How to Convert an Army Figure into a Population Figure

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Right back to Beloch's magisterial investigation from 1886,[1] the backbone of studies of the population of the ancient Greek world has been the information we have in literary sources about the size of the army of various *poleis*. The size of the population of Athens has been studied in a plethora of books and articles.[2] For other *poleis* the army figures have often been converted into population figures on the assumption that the defence force of a Greek *polis* constituted about one quarter of the total population.[3] But that is a crude method that does not take into account a number of important factors. The figures stated in our sources are in most cases the

[1] The following are cited by author and date: K. J. Beloch, *Die Bevölkerung der griechisch-roemischen Welt* (Leipzig 1886); M. H. Hansen, *Demography and Democracy. The Number of Athenian Citizens in the Fourth Century B.C.* (Herning 1985).

[2] Bibliography in J.-N. Corvisier and W. Suder, *Polyanthropia-Oliganthropia. Bibiographie de la démographie du monde grec* (Wroclaw 1996); Hansen (1985), *Three Studies in Athenian Demography* (Copenhagen 1988), *Studies in the Population of Aigina, Athens and Eretia* (Copenhagen 2006) 19–60. For an alternative view see E. Ruschenbusch, "Zum letzten Mal: Die Bürgerzahl Athens um 330 v. Chr.," *ZPE* 54 (1984) 253–269, and "La démographie d'Athènes au IV^e^ siècle av. J.-C.," in M. Bellancourt-Valdher and J.-N. Corvisier (eds.), *La démographie historique antique* (Arras 1999) 91–95.

[3] "Die waffenfähigen Männer" equal one quarter of "der Gesamtbevölkerung": Beloch (1886) 42, 53, followed—with some modifications—by, e.g., J.-N. Corvisier and W. Suder, *La population de l'Antiquité classique* (Paris 2000) 34.

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number of hoplites in the field army.[4] What is the relation between the number of hoplites and the total number of men in the field army? and between the size of the field army and that of the entire defence force of the *polis*? and between the defence force and the total number of full citizens? and between the adult male citizens and the citizens of both sexes and all ages? and between the citizens and the total population including foreigners and slaves? Historians do not normally bother to answer all these questions. Beloch in fact was the first to admit that to assume a ratio of one to four between defence force and total population resulted in too small numbers. In the second edition of his *Griechische Geschichte* he stated that the numbers he had calculated in 1886 were *Minimalzahlen* whereas the numbers he now suggested were *wahrscheinliche Mittelzahlen*.[5] Nevertheless, he did not in any individual case answer all the questions I have listed above, but in the case of Corinth and elsewhere he took some of them into account.[6]

In this article I survey the evidence we have to answer the question: if we know the number of hoplites fighting in the field army of a *polis*, what is the most likely multiplier to use to estimate the total population of the *polis* in question? I work from the assumption that we can trust the numbers of hoplites reported by Thucydides and Xenophon and sometimes other historians as well.[7] Readers who do not share this view should perhaps stop here and skip the rest of my article.

My calculation proceeds by six steps:

[4] For an excellent survey of the evidence see A. Schwartz, *Reinstating the Hoplite. Arms, Armour and Phalanx Fighting in Archaic and Classical Greece* (Stuttgart 2009) 235–292.

[5] K. J. Beloch, *Griechische Geschichte*[2] III.1 (Berlin/Leipzig 1922) 308 n.2.

[6] Beloch, *Griechische Geschichte* 275–276 n.7, compared with Beloch (1886) 120–121; cf. M. H. Hansen, *The Shotgun Method. The Demography of the Ancient Greek City-State Culture* (Columbia 2006) 5–6 n.18.

[7] E.g. Herodotos' figures for the number of hoplites fighting in the battle of Plataiai (9.28.2–29.2) and Diodoros' account of the Athenian field army mobilised in the Lamian War (18.10.2 and 18.11.3).

