CHAPTER 2

Medieval Response to Disease

LEARNING OBJECTIVES

- Evaluate theories of health and illness in the Middle Ages.
- Compare and contrast infectious diseases in the Middle Ages.
- Summarize the impact of leprosy on medieval society.
- Chronicle the plague's path and quarantine's role in medieval times.
- Describe the role of art and literature in medieval health and illness.

Introduction

The Middle Ages, the medieval period, extended from about 500 CE to 1500 CE in European history. Many authors temporally place its start with the fall of the Western Roman Empire until the beginning of the Renaissance and Age of Discovery; some consider it a "period of stagnation" between the Roman Empire and the later Renaissance.[1] Decayed teeth from medieval skeletons provided evidence for this, suggesting worsening dietary quality.[2] The invasion of Western Europe by groups of Vikings, Saxons, Goths, and others resulted in the feudal system in which land areas and peasants (serfs) were controlled by feudal lords.[1] Monasteries became the soles places of study and learning, and much of the previous Egyptian, Greek, and Roman study of science and medicine was severed from early medieval society.[1,3] Christianity, specifically the Roman Catholic Church, dominated society's culture; the blossoming of universities, towns, and more extensive commerce and trade began around 1100.[1] Public health was heavily influenced by the Silk Roads—both land and oceanic routes—enhancing trade and disease spread between East and West.[4,5] Faith and healing were inextricably linked, as were views of health and illness: diseases were *punishments*, and patients were *sinners*.[3] Hajar described the shift from Greek and Roman medicine as "prescriptions became prayers."[3] Despite this, in response to leprosy and plague, communities used public health actions—isolation and quarantine of individuals, groups, or ships.[6]

Small towns in England grew as both trade and birth rates boomed, with 80% of England's population living in rural and remote community settings.[7] Carole Rawcliffe's book *Urban Bodies: Communal Health in Late Medieval Towns and Cities* paints a more optimistic picture of medieval public health, a time in which small groups of people began to consider their common good to protect and promote their collective health.[7] Kinzelbach, in her discussion of German towns during the later

Middle Ages, notes the concepts of *miasmas*—the idea that noxious vapors contributed to infectious diseases and epidemics.[8] Toward the end of the medieval period, the plague dominated writings. [6]

Infectious diseases of public health, such as leprosy and plague, are prominently noted, and measles, smallpox, tuberculosis, and sweating sickness are also described.[9] Measles had its roots in Egypt and was called a "spotted disease," also called *Morbilli* in the Middle Ages, meaning a "petty plague."[10] Smallpox likely originated in the Orient, spread by Saracen armies to Syria, Egypt, and Spain in the 7th century.[10] When Crusaders returned, they brought smallpox to Europe (England, France, and Germany); the disease was epidemic in the 13th century, reportedly killing more than 6000 infants in Paris around 1445.[10] In England, an epidemic of fever beginning in 1486 was named *sweating sickness*. The epidemic started in Wales, spread to London, and then quickly over all of England, causing rapid death; subsequent epidemics in England are recorded in 1513, 1517, and 1551.[10]

Defining Moments in Public Health History

Health and the Environment

Theories of health, illness, medicine, and public health were intertwined, connecting individual health and the environment. The humoral theory, first proposed by Egyptians and extensively used by Greek and Roman physicians, continued with medieval Islamic and European physicians, remaining in some form until the 1800s.[3] Balance of the four humors (blood, black bile, yellow bile, and phlegm) was essential for good health, and imbalances were treated with removing the excess humor, such as bleeding for an excess of blood.[3] These beliefs were also connected to personality and mental state, such as too much black bile resulting in melancholy.[3] Medicine was still tied to magic, and astrology was integral to beliefs about health and illness.[11] The relation of the moon and stars was essential in both diagnosis and treatment, such as determining the best timing for bloodletting.[12] In the 1300s, drawings showing the relationship of the zodiac to human body parts. [12] (See **Figure 2.1**.)

Monastery herb gardens produced humor-specific remedies to aid the healing power of prayer.[1] Famous books describing herbal medicines first began in Greece (65 CE) with Dioscorides' *Materia Medica*, Pliny's *Naturalis Historia* (77–79 CE), *Saxon Leek Book of Bald* (900–950 CE), and *The Red Book of Hergest* (c. 1375 and 1425), which contained herbal remedies used by rural doctors.[3,13] Roses were highly valued for this purpose, and reportedly, Crusaders brought rosewater perfume home from the Middle East.[3] Herbal preparations also included coriander (for fever), mint (for stomach ailments), licorice and comfrey (respiratory illness), and rose, lavender, and sage (headaches and joint pains).[3] Vinegar, myrrh, and wine were used as antiseptics.[3] (See **Figure 2.2**.)

Many authors describe the "doctrine of signatures."[3] This spiritual concept relied on God-created remedies appearing similar to the diseased organ.[3] Eye diseases were treated with plants' blue flowers that resembled eyes.[14] A plant called lungwort (that looks like lung tissue) was used to treat respiratory disease and pneumonia, and a plant called bloodroot (that produced a red sap) was used to treat blood disorders.[15] This early theory, likely with origins in Chinese medicine—where yellow flowers were used to treat jaundice—extended into the Renaissance, and even later to more modern homeopathy concepts.[14,16] This theory is also connected to the humoral theory, as the balance of man's external environment is connected to the body's functions.[15] As an example, a plant growing in a wet area was used for coughs and fevers, whereas plants growing in mud were used to treat too much phlegm.[15]

Medieval Systems of Health Care

Advances in Science and Health Care

Between 800 and 1300, Islamic scholars fueled advances in science and medical care, based on Aristotle and Galen's earlier works.[17] Many older Greek and Roman medical texts were translated by medieval Islamic scholars as a springboard to a

