

CHAPTER 3

Overview of the Three Plague Pandemics

541 to ca. 1950

Bubonic plague is the inescapable reference point in any discussion of infectious diseases and their impact on society. In many respects plague represented the worst imaginable catastrophe, thereby setting the standard by which other epidemics would be judged. In later centuries, when societies experienced new and unfamiliar outbreaks of disease, they waited anxiously to see whether they would equal plague in their devastation. Particularly feared diseases, such as cholera in the nineteenth century and both the Spanish influenza and AIDS in the twentieth, were said by some to be “the return of the plague.” Similarly, tuberculosis, the leading killer of the nineteenth century, was widely referred to as “the white plague.” Indeed, the term “plague” has become a metonym for societal calamities in general, even when the crisis is not infectious, as in such phrases as “a plague of accidents” or a “plague of bank robberies.”

What features of bubonic plague, and of the responses of communities to it, marked it as so distinctive and so fearful? The most striking aspect of plague is its extraordinary virulence. “Virulence” is the capacity of a disease to cause harm and pathological symptoms. It is the measure of the ability of a pathogen to overcome the defenses of the human body to induce sickness, suffering, and death. Plague in that sense is extremely virulent. It strikes rapidly, causes excruciating and degrading symptoms, and, if untreated, invariably achieves a high case fatality rate (CFR), which simply

means the kill rate of a pathogen—the ratio of deaths to illnesses. In the era before the discovery of antibiotics, plague normally killed more than half of the people it infected, for a CFR of at least 50 percent—a rate attained by few other diseases. Furthermore, its progress through the body was terrifyingly swift. As a rule, plague killed within days of the onset of symptoms, and sometimes more quickly.

Other fearful characteristics of this disease were the age and class profiles of its victims. Familiar endemic diseases primarily strike children and the elderly. This is the normal experience of a community with infectious diseases such as mumps, measles, smallpox, and polio. But the plague was different: it preferentially targeted men and women in the prime of life. This aspect made plague seem like an unnatural or supernatural event. It also magnified the economic, demographic, and social dislocations that it unleashed. In other words, plague left in its wake vast numbers of orphans, widows, and destitute families. Furthermore, unlike most epidemic diseases, the plague did not show a predilection for the poor. It attacked universally, again conveying a sense that its arrival marked the final day of reckoning—the day of divine wrath and judgment.

Another distinguishing feature of plague is the terror it generated. Communities afflicted with plague responded with mass hysteria, violence, and religious revivals as people sought to assuage an angry god. They also looked anxiously within their midst to find the guilty parties responsible for so terrible a disaster. For people who regarded the disease as divine retribution, those responsible were sinners. Plague thus repeatedly gave rise to scapegoating and witch-hunting. Alternatively, for those inclined to the demonic interpretation of disease, those responsible were the agents of a homicidal human conspiracy. Frequently, vigilantes hunted down foreigners and Jews and sought out witches and poisoners.

This chapter presents an introductory overview of plague as a disease, including the public health policies deployed against it, the general impact of plague, and the three major plague pandemics that span some fifteen hundred years of history (fig. 3.1).

Plague and Public Health

Plague was also significant because it gave rise to a critically important societal response: the development of public health. Bubonic plague inspired the first and most draconian form of public health policy designed to protect populations and contain the spread of a terrible disease, that is, various

