PLAGUE

The very mention of plague induces shudders of horror in adults and schoolchildren alike. Plague has been responsible for some of the worst catastrophes in the story of humankind, and more than once has changed the course of history. Bubonic plague is caused by a bacterium, *Yersinia pestis*, mainly transmitted to humans by fleas from infected rodents, notably the black rat, *Rattus rattus*. Although most historians assume that this was the prime mode of transmission of most plague epidemics, some have recently questioned whether the so-called plagues of the past really were 'true' bubonic or pneumonic plague. The story of plague is at once the most gruesome and the most fascinating of medical mysteries.

'When leaving his surgery on the morning of April 16, Dr Bernard Rieux felt something soft under his foot. It was a dead rat lying in the middle of the landing.'

This unsettling moment comes near the beginning of *La Peste* (The Plague), a novel by the French philosopher Albert Camus (1913–60), first published in 1947.

'On the spur of the moment he kicked it to one side and, without giving it a further thought, continued on his way downstairs. Only when he was stepping out into the street did it occur to him that a dead rat had no business to be on his landing, and he turned back to ask the concierge of the building to see to its removal.'

Thus a dead rat, a doctor and a concierge become bound up in one of the most compelling fictional accounts of plague, set in the late 1940s in the Algerian port city of Oran. An allegory of the Nazi occupation of France, and a metaphor of the meaning of life and suffering, the story also contains all the classic plague scenarios. A few days after Dr Rieux comes across his first dead rat, the city is overwhelmed by the creatures. From basements, cellars and sewers the rats *'emerged in long wavering files into the light of day, swayed helplessly, then did a sort of pirouette and fell dead at the feet of horrified onlookers'*. Some

Two men discover a plague victim in the street during the Great Plague of London in 1665, whilst behind them another corpse is carried out to a cart for disposal.

die with blood spurting from their mouths, others are bloated and already beginning to rot. Everywhere people feel underfoot the squelchy roundness of dead – or still squealing but dying – rats. On 30 April the concierge, M. Michel, dies of bubonic plague. His last words are:

'Them rats! Them damned rats!'

As plague sweeps through the city, the doctor describes the panic, the horrors, the pain of death and broken hearts, the attempts to clean up and cordon off the city, separating loved ones and fuelling despair, frustration, compassion and anguish. When the plague recedes and the gates of the city open once more, there is

timeline

540–mid-6th century *First cycle of plague, possibly originating in Asia, spreads to North Africa then to the Mediterranean and the Middle East.*

541–4 *Plague of Justinian.*

1330s–18th century *Second cycle of plague, with many severe outbreaks in Europe.*

1347–53 *The Black Death – one of the most deadly pandemics in human history.*

1665–6 *The Great Plague of London.*

1720–2 *Plague in Marseilles – the last major outbreak in western Europe.*

From 1855 *Third cycle of plague, starting in Asia, with 12.6 million deaths in India between 1898 and 1948. In the 1900s plague reaches the Pacific coast of North America, Australia and Great Britain (with a few deaths in Glasgow, Cardiff and Liverpool).*

1894 *Severe epidemic in Canton (Guangzhou) and Hong Kong. Alexandre Yersin (1863–1943) identifies the plague bacillus.*

1895 *Yersin and others in Paris develop an anti-plague serum from the blood of horses to boost human immune systems.*

1896 *The Russian-born bacteriologist Waldemar Haffkine (1860–1930) sets up a small lab in Bombay and develops a successful vaccine.*

1898 *The French bacteriologist Paul-Louis Simond (1858–1947), working in Bombay and Karachi, deduces that rat fleas are the critical intermediary link between rats and humans.*

1900–4 *San Francisco suffers the first known plague epidemic in North America.*

1904–7 *The Plague Research Commission confirms the role of the rat and the flea in the transmission of plague.*

1907–9 *Plague in San Francisco, following the 1906 earthquake. 100,000 rats are captured.*

1910–11 *Epidemic of pneumonic plague in Manchuria in northeast Asia after hunters handle and eat the meat of infected tarabagans (Russian marmots), in a quest to cash in on the booming trade in their fur. The epidemic spreads along newly constructed railway lines, killing 60,000 people.*