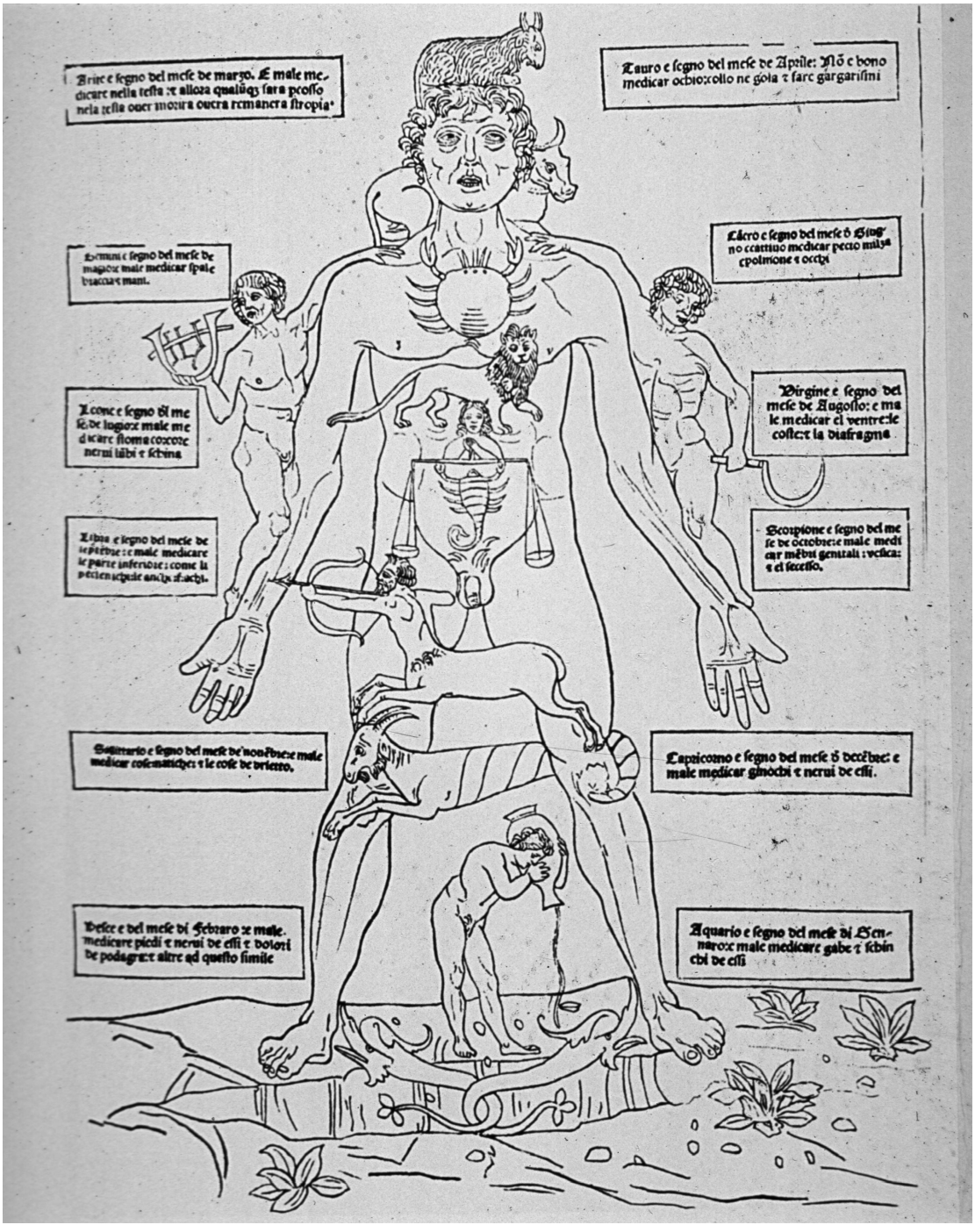

Figure 2.1 Zodiac Man or Man of Signs

Source: Ketham, Joannes de, active 15th century. Author/The National Library of Medicine

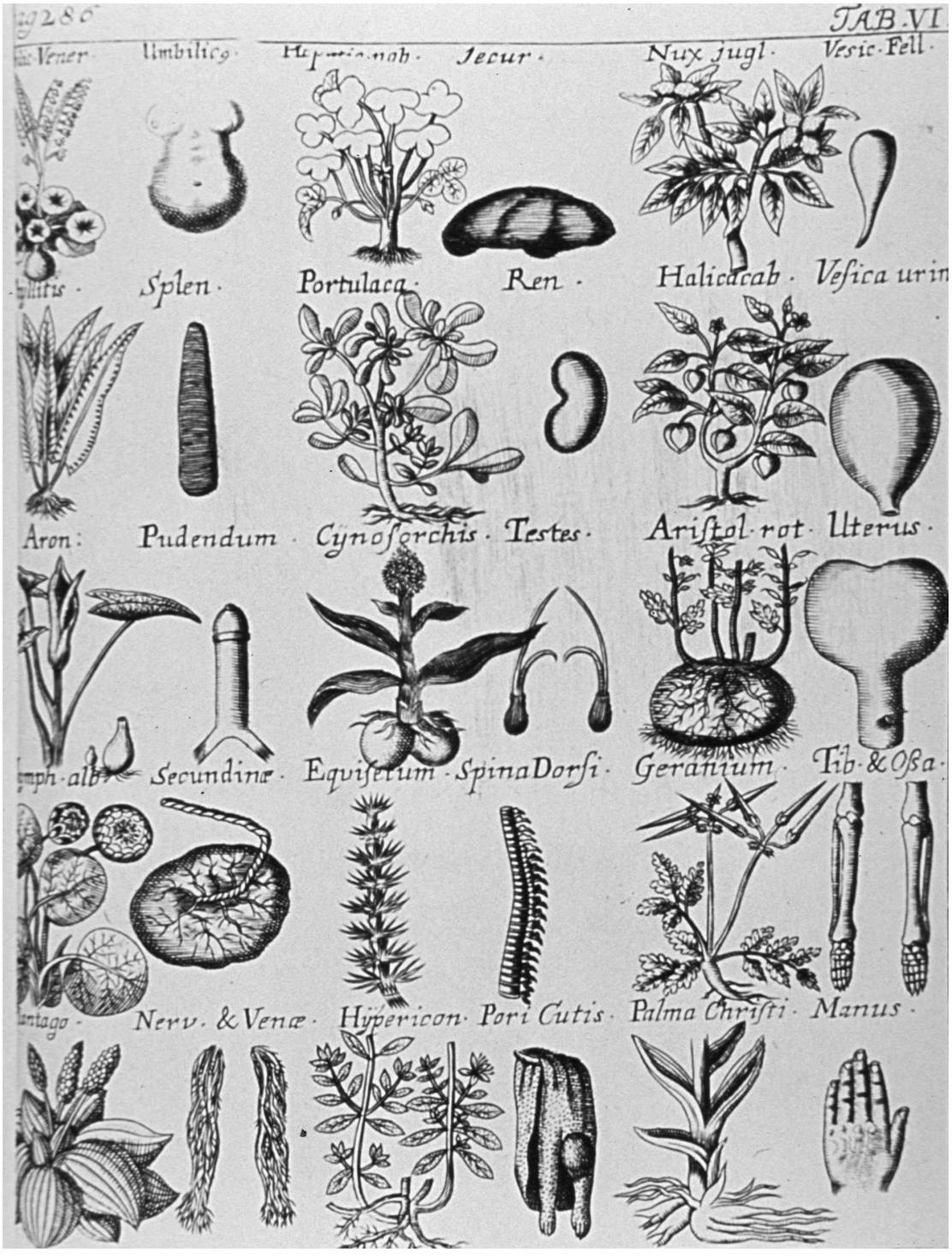

Figure 2.2 Plants of Medicinal Value to Particular Human Body Parts

Source: Courtesy of the National Library of Medicine

period of scientific and medical inquiry.[1] Avicenna (980–1037) wrote *The Canon of Medicine*, famous medical texts used in Europe.[18,19] The birth of universities from Paris to Padua to Prague and Oxford (perhaps 80 in all by the year 1500) rekindled a quest for knowledge about science, which also provided building blocks for public health improvements.[20] The invention of printing gave the technological means to salvage and reproduce the ancient writings from Arabs, Greeks, Romans, and Jews, giving medicine, science, and public health a renewed foundation.[20]

Hospitals, Healers, and Public Health

Medieval health care systems incorporated public health principles. *Hospitals* served a variety of functions closer to the word *hospitality* than their later meaning; rather than primarily caring for the sick, they sheltered the old, the poor, the dying, the blind, and those without parents, means, or mental faculties.[1] Monasteries built hospitals, and the oldest hospital in France was called the Hotel-Dieu, founded in 542 CE in Lyon; the Hotel-Dieu in Paris was founded in 652 CE .[1] Hospitals were subsequently built in Italy (898 CE), England (937 CE), and St. Bartholomew's Hospital in London, England, was built in 1123.[1] Hospital growth during the Crusades accelerated even more, and by the end of the 1300s, there were more than 30 hospitals in Florence, Italy alone, propelled in part by the plague.[1] (See **Figure 2.3**).