(1) To a force of, say, 1000 hoplites must be added (a) an equal number of light-armed infantry and (b) some cavalry. Accordingly the entire field army amounts to at least 2000 men.
(2) To convert this army figure into a population figure we must also add a minimum of 25% who were exempted, most because they were unfit for military service, some because they were indispensable for the running of the *polis*. We thereby reach a total of adult male citizens of military age of some 2500 men altogether.
(3) Active service in the field army presumably covered the years between 20 and 49.
(4) Assuming a life expectancy of ca. 25 years and a growth rate of 0.5% per year, the 2500 citizens in the thirty age classes from 20 to 49 constituted ca. 42% of all male citizens from birth to grave, i.e. a total of 5952 persons or, in round numbers, 6000.
(5) Adding an equal number of female citizens we reach 12,000 as the probable size of the citizen population. Thus, a given number of hoplites must be multiplied by six to establish the number of male citizens and twelve to find the number of citizens of both sexes and all ages.
(6) To this number must be added an unknown number of foreigners and slaves.

Comments and documentation

The presumption is that the hoplites whose numbers are reported by the historians were citizens of the *poleis* in question and not, e.g., mercenaries.[8] They are usually identified by city-

[8] Thus also H. van Wees, *Greek Warfare. Myths and Realities* (London 2004) 74: "The near disappearance of mercenaries from the fifth-century record is an optical illusion, created by our very detailed knowledge of the wars fought by two states which were exceptional in rarely needing mercenaries, and our almost complete lack of information about the wars of states whose reliance on mercenaries was more extensive and more typical." It cannot be precluded, however, that among the light-armed there were some mercenaries who only exceptionally are specified in our sources. Thus Xenophon mentions 300

ethnic and that indicates citizen status.[9] Similarly we can presume that usually the cavalry and the light-armed sometimes mentioned in passing were citizens too.[10] We cannot preclude, however, that occasionally—without it being specified—some metics may have served alongside the citizens—some as hoplites, some as light-armed—and that a contingent of light-armed may even have included some slaves as well. In such cases the total we get by multiplying the number of hoplites by twelve may exceed the number of citizens but will still be smaller than the population of the *polis*.

Re step 1 (a): Whenever ancient historians report army figures, it is mostly the number of hoplites that is recorded. Cavalry and, in particular, light-armed infantry are either passed over in silence, or when they are mentioned their numbers are only exceptionally stated whereas in some cases the historian is content with a vague reference to "a large number" or "a multitude" *vel sim*.[11] We possess sufficient sources, however, to conclude that normally the number of light-armed infantry equaled or even surpassed the number of hoplites engaged in a battle.

Thus, according to Herodotos (9.28.2–29.2) the Greek army that fought in the battle of Plataia numbered 38,700 hoplites, of whom 5000 were Spartiatai; 35,000 helots (seven per Spartiate); and 34,500 light-armed. So apart from the 5000 Spartiatai and their helots there were 33,700 hoplites and 34,500 light-armed.

At Delion the Boiotian army numbered 7000 hoplites and over 10,000 light-armed (Thuc. 4.94.1). Thucydides states that

Cretan bowmen in his survey of the armed forces at the battle of Nemea in 394 (*Hell.* 4.2.16).

[9] M. H. Hansen, "City-Ethnics as Evidence for Polis Identity," in M. H. Hansen and K. Rauflaub (eds.), *More Studies in the Ancient Greek Polis* (Stuttgart 1996) 169–196, at 182–187.

[10] Cf. e.g. the 1800 Thespians mentioned at Hdt. 9.30.1.

[11] E.g. Thuc. 2.31.2 (Megara 431), 7.42.1 (Syracuse 414); Xen. *Hell.* 2.4.12 (Mounychia 403), 4.2.17 (Nemea 394).

the Athenians "had no regular light-armed troops (ψιλοί) with them on this occasion, nor did Athens have an organised force of this kind."[12] Nevertheless we hear at 4.101.2 that a substantial number of Athenian light-armed (ψιλοί) and baggage-bearers (σκευοφόροι) were killed in the battle. Gomme notes that "the majority of poorer citizens at Athens who might have been drafted into light-armed units served in the navy," an observation substantiated by the evidence adduced by van Wees.[13]

At Mantinea in 418 the Boiotian force mustered 5000 ὁπλῖται, the same number of ψιλοί, 500 ἱππῆς, and 500 ἄμιπποι (Thuc. 5.57.2).

