



HAL
open science

Epidemics and Wars: Comparative Archaeology and Anthropology of Ancient Greek Mass Burials

Reine-Marie Bérard, Dominique Castex

► **To cite this version:**

Reine-Marie Bérard, Dominique Castex. Epidemics and Wars: Comparative Archaeology and Anthropology of Ancient Greek Mass Burials. Athens Journal of History, 2021, 7 (4), pp.295-318. 10.30958/ajhis.X-Y-Z . halshs-03334808

HAL Id: halshs-03334808

<https://shs.hal.science/halshs-03334808>

Submitted on 5 Sep 2021

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Epidemics and Wars: Comparative Archaeology and Anthropology of Ancient Greek Mass Burials

By Reine-Marie Bérard & Dominique Castex‡*

The high number of dead bodies to deal with in time of mortality crises (events marked by an unusually high number of dead in a limited amount of time) often leads to modifications in the traditional funerary practices of a society. This contribution questions the way Ancient Greeks, from the 8th till the 3rd c. BC, handled such mortality crises, focusing on mass burials. In a first methodological part, we discuss the means to identify funerary sites related to mortality crises, using the methods of archaeoethanatology. By confronting archaeological features (taphonomic processes, position of the remains, grave type, offerings, etc.) and bioanthropological data (number of dead, sex, age, pathologies, etc.), we will first define the main characteristics of mass burials. We will then question how to discriminate between mass burials linked to war, epidemics, massacres and famine, underlining the major importance of historical sources in this process. The second part is dedicated to the study of various cases from Athens, Paros, Chaeronea, Tanagra and Greek Sicily and their interpretation. We will argue that epidemic mass burials are the most difficult to identify, since they may present innumerable variations in terms of osteoprofiles and archaeological features. Finally, we will question our abilities, as archaeoanthropologists, to evaluate the impact of epidemics on the funerary treatment of the dead in the Ancient world.

Keywords: *Mass-grave, Ancient Greek, Archaeoethanatology, History, Biology*

Introduction

The high number of dead bodies to deal with in time of mortality crises (events marked by an unusually high number of dead in a limited amount of time) often leads to modifications in the traditional funerary practices of a society. This contribution questions the way Ancient Greeks, from the 8th till the 3rd c. BC, handled such mortality crises, focusing on mass burials. It is only with the development of specific methods for funerary archaeology in the 1980s and the subsequent possibility to identify simultaneous deposition of several individuals within the same structure that past mortality crises have started to reveal some of their secrets. Osteological collections constituted in times of crisis have opened the way to two new grounds of investigation: the first one concerns the treatment of the dead and the changes in funerary traditions in

*Researcher, French National Center for Scientific Research, Aix-Marseille University, France.

‡ Researcher, French National Center for Scientific Research, Bordeaux University, France.

times of mortality crises; the other aims at defining the nature of these crises on the bases of biological data drawn from the examination of the skeletons. Accumulated findings and their analysis gradually led to fruitful interdisciplinary synthesis work. The study of the second plague pandemic which affected the world from the 14th to the 18th century and the modifications of the funerary practices during the First World War of 1914–1918 were two of the main laboratories for such investigations, respectively in the field of epidemic and armed conflicts. But some other medieval and modern crises, particularly devastating, also had a strong impact on their contemporaries, leaving traces in textual and iconographic evidence. The comparison of these documents with the funerary archaeological data available for the same periods has given birth to various profitable works. History, archaeology and biology were integrated in order to provide complementary information to approach past societies' attitudes to massive simultaneous deaths and apprehend the causes behind the constitution of some of these complex funerary structures. Step by step, at the interface of several disciplines, a methodological strategy progressively developed, now allowing proposing inquiries on older epochs for which the sources are less complete and diversified.

This paper hence aims to investigate the archaeological evidence for mortality crises in Ancient Greece from Archaic to Hellenistic times. For this period, archaeological documentation is relatively rich, but most of the funerary structures that can be connected with a turmoil context have only been the subject of isolated works. We will first discuss the methodological procedure required to identify and analyse mortality crises in archaeology, then present various case studies from the Aegean and colonial world probably linked to distinct sorts of crises (war, epidemic, famine and massacres). A new approach will be tested on the wide-ranging types of data available so far in order to discuss, and possibly re-discuss, their respective relevance for the interpretation of the sites and their inter-relationship. It will also be an opportunity to point out the data that are presently missing and which exploitation would be necessary to allow a comprehensive apprehension of the different types of mortality crises of the past. In doing so, we hope to humbly contribute to the constitution of a corpus of specific methods for the excavation and study of mass burials of the Ancient world.

Identifying Funerary Sites Related to Mortality Crises

Demonstrating Simultaneous Deaths

To archaeologists, the presence of several dead within the same burial pit usually suggests the hypothesis of an abnormal mortality, sign of a human group's adaptation to the situation of handling a large number of bodies in a short time. However, the only possibility of proving this is to make certain

observations based on archaeothanatological methods¹. The examination should focus on the articular relationships between the different bones present in the grave. Firstly, the existence of maintained anatomical connections represents fundamental evidence confirming the primary deposition of all the individuals. This means that the bodies decomposed in the same place where they were first deposited and then found by the archaeologists, thus immediately eliminating the hypothesis of an organized ossuary where the bones may be arranged by type (long bones, crania, etc.). Secondly, if the osteological observations reveal juxtapositions and superpositions of skeletons with the preservation of anatomical connections, it is then possible to affirm the simultaneous deposition of individuals and the grave may be called 'multiple'. This excludes the prospect of a 'collective' sepulture, which refers to a burial formed by successive depositions of bodies over time². This latter type of grave indeed usually shows a classic mortality profile and the introduction of each new body causes bone dislocations on the earlier individuals already reduced to skeletons. The terms 'multiple' and 'collective', widely employed by French archaeologists, are still debated³. The word 'multiple' is still rare in English-language literature, and is not always differentiated from the term 'collective'. It is more common to find the expression 'mass grave' or 'mass burial', for which there is no real consensus but which seems specifically applied to multiple burials containing dozens of bodies lying in various positions and orientations⁴.

It must be kept in mind that, although multiple burials provide the most reliable archaeological evidence of excess mortality, they were not systematically used in times of crisis. Various French archaeological examples from medieval and modern periods show that some burial sites, clearly constituted in times of pestilences, consist of individual graves⁵; this more careful treatment of bodies, following traditional burial practices, could be explained by the lesser virulence of certain epidemics or by the demographic structure of the populations affected. It is easily understandable that all intermediates exist between funerary sites with single tombs very close in time and mass graves. In the case of individual deposits, we obviously lose

¹ Duday 2009.

² Castex *et al.* 2014: 299-300.

