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Plagues Past and Present

The Archaeological Dimension

Anthony Harding

Abstract: With the world currently focused on the COVID-19 pandemic, it is timely to remember that over long timescales plagues or pandemics are nothing unusual. The Black Death is the most famous of these, but there are several others that caused major disruption in ancient times: the Justinianic plague of the 540s CE, the Antonine plague of the second century CE, or the outbreak that occurred in Athens in 430 BCE. Evidence has recently been adduced to show that *Yersinia pestis*, the bacterium responsible for the disease, was present in Eurasia by the end of the 4th millennium BCE. In this paper I discuss possible implications for the later prehistory of Europe, in which puzzling gaps in the archaeological record are usually assumed to reflect lack of relevant fieldwork, but which may actually be the consequence of widespread disease bringing about a collapse in the normal life of communities.

Introduction

Plagues are something with which we in the modern western world are not familiar. Even though a range of writers, from Defoe to Camus, have written eloquently about them and their effects, they seem remote from our daily existence – or they did until recent times.

Daniel Defoe wrote his *Journal of the Plague Year* in 1722, though it describes the Great Plague of London of 1665, when he was only five years old. Half novel, half documentary, it gives a vivid picture of what it would be like to live in a plague-ridden city prior to the advances of modern medicine. Albert Camus wrote *La Peste* in 1947, the events taking place in the French-Algerian city of Oran. Its plot uncannily resembles recent events: the initial denials and downplaying of the seriousness of the situation, followed by lockdown, depression, personal tragedy, the eventual discovery of a cure, and delivery. Hardly known at all is a play by Karel Čapek, *Bílá nemoc* (*The White Disease*), written in 1937 and setting a disease similar to leprosy, and preferentially infecting those over 45, as the backdrop to a tale of war and politics, with a cure being used as blackmail to stop warmongering. While we probably do not have to worry about blackmail in the present pandemic, vaccine nationalism is another matter, with countries trying to assure their own access to vaccine before allowing others to acquire it.

Today we find ourselves in a situation that for all of us living in Europe is unprecedented. All around us drastic changes are taking place: we are restricted from travelling or even leaving our homes, we have to wear face-masks if we do, we cannot meet our friends and family, and people we know are ill or, sadly, have left us for good (including a number of senior archaeologists). These are all the results of an extraordinary phenomenon which hit us in 2020, even though medics have been warning us of the dangers for years. Yes, SARS-CoV-2, commonly known as COVID-19, has affected almost everyone in the world, and at the time of writing (mid-January 2021), the numbers

affected are approaching 100 million, with nearly 2 million deaths worldwide (Worldometers, and Johns Hopkins University Coronavirus Resource Center). With a 'case fatality rate' (CFR) around 1%, the virus is not nearly as dangerous as other recent epidemics such as SARS (over 10%), MERS (35%), Ebola (up to 90%), let alone the 'Spanish' flu of 1918–19 (H1N1 influenza A virus), which is estimated to have killed more than 50 million people worldwide. But its ubiquitous presence in the world today serves to make us think about the effects of such diseases in earlier populations, when medical knowledge was rudimentary or absent altogether.

Looking back in time, there are several well-known pandemics in European or world history. The most famous is the Black Death, at its most virulent between 1347 and 1351, and estimated to have killed over 100 million people world-wide. The disease, also known in English at the time as the Plague, was caused by the bacterium *Yersinia pestis* being carried on fleas and infecting humans, resulting in bubonic plague. Records of the period indicate that those affected usually suffered from the growth of buboes (painful swellings in the neck, groin or armpit), as well as a high fever and nausea. Untreated, as people obviously were at that time, death usually occurred within a few days.

Such 'plagues' have occurred at various times, often restricted geographically and therefore not attracting as much attention as global pandemics. The Great Plague of London in 1665 was a major event there, but it is often forgotten (by people in England, at least) that the disease had been around for centuries, flaring up in particular places at particular times. London lost around one quarter of its population, some 100,000 people; though nationwide its effects were not as drastic as those of the Black Death, it was still a major setback, the end of which is usually attributed to the destruction of the medieval city of London in the Great Fire of 1666. (In fact the infection had probably played itself out by then naturally, as so many people had been infected or died that 'herd immunity' had built up.)

