidity and mortality censuses, 126–127; number of quarantined persons, 60; origins of, 77; post-war acceptance of home isolation, 106–107, 110; post-war liberation and disinfection, 100–103. *See also* Inoculation, practice of; Inoculation controversy (1721); Sequestration, large-scale
- Boston smallpox epidemics (1800s), 169, 187–189, 190, 225t, 251, 259
- Boston smallpox epidemics (1900s), 258
- Boston Tea Party (1773), 87–91
- Boston Vaccine Institute, 145, 211
- Bowditch, Henry, 239
- Boylston, Zabdiel, 45, 47–49, 50, 51–55, 57, 63, 85, 324
- British Cholera Commissioners, 195, 199
- British Customs Service, 37–38
- British West Indies, 66–67, 117–119, 125
- Brookline tent hospital, 287–288
- Bryan, William, 288, 291
- Bubonic plague: British epidemics, 22, 28, 34, 35, 36; colonial prohibition on infected persons, 39–40; contact contagion theory and, 172; death rate, 34; discovery of bacillus, 239; in France, 49–50; in New Orleans, 291–292; as quarantinable disease, 4; rat flea vector, 4, 291–293, 314; in San Francisco, 291, 319
- Bush, George W., 317

- Calf lymph vaccines. *See* Vaccinations, of cowpox
- Cambridge: mandatory vaccination laws, 260
- Caribbean islands: contagious diseases in, 16, 29–30; slave trade, 33. *See also* British West Indies
- Case fatality rate (CFR). *See* Diseases with High Case Fatality Rates and Short Incubation Periods
- Castle Island quarantine station: control of harbor access, 128; hospital facilities, 79, 81; lax enforcement, 30–31, 41, 76; USMHS services, 136; vessel inspections, 34–35, 36–37
- Cat Island quarantine station, 99–100
- Caulfield, Ernest, 22, 68
- Centers for Disease Control and Prevention (CDC), 308–309, 319, 320
- Chadwick, Edwin, 194
- Chandler, William, 256
- Chapman, Jonathan, 176
- Chelsea: smallpox refugees fled to, 99
- Chickenpox, 243
- Chlorination of water, 242
- Cholera: in Boston, 182–187, 267; case fatality rate and incubation period, 315*t*; cause of, 238–239; chlorination of water, 242; as communicable waterborne disease, 195–196; contact contagion theory and, 172; contagion and quarantine, 193–196; deaths due to, 185, 186, 194, 205; modern rarity of, 311; physician viewpoints on, 198–199; spread of, 7
- Cholera epidemic (1892), xv, 4, 254–255
- Clapp, Roger, 34, 36–37
- Clark, Henry, 184, 211
- Clark, John, 51, 61, 68
- Class-based disease control: Boston's Brahmins and, 188, 273–274; during colonial era, 23; history of quarantines for low-income persons, 6; Poor Houses and, 89; quarantine as social code, 32–33, 307; unemployment during pandemics, 1; xenophobic social and public health policies, 8–9, 40, 66–68, 123, 180–184, 188
- Cofer, Leland, 272
- Cogswell, Charles, 254–255
- Coleman Company, 305
- Columbian Sentinel*: on cow pox vaccination, 147; on yellow fever in Boston, 152; on yellow fever in Philadelphia, 121, 122
- Commissioners of Health, 158–159
- Common cold, 6–7
- Confluent smallpox, 45
- Congenital syphilis, 243
- Consumption. *See* Tuberculosis
- Contact contagion theory, 172
- Contact tracing, 307, 308, 321
- Continental Army: contagious troops departed Boston, 103–106; inoculation of troops, 102–103, 107–108, 110; post-war liberation and disinfection of Boston, 101–102, 107; smallpox threat to, 93, 96–97
- Continental Congress: Declaration of Independence, 104
- "The Control of Tuberculosis" (state pamphlet), 264
- Cooke, Elisha, 46, 50–51, 61, 63
- Cooper, William, 79, 82
- Corporate collusion with municipal services, 268
- Cotting, Benjamin E., 209
- Cotton, John, 27
- COVID-19 pandemic (2020), xiv, xv, 3; aerosol particles of less than five microns and, 18–19; case fatality