³ Boulestin 2019.

⁴ Knüsel, Robb 2016: 657. In this communication, we use both the terms 'mass burial' and 'mass grave' indifferently. Though there is no commonly accepted definition of what should be called a mass grave, the term is intended in this communication as a multiple grave containing many human corpses. If some authors have proposed to reserve the term for graves containing at least six dead (Skinner 1987), the United Nations places the limit at three or more corpses (Haglund, Connor, Scott 2001: 57). In fact, we will see, throughout this article, that the context is more important than the number of dead to define what a mass grave is.

⁵ e.g. Bizot *et al* 2005.

information on the simultaneous decomposition of several corpses, but other observations can be considered: prevalence of burials excavated directly in the earth, size and orientation of the pits, unusual positions of the bodies are all archaeological clues that may let us identify particularities in the funerary practices of the populations concerned, and therefore suspect a crisis. We can also mention examples where there are very few skeletons compared to the available surface and consequently the remains are not superposed. Evidencing a single digging is then a strong argument for simultaneous depositions, as well as the relative location of each skeleton in the grave, the positions of some being influenced by those of others.

However, tracking the simultaneity of death has some limits, firstly when it comes to cremation. Indeed, it can be assumed that cremation was practised during some crises, particularly in periods of epidemics. This was the case, in particular, for cholera epidemics in the modern era¹. Such cases deprive us of identifiable archaeological evidence. While it is feasible to prove the grouping of burnt bones of several individuals within the same burial structure, it is impossible to affirm that the cremation of these persons was simultaneous and to discuss the length of time between their deaths.

It is also often accepted that the simultaneity of the body depositions necessarily demonstrates the coincidence or proximity of the death time of the individuals. Nonetheless, certain cases, although rare, can lead to misinterpretations. Indeed, some specific environments, for example very cold climates that assure prolonged conservation of the bodies, can lead, when the temperatures are more favourable for digging, to the concomitant burial of many individuals from the same community who died at different times². In some other cases, due to the poor preservation and/or poor representation of the skeletons, it is not possible to conclude on the simultaneous nature or not of the deposits.

To interpret multiple burials as a sign of an actual phase of crisis, it is also crucial to be able to detect whether they are the result of an isolated event (e.g. poisoning or accident involving members of the same family or group) or whether they evidence a mortality peak, or a real meltdown (which usually implies several contemporary multiple graves).

Identifying the Cause of Death

Here again, the archaeological context can play a key role and provide information which, as previously mentioned, determines the biological studies. Burial directly in the earth is a feature common to the great majority of the victims of mortality crises, independently of the chronological background and

¹ Popu 2009.

² Duda 2008.

the nature of the turmoil¹. This characteristic can occasionally lead to suspicion of abnormal mortality and let us distinguish between graves constituted in times of crisis and those resulting from natural mortality.

The material accompanying individuals in their graves may help indicate the type of a mortality crisis. Armour and weapons found in situ, sometimes with artefacts still in the bones, easily suggest a preliminary diagnosis of armed conflict². Furthermore, when projectiles, military buttons, and in some cases identity plaques are present, it is often possible to attribute the deaths unequivocally to acts of war³. Nevertheless, caution is required because epidemics may occur in the wake of war⁴. Also, in the archaeological context, other types of objects, religious or not (medals depicting some saints, amulets and talismans, jewels made from materials known to be prophylactic, such as amber, pendants in the shape of a Christ's head, crosses, etc.), may lead us to suspect that the burials were linked to a high level of infectious mortality, and in particular to the plague⁵. However, deposits of such offerings are generally restricted, especially in the medieval and modern periods; a common feature of the funerary practices in times of epidemics is the scarcity of furniture accompanying the deceased. Finally, it should be mentioned that finding specific substances, related to an original handling of the corpses, may indicate an epidemic backdrop. In particular, the use of lime is frequent in plague burials at the end of the second pandemic (17th-18th century), in accordance with instructions from the political authorities to accelerate the decomposition of bodies and limit odours. However, lime is also present, and always for the most recent periods, in the context of military conflicts⁶.

Sometimes, topographical markers, such as headstones or crosses, have also materialized the remembrance of a mortality crisis. This was especially the case for some plague cemeteries⁷. The presence of this type of commemorative structure, coupled with archival research, may in some cases motivate an archaeological diagnosis.

Where burial sites, possibly created in times of crisis, are correctly dated, investigations on contemporary historical texts and files can lead to establish specific causes of death (e.g. identification of the site as a plague cemetery, a battle site, slaughter-related pit). Although there are many uncertainties about the documents that can be examined during such times (disorganization of society, losses, negligence, disrupted records, mortality linked to events for which the authorities have an interest in hiding the truth, such as political massacres, etc.), written sources can provide answers to the various questions

¹ Castex, Kacki in press/

² e.g. Figueres 2008, Beyneix 2012, Vassallo 2016.

³ Adam 2006; Rigeade *et al.*, 2006; Cabot 2017.

⁴ Castex *et al.* 2011.

⁵ Bizot *et al.* 2005; Kacki *et al.* 2019.

⁶ Cabot 2017.

⁷ Signoli *et al.*, 2007.

that are raised by the presence of multiple burials. For the most recent periods, they make it possible to situate the burial site in its geographical, political and chronological environment (plan, notarial acts, etc.)¹. They can be used to identify the origin of the crisis (community counts, census, enumeration, hospital or military accounts, chronicles...)². In an epidemic context, historical sources can further contribute to discussions on contemporary medical knowledge and conception of the mortality crisis (prophylaxis, treatment of the sick, notion of contagion and epidemic, sanitary regulations, isolation of the infected, burial instructions, handling of cadavers...)³. Although papyri and epigraphic inscriptions are more informative on the question of the burials and space management than on their exact location, they also can provide testimonies on mortality crises. More complex and limited (since they use documents with imprecise dating), this type of inquiry is still rare⁴.

In the absence of this archaeological and historical information, but obviously also as a complement, it is necessary to have access to diverse biological investigations of the skeletons in order to prove that all individuals assembled in multiple burials died from the same sudden event⁵. The most visible clues concern brutal deaths, mainly due to inter-human violence. We will thus try to identify specific pathological lesions linked to the cause of death. The detection, by macroscopic analysis, of signs related to battle trauma authorizes the rapid characterization of war or massacre contexts. More detailed studies using increasingly performant medical imagery techniques can take into consideration the different parameters of these lesions (location, size, direction and angulation) and eventually allow a reconstruction of the weapons and gestures that provoked these traumas⁶. However, this research is not informative in the case of sudden lethal infectious mortality crises (e.g. plague, cholera) because these acute diseases do not have time to develop bone lesions. Another point of discussion in palaeopathology is to try to define the health state of the population (growth stress markers, indices of nutritional deficiencies) that might indicate a favourable and aggravating context during an epidemic crisis.