1924–5 *Outbreak of plague in Los Angeles.*

1950s *The antibiotics streptomycin and gentamycin are used to treat plague.*

1994 *Outbreak – possibly of plague – in India rings alarm bells around the world.*

2001 *Scientists unravel the complete genetic structure of the bacillus responsible for plague.*

21st century *Approximately 2000 new cases and 180 deaths per year, with 98.7 per cent of cases and deaths in Africa.*

'We see death coming into our midst like black smoke, a plague that cuts off the young, a rootless phantom that has no mercy for fair countenance. Woe is me of the shilling [bubo] in the armpit; it is seething, terrible, where ever it may come, a head that gives pain and causes a loud cry, a burden carried under the arms, a painful angry knob, a white lump.'

JEUAN GETHIN (d.1349), WELSH POET

rejoicing and relief. But Dr Rieux knows that *'the plague bacillus never dies or disappears for good … and that perhaps the day would come when … it would rouse up its rats again and send them forth to die in a happy city'.*

Dead rats and modern imaginations

Rats and rat fleas invariably feature together in our imaginations as the harbingers of the terrible plagues of the past. At the start of a typical epidemic, large numbers of rodents are suddenly afflicted. As in Camus' story, when the rats begin to die off, the infected rat fleas (*Xenopsylla cheopis*), frantic with hunger, search for new sources of blood, and thus turn to humans. Engorged with plague bacilli, the flea acts like a hypodermic needle, injecting the bacilli into the lymphatic system of humans.

The early signs of the disease are the hard swollen buboes (from the Greek *boubon*, 'swollen groin') in the groin, armpit or neck, close to the site of the flea bite. Plague can also become pneumonic when the bacilli enter the lungs, and when this happens the disease can be transmitted directly from person to person. Septicaemic plague is the most lethal form of all, occurring when the bacilli go straight into the bloodstream, and resulting in the haemorrhaging body being covered with ominous black 'tokens'. Untreated, bubonic plague kills up to 60 per cent of its victims, pneumonic plague some 90 per cent, and septicaemic plague virtually 100 per cent. The human flea, *Pulex irritans*, may also play a role in the subsequent inter-human dissemination of the plague – this remains a plausible but contentious theory.

Writers and eyewitnesses

Rat 'falls' or 'die-offs' are the key feature that precipitates an outbreak of plague in humans. In India and China, folk wisdom warns that when the rats start dying, it is time to flee. But in early European descriptions of plague, there is an eerie silence about dead rats. In *A Journal of a Plague Year* (1722) Daniel Defoe (1660–1731) gives a riveting semi-fictional account of the Great Plague that visited London in 1665–6. Although he recounts a similar sequence of events as Camus does in *La Peste*, Defoe nevertheless says nothing about dying rats. The diarist Samuel Pepys (1633–1703), who actually lived through the Great Plague, also fails to mention dead rats.

The transmitter of plague from infected rats to humans is the flea. Fleas are tiny, flattened insects which pass the disease on when they bite their victims to obtain a meal of blood.

During the Black Death of the mid-14th century, eyewitnesses such as Giovanni Boccaccio (1313–75) mention the myriad human corpses that littered the streets and filled the mass graves, but again there is no mention of swarms of dying rats. Further back in time, the account made in 542 by

Procopius of Caesarea (*c.*500–*c.*565) of the Plague of Justinian – thought to be the first major epidemic of bubonic plague in European history – gives no clues as to whether this 'plague' was sparked off by rats and their fleas.

Camus was writing some 50 years after scientists had conclusively shown that the plague bacillus is transmitted by infected rodents and their fleas. Procopius, Boccaccio, Defoe and others were describing plague hundreds of years before that connection had been made. Their accounts of the signs and symptoms, the devastation, the human terrors and the social, economic and psychological consequences of plague are not dissimilar. But was this the same disease? Most historians would say 'yes' – but some have taken a different view (see What was the Black Death?, right).

