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SKELETONS IN THE CUPBOARD?

Femurs and food regimes in the Roman world

Miko Flohr

The study of (mal)nutrition in the ancient world long was, as Peter Garnsey (1999, 43) called it, an ‘undernourished plant’, but since the turn of the millennium there has been a proliferation of studies discussing the quality of Roman food regimes. While Roman diets are being approached from a variety of angles and by a range of specialists, it is the study of skeletal remains that has, in the last decade, had the most impact on the terms of the debate. Progress in our understanding of the skeletal record has been spectacular. Scholars have begun to study evidence for stature on a larger scale, enhancing the statistical and historical significance of their work, and making it possible to assess changes in average human body length over the very long term. Well-known is the work by Koepke and Baten (2005) on the biological standard of living in Europe during the last two millennia. For Italy, Giannecchini and Moggi-Cecchi (2008) have analysed the chronological development of stature between the early Iron Age and the early Middle Ages. Unfortunately, work on a very large and promising dataset of all published skeletal remains from the Roman period by Klein Goldewijk has thus far remained unpublished except for one chart published by Jongman (2007b, 194) and a very short methodological article by Klein Goldewijk and Jacobs (2013). At the same time, scholars have begun to systematically analyse them for indications of ill health that can be associated with structural malnutrition, such as porotic hyperostosis, and dental enamel hypoplasia. While studies like those of Lazer (2009; 2017) at Pompeii, and those of Killgrove (this volume, with references) in the region around Rome highlight the possibilities of such approaches, most of this work is still more-or-less limited to the micro-scale, partially for problems of compatibility and transparency outlined by Killgrove in this volume, partially because this work is labour-intensive and requires specialist skills not common among archaeologists. However, both developments have significantly increased the amount of historical information that can be extracted from the skeletal record.

Not unexpectedly, however, scholars have not yet come to a broadly shared consensus on what the skeletal record has to say about Roman food regimes. As happens more often in the study of issues related to ancient economic history, there is a more optimistic camp, and a more

pessimistic camp – the former highlighting Roman dietary achievement, the latter highlighting Roman dietary shortcomings. Two of the most thorough and detailed general explorations of the relation between malnutrition and skeletal evidence come from scholars that have a less optimistic take on Roman food regimes. Peter Garnsey's broad discussion of skeletal evidence in his book on food and society in the Ancient world leaves no doubt that the author believes earlier accounts on the topic to have been overly optimistic about the quality of ancient diets (Garnsey 1999, 43–61). More recently, Walter Scheidel spread a similar message in his chapter on physical well-being in the *Cambridge Companion to the Roman Economy* (2012b), incorporating the more recent literature. Particularly focusing on the issue of stature, more optimistic sounds have been made by Willem Jongman (2007b) in a chapter on the historical development of the Roman Economy in the imperial period, and by Geoffrey Kron, in a lengthy article on ancient health, nutrition and living standards in *Historia* (Kron, 2005a) and in the preceding chapter in this volume. As they appear, the two positions cannot be reconciled, and their very frontal opposition begs the question of how solid conclusions derived from skeletal remains at this point actually are, and to what extent skeletal remains actually can be used in methodologically satisfying ways – either one is right, and the other is wrong, or the skeletal evidence is simply less ready to contribute to robust historical scenarios than one may want it to be, and it will have to be approached with more caution until we have a better understanding of it.

Bones and biases

It certainly is not hard to find challenges involved in bringing together skeletons and economic historians. The most crucial problem perhaps is that it is almost impossible for individual scholars to completely master the theoretical and methodological complexities of the scholarly fields involved, which bears the risk of Roman historians handling the osteological evidence too superficially, and of osteoarchaeologists not asking the questions of their material that matter most to Roman historians. Additionally, there also is a vast difference in publication culture: whereas osteoarchaeologists tend to come from a rigidly analytical scientific tradition that highly values explicit methodological precision, Roman historians have strong roots in the more rhetorical classical tradition, where the reconstruction of palatable historical scenarios often is more highly valued than detailed discussion of all the methodological complexities involved. Furthermore, as Killgrove rightly emphasizes elsewhere in this volume, raw osteoarchaeological data are often extremely inaccessible, and key arguments in the debate rest, essentially, on evidence that remains partially unpublished and is not easily accessible (the repeated references in recent literature to Klein Goldewijk's unpublished work are a case in point). Moreover, predictably, the evidence that is published is not necessarily published in a way that allows it to be used by others too. This relative lack of conventions is probably typical for a fast-developing field, and it will undoubtedly get better in the future, but this will be a slow process.