In 374 Jason of Pherai could field an army of 20,000 hoplites, 8000 cavalry, and a number of light-armed that could "stand up to all mankind."[14]

For Athens the best source is Perikles' survey of the army strength of Athens at the outbreak of the Peloponnesian War (Thuc. 2.13.6–8, 2.31.2). Unless one accepts Beloch's emendation of 6000 for 16,000 in the reserve,[15] there is no escape from the conclusion that the field army of 13,000 citizen hoplites is outnumbered by the rest of the armed forces: 16,000 old, young, and metic hoplites to defend Athens,[16] 1200 cavalry, 1600 archers, and an unspecified number of men to man the fleet. Even if we add the metic hoplites to the hoplites in the field army,[17] the total number of hoplites could not match the

[12] Cf. S. Hornblower, *A Commentary on Thucydides* II (Oxford 1996) 300–301.

[13] Gomme, *Historical Commenary on Thucydides* III (Oxford 1956) 564–565; H. van Wees, "Politics and the Battlefield: Ideology in Greek Warfare," in A. Powell (ed.), *The Greek World* (London 1995) 153–178, at 163.

[14] Xen. *Hell.* 6.1.19: πελταστικόν γε μὲν ἱκανὸν πρὸς πάντας ἀνθρώπους.

[15] Beloch (1886) 66; followed by G. Busolt and H. Swoboda, *Griechische Staatskunde* II (Munich 1926) 764–765.

[16] M. H. Hansen, "The Number of Athenian Hoplites in 431 B.C.," *Symb Oslo* 56 (1981) 19–32, at 20–24.

[17] At 2.13.7 the metic hoplites form part of the reserve, but other sources

rest of the armed forces.

Re step 1 (b): The hoplite force was almost invariably supported by some cavalry. The battles of Marathon (490) and Plataea (479) were exceptional in that the Greeks had no cavalry at all.[18] In many cases cavalry is mentioned but the number of cavalrymen not recorded,[19] but when it is, the relative strength of hoplites and cavalry was often in the range of ten-to-one. At Nemea in 394 there were 6000 Lakedaimonian hoplites as against 600 cavalry, 5000 Boiotian hoplites as against 800 cavalry, and 6000 Athenian hoplites as against 600 cavalry (Xen. *Hell.* 4.2.16–17). Other Athenian forces consisting of ten times as many hoplites as cavalrymen are mentioned at Thuc. 2.79.1 (Spartolos 429), Thuc. 4.42.1 (Solygeia 425), and Xen. *Hell.* 1.1.34 (Ephesos 409). These figures fit the numbers mentioned by Perikles in his speech to the Athenians at the beginning of the war: the Athenian field army numbered 13,000 citizen hoplites and 1200 cavalry (Thuc. 2.13.7). At Leuktra in 371, 10,000 hoplites and 1000 cavalry fought on the Spartan side (Xen. *Hell.* 6.4.10). At Delion 424 the Boiotian army amounted to 7000 hoplites as against 1000 cavalry (Thuc. 4.93.3), at Mantinea the Boiotians had 5000 hoplites as against 500 cavalry (5.57.2).

Re step 2: When ancient historians calculate populations on the basis of the number of hoplites, they often equate hoplites in the field army with men of hoplite status and assume that every single citizen of hoplite status was actually drafted.[20] But

show that they served in the field army: Thuc. 2.31.2, 4.90.1; Xen. *Vect.* 2.2; Hyp. 3.29–33; *IG* II^2 505.

[18] Hdt. 6.112.2, οὔτε ἵππου ὑπαρχούσης σφι (Marathon); 9.28–29 (Plataiai).

[19] Tanagra 457 (Thuc. 1.107.7); Mantinea 418 (5.67.1–2); Syracuse 415 (6.67.2); Mounychia 403 (Xen. *Hell.* 2.4.10); Haliartos 395 (3.5.19); Koroneia 394 (4.31.5); Corinth 392 (4.4.10); Lechaion 390 (4.5.12); Kromnos 365 (7.4.22).

[20] Beloch (1886) 13–14; Ruschenbusch, *ZPE* 54 (1984) 256. Cf. Hansen (1985) 16. Discussing the population of Corinth, J. B. Salmon, *Wealthy Corinth*

there has never, in any society, been a 100% call-up of the year classes liable to military service. Some have to be exempted from military service because they are indispensable for the running of society, others because they are unfit for military service.