The first great plague

The word 'plague' derives from the Greek word *plege*, and the Latin word *plaga*, meaning 'blow' or 'stroke'. Like the words 'pest', 'pestilence' and 'pox', it was often used to cover a multitude of devastating epidemic diseases. The various biblical 'plagues' and some of the ancient 'plagues', such as the Plague of Athens (430–427 BC), the Plague of Orosius (AD 125), the Plague of Antoninus (164–89) and the Plague of Cyprian (250–66), were lethal epidemics but, while their identity remains uncertain, they were probably not bubonic plague.

The first great plague to bear the characteristic swollen buboes was the Plague of Justinian in 541–4. Spreading from Egypt to Europe, the Plague of Justinian may well have played a role in the eventual collapse of the Roman empire.

In the fourth century, the Roman empire had split in half with two capitals: Rome in the west and Constantinople in the east. By the sixth century, the western Roman empire, invaded by Goths and Vandals, had already fallen apart; in the east the emperor Justinian (r.527–65), was determined to re-conquer and unite the western and eastern realms. But his ambitions were thwarted by the plague that bears his name. The Plague of Justinian killed, at its peak, as many as 10,000 people a day in Constantinople (now Istanbul) and spread like wildfire through coastal ports and inland towns. It is estimated that perhaps one-quarter of the population of Mediterranean Europe died over the following few years.

The Byzantine chronicler Procopius of Caesarea vividly described the horrors of this epidemic, *'by which the whole human race came near to be annihilated'*.

WHAT WAS THE BLACK DEATH?

Most historians still adhere to the conventional view that the Black Death and later plague epidemics were a combination of bubonic, pneumonic and septicaemic plague, and that the black rat and its fleas (even if absent from most documentary sources) were somehow involved. Overturning conventional wisdom is not easy, especially when it relates to a story so ingrained in our minds.

But there are a number of scholars who have argued that the first and second cycles of 'plague' were not bubonic plague at all. Anthrax (a bacterial disease) or some highly contagious haemorrhagic fever, rather like the Ebola virus, are possible alternatives.

Spurred on by such debates, scientists are now excavating old plague pits in the hope of identifying the pathogenic agent responsible, and thus solving some of the mysteries. Others are looking for the remains of black rats, in the hope that they might tell us more.

The plague devastating Florence in 1348, an event graphically described by the Italian author Giovanni Boccaccio in *The Decameron* (1350–3), from which this illustration is taken. One observer during the Black Death likened the plague pits in which the layers of corpses were separated with sprinklings of dirt to 'cheese between layers of lasagne'.

Victims, he reported, writhed in fever, suffering agonies from grossly swollen buboes. Some became delirious and hallucinated, others died vomiting and choking on blood – possibly suggesting that both the bubonic and pneumonic forms of the disease were involved. There were too many corpses to bury. Roofs were removed from the fortified towers of Constantinople so that the dead bodies could be piled high. Some of the corpses were tossed onto rafts and allowed to drift out to sea. Panic, disorder and madness reigned. Thus began the first cycle of bubonic plague.

The origins of the Black Death

The eruption of the second cycle of plague – the catastrophic Black Death, which spread from Asia to the Middle East, North Africa and Europe in the mid-14th century – is firmly imprinted on many people's imaginations. Descriptions of buboes the size of an egg or even an apple, plus blotches, boils, bruises, black pustules and the coughing up of blood, vomit and sputum suggest that the Black Death may have been a combination of bubonic, septicaemic and pneumonic plague. While there are still many unsolved riddles about the Black Death, most

historians agree that in Europe alone, in the space of a few years, from 1347–53, at least 25 million people died, possibly more than one-third of the population of Europe. It was the greatest demographic crisis of the Medieval period, and in terms of the proportion killed, the single most calamitous epidemiological event in all of history.

> 'How many valiant men, how many fair ladies, breakfasted with their kinsfolk and that same night supped with their ancestors in the other world.'
>
> GIOVANNI BOCCACCIO (1313–75)

How, where and why the Black Death started is less certain. It is possible that it erupted somewhere in the steppes of Central Asia in the 1330s and then spread westwards along the caravan routes. The most gripping (but not necessarily the most plausible) account of its introduction to Europe begins on the Crimean coast of the Black Sea at the trading post of Kaffa (now known as Theodosia), where a group of Genoese merchants were trapped by besieging Tartars.