Yet even without these practical difficulties in bringing together the relevant data and in discussing them in a way that successfully integrates both research cultures involved, the relationship between the excavated skeletal record and historical reality is extremely complex. First of all, it is impossible to ignore the extent to which the composition of the skeletal record has been influenced by excavation practice: bones have been found only at places that have been excavated, and it has only very rarely been the case that these places were selected for osteoarchaeological purposes only – the study of skeletal evidence is an epiphenomenon of excavation practice dictated by other agendas. For instance, the Casal Bertone excavation discussed by Killgrove essentially was a rescue excavation necessitated by the construction of a

high-speed rail line (Musco et al., 2008); the same is true for the excavation at Castellaccio Europarco, which preceded the construction of a major extra-urban shopping mall (Buccellato, 2007, esp. fig. 4). In general, certain parts of the Roman world are much better known than others, and the evidence at our disposal is biased in several important ways. It is heavily skewed towards Italy and temperate Europe at the expense of the rest of the Roman world, including densely populated regions in North Africa, along the Nile, and in Asia Minor. More importantly, the known skeletal record privileges centralized necropolises over isolated graves and thus city and settlement over countryside: especially for the late Republic and for the imperial period, the large majority of excavated skeletal remains comes from contexts associated with cities or other large settlements. People who spent their lives on farmsteads on the countryside are, by consequence, structurally underrepresented in our evidence, as are classes of people that for some reason or another were buried outside necropolises – or not at all. Thus, while Killgrove rightly stresses that the osteoarchaeological record reaches social layers far below the strata that had access to epigraphy, it still does not necessarily include all groups in society, and we do not know precisely who is lacking: it is true that the Casal Bertone excavation included a lot of people who had been inhumated without any formal tomb or gravestone to indicate their burial place, but this does not mean that we have all relevant social layers. Moreover, even if we are optimistic about the urbanization rate, a large majority of the ancient population remains almost completely invisible, and it is very hard to find a way to make up for that.

Short Romans, tall Romans

As far as stature is concerned, it should be emphasized that both the ‘optimistic’ and the ‘pessimistic’ position have their weaknesses. Kron has argued that adult males in Roman Italy, on average, must have been around 168.3 cm tall, a figure that he uses to confirm that Romans (and Greeks) were ‘significantly taller than the nineteenth century working class populations’ (Kron 2007, 72–79; in this volume). He believes that this picture is corroborated by the fact that minimum recruitment heights for the Roman army as reported by Vegetius (*De Re Militari* 1.5) were much taller than those of nineteenth-century European armies. There are several methodological problems with this. First of all, there is no reason to suppose that Roman recruitment heights are directly comparable to those of the nineteenth century: as the technological context of warfare is completely different, so are the physical demands on soldiers in the battlefield. Moreover, as Kron himself indicates, the figures mentioned by Vegetius only applied to the cavalry and the *first* cohort of the legions, rather than to the army as a whole – indeed, when referring to them, Vegetius leaves no doubt that such heights even among Romans were exceptional rather than the norm: they date, he says, from a period when the flower of the nation sought military, rather than civil careers, and when the total amount of recruits was much higher (*sed tunc erat amplior multitudo*, 1.5), suggesting that in his day, when recruitment was more problematic, it was often necessary to compromise on stature. More problematic still is that essentially, the difference between Kron and more conservative estimates of body heights depends on the fact that they use different formulae to calculate stature from long bones: Kron (this volume) uses the Trotter and Gleser formula for ‘whites’ and the method of Olivier; others have used Pearson’s formula, or the Trotter and Gleser formula for ‘blacks’. Significantly, Klein Goldewijk and Jacobs (2013, 11) have recently argued that the methods to reconstruct stature from long bones are essentially all unreliable, and that one should compare bones, not reconstructed heights (cf. Killgrove, this volume). However, underneath these methodological issues lies a more fundamental problem with Kron’s approach: even if he was right in his assertion that Greeks and Romans were taller than the nineteenth-century working

classes in northern Europe, then what does it *mean*? For all the achievements of the Greeks and Romans compared to medieval and Early Modern Europe, to fully appreciate the development of stature in the Greco-Roman world, it needs to be judged in its own historical context, both geographically *and* chronologically: a key question is how Greco-Roman food economies relate to Mediterranean food economies of the late Bronze Age and early Iron Age, and to those of late antiquity and the medieval period. Early industrial Europe does not constitute a valid direct historical comparison.