The most rigorous conscriptions ever seen were those during World War I. In the belligerent European states the number of conscripts constituted 57% of all men between 15 and 49 when the war broke out in 1914. In Germany and Austria-Hungary the conscripts constituted no less than 80% of all men of military age and fit for military service.[21] This astonishing level of military service was achieved in states that possessed far more efficient institutions than anything known from the ancient world, with Sparta as a possible exception. But still there is a considerable gap between the number of conscripts and all men in the same age group. Furthermore, not only mortality but also morbidity were higher in the ancient world than in societies of the nineteenth and twentieth centuries.[22] So of men in their twenties, thirties, and forties the percentage unfit for military service for reasons of health must have been higher in a Greek *polis* than in a modern nation. Finally, to those exempted for reasons of health we must add those who were exempted from military service for other reasons. In Athens the members of the Council of Five Hundred as well as many other magistrates and others performing public duties were relieved of the obligation to serve in the field army.[23] There can be no

(Oxford 1984) 165–169, equates a force of 5000 hoplites with the Corinthian citizen population of hoplite census.

[21] G. Hirschfeld et al., *Enzyklopädie Erster Weltkrieg* (Paderborn 2003) 664–665; cf. Hansen (1985) 18–21. Of course, not all were sent to the front simultaneously. Throughout the war large numbers of conscripts were working on the home front—often in uniform.

[22] W. Scheidel, "Demography," in W. Scheidel, I. Morris, R. Saller (eds.), *The Cambridge Economic History of the Ancient World* (Cambridge 2007) 38–86, at 41.

[23] Hansen (1985) 17–18.

doubt that every living soul was required to do military service when a city was besieged and risked an *andrapodismos* if conquered,[24] but there can be no doubt either that the armies sent into the field never included all men of military age. As usual we lack precise data, but a very cautious estimate is that a mobilisation of the field army up to the age of 40 or 50 can have affected at most 80% of all men in the year-classes in question. Consequently to the number of hoplites in a field army we must add 25% to reach the corresponding number of male citizens in the same age group.[25]

Re step 3: Most historians assume that the field army was recruited from citizens aged between 20 and 49, but some prefer to exclude citizens in their forties and restrict the field army to the twenty year classes from 20 to 39.

Both in Athens and in Sparta citizens were liable to military service up to the age of sixty. The Spartan field army comprised the forty year classes between 20 and 60, but the number of year classes to be called up was decided by the ephors in each case. The Leuktra campaign involved thirty-five year classes, i.e. Spartiatai up to the age of 55, but after the defeat the remaining five year classes were called up too.[26] In fourth-century Athens citizens could be called up until they turned 59. In their last year of service they served as arbitrators (Arist. *Ath. Pol.* 53.5). As in Sparta the number of year classes to be called up was decided in each individual case (*Ath.Pol.* 53.7).[27] In 347

[24] Two examples are the siege of Megalopolis in 318 (Diod. 18.70.1) and that of Rhodes in 305 (Diod. 20.84.1-3), cf. Hansen (1985) 97–98 n.97.

[25] The difference between the number of conscripted citizens and citizens in the same age group is ignored by most historians, including Beloch (1886), but in the second edition of his *Griechische Geschichte* the difference is duly taken into account, see Hansen, *Shotgun Method* 5–6 with n.18.

[26] Xen. *Hell.* 6.4.17, cf. 5.4.13, *Lac.Pol.* 11.2, and J. F. Lazenby, *The Spartan Army* (Warminster 1985) 12.

[27] In the fifth century the conscription was by a κατάλογος drawn up in each individual case, in the fourth century it was by year classes, see M. R. Christ, "Conscription of Hoplites in Classical Athens", *CQ* 51 (2001) 398–422.

citizens up to the age of 40 were called up for a campaign to Thermopylai (Aeschin. 2.133),[28] and similarly the army mobilised in the Lamian war comprised citizens up to the age of 40 (Diod. 18.10.2). The field army that lost the battle of Chaironeia in 338 must have comprised citizens up to the age of 50 since, after the defeat, citizens in their 50's were called up too (Lycurg. 1.39). Thucydides' juxtaposition of 13,000 hoplites in the field army as against 16,000 "oldest, youngest, and metic hoplites" in the reserve (2.13.7) indicates that the field army in full force cannot normally have included citizens in their 50's, and historians still disagree about whether citizens in their 40's belonged to the field army or to the "oldest."[29] In my opinion the sources support the view that citizens in their 40's had to serve when the army was called up in full force for a campaign.