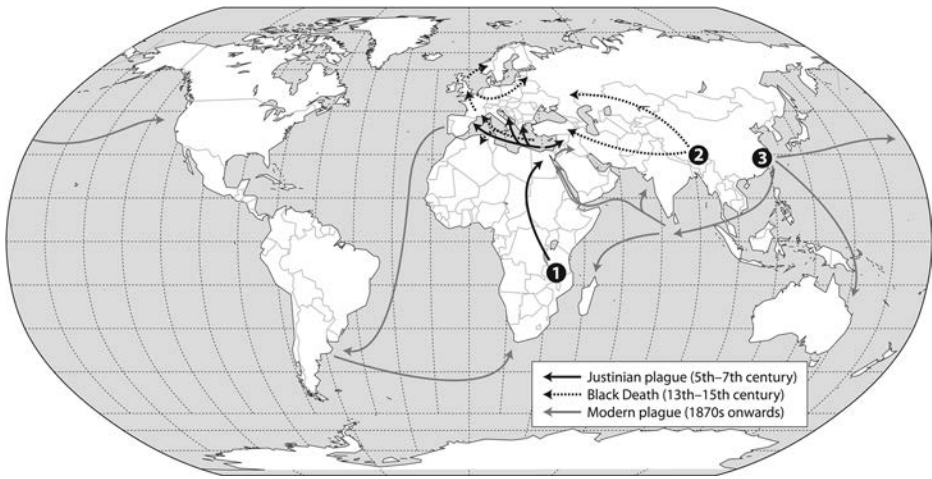


Figure 3.1. The three pandemics of bubonic plague. (Drawing by Bill Nelson.)

forms of enforced isolation of the sick (we omit Hansen's disease and the relegation of its victims to leper colonies on the grounds that leprosaria were noncurative institutions and did not contribute to the development of public health strategies). Antiplague measures of public health involved reliance on the military for their implementation. They mandated, first of all, sanitary cordons—military lines intended to isolate a population by preventing all movements of people and goods. In addition, defenses against the plague included pesthouses, known as lazarettos, and quarantine; health authorities variously known as health magistrates or boards of health were equipped with emergency powers to enforce the regulations. In some places stocks and scaffolds were erected to remind the population of the powers of these agencies.

Renaissance Italian city-states played a special role as the pioneers of these antiplague responses. This responsibility was thrust upon them by their vulnerable positions at the center of trade routes in the Mediterranean, where they received passengers and goods—and stowaway rats—from the Middle East and North Africa. Florence and the port cities of Venice, Genoa, and Naples were pioneers in the development of these policies, which were widely imitated.

In later centuries, another pattern emerged. When new and deadly diseases struck, such as cholera, yellow fever, and AIDS, one of the first responses of health authorities was to attempt to reactivate antiplague measures. It is said of military generals that they tend to fight the last war

over again, thereby confronting new enemies with inappropriate strategies from the past. Much the same can be said of public health authorities over the centuries. This temptation is all the greater because the instruments of antiplague defense give the impression of a forceful and energetic response, thereby providing the population with some sense of protection.

The Impact of Plague

A leading feature of the plague as a disease is its enormous social impact. Certainly bubonic plague makes a strong case for not regarding infectious diseases as a narrow and specialized interest. Plague was part of the “big picture,” as essential for understanding history during the periods in which it afflicted society as the study of war, religion, economics, and high culture. The point is not, of course, to make a case for disease determinism, or what one might call “microbial Marxism.” The argument is more simply that certain diseases do have a transformative effect on society, and plague is one of them. Most other diseases, even massive killers such as influenza or polio, have not had a similar influence. A major task of our exploration of plague is to examine why such major differences exist in the realm of infectious diseases—why some leave a major cultural, political, and social imprint, and others do not.

Bubonic plague is one of the best examples of a disease that affects every aspect of society. It transformed the demography of early modern Europe. Its recurring cycles, with an epidemic every generation, constituted a major brake on population growth between the fourteenth and eighteenth centuries. It had devastating effects as well on economic life and development. And it substantially influenced religion and popular culture, giving rise to a new piety, to cults of plague saints, and to passion plays. Bubonic plague also deeply affected the relationship of people to their mortality, and indeed to God.

The plague in Europe led to an outpouring of sermons and religious pamphlets in which a central theme was theodicy—that is, the vindication of an omnipotent God’s goodness in the face of evil and suffering. It was relatively easy to accept that God could be angry and would punish those who turned away from him and disobeyed his commandments. But how could one explain the gruesome suffering and mass death of innocents, especially children? It is true that plague led to an upsurge of piety, but it also generated a powerful undertow pulling in the opposite direction. For some, the experience of bubonic plague led to the terrifying conclusion that there might

be no God. A loving and all-powerful being would not take the lives of half the population of a great city, indiscriminately slaying men, women, and children. The result was not so much atheism as a mute despair that was most often barely articulated—a psychological shock that, with historical hindsight and anachronism, one might call posttraumatic stress.