The role of physicians (restricted to men) is well documented. Women health workers, often called *women healers*, were first recorded in the early 13th century.[21] In the earliest monastery health clinics, lay healers worked side-by-side with monks. *Wise women* was the name given to lay women healers; formal nursing practice was

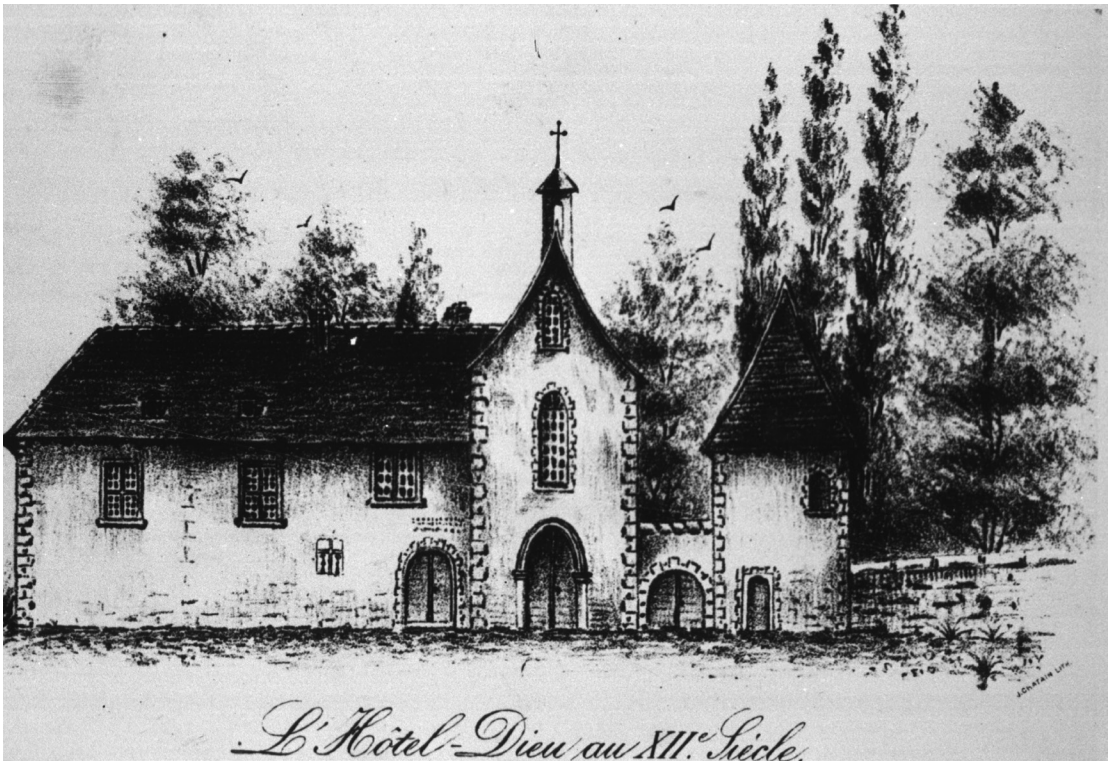

Figure 2.3 Hopital, Issoudun, France: General View of L'Hotel-Dieu au XII Siecle

Source: Courtesy of the National Library of Medicine

noted after 1096, during the crusades to the Holy Land, a time when injuries and diseases in knights required a more organized system of care.[21] In France, women became Good Samaritans and were trained by physicians; other women joined nursing orders to work in European hospitals.[21] Minkowski described medieval hospitals as "an ecclesiastical facility with staggering mortality rates that encourages a vision of cure only in the hereafter."[21] As such, care was supportive, emphasizing nutrition, use of herbal remedies, and humoral treatments such as bleeding and purging.[21] Midwives joined other women healers and nurses in providing a wide range of care, including medical and even surgical roles. As late as the 1400s in Italy and Germany, women enjoyed a broad scope of health-related practice.[21] However, tensions grew between nurses' domains and those of physicians, and university-trained (male) physicians claimed the practice of medicine. England, under King Henry V, banned women from practicing either medicine or surgery in 1421.[21] Widespread restrictions prevented women from entering university training or practicing as physicians, prompting a famous trial of Jacqueline Felicie; some women healers were even prosecuted as witches in the 14th and 15th centuries.[21] (See **Figure 2.4**.)

Leprosy: A Crisis for Health and Society

Background

People of the Middle Ages tried to protect themselves and their communities from the spread of disease, sometimes through extreme measures; fear of contagion and religious beliefs often drove these actions. Leprosy was believed to be inherited, or more often, a direct result of punishment from God, a moral disease, or even a curse.[22,23] Theories of causation ranged from eating spoiled fish, meat, or other foods, to genetic causes; physicians commonly supported the theory of too much black bile.[23] Palliative treatments included a medicinal remedy combined with religious actions, such as prayer and carrying religious symbols, including herbs, Chaulmoogra

Figure 2.4 Medieval Hospital

Source: Courtesy of the National Library of Medicine

(hydnocarpus) oil on the body, and treating excess black bile with bleeding.[23] One special treatment espoused by Hildegard of Bingen (1098–1179) was the white lily and soil from ant hills, both having presumed curative powers.[23]

We now know that leprosy (called Hansen's disease) is caused by a bacterial infection and can be spread by coughing or sneezing to other people through tiny bacteria-laden droplets.[24] In 1873, Dr. Gerhard Hansen from Norway discovered that *Mycobacterium leprae* was the causative agent.[25] Bacteria reproduce very slowly, resulting in an incubation period of 5 years, symptoms sometimes not evident for as long as 20 years. Further, the disease is not highly contagious, requiring more than occasional contact with infected individuals.[26] One author suggests that only 10% of people exposed to leprosy subsequently contract it, with variable severity.[23]

Leprosy affects many organs and body parts, including the skin, respiratory tract, eyes, and nerves.[26] Over time, it may cause extensive skin damage, damage to nerves, and progressive muscle weakness.[27] Leprosy may cause blindness and dramatic and disfiguring appearance from chronic skin disease and bony deformities.[23] Destruction of the bony area above the upper teeth and where the nose meets the face produced a characteristic facial appearance, called *leonine faces*.[28,29] People with these deformities had extensive nerve damage, loss of sensation and movement in their arms and legs, along with damage to the bones of the hands and feet.[28] Hand deformities were described as *claw hand*, and victims experienced similar crippling bony changes to their feet.[23]

Origins of Leprosy

Leprosy was reported in ancient China, Egypt, and India.[22] According to some authors, it was first seen in the Orient and spread to Italy after a Palestine expedition. Celsus, the Roman medical writer, documented the disease at the beginning of the first century; leprosy was seen in Gaul in the 2nd century, and in the 8th century, a leper hospital was built in Corbeil, France.[10] An Egyptian papyrus described leprosy in about 1550 BCE in an Egyptian papyrus.[22,25] Although there continues to be controversy about the actual origin, the Bible's book of Leviticus called it *tsaraath,* and it was called *lepra* by the Greeks.[29] Using genetic evidence, scientists later theorized that the bacteria's evolution would help them trace the route of the causative agent, results suggesting that leprosy began in the Near East or Eastern Africa.[30] Subsequently, and as a result of human travel and relocation, since the 1500s, leprosy was spread to the Americas and West Africa from northern Africa and Europe.[30]

Estimates of the numbers of lepers and hospitals vary widely in the literature. Dupouy writes that larger numbers of lepers were recorded after the Crusades when nearly every town had a hospital (better described as an asylum) for these patients.[10] It was also during that time that lepers (*ladres*) were named for St. Lazarus, their patron Saint. During the reign of Louis VIII, there were an estimated 2000 hospitals for lepers; the number of hospitals in France peaked at 19,000.[10] The building and oversight of *leprosariums* were performed by the Church, as both the origins and treatments of the disease had religious roots. Lazar or leper houses were created and situated on the outskirts of communities, each built with its own chapel, gardens, and cemetery.[23] Some authors write that leprosy peaked during the 12th and 13th centuries, affecting about 1.5 million people.[23] European leprosy wasn't noted in the New World until after Columbus' voyage; slave trading later brought Africa's disease.[31]

Public and Social Reaction to Leprosy

Leprosy had a devastating impact on social aspects of medieval life. Fear of disease was based on perceptions that leprosy was highly contagious.[23] Restrictive laws passed, and police regulations were enacted as fear of the disease created public anxiety. Patients wore "a gray mantle, a hat and wallet," along with a "*tartarelle*, a species of rattle, or a small bell," all designed to warn others they were coming.[10] Specific robes, footwear, gloves, masks, and robes adorned with yellow crosses or an "L" were required in some communities.[23] Lepers were sometimes required to carry long poles, to ensure their distance from other members of the public when accepting charitable gifts.[23]

Charitable support for people with leprosy was considerable. The Archbishop of Canterbury

established and ensured charitable support for leper houses in England before the Crusades, even including one for monks with leprosy, built in 1137.[28] Some Crusaders returned with leprosy, creating a liturgical conundrum, as the Crusaders were blessed, but leprosy was God's punishment.[28] Lepers were recipients of sympathy and charitable giving, later called "Christ's poor."[28] In 1163, the Bishop of Exeter allowed begging to ensure lepers had sufficient food, and in 1204, English King John gave lepers a "portion of all flour sold at market."[23] Leper houses had strict rules requiring church attendance, taking a vow of chastity, wearing specific clothing, and these houses, as described by Roberts, "combined the functions of prison, monastery, and almshouse, and responded to the need for seclusion and segregation."[28] (See **Figure 2.5**.)