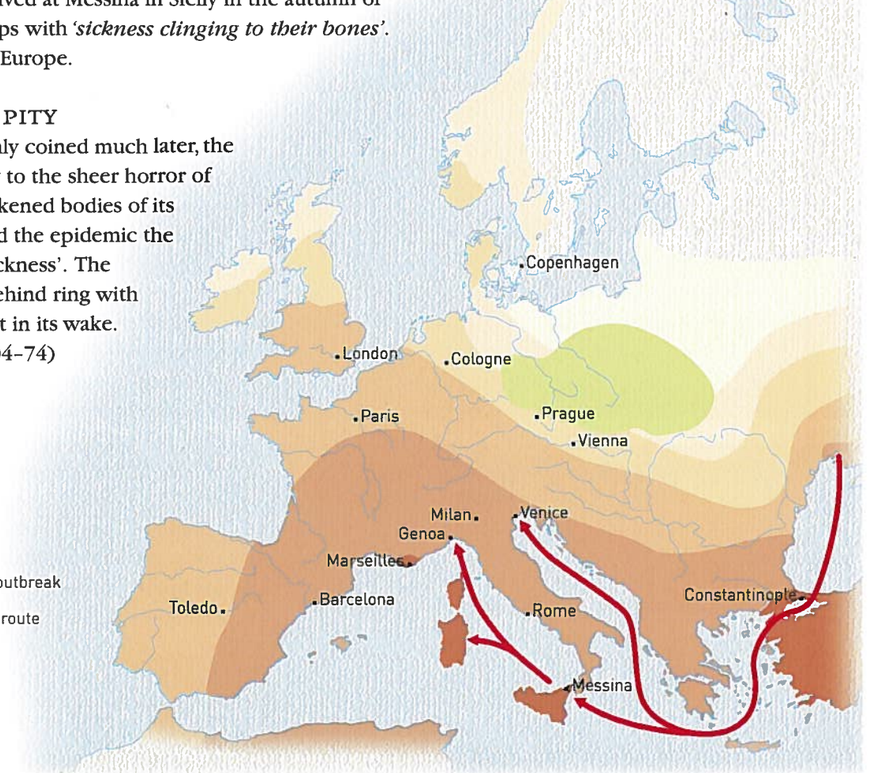
When the attackers were struck by the plague, they were forced to retreat, leaving behind hundreds of unburied corpses. According to Gabriele de' Mussis (d.1356), as a parting shot the Tartar leader Khan Jani Beg (d.1357), *'stunned and stupefied'* by the arrival of the plague, *'ordered corpses to be placed in catapults and lobbed into the city in the hope that the intolerable stench would kill everyone inside … '*

The 'intolerable stench' did not, apparently, kill all the Genoese. Some escaped, unwittingly carrying the plague with them back to the shores of the Mediterranean. When they arrived at Messina in Sicily in the autumn of 1347 they tumbled off the ships with *'sickness clinging to their bones'*. The Black Death had reached Europe.

The sorrow and the pity

The term 'Black Death' was only coined much later, the word 'black' referring possibly to the sheer horror of the pestilence and to the blackened bodies of its victims. Contemporaries called the epidemic the 'Great Mortality' or the 'Big Sickness'. The poignant accounts they left behind ring with the terrible sorrows it brought in its wake. The Italian poet Petrarch (1304–74)

The epidemic of plague, known as the Black Death, spread rapidly through Europe in the mid-14th century. Probably carried overland from Central Asia initially via caravan trading routes, it was disseminated to major coastal ports across western Europe on merchant ships.



expressed the perplexity and loneliness that must have haunted those who survived:

> *'Where are our dear friends now? Where are the beloved faces? Where are the affectionate words, the relaxed and enjoyable conversations? What lightning bolt devoured them? What earthquake toppled them? What tempest drowned them? What abyss swallowed them? There was a crowd of us, now we are almost alone.'*

A tax collector and shoemaker in Siena, Italy, called Agnolo di Tura believed, like many others, that *'This is the end of the world'*. His whole family died, *'And I, Agnolo di Tura, called the Fat, buried my five children with my own hands'*.