- rate and incubation period, 315t; economic impacts and poverty levels, 10; large-scale quarantines, 308; need for public education, 21; nursing home deaths due to, 8; PCR and RT-PCR testing, 321–322; state-level responses to, 327; zoonotic origins of, 326
- Cowpox vaccination. *See* Vaccinations, of cowpox
- Crafts, Thomas, 96, 99, 104, 108
- Cumming, Hugh, 290, 291–292, 298–299
- Cunard, Samuel, 175, 213
- Curley, James M., 271–274, 275
- Currie, Donald H., 285, 286
- Currie, William, 116–117
- Cushing, Thomas, 61
- Danforth, Thomas, 144, 145
- D'Aulney, Charles de Menou, 32
- Davenport, Richard, 30–31, 34
- Deer Island quarantine station, 176, 179–192, 200, 201t; cholera outbreak, 184–186; deaths during detention, 180, 182; hospital facilities, 186, 203–204; House of Corrections, 180–182, 202; Irish poverty, slums and cholera, 182–184; joint station with Gallop's Island, 199; the new untouchables, 186–187; reemergence of smallpox in Boston, 187–189; typhus epidemic and quarantine of steamship passengers, 289, 290; use of vessels for detention, 181–182; vaccination legislation, 189–192; vessel inspections, 36–37, 43
- Delousing, 288–289, 293
- Derby, George, 204–205, 224–225
- Dexter, Aaron, 145–146, 161
- Diphtheria, 22, 243, 244, 246, 258, 263, 315t
- Diphtheria bacillus, 239
- Disease reporting: adverse impacts, 168; by Board of Health, 245–246; by commanders of ships, 8–9, 13, 61; coordinated surveillance stage, 16–17; failures to, 169; INS requirements, 304; local requirements for, 223, 230–231; by physicians, 9, 64; by public health systems, 9; redefinition of, 243–245; state requirements for, 164–165; stigma and, 230–231; telegraph for, 222
- Disease transmission dynamics: air transport and, 17–18; quarantine principles and, xiv–xvi
- Diseases with High Case Fatality Rates and Short Incubation Periods, 312, 315–316, 315f
- Disinfection strategies: chlorination of water, 242; in colonial era, 51; costs of, 223; fumigation, 4, 62, 231, 250, 251–254, 292; germ theory and, 238, 240, 252; purification rituals for human disinfection, 254–257; school inspections and quarantines, 242–243; under USPHS, 4
- Distancing strategies: aerosol-borne epidemics and, 18, 21, 128, 165, 239, 285; benefits of social contact, 8; early Massachusetts laws, xiv; premise of social, 18–19; as supplementary to pharmaceutical strategies, 324
- Distempers, 22, 60. *See also* Throat distemper epidemic (1735–1740)
- Doctors without Borders, 21
- Dorrington, William, 91
- Douglass, William, 47, 48, 55, 56, 57, 63, 68, 84–85
- Dowse, Jonathan, 42–43
- Draper, Richard, 82
- Dummer, William, 62

- Durgin, Samuel: as Boston port physician, 200, 217, 236, 245; as chairman of Boston Board of Health, 200, 238, 240, 251–252, 253, 255, 258; as chairman of Committee on the Infectious Period of Communicable Diseases (APHA), 241; disease reporting, 244; expansion of hospital isolation capacity, 246–247; experience with tuberculosis, 261, 262; forcible vaccination, 259; germ theory and, 239; on importance of USMHS, 248; imposition of summertime quarantines in southern states, 249–250; as port physician on Deer Island, 202–203; school inspections and quarantines, 9, 243; vaccination and fumigation program (1882), 250; vessel quarantines for ships from southern states, 251
- Earhart, Amelia, 300
- East European Jewish immigrants, 254–256
- Eberth, Carl Joseph, 238–239
- Ebola, 308, 326
- Ebola epidemic (2014), xiv, 3
- Ecological disruption, 325–328
- Education. *See* Public education
- Eliot, Samuel, 168
- Emerson, Haven, 1
- Epidemic environmental conditions, use of term, 171
- Epizootic diseases, 224
- Erysipelas, 208
- Ethnic cleansing strategy. *See* Deer Island quarantine station
- Europe: Eastern European Jewish emigrants to U.S. from, 254–256; germ theory, 238; smallpox epidemic (1872), 217; tuberculosis as communicable disease, 261, 262; WWI era emigration to U.S. from, 275, 284–285. *See also specific countries*
- “Experiments upon Volunteers to Determine the Cause and Mode of Spread of Influenza, Boston, November and December 1918” (USPHS), 286
- Exposure, concept of, 317–318, 320–321
- Federal public health jurisdiction: national quarantine program (1799), 131–133, 248, 271–275; during yellow fever epidemic (1793), 123–124. *See also Quarantine, federal solutions to; specific federal agencies*
- Federal Security Agency, 304–305
- Fight-or-flight syndrome, 7
- First International Sanitary Conference (1851), 193–194
- Fisher, Chester Irving, 236, 240
- Fitzgerald, John “Honey Fitz,” 268, 269–270
- Fomites, 240
- Fort Hill cholera hospital, 185
- Foster, Frank P., 210–211
- Foster, Isaac, 136
- Foster, Jedediah, 94, 98
- Four-Tier Intervention System for Communicable Disease, 311–313, 313t, 327–328
- France: draft convention for sanitary control of aerial navigation, 299; plague outbreak, 49
- Franklin, Benjamin, 64
- Franklin, James, 48
- Freedom of mobility: in Siracusa principles, 7–8
- Freedom of the press, 9–10, 82–84
- Fumigation strategies: for rat eradication, 292; side effects of, 62; under USPHS, 4
- Gage, Thomas, 88–90, 91, 92, 93–94, 99