First, we have some prosopographical evidence. In 424 Sokrates served as hoplite in the battle of Delion, aged 45 (Pl. *Ap.* 28E, *Lach.* 181B), and in 422 he fought in the battle of Amphipolis aged 47 (*Ap.* 28E). Laches too fought in the battle of Delion (*Lach.* 181B) and he was older than Sokrates (*Lach.* 186C). In 338 Demosthenes fought in the battle of Chaironeia aged 46 (Aeschin. 3.253; Plut. *Dem.* 202, *Mor.* 845F). Sphodrias and his son Kleonymos were both killed in the battle of Leuktra (Xen. *Hell.* 6.4.14). Kleonymos must have been over 20 and his father over 40.

Second, several sources show that a hoplite force included a substantial number of men over 40. In his speech to the Boiotian army in 424 before the battle of Delion the general Pagondas presumes that a number of the older hoplites had fought in the battle of Koroneia in 447/6 (Thuc. 4.92.7). These veterans must in 424 have been in their mid-40's or older.

[28] The best MSS. have τριάκοντα, but the reading τετταράκοντα (preferred by most editors) has recenty been confirmed by *P.Oxy.Hels.* 1 col. ii.25–26.

[29] The latter is the view of A. H. M. Jones, *Athenian Democracy* (Oxford 1957) 163–164, and van Wees, *Greek Warfare* 242. Both assume that the known examples of individual hoplites in their forties are evidence of citizens who joined the field army as volunteers.

According to Aristophanes grizzled men were regularly seen in the ranks,[30] but men usually become grey-haired in their 40's, not in their 30's.[31] In 353/2 the Athenians decided to draft citizens up to the age of 45 to man a fleet of forty triremes (Dem. 3.4).[32] As indicated above, the Athenian army at Chaironeia in 338 comprised citizens up to the age of 50 (Lycurg. 1.39). After the defeat the female citizens in Athens inquired whether their relatives had survived. Some inquired about their husbands, some about their fathers some about their brothers. Almost all the fathers must have been over 40 (Lycurg. 1.40). Other general but less precise references to older hoplites include Jason of Pherai's statement in his speech to the Lakedaimonians that in the armies of the *poleis* some are old whereas others are too young (Xen. *Hell.* 6.1.5).[33]

Third, there is an important *a priori* argument: if the field army normally comprised the year classes between 20 and 39, and excluded citizens in their forties, we end up having unbelievably high population figures when we convert the army figures into a population figure. Men from 20 to 39 constituted 31.5% of all males, and 1000 hoplites from these twenty year-classes would correspond to a citizen population of almost 8000 men and a total of 16,000 citizens of both sexes and all ages, instead of 12,000, which is already a high figure.

Re step 4: I work on the presumption that the male population of a Greek *polis* had a life expectancy at birth of approxi-

[30] Ar. *Ach.* 600–601, ὁρῶν πολιοὺς μὲν ἄνδρας ἐν ταῖς τάξεσιν νεανίας δ' οἵους σὺ διαδεδρακότας.

[31] Cf. Ar. *Lys.* 595. Hansen, *Three Studies* 23 n.12.

[32] Dem. 3.4, τοὺς μέχρι πέντε καὶ τετταράκοντ' ἐτῶν αὐτοὺς ἐμβαίνειν. It follows that most, perhaps all the citizens called up had to serve as rowers. But that was an even harder job than to serve as a hoplite, see B. Rankov, "Reconstructing the Past: the Operation of the Trireme Reconstruction Olympias in the Light of the Historical Sources," *The Mariner's Mirror* 80 (1994) 131–146, and Hansen, *Studies* 16 n.20. Thus, we can infer *a fortiori* that citizens in their forties were normally called up for service in the field army.

