



WAYNE STATE
UNIVERSITY

Pandemic Perspectives

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Pandemic Perspectives

Historical accounts of
pandemics and epidemics

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An Overview of Two Ancient Epidemics:

The Plague of Athens, 403-427 BCE

The Antonine Plague, 165-180 CE

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Life in the Ancient Mediterranean

A very brief introduction



Everyday Life

- People in the ancient world faced the constant threat of violence, both organized and casual, poverty, chronic malnutrition, crowded living conditions, lack of clean drinking water and adequate waste disposal, a subsistence agriculture dangerously dependent on the whims of weather, and deadly pathogens.
 - River valleys, the centers of the earliest civilizations, are notoriously unhealthy places.
 - Cities were population sinkholes with urban death rates normally exceeding urban birth rates.
 - While most people in antiquity lived in non-urban landscapes that would protect them from many communicable diseases as long as they didn't travel...
 - Isolation made them vulnerable to novel diseases spread by traveling merchants, refugees, and soldiers due to the lack of herd immunity.
 - Historians have further concluded that infectious disease was a more important factor than primary malnutrition in high mortality regimes.



Ancient Plagues

- Pestilence and plagues are recorded frequently in our sources.
 - (Unless specified as *yersinia pestis*, “plague” throughout the following presentation is used in the generic meaning of a widespread epidemic.)
- Richard P. Duncan-Jones (1996) points out that the Roman historian Livy records plagues a little more than every 8 years in his extant history covering the years between 490 and 292 BCE. After a lacuna in the narrative, Livy’s work survives for the years 221 to 167 BCE. In this portion, a bit closer to Livy’s own lifetime, plague is mentioned substantially more often with a mean of every 5.8 years as opposed to 8.25 years.
- Livy is by no means unique in his frequent references to plague and disease.



Life Expectancy in Antiquity

- Demography is a discipline that depends on data.
- Attempts have been made to elicit data from Ulpian's life table and from tombstone inscriptions in Roman North Africa.
- Bagnall and Frier (1994) compared the set of Regional Model Life-Tables developed Coale and Demeny (revised 1983) to the surviving census records in Roman Egypt.
 - They concluded that these census records best matched model life tables with a mean life expectancy at birth in the lower to mid twenties.



Problems with Model Life Tables

- Despite the Eurocentric (and recent) data used to construct the model life tables, ancient historians have frequently employed them and still do.
- Over time, it became apparent that the age specific death rate on a given table may dramatically overstate or understate the actual age-specific death rate in an ancient society.
 - E.g., the widespread presence of malaria or tuberculosis in a society would result in a table-predicted death-rate significantly understating the actual death rate of young adults.
- Walter Scheidel (*JRS* 2001) suggested that we can say little beyond that mean life-expectancy depended on environment and other factors that the model life tables do not and indeed cannot capture.
 - Scheidel did add that, absent empirical data, the tables will always be ‘useful to think with’.
- Regardless of these problems, it is clear that antiquity was a world of high mortality that, in turn, required high fertility to maintain population.



Additional Reading: Introduction

- Bagnall, R. S. & Frier, B. W. *The Demography of Roman Egypt*. Cambridge: Cambridge University Press, 1994.
- Garnsey, Peter. *Food and Society in Classical Antiquity*. Cambridge: Cambridge University Press, 1999.
- Hopkins, Keith. "Taxes and Trade in the Roman Empire (200 B.C.-A.D.400). *JRS* 70 (1980) 101-25.
- Little, Lester K. (ed). *Plague and the end of antiquity: the pandemic of 541-750*. Cambridge: Cambridge University Press, 2007.
- McNeill, William. *Plagues and Peoples*. New York: Doubleday, 1976.
- Parkin, Timothy G. *Demography and Roman Society*. Baltimore: Johns Hopkins University Press, 1992.
- Potter, D. S. & Mattingly, D. J., eds. *Life, Death and Entertainment in the Roman Empire*. Ann Arbor: University of Michigan Press, 1999.
- Sallares, Robert. *The Ecology of the Ancient Greek World*. Cornell University Press, 1991.
- Saller, Richard. *Patriarchy, Property and Death in the Roman Family*. Cambridge: Cambridge University Press, 1994.
- Scheidel, Walter. *Death on the Nile: Disease and the Demography of Roman Egypt*. Leiden: Brill, 2001.
- Scheidel, Walter. (ed.). *Debating Roman Demography*. Leiden: Brill, 2001.
- Scheidel. "Roman Age Structure" Evidence and Models" *JRS* 91 (2001) 1-26.
- Scheidel, Walter, Morris, Ian, Saller, Richard. *The Cambridge Economic History of the Greco-Roman World*. Cambridge: Cambridge University Press, 2007.
- Scobie, Alex. "Slums, Sanitation, and Mortality in the Roman World." *Klio* 68 (1986): 399-433.