- Galbiati, Gennaro, 208
Gallatin, Albert, 124
Gallop, John, 198
Gallop's Island quarantine station, 197–206, 201t, 276–282; boat travel to, 203–204, 218, 269–271, 276, 285; under Coast Guard jurisdiction, 305; dismantling of, 304–305; effectiveness of isolation and treatment, 234t; federal improvements to, 291; forcible removal to, 219, 222, 252; history of early ownership, 197–198; hospital facilities, 197, 203, 255–256; human disinfection practices, 254–255; mild cases during 1900s, 259; relocation from Deer Island to, 197–204; resignation of consulting physicians, 204–206; role of port physician, 200; sale of to USPHS, 271–275; during smallpox epidemic (1872), 217, 221, 251; studies on rats in plague transmission, 291–293; typhus epidemic and quarantine of steamship passengers, 290; use of prison labor from Deer Island, 202–203; USPHS transfer of quarantining to Army Base in South Boston, 302–303; under War Shipping Administration jurisdiction, 305. *See also* Boston Maritime Quarantine Department, end of
- Gardner, Joseph, 108
Gaston, William, 221, 226, 228
Gates, Bill and Melinda, 21
General Court. *See* Massachusetts General Court
General Services Administration (GSA), 305
Germ theory and quarantine, 238–247; changing public opinion on, 239–240; disease reporting redefined, 243–245; disinfection and school quarantine, 242–243; emergence of isolation hospitals, 246–247; incubation periods for quarantinable disease, 240–242
Germ theory of disease, medicine prior to, xv, 22
Germ warfare. *See* Revolutionary War and smallpox
Good Government Association, 269
Gore, Christopher, 146
Gorham, John, 161
Graves, Samuel, 89, 90
Green, Samuel A., 219, 226, 240
Grubbs, Samuel B., 284–285
- Hamilton, James, 76
Hancock, John, 83, 89, 119
Handwashing, 5, 252
Harrison, Robert H., 97
Harvard Medical School, 109, 160–161, 168, 242, 258, 261
Hayes, Rutherford, 249
Hayward, George, 160–161
Hayward, Lemuel, 108
Heath, Alfred B., 250–251
Heath, William, 107–108
Herd immunity, 112, 127, 165
HMS Seahorse incident, 56
Hoar, John F., 260–261
Hogs Island, 43
Holt, Joseph, 253–254
Home isolation: applied to children, 243; disease-specific, 245, 263; during epidemics, 46–47, 53, 321; future trends, 327; inadequate practice of, 223, 233; as labor intensive, 42; lax maritime quarantine enforcement and, 41–42; new regulations (1895), 246; post-war acceptance and practice of, 106–107, 110; shift to island isolation, 44; during smallpox epidemic (1872), 234t; in stages of quarantine, 19–20; for throat distemper, 68–69. *See also* Red flags, on infected households

- H1N1 influenza, 312, 315^t
- Hospitals: British military ship-based, 90–91; emergence of isolation, 246–247; emergency systems, 1; established for inoculation, 79–82, 107–110, 113; isolation wards, 241, 247, 267, 308, 310, 321; large-scale response to epidemics by, 2; public acceptance for isolation, 265. *See also specific hospitals and island quarantine stations*
- House of Industry, 180–181, 188
- Household quarantine. *See Home isolation*
- Housing reforms, physician support of, 204–206
- Howard, John C., 144
- Howe, William, 95–97, 100
- Human experimentation, 51, 54, 85, 113, 144–148, 285–287
- Human rights issues, for victims of quarantine, 168
- Humphreys, Benjamin, 154
- Hutchinson, Anne, 31
- Hutchinson, William, 51
- Hydrocyanic acid gas, 292
- Immigration: during colonial era, 12–13; comparison of Philadelphia vs. Boston, 127–128; as federal function, 15; INS disease reporting requirements, 304; quarantine exclusion based on, 15–16; quarantine principles and, xv; as state/local function, 15; under U.S. Treasury Department, 296; vaccination for unvaccinated arrivals, 250–251; WWI era Europeans to U.S., 275, 284–285. *See also East European Jewish immigrants; Irish immigrants*
- Incubation periods, for quarantinable disease, 240–242, 260, 263, 312, 315^f
- Infectious distempers, 60
- Influenza viruses, 17–18, 21
- Ingalls, Paschal P., 204
- Inoculation, practice of: acceptance as public good, 78, 84–85; compliance of physicians with, 63–65; in hospitals, 79–82, 107–110, 113; inoculation of British troops, 97; inoculation of Continental Army, 102–103, 107–108, 110; mass inoculation initiatives, 79–82, 103–107; sequestration and, 57–58, 62–65; side effects of, 45–46
- Inoculation controversy (1721), 45–58; aftermath of epidemic, 55–58; government regulation of, 57–58, 114; Mather, Cotton supportive of inoculation, 47–55
- Inquiry into the Causes and Effects of the Variolae Vaccinae* (Jenner), 142
- International Nosological Conference (1900), 239
- International Sanitary Convention for Aerial Navigation (1934/1944), 299–301, 304
- International Sanitary Conventions (1866–1926), 17, 240–241, 269, 289, 291
- Internet, and public education, 322
- Irish immigrants: influx in Boston, 15, 33, 59–60, 67–68, 157, 179–180, 182, 187, 273; prior to vaccination requirements in Ireland, 215; religious persecution of Catholics, 59; transmission of disease by, 62
- Irish Quarantine (1847–1855), 188–189. *See also Deer Island quarantine station*
- Island quarantine stations: Boston City Council ends use of, 167–168; costs of, 84; decline in use of, 301–302; improved humanitarian approach to, 141; as military