Communities differed in their responses to leprosy, ranging from total isolation of lepers to more inclusionary steps.[23] Such decisions were not taken lightly and made by local groups of physicians, church leaders, and even people with leprosy.[23] Ceremonial events, nearly identical to funerals (including putting earth on the victim's head), demarcated a leper's separation from the community.[23] "Leper Masses" signaled official removal from society.[29] A clergy member walked the patient to their new (and isolated) house as if a funeral. Lepers were prohibited from visiting other homes, going barefoot, drinking from any well except their own; they were buried in their own cemetery.[10] "When you speak to an outsider, stand to the windward," they were told, and "you must pass not plates nor cups without first putting on your gloves."[10]

Laws were passed in response to public perception of contagion and incurability, designed to separate lepers from the public. At least in theory,

—A Leper House.—Miniature from the "Miroir Historical" of Vincent de Beauvais. Manuscript of the Thirteenth Century.

Figure 2.5 Leper House—From Miniature in Vincent de Beauvais 's "Miroir Historical"

Source: © duncan1890/DigitalVision Vectors/Getty Images

this isolation would protect the public's health.[23] Laws were recorded in Wales before 950 CE; a law in England made the disease grounds for divorce.[28] Laws defining separation of those with leprosy from those without were passed by the Third Lateran Council in 1179 (Pope Alexander III), and *writs of separation* were given to lepers by Medieval English officials.[23] In London in 1276, courts (called "assizes") prohibited people with leprosy from living there.[23] Conversely, France, had no restrictions on people with the disease; restrictions, prohibitions, or segregation from other community members varied by community.[23] Lepers were still living but dead to all workings of society, a social construct enforced by law.[10] However, despite a vast literature about medieval social isolation of lepers, it seems clear that there was considerable geographic variation in the extent of these practices. Further supporting this notion was a study of the skeletons of 128 individuals from 41 different archeological sites, revealing that most were *not* buried in cemeteries for lepers.[28]

Leprosy began to decline in the mid-1200s and was nearly nonexistent in Europe in the 1500s, with some exceptions in France, Ireland, and Scandinavia.[23] By 1470, England reported a decline in leprosy, and the last case in London was diagnosed in 1557; the disease was reported only occasionally after that.[28] Why did this happen? Experts disagree. Some suggest better sanitary conditions and overall living environment, the competing rise of pulmonary tuberculosis in developing cities, or even the cold climate. Others suggested that the Black Death contributed, as people with leprosy were already crippled from disease and readily succumbed to the plague.[23]

The Black Death

The Black Death, Great Dying, or Great Pestilence, termed Black Death much later, was one of several plague epidemics throughout history.[32,33] According to some authors, plague's first mention is from the Bible, first book of Samuel, in about 1000 BCE.[32,34] In this biblical account, the Philistines had an outbreak of "tumours" (Hebrew *ophal*) after seizing the Ark of the Covenant from the Israelites and then traveling to different cities.[34] They promptly returned the Ark, attributing their infectious plight directly to it. Resultant controversy about whether this was bubonic plague or a diarrheal disease (the tumors or "emerods") favors at least the possibility of bubonic plague.[34] Other early accounts from 300 BCE and first century CE (the latter documented by Rufus of Ephesus) occurred in Libya, Syria, and Egypt; however, it is impossible to exclude other infections as the cause.[32]

Plagues were not totally new, though none matched the devastation of the 14th-century bubonic plague.[35] Thucydides described the plague of Athens (about 430 BCE), its lethal impact, and its crucial role in enabling the Spartans to conquer Athens.[35] The Justinian Plague was noted in 532 CE, first in Egypt, then the Middle East, and on to Turkey, Constantinople, and Greece; within a decade it reached Italy, France, and Germany just a few years later.[32] Total population losses were estimated to exceed 50% in North Africa, Europe and parts of Asia, the account chronicled in detail by Procopius of Caesarea, termed by some authors as the "first pandemic."[32]

The "second pandemic" stuck in the Middle Ages and was originally called the *Great Dying*, *Great Pestilence*, and later the *Black Death*, and was documented first in China in 1334, spreading along the trade routes on the Black Sea, to Constantinople, then later to Italy in about 1347.[32] Estimates of the plague's ravages during the Middle Ages vary, but likely more than a third of Europe's population died as a result of it.[32] Others note similar devastation in northern Africa, Europe, and parts of the Middle East, with the *Great Dying* killing about 25% of the 100 million people over just a few short years, from 1346 to 1352.[33] Mortality rates were estimated to be as high as 80%.[33] The pattern continued with smaller outbreaks throughout the 1300s and 1400s, the "third pandemic" beginning much later in Yunnan, a Chinese province, about 1855.[32]

Plague's Global Path

The plague spread along the route where Chinese silk was carried across Asia to Europe, called the Silk Road.[33] According to the Decameron Web project of the Italian Studies Department's Virtual Humanities Lab at Brown University, plague in northeastern China (province of Hopei) in 1334 killed an estimated 5

million people, representing nearly 90% of the population.[36,37] Along this route, plague was seen in Astrakhan and Saray, along the Don River to Kaffa, a port on the Black Sea. Pera, near Constantinople, and Messina in Sicily were also important transmission points along the route.[33] Mortal spread through the Greek islands, Anatolia, and the Balkans was chronicled by Byzantine emperor Cantacuzenus in 1347, when he described his son's death.[33]

In 1348, plague spread to Tunis (north coast of Africa) and Spain via Sardinia, spreading to Europe. Ships transported their goods and also disease.[33] Plague arrived in Alexandria in 1347 and then in Cairo, Gaza, Beirut, Damascus, and Morroco. In 1348, it spread to Europe's Atlantic coast, crossing France through Toulouse to Bordeaux on the west coast, via the Garonne River. Plague spread by ship to Great Britain, then Ireland in 1348.[33] Then, crossing the North Sea, it spread to Scandinavia, killing much of the population in Denmark and Germany, spreading to Poland in 1351 and Russia in 1352, making nearly a complete circle.[33] (See **Figure 2.6**.)

What Caused the Plague?

