

Pathology

Most historians and microbiologists identify the disease that spread in the fourteenth century as the bubonic plague, which is caused by the bacillus *Yersinia pestis*. The disease normally afflicts rats. Fleas living on the infected rats drink their blood and then pass the bacteria that cause the plague on to the next rat they bite. Usually the disease is limited to rats and other rodents, but at certain points in history—perhaps when most rats have been killed off—the fleas have jumped from their rodent hosts to humans and other animals. One of these instances appears to have occurred in the Eastern Roman Empire in the sixth century, when a plague killed millions of people. Another was in China and India in the 1890s, when millions again died. Doctors and epidemiologists closely studied this outbreak, identified the bacillus as bubonic plague, and learned about the exact cycle of infection for the first time.

The fourteenth-century outbreak showed many similarities to the nineteenth-century one, but also some differences. There are no reports of massive rat die-offs in fourteenth-century records. The medieval plague was often transmitted directly from one person to another through coughing and sneezing (what epidemiologists term *pneumonic* transmission) as well as through fleabites. The fourteenth-century outbreak spread much faster than the nineteenth-century epidemic and was much more deadly, killing as much as one-third of the population when it first reached an area. These differences have led a few historians to speculate that the Black Death was actually not the bubonic plague but a different disease, perhaps something like the Ebola virus. Other scholars counter that the differences could be explained by variant strains of the disease or improvements in sanitation and public health that would have significantly limited the mortality rate of later outbreaks, even in poor countries such as India. These debates fuel continued study of medical aspects of the plague, with scientists using innovative techniques such as studying the tooth pulp of bodies in medieval cemeteries to see if it contains DNA from plague-causing agents.

Though there is some disagreement about exactly what kind of disease the plague was, there is no dispute about its dreadful effects on the body. The classic symptom of the bubonic plague was a growth the size of a nut or an apple in the armpit, in the groin, or on the neck. This was the boil, or *bubo*, that gave the disease its name and caused agonizing pain. If the bubo was lanced and the pus thoroughly drained, the victim had a chance of recovery. If the boil was not lanced, however—and in the fourteenth century, it rarely

was—the next stage was the appearance of black spots or blotches caused by bleeding under the skin. (This syndrome did not give the disease its common name; contemporaries did not call the plague the Black Death. Sometime in the fifteenth century the Latin phrase *atra mors*, meaning “dreadful death,” was translated as “black death,” and the phrase stuck.) Finally, the victim began to cough violently and spit blood. This stage, indicating the presence of millions of bacilli in the bloodstream, signaled the end, and death followed in two or three days. The coughing also released those pathogens into the air, infecting others when they were breathed in and beginning the deadly cycle again on new victims.

Spread of the Disease

Plague symptoms were first described in 1331 in southwestern China, then part of the Mongol Empire. Plague-infested rats accompanied Mongol armies and merchant caravans carrying silk, spices, and gold across Central Asia in the 1330s. The rats then stowed away on ships, carrying the disease to the ports of the Black Sea by the 1340s. One Italian chronicler told of more dramatic means of spreading the disease as well: Mongol armies besieging the city of Kaffa on the shores of the Black Sea catapulted plague-infected corpses over the walls to infect those inside. The city's residents dumped the corpses into the sea as fast as they could, but they were already infected.

In October 1347 Genoese ships brought the plague from Kaffa to Messina, from which it spread across Sicily. Venice and Genoa were hit in January 1348, and from the port of Pisa the disease spread south to Rome and east to Florence and all of Tuscany. By late spring southern Germany was attacked. Frightened French authorities chased a galley bearing plague victims away from the port of Marseilles, but not before plague had infected the city, from which it spread to southern France and Spain. In June 1348 two ships entered the Bristol Channel and introduced it into England, and from there it traveled northeast into Scandinavia. The plague seems to have entered Poland through the Baltic seaports and spread eastward from there (Map 11.1).

Medieval urban conditions were ideal for the spread of disease. Narrow streets were filled with refuse, human excrement, and dead animals. Houses whose upper stories projected over the lower ones blocked light and air. Houses were beginning to be constructed of brick, but many wood, clay, and mud houses remained. A determined rat had little trouble entering such a house. In addition, people were already weakened by famine, standards of personal hygiene remained frightfully low, and the urban