- punishment sites, 32; Puritan isolationist views and, 25, 27–28; as quarantine net, 12–15; trials of island keepers, 72–75; used currently in some countries, 325. *See also* Maritime quarantine; specific island stations
- Isolation, definitions of, 306–307
- Italy, prohibition of sanitary supervision of vessels prior to departure, 288–289
- Jackson, James, 143, 145–146, 161
- Jacobson, Henning, 260
- Jay, John, 118
- Jay Treaty (1796), 117–118
- Jefferson, Thomas, 149
- Jenner, Edward, 142, 147, 242
- Klebs, Theodor, 239
- Koch, Robert, 238–239, 261–262
- Laha, Samuel, 119, 121
- Least harm theory, 323–324
- Legg, Samuel, 27–28, 36
- Leprosy, 4, 15, 266, 312, 315^t
- Lice, and typhus fever, 289, 291
- Lincoln, Frederick, Jr., 198, 199, 202, 206
- Lincoln hospital, 107
- Lister, Joseph, 252
- Little, Samuel, 203, 218
- Lloyd, James, 144
- Loathsome diseases. *See* Leprosy; Syphilis; Tuberculosis
- London plague (1665), 22, 35
- Long Island, 43
- Los Angeles, California: pneumonic plague outbreak (1924), 319; radio pratique, 304
- Lowe, Abraham, 171, 175
- Low-income persons: current U.S. percentage of, 10; humanization of quarantine for, 1. *See also* Class-based disease control; Overseers of the Poor
- Lyde, Nathaniel, 121, 122
- Lyman, George W., 154
- Lyman, William, 123–124
- Maguire, Daniel, 303–304
- Malaria, 22, 119
- Malignant fevers, 22, 39–40, 152
- Marburg, 308
- Maritime quarantine: Boston's budget for, 246; effectiveness of, 148; under federal jurisdiction, 4, 132; during French plague outbreak, 49–50; improved vessel fumigation, 251–254; increased sanitary controls, 170; justice of the peace oversight, 39–40; quarantine of vessels from West Indies/South America, 138; radio pratique, 303–304; shift to inoculation, 84; during smallpox epidemic (1872), 218; vessel inspections, 14, 16–17, 31, 38, 56, 60, 62, 77, 87, 114, 115, 117, 118–119, 120, 125. *See also* Island quarantine stations; Miasma theory and maritime commerce/quarantine; Quarantine, five stages of practice; U.S. Public Health Service (USPHS), quarantine under
- Markel, Howard, 256
- Martin, Henry A., 207–215, 224, 235
- Mass quarantine, 317–320
- Massachusetts, Commonwealth of: Board of Health urged vaccination, 217; Bureau of Vital Statistics, 239; disease reporting, 64, 244; laws on tuberculosis, 263–264; repeal of quarantine laws, 165–166, 168–170
- Massachusetts Bay Colony: British takeover of governorship, 88–89; charter, 26, 30, 31, 33, 35, 38, 39, 91. *See also* headings at Boston; Puritanism

- Massachusetts Bay Colony, quarantine in, 22–44; alignment with isolationist policies, 30–33; evasion of plague quarantine, 34–37; founding of British Customs Service, 37–38; functioned as fishing net, 12–13; as public health tool, 39–42; regulations, 14; religious origins, 23, 25–28; Spectacle Island quarantine hospital, 42–44; trade patterns and path of disease, 28–30, 34–38
- Massachusetts Department of Public Health (MADPH), 306, 307
- Massachusetts General Court: An Act to diffuse the benefits of inoculation for the Cow Pox, 146; An Act to secure General Vaccination (1855), 190; award of land for Boston hospital, 122; ban on entrance of smallpox-infected to enter towns, 71; ban on hackney carriages as ambulances, 222; ban on home isolation, 219; community quarantine as social code, 32–33; expansion of powers of public health inspectors, 230–232; as guardians of Puritanism, 31, 32–33; influence of consulting physicians on, 168–169; inoculation legislation, 102–103; Irish immigrant registration requirement, 33, 60; management of epidemics, 24, 30–31, 34, 43, 49–50, 62–63, 82, 103–104, 113–114; maritime quarantine, 8, 27, 28, 32, 39–40, 60; as Provincial Congress during Revolutionary War, 93–95, 98, 99, 101–102; purchase of Rainsford Island, 69; red flag legislation, 65–66, 71; on smallpox as notifiable disease, 164; on tuberculosis as communicable disease, 261
- Massachusetts General Hospital, 119, 161, 191
- Massachusetts Government Act (Great Britain), 87
- Massachusetts Health Department, 233, 234–235, 237
- Massachusetts Medical Association, 116
- Massachusetts Medical Society, 55, 135, 136, 141, 145–146, 161, 173, 199
- Mather, Cotton, 41–42, 47–55
- Matthews, Nathan, 255–256, 268, 278
- McCormack, John W., 302
- Measles, 22, 72, 239, 243, 244, 246, 263, 310–311, 315t
- Measles epidemic (1713), 47
- Membranous croup, 246
- Meningococcal disease, 310, 315t
- MERS, xv
- Miasma theory and maritime commerce/quarantine, 157–178; consulting physicians as brain trust, 160–164; the cult against quarantine, 170–172; mandatory disease reporting, 164–165; medical opposition to quarantine, 165–168; mothballing quarantine, 158–160; port physician as epidemic gatekeeper, 172–178; repeal of quarantine laws, 168–170
- Miasma theory of disease, xiv, 4, 53, 56, 114–118, 151, 195–196, 239
- Mifflin, Thomas, 115
- Mobility, freedom of, 7–8
- Molasses Act (1733) (Great Britain), 66, 67
- Monkeypox, 315t
- Morbidity and Mortality Weekly Report (MMWR)*, 21
- Moriarty, John, 186
- Moriarty, Joseph, 179, 186
- Mosquitoes (*Aedes aegypti*), 123, 125, 155, 249, 292, 296, 299, 301, 314
- Mumps, 243
- Mursey, Thomas, 76

