

How a mysterious disease laid low Europe's masses

*In the 1300s, a third of the population
died of plague brought by fleas, shocking
the medieval world to its foundations*

Charles L. Mee jr.

In all likelihood, a flea riding on the hide of a black rat entered the Italian port of Messina in 1347, perhaps down a hawser tying a ship up at the dock. The flea had a gut full of the bacillus *Yersinia pestis*. The flea itself was hardly bigger than the letter "o" on this page, but it could carry several hundred thousand bacilli in its intestine.

Scholars today cannot identify with certainty which species of flea (or rat) carried the plague. One candidate among the fleas is *Xenopsylla cheopis*, which looks like a deeply bent, bearded old man with six legs. It is slender and bristly, with almost no neck and no waist, so that it can slip easily through the forest of hair in which it lives. It is outfitted with a daggerlike proboscis for piercing the skin and sucking the blood of its host. And it is cunningly equipped to secrete a substance that prevents coagulation of the host's blood. Although *X. cheopis* can go for weeks without feeding, it will eat every day if it can, taking its blood warm.

One rat on which fleas feed, the black rat (*Rattus rattus*), also known as the house rat, roof rat or ship rat, is active mainly at night. A rat can fall 50 feet and land on its feet with no injury. It can scale a brick wall or climb up the inside of a pipe only an inch and a half in diameter. It can jump a distance of two feet straight up and four horizontally, and squeeze through a hole the size of a quarter. Black rats have been found still swimming days after their ship has sunk at sea.

A rat can gnaw its way through almost anything—paper, wood, bone, mortar, half-inch sheet metal. It

gnaws constantly. Indeed, it *must* gnaw constantly. Its incisors grow four to five inches a year: if it were to stop gnawing, its lower incisors would eventually grow—as sometimes happens when a rat loses an opposing tooth—until the incisors push up into the rat's brain, killing it. It prefers grain, if possible, but also eats fish, eggs, fowl and meat—lambs, piglets and the flesh of helpless infants or adults. If nothing else is available, a rat will eat manure and drink urine.

Rats prefer to move no more than a hundred feet from their nests. But in severe drought or famine, rats can begin to move en masse for great distances, bringing with them any infections they happen to have picked up, infections that may be killing them but not killing them more rapidly than they breed.

Rats and mice harbor a number of infections that may cause diseases in human beings. A black rat can even tolerate a moderate amount of the ferocious *Yersinia pestis* bacillus in its system without noticeable ill effects. But bacilli breed even more extravagantly than fleas or rats, often in the millions. When a bacillus finally invades the rat's pulmonary or nervous system, it causes a horrible, often convulsive, death, passing on a lethal dose to the bloodsucking fleas that ride on the rat's hide.

The ultimate bacillus breeder

When an afflicted rat dies, its body cools, so that the flea, highly sensitive to changes in temperature, will

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find another host. The flea can, if need be, survive for weeks at a time without a rat host. It can take refuge here, even in an abandoned rat's nest or a bale of cloth. A dying rat may liberate scores of rat fleas. More than that, a flea's intestine happens to provide ideal breeding conditions for the bacillus, which will eventually multiply so prodigiously as finally to block the gut of the flea entirely. Unable to feed or digest blood, the flea desperately seeks another host. But now, as it sucks blood, it spits some out at the same time. Each time the flea stops sucking for a moment, it is capable of pumping thousands of virulent bacilli back into its host. Thus bacilli are passed from rat to flea to rat, contained, ordinarily, within a closed community.

For millions of years, there has been a reservoir of *Yersinia pestis* living as a permanently settled parasite—passed back and forth among fleas and rodents in warm, moist nests—in the wild rodent colonies of China, India, the southern part of the Soviet Union and the western United States. Probably there will always be such reservoirs—ready to be stirred up by sudden climatic change or ecological disaster. Even last year, four authentic cases of bubonic plague were confirmed in New Mexico and Arizona. Limited outbreaks and some fatalities have occurred in the United States for years, in fact, but the disease doesn't spread, partly for reasons we don't understand, partly because patients can now be treated with antibiotics.

And at least from biblical times on, there have been sporadic allusions to plagues, as well as carefully recorded outbreaks. The emperor Justinian's Constantinople, for instance, capital of the Roman empire in the East, was ravaged by plague in 541 and 542, felling perhaps 40 percent of the city's population. But none of the biblical or Roman plagues seemed so emblematic of horror and devastation as the Black Death that struck Europe in 1347. Rumors of fearful pestilence in China and throughout the East had reached Europe by 1346. "India was depopulated," reported one chronicler, "Tartary, Mesopotamia, Syria, Armenia, were covered with dead bodies; the Kurds fled in vain to the mountains. In Caramania and Caesarea none were left alive."

