In this series of six lectures I want to look at some of the great diseases and their relationship to human history. That relationship has usually been described in terms of the impact of epidemics on societies, politics, economies and cultures. The classic statement of this view is William H. McNeill's book *Plagues and Peoples*, first published in 1976. In it, McNeill, a specialist in global history and author of probably the best two general histories of human society to appear in the twentieth century, sought to uncover a dimension of human history that historians have not hitherto recognized: the history of humanity's encounters with infectious diseases, and the far-reaching consequences that ensued whenever contacts across disease boundaries allowed a new infection to invade a population that lacked any acquired immunity to its ravages.

After surveying human history from its very beginnings in Africa up to the present, McNeill concluded that 'infections disease...will surely remain...one of the fundamental parameters and determinants of human history.'

In a similar way, the latest general survey of the subject, by J. N. Hays, examining *Epidemics and Human Response in History*, argues that 'throughout history, diseases have swept the globe, bringing down empires, wrecking economies, and changing the course of history...Humans claim control over their own destinies, individual and collective...[but] that claim falls in the face of attack by tiny organisms'. Paul Slack's recent book *Plague: A Very Short Introduction* similarly claims that 'epidemics of plague...have shaped the course of human history'. The history of disease, and especially epidemic disease, or in other words disease notable by its sudden and widespread temporary occurrence, has usually been described in quasi-military language when it comes to assessing its relationship with human society: bacilli, microbes and viruses 'attack' human societies, who organize a 'defence' against them that was usually overwhelmed by the 'invading' hordes of micro-organisms.

So disease is often presented as an independently acting factor on human history, although in practice, especially with McNeill, its spread is frequently explained in relation to changes in patterns of trade, exploration or warfare that bring together hitherto separate 'disease pools' in areas of the globe geographically isolated from each other in a 'confluence' with devastating effects on previously unaffected areas where human society has not acquired immunity to the new disease through previous exposure to it. So in this series of lectures I hope to show that epidemics, sudden, mass outbreaks of disease, have their origins in changes in the way people interact, that political, military, economic, social and cultural developments have been their ultimate cause. I want in other words to approach epidemics historically, as an integral part of human history, rather than as a factor impacting upon it from outside. McNeill was writing some 35 years ago, too, and since that time the social history of medicine has grown to be an integral part of modern historical studies; we know a lot more than we did in his day, and I will incorporate as much of this new knowledge as I can in this series of lectures.

As McNeill suggests, and as I hope to show in later lectures in the series, it would be wrong to claim any kind of superiority over people in the past in this respect. Human society continues to interact with disease in a variety of ways, and although we've managed to banish some diseases like smallpox, others have emerged to take their place, like AIDS or SARS. Medical science has identified the causes of most diseases, and suggested ways of preventing and treating them, and I'll devote part of each lecture to the ways in which past societies dealt with epidemic disease; but whether or not the methods used at any time, including the present, are successful is more often than not dependent on far more intractable factors of human society and politics. In some cases, the decline of a particular disease, such as tuberculosis, which was non-epidemic but pervasive right up to the twentieth century, owes, as I'll suggest in a later lecture, far more to general social and economic developments than to the intervention of medical science.

I've chosen to approach this subject through the study of six distinct diseases, each of which interacted with, and was influenced by, human society in a different way, though I will also of course be trying to set each of them in a broader context and make some comparisons with other diseases too. This way of approaching the topic is not completely problem-free, however. Making retrospective diagnoses with the tools of twenty-first-century medical science isn't always possible, not least because past societies had a different concept of medicine, describing diseases by their symptoms and using generic and undifferentiated terms to denote what we might nowadays think of as a whole range of distinct infections. Even more problematical is the fact that micro-organisms can and often do mutate, as with for example the dominant strain of cholera in the twentieth century, known as El Tor from the place where it was discovered, in Egypt, in 1905; its symptoms far milder than those of the classic cholera of the nineteenth-century epidemics. Diseases often have many different strains - there are more than 200 in the case of cholera -and these may have slightly differing symptoms, so that relying on descriptions of symptoms by contemporaries can be fraught with perils of interpretation, perils to which some historians have too easily succumbed.