Other plagues include those of Moscow (1770–72), Marseille (1720–23), Mexico (1545–48), as well as other epidemics in modern, medieval and ancient history.

There have been many epidemics in history, but few pandemics. For those suffering the effects of such an infectious disease, the difference between the two is academic. Epidemics are serious but restricted in geographical spread; pandemics are universal or almost so. Seen in that light, many 'plagues' recorded in historical sources were epidemics, since they affected a relatively small area. This might well include outbreaks of diseases such as cholera or typhoid fever, which have occurred with some frequency over the ages.

Historical Accounts

Before going further back in time, one may recall how sickness is often mentioned in literature. The 'sweating sickness' is mentioned in many 16th century English sources, causing very rapid deterioration and frequently death; Shakespeare refers to it in *Macbeth*. A number of notables are thought to have died from it, including the Archbishop of Canterbury, Cardinal Reginald Pole, while several people at the court of Henry VIII (including his then mistress Anne Boleyn, later his second wife) may have suffered from it. For this reason he left London with his court for a time in 1528, as the disease was rife in the city. The disease is thought to have been viral, but there is no agreement on exactly what it was.

A manuscript in the Parker Library of Corpus Christi College, Cambridge, brought from the monastery of Elbing (now Elbląg), and dating to the 15th century but containing a range of pieces from 100 years earlier, describes the

'Signs of the Plague'.[1] These numbered ten, and included comets, a bad conjugation of planets, unusual variations of temperature, increased numbers of frogs, toads, mice and fleas, and birds abandoning their nests. The observation of these phenomena served as a guide to action at the time, when the Black Death was still circulating in Europe.

The Justinianic Plague, dating ca. 541–549 CE, also known as the First Pandemic, left an indelible mark on those who recorded it. As described by Procopius (*History of the Wars* II, 22),

> (…) with the majority it came about that they were seized by the disease without becoming aware of what was coming either through a waking vision or a dream. And they were taken in the following manner. They 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 shewed no change from its previous colour, nor was it hot as might be expected when attacked by a fever, nor indeed did any inflammation set in, but the fever was of such a languid sort from its commencement and up till evening that neither to the sick themselves nor to a physician who touched them would it afford any suspicion of danger. It was natural, therefore, that not one of those who had contracted the disease expected to die from it. 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 (…) below the abdomen, but also inside the armpit, and in some cases also beside the ears, and at different points on the thighs (…). (…) there ensued with some a deep coma, with others a violent delirium, and in either case they suffered the characteristic symptoms of the disease (…). And those who were attending them were in a state of constant exhaustion and had a most difficult time of it throughout. For this reason everybody pitied them no less than the sufferers, not because they were threatened by the pestilence in going near it (for neither physicians nor other persons were found to contract this malady through contact with the sick or with the dead, for many who were constantly engaged either in burying or in attending those in no way connected with them (…).
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> Death came in some cases immediately, in others after many days; and with some the body broke out with black pustules about as large as a lentil and these did not survive even one day, but all succumbed immediately. With many also a vomiting of blood ensued without visible cause and straightway brought death.

The symptoms described seem similar to those of the Black Death; hence the assumption that *Y. pestis* was to blame. This being the case, this was also a bacterial disease, unlike influenza or COVID-19, which as we know are viral. The effect on those attending the sick is very striking and reminiscent of health workers in hospitals at the present day, who are suffering exhaustion, burnout and acute mental stress. It is also evident from several passages in Procopius and other authors that this was indeed a pandemic, since it spread around the Roman Empire and Europe, and was not confined to Constantinople as an epidemic might have been.

Of the various outbreaks of sickness that are reported before this, the most famous is that relating to the 'plague of Athens' in the second year of the Peloponnesian War (430 BCE). According to Thucydides (*History* II, 7):

[1] Source: Dr Philippa Hoskin in the Newsletter of Corpus Christi College, April 2020.