In the Middle Ages, there were many explanations for the plague. Christians, Muslims, and Jews all blamed it on each other.[38] Mentally ill and disabled people (from the belief that they were witches) were murdered.[38] Women lepers and Jews were also suspect: 16,000 Jewish residents were killed in Strasbourg, and by 1351, more than 350 massacres were recorded in over

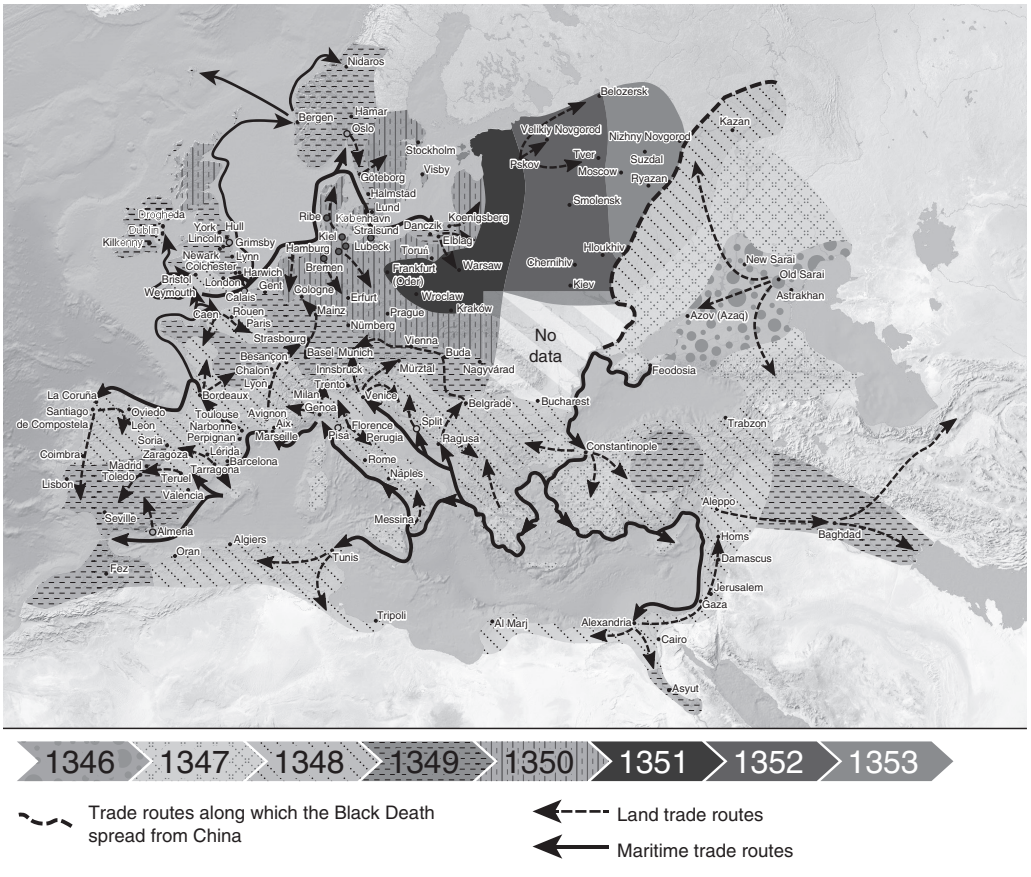

Figure 2.6 Spread of the Black Death in Europe, 1346–1353

200 primary and smaller Jewish communities, precipitating Jews in northern Europe to migrate east toward Poland and Russia.[38]

The *bubonic* name comes from the initial presentation of large swellings, or "buboes," in the lymph nodes, the body's initial response to the infection.[33] After about three days, the lumps in the neck, groin, or armpits progressed to high fever and black skin colorings from bleeding under the skin.[33] When the infection traveled to the bloodstream, it was quickly fatal from bleeding and shock. Another manifestation of the plague was pneumonia, a very fatal situation, characterized by coughing of blood and subsequent death.[33] Death rates from bubonic plague ranged from 30% to 75%; pneumonic plague, because of its effects on the lungs, caused death in 90% to 95%, and septicemic, the most widespread and virulent blood infection, killed 100% of its victims.[38,39] Artistic depictions, such as wood engravings, highlighted town responses.[40] (See **Figure 2.7**.)

The relation of human plague to rats and fleas, and ultimately bacterial infection, was not

Figure 2.7 The Pedlar Dance of Death

Source: © duncan1890/DigitalVision Vectors/Getty Images

documented until many years later. Plague infects rodents, and fleas with rodent hosts can transmit infections to humans; this represents a common mechanism of disease spread for bubonic and septicemic plague.[38] In 1894, the French bacteriologist Alexandre Yersin discovered the bacterium *Yersinia pestis* to be the causative agent. These bacteria are found in wild rodents and are transmitted rat-to-rat by fleas, specifically *Xenopsylla cheopis*, the oriental rat flea.[33] The rat carries the bacteria, and fleas bite the rat and send the bacteria to the next rat; as rats die, the fleas move to humans or other animals, infecting them in the process.[33] Rats are required to spread the disease, as they both carry the bacteria and serve as a host for fleas. The epidemic in rats is called *epizootic* (animal epidemic) and is needed to spread the disease, along with close proximity of humans and rodents, such as in medieval villages and towns, or especially in medieval ships.[33] Some theorized that marmots, which were large rodents in central Asia, might be the original source, as their fur was a valued trade item along the Silk Road.[33]

Firsthand Accounts

Notary Gabriele de'Mussi from Piacenza provided an early account of the plague in Kaffa, describing what happened when a ship reached the port as he says, "Alas! our ships enter the port, but of a thousand sailors hardly ten are spared."[41] He chronicled the tormented decisions of action or inaction, writing, "Lamenting our misery, we feared to fly, yet we dared not remain."[41] De'Mussi also cited an early example of biological warfare when the Tartars ordered "corpses to be placed in catapults and lobbed into the city" during the Siege of Caffa in 1346.[42]

Giovanni Boccaccio (1313–1375) wrote the *Decameron* after his father died of the plague.[35] He was a noted and prolific Italian writer who also chronicled the Black Death in Florence, Italy.[43,44] He wrote that "deadly pestilence which, whether disseminated by the influence of the celestial bodies, or sent upon us mortals by God in His just wrath by way of retribution for our iniquities, had had its origin some years before in the East," further describing its path to the West.[43]

Boccaccio described continued spread and destruction despite government sanitary measures in the city, keeping sick people away, praying to God in public and private, and implementing preventive measures in fashion at the time.[43] Early symptoms were described as follows: "It first betrayed itself by the emergence of certain tumors in the groin or the armpits, some of which grew as large as a common apple…which the common fold called *gavoccioli*."[43] These progressed, and black or bluish spots appeared on the skin of the arms and legs, yet other signs, like nosebleeds, meant certain death within three days.[43] Disease spread was fast and far-reaching, and Boccaccio, in his analogy to the spread of a burning field in the wind, wrote, "just as firs devours things dry or greasy when they are brought close to it, the evil went yet further.…"[43] According to Boccaccio, the contagion was not simply among people, but through touching belongings or clothes of a sick person; he described the near-immediate death of hogs in the street after contact with rags from sick humans.[43] (See **Figure 2.8**.)

Boccaccio advised avoiding contact with ill people or their possessions, writing, there was "no medicine for the disease superior or equal in efficacy to flight."[43] Afflicted medieval cities and towns were "ghost" towns with few people and where the usual rites and ceremonies of respectful social interactions and even proper funerals were abandoned.[43] Many fled their homes to rural country sites, hoping to escape the disease and the wrath of God through their social isolation.[43] He described the unintentional isolation of sick people by systematic neglect when families left families, parents left children, and friends, neighbors, and servants were nowhere to be found.[43] People died alone, not noticed. Bodies were dragged into the street. Hired corpse carriers, called *becchini,* replaced the custom of corpses carried on peers' shoulders as part of a funeral.[43] Notably absent were groups of mourners or crowds of church members. Priests, now sparse in number, chose the nearest church and empty tomb, with sometimes several people buried at once.[43] Funerals were hurried, noticed by friends and neighbors only because of the dead's noxious smells as they passed by.[43] Disruption of customary social and religious practices resulted in what Boccaccio described as the total loss of respect for human life, "that a dead man was then of no more account than a dead goat would be to-day."[43]

Figure 2.8 Miniature of the Decameron

Source: © Morphart Creation/Shutterstock.