In addition to investigation on any pathological lesions detected on the skeletons, it can sometimes be demonstrated that the individuals were grouped

¹ Bizot *et al* 2005; Adam 2006.

² e.g. for epidemics Signoli *et al.* 2002; Cabot 2017

³ Castex, Kacki in press.

⁴ It is a research line of the project ANR-19-CE27-0012, *Pestilences and human societies: emergence, evolution and bio-cultural transformations*, led by D. Castex. One of the aims is to draw up a historical corpus of antique epidemic crises supported by different textual evidences

⁵ Castex 2008.

⁶ e.g. Boucherie *et al.* 2017.

according to their age and/or sex¹. Depending on the nature of the crisis which affects a community, or part of it, at a specific time and place, the selection mechanisms of the population will be different in terms of age and sex. The study of the mortality profile may inform us about the type of the crisis. Indeed, each epidemic has its own demographic signature, in the same way that a group of young males will allow us to consider a possible military recruitment, while an age and sex distribution more in conformity with a natural mortality, with the presence of men, women and children, will rather suggest a massacre².

When an epidemic crisis is suspected, the hypothesis proposed about its nature based on demographic parameters can be confirmed with absolute assurance by paleomicrobiology studies. Since the original works of the late '90s³, examinations of series supposedly linked to plague have multiplied and the expansion in paleogenomics has driven spectacular advances in knowledge of the evolutionary history of the *Yersinia pestis* bacterium during its different pandemics⁴. Other studies have allowed recognizing additional pathogens such as *Salmonella enterica*, responsible for typhoid fever⁵ or *Rickettsia prowazekii*, accountable for typhus⁶. By permitting the identification of these pathogens, paleomicrobiology, a research field in constant progression, has enabled archaeology to transcend some of the limitations it traditionally faced. Discussions concerning the rise and spread of certain epidemics can now emerge on the basis of older sites without written sources.

Attempt to access to the knowledge of abrupt mortality crises of the past thus requires the development of interdisciplinary investigations, tackled from the intersecting angles of human and social science (history and archaeology) and biology. For obvious reasons, such research is generally easier for recent epochs, as they may offer precious information from written sources. However, if archaeological and textual sources have long been considered complementary, they often appear contradictory⁷. Synthetic reports, devoted to great mortality that occurred mainly in the Middle Ages, have allowed us to test the importance of archaeological and anthropological data in the context of calamities, in particular epidemics, and therefore to focus inquiry on older times. Based on the methodological precepts briefly presented here, we will now tackle different case studies centred on ancient Greece, a period that has been relatively unexplored in such contexts. The specific characteristics of each site will be discussed, as well as the strategy adopted to attempt to interpret them and the questions that some of them still raise.

¹ This is what French researchers call study of 'recruitment' by age and sex, which simply consists to discuss: who is present, who is absent?

² e.g. Castex, Kacki 2016. See below for other examples related to the Ancient world.

³ Drancourt *et al.* 1998.

⁴ Spyrou *et al.* 2016; Keller *et al.* 2018.

⁵ Vagene *et al.* 2018.

⁶ Raoult *et al.* 2006.

⁷ Castex *et al.* 2011.

Cases Studies from Archaic and Classical Greece

Numerous excavations were led in the Ancient Greek world, from the 19th century onwards. Mass graves were punctually discovered, but rarely compared and analysed according to the methodological procedure we have just exposed, confronting historical, archaeological, anthropological and biological sources. The following examples, taken from the Greek Aegean and colonial area from Archaic to Hellenistic times, will give us an opportunity to discuss the varying importance of these sources and criteria for the interpretation of different types of mass burials. We will go from the clearest towards the more enigmatic cases.

War

Wartime multiple sepultures are no doubt among the easiest mass graves to identify, following the list of criteria established earlier, especially in the Ancient Greek World where such graves are mentioned by various authors¹ and were it were often marked by explicit inscriptions. It is for example the case in Classical Athens, when soldiers began to be entombed every year at state expense in a particular area of the Kerameikos Cemetery, the 'Demosion Sema' (public cemetery) mentioned by Thucydides (II, 34) and described at length by Pausanias (I, 29).²

War dead was cremated and buried by tribe in a tomb separated in ten trenches (one per tribe) each year. Ten different headstones erected on the graves, specifying the date and place of the battle, gave the lists of the dead men's names, sometimes their status and function. Similar monuments and funerary steles exist in other cities like Tanagra and Thespies³. In such cases, recognizing wartime mass graves is quite straightforward.

But even in the absence of explicit inscriptions, identifying mass burials linked to war is generally relatively easy. Indeed, soldiers being mostly male individuals in their 20's or 30's, the age and sex ratio of the deceased clearly appears as an important indication to single out a military mass grave⁴. Besides, other clues to label a mass grave as a soldier's burial are the traumas connected to the fatal wounds. Such traumas were for example visible on the bones of

¹ See for example Pausanias, *Periegesis*, I, 32, 3 for the description of mass graves related to the battle of Marathon; Herodotus, IX, 85 for Plataea; Pausanias, *Periegesis*, IX, 40, 10 for the tumuli of the battle of Chaeronea, etc.

² A lot has been written about this state cemetery. See lastly Arrington 2015, with anterior bibliography.

³ Low 2003.

⁴ See: Castex, Kacki 2016 on the importance of age and sex ratio to determine the causes of death in ancient mass graves.

some of the 254 skeletons, laid in seven rows in the large quadrangular pit discovered in Chaeronea in 1879¹ (maybe the tomb of the Thebans who died fighting Philipp in 338 BC²) or on the remains gathered in the nine mass burials of Himera (Sicily), related to the two battles of Himera between Greek and Punic armies in 480 and 409 BC³ (see Figure 1). Many arrowheads and spearheads were found still embedded in the bones⁴. On this site, the very precise examination of the skeletons has even permitted to reconstruct the way some of the fatal blows were inflicted. It is interesting to underline that Diodorus claims (XIII, 75) that many Greek warriors, including Syracusans, were left unburied on the battlefield after the second battle of 409 and were only gathered one year later. The impressive mass grave illustrated here (figure 1) may thus have pertained rather to soldiers from Himera itself, buried by local populations, while allies were left unburied by their fellow companions fleeing away in emergency in front of defeat in order to try and protect Syracuse, threatened by the Carthaginese fleet.

Figure 1. Mass burial from the battle of 409 BC, Himera, Sicily.