Everywhere – from the China Sea to the Mediterranean, across vast swathes of continental Europe and the British Isles, to the northern reaches of Scandinavia and Russia – countless bodies were buried by surviving family and friends, tossed onto rattling carts, buried in pest pits, or left to rot in the midday sun, to be devoured by wolves, pigs and dogs. In Venice the dead were dropped into gondolas and rowed out to sea with cries of '*Corpi morti, corpi morti*'.

WHY ME? WHY HERE? WHY NOW? Written accounts of plague epidemics dating from the Medieval and early modern periods remind us of the many ways in which people at the time wrestled to make sense of the origin, cause and spread of plague.

At one level were the divine and celestial explanations – God's reaction to the sins of humanity, or some ominous configuration of stars and planets.

There were also the 'down-to-earth' explanations: earthquakes, unusual weather and, above all, the rot and decay of rubbish accumulating in streets and dung heaps, emitting foul miasmas that poisoned the air.

And then there were the people themselves: whether sinful, smelly or sickly, humans were somehow thought to be bound up with the pestilential corruption of the world, and also capable of spreading sickness by contagious vapours from breath, buboes or clothes.

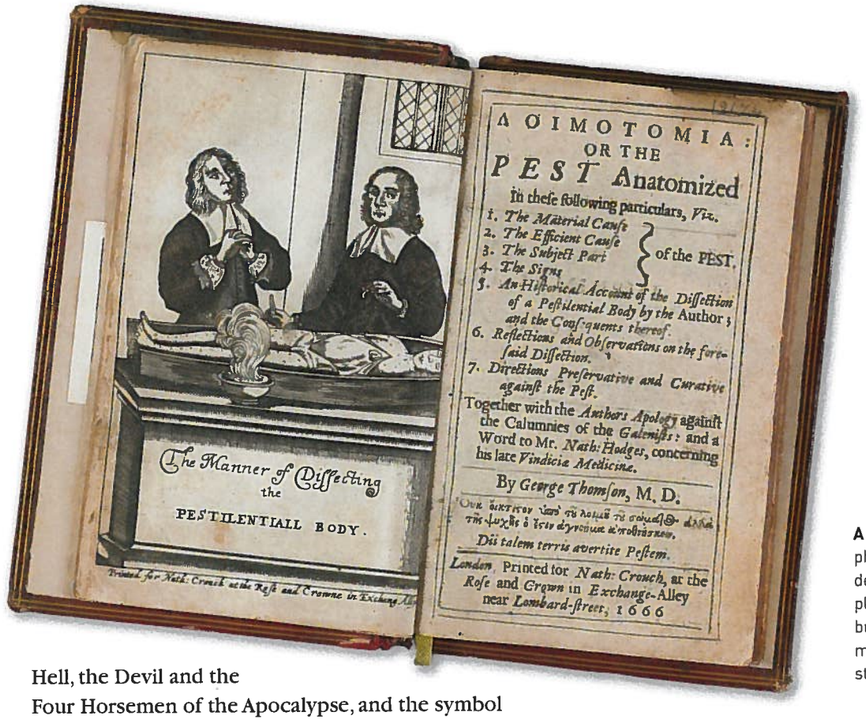
Rotting corpses and silent bells

The smell of death was all-pervading – in the foetid breath and buboes of the afflicted, in the filthy alleys of crowded towns and villages, in the ghost ships crewed by dying sailors, in the mass graves stacked high with putrefying corpses. Giovanni Boccaccio (1313–75), describing Florence in *The Decameron* (1350–3), wrote:

> *'Many dropped dead in the open streets, both by day and by night, whilst a great many others, though dying in their own houses, drew their neighbours' attention to the fact more by the smell of their rotting corpses than by any other means. And what with these, and the others who were dying all over the city, bodies were here, there and everywhere.'*

With the sadness and stenches came a dreadful silence. In some places even the funeral bells and weeping ceased – for *'all expected to die'*. Petrarch, who had lost his beloved Laura to the plague in Avignon in 1348, noted the vast and dreadful silence hovering over the world. *'Is it possible'*, he wondered, *'that posterity can believe these things? For we, who have seen them, can hardly believe them'*.