Theories About the Great Dying: The Plague Tractates

Nowhere were the influences of religion and science so evident as in the documentation of theories and possible reasons for the plague. A noted Paris surgeon named Guy de Chauliac attributed its origin to a combination of atmospheric changes caused by a peculiar alignment of the planets during March of 1345.[35] *Plague tractates,* short essays or treatises, became a new written form of medical literature originating during the 14th and 15th centuries to recount theories of causation and control, emphasizing prevention over cure.[35,45,46]

The plague tractates attempted to capsulize current myriad theories, to assure the public that much was known and something could be done.[45] These short essays contained advice for physicians, the general public, and how to treat the sick, with no shortage of speculation about how and why the plague occurred; they provided a glimpse into the medical and public health thinking of the time.[45]

An example of an early tractate was written by James of Agramont, a physician, in 1348, for the general public.[46] He quoted Deuteronomy 24, that the plague killed "master and servant alike," confirming it was a result of sin for those who do not keep God's commandments. [46] Another discussion connected the Black Death to the book of Revelation and the Four Horsemen of the Apocalypse—pestilence, war, famine, and death—and provided a Christian perspective and pragmatic way to deal with the plague's rampaging throughout Europe.

The Tractate of John of Burgundy (Sir John Mandeville, a medical professor) from 1365 described the atmosphere's role and ascribed the epidemic to "corrupt humors or vapours" which mixed with the atmosphere to cause disease.[45] Astrological beliefs were paramount: the position of Jove and Saturn, and more importantly, their relative positions years prior, creating an environment for human disaster.[45] The miasma theory's power in disease contagion (although not yet recognized as such) was prominent; the pores of the body were especially important and believed to be a powerful entryway.[46] John Burgundy gave recommendations for "disinfection," attempts to purify the indoor air through fires of juniper branches or specially concocted powders creating *disinfecting* smoke.[45] Air disinfection was

strengthened by using *internal disinfectants*—drugs of the medieval times—which were herbal remedies with intense aromas, such as vinegar, "diptaine, scabious, tormentil, pimpernel, roses and violets." [45] This theory—that noxious vapors caused disease—began much earlier, as noted from Thucydides in Galen's writings, and later through Constantine.[45]

In a concise treatise, Johannes Jacobus (who was the Royal and Papal Physician, Chancellor of Montpellier), in about 1364, described poor household sanitation, global causes ("celestial humors and spirits"), and foul-smelling standing water or dead bodies from war.[45] His best preventive advice was to travel away quickly, as far as possible![45]

The Public Health Response: Flight and Quarantine

People believed the plague was highly contagious, and everyone (including doctors) got as far away as possible from those who were stricken, whether family, friends, alive or dead.[35] Some early evidence suggests physicians wore gloves and gowns and an herb-filled face mask, appearing like an animal's nose or bird's beak, for personal protection.[35] (See **Figure 2.9**.)

Public health practices during this time imitated later isolation and quarantine actions.[9] In response to the Black Death in the 1300s in Italy and southern France, Rosen notes that environmental practices evolved to include isolation and quarantine, with the use of *observation stations* and *isolation hospitals* for sick and dying people.[9] According to Duffin, the term *quarantine* originated in the town of Tagusa in Italy in 1377, derived from the Italian word *quaranta*, which meant *forty*, significant in Christianity for the number of days in Lent.[35] Rosen puts the origin of quarantine and isolation practices a bit earlier, beginning with a decree by Bernabo Visconti, Duke of Milan, in 1374.[9] Venice, as an important commerce entry port, began inspecting incoming ships; early evidence of health councils to oversee public health in communities was recorded as early as 1348.[9] In 1377, a month-long isolation period was started on the Dalmatian coast to limit plague entry, later extended to 40 days; Marseilles strictly followed this practice in 1383.[9]

Quarantine efforts (despite the potential danger to healthy people) were enforced.[33] Ships were sent to quarantine locations, called *lazarettos*, where they stayed until local officials set them free to travel.[33] From our knowledge of how the plague is spread, close confines had potentially disastrous effects on those confined and healthy; it is unclear whether it limited spread to other localities.[33] Evidence of the failure of ship quarantine was later provided from an example in Marseilles in 1720. When the *Grand Saint Antoine*, a sailing ship transporting goods from the Near East, was quarantined, some of its crew became sick and died; however, dockworkers who unloaded the ship's contents fell ill, initiating spread to the rest of the city.[33] The experience in Venice, using strict quarantine requirements in the 1400s, similarly failed to stop disease spread to the city.[33]

Figure 2.9 Plague Doctor

Source: Courtesy of the National Library of Medicine

The Plague in Art and Literature

In contrast to previous Christian-inspired works, the plague's impact was directly visible in the arts, such as in paintings that included people, skeletons, and corpses.[38] Sculptures "showed worms and snails munching on the diseased persons." [38] *La Danse Macabre* (or *Dance of Death* in English) and *Ars moriendi* ("the art of dying") were expressions of death in painting, music, and theater; death was personified as a corpse or skeleton, encompassing all social classes.[38,47] Mollaret writes that the denouement in Shakespeare's *Romeo and Juliet* was, in fact, related to the consequences of the plague.[48] (See **Figures 2.10** and **2.11**.)

Plague Consequences

The *Great Dying* of the Middle Ages had a widespread impact on society because it lasted for 130 years, impacting the economy, religion, culture, and health care.[38] The death toll in Italian cities was huge: 70% died in Pisa, 75% in Venice, and in Florence, so many died it was called "the plague of Florence."[49] An estimated 80,000 died in just 3 months, and overall, about half of Italy's population died of plague.[49] In the 1400s, the population, unaffected by massive outbreaks, began to grow once more but took decades to recover; population in affected areas did not surpass numbers seen before the Black Death until the 1500s.[33]

Social and economic devastation was rampant. Trade plummeted, and people to make goods were few, ill, or dying.[50] France, Italy, and England experienced peasant revolts, attributed to the plague, resulting in competition for labor that included financial incentives and additional latitude for peasants in Western Europe.[38] However, in Eastern Europe, the situation was dramatically different, demonstrating "renewed stringency of laws that tied the remaining peasant population more tightly to the land than ever before through serfdom."[38] If they did not die of the plague, children born during this

Figure 2.10 Anonymous Engraving, Dance of Death, 1493; News Photo

Source: © QatlasMaps/Shutterstock

Figure 2.11 Clusone (Bergamo, Lombardy, Italy) - Dance of the Death, ancient fresco

Source: © clodio/iStock/Getty Images Plus/Getty Images

time might be more likely to die from other causes. Weakened population growth and the resultant European economy persisted until the late 1600s.[38]

Some abandoned their religion because too few people were left to conduct worship, and a general skepticism emerged regarding the efficacy of prayer for stopping the plague.[50] Some authors suggest that the Church garnered more wealth due to the plague, as people were terrified of dying in sin. Still, Tuchman writes: "The Plague accelerated discontent with the Church at the very moment when people felt a greater need of spiritual reassurance."[51] He further writes that "…the absolutes of a fixed order were loosed from their moorings. Minds that opened to admit these questions could never again be shut."[51]

Plague Controversies

Many differing opinions about aspects of the Black Death remain. Experts write that because the disease became endemic in rat populations, intermittent epidemics in humans occurred in Europe for hundreds of years following the Black Death.[52] For example, an epidemic occurred in Marseilles, France, in 1720, killing an estimated 50,000 people, then disappeared by 1722.[52] India similarly experienced intermittent outbreaks at Cutch, Gujarat, and Kattyawar (1812–1821) and at Pali (1836–1838).[52] During this period, the plague was seen in Burma, then in the nearby Yun-nan Province in China from 1800 until about 1850, though not in epidemic proportion.[52] There was accelerated spread to Yun-nan-fu (the provincial capital) in 1866; nearly three decades later, the plague reached Canton and Hong Kong in 1894.[52] In contrast to the Justinian era, when caravans and small sailing ships dominated, in 1894, there were railways and steamships, facilitating transport of people, goods, and disease vectors.[52]

However, what is equally controversial (and essential to public health) is why the plague in

Europe actually stopped. Some authors attributed it to changes in the rat population, with *Rattus norvegicus* (the sewer rat or brown rat) becoming the predominant species instead of the earlier *Rattus rattus*, or black rat.[33,52] The rationale was that the brown rat, unlike the black rat, does not live near humans, preferring sewers, although it was equally susceptible to plague.[33] However, this is disputed by some authors on temporal grounds, who note that the plague declined before *R. novegicus* became the predominant species.[52] Some scientists suggest that black rats became resistant to plague, though others argued that resistance would not enable widespread rodent protection.[33]