The Plague of Athens

430—426 BCE



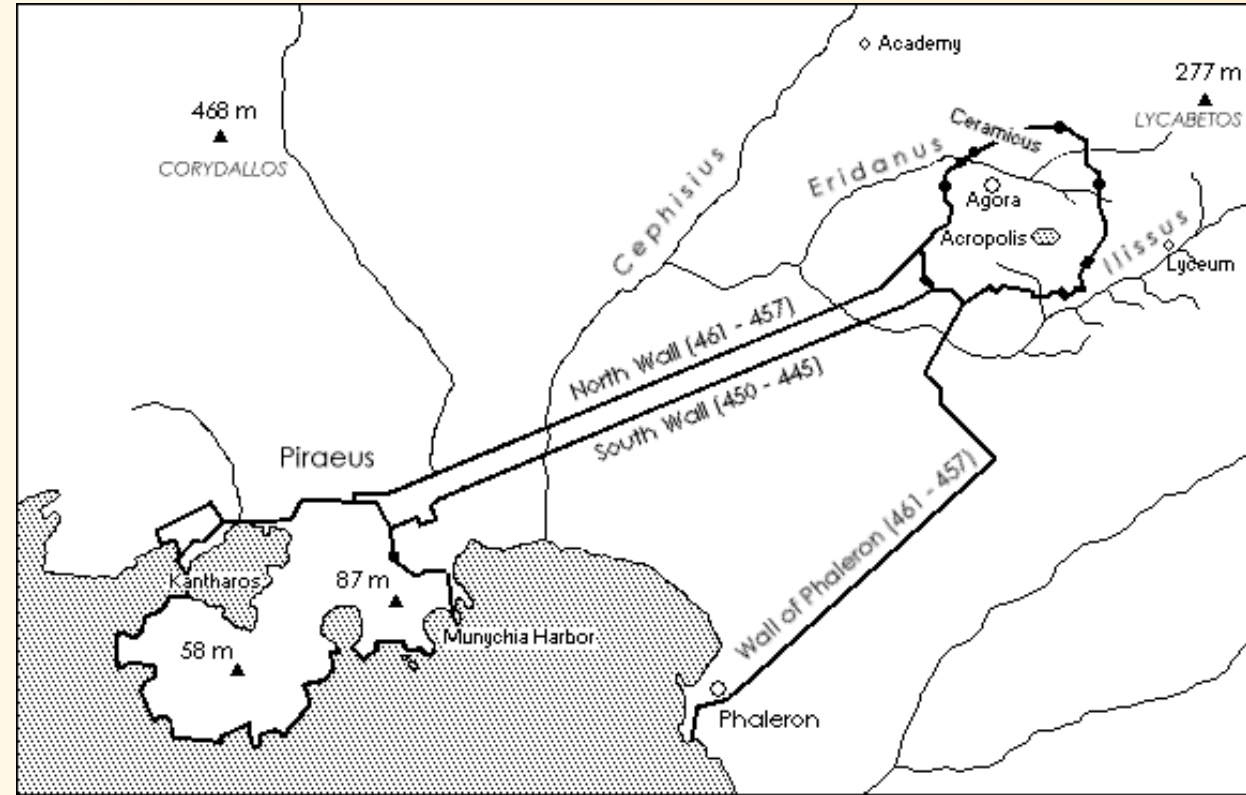
Peloponnesian War and the Athenian Plague

- War broke out between the two alliances, one led by Athens, the other by Sparta, in 431 BCE. The war finally concluded in 404 with the surrender of Athens.
- Perikles, the effective leader of democratic Athens for many years prior to the war, convinced the Athenians to move the flocks to the islands, abandon their villages and homes in the countryside, and seek shelter behind the long walls.