Those with a more pessimistic view on Roman stature have put more emphasis on differences between Roman, pre-Roman and post-Roman body lengths in the Mediterranean. Giannecchini and Moggi-Cecchi (2008) have argued that the Roman imperial period saw a marked decrease in stature, followed by a marked increase of bodily height in late antiquity; similarly Koepke and Baten (2005) have advocated a pan-European increase in bodily height between the fourth and sixth century AD – coinciding with the collapse of the western half of the Roman Empire. However, although both studies incorporate a lot of evidence, on closer inspection, their argument is not unproblematic. A crucial problem with the work of Giannecchini and Moggi-Cecchi is that the evidence used to assess the Roman imperial period to a considerable extent comes from one place, which, in turn, is barely represented in the datasets used to make sense of preceding and subsequent periods. More worryingly still, that place happens to be the city of Rome, where living conditions and the food economy were fundamentally different from anywhere else in the Roman world: of the 284 bodies analysed by Giannecchini and Moggi-Cecchi for the imperial period, 159 (56%) came from cemeteries in the direct environment of Rome (see Figure 22.1); in other periods, the balance is completely inverted: in the pre-Roman period, the skeletons come from all over Italy, but not from closer to Rome than Gabii (Osteria dell’Osa); in the post-Roman period, 73% of all skeletons come from Tuscany, and only 2% come from Rome (Giannecchini and Moggi-Cecchi 2008, 285–286). No statistical technique can make up for such a bias, and their analysis mainly suggests that people in the

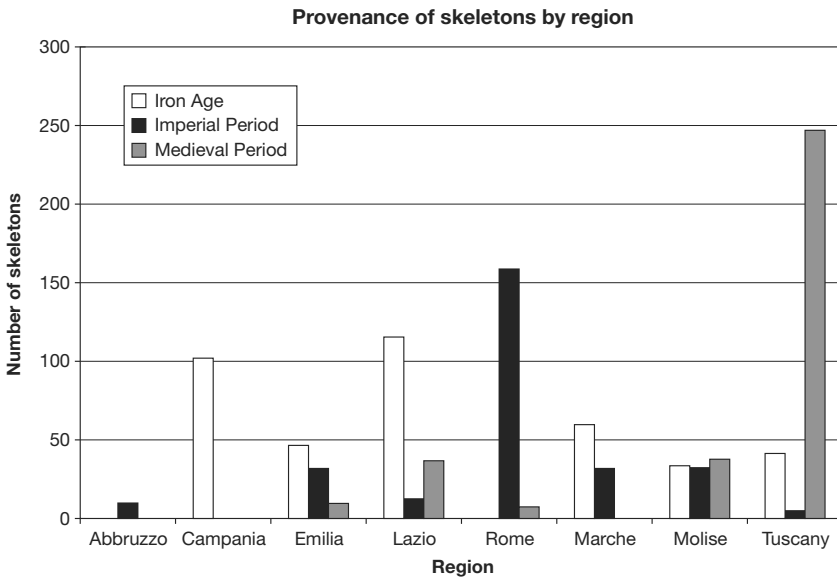


Figure 22.1 Provenience of evidence used by Giannecchini and Moggi-Cecchi (2008), by period.

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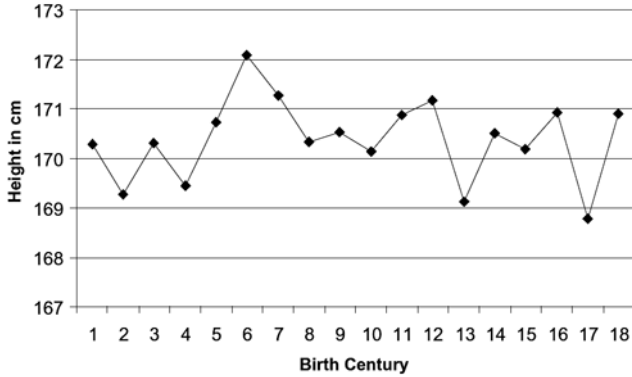


Figure 22.2 Height development, first to eighteenth centuries. From Koepeke and Baten, (2005, 76, fig. 2).