Others attribute disease disappearance to improvements in hygiene, housing, and sanitation. Wu Lien-teh argues that declines in multiple locations (India and China for example) and Europe suggest a "natural decline of plague" rather than environmental factors.[52,53] Some theorize that a less virulent strain of *Yersinia pestis* evolved, "acting as a vaccine" to more virulent strains.[33] Pathologists note another closely related bacteria to the agent causing plague: *Yersinia pseudotuberculosis*, which provided plague immunity but did not cause illness in rats.[33] So, one theory is that *Yersinia pseudotuberculosis* (or another similarly innocuous infection) spread throughout Europe's rat populations, conferring immunity to plague.[33] Some experts emphasize the importance of differences in local environments, hosts, and vectors that may impact disease presence.[54] Seasonal and climatic changes may impact the availability of vector fleas. For example, if a rodent population is devastated by an epizootic, fleas, not able to find a local rodent host, may migrate to humans.[54,55] These hypotheses, discussed as potential reasons for plague decline, remain topics of conjecture and controversy.

From Past to Present: Public Health Perspectives

Although some historians paint a stagnant picture of the Middle Ages, it had many unique ideas, practices, and diseases relevant to public health today, such as the notion that small groups of people organized for their collective good in rural settings were essential to survival during plague years. The changing organization of health care, with many hospitals serving broader public health and social functions (such as housing and food), is a concept gaining momentum today by integrating *social care* into health care delivery.[56] Today, in an aging society, a renewed emphasis on social care is paramount. In the United States, 25% of older adults are socially isolated, increasing their risks of dying prematurely.[57] More recently, COVID-19 pandemic policies have exacerbated social isolation in older adults, who are more vulnerable to the virus's lethality.[58] Recent commentaries call for stronger health care connections, mitigating life-shortening isolation using technology and stronger social supports.[59, 60]

The documented place of women in medieval public health and health care was recognized, first as generalist healers, midwives, nurses, and physicians, then as women who were separated from training and medical practice, and even prosecuted as witches.[21,61] This was an enduring shift relevant today; later champions such as Margaret Sanger, Lillian Wald, Alice Hamilton, and Martha Eliot further remind us of women's enduring contributions to public health.[61]

Medieval theories of health and disease remained tied to magic, religion, and toxicity of noxious odors, guiding public health practice around plague. Lepers were socially ostracized, with fear of an unknown disease etiology driving social and public health behaviors; stigma remains prevalent in areas of public health such as mental illness. The Great Dying was a global threat; public health practices of isolation and quarantine likely served little to halt disease spread and societal devastation but represented early attempts to organize community efforts to prevent disease. Outbreaks and pandemics remain relevant to public health: ebola, influenza, plague in Madagascar, and the COVID-19 pandemic highlight the enduring need for a more robust public health system and focus on global preparedness.[62-66] Authors of the plague tractates tried to educate and reassure the public with the best available information in terrifying times; public health communication remains a hallmark of effective practice.

WRAP-UP

For Additional Study

- Trautman JR. A brief history of Hansen's disease. *Bulletin of the New York Academy of Medicine.* 1984;60(7):689–695.
- Pollitzer R. A review of recent literature on plague. *Bulletin of the World Health Organization.* 1960;23:313-400.
- McEvedy C. The bubonic plague. *Sci Am.*1988;258(2):118–123.
- Singer DW. Some plague tractes (fourteenth and fifteenth centuries). *Proceedings of the Royal Society of Medicine.*1916;9:159–214.
- Fee E, Korstad RR. Women health workers: Past and present. *Am J Public Health.*1992;82(2):165–166.

Discussion Questions

1. Describe the social, cultural, and political context of this period. How did these factors influence public health?
2. For each *Defining Moment* in this chapter, identify public health issues, themes, and tensions relevant to public health today.
3. Compare and contrast historical strategies used to achieve public health progress with more recent methods. How might past approaches inform today's practice?
4. Discuss stigma related to leprosy. Are there analogies in public health today?
5. Identify topics of plague controversies. How do these relate to pandemics today?

References

1. A history of medicine: What is European medieval and Renaissance medicine?. *Medical News Today.* Published 2016. Updated 2016. Accessed June 11, 2016. http://www.medicalnewstoday.com/info/medicine/medieval-and-renaissance-medicine.php
2. Manzi G, Salvadei L, Vienna A, Passarello P. Discontinuity of life conditions at the transition from the Roman imperial age to the early middle ages: Example from central Italy evaluated by pathological dento-alveolar lesions. *American Journal of Human Biology: The Official Journal of the Human Biology Council.* 1999;11(3):327–341.
3. Hajar R. The air of history: Early medicine to Galen (Part I). *Heart Views: The Official Journal of the Gulf Heart Association.* 2012;13(3):120–128.
4. The Silk Roads. Khan Academy website. Published 2016. Accessed June 11, 2016. https://www.khanacademy.org/partner-content/big-history-project/expansion-interconnection/commerce-collective-learning/a/the-first-silk-roads
5. The Silk Road. Published 2016. Accessed June 11, 2016. http://www.ess.uci.edu/~oliver/silk.html
6. Module 1: A Brief History of Public Health. New York State Department of Health. Accessed March 4, 2016. http://studylib.net/doc/7521107/instructor-guide-for-module-1---empire-state-public-healt
7. Rawcliffe C. *Urban Bodies: Communal Health in Late Medieval English Towns and Cities*. Boydell Press; 2013.
8. Kinzelbach A. Infection, contagion, and public health in late medieval and early modern German imperial towns. *J Hist Med Allied Sci.* 2006;61(3):369–389.
9. Rosen G. *A History of Public Health*. Expanded ed. Baltimore: Johns Hopkins Univ. Press; 1993.
10. Dupouy E. *Medicine in the Middle Ages: Extracts from "Le Moyen Age Medical."* Cincinnati Lancet Press; 1889.
11. Jones PM. Medicine. Oxford Bibliographies website. Published 2010. Updated December 15, 2010. Accessed January 3, 2017. http://www.oxfordbibliographies.com/view/document/obo-9780195396584/obo-9780195396584-0051.xml.
12. Bovey A. Medicine, diagnosis and treatment in the Middle Ages. British Library. The Middle Ages website. Published 2015. Updated April 30, 2015. Accessed June 1, 2017. https://www.bl.uk/the-middle-ages/articles/medicine-diagnosis-and-treatment-in-the-middle-ages
13. The red book of Hergest. BBC.co.uk. Published 2014. Accessed June 1, 2017. http://www.bbc.co.uk/wales/history/sites/themes/society/myths_red_book.shtml
14. Doctrine of signatures. Exploring the History of Medicine website. Accessed June 1, 2017. http://www.science