Plague also had major effects on the arts and culture. In literature, an entire genre of plague literature arose, including works by Giovanni Boccaccio, Daniel Defoe, Alessandro Manzoni, and Albert Camus. It also transformed the iconography of European painting and sculpture, and it deeply affected architecture, with the construction of major cathedrals and churches dedicated to the redeemer, the Virgin Mary, and the plague saints Sebastian and Roch. Plague columns, often built to celebrate the ending of plague in a city, appeared in Vienna and throughout central Europe to remind the population of God's mercy.

As late as the mid-twentieth century, the disease inspired Ingmar Bergman's 1957 film *The Seventh Seal*. At the height of the Cold War, Bergman was deeply concerned about the possibility of nuclear war. As a way of imagining the apocalypse, bubonic plague presented itself naturally as the ultimate experience of human calamity and therefore as a metaphor for atomic catastrophe.

Similarly inspired by the experience of plague in the seventeenth century, the city of Oberammergau in Bavaria initiated a German tradition of passion plays. The survivors of an epidemic there in 1630 took a vow: if the people were spared, the city council promised to perform a passion play involving the whole population of the town and to continue to do so at regular intervals in perpetuity. This vow gave rise to an ongoing, and controversial, series of plays that enacted the passion of Christ and sometimes incited viewers to anti-Semitic violence.

Plague also had a major intellectual impact on the medical paradigm of disease by profoundly testing the humoral explanatory framework. The doctrines of Hippocrates and Galen had difficulty in satisfactorily explaining the passage of bubonic plague. How was it possible that vast numbers of people experienced the same humoral imbalance at almost precisely the same time? Hippocrates and his followers invoked the possibility of what might be called, in present-day parlance, environmental insults. The orthodox explanation was that the atmosphere in a given locality had been "corrupted," creating an "epidemic constitution." Its cause was a deadly fermentation arising from decaying organic matter either in the soil or in nearby marshes and swamps. This poisonous effusion contaminated the air

and sickened large numbers of susceptible people when they inhaled the poison or absorbed it through their pores.

A medieval variant of this view was propounded by astrologers, who suggested that the trigger to plague and other epidemic diseases was a dangerous alignment of the stars and planets. Disorder in the cosmos was then reflected in disorder in the microcosm of the body. Even those who did not regard the appearance of a comet or the conjunction of planets as the direct causes of an epidemic often believed that such celestial events could serve as portents. Similarly, unusual climatic events—earthquakes, floods, and fires—could presage a crisis in public health.

Girolamo Fracastoro, a sixteenth-century Italian physician, confronted the problem of explaining epidemics in a fundamentally different manner. He eliminated the mediation of the humors altogether, suggesting instead that epidemic disease was caused by a poisonous chemical transmitted—in ways that he did not understand—from one person to another. In the seventeenth century the German Jesuit Athanasius Kircher developed the idea further, suggesting that the plague was spread by what he called “animalcules” that somehow passed from an infected person to a healthy one. Fracastoro and Kircher were thus pioneers in developing the concept of contagion.

The idea of contagion appealed at first far more to the popular imagination than it did to the mind of elite, university-trained physicians who could find the suggestion nowhere in the classic texts. Only in the late nineteenth century did microbiology validate the heretical etiology of Fracastoro and Kircher through the work of Louis Pasteur (1822–1895) and Robert Koch (1843–1910), as discussed in Chapter 12.

A History of Three Plague Pandemics

It is important to distinguish among three closely related terms. Infectious diseases are normally placed along a continuum according to their severity in terms of the numbers of sufferers and the extent of their geographical reach. An “outbreak” is a local spike in infection, but with a limited number of sufferers. An “epidemic,” by contrast, normally describes a contagious disease that affects a substantial area and a large number of victims. Finally, a “pandemic” is a transnational epidemic that affects entire continents and kills massive numbers of people. All three terms, however, are loose approximations, and the boundaries separating one from another are imprecise and sometimes subjective. Indeed, a contagious disease confined to a single

locality is occasionally termed a pandemic if it is sufficiently virulent to afflict nearly everyone in the area.