Roman metropolis in the imperial period were shorter than people elsewhere in Italy in the Republican and late antique periods. This does not, of course, imply that there was a significant decline in body height in the Roman world at large. Moreover, even if the evidence from Rome suggested that the living conditions in the metropolis were worse than elsewhere in the Roman world (which it does not unequivocally do), it still would not follow that this was related to malnourishment – as is well known, stature has many determinants, and specifically in the case of the Roman metropolis, it is essential to point to the epigraphically attested seasonality of mortality patterns, which several scholars have linked to endemic malaria, and from which Scheidel (2013, with references) sketched a picture of a population that, from young age, suffered from bad health. While others have been more sceptical about the extent

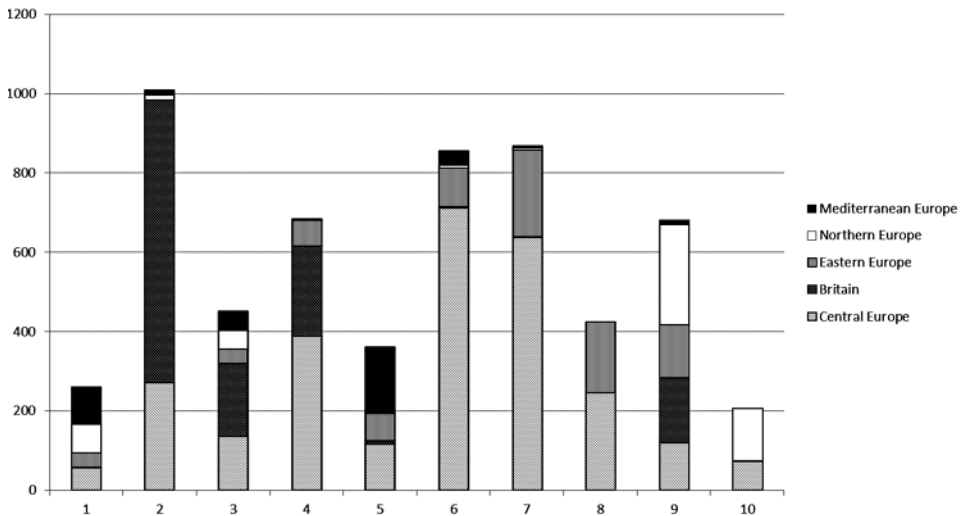


Figure 22.3 Regional provenance of the data used by Koepeke and Baten, first to tenth centuries. Chart: Miko Flohr.

of malaria in and around the Roman metropolis (especially Lo Cascio, 2006), the point is that there is a range of credible possibilities for bad health, related to, for instance, the structural overpopulation in the metropolis, bad hygiene (classic, if overly dramatic, is Scobie, 1986), the water-rich nature of key zones in Rome's urban landscape, or, possibly, by structural shortage of food. It is unknowable which factor contributed what to the overall picture.

The analysis of Koepke and Baten (see Figures 22.2 and 22.3) operates on a much higher level of abstraction, but it uses a similar dataset and struggles with similar biases – for instance, it has only 11 Mediterranean skeletons for the second century, and only four for the fourth; this casts doubts about the validity of their claims for body length in the Roman Mediterranean, and while it is true that their data for Europe do suggest an increase in body length following the fall of the western Roman Empire, it should be noted that the peak coincides with the period in which the largest number of skeletons comes from southern Germany and the Rhine Region and when skeletons from Britain disappear from the equation (Koepke and Baten, 2005, 64). This is a typical bias that is not repeated in later periods, and which does not appear in their analysis as they have merged Britain, Germany and the Rhine region into one broad data category.

Rome and the Malthusian ceiling

Perhaps, one should reluctantly conclude that at this point, skeletal evidence remains essentially inconclusive as far as the historical development of stature is concerned. Theoretically, one possible way forward would be to reconstruct local developments in the long term in several specific places and compare these developments, but there are virtually no large necropolises that continue for more than three or four centuries, and there is no city or settlement where we can reliably follow local stature trends from the pre-Roman period until late antiquity. The only possible exception is the city of Rome, but Killgrove's analysis of skeletons from the city and the *suburbium* provides a clear example of the problems faced even here: while analysing chronological developments in bone-length within the context of one city is theoretically very promising, the results appear contradictory in themselves, with males and females going into different directions, and have a very weak statistical significance.