As the 'Great Mortality' slowly retreated, there was an outpouring of macabre art and literature across Europe. The Dance of Death, the Grim Reaper, fearsome visions of



A historical account by the physician George Thomson, detailing the dissection of a plague victim. Incense is burning in the bowl as a means of camouflaging the stench of the body.

Hell, the Devil and the Four Horsemen of the Apocalypse, and the symbol of the skull and crossbones – all are chilling reminders of the scars that the Black Death seared into the minds of men and women in the later Middle Ages.

Plague continues to take its toll

After the ravages of the Black Death, plague did not disappear. It continued to reap its grim harvests, and between the 14th and 18th centuries, some 50 million Europeans are believed to have died as the plague periodically swept from east to west.

The Great Plague of London in 1665–6 – so vividly described by Samuel Pepys and Daniel Defoe – killed 70,000–100,000 people, or one-fifth to one-quarter of the population of London, causing panic and terror. 'Searchers' – often illiterate old women – sought out and identified the sick, who were incarcerated in their homes, their doors marked with a red cross and the words '*Lord have mercy upon us*'. Carts collected the dead at night, and the corpses filled up mass graves to the brim. The churches were crammed with the grieving, the penitent and the sickly. Many who could afford to do so fled, including not only the court, but also priests and physicians.

Whipped for Not Smoking

During the Great Plague of London of 1665–6 a schoolboy at Eton College is recorded as being 'never whipped so much in his life as he was one morning for not smoking' *– tobacco being regarded as a way of preventing infection.*

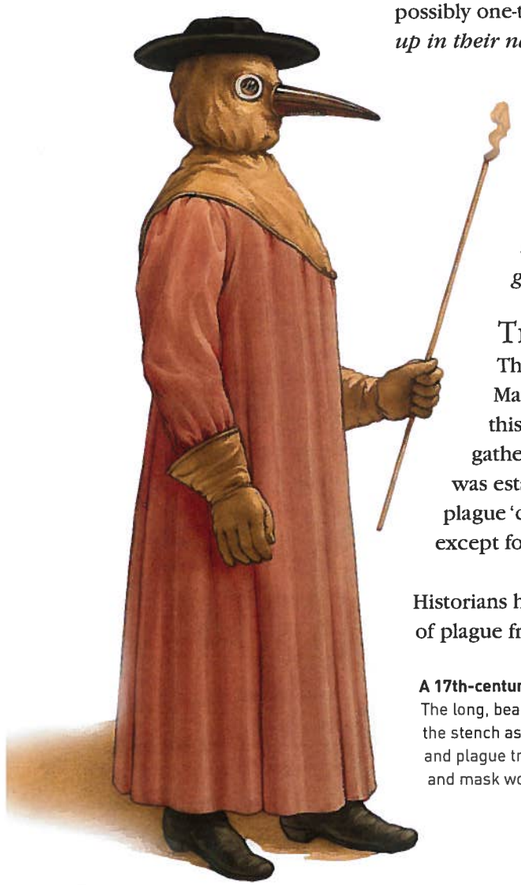
'But Lord', wrote Pepys on 16 October 1665, *'how empty the streets are, and melancholy, so many poor sick people in the streets, full of sores, and so many sad stories overheard as I walk, everyone talking of this dead, and that man sick, and so many in this place, and so many in that'.*

'Now, there is a dismal solitude … shops are shut … people rare, very few walk about … and there is a deep silence in almost every place. If any voice can be heard, it is the groans of the dying, and the funeral knell of them that are ready to be carried to their graves.'

THOMAS VINCENT, DESCRIBING THE GREAT PLAGUE OF LONDON, 1665–6

Pepys himself survived, and even at times enjoyed the occasional merrymaking. His wife, whom he sent to Woolwich, was much *'afeared'* about her pet dog, as the authorities rounded up and killed all stray dogs and cats. She also washed her hair in vinegar while Pepys, who was *'put into an ill conception of myself and my smell'*, was *'forced to buy some roll tobacco to smell and chaw – which took away the apprehension'*.