Source: Soprintendenza BB.CC.AA di Palermo

Some cases are more challenging to understand, though they clearly seem to pertain to military loss, such as the *polyandria* ('[the grave of] many men', a term used by the Ancient themselves to designate multiple burials mainly related to

¹ Pritchett 1985, p. 136.

² Pausanias, *Periegesis*, IX, 40, 10.

³ About these battles, see Diodorus Siculus, XI, 20-28.

⁴ See, between other publications of the same author: Vassallo 2010, 30–31.

war events¹) of Paros. Excavated since the mid '80s by P. Zapheirou and dated around 730 BC², these two mass graves consisted in two big pits whose sides were made of massive stone slabs. They yielded respectively 40 and 120 amphorae, each lidded by a small vase. Inside the urns were the burnt bones of at least 120 adult males aged approximately between 18 and 45 years old, which skeletons show traces of battle wounds; some had weapons parts still stuck within³. Two of the amphorae bore figural depictions, presenting violent fight scenes and an individual *prothesis*, that is the typical Greek ceremony of exhibition of the dead body⁴. The interpretation of these pits as wartime mass graves seems thus highly probable.

Nonetheless, it is worth emphasizing that one of the main criteria usually taken into consideration to identify a mass burial is not met in Paros. Indeed, as was previously underlined, it is very difficult, when not impossible, to establish the simultaneity of death when burnt remains of several people are gathered, especially when – as here – the bones of each person are isolated in distinct containers. Such a separation surely indicates that every warrior had been cremated on his own pyre. As far as we know, they could well have died and been cremated decades apart before the placing of their urns in a same pit. Technically, it thus is unattainable to assess the coincidence of death of all the individuals. Nonetheless, the unique funerary treatment that they underwent, the monumentality and centrality of the grave in the necropolis, and the original use of iconographic discourse on two vases for the very first time in the history of Parian ceramics allows us to favour the hypothesis of a soldier mass burial. It may be related to the Lelantine War that opposed Chalcis and Eretria (and the rest of the Hellenic world after them) between 750 and 650 BC, or perhaps to one of the numerous – and unfortunately poorly documented – conflicts between Paros and Naxos⁵. Without a decisive argument, we will probably never know whether the Paroikia warriors died in Paros, or if they fell in foreign land and were brought back home in ashes to be buried in an exceptional honorary place in the middle of what was about to be the new Parian cemetery. Either way, the tremendous importance of archaeological remains appears clearly here since they allow us to apprehend historic events and to frame political systems that no other source documents⁶.

Massacres and Executions

¹ E.g.: Plutarch, *De Erodoti Malignitate*, 42; *Alexander*, IX; *Titus Flaminius*, VII; *Moralia*, 372E; 823E; 872E; Dio. Hal., 1.14; Strabo., 9.4.2. See also: Clairmont 1983, 368–372 for various occurrences and uses of the term in Pausanias' *Periegesis*.

² See lastly Agelarakis 2017 with previous bibliography on these two *polyandria*.

³ Agelarakis & Zapheirou 2005.

⁴ Croissant 2008.

⁵ Agelarakis, Zapheirou 2005: 34.

⁶ On the importance of wartime mass graves for our understanding of Ancient Greek political systems and ideologies, see Bérard 2020.

Mass burials related to massacres and executions may at first seem to have a lot in common with multiple military sepultures. Indeed, they are often likewise characterized by a high number of individuals buried simultaneously and presenting sharp or blunt force traumas, sometimes with part of weapons such as arrows or spearheads still embedded in their bones. Alike military mass graves, depending on who took care of burying the remains and in which conditions, the grave may be well-ordered and showing signs of affliction for the dead or, on the contrary, hastily prepared with a lack of vigilance obvious from the messy disposition of the bodies. Despite these possible similarities, massacres mass graves usually differ from warriors' multiple burials by the selection of the deceased. Indeed, slaughters are not only exclusively directed against soldiers, but may also concern civilians and therefore contain both men and women, adults, children and old people¹. A combined study of the biological profile and the perimortem traumas of the dead is thus determinant to identify massacres mass burials.

Mass burials related to executions, that is killing perpetrated not by out-of-control enemies or invaders, but by regular authorities as a punishment in a more-or-less legal context may show a selection of the deceased quite similar to combatants' mass burials². It is for example the case in the Phaleron necropolis, near Athens, where several multiple graves containing only men who perished in their 20 to 50s were discovered. In 1915, a first pit yielded 17 individuals, all adult males. Some of them wore metal clamps around the neck and limbs, indicating that they probably were prisoners put to death through the practice of pillory exhibition³.

More recently, in March 2016, archaeological excavation undertaken by the Ephorate of Antiquities of West Attica, Piraeus and Islands brought to light three nearby mass burials in trenches, probably related to three successive episodes in a same period, for a total of 78 people⁴, all males⁵, mainly in their 20–40s⁶. Many clues led archaeologist Stella Chryssoulaki⁷ to interpret these pits as the inhumations of captives and convicts executed together. First, these men

¹ On the notion of massacre and its relation to war, see El Kenz 2005.

² Indeed, in the Ancient Greek world especially, death penalty mainly hit men.

³ Keramopoulos 1923; Pelekidis 1916.

⁴ 46 men in the first trench, 16 in the second and 16 in the last.

⁵ At least all the individuals whose sex could be determined from an anthropological examination of the remains.

⁶ Four of them were much younger, though, probably adolescents between 12 and 15 years old at death. For the bioarcheological study of this mass burial, see Ingvarsson-Sundström 2019.

⁷ Chryssoulaki 2019.

had their hands tied at the moment of death, 55 by iron bonds (see Figure 2), 23 by perishable bonds, maybe of rope or leather.

Figure 2. The first mass burial of the 2016 excavation in Phaleron Necropolis, showing men with their hands attached with iron bonds



Source: Hellenic Ministry of Culture, Ephorate of Piraeus and the Islands, Giannis Asvestas

Besides, the absence of regularity in the way they had been placed or rather thrown inside the pits showed that no care was taken in the burying process. In some cases, it actually seems likely that the men were executed directly on the edge of the pit in which they simply fell as they died. Indeed, many of them exhibited signs of perimortem blunt force trauma on the temples. These were, no doubt, the cause of their death, suggesting killing by a violent blow at the head. Interestingly, Plutarch (*Life of Pericles* 24.2) says that the Samian Duris accused Pericles of executing the Samian generals responsible for the siege of Milet in a similar way: after exhibiting them for ten days on the public agora, he would have killed them by smashing their skull with a club (ξύλοις τὰς κεφαλὰς συγκόψαντας). Though Plutarch himself gives little credit to this hearsay, this passage still appears to confirm the existence of a mode of execution quite similar to the one observed on many skeletons of the Phaleron mass pits. While the selection of the dead in terms of age and sex, and the presence of many perimortem traumas make this burial similar enough to a

wartime burial, it is thus mainly this systematic character of the observed lesions on a high number of dead that strongly suggest an execution.