Untold millions would die in China and the rest of the East before the plague subsided again. By September of 1345, the *Yersinia pestis* bacillus, probably carried by rats, reached the Crimea, on the northern coast of the Black Sea, where Italian merchants had a good number of trading colonies.

From the shores of the Black Sea, the bacillus seems to have entered a number of Italian ports. The most famous account has to do with a ship that docked in the Sicilian port of Messina in 1347. According to an Italian chronicler named Gabriele de Mussis, Christian merchants from Genoa and local Muslim residents in the town of Caffa on the Black Sea got into an argument; a serious fight ensued between the merchants

and a local army led by a Tatar lord. In the course of an attack on the Christians, the Tatars were stricken by plague. From sheer spitefulness, their leader loaded his catapults with dead bodies and hurled them at the Christian enemy, in hopes of spreading disease among them. Infected with the plague, the Genoese sailed back to Italy, docking first at Messina.

Although de Mussis, who never traveled to the Crimea, may be a less-than-reliable source, his underlying assumption seems sound. The plague did spread along established trade routes. (Most likely, though, the pestilence in Caffa resulted from an infected population of local rats, not from the corpses lobbed over the besieged city's walls.)

In any case, given enough dying rats and enough engorged and frantic fleas, it will not be long before the fleas, in their search for new hosts, leap to a human being. When a rat flea senses the presence of an alternate host, it can jump very quickly and as much as 150 times its length. The average for such jumps is about six inches horizontally and four inches straight up in the air. Once on human skin, the flea will not travel far before it begins to feed.

The first symptoms of bubonic plague often appear within several days: headache and a general feeling of weakness, followed by aches and chills in the upper leg and groin, a white coating on the tongue, rapid pulse, slurred speech, confusion, fatigue, apathy and a staggering gait. A blackish pustule usually will form at the point of the fleabite. By the third day, the lymph nodes begin to swell. Because the bite is commonly in the leg, it is the lymph nodes of the groin that swell, which is how the disease got its name. The Greek word for "groin" is *boubōn*—thus, bubonic plague. The swellings will be tender, perhaps as large as an egg. The heart begins to flutter rapidly as it tries to pump blood through swollen, suffocating tissues. Subcutaneous hemorrhaging occurs, causing purplish blotches on the skin. The victim's nervous system begins to collapse, causing dreadful pain and bizarre neurological disorders, from which the "Dance of Death" rituals that accompanied the plague may have taken their inspiration. By the fourth or fifth day, wild anxiety and terror overtake the sufferer—and then a sense of resignation, as the skin blackens and the rictus of death settles on the body.

In 1347, when the plague struck in Messina, townspeople realized that it must have come from the sick and dying crews of the ships at their dock. They turned on the sailors and drove them back out to sea—eventually to spread the plague in other ports. Messina panicked. People ran out into the fields and vineyards and neighboring villages, taking the rat fleas with them.

When the citizens of Messina, already ill or just becoming ill, reached the city of Catania, 55 miles to the south, they were at first taken in and given beds in the hospital. But as the plague began to infect Ca-

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ania, the townspeople there cordoned off their town and refused—too late—to admit any outsiders. The sick, turning black, stumbling and delirious, were objects more of disgust than pity; everything about them gave off a terrible stench, it was said, their “sweat, excrement, spittle, breath, so foetid as to be overpowering; urine turbid, thick, black or red. . . .”

Wherever the plague appeared, the suddenness of death was terrifying. Today, even with hand-me-down memories of the great influenza epidemic of 1918 (SMITHSONIAN, January 1989) and the advent of AIDS, it is hard to grasp the strain that the plague put on the physical and spiritual fabric of society. People went to bed perfectly healthy and were found dead in the morning. Priests and doctors who came to minister to the sick, so the wild stories ran, would contract the plague with a single touch and die sooner than the person they had come to help. In his preface to *The Decameron*, a collection of stories told while the plague was raging, Boccaccio reports that he saw two pigs rooting around in the clothes of a man who had just died, and after a few minutes of snuffing, the pigs began to run wildly around and around, then fell dead.