The plague spread to many other English towns and villages. When the community of Eyam in the Peak District of Derbyshire was hit, the rector, William Mompesson (1639–1709), cordoned off the village in an attempt to prevent the plague spreading to the surrounding countryside. The villagers left coins in vinegar-filled holes in gateposts along the bounds of the village to pay for food left for them by neighbours. By the autumn of 1666, over 250 of Mompesson's flock had died, possibly one-third of the population of Eyam. As one chronicler described it, *'shut up in their narrow valley, the villagers perished helplessly like a stricken flock of sheep'*. The rector's own wife was one of the victims. Mompesson survived and, reflecting on the tragedy, wrote: *'The condition of this place hath been so dreadful that I persuade myself it exceedeth all history and example. I may truly say our Town has become a Golgotha, a place of skulls … My ears never heard such doleful lamentations. My nose never smelt such noisome smells and my eyes never beheld such ghastly spectacles.'*



A 17th-century physician wearing a traditional plague-preventive costume. The long, beak-like nose piece was filled with aromatic substances to combat the stench associated with plague. Although the connection between fleas and plague transmission was unknown at the time, the long robes, gloves and mask would have helped to give the wearer protection from flea bites.

THE RAT RACE

The last devastating outbreak of plague in western Europe was in Marseilles, France, in 1720–2, when around 50,000 people died. On this occasion dead rats were noted: apparently 10,000 of them were gathered up by fishermen and dumped out at sea. But still no connection was established at the time between rats and bubonic plague. Thereafter, plague 'disappeared' from western Europe – or at least never reappeared, except for a few brief flurries.

Historians have long debated all sorts of theories about the disappearance of plague from western Europe. For England, the Great Fire of London in September 1666, the cleansing of urban environments, the development of resistance to plague amongst the black rats, the ousting of the black rat (*Rattus rattus*) by the brown or sewer rat (*R. norvegicus*), and changes in climate are just a few of the ideas that have been mooted, but which have generally been questioned. Quite a number of historians have highlighted the effectiveness of quarantine measures (see Quarantine, page 18), but why the cycle of plague was eventually broken still remains something of a puzzle. Although plague receded from western Europe, it continued to flare up in eastern Europe, Asia and Africa, and eventually reached North America and Australia. The third great plague pandemic originated in China in the mid-19th century, and by the 1890s was causing massive mortality in many parts of Southeast Asia. With plague raging in Hong Kong in 1894, two leading scientists were sent to find its cause.

Alexandre Yersin (1863–1943), a Swiss-born French bacteriologist, and Shibasaburo Kitasato (1852–1931), a Japanese bacteriologist who had worked with Robert Koch (1843–1910) in Berlin, were in a race to come up with an answer. Kitasato had the backing of the British authorities in Hong Kong and

'FLEE EARLY, FLEE FAR, RETURN LATE'

The advice usually given to those wishing to avoid infection during an outbreak of plague was to flee. This was often a dilemma for physicians and priests, as it meant leaving the poor and sick to face illness and death alone.

During the Black Death and later plagues, many people undertook penance and prayed for forgiveness in the hope of avoiding infection. Some took penitence to extremes, flogging themselves or one another with knotted strips of leather or iron spikes. Yet more horrific was the mass torture and murder of thousands of Jews and others in Europe accused of poisoning wells and spreading the disease. These pogroms cast a dark shadow over the era of the Black Death.

In later plague epidemics, authorities ordered cleaning up of dung heaps, and quarantining the infected. Individuals sought to save themselves by smoking tobacco, sitting under a foul-smelling latrine or sniffing roses. Viper fat, spiders' webs, toad poison, woodlice and crab's eyes were a few of the antidotes offered for sale. When the plague threatened London, someone suggested filling a ship with peeled onions and letting it float down the Thames, in the hope that its absorbent powers would protect the city.