In accordance with this terminology, humanity has experienced three pandemics of bubonic plague. Each consisted of a cycle of recurring epidemic waves or visitations, and the cycle lasted for generations or even centuries. So recurrent were these outbreaks of plague that they provided writers with a logical and convincing device to drive the plot of a story forward. A notable example is Shakespeare's tragedy *Romeo and Juliet*, which unfolds against the background of an outbreak of plague in the Italian city of Verona. The tale reaches its tragic denouement as a result of the disease, which interrupts communication between Verona and Mantua. When Friar John attempts to deliver Juliet's crucial letter to Romeo, who is exiled in Mantua, he is forcibly detained: "The searchers of the town, suspecting that we . . . were in a house where the infectious pestilence did reign, sealed up the doors and would not let us forth. So that my speed to Mantua there was stayed. . . . So fearful were they of infection" (Act 5, scene 2, lines 8–12, 17). Bubonic plague thus furnished an entirely plausible artifice for structuring the tale of the star-crossed lovers and their double suicide. As Shakespeare's audience well knew, plague in early modern Europe was an ever-present danger that could strike at any time and without warning.

The cyclical pattern of plague was marked also by a pronounced seasonality. Plague epidemics usually began in the spring or summer months and faded away with the coming of colder weather. Especially favorable were unusually warm springs followed by wet, hot summers. The modern explanations for these propensities are the need of fleas, which carried the disease, for warmth and humidity to enable their eggs to mature, and the inactivity of fleas in cold and dry conditions. Although this pattern predominated, the disease has also been known to erupt mysteriously in Moscow, Iceland, and Scandinavia in the depth of winter. These atypical eruptions of the disease posed serious epidemiological puzzles.

The First Pandemic, or the Plague of Justinian

The first appearance of bubonic plague in world history was the so-called Plague of Justinian, or Justinianic Plague, named after the Byzantine emperor Justinian I, under whose reign it first appeared. Some people held his alleged misdeeds, according to the historian Procopius, to be responsible for incurring divine wrath. The pandemic is thought by present-day geneticists, however, to have originated as a zoonosis, or epidemic disease that can be

transmitted from animals to humans, in an endemic African “focus” (or local area of infection). In 541 CE it first erupted as a human affliction at Pelusium in the Nile Delta. Thereafter it lasted through eighteen successive waves over a period of two hundred years until 755, when it disappeared as suddenly and mysteriously as it had arrived.

This round of pestilence afflicted Asia, Africa, and Europe, and it left a dreadful but unquantifiable mortality in its wake. Few direct accounts of this disaster have survived, but the extant reports of such eyewitnesses as Gregory of Tours, John of Ephesus, Bede, and Procopius agree on the magnitude of the calamity. In Procopius’s words, this was “a pestilence by which the whole human race was near to being annihilated.”¹ Recent impressionistic assessments suggest a total fatality of 20–50 million.

This extensive mortality and the descriptions of the classic symptoms of bubonic plague—the hard bubo in the armpit, groin, or neck—are clear diagnostic indicators of the identity of the disease. In recent years, moreover, paleopathologists have been at work exhuming bodies from the cemeteries of late antiquity, extracting DNA from their dental pulp, and confirming the presence of the bacterium *Yersinia pestis*, which causes the disease. Scientists working in Bavaria in 2005, for example, identified the plague bacillus in skeletal remains from a sixth-century cemetery at Aschheim, strongly suggesting that the traditional diagnosis of bubonic plague is accurate (fig. 3.2)



Figure 3.2. Scanning electron micrograph of a mass of *Yersinia pestis* bacteria, which cause bubonic plague, in the foregut of the flea vector. (Rocky Mountain Laboratories, NIAID, NIH.)

The Second Pandemic, or the Black Death

The second plague pandemic began in Central Asia in the 1330s, reached the West in 1347, and persisted for five hundred years until it disappeared in the 1830s. Its first wave in Europe, from 1347 until 1353, is often called the Black Death today, although this restricted terminology began only in the eighteenth century. Various fourteenth-century accounts instead refer to the disaster as the “great pestilence,” the “plague of Florence,” “the mortality,” and the “plague.” Partly for this reason, and partly because of the dark buboes and gangrene that are plague symptoms, many scholars still employ the original and more extensive meaning of Black Death—as a synonym for the whole of the second pandemic.