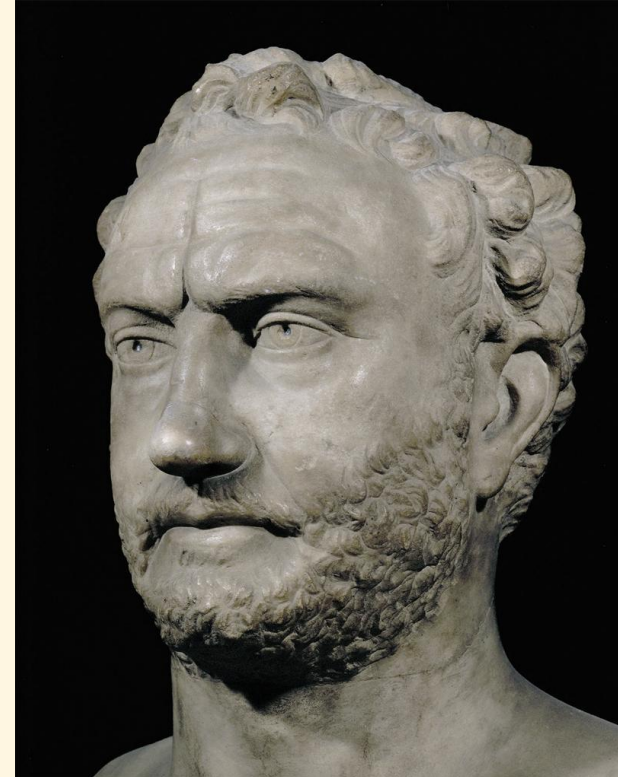
The Long Walls

- Built from 461 through 445, these walls connected the city of Athens with its two ports Phaleron and the Piraeus.
- Certainly some families found shelter in the city or its ports, especially better-off Athenians who may have had both a farm and an urban dwelling.
- Nevertheless, the space between the walls—and between the city and its ports—became a vast refugee camp with inadequate sanitation for at least 100,000 people and perhaps tens of thousands more.



Plague

- Thucydides (2.48) wrote that it began in Ethiopia and then spread first to Egypt and Libya and then to most of the Persian Empire.
- It spread to Athens in the second year of the war (430 BCE).
- It does not seem to have spread widely in Greece. However...



Courtesy Artstor/Erich Lessing Culture and Fine Arts Archives



Plague Spreads to Potidaea

- The Athenians had besieged Potidaea in 432; it would surrender in the winter of 430/29.
- In 430, with the plague already ravaging Athens, Athenian forces raided the Peloponnesian peninsula.
- Afterwards, the assembled hoplites and cavalry reinforced the troops besieging Potidaea.
- Unfortunately, the reinforcements brought the plague with them.



Death of Perikles

- Perikles succumbed to the plague in 429; several months after two of his sons died from it.
- While Thucydides was no supporter of Perikles' popular faction, he clearly admired him and wrote that his death took from the Athenians their most capable leader.
- The malady lingered until 429/28 and then returned in 427/26.
- Thucydides, who caught and survived it, suggested that the plague caused a lack of public order that paved the way for some of the war's later atrocities.



Thucydides' Description of symptoms (II.49)

- Fever, inflammation of the eyes, bloody tongues or mouths, fetid breath, sneezing, hoarseness, chest pain, a hard cough, unquenchable thirst, and inability to sleep. This could be accompanied by vomiting and discharges of bile which was frequently followed by “ineffectual retching...[and] violent spasms....Externally the body was not very hot to the touch...but reddish, livid and breaking out into small pustules and ulcers....internally it burned”.
- After about seven or eight days, it could move into the bowels, “inducing a violent ulceration accompanied by severe diarrhea” If it reached this stage, the patient usually died.