These problems are particularly acute in the first of the diseases I want to consider, namely bubonic plague. The word *plague* which is found in a whole variety of written sources from the Ancient World to the early modern period in Europe, just meant a terrible and sudden mass visitation such as the Biblical *Plague of Locusts* or the cattle disease known as *Rinderpest*, *Pest* being the German for plague - incidentally only the second disease,
after smallpox, to have been completely eradicated from the globe. The modern use of the word *Plague* to denote a specific disease of human beings generally refers, as it will in these lectures, to *bubonic plague*, now known to be caused by a bacillus, *Yersinia pestis*, noted for the very high death rates to which it led, normally between a quarter and a half of the population in infected areas, with a morbidity — in other words, the number of people affected in all, whether they died or not — running at twice that level. These very high rates of morbidity and mortality ensured that chroniclers, diarists and officials recorded plague epidemics whenever they occurred, usually describing the symptoms in detail.

We can’t be sure that all *plagues* described in the sources refer to the same disease, but attempts by historians like Samuel Cohn and Graham Twigg to suggest that, for example, the Black Death, the visitation of ‘plague’ widely recorded in medieval Europe, was not bubonic plague but some other disease, have fallen foul of recent DNA testing of skeletons from a variety of plague burial sites in Europe have found definitively that *Yersinia pestis* was present in all of them, albeit in different strains or biovars indicating that it found its way from China to Europe around 600 B.C. along a variety of routes. Just because some of the symptoms described in Ancient or medieval sources were different from those exhibited by the disease today doesn’t mean, therefore, that it wasn’t bubonic plague.

The first pandemic — that is, a global or almost global series of linked epidemics of the same disease — that can be described as bubonic plague with any degree of plausibility is that generally known as the *Plague of Justinian*, sweeping across the Roman Empire and its former territories in the West from 541 to 767 A.D. in a series of fifteen great waves. It was described by the chronicler Propopius, who wrote in 752 A.D. of a ‘plague that threatened to annihilate the human race’:

It started from the Egyptians who dwell in Pelusium. Then it divided and moved in one direction towards Alexandria and the rest of Egypt, and in the other direction it came to Palestine on the borders of Egypt; and from there it spread over the whole world, always moving forward and travelling at times favourable to it. ... And this disease always took its start from the coast, and from there went up to the interior...[People] had a sudden fever, some when just roused from sleep, others while walking about, and others while otherwise engaged, without any regard to what they were doing. And the body showed no change from its previous colour, nor was it hot as might be expected when attacked by a fever... But on the same day in some cases, in others on the following day, and in the rest not many days later, a bubonic swelling developed; and this took place not only in the particular part of the body which is called boubon, that is, “below the abdomen,” but also inside the armpit, and in some cases also beside the ears, and at different points on the thighs.

As Procopius suggested, with his reference to the plague spreading from the sea, the disease was mainly spread by trade. It’s carried by fleas which jump from rats, specifically the black rat, universally present on seaborne trading vessels in the Mediterranean, to human; in some cases it’s also spread by droplet infection, by people coughing or sneezing.

Justinian’s plague spread not least because Justinian, who had become Emperor in 527, had succeeded in reconquering many of the lost territories of the former Empire, taking North Africa from the Vandals and Italy from the Goths and bringing Spain under Byzantine control once more. Political unity in the Mediterranean brought wider regions into trading with Byzantium, specifically the Middle East, and by the same token, the massive mortality caused by the plague, generally agreed to have been around 30 per cent of the population at least of the towns and cities affected, brought a halt to the expansion of the Empire by leaving fields untilled, taxes unpaid, and armies fatally under strength; indeed it subsequently opened up the Empire to the advance of Islam.

At the same time, however, climate historians using studies of ice-cores and tree-rings have dated a sharp and serious deterioration in the climate to the years between 536 and 545, caused by volcanic eruptions in south-east Asia covering the globe with a film of dust in the upper atmosphere, causing poor harvests and bringing people into the towns, particularly Constantinople, in search of food. Lower temperatures and wetter summers also favoured the growth of rat populations in Africa, which expanded their territory until they reached the shores of Justinian’s newly enlarged Empire. Here is a graph of various estimates of climate change over a long period where you can see a sharp drop of the red line in the 530s and 540s before the climate recovers. A similar graph of climate fluctuations taken from sedimentary deposits in the Sargasso Sea tells a similar story. You can see the dip as we move from left to right, back in time, around 1500 years from the present.