This pandemic is conventionally thought to have arrived aboard Genoese galleys that sailed from the Black Sea in the summer of 1347 and docked at Messina in Sicily. It then spread rapidly to the rest of the island, onward to Sardinia and Corsica, and then in a more leisurely manner to mainland Italy. There its work was assisted by ships bearing plague that docked at Genoa. Mainland Italy and the whole of mainland Europe were engulfed in the general epidemic carnage. That Italian cities were the first in Europe to be ravaged by plague was no coincidence: their early devastation reflected the geographical vulnerability of Italy’s position at the center of Mediterranean trade.

At the time the Black Death arrived, Europe was in the throes of a lengthy period of social and economic hardship that favored the advance of the disease. The thirteenth century had been a period of economic expansion, demographic growth that doubled the numbers of Europeans between 1100 and 1300, and urbanization. Substantial towns with populations in excess of fifteen thousand inhabitants multiplied, and within them crowding and unsanitary housing became significant urban problems. Then, after about 1270, an economic recession set in as output stagnated, producing lower wages and contributing to poverty. Agricultural production fell sharply, leading to a classically Malthusian crisis—that is, population growth exceeded output, leading to famine.

Unprecedentedly sustained bad weather then fatally undermined a system that was already beginning to stall. Driven by persistent torrential rain occurring at critical times over successive years, and worsened by unseasonably cool temperatures that shortened the growing season, the production crisis culminated in a series of catastrophic crop failures. Widespread flooding, windstorms, and brutal winters compounded the impact, with “seedbeds sodden, crops and pastures under water, grain rotting, fish traps

wrecked, dikes washed away, meadows too wet to be mown, turf too soggy to be cut, and quarries too swollen with the overflow to be worked for stone or lime.”² Contemporaries feared the need for another Noah and his ark.

Rivaling the Egyptian famine predicted by Joseph in the book of Genesis, but without the Pharaoh’s storage facilities or modern distribution networks, the late medieval “Great Famine” lasted—with ever-escalating impact—from 1315 to 1322. Causing the death of millions, it afflicted the whole continent north of the Alps, and it was followed by additional years of severe shortage and high prices between 1345 and 1348. Furthermore, in 1319 and 1320 a devastating disease thought to be rinderpest decimated cattle across northern Europe, seriously reducing access by most of the population to meat and milk and crippling production by destroying draft animals and their manure. This “Great Bovine Pestilence” therefore combined with recurring crop failures to undermine human nutrition, growth, and development.

The starkly unequal power relationships of late medieval society deepened the economic depression and enormously exacerbated poverty. Writing with specific reference to Sweden but in terms that applied to the whole of western Europe, paleoecologist Per Lagerås makes this point forcefully:

The impoverishment of the population was also due to the inequality of medieval society. Even under normal conditions, heavy burdens of taxes, rents, tithes, and labour duties left little surplus for ordinary people. The number-one priority for the upper classes and the central power was to keep up their luxury consumption and life style while little resources were invested back into the agricultural system. When they experienced declining incomes due to poor yields their immediate reaction was to compensate by further raising taxes and rents. This counterproductive reaction is partly to blame for the stagnating economy and the non-sustainable agriculture. For the above-mentioned reasons people were on the edge of starvation.³

The results seriously compromised resistance to disease among people who were born after 1315. They suffered malnourishment in their developmental years and had become immunocompromised adults by the time plague-carrying Genoese ships docked at Messina.

During its relentless progress from Sicily across the whole of Europe, the Black Death outstripped even the Great Famine in its impact. During its first wave, between 1347 and 1353, it is estimated to have killed as much as

half the population of the continent, creating what Lagerås calls “the worst disaster that has ever hit Europe.”²⁴ One of the most famous local tragedies was the epidemic that decimated Florence in 1348 and is vividly portrayed by Boccaccio’s *Decameron*. Other famous epidemics include Milan in 1630, which resulted in two major works of plague literature by Alessandro Manzoni—*The Column of Infamy* and *The Betrothed*; Naples in 1656; and the “Great Plague” of London during 1665–1666, which is the subject of Daniel Defoe’s influential account *A Journal of the Plague Year*.