[33] See also Andoc. 4.22: στρατεύονται μὲν οἱ πρεσβύτεροι, δημηγοροῦσι δὲ οἱ νεώτεροι. But the speech is probably a late literary composition.

mately twenty-five years and a maximum natural growth rate of 0.5% per year.[34] The model I have used in all my studies is the Princeton Model Life Tables, Model West mortality level 4 and growth rate of 0.5%.[35] According to this model men aged 20–49 constitute 41.8% of all males. An average annual growth rate of 0.5% is, if anything, too high. It might be more realistic to prefer a static population, especially for studies that cover longer periods. Scheidel has a long and judicious discussion of the problem and suggests a long-term growth rate between 0.25% and 0.45% per year.[36] Recently he has become even more restrictive and for the period 800–300 B.C. he now suggests an average annual growth rate of 0.15 per cent.[37]

Similarly, a life expectancy of 25 years is perhaps on the high side. Several historians working with the demography of ancient societies prefer a life expectancy of 20 to 22.5 years (mortality levels 2 and 3).[38] Recently, however, other historians advocate a swing of the pendulum and suggest a life expectancy of perhaps even 40 years.[39] In my opinion a life ex-

[34] Hansen (1985) 11–13. Analysing the Egyptian evidence, R. Bagnall and B. Frier, *The Demography of Roman Egypt* (Cambridge 1994) 74–110, assume an average life expectancy at birth of 20 to 25 years. B. Frier, "More is Worse: Some Observations on the Population of the Roman Empire," in W. Scheidel (ed.), *Debating Roman Demography* (Leiden 2001) 139–159, at 146, assumes the same life expectancy for the Roman world altogether.

[35] A. J. Coale and P. Demeny, *Regional Model Life Tables and Stable Populations* (Princeton 1966).

[36] W. Scheidel, "The Greek Demographic Expansion: Models and Comparisons," *JHS* 123 (2003) 120–140, at 123.

[37] Scheidel, in *Cambridge Economic History* 42–44.

[38] E.g. Corvisier and Suder, *La population* 19. For the present investigation it does not make a great difference if we use mortality level 3 instead of 4. In that case the percentage goes down by 0.5 only, from 41.8% to 41.3%, and 1000 hoplites correspond to a total of 12,100 citizens, see Coale and Demeny, *Regional Model* 126 and 128. If instead of an annual growth rate of 0.5% we assume a stationary population at mortality level 3, the percentage goes up to 43% and the result is a total of 11,626 citizens.

[39] G. Kron, "Nutrition, Hygiene and Mortality. Setting Parameters for

pectancy of more than 30 years is implausible and in conflict with the little explicit evidence we have.

Re step 5: It is still a moot point whether female infanticide occurred to such an extent that it could upset the sex ratio in favour of the male population. According to Polybios, parents' unwillingness to raise the children they got was one of the reasons for the prevailing *oliganthropia* (36.17.7), and other sources recommend the raising of boys but exposing of girls (Poseidippos fr.12 K.-A. and *P.Oxy.* IV 744). These and other sources indicate that female infanticide may have been demographically important.[40] But almost all the evidence we have dates from the Hellenistic and Roman periods;[41] there is no reason to assume that exposure of newborn children was common in the Archaic and Classical periods,[42] and accordingly I assume that in the Classical *polis* the sex ratio was one to one.

Re step 6 (a): In Athens the metics were liable to military service. They served in the home guard (Thuc. 2.13.7) and on various occasions in the field army, some among the hoplites (2.31.2), others probably among the light-armed.[43] The presumption is that similar rules applied at least in some other *poleis*. In so far as that was the case they were probably included in the number of hoplites recorded by the historians, and in the

Roman Health and Life Expectancy Consistent with our Comparative Evidence," in E. Lo Cascio (ed.), *L'impatto di la peste Antonina* (forthcoming). Again, Kron's much higher life expectancy is of no consequence for the present calculation of the total population. In a stationary population with a male life expectancy of 40 years (mortality level 10), the thirty year classes from 20 through 49 constitute 43%.

[40] Thus A. Bresson, *L'économie de la Grèce des cités* (Paris 2008) I 59–60, with a judicious survey of the whole issue.

[41] As pointed out by R. Sallares, *The Ecology of the Ancient Greek World* (London 1991), who doubts that infanticide was demographically important (151–154).

[42] The evidence for Spartan exposure of children is late (Plut. *Lycurg.* 16.1–2) and relates to boys, not girls.