“Tedious were it to recount,” Boccaccio thereafter laments, “brother was forsaken by brother, nephew by uncle, brother by sister and, oftentimes, husband by wife; nay what is more and scarcely to be believed, fathers and mothers were found to abandon their own children, untended, unvisited, to their fate, as if they had been strangers. . . .”

In Florence, everyone grew so frightened of the bodies stacked up in the streets that some men, called *becchini*, put themselves out for hire to fetch and carry the dead to mass graves. Having in this way stepped over the boundary into the land of the dead, and no doubt feeling doomed themselves, the *becchini* became an abandoned, brutal lot. Many roamed the streets, forcing their way into private homes and threatening to carry people away if they were not paid off in money or sexual favors.

Visiting men with pestilence

Some people, shut up in their houses with the doors barred, would scratch a sign of the cross on the front door, sometimes with the inscription “Lord have mercy on us.” In one place, two lovers were supposed to have bathed in urine every morning for protection. People hovered over latrines, breathing in the stench. Others swallowed pus from the boils of plague victims. In Avignon, Pope Clement was said to have sat for weeks between two roaring fires.

The plague spread from Sicily all up and down the

Atlantic coast, and from the port cities of Venice, Genoa and Pisa as well as Marseilles, London and Bristol. A multitude of men and women, as Boccaccio writes, “negligent of all but themselves . . . migrated to the country, as if God, in visiting men with this pestilence in requital of their iniquities, would not pursue them with His wrath wherever they might be. . . .”

Some who were not yet ill but felt doomed indulged in debauchery. Others, seeking protection in lives of moderation, banded together in communities to live a separate and secluded life, walking abroad with flowers to their noses “to ward off the stench and, perhaps, the evil airs that afflicted them.”

It was from a time of plague, some scholars speculate, that the nursery rhyme “Ring Around the Rosy” derives: the rose-colored “ring” being an early sign that a blotch was about to appear on the skin; “a pocket full of posies” being a device to ward off stench and (it was hoped) the attendant infection; “ashes, ashes” being a reference to “ashes to ashes, dust to dust” or perhaps to the sneezing “a-choo, a-choo” that afflicted those in whom the infection had invaded the lungs—ending, inevitably, in “all fall down.”

In Pistoia, the city council enacted nine pages of regulations to keep the plague out—no Pistoian was allowed to leave town to visit any place where the plague was raging; if a citizen did visit a plague-infested area he was not allowed back in the city; no linen or woolen goods were allowed to be imported; no corpses could be brought home from outside the city; attendance at funerals was strictly limited to immediate family. None of these regulations helped.

In Siena, dogs dragged bodies from the shallow graves and left them half-devoured in the streets. Merchants closed their shops. The wool industry was shut down. Clergymen ceased administering last rites. On June 2, 1348, all the civil courts were recessed by the city council. Because so many of the laborers had died, construction of the nave for a great cathedral came to a halt. Work was never resumed: only the smaller cathedral we know today was completed.

In Venice, it was said that 600 were dying every day. In Florence, perhaps half the population died. By the time the plague swept through, as much as one-third of Italy’s population had succumbed.

In Milan, when the plague struck, all the occupants of any victim’s house, whether sick or well, were walled up inside together and left to die. Such draconian measures seemed to have been partially successful—mortality rates were lower in Milan than in other cities.

Medieval medicine was at a loss to explain all this, or to do anything about it. Although clinical observation did play some role in medical education, an extensive reliance on ancient and inadequate texts prevailed. Surgeons usually had a good deal of clinical experience but were considered mainly to be skilled craftsmen, not men of real learning, and their experience

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not much incorporated into the body of medical knowledge. In 1300, Pope Boniface VIII had published a bull specifically inveighing against the mutilation of corpses. It was designed to cut down on the sale of miscellaneous bones as holy relics, but one of the effects was to discourage dissection. Physicians, priests and others had theories about the cause of the plague. Earthquakes that released poisonous fumes, for instance. Severe changes in the Earth's temperature creating southerly winds that brought the plague. The notion that the plague was somehow the result of a corruption of the air was widely believed. It was this idea that led people to avoid foul odors by hanging flowers to their noses or to try to drive out the infectious foul odors by inhaling the alternate foul odors of a latrine. Some thought that the plague came from the raining down of frogs, toads and reptiles. Some physicians believed one could catch the plague from "lust with old women."