What was it?

- Thucydides was not a trained medical practitioner. Symptoms described unfortunately overlap several diseases and some of the Greek words he used have more than one accepted meaning. Thus, parts of his description lack the necessary clinical precision for us to be absolutely sure of either the translation or the disease.
 - (See: Littman & Littman, 1969, for a detailed discussion of these difficulties.)
- Consequently, there is no uniform agreement among recent scholars who have proposed more than two dozen candidates, including plague (*yersinia pestis*), measles, smallpox, and ebola.



Recent Discovery

- In 2001, a fifth-century BCE mass grave in Attica was discovered at the famed Kerameikos cemetery. Its excavation in part yielded 3 skeletons from which DNA was extracted from dental pulp. (See: Manolis Papagrigrorakis, *et al*, 2006). This extracted DNA was then compared to DNA from likely candidates for this pestilence.



Kerameikos cemetery



Results of Experiment

- The first six attempts used genomic sequences from plague (*Yersinia pestis*), typhus, anthrax, tuberculosis, cowpox, cat-scratch disease. These failed to show a match.
- The seventh, yielded a match to *Salmonella enterica* serovar Typhi, the bacillus causing typhoid fever.



The debate

- In a letter to the editor, Beth Shapiro and her colleagues (2006) argue that the results of the above experiment suggest that the dental pulp DNA at issue is possibly salmonella, but not typhoid. They write that “the Athens sequence and typhoid would have shared a common ancestor in the order of millions of years ago.”
- Papagrigrakoris replied that there was no contamination from the soil and that Salmonella species do not survive long in soil. He further argued that none of the criticisms leveled against the experiment exclude his conclusion.



The debate continues

- More recently, R.J. Littman (2009) has argued that the conclusion of Papagrigorakis and his colleagues is premature. Littman writes: “We know from Hippocrates that typhoid was most likely endemic in the Greek world. The presence of an endemic disease does not necessarily indicate that it was the cause of death.”



The Disease or Diseases is still Uncertain

- Comparing theoretical epidemic curves, Littman writes that the Athenian plague can be limited to two categories of disease, the first includes typhus, plague and arboviral diseases (e.g., dengue fever, West Nile), the second includes smallpox.
 - Measles and explosive streptococcal disease are less likely candidates.
- Littman is somewhat less certain here than in his co-written 1969 article which concluded that typhus, smallpox, and perhaps measles were the most likely culprits.



Assessing the Human Cost

- Many Mediterranean city-states, including Athens, routinely kept track of citizens who could vote, or who could be called upon for military service as infantry or cavalry.
- Thucydides (III.87) recorded the numbers. Unlike Herodotus, or many other ancient historians, modern historians accept Thucydides' numbers as accurate, or at least not inflated.



Human Cost

- Thucydides wrote that the Athenians lost 4,400 hoplites to the plague, some 300 cavalry & countless others.
- It is unclear if the 4,400 cited referred only to frontline citizen hoplites, or to all hoplites, including resident aliens obligated to serve, and older men who would still be called upon (only) to defend the long-walls and the city.
- The 300 cavalry deaths, however, represent 30% of the 1,000 citizens on the cavalry roll.



Detail from seventh-century Chigi Vase showing hoplite battle.



Human Cost (concluded)

- The precise numbers Thucydides cited did not include women, children, elderly and *thētes* (citizens too poor to serve as hoplites).
- *Thētes* comprised about half of the citizen class and were the majority of the oarsmen in the Athenian fleet.
- In all probability, plague deaths in these groups were proportionately similar to the better documented hoplites and cavalry.
- With perhaps 25%-30% of the population dead, Athens took years to recover.