> (…) there was no ostensible cause; but people in good health were all of a sudden attacked by violent heats in the head, and redness and inflammation in the eyes, the inward parts, such as the throat or tongue, becoming bloody and emitting an unnatural and fetid breath. These symptoms were followed by sneezing and hoarseness, after which the pain soon reached the chest, and produced a hard cough. When it fixed in the stomach, it upset it; and discharges of bile of every kind named by physicians ensued, accompanied by very great distress. In most cases also an ineffectual retching followed, producing violent spasms, which in some cases ceased soon after, in others much later. Externally the body was not very hot to the touch, nor pale in its appearance, but reddish, livid, and breaking out into small pustules and ulcers. But internally it burned so that the patient could not bear to have on him clothing or linen even of the very lightest description; or indeed to be otherwise than stark naked. What they would have liked best would have been to throw themselves into cold water; as indeed was done by some of the neglected sick, who plunged into the rain-tanks in their agonies of unquenchable thirst; though it made no difference whether they drank little or much. Besides this, the miserable feeling of not being able to rest or sleep never ceased to torment them. The body meanwhile did not waste away so long as the distemper was at its height, but held out to a marvel against its ravages; so that when they succumbed, as in most cases, on the seventh or eighth day to the internal inflammation, they had still some strength in them. But if they passed this stage, and the disease descended further into the bowels, inducing a violent ulceration there accompanied by severe diarrhoea, this brought on a weakness which was generally fatal. For the disorder first settled in the head, ran its course from thence through the whole of the body, and, even where it did not prove mortal, it still left its mark on the extremities; for it settled in the privy parts, the fingers and the toes, and many escaped with the loss of these, some too with that of their eyes. Others again were seized with an entire loss of memory on their first recovery, and did not know either themselves or their friends.[2]

Estimates of fatalities are necessarily speculative, but a figure of 30,000 is often cited; the highest profile fatality was Pericles himself, along with members of his family. It is thought that the effects of the epidemic were strong enough to weaken Athens in the war, leading eventually to her defeat.

In this case, there is no direct archaeological or DNA evidence to indicate more precisely the cause of the sickness, as far as I am aware. The descriptions in the literary sources are all we have to go on.

Archaeogenetic Studies

Although literary sources tell us about epidemics and their effects on particular populations, in most cases it is impossible to be sure what the cause of the infection was. The listing of symptoms is certainly indicative, but not conclusive. This is where recent studies of surviving DNA have proved essential, since traces of the pathogen involved are present in recovered human remains. In order to associate particular studied individuals with known outbreaks, it is necessary that good dating evidence is available. This is easier said than done, though certain medieval and early modern populations have been found to be well dated archaeologically.

DNA studies on victims in cemeteries recovered archaeologically have shown that the Black Death was caused by *Yersinia pestis*

[2] A version of this account was also given by Lucretius in his *De rerum natura* (Book VI).

(Haensch *et al.* 2010; Schuenemann *et al.* 2011). Many other outbreaks of plague between the 14th and 17th centuries were also caused by *Y. pestis* (Spyrou *et al.* 2016; Spyrou *et al.* 2019).[3] Further back in time, there is now strong evidence that the Justinianic plague was also caused by *Y. pestis* (Wagner *et al.* 2014; Keller *et al.* 2019). It seems clear that *Y. pestis* is always latent in the background; it emerges into a fully fledged epidemic at particular times, perhaps as a chance result of poor hygiene, the infected fleas being carried by rats.

What is more, recent work has shown that *Y. pestis* was present by at least 3000 BCE (Rasmussen *et al.* 2015). By sequencing the genomes, it was found that ancient plague strains were ancestral to known historical strains, though apparently causing pneumonic and septicaemic plague, not bubonic; that came along somewhat later, perhaps by 1000 BCE. Spyrou *et al*. (2018) have suggested on the basis of their DNA work that bubonic plague can be traced back to the Bronze Age.

For archaeologists, the importance of these studies is their ability to shed light on ancient populations where there are otherwise puzzling gaps in the record.