While there’s little doubt that the Plague of Justinian itself was bubonic plague, there’s less certainty about the epidemics that swept across the Empire in the following decades. What is certain, however, is that the disease more or less vanished from Europe and even the Middle East from the eighth century to the middle of the fourteenth. Perhaps it’s no coincidence that this coincided with a period when the climate warmed up, to the extent indeed that the Vikings were able to settle Iceland in 974 and from there establish a viable agricultural colony on the shores of Greenland (here are Viking ruins at Hvalsøy in southern Greenland). Correspondingly, bubonic plague reappeared as the climate began to deteriorate as the so-called Medieval Warm Period came to an end in the second half of the thirteenth century, bringing the Viking Settlements in Greenland into serious difficulties until they were abandoned early in the fifteenth century. Well before that, in the years 1315 to 1322, wet and cold summers were causing crop failures and leading to an epidemic of cattle disease. In the 1340s the climate deteriorated further, possibly because of cosmic debris circling the earth following the break-up of a comet, a hypothesis supported by contemporary references to strange sights in the night sky.
However, these factors, even if you accept their importance, were only enabling; it took once more the expansion of trade, the growth of cities, and above all the massive east-west movement of the Mongol Hordes under Genghis Khan, who established a vast empire in the 13th century across which not only silk and other Asian products could travel but also rats and fleas, aided by the cooler climate in the 14th century; the opening of the Straits of Gibraltar to trade following the ending of Islamic control in 1291 enabled the disease to spread to north-west Europe as well. Bubonic plague was actually brought to the Crimea in 1346 from the Caucasus by a Mongol army, one of many trying to establish their power following the break-up of Genghis Khan’s Empire. The army was devastated and had to retreat, but the disease infected local inhabitants and was carried by ship to Constantinople and thence following seaborne trading routes to the rest of the Mediterranean and beyond.

The best-known medieval description of the symptoms as they occurred in the Black Death is by the Italian author Giovanni Boccaccio, whose *Decameron* features stories told to each other by a group of Florentines fleeing from the city after plague has struck in 1348:

Its earliest symptom, in men and women alike, was the appearance of certain swellings in the groin or armpit, some of which were egg-shaped while others were roughly the size of the common apple...within a short time [they]...would appear at random all over the body. Later on, the symptoms of the disease changed, and many people began to find dark blotches and bruises on their arms, thighs, and other parts of the body...in most cases death occurred within three days from the appearance of the symptoms we have described...the majority without any fever or other complications.

Like other Italians, Boccaccio had no doubt that the plague, as he wrote, ‘had originated some years earlier in the East, where it had claimed countless lives before it unhappily spread westward, growing in strength as it swept relentlessly on from one place to the next.’

By 1348 it was in London, from where it moved northwards to Oslo and then to Ireland and Germany, reaching the Danube in 1349 and Scotland and Sweden in 1350, Poland in 1351, Kiev in 1352 and Muscovy in 1353, by which time it had more or less run its course in the rest of Europe. The devastation was immense: recent estimates have put the number of dead across Europe at 50 million out of a total population of 80 million. In other words more than half the entire population of Europe died from the disease. The local impact was often even more severe, with the number of households in Chambéry in France falling from 403 in 1348 to 184 the following year, a population of 11,400 in San Gimignano in Italy in 1322 collapsing to 4,500 in 1349, and the number of wills proved in London courts increasing fifteenfold between 1348 and 1349. The disease affected everyone, rich and poor alike, and the countryside as much as towns and cities. No-one seemed immune.