This is a sobering, but nonetheless important, result. While it is very well possible that, in the future, our knowledge of Roman skeletal remains will allow us to nuance and modify the models we use to make sense of living conditions in the Roman world, it is likely to remain essentially the other way around for considerable time to come: scholars will interpret excavated skeletal remains in the light of their preferred models of the nutritional status of Romans, and these models have been developed on the basis of other data. The big question at this point is whether those models should be optimistic, pessimistic or neutral in nature: is there reason to expect that undernourishment in the Roman world at large was bigger than, smaller than or comparable to that of pre- and post-Roman phases? In the end, most scholars seem to agree that this remains in the first place an issue of population pressure: it depends on the extent to which Rome's imperial food economies operated at a level close to their maximum capacity, so that further population growth would lead to food scarcity. To be sure, the ancient Mediterranean has a long history of communities sending out surplus population to places outside their political territory, and the consistency of this pattern suggests that, especially in the first millennium BC, many communities in the Ancient Mediterranean had to find ways to accommodate population growth above the carrying capacity of their hinterland – overpopulation was a familiar issue, but there was a ready solution, too: migration to places where there was still room for population growth. Is there any evidence that, in the Roman period, there were no places left to go to?

Scheidel (2009, 70) has argued that, by the early imperial period, the Mediterranean was

operating close to its maximum carrying capacity, but it is worth emphasizing that there is no direct evidence unequivocally supporting this claim. Particularly, there is no reason why the Romans could not have lessened the pressure on their imperial ecosystem by founding more cities in fertile regions in the margins of their imperial network, and simply filling them with colonists and veterans. Several emperors, of course, did precisely this. Augustus founded a large number of towns throughout the empire, and he was able to emphasize (although probably not without exaggeration) that many of these places had become populous and famous already during his lifetime (*Res Gestae*, 28: *'quae vivo me celeberrimae et frequentissimae fuerunt'*). A century later, Trajan founded a series of cities a bit more beyond the immediate surroundings of the Mediterranean, such as Timgad in Numidia, Nicopolis in Moesia, and Xanten on the lower Rhine (Bennett, 1997, 315–316). Most of these cities also seem to have transformed into flourishing, independent communities, suggesting that by AD 100 there still was enough under-explored land available in the empire to resort to the strategy of colonization if population pressure became too high. As a demographic instrument, however, colonization does not really seem to have been used in the imperial period.

Indeed, on the whole, it should be noted that the Roman Empire, outside the direct environment of the central Mediterranean, does not appear to have been very densely populated. While our knowledge of Roman period settlements is not unbiased, plotting the settlements included in the Pleiades database on a map gives a relatively reliable indication of broad settlement trends (see Figure 22.4): settlements are very unequally divided over the Roman



Figure 22.4 Density of known Roman-period settlements based on Pleiades Database (Version: October 21, 2015). Map: Miko Flohr.

world, and there are entire regions that appear rather empty. This is true for all river valleys in Gaul and Spain that flow towards the Atlantic, and for the very fertile Gharb region in what is now Morocco. It also seems true for large parts of the Ebro basin, which seems to have been rather thinly populated, particularly between the river and the Pyrenees. Some of these ‘empty’ regions were too cold for olives, but in others it is very well possible to cultivate the complete Mediterranean triad (Garnsey 1999, 12–20). In other words: there is no evidence suggesting that population pressure was getting the better of the Roman food economy on an empire-wide level – quite the contrary.

This does not mean that there was no undernourishment in the Roman world. Rather, it would suggest that this undernourishment was not necessarily directly related to the sheer quantity of people living in the Mediterranean. It is possible, and perhaps likely, that in some larger urban communities, and particularly (as already suggested above) in the Roman metropolis, there was, on a structural basis, friction undernourishment due to the malfunctioning of local and regional food markets. Well-attested institutions like the *amona* in Rome (and occasionally elsewhere in the Latin-speaking West), the grain distributions by wealthy benefactors, and the municipal grain funds (*sitionia*) in the Greek East, suggest that access to grain was not self-evident for all urban inhabitants (Erdkamp, 2005, 237–257; 2008; Zuiderhoek, 2008; Holleran, this volume): even if grain-distributions did not target those in need, they come from an ideology that assigns heavy weight to food security, highlighting the potential for malnutrition in urban contexts. These social and cultural echoes of food insecurity, in turn, suggest that those who grew up in bigger urban centres had higher chances of suffering from undernourishment during childhood, and of being shorter for that reason. If this means that the overall average stature is inversely related to the proportion of people living in large cities – the larger the number of urban inhabitants, the shorter the stature – then we may expect Romans *on average* to be a little bit shorter than their predecessors and their successors, and we may expect those on the pessimistic side of the debate to have a slightly stronger case. Yet given the biases in the dataset of, particularly, Giannecchini and Moggi-Cecchi one should be cautious not to overestimate these differences. After all, as the evidence collected by both Wilson (2011) and De Ligt (2012) highlights, many Roman cities were rather small, and rather unlike the Roman metropolis.