By the fall of 1348, the plague began to abate. But then, just as hopes were rising that it had passed, the plague broke out again in the spring and summer of 1349 in different parts of Europe. This recurrence seemed to prove that the warm weather, and people bathing in warm weather, caused the pores of the skin to open and admit the corrupted air. In other respects, however, the plague remained inexplicable. Why did some people get it and recover, while others seemed not to have got it at all—or at least showed none of its symptoms—yet died suddenly anyway? Some people died in four or five days, others died at once. Some seemed to have contracted the plague from a friend or relative who had it, others had never been near a sick person. The sheer unpredictability of it was terrifying.

In fact, though no one would know for several centuries, there were three different forms of the plague, which ran three different courses. The first was simple bubonic plague, transmitted from rat to person by the bite of the rat flea. The second and likely most common form was pneumonic, which occurred when the bacillus invaded the lungs. After a two- or three-day incubation period, anyone with pneumonic plague would have a severe, bloody cough; the sputum cast into the air would contain *Yersinia pestis*. Transmitted through the air from person to person, pneumonic plague was fatal in 95 to 100 percent of all cases.

The third form of the plague was septocemic, and its precise etiology is not entirely understood even yet. In essence, however, it appears that in cases of septocemic plague the bacillus entered the bloodstream, perhaps at the moment of the fleabite. A rash formed and death occurred within a day, or even within hours, before any swellings appeared. Septocemic plague always turned out to be fatal.

Some people did imagine that the disease might be coming from some animal, and they killed dogs and cats—though never rats. But fleas were so much a part of everyday life that no one seems to have given them a second thought. Upright citizens also killed gravediggers, strangers from other countries, gypsies, drunks, beggars, cripples, lepers and Jews. The first persecution of the Jews seems to have taken place in the South of France in the spring of 1348. That September, at

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Both the pope and the king of France sent urgent requests for help to the medical faculty at the University of Paris, then one of the most distinguished medical groups in the Western world. The faculty responded that the plague was the result of a conjunction of the planets Saturn, Mars and Jupiter at 1 P.M. on March 20, 1345, an event that caused the corruption of the surrounding atmosphere.

Ultimately, of course, most Christians believed the cause of the plague was God's wrath at sinful Man. And in those terms, to be sure, the best preventives were prayer, the wearing of crosses and participation in other religious activities. In Orvieto, the town fathers added 50 new religious observances to the municipal calendar. Even so, within five months of the appearance of the plague, Orvieto lost every second person in the town.

There was also some agreement about preventive measures one might take to avoid the wrath of God. Flight was best: away from lowlands, marshy areas, stagnant waters, southern exposures and coastal areas, toward high, dry, cool, mountainous places. It was thought wise to stay indoors all day, to stay cool and to cover any windows that admitted bright sunlight. In addition to keeping flowers nearby, one might burn such aromatic woods as juniper and ash.

The retreat to the mountains, where the density of the rat population was not as great as in urban areas, and where the weather was inimical to rats and fleas, was probably a good idea—as well as perhaps proof, of a kind, of the value of empirical observation. But any useful notion was always mixed in with such wild ideas that it got lost in a flurry of desperate (and often contrary) stratagems. One should avoid bathing because that opened the pores to attack from the corrupt atmosphere, but one should wash face and feet, and sprinkle them with rose water and vinegar. In the morning, one might eat a couple of figs with rue and

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Chillon on Lake Geneva, a group of Jews were accused of poisoning the wells. They were tortured and they confessed, and their confessions were sent to neighboring towns. In Basel all the Jews were locked inside wooden buildings and burned alive. In November, Jews were burned in Solothurn, Zofingen and Stuttgart. Through the winter and into early spring they were burned in Landsberg, Burren, Memmingen, Lindau, Freiburg, Ulm, Speyer, Gotha, Eisenach, Dresden, Worms, Baden and Erfurt. Sixteen thousand were murdered in Strasbourg. In other cities Jews were walled up inside their houses to starve to death. That the Jews were also dying of the plague was not taken as proof that they were not causing it.

On the highways and byways, meanwhile, congregations of flagellants wandered about, whipping themselves twice a day and once during the night for weeks at a time. As they went on their way they attracted hordes of followers and helped spread the plague even farther abroad.

The recurrence of the plague after people thought the worst was over may have been the most devastating development of all. In short, Europe was swept not only by a bacillus but also by a widespread psychic breakdown—by abject terror, panic, rage, vengefulness, cringing remorse, selfishness, hysteria, and above all, by an overwhelming sense of utter powerlessness in the face of an inescapable horror.