[43] Cf. Thuc. 4.90.1 where the μέτοικοι are listed between the Athenians and the ξένοι, who presumably served as light-armed.

force of light-armed too, were either passed over in silence by the historians or referred to in general without further specification. But there must have been a number of male metics not liable to military service and a considerable number of female metics as well.[44]

Re step 6 (b): A Classical Greek field army composed of hoplites, cavalry, and light-armed was followed by a host of shield-bearers (ὑπασπισταί), baggage-carriers (σκευοφόροι), and other attendants (ὑπηρέται). There was no sharp distinction between the three groups.[45] Some were slaves who served the army as such (Xen. *An.* 4.1.12–13, 6.5.3, 6.6.38); others were privately-owned servants of individual soldiers (Ar. *Ach.* 1099 ff.; Xen. *An.* 4.2.20, *Mem.* 3.13.6). Each Spartan hoplite had a helot as his attendant (Xen. *Hell.* 4.5.14), and Thucydides tells us that the 3000 Athenian hoplites who besieged Poteidaia received a daily payment of two drachmas "one for himself and one for his servant (ὑπηρέτῃ)."[46] But not all hoplites had an attendant,[47] and not all attendants were slaves.[48] It is a moot point whether, at least in some cases, the attendants could join the battle among the light-armed. There is no doubt that the helots in some cases formed part of the Lakedaimonian field army.[49]

It is impossible to estimate the relation between the number of slaves attached to the field army and the size of the slave

[44] Comparing the number of fourth-century tombstones commemorating metics (650 metics of whom 40% are women) with those commemorating citizens (2110 citizens of whom 35% are women) we can infer that the sex ratio for metics must have been the same as for citizens. Hansen, *Three Studies* 10.

[45] K.-W. Welwei, *Unfreie im antiken Kriegsdienst* I (Wiesbaden 1974) 57–65; van Wees, in *The Greek World* 68–71; P. Hunt, *Slaves, Warfare, and Ideology in the Greek Historians* (Cambridge 1998) 166–170.

[46] Thuc. 3.17.4. See also Ar. *Ach.* 1136–1137; Dem. 54.4; Theophr. *Char.* 25.4.

[47] Xen. *An.* 3.4.32. Hunt, *Slaves* 167; van Wees, *Greek Warfare* 68.

[48] Xen. *An.* 5.8.5. Hunt, *Slaves* 168.

[49] E.g. Thuc. 4.80.3–5; Hunt, *Slaves* 56–62.

population of the *polis* in question, and it is impossible to assess the size of the slave population of a *polis*. Slaves were hardly ever counted, so their numbers are hardly ever recorded.[50] There must have been enormous variations from *polis* to *polis*. Athens seems to have had an exceptionally large slave population, due, i.a., to the high number of public slaves and slaves working the silver mines in southern Attica. In a wealthy *polis* there were obviously many more household slaves (οἰκέται) than in a poor one. In *The Shotgun Method* (57) I assumed that, on average, every second household possessed a slave. I believe that I aim low with the shotgun when I assume that, on average, we have to add 10% to the total number of citizens in order to reach the total number of inhabitant of a *polis*.[51]

Conclusion

The conclusion of this investigation is that by multiplying a given number of hoplites by twelve we can get a rough idea about the total number of citizens of the *polis* in question. The method I have used is an instance of the 'shotgun method'. To study ancient history is like hunting hares. The hunter uses a shotgun instead of a rifle because the spreading out of the pellets is very efficient when used against smaller animals. Similarly, the quantifications presented by ancient historians are never precise, but within certain limits they can provide us with extremely valuable information about ancient societies, in this case the number of citizens of a *polis* and—according to the estimated number of foreigners and slaves to be added—the size of the total population of the *polis* in question. The population figures I reach are higher than those of other historians;

[50] One exception is at Megalopolis in 318 where the defensive force was found to be 15,000 πολῖται, ξένοι, and δοῦλοι (see n.24 *supra*): slaves must have been counted since they are included in the defence force of 15,000. On the incredibly high numbers of slaves mentioned by Athenaios at 272B–D, see Hansen (1985) 30–31.

[51] M. H. Hansen, "An Update on the Shotgun Method," *GRBS* 48 (2008) 259–286, at 267.

but all the way through I have aimed low with the shotgun, and I presume that—in order to obtain an even better approximation—sometimes a smaller and sometimes a larger number of persons must be added to the total obtained by multiplying the number of hoplites by twelve and adding 10% foreigners and slaves.

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