Then, for reasons that are much debated and that we discuss in Chapter 4, bubonic plague receded from western Europe between the end of the seventeenth century and the middle of the eighteenth. The last epidemics to strike Scotland occurred in 1640, England in 1665–1666, the Netherlands in 1710, France in 1720–1722, and Italy in 1743. Interestingly, outbreaks at Messina form convenient bookends for the second pandemic: it was the first place in the West to suffer in 1347, and the last in 1743.

Although, understandably, the demographic disaster so graphically described by contemporary writers and historians at the outset of the second pandemic has captured the imagination, it is clarifying to recognize that the virulence of the plague did not decline over the centuries. Some of the final epidemics of the second pandemic were among the most devastating and dramatic, such as the great disasters in London (1665–1666) and Marseille (1720–1722). What had changed was that these final attacks were localized events that failed to achieve the continental reach of the first invasions.

The Third Pandemic, or Modern Plague

The third and final pandemic of bubonic plague originated, like the second, from a Central Asian focus, erupting in the wake of social unrest and warfare in China in 1855. It attracted global attention when it attacked Canton and then Hong Kong in 1894 and later moved on to cities that were nodal centers in international trade such as Buenos Aires, Honolulu, Sydney, Cape Town, Naples, Oporto, and San Francisco. Unlike its predecessors, which devastated nearly every place they touched, the third pandemic was radically uneven in its impact as it followed instead the international fault lines of inequality, poverty, and neglect.

Bubonic plague during the third pandemic overwhelmingly scourged Third World countries while largely sparing the industrial nations of Europe and North America. Above all, this third round of plague ravaged India, where it caused as many as 13 to 15 million deaths between 1898 and 1910.

Before finally receding, it ultimately killed approximately 20 million people, according to conservative estimates, and touched five continents, though largely sparing the industrial West. Furthermore, in India and China plague was not a universal affliction as it had been during the second pandemic. In India, it had a predilection for the infamous tenements (*chawls*) of Bombay (now Mumbai) and the hovels (*bastis*) of Calcutta while barely affecting Europeans or the wealthy.

Europe experienced brief flare-ups in 1899 at Naples, Oporto, and Glasgow but lost a total of seven thousand people to plague for the entire half-century after 1899. Central and South America suffered thirty thousand plague deaths during the third pandemic. The United States recorded a mortality of approximately five hundred victims in minor outbreaks at San Francisco, New Orleans, and Los Angeles.

In the Americas the third pandemic had a restricted impact on humans, but it did leave a major environmental imprint by establishing stable reservoirs of infection among sylvatic rodents in the Southwest of the United States, the northeast of Brazil, and the south of Argentina. In those locations it persists to the present amidst massive cyclical die-offs of rodents and an ongoing trickle of cases of bubonic plague among humans who venture into the wrong place or whose pets exchange fleas with ground squirrels and gerbils. The Centers for Disease Control and Prevention (CDC) reports that between 1900 and 2016, there were just over one thousand cases of plague in the United States, concentrated in New Mexico, Arizona, Colorado, and California, mostly among hunters and campers.

The reservoirs in the Americas thus formed additions to the preexisting plague reservoirs on every other continent. As a result, the World Health Organization (WHO) reports that 3,248 cases of plague and 584 deaths occurred between 2010 and 2015, spread over four continents, but with concentrations in the Democratic Republic of the Congo, Madagascar, and Peru. The official statistics are, however, almost certainly significant underestimates because of misdiagnosis, concealment by communities and governments, and the absence of laboratory facilities in many settings.

Most influentially, the third pandemic marked the moment when the complex etiology of the disease with its interaction between rodents, fleas, and humans was unraveled. As a result, beginning in the early twentieth century new public health policies based on this knowledge were implemented. Authorities targeted fleas and rats with insecticides, traps, and poison, thereby replacing the draconian antiplague measures that characterized the second pandemic and the early years of the third.