Prehistory

Since *Y. pestis* was present in human populations in later prehistory, there are potentially important implications for the trajectory of human health in the millennia prior to recorded history. Some of these have already been suggested: the effects of the viral vector being present in human populations have been blamed for the decline of Neolithic communities across Eurasia, for instance the disappearance of the Tripillya mega-sites in the later centuries of the fourth millennium BCE (Menotti – Korvin-Piotrovskiy 2012; Müller *et al.* 2016; Rascovan *et al.* 2019). These authors maintain that their results show that such declines were not caused by the migrations of populations that other studies have confirmed.

Archaeologically speaking, there are many times when there are puzzling gaps in the record, with few sites known for particular periods of time. A good example is the decline of the lake villages of the sub-Alpine region, in both the Neolithic and the Bronze Age (Menotti 2015). Many potential reasons have been suggested, though in this case a rapid rise in lake level is usually assumed to be the most plausible. The gaps in the record are often attributed to inadequate knowledge of an area or period, with a lack of survey work or excavation having taken place, or inadequate preservation of suitable remains; at others it seems that in spite of good coverage, and with sites of other periods being abundant, there is a genuine absence of human activity at particular times. How, then, are these lacunae to be explained? And how are well-known 'collapses' in the archaeological or historical record (such as the Mycenaean or the Mayan) to be understood?

Catastrophes of various kinds have been invoked as causes in a number of instances, ranging from climatic effects (drought, flooding), volcanic eruptions, asteroid strikes, internal strife, invasion from abroad, and – finally – disease. Jared Diamond, in his book *Collapse: How Societies Choose to Fail or Survive* suggests several more causes: environmental degradation of various kinds, over-exploitation of resources, energy shortages, and above all overpopulation, relative to the practicable (as opposed to the theoretical) carrying capacity of the environment. In most cases it is hard, if not impossible, to come to any definitive

[3] Many news reports from 2016 (e.g., Stanbridge 2016) stated that the Great Plague of London had been associated with *Y. pestis*, but I thank Kirsten Bos (pers. comm.) for informing me that the samples in question actually date somewhat earlier in the 17th century.

conclusion about which of these, if any, might be responsible.

Disease brought about by *Y. pestis* is obviously not the only possible sickness that may have affected ancient populations. Without scientific knowledge of how disease is caused or transmitted, pre-industrial societies would have been at risk from many sources, especially those relating to poor hygiene. Diseases such as cholera and typhoid fever, as well as the many varieties of gastroenteritis, result from the ingestion of infected food or water. Tuberculosis is believed to have been present in antiquity (Barberis *et al*. 2017), as is smallpox (Riedel 2005); the origin of measles is uncertain but it has been suggested as a possible cause of the Antonine Plague in the second century CE (Düx *et al.* 2019). Any or all of these might have caused severe loss of life in prehistoric societies.

As well as 'collapses', there are plenty of situations where a particular cultural phenomenon came to an end, being replaced by different cultural manifestations. Here changes brought about by technological advances, or by human actions, cannot easily be disentangled from those potentially attributable to disease. Thus most commentators agree that the start of the Neolithic way of life in Europe was due to the spread of farming across the continent, by whatever means – and genetic work shows beyond reasonable doubt that it was actual people who moved, not just ideas (Haak *et al.* 2010; Hofmanová *et al.* 2016). The same is true for the Beaker phenomenon, as we now know (Olalde *et al.* 2018). In the Bronze Age of central Europe, there has been speculation over many years about the rise and fall of the 'Koszider period' in Hungary, when a particular set of artefacts distinguished certain levels in tell sites, after which they were abandoned; usually attributed to hostile incursions, it seems equally possible that other factors, including disease, were to blame (Mozsolics 1957; Bóna 1958; Pusztainé Fischl *et al.* 2013; Vicze *et al.* 2013; Kienlin 2015, 40).

These matters must await further DNA work relating to the disease vectors, present in human and animal remains from various contexts. For now it remains to be thankful that modern science can not only develop means to ward off the present disease, but also identify when and where it occurred in the past. Both of these achievements can be regarded as a triumph for modern science.

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