The Olympias, a reconstructed Athenian Trireme



Additional Reading: Athenian Plague

- Thucydides, *The Peloponnesian War*. (Available in many translations.)
- Littman, R.J. & Littman M.L. “The Athenian Plague: Smallpox.” *Transactions and Proceedings of the American Philological Association*. 100 (1969) 261-275.
- Littman, Robert J. “The Plague of Athens: Epidemiology and Paleopathology.” *Mount Sinai Journal of Medicine* 76 (2009) 456-467.
- Hanson, Victor Davis. *A War like no Other*. Random House, 2009.
- Papagrigrorakis, M., Yapijakis, C., Synodinos, P., Baziotopoulou-Valavani, E. “DNA examination of ancient dental pulp incriminates typhoid fever as a probable cause of the plague of Athens.” *International Journal of Infectious Diseases* 10 (2006) 206-214.
- Shapiro, B., Rambaut, A., Gilbert, M. Thomas P. “No proof that typhoid caused the Plague of Athens (a reply to Papagrigrorakis et al.): *International Journal of Infectious Diseases* 10 (2006) 334-335. Papagrigrorakis responded, *Op cit.*, 335-336.



The Antonine Plague

165—180 CE



Literary Sources

- Contemporary sources are relatively sparse.
 - Galen, antiquity's most famous medical practitioner, and the personal physician of the Emperor Marcus Aurelius, refers to it several times.
 - He mentioned that he lost his personal slaves to it and that he fled to Pergamum to avoid it.
 - Unlike Thucydides, however, his references deal with attempts to treat the malady, rather than provide a description for the ages.
 - Aelius Aristides and Lucian are other contemporary literary sources.
 - Finally, there is a surviving administrative report from Egypt referring to an epidemic 4 years before the writing of the report.



Later Ancient Sources

- Writing in the late fourth century, Eutropius made a brief reference in the *Breviarium*.
- Orosius, a fifth-century Christian author (in various places in book VII) normally associates plague with persecution of Christians.
- There are also references to the plague in the life of M. Aurelius (XIII.3), and Lucius Verus (VIII.1-2), two of the biographies in the uneven collection of fourth-century biographies known as the *Scriptores Historiae Augustae*.
- Ammianus Marcellinus and Jerome provide additional references.
- Cassius Dio, a contemporary of the plague, wrote a History of Rome in 80 books.
 - Much of it is lost, including the parts covering the years of the plague.
 - Nevertheless, regarding an episode in 189, usually thought to be a reoccurrence of the earlier outbreak, Dio wrote...



Cassius Dio on the Pestilence of 189 CE.

- “[T]wo thousand persons several times died in Rome on a single day.”(73.14.2).
- Hyperbole? Probably. Dio continues: “[m]any more, not merely in the capital but throughout almost the entire empire, perished by the hands of scoundrels, who smeared some deadly drugs on tiny needles, and, for pay, infected men with the poison by means of these instruments.”
 - Americans apparently do not have a monopoly on conspiracy theories.
 - Quite possibly, this is a reference to hucksters pushing deadly cures. That people in the present Covid-19 pandemic have been reported drinking bleach and trying other dangerous remedies is perhaps relevant.
- One sentence later, 73.15 begins: “[s]till, the effect of Commodus upon the Romans was worse than that of all pestilences and all villainies.”
 - Dio’s final two quotes above can clearly diminish the impression of the overall plague-caused mortality.



Modern Opinion

- In the early nineteenth century, historian Barthold Niebuhr declared that the Roman Empire never recovered from the devastation wrought by the Antonine Plague.
- A century later, Otto Seeck wrote that over half the Empire's population perished.
- Arthur Boak (1955) maintained that the Antonine plague caused a severe and continuing manpower shortage that led to the admission of Germanic tribes into the Danubian provinces and the growing prominence of Germanic recruits in the army.
 - Boak also argued that these efforts did not reverse the manpower shortage, except locally and for the short term.
- In J.F. Gilliam (1961) took issue with earlier claims and argued that the plague killed about one to two percent of the population.
 - Just to put this into perspective, if Covid-19 should kill one percent of U.S. population, that would equate to about 3.3 million people.