What is remarkable though is that, despite the fact that these men were clearly executed and notwithstanding the general lack of attention in their mortuary treatment, they were not totally deprived of funerary offerings. Indeed, a few objects laid beside them: an arrowhead in the chest of one man, and a dagger in contact with the tibia of another in the third pit could be related to their injuries and death. But there were also some personal ornaments such as rings in the second trench and, more surprisingly, in the first trench, two vases traditionally used in funerary context for libations. Their type determined the dating of the tomb between the second and the third quarter of the 7th c. BC. Historical sources concerning this period suggest – though the hypothesis remains unprovable and quite risky at this stage – that these men could have been some of the plotters led by Cylon who tried to establish tyranny in Athens around 625 BC¹.

In this case the interpretation of the mass burial thus relies on a combined study of anthropological features (sex, age at death and pathologies), taphonomic ones (form of the grave, simultaneity and lack of care of the depositions), archaeological artefacts (offerings and traces of decomposed ties) and historical sources, concerning both the mode of killing and its possible cause. But the presence of links or shackles is not always to be related to some kind of execution.

Slave Multiple Burials?

A 4th century shaft discovered in Pydna (Ancient Macedonia) in January 2000, containing 115 dead, raises questions about how to perceive mass burials of individuals of subaltern status². Indeed, these individuals had been thrown into a 4 m deep rectangular rock-cut pit, all mixed up in various positions, showing no sign of care in the layering of the bodies whatsoever. Four different layers were observed, probably equating to four phases of deposition, not strictly contemporary. Few humble artefacts accompanied the dead, mostly related to clothes and personal ornaments (for example fibulae and ring), while no offerings or objects pertaining to any kind of funerary rituals (such as perfume or banquet vases) is mentioned. Iron bonds (a neck band, an arm shackle, an isolated leg fetter and a pair of leg fetters) were found on four of the dead, which led the archaeologists to assume that these people may have been slaves who died in four main episodes separated by a short amount of time (corresponding to the four layers of bodies).

¹ This conspiracy is briefly mentioned by Herodotus (V, 71–5.72), Thucydides (I, 126.2 – I, 126.12) and Plutarch (*Life of Solon*, 12.1–12.14).

² Triantaphyllou, Bessios 2005.

The biological data helped the scientists in their interpretation of this atypical grave. Indeed, the anthropological study indicated that men and women occurred in almost equal frequency, and that various age categories were represented, from children to adults, with a very high mortality rate of adolescents and young adults. Mature adults were rarer, and senile (over 50 years old) totally absent. While no sign of violent ante-mortem trauma (fractures, sharp blows, etc.) has been observed, the anthropologists underlined the poor general health state of these people. Many of them showed signs of physiological stresses such as enamel hypoplasia, Harris lines, anaemia, *cribra orbitalia*, etc. suggesting dietary and nutritional deficiencies during growth. The prevalence of affections of the musculoskeletal system was also very high, with an important rate of enthesopathies, strong muscular attachments, and arthritic changes that affected even very young individuals of both sexes, especially on the joints of ankles and wrists. All these signs denote that these individuals endured poor alimentation during childhood and were exposed to heavy physical labour from their youngest age. All these biological clue concords with the archaeological features to indicate that these people were of low status and probably pertained to subaltern working classes. The authors thus suggest that they may have been slaves who died before their time because of their poor health state and rough living conditions. This conclusion, though highly interesting, raises questions about the funerary treatment of slaves in the ancient Greek world, about which we actually hear very little from the texts¹. We only know from inscriptions that slaves who had died on the battlefield were usually buried with their comrades², with the exception of the battles of Marathon where slaves fought for the first time with the Athenians but were buried separately (Pausanias, *Periegesis*, I, 32.3) and Platea, where the Spartans buried the helots in a separate grave from the *homoioi* (Herodotus, IX, 85). From an archaeological point of view, only a few burials and cemeteries have been interpreted as possibly linked to slaves³. But the distinction between slaves and subaltern classes remains delicate if not totally impossible to draw from the mere archaeological records, all the more since there were many different kind of slaves status and attitudes towards slaves in the Ancient Greek world⁴.

Returning to the interpretation of Pydna's mass grave as a slave burial, it does not really question the precise cause of death of so many persons in a short period, that is to say the origin of the mortality crisis we are dealing with in this case. Considering that there was no sign of violent inter-human perimortem

¹ Lindenlauf 2001, 95.

² Kurtz & Boardman 1971, 198-199; Low 2003, 102.

³ See a possible case near the Greek colony of Poseidonia-Paestum, in Southern Italy: Contursi 2016; Zuchriegel 2017, chapter 3.

⁴ Garlan 1988; Hunt 2017; Forsdyke 2021.

interactions on the bones, the possibility of war or massacre victims can indeed be ruled out. Starvation or epidemics remain the two most probable options. To decide between these two, one would need to access the complete biological profile of all the dead (while, when the paper presenting this research was published, only around half of the skeletons had been studied by anthropologists). Though almost no work has been dedicated up to date to the comparison and differentiation of the biological profile and death toll of famine and various types of epidemics¹, it could be a first step in that direction. Finally, it could be interesting to attempt an analysis directed at searching for possible pathogens agents on these skeletons, that could be the sign of a death correlated to epidemics – as has been suggested in the case of an exceptional mass burial from the Kerameikos cemetery in Athens.

Epidemics?