- National Board of Health, 249–250, 252–253
National Library of Medicine, 294
National Quarantine Act (1893) (U.S.), 256–257
National Quarantine and Sanitary Conventions (1857/1861), 193–195
Navigation Act (1651) (Great Britain), 37
Nazis, use of Zyklon B in gas chambers, 4
Negri, Giuseppe, 208
New England Journal of Medicine and Surgery and Collateral Branches of Science, 161
New York City: cholera epidemic (1892), 256; disease-specific quarantines based on incubation periods, 240–241; treatment of cholera at quarantine stations, 195; tuberculosis as communicable disease, 262; use of telegraph in public health, 222
New York (state): laws on smallpox-infected visitors, 71
Newcomb, Charles, 198
Nicolle, Charles, 289
Noddle's Island hospital, 81, 144–145
Non Importation and the Embargo Acts (1807) (U.S.), 149
Nonpharmaceutical interventions, use of term, 1
Novel pathogens, 2, 11, 30, 312, 316, 318, 324–327
Noyes, Oliver, 61
Nursing care: during COVID-19, 321; on island quarantine stations, 72, 203, 274; in isolation hospitals, 247, 287; visiting nurses for tuberculosis cases, 263; volunteer, 185
Nursing homes, deaths due to COVID-19, 8
O'Brien, Hugh, 246
Otis, Harrison G., 164–165, 168
Overseers of the Poor, 60, 65, 67, 146, 165
Page, William H., 219
Pan American Sanitary Code (1924), 17, 295
Pandemic, definition of, 323
Parcher, George, 291–292
Parran, Thomas, Jr., 302–303, 304, 305
Pasteur, Louis, 239
Pasteur Institute, 289
Pathogen exclusion strategies, and quarantine principles, xvi
The Pathogen Pyramid, 5–6, 5f
Payne, William, 42–43
Pediculosis, 243
Penn, William, 129–130
Pennsylvania: disregard for sickly, 71; laws on treatment of vessels, 128; maritime quarantine laws, 126. *See also headings at Philadelphia*
Personal hygiene: handwashing, 5, 252; as individual responsibility, 5; self-actuated quarantine, 5
Personal protective equipment (PPE), 321
Pertussis, 243, 315t
Pest houses, 7, 13, 14, 15, 37, 42, 51, 119
Pestilential fevers, 22, 39–40
Pharmaceutical companies, 322–323
Philadelphia: comparison with Boston quarantine system, 124–130; deaths due to smallpox, 127; deaths due to yellow fever, 118, 121, 131; immigration in, 127–128; ship inspections by physicians, 14; smallpox epidemics, 125
Philadelphia Board of Health, 130
Philadelphia City Council, 129–130
Philadelphia fever. *See headings at Yellow fever*
Philanthropy, for public health initiatives, 21

- Phillips, John, 158
- Physicians: during colonial era, 23; disease reporting by, 244, 263, 306; germ theory acceptance, 238; isolation wards improved, 247; mass inoculations, 79–82; practice of inoculation, 63–65, 108–109; public trust in, 212–214; ship inspections by, 14; treatment on island quarantine stations, 14–15; tuberculosis patient care, 263; vested interests in treatment vs. quarantine, 113, 114–115. *See also* Port physicians
- Pickering, John, 50
- Pierce, Henry, 230, 231–232
- Pine Island smallpox hospital, 229–230
- Plague, use of term, 22
- Pneumonic plague, 308, 311, 315t, 319
- Point Shirley hospital, 79–80, 81–82, 98–99
- Polio, 295, 310–311, 315t
- Political caucus, 50
- Polymerase chain reaction (PCR) testing, 321–322
- Poor House, 89
- Port physicians: appointment of, 135; challenges of, 159; disinfection role, 254; examination of passengers, 189, 217; as gatekeepers, 172–178, 192; inspections made by, 13–14, 197, 203; limited staff of, 236; at Philadelphia ports, 128–129, 135, 138; role with quarantine, 139; as vaccinators, 250
- Poverty level, families in U.S., 10
- Prescription drugs, 162
- Press, freedom of the, 9–10, 82–84
- Price, Ezekiel, 101, 103
- Privy Council: colonial independence from, 31; on colonial quarantine laws, 39, 60–61; delays in decision making by, 30; mercantile policies, 25
- Province Hospital, 91
- Province Island quarantine station, Philadelphia, 125, 126
- Public education, 5–6, 21, 322
- Public Health Emergency of International Concern (PHEIC), 323
- Public health insurance, 324
- Public hygiene and sanitation: advances in, 4–5; contaminated water and tuberculosis, 264; emphasis on, 184, 301–303; housing reforms, 204–206; improvements to, 243, 255; lack of knowledge on, 189; reforms under Smith, 189; substandard housing, 218
- Public policy: dependencies of, 2; as support to quarantine systems, 1
- Public resources: as support to quarantine systems, 1
- Public support: as necessity to quarantine systems, 1
- Public surveillance. *See* Four-Tier Intervention System for Communicable Disease
- Public trust: backlash to mass quarantine, 318, 320; decline of, 317; history of, 4; impact of government top-down approaches on, 6; importance of, 2, 327; in medical profession, 212–214; transparency and, 316, 319–320
- Puritanism, 25–28; caste culture of, 33; decline of, 59, 65; disease as God's displeasure, 27; expulsion of infected, 27–28; impact of Mather, Cotton's experimental faith on, 49; isolationist views, 26, 32–33. *See also* Massachusetts Bay Colony
- Putnam, Israel, 101