After a decade's respite, just as Europeans began to recover their feeling of well-being, the plague struck again in 1361, and again in 1369, and at least once in each decade down to the end of the century. Why the plague faded away is still a mystery that, in the short run, apparently had little to do with improvements in medicine or cleanliness and more to do with some adjustment of equilibrium among the population of rats and fleas. In any case, as agents for Pope Clement estimated in 1351, perhaps 24 million people had died in the first onslaught of the plague; perhaps as many as another 20 million died by the end of the century—in all, it is estimated, one-third of the total population of Europe.

Very rarely does a single event change history by itself. Yet an event of the magnitude of the Black Death could not fail to have had an enormous impact. Ironically, some of the changes brought by the plague were for the good. Not surprisingly, medicine changed—since medicine had so signally failed to be of any help in the hour of greatest need for it. First of all, a great many doctors died—and some simply ran away. "It has pleased God," wrote one Venetian-born physician, "by this terrible mortality to leave our native place so destitute of upright and capable doctors that it may be said not one has been left." By 1349, at the University of Padua there were vacancies in every single chair of medicine and surgery. All this, of course, created room for new people with new ideas. Ordinary people began wanting to get their hands on medical guides and to

take command of their own health. And gradually more medical texts began to appear in the vernacular instead of in Latin.

An old order was besieged

Because of the death of so many people, the relationship between agricultural supply and demand changed radically, too. Agricultural prices dropped precipitously, endangering the fortunes and power of the aristocracy, whose wealth and dominance were based on land. At the same time, because of the deaths of so many people, wages rose dramatically, giving laborers some chance of improving their own conditions of employment. Increasing numbers of people had more money to buy what could be called luxury goods, which affected the nature of business and trade, and even of private well-being. As old relationships, usages and laws broke down, expanding secular concerns and intensifying the struggle between faith and reason, there was a rise in religious, social and political unrest. Religious reformer John Wycliffe, in England, and John Huss, in Bohemia, were among many leaders of sects that challenged church behavior and church doctrine all over Europe. Such complaints eventually led to the Protestant Reformation; and the assertion that Man stood in direct relation to God, without need to benefit from intercession by layers of clergy.

Indeed, the entire structure of feudal society, which had been under stress for many years, was undermined by the plague. The three orders of feudalism—clergy, nobility and peasantry—had been challenged for more than a century by the rise of the urban bourgeoisie, and by the enormous, slow changes in productivity and in the cultivation of arable land. But the plague, ravaging the weakened feudal system from so many diverse and unpredictable quarters, tore it apart.

By far the greatest change in Western civilization that the plague helped hasten was a change of mind. Once the immediate traumas of death, terror and flight had passed through a stricken town, the common lingering emotion was that of fear of God. The subsequent surge of religious fervor in art was in many ways nightmarish. Though medieval religion had dealt with death and dying, and naturally with sin and retribution, it was only after the Black Death that painters so wholeheartedly gave themselves over to pictures brimming with rotting corpses, corpses being consumed by snakes and toads, swooping birds of prey appearing with terrible suddenness, cripples gazing on the figure of death with longing for deliverance, open graves filled with blackened, worm-eaten bodies, devils slashing the faces and bodies of the damned.

Well before the plague struck Europe, the role of the Catholic Church in Western Europe had been changing. The Papacy had grown more secular in its concerns, vying with princes for wealth and power

even while attempts at reform were increasing. "God gave us the Papacy," Pope Leo X declared. "Let us enjoy it." The church had suffered a series of damaging blows in the late 1200s—culminating in 1309 when the Papacy moved from Rome to Avignon. But then, the Black Death dealt the church a further blow, for along with renewed fear and the need for new religious zeal came the opposite feeling, that the church itself had failed. Historical changes rarely occur suddenly. The first indications of change from a powerful catalyst usually seem to be mere curiosities, exceptions or aberrations from the prevailing worldview. Only after a time, after the exceptions have accumulated and seem to cohere, do they take on the nature of a historical movement. And only when the exceptions have come to

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dominate, do they begin to seem typical of the civilization as a whole (and the vestiges of the old civilization to seem like curiosities). This, in any case, is how the great change of mind occurred that defines the modern Western world. While the Black Death alone did not cause these changes, the upheaval it brought about did help set the stage for the new world of Renaissance Europe and the Reformation.

As the Black Death waned in Europe, the power of religion waned with it, leaving behind a population that was gradually but certainly turning its attention to the physical realm in which it lived, to materialism and worldliness, to the terrible power of the world itself, and to the wonder of how it works.