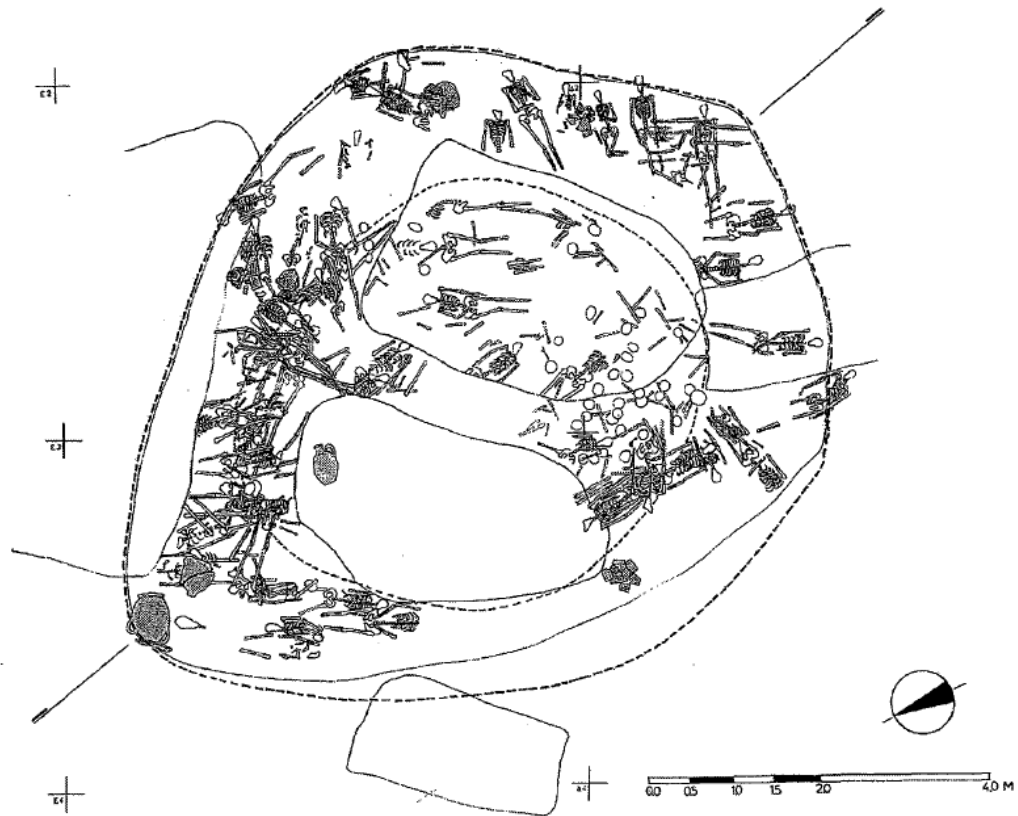
Apart from the already mentioned numerous wartime mass burials, the Kerameikos cemetery has yielded a unique mass grave, interpreted by its discoverers as linked to an epidemic, maybe the great plague that struck Athens during the first year of the Peloponnesian War according to Thucydides². It was a huge, 6 m long, roughly round pit, dug between the Sacred Way and the Street of the Tombs³. Though pierced by two later pits that disturbed its global apprehension, it appeared that this structure contained several dozen dead. Based on the density of skeletons in the preserved area of the grave, archaeologist Effie Baziotopoulou suggest it originally gathered around 150 individuals. The bodies had been put in many layers, first with some order and care, regularly spaced out. Then, rush seems to have increased and the corpses were placed with less attention and less room between them, in various positions and orientations. As for the biological profile of the dead in this grave, there were both men and women, and also a few immature who were deposited in or under big pot sherds.

¹ See De Lépinau *et al.* in press.

² Thucydide, II, 47–54.

³ Baziotopoulou-Valavani, 2002.

Figure 3. Map of the mass burial excavated in 1998 in the Kerameikos Cemetery, Athens



Source: Baziotopoulou 2002, Figure 3, p. 191.

Apart from these sherds, close to 30 vases were found, mainly in the lower levels of the grave, those showing the greatest care towards the dead. Among them were a few drinking vessels, but predominantly perfume vases including many *lekythoi* and even white-ground *lekythoi*, known to be exclusively funerary offerings¹. Their typology allows to date the grave around 435-420 BC. These offerings demonstrate some kind of funerary concern for these dead, especially in the first phase of the mortality crisis. This feature clearly distinguishes this mass burial from the one in Pydna and is pretty uncommon when compared with epidemics mass burials of later periods. Finally, it is the sense of precipitation visible in the rough positioning of the last deceased that appears to the archaeologists as a decisive argument to suggest that these individuals may have died of epidemics rather than famine – that would not have raised, according to them, the same sense of panic and haste. One could nonetheless underline that starvation and epidemics often walk hand in hand in history.

¹ Kurtz 1975.

This first archaeological explanation has led a determinant role in the anthropological study of the grave. Indeed, if no detailed publication is up-to-now available on the macroscopic examination of the skeletal remains and the possible presence of traumas, stress markers or musculoskeletal indicators, that would allow knowing more about the life condition and history of these individuals, DNA analysis was conducted and released on three teeth, sampled from three dead in this grave. Anthropologist Manos Papagrigrorakis concluded that these teeth contained the DNA of a bacterium that could be related to *Salmonella Enterica*, responsible for modern typhus¹. This result has been contested by B. Shapiro² and R. Littman³, on two grounds. First, they affirmed that the bacterium could be an undetermined contemporary one currently existing in the soil (an argument refuted by Papagrigrorakis, insisting on the attention paid to the non-contamination of the samples). Their second claim was that the bacterium was not that close to modern Typhus bacterium, and could be something totally different. Though Papagrigrorakis recognized the uncertainty of his hypothesis, he still argues that nothing his contesters said could rule out the possibility of these individuals to have died of Typhus⁴. He finally concludes that it was, probably, the famous disease described by Thucydides as the great 'plague' of Athens. Interestingly, the ancient historian claims that the number of dead was so high that panic struck the city and that many of them were simply left unburied. This pit could thus demonstrate another way of facing mass death in Ancient Athens, midway through normal funerary practices and burial denial all in all.

Despite this debate and doubt, this mass burial is thus particularly interesting since it could represent one of the earliest cases of epidemics mass burial known up to this day. To confirm this interpretation, though, one should analyse the detailed biological profile of all the individuals gathered in this grave, especially their repartition in age categories⁵. Only when a complete pathological survey is done, including data on bone growth and stress markers, will it be possible to cast away definitely the chance of famine and precise the possible type of epidemic. It would then be necessary to look for accurate statistics on the death toll and demographic impact of typhoid fever in ancient societies. In this regard, the comparison of the Athenian findings with that retrieved from 16th-century Mexico about the terrible disease that decimated

¹ Papagrigrorakis *et al.* 2006a.

² Shapiro *et al.* 2006.

³ Littman 2009.

⁴ Papagrigrorakis *et al.* 2006b.

⁵ It would also be very interesting to try and understand if this mass grave was linked to the same event as the second nearby mass grave, mentioned by the authors in the same publication (Baziotopoulou-Valavani, 2002)) but without any details. The only thing we know is that it was a rectangular pit which yielded at least 27 well-ordered individuals.

indigenous populations of the Americas during the first contact period (Vågene et al. 2018) will be fundamental. The Kerameikos cemetery has therefore still a lot to tell us and need further investigation to uncover clear evidence of epidemics-related mass burials in the Ancient Greek World.