- Quakers, 31, 128
- Quarantine, federal solutions to, 248–257; improved vessel fumigation, 251–254; National Board of Health, 249–250, 252–253; purification rituals for human disinfection, 254–257; vaccination and immigration, 250–251. *See also specific federal agencies*
- Quarantine, five stages of practice, 11–21; coordinated surveillance stage, 16–17; expulsion of infected stage, 12–13; inspection and confinement stage, 13–16; international cooperation stage, 17; international disease strike force and self-enabled quarantine stage, 17–21
- Quarantine, for the twenty-first century, 310–328; advanced diagnostics and the internet, 321–322; conflicting agendas and government indecision, 322–323; Diseases with High Case Fatality Rates and Short Incubation Periods, 312, 315–316, 315f; Four-Tier Intervention System for Communicable Disease, 311–313, 313t, 327–328; future trends, 327–328; measurement of by least harm theory, 323–324; political legitimacy of, 317–321; Quarantine Intervention Assessment Tool, 314f; quarantine theory revisited, 311–316; as tool for emerging pathogens, 324–327; transparency, trust, and triage, 316
- Quarantine, introduction: culturally sensitive isolation, 7–8; definitions of, 306–308; disease transmission and, xiv–xvi; evidence-based, 6; freedom of the press and, 9–10; germs and public hygiene, 3–6; historical legacy of, xiii–xvii, 2–3, 6, 7, 8; immigration policies and, xv; key supportive elements of, 1; large-scale response to epidemics, 3; as noncoercive confinement, 6–7; pathogen exclusion strategies and, xvi; The Pathogen Pyramid, 5–6, 5f; race-based surveillance and reporting, 8–9; Read, William on evidence-based premise of, 195–196; as ultimate weapon, 2–3. *See also Germ theory and quarantine; U.S. Marine-Hospital Service (USMHS)*
- Quarantine Intervention Assessment Tool, 314f
- Quarantine scofflaws, 148–150
- Quartering Act (Great Britain), 87
- Quincy, Josiah, 158, 161, 163–164
- Rabies antidote, 239
- Race-based surveillance, 8–9. *See also Class-based disease control*
- Rainsford Island, 15, 201t; forcible removal to, 159–161, 166; hospital facilities, 71–76, 76, 79, 84, 87–88, 91, 99, 110, 118–119, 120–121, 148, 150, 159; immigrant slave labor, 137; improved disinfection procedures, 170; port physician inspections, 135; purchase of, 69; quarantine station, 69–70; typhus epidemic and quarantine of steamship passengers, 289, 290; vessel inspection and quarantine, 60, 152, 153–154; visitor permits, 160
- Rand, Isaac, 72, 108, 116, 139, 144
- Rand, Isaac, Jr., 118–119
- Randolph, Edward, 38
- Rat eradication, 292
- Rat flea vector, 4, 291–293, 314
- Rayner, Isador, 256
- Read, William, 195–196, 217–218, 219
- Red flags, on infected households, 65–66, 71, 79, 106, 223, 231

- Religion: nondenominational Christian day of prayer regarding yellow fever, 120. *See also* Puritanism; Quakers
- Remittent fevers, 114, 115, 119
- Revere, Paul, 122, 135–140, 150, 252
- Reverse transcriptase-polymerase chain reaction (RT-PCR) testing, 321–322
- Revolutionary War and smallpox, 86–111; Boston Tea Party, 87–91; Boston's two-month quarantine, 104–107; civic responses during, 98–100; effects of smallpox on outcome of war, 110–111; germ warfare, 91–98; legislative intervention, 103–104; liberation and disinfection of Boston, 100–103; smoke houses and disinfection, 99, 105, 106, 109–110. *See also* Continental Army; Royal British Army
- Ring quarantine strategy, 19, 93
- Robinson, John, 72
- Roosevelt, Theodore, 268
- Roxbury Almshouse and Hospital No. 1, 233, 234t
- Royal British Army: Boston Harbor blockade and embargo, 88–89, 92–93; Bunker Hill casualties, 95; living conditions of, 89–90; release of poor Bostonians as germ warfare, 91–98; smallpox threat to, 90–92, 95; use of floating hospitals, 90–91; violations of colonial public health laws, 90. *See also* Revolutionary War and smallpox
- Rubella, 315t
- Rush, Benjamin, 115–116, 132–133
- Saffron scourge. *See headings at Yellow fever*
- San Francisco, California: bubonic plague in, 291, 319; radio pratique, 304
- Sanitary Aerial Navigation Treaty (1933), 17
- Sanitary cordons, 70–71
- Sanitation systems. *See* Public hygiene and sanitation
- SARS, 308, 311, 315t, 326
- SARS epidemic (2003), xv, 3, 20, 316
- Sassone, Charles, 305
- Scarlet fever, 22, 243, 244, 246, 258, 263, 315t
- School system inspections, 9, 242–243
- Schuylkill River, 128
- Scollay, John, 87, 93
- Second Pan American Conference of Directors of Health (1932), 299
- Selectmen, of Boston: appointment of health officers, 119; failures of, 56, 61–62; as guards of Harbor access, 40, 104; issuance of certificates of health, 98, 104; as outside purview of Privy Council, 126; public health role of, 37, 39, 40, 41, 46–47, 65–66, 70, 71, 90, 108–109, 114, 117, 122, 127, 129; quarantine orders, 125; use of watchmen during quarantine, 25, 26, 40, 41, 46–47, 64, 70–71, 120–121; vessel inspection and regulation, 77
- Self-directed behavior, 327
- Self-infection, of smallpox. *See* Inoculation controversy (1721)
- Self-tethering. *See* Four-Tier Intervention System for Communicable Disease
- Semmelweiss, Ignaz, 252
- Sequestration: as associated with inoculation, 57–58, 62–65; as public health tool, 62–65; quarantine distinguished from, 57–58; use of term, 57