The Black Death was only the opening, if the most serious, episode in what historians have called the second pandemic of bubonic plague in Europe, lasting all the way up to the eighteenth century. Despite McNeill’s assumption that repeated exposure to a disease confers a degree of immunity on human populations, morbidity and mortality rates remained high in all subsequent epidemics of bubonic plague, even though it became increasingly confined to Europe’s cities. Here’s a chart of burials among the laity at San Domenico, Siena, for example, showing plague years through the second half of the fourteenth and the first half of the fifteenth century. The Plague of London in 1665 killed around a fifth of the population, or some 68,596 people as recorded by the summary of the year’s bills of mortality – the figure can be seen in the right-hand column just below the middle section. The plagues in Genoa and Naples in 1656-7 and Marseilles in 1720-21 had a mortality rate of around 50%, its effects suggested in this engraving from 1727 by Simon Thomassin. So the question arises, first, what was the broader social, economic, cultural and political impact of these repeated epidemics, secondly, how did medicine try to cope with them, thirdly what did governments do, and finally why did the bubonic plague eventually disappear from Europe?

Obviously, when the population is drastically reduced, labour becomes scarce, so it increases in price, meaning that there’s a shift in the balance of power in society away from landlords and employers and towards tenants, mostly small peasant farmers, and workers. Labourers on the land could and did demand a reduction of feudal exactions as the price of providing their labour. There was also more to go round among a much smaller population, so the overall standard of living of ordinary people rose. Wages doubled or trebled, while rents and the general price of land fell. Feudal obligations and labour services could no longer be enforced. For those who survived, times were better, while measured by GDP per capita the economy became more productive.

There were widespread complaints from the upper classes about the overturning of the social order all this implied. Attitudes towards authority became less deferential, culminating in France in the *Jacquerie* of 1356-58, in Florence in a great popular rebellion in 1378, and in England in the Peasants’ Revolt of 1381, here seen being defeated, with the death of its leader Wat Tyler, as Richard II addresses the rebels. In all these rebellions peasants were protesting against feudal exactions which governments were trying to impose, or re-impose, by force. ‘When Adam delved and Eve span’, as the peasants’ rhetorical question went, ‘who was then the gentleman?’ More prosaically, as an Italian commentator declared in 1363, peasants were moving from poor land to occupy the best plots whose owners and their families had died, while workers were demanding a threefold increase in wages. ‘The common people’, he wrote, ‘by reason of the abundance and superfluity that they found, would no longer work at their accustomed trades; they wanted the dearest and more delicate foods...while children and common women clad themselves in all the fair and costly garments of the illustrious who had died.’
In England the government tried to put a ceiling on wages through the Statute of Labourers of 1351, which complained about ‘the malice of servants who after the pestilence were idle and unwilling to serve without securing excessive wages’; and in 1363 Parliament passed the first of a long series of sumptuary laws designed to make people dress according to their station in life, complaining of ‘the outrageous and excessive apparel of many people, contrary to their estate and degree’. Ordinary people were able to afford warm woolen clothing, and the rising demand for it prompted the rapid growth of the woollen industry, along with the enclosure of common land for sheep-farming. English population was still below the level of 1300 three centuries later. Still, though high labour costs were the major factor in stimulating the technological innovation that began the industrial revolution in the 18th century, this was a result not of the plague but of other factors, ranging from new epidemic diseases to higher ages at marriage; in many parts of Europe people were trying to maintain the higher standard of living that was one consequence of the Black Death, at least for the survivors, by having fewer children.

Did the Black Death tear apart the fabric of medieval society? Boccaccio reported that ‘all respect for the laws of God and man had virtually broken down’. Some historians have argued that it caused a kind of collective trauma, a ‘mental shock’ that ‘inflicted what can only be called a wound deep in the social body’ producing ‘a resolution of feeling and practice’. Certainly there were many extreme reactions to it. In the deeply religious culture of medieval Europe, many people saw it as a punishment visited upon a sinful society by God, and some tried to offer themselves as sacrificial objects of atonement, forming themselves into roaming bands known as the Flagellants, especially in Germany and the Netherlands, visiting towns and beating themselves with whips embedded with nails in front of the assembled population. In cities such as Frankfurt, Mainz, Cologne and Brussels their arrival sparked attacks on the local Jewish community that ended in horrific massacres. A thousand Jews were killed in Strasbourg and most Jewish communities in the Rhineland were wiped out; many Jews were burned to death. The church moved quickly to control these outbursts and in later epidemics tried to channel the popular need for penitence into more orderly services and processions. Plague victims were encouraged to seek blessing and intercession from the church. More generally, culture became obsessed with death, producing dark and disturbing images such as the Dance of Death.