museum.org.uk/broughttolife/techniques/doctrine. Published 2017
15. McKee G. Botany. PBS.org. Time Team America website. Published 2014. Accessed June 1, 2017. http://www.pbs.org/time-team/experience-archaeology/botany/
16. Suppan L. The doctrine of signatures. *Journal of Pharmaceutical Sciences*.17(6):581–585.
17. Edriss H, Rosales BN, Nugent C, Conrad C, Nugent K. Islamic medicine in the Middle Ages. *The American Journal of the Medical Sciences*. 2017.
18. Nasser M, Tibi A, Savage-Smith E. Ibn Sina's Canon of Medicine: 11th century rules for assessing the effects of drugs. *Journal of the Royal Society of Medicine*. 2009;102(2):78–80.
19. Islamic medical manuscripts. Published 2004. Updated December 13, 2013. Accessed June 11, 2016. https://www.nlm.nih.gov/hmd/arabic/E8.html
20. Ravenel MP. The story of medicine in the Middle Ages. *American Journal of Public Health and the Nations Health*. 1935;25(12):1382–1383.
21. Minkowski WL. Women healers of the Middle Ages: Selected aspects of their history. *American Journal of Public Health*. 1992;82(2):288–295.
22. NIH. National Institute of Allergy and Infectious Diseases. Published 2011. Updated February 8, 2011. Accessed June 10, 2016. https://www.niaid.nih.gov/topics/leprosy/understanding/Pages/history.aspx
23. Covey HC. People with leprosy (Hansen's disease) during the Middle Ages. *Soc Sci J*. 2001;38(2):315–321.
24. Centers for Disease Control. Hansen's Disease (Leprosy). Published 2013. Accessed April 29, 2016. http://www.cdc.gov/leprosy/
25. Stanford University. History of leprosy. Published 2005. Accessed June 10, 2016. https://web.stanford.edu/group/parasites/ParaSites2005/Leprosy/history.htm
26. World Health Organization. Leprosy. Published 2016. Updated April 2016. Accessed June 10, 2016. http://www.who.int/mediacentre/factsheets/fs101/en/
27. MedlinePlus. Leprosy. Published 2016. Updated June 7, 2016. Accessed June 10, 2016. https://www.nlm.nih.gov/medlineplus/ency/article/001347.htm
28. Roberts CA, Lewis ME, Manchester K. *The Past and Present of Leprosy: Archaeological, Historical, Paleopathological and Clinical Approaches: Proceedings of the International Congress on the Evolution and Paleoepidemiology of the Infectious Diseases 3 (ICEPID), University of Bradford, 26th-31st July 1999 (under the Presidency of Professor Yves Coppens)*. Archaeopress; 2002.
29. Trautman JR. A brief history of Hansen's disease. *Bulletin of the New York Academy of Medicine*. 1984;60(7):689–695.
30. Monot M, Honore N, Garnier T, et al. On the origin of leprosy. *Science*. 2005;308(5724):1040–1042.
31. Badger LF. History of leprosy in the United States. *Ann N Y Acad Sci*. 1951;54(1):6–11.
32. Riedel S. Plague: From natural disease to bioterrorism. *Proceedings*. 2005;18(2):116–124.
33. McEvedy C. The bubonic plague. *Sci Am*. 1988;258(2):118–123.
34. Freemon FR. Bubonic plague in the book of Samuel. *Journal of the Royal Society of Medicine*. 2005;98(9):436–436.
35. Duffin J. *History of Medicine*, Second Edition. *A Scandalously Short Introduction*. University of Toronto Press; 2010.
36. How the plague spread to Italy. Brown University Decameron website. Published 2010. Updated March 12, 2010. Accessed April 24, 2016. http://www.brown.edu/Departments/Italian_Studies/dweb/plague/origins/spread.php
37. Decameron Web Italian Studies Department Virtual Humanities Lab. Published 2015. Updated January 19, 2015. Accessed June 11, 2016. http://www.brown.edu/Departments/Italian_Studies/dweb/the_project/about.php
38. Ligon BL. Plague: A review of its history and potential as a biological weapon. *Seminars in Pediatric Infectious Diseases*. 2006;17(3):161–170.
39. Centers for Disease Control. Plague. Published 2015. Updated September 10, 2015. Accessed June 5, 2016. http://www.cdc.gov/plague/index.html
40. Evans E. *Bring Out Your Dead in England*. U.S. National Library of Medicine; 1864.
41. Gabriele de' Mussi on the plague. Brown University. Decameron Web. Published 2010. Updated February 18, 2010. Accessed April 24, 2016. http://www.brown.edu/Departments/Italian_Studies/dweb/plague/perspectives/de_mussi.php
42. Wheelis M. Biological warfare at the 1346 siege of Caffa. *Emerg Infect Dis*. 2002;8(9):971–975.
43. Halsall P. Medieval Sourcebook: Boccaccio: The Decameron—Introduction 1996. Published 1996. Accessed April 3, 2016. https://sourcebooks.fordham.edu/source/boccacio2.asp
44. Boccaccio's life and works. Italian Studies Department Virtual Humanities Lab. Decameron Web. Updated January 25, 2014. Accessed June 11, 2016. http://www.brown.edu/Departments/Italian_Studies/dweb/boccaccio/life1_en.php
45. Singer DW. Some plague tractes (fourteenth and fifteenth centuries). *Proceedings of the Royal Society of Medicine*. 1916;9:159–214.
46. Decameron Web: Religious Interpretations of the Causes of the Plague. Brown University. Italian Studies Department. Published 2010. Updated 2010. Accessed April 3, 2016. http://www.brown.edu/Departments/Italian_Studies/dweb/plague/causes/religious.php
47. Huber ER. *Death, Dying, and the Culture of the Macabre in the Late Middle Ages*. University of Rochester Libraries. Published 2016 Updated 2016. Accessed June 5, 2016. http://www.library.rochester.edu/robbins/death
48. Mollaret HH. [A personal view of the history of the genus Yersinia]. *Contributions to microbiology and immunology*. 1987;9:1–13.

49. The death toll. Brown University. Decameron Web. Published 2010. Accessed April 24 2016. http://www.brown.edu/Departments/Italian_Studies/dweb/plague/effects/death_toll.php
50. Social and economic effects of the plague. Brown University. Decameron Web. Published 2010. Accessed April 24, 2016. http://www.brown.edu/Departments/Italian_Studies/dweb/plague/effects/social.php
51. Tuchman BW. *A Distant Mirror: The Calamitous 14th Century*. Random House Trade Paperbacks; 1978.
52. Pollitzer R. *Plague*. Geneva: World Health Organization; 1954.
53. Wu Lien-teh CJ, Pollitzer, R, Wu CY. *Plague: A Manual for Medical and Public Health Workers*. Shanghai, 1936.
54. Pollitzer R. A review of recent literature on plague. *Bulletin of the World Health Organization*. 1960;23:313–400.
55. Stenseth NC, Atshabar BB, Begon M, et al. Plague: Past, present, and future. *PLoS Med*. 2008;5(1):e3.
56. National Academies of Sciences, Engineering, Medicine. *Integrating Social Care into the Delivery of Health Care: Moving Upstream to Improve the Nation's Health*. Washington, DC: The National Academies Press; 2019.
57. National Academies of Sciences, Engineering, and Medicine. *Social Isolation and Loneliness in Older Adults: Opportunities for the Health Care System*. Washington, DC: The National Academies Press; 2020.
58. Centers for Disease Control. COVID-19: Hospitalization and death by age. Updated Feb.18, 2021. Accessed January, 2021. https://www.cdc.gov/coronavirus/2019-ncov/covid-data/investigations-discovery/hospitalization-death-by-age.html
59. Armitage R, Nellums LB. COVID-19 and the consequences of isolating the elderly. *The Lancet Public Health* 2020;5(5):e256.
60. Carney-Knisely GJ. Unintended consequences: Social isolation in the elderly during COVID-19. *Ohio Journal of Public Health*; 2021;4(1):3–4.
61. Fee E, Korstad RR. Women health workers: Past and present. *Am J Public Health*. 1992;82(2):165–166.
62. The five deadliest outbreaks and pandemics in history. In: *Culture of Health Blog*. Robert Wood Johnson Foundation; 2013.
63. Roberts L. Echoes of ebola as plague hits Madagascar. *Science*. 2017;358(6362):430–431.
64. Centers for Disease Control. Ebola (ebola virus disease). Published 2017. Updated October 18, 2017. Accessed November 1, 2017. https://www.cdc.gov/vhf/ebola/index.html
65. World Health Organization. Preparing for pandemics. Published 2020. Accessed January 5, 2020. https://www.who.int/westernpacific/activities/preparing-for-pandemics
66. World Health Organization. Coronavirus Disease 2019 (COVID-19). Published 2020. Accessed September 10, 2020. https://www.who.int/