- Sequestration, large-scale, 78–85, 107, 125; control of the press, 82–84; inoculation as an accepted public good, 84–85; inoculation hospitals, 79–82
- Sewall, Samuel, 52
- Sewall's Point inoculation hospital, 108–109
- Shattuck, George C., 160–161
- Shattuck, Lemuel, 189
- Shibasaburo, Kitasato, 239
- Shirley, William, 76
- Siracusa principles (UN), 7–8
- Slave trade, 33
- Smallpox, 22; case fatality rate and incubation period, 315t; deaths due to, 127, 188, 217, 218–219, 222, 223, 225, 225t, 226, 227–228f, 233, 238; disease reporting, 244; disfigurement due to, 24, 45; early expulsion of victims, 12; eradication of due to vaccination, 310; history of treatment, 7, 10; inoculation against, 25; permanent disability due to, 45–46; as quarantinable disease, 4; self-infection, 46; spread of, 7; study on herd immunity, 127; throughout New England, 56; transmissible via clothing/cloth, 37, 41; WHO elimination of, 19. *See also* Inoculation controversy (1721); Revolutionary War and smallpox; Vaccinations, of cowpox; Warning out, and branding outcasts; specific Boston epidemics; specific epidemics
- Smith, James, 147
- Smith, Jerome Van Crowninshield, 163, 166, 173, 185, 189
- Smith, William, 124
- Smoke houses and disinfection, 99, 105, 106, 109–110, 113–114
- Snow, John, 194, 196
- Social contact, survival rates improved by, 8
- Social distancing. *See* Distancing strategies
- Southampton Street smallpox hospital, 258–259, 260–261
- Spanish flu epidemic (1918), 20, 285–288
- Spears, Henry, 150
- Spears, Thomas, 137–138
- Spectacle Island quarantine station, 42–44, 51, 52, 60, 62, 68–70, 201t
- Squantum Neck, 42
- S.S. *Cretic* incident, 288–289
- Stagecoach service, 44, 80, 120
- Stamp Act (1764) (Great Britain), 86–87
- State legislature. *See* Massachusetts General Court
- Sternberg, George M., 242
- Stokes Law, 18–19
- Suffolk District Medical Society, 195
- Sullivan, John A., 270
- Sunstein, Cass, 3
- Sweeney, Alvin, 294
- Swett Street smallpox hospital, 230, 232, 234t, 255. *See also* Southampton Street smallpox hospital
- Swine flu, 308
- Syphilis, 15, 208, 235, 315t
- Technological advances in diagnostics, 321–322
- Telegraphy, use in public health initiatives, 222, 224, 294, 295f
- Telemedicine, 327
- Telepathogenesis, 18–19, 21
- Ten Brothers* tragedy, 152–155
- Thaxter, Samuel, 42–43
- Thorndike, Israel, Jr., 154
- Throat distemper epidemic (1735–1740), 22, 68–70
- Ticks, 314

- Tilton, James, 113–114
- Trade patterns: British navigation laws and taxes, 37–38, 86–87; commercial passenger transatlantic travel, 176, 213; decline due to epidemics, 65, 83; expansion via stagecoach service, 44; foreign competition and interference, 66–67; impact of state quarantine laws on, 123; interstate quarantines, 117–118; path of disease and, 28–30, 34–38; post-independence American, 112–113, 117–118; quarantine of southern ports and, 253–254; rise of mercantilism and laissez faire capitalism, 59, 65. *See also* American shipping industry
- Transparency, in government decision making, 2, 316, 319–320, 327
- Triage principles, 2, 316, 327
- Tubercle bacillus, 238–239, 261–262
- Tuberculosis: airborne transmission of, 261; case fatality rate and incubation period, 315t; deaths due to, 244, 261, 262, 264–265; early mismanagement of, xiv; enforced quarantine, 264; forcible removal to isolation hospitals, 264; incubation period for, 299; as loathsome disease, 15; as notifiable disease, 263; prohibition on spitting in public as preventative, 4; seen as dangerous disease, 261–265; unsupervised self-quarantine, 1
- Typhoid, xv, 5, 22, 119, 244, 246, 315t
- Typhoid bacillus, 238
- Typhus fever: deaths due to, 180; diagnosis of, 22, 119; as notifiable disease, 244; as quarantinable disease, 4; quarantines against, 188–189; on ships from Europe, 284; on ships from Ireland, 179–180; strikes Boston Harbor, 288–291; transmission of, 171
- Unified Incident Command Center, Rapid Response Team, xiv
- United Nations Economic and Social Council: Siracusa principles, 7–8
- Uppercu, Inglis, 297
- U.S. Army: vaccination during War of 1812, 147
- U.S. Coast Guard: on Gallop's Island quarantine station, 305
- U.S. Commerce Department: Aeronautics Branch, 298
- U.S. Congress: jurisdiction over international commerce, 132; national quarantine program (1799), 131–133; nonpassage of first national quarantine law, 123–124
- U.S. Immigration and Naturalization Service (INS): disease reporting requirements, 304
- U.S. Marine-Hospital Service (USMHS): enforcement authority, xvii; expansion of quarantine authorities under, 16; federal surgeons stationed in overseas ports, 248–249; maritime quarantine programs, 15; medical officers of, 136; quarantine authority, 252–253, 256–257; vessel sanitation, 251
- U.S. Post Office: mishaps in delivery of vaccines, 147; use of airplanes, 297–298
- U.S. Public Health Service (USPHS): CDC as successor to, 308–309; classification of communicable and loathsome diseases, 15–16; early history of, 4; international cooperation stage, 17; port operations under, 271, 275; sale of Gallop's island to, 271