Contemporary medicine was initially overwhelmed by the Black Death and doctors went along with everyone else as seeing in it no more than the expression of God’s wrath. But it was also recognized that there were intermediate causes too; as the medical faculty of the University of Paris argued in October 1348, the atmosphere was being corrupted by an unfortunate conjunction of Jupiter, Saturn and Mars.” This began a long argument about the causes of disease in general that was to reach its climax in the nineteenth century. While some insisted that epidemics occurred when the air was corrupted by a disease-laden miasma, others observed that it was carried from person to person by infection. With repeated visitations of the plague, the idea that it was transmitted and infectious gained currency. Still, even in the seventeenth century it was assumed that infection brought with it not so much contagion by touch or breath as infection through contamination of the air. Physicians developed a special costume with a hollow beak containing aromatic herbs or chemicals to purify the air before they breathed it. Meanwhile, for many people, flight was an obvious remedy, though in fact it only helped spread the disease more rapidly. Physicians prescribed blood-letting or purgatives to restore the internal balance of humours within the body, or ointments to reduce swellings. None of them had any effect. Pope Clement VI had the right idea: he stayed in his apartment and had large fires lit in his room, constantly stoked to keep them going; the heat killed any plague bacilli that came his way, and he survived.

By the seventeenth century, a more or less agreed way of coping with epidemics had evolved. Governments intervened in particular with the imposition of a quarantine, meaning a period of isolation lasting forty days. In April 1348 the city governments of Venice and Florence reacted to the arrival of the Black Death by establishing a health commission whose purpose was to organize the removal of ‘infected persons’ and ‘putrid matter’ from the streets to stop them bringing about a ‘corruption or infection of the air’. The cities were barred to travellers and goods coming from places known to be infected. By 1377 the Venetian colony of Ragusa (Dubrovnik) was isolating all incoming travellers and ships for a period, established in 1383 as forty days when the policy was adopted by Marseilles. From 1423 Venice used a specific island in the lagoon for this purpose, and transported people infected with plague to a pesthouse set up there, consisting of individual cabins around a square; it was known as a Lazaretto, from the Biblical figure of Lazarus, raised from the dead by Christ. By the end of the fourteenth century Milan was regularly monitoring illnesses in the city and registering deaths with their causes. By the sixteenth century quarantine had expanded to stop ships, goods and people leaving infected cities, and in England an Act of 1604, based on Italian practice, ordered watchmen to keep infected people locked in their houses by ‘violence’ if necessary, and prescribed hanging for anyone with a plague sore found wandering the streets in the company of others. In the 1720s a quarter of the entire French army was stationed in a cordon sanitaire round Marseilles to stop people from the infected city leaving it; the plague spread rapidly from the harbour area but despite the fact that some people had already fled, it did not move into the surrounding towns and villages.

These plague regulations were part of a general increase in state control particularly over the poor, among whom the victims of the plague after the Black Death itself were most numerous. Living in overcrowded and dirty conditions, in rat-infested quarters of Europe’s great cities, without proper hygiene and sanitation, they were part of a wider net of rules and laws imposed by late medieval and early modern governments and city authorities on the poor, focusing in particular on beggars, vagrants and paupers. But the state apparatus of the period was far from capable of imposing such rules effectively, and bubonic plague continued to spread across
Europe or major parts of the continent through the seventeenth century. Perhaps the best-documented of all plague epidemics was the outbreak that occurred in London in 1665. Plague reached the Netherlands in 1663 and the government in London imposed a quarantine on ships arriving from Dutch ports, but in April 1665 the first cases were reported in St Giles, to the west of London, and in the summer the disease spread rapidly, as can be seen from the records of burials in a number of London parishes.