Those who could, such as the wealthy, fled from plague-infected areas, as this woodcut of London from 1630 shows.

access to a large number of autopsies in Kennedy Town Hospital. Yersin made do with a straw hut and a few basic medical tools, and had to bribe gravediggers to allow him to cut out some buboes from the dead awaiting burial. Both scientists thought they had found the plague bacillus in the summer of 1894. It was, however, Yersin's bacillus – a gram-negative bacterium – that was identified as the correct one. He named it *Pasteurella pestis* in honour of his French patron, Louis Pasteur (1822–95). In 1954 it was renamed *Yersinia pestis*.

Yersin also developed an anti-serum that became the first 'cure' for plague. But neither Yersin nor Kitasato solved the critical piece of the puzzle – how was plague spread? Although Yersin had noticed the large number of dead rats lying on the road in infected areas of Hong Kong and had speculated that plague might be rat-borne, it was Masanori Ogata (1853–1919) working in Formosa (now Taiwan) and Paul-Louis Simond (1858–1947), a French scientist in Bombay, who in 1898 worked out that plague was transmitted from rats to humans by the bite of a flea. The idea was initially ridiculed, and it took nearly a decade before it was finally accepted by the scientific community.

Pockets of pestilence

During this third great plague pandemic, the disease reached North America – and also Australia – for the first time. In 1900 the SS *Nippen Maru* arrived at San Francisco from China and, although it was quarantined, plague somehow reached the Chinese community. A Chinese immigrant, Chick Gin, was the first victim. He was found dead in a filthy, overcrowded 'flophouse' called the Globe Hotel with foaming, bloody spittle over his face, ashen grey skin and huge swellings around his groin and armpits. His death was quickly followed by draconian measures to quarantine, vaccinate and 'cleanse' Chinatown.

When plague struck San Francisco again after the terrible earthquake in 1906, there was, this time, an understanding of the role of the rat and its flea in the transmission of plague. The authorities set out to 'wage a war on the rats': posters encouraged people to trap and poison them, but they also warned against picking up dead rats or squashing fleas with fingers or teeth. There were 121 cases of plague and 113 deaths in the first outbreak (almost all Chinese immigrants), and 160 cases and 78 deaths in the second outbreak (this time mostly white Americans).

Los Angeles was hit in 1924–5, and as recently as the 1970s and 80s there have been curious and isolated cases of plague in parts of the USA – some of which have been traced not to rats but to prairie dogs. A number of other small mammals are now known to harbour the plague bacillus in the wild, including ground squirrels, marmots, chipmunks and rabbits. Except for western Europe, pockets of pestilence remain in all parts of the world. As Camus' Dr Rieux reminds us, *'the plague bacillus never dies or disappears for good'*.

Plague persists

Today, there are antibiotics to control plague and a vaccine that confers some protection, but plague remains endemic in many countries in Africa, eastern Europe, the Americas and Asia, with about 2000 cases a year (including some ten to 20 in the USA). When in 1994 pneumonic plague broke out in Surat, a city in the Indian state of Gujarat, there were scenes reminiscent of the Black Death: panic, people fleeing, scientists in plague-protective garb, and, above all, confusion. And while this outbreak was dealt with quickly using mass preventive vaccination and antibiotics, it reminded the world that plague is still a disease that can terrify and perplex us.

QUARANTINE

The use of quarantine to prevent contagious epidemics from entering ports arose in the wake of the Black Death. In 1377 the Venetian colony of Ragusa (now Dubrovnik in Croatia) detained travellers from infected places on a nearby island for 30 days – *trentini giorni*. When this proved ineffective, the period was raised to 40 days – *quaranti giorni* – from which we derive the word 'quarantine'. The Italian states in the 14th and 15th centuries imposed stringent quarantine regulations during times of plague, and other countries soon followed suit.

The most impressive example was the Habsburg *cordon sanitaire*, which from the early 18th century ran from north of the Danube to the Balkans. It was manned by 100,000 peasants with checkpoints and quarantine stations to prevent the movement of contagious people coming into Europe from the adjacent Ottoman empire.

A scene outside a plague-infected house in Karachi (then in British-ruled India, now in Pakistan), photographed in 1897. Millions have died from plague in Asia over the centuries, with an estimated 12.6 million deaths from the disease between 1898 and 1948 in India alone.