Modern Opinion (continued)

- The Littmans (1973) identified the disease as smallpox and argued that its death rate would have been similar to the mean death rate for smallpox, which is ten percent. They then estimated the Antonine Plague death rate at between seven and ten percent.
- R. J. Duncan-Jones' (1996) article in the *Journal of Roman Archaeology (JRA)*, reignited a debate that continues today, both within the pages of the *JRA* and in a multitude of other publications.
- For the most part, scholars of the Antonine Plague tend to focus on finding reliable and verifiable means to measure the impact rather than on identifying the pathogen.



Appearance of the Plague

- Ammianus (XXIII.6.24) wrote that the plague filtered into the Empire in the wake of Lucius Verus' campaign in Parthia around 165.
- In Ammianus' account, it originated with a deadly vapor that was released in the sacking of the Parthian capital of Ctesiphon and nearby Seleucia, specifically with the destruction of the temple of Apollo Camaeus by troops of Avidius Cassius in Seleucia.
 - Remember the plague in the *Iliad* also began with Apollo's anger.
- Ammianus continued, the plague: "polluted everything with contagion and death, from the frontiers of Persia all the way to the Rhine and to Gaul."



Marcomannic War

- Marcus Aurelius spent years in the Danube region fighting against the Germanic Marcomanni.
- The threat was severe enough that veteran troops returning from Parthia reinforced the regions...and doubtlessly spread the disease.
- The plague required the Emperor to delay his planned campaign against the Marcomanni for a year until 168. By that time, Marcus Aurelius was able to recruit two new legions in Italy for the campaign.
 - The delay shows the severity of the crisis.
 - That new legions were raised supports the idea that the manpower shortage was only temporary.



Observations

- Presuming the sources are correct, and the army was the original vector in spreading the plague throughout the Empire, it would have been hit hard.
 - Eutropius (VIII.12) remarked that “a great proportion of the inhabitants and almost all of the troops [died].”
 - Life in crowded barracks or marching camps would not have helped to contain it. Legions or smaller units returning to their bases from the Parthian campaign, or being sent to fight the Marcomanni, would have aided in its transmission.
 - The military establishment comprised a bit less than one percent of the Empire’s population.
 - There is no reason to doubt that Rome and other large cities suffered greatly.
 - How it affected the rural regions is largely unknown.
 - The question is scale.



Gauging the Impact

- Over the decades, short or longer term labor shortages in Pannonia, Egypt and in the Spanish silver mines have all been attributed to the plague.
- Regarding Egypt, Greenberg (2003), Bagnall (2000 & 2002) suggest that, although the plague may well have had an impact, banditry, lower than average flood levels in the Nile Valley, and migration can explain these changes too.
- After 1955, with Boak's thesis on a Roman manpower shortage having considerable support, many argued that the *agri deserti* of Roman legal sources was evidence of depopulation, much of it due to the Antonine plague.
 - Over the last generation or so, however, *agri deserti* is now thought to refer to land that had fallen off of the tax rolls for a variety of reasons not necessarily, related to plague:
 - Land abandoned by peasants relocating from drought-stricken regions or fleeing from the threat of raids.
 - Land that was still occupied but in periods of unrest had come under the control of local leaders.



Population and Urbanization

- Population of the Roman Empire probably hovered around 55 to 60 million and was almost certainly between 50 and 70 million.
 - Some estimates are as low as 45 million. Kyle Harper (2017) suggests 60 million in 14 CE, rising to 75 million by 165 CE.
- Urbanization:
 - In Roman Egypt 25% or more of the population may have lived in urban settings. Coastal regions of western Anatolia were also heavily urbanized. Rome possibly—indeed, probably—had a population of about one million. There were of course other large and medium cities.
- Nevertheless, the overall percentage of the population living in rural settings was certainly at least 80% of the total population, perhaps closer to 90%.
 - Over the last twenty years, estimates of the percentage of the imperial urban population cluster around 11% to 12%.
 - Harper, however, asserts 15%.