- U.S. Public Health Service (USPHS), quarantine under, 283–309; Committee on Standard Regulation report (APHA), 306, 310; communication codes and secrecy, 293–294; dismantling Gallop's Island, 304–305; expanded reporting, 306; experimentation on Navy volunteers, 285–286, 287; Grubbs, Samuel B. and Gallop's Island, 284–285; International Sanitary Convention for Aviation, 299–301; merger of immigration and quarantine services, 294–296; mosquitoes and age of aviation, 296–299; narrowed conception of quarantine, 306–309; radio pratique, 303–304; sanitation trumps quarantine, 301–303; Spanish flu, 287–288; studies on rats in plague transmission, 291–293; typhus strikes Boston Harbor, 288–291
- U.S. Supreme Court: on federal immigration policy, 15; on mandatory vaccination, 260
- U.S. Treasury Department, 4, 17, 271, 292, 296. *See also* U.S. Marine-Hospital Service (USMHS)
- Vaccination Acts (1840/1853) (Great Britain), 215
- Vaccinations, of cowpox, 141–150; during 1872 epidemic, 235–237; administered at no cost, 109, 145, 146, 147, 165, 211; for arriving immigrants, 250–251; battle of medical experts on, 209–210; credibility of physicians, 212–214; efficacy of, 210–212, 215, 260; evasion of quarantine, 148–150; evolution of, 207–216; experimentation on children, 144–148; mandatory and forcible (1901), 259–261; myth of lifetime immunity, 15, 24, 146, 187, 208, 213; rate of in Boston, 165, 187, 211, 215, 235; as requirement for school admission, 187, 190; revaccination, 187, 190, 209–210, 214–216, 235; Waterhouse, Benjamin's contribution to, 142–144
- Vaccines: anthrax, 242; for emerging diseases, 21; supplies during pandemics, 324
- Vector distancing strategies, 314
- Ventilation systems: disease transmission and, 18–19
- Vigilant (transport vessel), 269–271, 276, 285–286
- Vigilante justice incidents, 99–100, 229–230
- Virginia: inoculation controversy, 81
- Wallace, Alonzo, 240
- War of 1812, 149, 151
- War Shipping Administration, 305
- Ward, Artemas, 102–103
- Ward, John F., 147
- Warding off. *See* Warning out, and branding outcasts
- Warner, H. J., 302
- Warning out, and branding outcasts, 59–77; challenges for island keepers, 72–75; early history of, 71; hospital isolation for exposed, 75–77; red flag legislation, 65–66, 71; sequestration as public health tool, 62–65; throat distemper and hospital construction, 68–70; warning out smallpox victims, 70–72; xenophobic public health policies, 66–68
- Warren, John, 108–109, 116, 139, 141–142, 144, 145–146, 161, 188
- Warren, John C., 109, 145–146, 160–161, 162, 167–168

Warren, Joseph, 89, 108
 Washington, George, 122; crisis management skills of, 110–111; defended against germ warfare, 94–98, 100; liberation and disinfection of Boston, 101–103; troop smallpox preparedness, 93, 99, 105, 107–108. *See also* Continental Army
Watchmen. See Selectmen, of Boston
 Waterhouse, Benjamin, 142–144, 145, 146, 147, 207, 324
 Waters, Josiah, 119, 120–121, 122
 Waters, William, 69–70, 72–76
 Webb, Melville E., 215, 223, 228, 234t, 235–236
 Webster, Noah, 116
 Weeks, Francis, 144
 Welsh, Thomas, 136–138, 144
 West Boston hospital, 108, 109
 West Indies yellow fever epidemic (1647), 22
 White, James C., 204
 Whooping cough. *See* Pertussis
 William Smith & Co., 229–230
 Williams, John, 124
 Winthrop, Adam, 42–43
 Winthrop, John, 23, 26, 27, 29–32, 35
 Woolhouse, Mark, 2, 5
 World Health Organization (WHO), 19, 20, 301, 323, 325
 Wou'dbe, Betty, 73
 Wu-Wei concept. *See* Four-Tier Intervention System for Communicable Disease
 Xenophobia. *See* Class-based disease control

Yellow fever, 22; bans on air passengers with, 301; in Boston, 60; in Caribbean islands, 16; deaths due to, 118, 121, 131, 134, 135, 152–153, 249; debates over origins of yellow fever, 241; as miasmatic disease, 56; as noncontagious, 170–171, 172; as quarantinable disease, 4; in southern ports, 254; symptoms of, 114; vessel inspections, 188
Yellow fever (1793) and Boards of Health, 112–133; comparison of Philadelphia and Boston quarantine systems, 124–130; deaths due to, 118, 121; debates over origins of yellow fever, 115–118; federal intrusion into public health, 123–124; geographical factors, 128–129; immigration in Philadelphia, 127–128; panic principles, 118–123; smallpox epidemic (1792) and, 113–115; styles of participatory democracy, 129–130; threat to seat of government, 130–133
Yellow fever (1819) and quarantine, 151–156; deaths due to, 152–153; public health and the press, 155–156; *Ten Brothers* tragedy, 152–155
 Yersin, Alexandre, 239
 Zoonotic diseases, 292; increase of, xvi; as pathogenic for humans, 2; threat of, 325–326
 Zyklon B, 4, 292

About the Author

Charles Vidich is a consultant and adviser on public health and bioterrorism issues and was appointed as a visiting scientist at the Harvard School of Public Health, working for ten years on national quarantine policy. He has numerous publications on occupational and environmental health and served as incident commander for the U.S. Postal Service's national anthrax response in 2001–2002. He holds SM and MCP degrees from Harvard and has received numerous White House, EPA, and Postal Service awards for his environmental and anthrax response work. He serves on the Connecticut Council on Environmental Quality, appointed by the Speaker of the House.