Conclusion

As we hope to have demonstrated in this communication, different types of mortality crises motivate distinct types of funerary practices and sites, more or less easy to identify. If mass burials related to acts of war are both relatively simple to apprehend and frequent in the archaeological record of the Ancient Greek world, recognizing epidemic burials appeared to be much more difficult. Though many written sources describe the panic generated by the abundance of dead in times of epidemics and the incapacity of the living to take care of them, we actually know very few archaeological contexts that can clearly be linked to such events, particularly in Ancient Greece but more generally in ancient societies. This rarity is not without raising questions: what happened to the numerous dead who passed away during massive epidemic outbreak? What was their funerary treatment? Did some of them were simply deprived of any kind of formal burial, are their burials still to be found, or are we just incapable of recognizing them, either because they were cremated, or placed into single burials, following the traditional funerary practices of the community they belonged to? Whatever the answer, it clearly appears that epidemic, even more when concomitant with times of starvation, more than any other type of massive death cause, challenges our abilities, as archaeoanthropologist, to evaluate the impact of mortality crises on the funerary beliefs and behaviours of the Ancient world. Establishing the precise nature of a possible epidemic disease in archaeological environments raises many problems. It cannot be straightforward (as it may be the case for contexts easier to apprehend, such as wartime burials) and requires to call upon detailed analysis concerning the biological profile of the dead. In the absence of precise data for the sites under study here, we were not able to offer definite conclusions. Let us hope that new discoveries and comprehensive publications will allow in the future for a better understanding of this fundamental matter for our knowledge of ancient societies, both from a biological and cultural point of view.

Acknowledgments

This contribution was written during the ANR project 19-CE27-0012 of the French National Agency for Research 'PSCHEET, *Pestes et sociétés humaines : émergence, évolution et transformations bio-culturelles*', directed by Dominique

Castex. Our thanks to Dr. Effie Baziotopoulou, Stella Chrysoulaki and Stefano Vassallo for their kind help and explanations on the archaeological contexts they excavated and studied, and for allowing us to use templates they had developed.

References

- Adam F (2006) *Alain Fournier et ses compagnons d'arme : une archéologie de la Grande Guerre*. Metz: Editions Serpenoise.
- Agelarakis A, Zapheirou P (2005) The Warriors of Paros. *Archaeology Magazine*. 58(1):30–35.
- Agelarakis A (2017) *Parian Polyandria: the Late Geometric funerary legacy of cremated soldiers' bones on socio-political affairs and military organizational preparedness in Ancient Greece*. Oxford: Archaeopress Publishing Ltd.
- Arrington NT (2015) *Ashes, Images, and Memories: The Presence of the War Dead in Fifth-Century Athens*. New York: OUP USA.
- Baziotopoulou-Valavani E (2002) A mass burial from the cemetery of Kerameikos. In M Stamatopoulou, M Yeroulano (eds), 187–202, *Excavating Classical Culture; Recent Archaeological Discoveries in Greece*, Oxford: BAR.
- Bérard RM (2020) La politique du cadavre. *Annales. Histoire, Sciences Sociales*. 75e année (1): 1–38
- Beyneix A (2012) Neolithic violence in France: an overview. In R. Schulting, L. Fibiger, 207–222, *Sticks, stones and broken bones. Neolithic violence in a European perspective*. Oxford: Oxford University Press.
- Bizot B, Castex D, Reynaud P, Signoli M. (2005) *La saison d'une peste (avril-septembre 1590). Le cimetière des Fédons à Lambesc*. Paris: CNRS Éditions.
- Boucherie A, Jørvik MLS, Smith M. (2017) Wounded to the bone: Digital microscopic analysis of traumas in a medieval mass grave assemblage (Sandbjerget, Denmark, AD 1300–1350). *International journal of Paleopathology*, 19: 66–79.
- Boulestin B (2019) Faut-il en finir avec la sépulture collective (et sinon qu'en faire)? *Bulletin de la Société Préhistorique Française* 116(4): 705–723.
- Cabot E (2017) La bataille du Mans des 12-14 décembre 1793 : les archives du sol. *Corps* 1: 273–281.
- Castex D (2008) Identification and interpretation of historical cemeteries linked to epidemics. In D Raoult, M Drancourt (eds), 23–48, *Paleomicrobiology: Past Human Infections*. Berlin/Heidelberg: Springer.
- Castex D, Brůžek J, Sellier P, Velemínský P, Kuchařová H *et al.* (2011) Bioarchaeological study of a mortality crisis. Cemetery of St. Benedict in Prague, Czech Republic (17th – 18th century AD): methodological approach. *Anthropologie (Brno)* 49(1):79–88.
- Castex D, Kacki S. (in press) 'Bring out your dead': funerary practices in epidemic times and their variation with respect to medical knowledge, In C Knusel, EM Schotsmans (eds) *The Routledge Handbook of Archaeoethnology*. Abingdon: Routledge.
- Castex D, Kacki S. (2016) Demographic patterns distinctive of epidemic cemeteries in archaeological samples. *Microbiology Spectrum* 4(4):1–11.