Scale

- Few today would agree with the conclusions of Boak, Seeck, or Niebuhr that the death rate approached 50% and that the Empire never recovered.
- Scheidel, Duncan-Jones, Harper, Littman maintain that the Antonine plague resulted in a death rate approaching or exceeding seven to ten percent with some estimates as high as 15% and even higher.
- Others, Bagnall, Greenberg, Bruun, Elliott, question whether the evidence used to support these estimates is indeed unique to the plague years. If the evidence can be disassociated from the plague years (see slide: “Gauging the Impact” above), they contend that a higher death rate than the one to two percent proposed by Gilliam is unproven.
- Thus, the scale of impact is still a matter of debate.



Final Thoughts

- People in antiquity lived in an environment of high mortality and high fertility; epidemic and endemic disease was a constant.
 - Plague and pestilence clearly caused excess deaths, i.e., deaths in a time period of time over and above the expected number that would have occurred in the plague's absence.
 - Plagues also resulted in replacement deaths (deaths of those who would have died from other diseases in the same period, but instead died from the plague).
 - The true dimension of the human cost is therefore unrecoverable.
- It is worth remembering that, despite the harsh realities of life—and they could be very harsh indeed—ancient peoples built the pyramids, the hanging gardens, and the Parthenon. They constructed well-maintained aqueducts, sewers, and roads, and created impressive systems of law, mathematics, and philosophy.



Additional Reading: Antonine Plague

- Bagnall, Roger. "P. Oxy. 4527 and the Antonine plague in Egypt: death or flight?" *Journal of Roman Archaeology* 13 (2000) 288-292.
- ----- "The effects of plague: Model and evidence." *Journal of Roman Archaeology*, 15 (2002) 114-120.
- Boak, Arthur E. R. *Manpower Shortage and the Fall of the Roman Empire in the West*. Ann Arbor: University of Michigan Press, 1955.
- Bruun, C. "The Antonine plague in Rome and Ostia." *Journal of Roman Archaeology* 16 (2003) 426-434.
- Duncan-Jones, R. "The impact of the Antonine plague." *Journal of Roman Archaeology* 9 (1996) 108-136.
- ----- "The Antonine Plague Revisited." *Arctos* 52 (2018) 41-72.
- Elliot, Colin. "The Antonine Plague, Climate Change and Local Violence in Roman Egypt." *Past and Present* 231 (2016) 3-31.
- Flemming, Rebecca. "Galen and the Plague." In *Galen's Treatise Περὶ Ἀλυπτίας (De Indolentia) in Context*. Edited by Caroline Petit, pp.219-244. Leiden: Brill, 2018.
- Gilliam, J. F. "The Plague under Marcus Aurelius." *American Journal of Philology* 82 (1961) 225-251.
- Greenberg, J. "Plagued by doubt: Reconsidering the impact of a mortality crisis in the 2nd c. A.D." *Journal of Roman Archaeology* 16 (2003) 413-425.
- Haldon, J., Elton H. et al. "Plagues, climate change, and the end of an empire. A Response to Kyle Harper's *The Fate of Rome (2): Plagues and a crisis of empire*." *History Compass* 16 (2018) 1-10. This is one of 3 critiques by the same authors of Kyle Harper's book below. The critique cited here is relevant to the Antonine Plague.
- Harper, K. *The fate of Rome: climate disease and the end of an Empire*. Princeton: Princeton University Press, 2017.
- Littman, R. J. & Littman, M. L. "Galen and the Antonine Plague." *American Journal of Philology* 94 (1973) 243-255.
- McConnell, Joseph, et al. "Lead pollution recorded in Greenland ice indicates European emissions tracked plagues, wars, and imperial expansion during antiquity." *Proceedings of the National Academy of Sciences*. 115.22 (2018) 5726-5731.
- Silver, Morris. "Antonine Plague and Deactivation of Spanish Mines." *Arctos* 45 (2011) 133-142.
- Scheidel, Walter. "A model of demographic and economic change in Roman Egypt after the Antonine plague." *Journal of Roman Archaeology* 15 (2002) 97-114.