People began to flee; King Charles II moved his court to Salisbury then Oxford; deliveries of prisoners to London jails were halted; the Inns of Court ceased functioning. Days of prayer and fasting were ordered; all to no avail. Government actions had a varied effect. On the one hand quarantine reduced the traffic in ships and therefore the movement of rats, but on the other hand the authorities ordered the arrest and destruction of dogs and cats, thinking they spread disease, and so allowed rats to multiply. Victims were confined in their houses with a red cross painted on their front door with the words ‘Lord Have Mercy On Us’. Samuel Pepys wrote in his diary: “This day, much against my will, I did in Drury Lane see two or three houses marked with a red cross upon the doors, and ‘Lord Have Mercy upon Us’ writ there – which was a sad sight to me, being the first of the kind....that I ever saw. It put me into an ill conception of myself and my smell, so that I was forced to buy some roll tobacco to smell and chew, which took away the apprehension.” Often, however, people resisted and many removed the crosses and notices and escaped. Bonfires were lit in the streets and guns discharged to set the supposedly stagnant air in motion, houses were fumigated and those who were most intimately concerned with the dead, such as the city servants who toured the city crying ‘bring out your dead!’ and manned the carts taking bodies away for burial, smoked vigorously to try and ward off infection. A more effective measure perhaps, was the order for rubbish to be cleared from the streets and ditches; the disease flourished in poor districts suffering from overcrowding and lack of hygiene, sanitation and proper rubbish disposal facilities; these were often outlying districts where, in addition, the presence of large granary stores encouraged rats, so such measures may have had an effect.

Nevertheless, the Great Plague of 1665 killed an estimated 20% of London’s population, or around 97,000 people. And it wasn’t just London that was affected; 2,200 people died in Norwich, and in Colchester around 5,000, or half the population. It’s also important to realize, however, that the Plague of 1665, celebrated because of Daniel Defoe’s novel A Journal of the Plague Year, published in 1722, and Pepys’s Diary, wasn’t the only one to affect the capital city; in fact it wasn’t even the most severe. Plague outbreaks in 1563 and 1595 killed a higher proportion of the population, and there were few years when there wasn’t an outbreak of plague somewhere in the British Isles. But the 1665 outbreak killed a higher absolute number of people, and it was remembered not just because of this, or because it preceded another disaster, the Great Fire of 1666, but also because it was the last major epidemic of plague in Britain. From this point onwards, plague began to retreat eastwards across Europe, a fact which in itself undermines the widely held belief that the Great Fire somehow purged and cleansed London of the causes of plague; sad to say, the city was just as dirty after the fire as it was before.

I’ve already mentioned the major epidemic in Marseilles in 1721. The last two major outbreaks in Europe happened in Moscow in 1771 and later in Constantinople. Here the epidemic was spread not by trade but by war – the conflict between Russia and Turkey that had led in 1770 to the Russian occupation of Wallachia and Moldavia, the future Romania; large numbers of men moving about the country and camping in insanitary and overcrowded conditions were an ideal vector of disease, and this was neither the first nor the last time that war spread infection. In Moscow itself the overcrowded living conditions in the largely wooden city, combined with its heavy dependence on textile manufacturing and trading in woollen goods that harbourd fleas, were ideal incubators of bubonic plague. Over 50,000 people died in Moscow from plague in 1771, perhaps 20 per cent of the population. The authorities ordered quarantines and isolation, set up a pesthouse, closed down wool factories and isolated the centre of the trade, the Big Woollen Court. Public baths were shut, Moscow was closed off from the outside world, and public gatherings including religious processions were banned. Massive popular resentment led to a major riot, in which foreign doctors - the majority – were attacked and the Archbishop of Moscow was beaten to death by an angry crowd accusing him of trying to seize an icon that was thought to bring about miraculous cures from the disease.

Although epidemics recurred in Constantinople in 1778, killing 100,000 people, and Cairo in 1791, with a death toll of 60,000 - both around 20% of the population – this was in effect the end of the second plague pandemic in Europe. Why did it retreat? There’s no evidence that it declined in virulence or mutated into a less deadly form. It’s long been thought that the westward spread of the brown rat from the Middle East, beginning in the late seventeenth century, displaced the black rat which carried the fleas that transmitted the plague; the brown rat is a burrowing animal that has less direct contact with humans, unlike the non-burrowing black rat, whose habitat is much closer to that of human society. But while this may have played a role, it doesn’t really fit the chronology. Nor do improvements in housing and hygiene, of which there were few enough anywhere before the mid-nineteenth century. I’ve referred to the possible influence of climate change in the origins of the Plague of Justinian, and it may be that the warming-up of the European climate following the so-called Little Ice Age had some effect in driving the Plague back eastwards, though we have to remember that the Great Plague of London came right in the middle of the European cool period.