- Castex D, Kacki S, Reveillas H, Souquet-Leroy I, Sachau-Carcel G *et al.* (2014) Revealing archaeological features linked to mortality increases. *Anthropologie (Brno)* 52(3): 299–318.
- Chryssoulaki S (2019) The excavations at Phaleron cemetery 2012-2017. An introduction. In C Graml, A. Doronzio, V. Capozzoli (eds), 103–114, *Rethinking Athens: Interdisciplinary Approaches to the Polis before the Persian Wars, International Workshop at the Ludwig-Maximilians-Universität München (Munich, 23th-24th February 2017)*. München: Utzverlag.
- Clairmont CW. (1983) *Patrios Nomos. Public Burial in Athens during the Fifth and Fourth Centuries: The Archaeological, Epigraphic, Literary and Historical Evidence*. Oxford: BAR.
- Croissant F (2008) Batailles géométriques pariennes. In B d'Agostino (ed), 30–62, *Alba della città, alba delle immagini?* Athens: Scuola archeologica italiana di Atene.
- De Lépinau A, Castex D, Brzobohatá H, Frolík J, Velínský F, *et al.* (in press) Entre peste et famine : caractérisation d'une crise de mortalité par l'étude de trois sépultures multiples du site de Kutná Hora - Sedlec (République tchèque, XIV^e siècle). *Bulletins et mémoires de la Société d'Anthropologie de Paris*.
- Drancourt M, Aboudharam G, Signoli M, Dutour O, Raoult D. (1998) Detection of 400-year-old *Yersinia pestis* DNA in human dental pulp: An approach to the diagnosis of ancient septicemia. *Proceedings of the National Academy of Sciences* 95:12637-12640.
- Duday H (2008) Archaeological proof of an abrupt mortality crisis: simultaneous deposit of cadavers, simultaneous deaths? In D Raoult, M Drancourt (eds), 49–54, *Paleomicrobiology: Past Human Infections*, eds, Berlin/Heidelberg: Springer.
- Duday H (2009) *The archaeology of the dead: lectures in archaeoethanatology*. Oxford : Oxbow.
- El Kenz D (ed) (2005) *Le massacre, objet d'histoire*. Paris: Gallimard.
- Figueres R (2008) Sur les traces de la bataille de Visby. *Questes. Revue pluridisciplinaire d'études médiévales* 14: 22–37.
- Forsdyke S (2021) *Slaves and Slavery in Ancient Greece*. Cambridge: Cambridge University Press.
- Garlan Y (1988) *Slavery in Ancient Greece*. Ithaca: Cornell University Press
- Haglund WD, Connor M, Scott DD (2001) The Archaeology of Contemporary Mass Graves. *Historical. Archaeology* 35(1): 57–69.
- Hunt P (2017) *Ancient Greek and Roman Slavery*. Hoboken: John Wiley & Sons
- Ingvansson-Sundström A (2019) *Bioarchaeological Field Analysis of Human Remains from the Mass Graves at Phaleron, Greece*. Stockholm: Opuscula. Annual of the Swedish Institutes at Athens and Rome.
- Kacki S, Tzortzis S, Castex D, Signoli M. (2019) Prévention, pratiques médicales et gestion sanitaire au cours de la deuxième pandémie de peste. In A Froment (ed), 119–133, *Archéologie de la santé, anthropologie du soin*. Paris: La Découverte.
- Keller M, Spyrou MA, Scheib CL, Neumann GU, Kröpelin A. *et al.* (2018) Ancient *Yersinia pestis* genomes from across Western Europe reveal early diversification during the First Pandemic (541–750). *Proceedings of the National Academy of Sciences* 116 (25): 12363–12372.
- Keramopoulos A (1923) *Ο Αποτυμπανισμός Αποτυμπανισμός. Συμβολή Αρχαιολογική Εις Την Ιστορίαν Του Ποινικού Δικαίου Και Την Λαογραφία*. Athens: Hestia
- Knüsel CJ, Robb J (2016) Funerary taphonomy: an overview of goals and methods. *Journal of Archaeological Science: Reports* 10: 655–673.

- Kurtz D (1975) *Athenian White Lekythoi: Patterns and Painters*. Oxford: Clarendon press.
- Kurtz D, Boardman J (1971) *Greek Burial Customs*. London: Thames and Hudson.
- Lindenlauf A (2001) Thrown Away Like Rubbish - Disposal of the Dead in Ancient Greece. *Papers from the Institute of Archaeology*. 12:86–99.
- Littman RJ (2009) The plague of Athens: epidemiology and paleopathology. *Mt Sinai J Med*. 76(5): 456–467.
- Low P (2003) Remembering War in Fifth-century Greece: Ideologies, Societies, and Commemoration beyond Democratic Athens. *World Archaeology* 35(1): 98–111.
- Papagrigrorakis MJ, Yapijakis C, Synodinos PN, Baziotopoulou-Valavani E (2006a) DNA examination of ancient dental pulp incriminates typhoid fever as a probable cause of the Plague of Athens. *International Journal of Infectious Diseases* 10(3): 206–14.
- Papagrigrorakis MJ, Yapijakis C, Synodinos PN, Baziotopoulou-Valavani E (2006b) Insufficient phylogenetic analysis may not exclude candidacy of typhoid fever as a probable cause of the Plague of Athens (reply to Shapiro et al.). *International Journal of Infectious Diseases* 10(4): 335–336.
- Pelekidis S (1916) Ανασκαφή Παλαιού Φαλήρου. *Αρχαιολογικό Δελτίο* 2:13–64.
- Popu H (2009). *La dépouille mortelle, chose sacrée : à la redécouverte d'une catégorie juridique oubliée*. Paris: L'Harmattan.
- Pritchett WK (1985). *The Greek State at War, Part IV*. Berkeley: University of California Press
- Raoult D, Dutour O, Houhamdi L, Jankauskas R, Fournier PE, Ardagna Y *et al.* (2006) Evidence for louse-transmitted diseases in soldiers of Napoleon's Grand Army in Vilnius. *The Journal of infectious diseases* 193(1):112–120.
- Rigeade C, Willot JM, Demolon P, Massa ER, Signoli, M. (2006) Anthropological approach of catastrophic burials from the 18th century (Martin du Nord Street, Douai, France). *Comptes rendus Paleovol* 5(7): 901–907.
- Signoli M, Séguy I, Biraben JN, Dutour O (2002) Paléodémographie et démographie historique en contexte épidémique. *Population*, 57(6): 821–847.
- Signoli M, Tzortzis S, Bizot B, Ardagna Y, Rigeade C *et al.* (2007) Découverte d'un cimetière de pestiférés du XVII^e siècle (Puy-Saint-Pierre, Hautes-Alpes, France). In M Signoli, D Chev , P Adalian, O Dutour, G Bo tch (eds), 131–136, *Peste: entre  pid mies et soci t s*. Florence: Firenze University Press.
- Shapiro B, Rambaut A, Gilbert MTP (2006) No proof that typhoid caused the Plague of Athens (a reply to Papagrigrorakis *et al.*). *International Journal of Infectious Diseases* 10(4): 334–335.
- Skinner M (1987) Planning the Archaeological Recovery of Evidence from Recent Mass Graves. *Forensic Science International* 34(4): 267–287.
- Spyrou MA, Tikhbatova RI, Feldman M, Drath J, Kacki *et al.* (2016) Historical *Y. pestis* Genomes Reveal the European Black Death as the Source of Ancient and Modern Plague Pandemics. *Cell Host & Microbe* 19: 874–881.
- Triantaphyllou S, Bessios M. (2005) A mass burial at fourth century BC Pydna, Macedonia, Greece: evidence for slavery? *Antiquity* 79 (105).
- V gene  J, Campana MG, Garc a NMR, Warinner C, Spyrou MA, *et al.* (2018) Salmonella enterica genomes recovered from victims of a major 16th century epidemic in Mexico. *Nature Ecology & Evolution* 2(3): 520–528.
- Vassallo S (2010) Le battaglie di Himera alla luce degli scavi nella necropoli occidentale e alle fortificazioni. I luoghi, i protagonisti. *Sicilia Antiqua* 7: 17–38

- Vassallo S (2016) Guerre et mort à Himère : les tombes de soldats grecs tués dans les batailles de 480 et 409 avant notre ère », In J Guilaine (ed), 51–60, *Violences de guerre, violences de masse. Une approche archéologique*. Paris: La Découverte.
- Zuchtriegel G (2017) *Colonization and Subalternity in Classical Greece: Experience of the Nonelite Population*. Cambridge: Cambridge University Press.