The most likely explanation is that quarantines and cordons sanitaires were eventually effective in keeping the plague at bay. Restrictions on shipping became more effective with the growth of state control in the age of mercantilism, of government-directed trade enforced by increasingly powerful armed navies. Above all, perhaps, the success of the Habsburg Monarchy in driving back the Ottomans after the siege of Vienna in 1683 led to a
heavily guarded military frontier being established along the border of the Monarchy with the Ottoman Empire in the 18th century, reinforced when epidemics threatened. Similar military frontiers were formed by the Russians and demonstrably prevented the spread of a major epidemic from south-east in the early 1820s. Thus bubonic plague was halted at the doors of Europe.

This was not quite the end of the story, however. In the mid-nineteenth century a third pandemic of plague began in China, spread by a series of rebellions and civil conflicts Hong Kong and Canton in 1894 and thence spreading with trade across the globe. There were outbreaks, quickly contained, in Glasgow, Paris, San Francisco and even in a rural part of East Suffolk. Not surprisingly, the threat of bubonic plague led to a major outbreak of nativist anti-Chinese sentiment in the USA. Here it actually struck, as in Honolulu in 1899, the Chinese quarter was isolated, disinfected and eventually indeed burned to the ground when the destruction of infected buildings got out of hand; similar measures were taken in the first outbreak of the disease in San Francisco. By this time, however, the causes of the disease were known. Yersinia Pestis was discovered in 1894 and a few years later the hypothesis of its spread by rats and fleas was accepted. Thus in the second outbreak of plague in San Francisco, in 1907, as the city was still in chaos following the devastating earthquake and fire of the previous year, the authorities offered a bounty for every dead rat brought in, and issues building regulations that ensured new constructions did not favour rats, were raised above ground, and were concrete rather than wooden.

The impact of the third pandemic on cities like San Francisco in terms of deaths was very small – no more than a few score.

Nevertheless, perhaps 13 million people died worldwide by the end of the major first phase of the pandemic in 1912. The vast majority of these were in India, where more than a million people died of the disease each year in the mid-1900s and bodies were burned on huge funeral pyres; the British medical authorities in India, fearful of the damage quarantines would do to trade, had refused to implement them in the face of the spread of the disease from Hong Kong. Massive poverty and overcrowding, lack of sanitation and proper waste disposal facilities were made worse by the refusal of the British authorities first to admit the disease was present, then pulled back when their measures of isolation, inspection, hospitalization and internal quarantines had led to popular riots and disturbances that rapidly threatened to get out of control.

Outbreaks of plague on a small scale have recurred ever since then, in Los Angeles in 1924, in Peru in 1945 and in other parts of the world, but they have been quickly contained. The disease has been combated by more effective sanitation and the use of rat poisons, suggested in this advertisement for a poison labelled Rough on Rats! That it might be needed by the inhabitants of Chinatown in San Francisco where the plague first broke out, indeed hinting perhaps it might even be applied to them. As the accompanying song went: ‘Rats! Rats! Rats! Rough on Rats! Hang your dog and drown your cats! We give a plan for every man to clear his house with Rough on Rats!’

Further measures have included disinfection and insecticide through the use of DDT, though this has its own problems, and the availability of a vaccine developed by a Russian physician working in India in 1897, Waldemar Haffkine, together with the use of antibiotics from the end of the Second World War. The mortality rate has plummeted, and the number of cases has dropped to a minimal level, with only isolated individuals affected. Nevertheless, bubonic plague has not been entirely eradicated. Antibiotic-resistant strains were discovered in Madagascar in 1997. And most disturbingly of all, bubonic plague has been used in biological warfare, with the Japanese armed forces Unit 731 experimenting on involuntary human subjects before dropping plague-infested fleas from the air on Changde and Ningbo during the Second World War, apparently causing outbreaks of the disease among the civilian population.

The history of plague raises a number of questions that I want to pursue in the following lectures in this series: the relationship of epidemics to human activity, to war, trade, patterns of urban living and the nature of urban society; poverty and wealth; sanitary reform and medical intervention; popular prejudice and unrest; and the role of government in society. In the next lecture I’ll follow these themes, and others, when I turn from the Black Death to the Great Pox.

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