An Update on the Shotgun Method

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In *The Shotgun Method* (2006) I argued that the total number of ancient Greeks in the age of Alexander the Great came to a minimum of 7–7.5 million and that a more realistic estimate seems to be between 8 and 10 million. My investigation was based on the Copenhagen Polis Centre's *Inventory of Archaic and Classical Poleis* (2004).[1] Out of 1035 communities recorded as *poleis* 166 are unlocated. Of the 869 located *poleis* 438 had remains of walls of the Archaic and/or Classical periods and a further 91 are referred to as fortified in written sources. The presumption is that in the fourth century B.C. almost every *polis* town was fortified (*Shotgun* 16–17). For 232 *poleis* we know the intramural area of the urban centre, and on the basis of the information we have about habitation quarters, houses, and the size of a Greek household we can make a rough calculation of the total number of ancient Greeks living in urban centres behind the walls (*Shotgun* 35–63). Published archaeological landscape surveys can give us an idea about the relation between urban and rural population (*Shotgun* 64–76), and by combining the two types of evidence it is possible to come up with an estimate of the total population (*Shotgun* 16–24). It is certainly not an exact estimate: it is rather a minimum figure which, on the other hand, is much higher than any other figure suggested in contemporary scholarship.

The Shotgun Method was published in 2006 as the third volume of the Fordyce W. Mitchel Memorial Lecture Series. Since the publication of the book I have continued research on ancient Greek demography and have profited, *inter alia*, from a per-

[1] M. H. Hansen, *The Shotgun Method. The Demography of the Ancient Greek City-State Culture* (Columbia 2006); M. H. Hansen and T. H. Nielsen (eds.), *An Inventory of Archaic and Classical Poleis* (Oxford 2004).

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ceptive review by Peter Hunt in *BMCR* 2007.04.58 (see 263–264 *infra*), from a seminal conversation I had with Bjørn Paarmann in summer 2007 (n.3 *infra*). Furthermore, at the European Social Science History Conference at Lisbon in February 2008 a session was devoted to a round table discussion of *The Shotgun Method*. The discussants were Frederick Naerebout (ancient history), John Davis (urbanism), Renzo Derosas (early modern historical demography), and Bruce Frier (ancient historical demography).[2]

In *The Shotgun Method* I extrapolated from the 232 *polis* towns with known or estimated intramural area and the 636 *polis* states with known or estimated size of territory to the 1,000 *poleis* which I assumed to have been the total number in a given year in the Classical period. I assumed that the territories of the 364 *poleis* whose size of territory is unknown would show the same size distribution as the 636 *poleis* with known or estimated size of territory (*Shotgun* 21). In this article I shall put both assumptions to the test. Is it reasonable to assume (1) that there was a total of 1,000 *poleis*? and (2) that the 364 *poleis* with unknown size of territory were distributed as the 636 whose territory is known or roughly assessed? Furthermore (3), I have almost tripled the number of test cases, i.e., the evidence we have in written sources about the population of a number of individual *poleis*. When compared with the averages and totals obtained by the shotgun method this evidence confirms that I aim low with my shotgun and that the totals I find almost invariably are smaller than those obtained by calculations based on information in the texts. Finally (4), I have restudied one of the controversial issues in ancient social history: the size of the family and the household, and I have paid more attention to what we can learn from the Egyptian material.

1. *The total number of poleis*

In the *Inventory* (54) and in *The Shotgun Method* (17–18, 21) I suggested that in any given year in the Classical period there

[2] Bruce Frier is one of the leading experts in the world on Roman historical demography. In the spring of 1983 we were both at the Institute for Advanced Study in Princeton and it is from him I have learned much of what I know about historical demography.

were ca. 1,000 *poleis* in the Greek world altogether. Around the year 400 B.C. a total of 862 *poleis* are attested and recorded in the *Inventory* (pp.1328–1337). For some of these communities, however, we cannot be sure that they were *poleis*. The evidence we have points in that direction but is not conclusive (*Inventory* 26–27, 1298–1309). Conversely, we have to take into account what the Germans call a *Dunkelziffer*—the difference between a number actually attested in the scanty sources we have and the estimated total we would be able to record if we had perfect sources. Given that for some regions we seem to know about all existing *poleis* (Phokis, the Thracian Chersonesos) I assumed that the *Dunkelziffer* would not exceed 10–20% of the total, and, balancing the conflicting factors, my guesstimate was that 1,000 *poleis* altogether would not be far off the mark (*Inventory* 53–54).

A closer look at the evidence at our disposal has caused me to change my view, and it is in particular what we know about the Delian League that indicates that in the Classical period there may have been more, perhaps even many more, than 1,000 *poleis*.

Of the 1,035 *poleis* recorded in the *Inventory*, 330 were members of the Delian League (*Inventory* 111). Thus, as the evidence stands, this alliance alone counts for close to one-third of all known *poleis*. Is this a true picture of the Greek *polis* world? or do we have to assume some distortion in the evidence we possess?[3]

All members of the Delian League were situated in a relatively restricted part of the Greek *polis* world. The alliance comprised almost all the islands in the Aegean down to but excluding Crete, most of the *poleis* along the coast of Thrace from the mouth of the river Axios to the Bosporos Strait, some *poleis* along the north coast of the Pontos, and many but far from all

[3] I owe this observation to Bjørn Paarmann who—in conversation—drew my attention to the fact that almost a third of all *poleis* attested in the Inventory were members of the Delian League and wondered whether that reflected the actual strength of the League or whether the preservation of the tribute lists provides us with a skewed picture of the importance of the League. The investigation conducted here confirms the second alternative.

poleis along the north, west, and south coasts of Asia Minor. Apart from Athens itself the only members situated in the Greek mainland were Herakleia and Methone in Makedonia.

In these regions a total of 474 *poleis* have been identified, of which 330 were members of the Delian League. Is that an overrepresentation of *poleis* compared with the rest of the Hellenic world? I for my part would not expect 46% of all *poleis* to be concentrated in this area. I do suspect an overrepresentation and I assume that it is connected with the fact that all members of the Delian League belonged here.

The 330 members of the League are known from the Athenian tribute quota lists and the corresponding assessment decrees; and for no fewer than 117 communities membership in the League is the only or in some cases the principal reason why they have been included in the *Inventory* (see Appendix A *infra*). If we had not had these precious inscriptions, only 213 members of the League would have been recorded as *poleis* in the *Inventory* and the total number of *poleis* in these regions would drop from 474 to 357.

It follows that the difference between the number of *poleis* attested in our sources and the total number of *poleis* is somewhat larger than I believed in 2004. The presumption is that if there had been similar alliances in other parts of the Greek *polis* world, and if we had had similar lists of members preserved, a three-figure number of otherwise unattested *poleis* would have been included in the *Inventory*. My guesstimate of the *Dunkelziffer* in the *Inventory* is probably too low. 1,000 *poleis* at any one time in the Classical period is probably on the low side, and a total of, say, 1,100 *poleis* may be more realistic.

2. *The conjectured size of the 364 poleis whose size of territory is unknown*

Of the 1,035 communities included in the *Inventory* as *poleis*, 166 are unlocated. Of the 869 located *poleis* the size of the territory is known or, at least, roughly estimated for 636 *poleis*. Thus, the size of the territory is unknown for 233 located *poleis* and for 399 *poleis* altogether if the 166 unlocated *poleis* are added to the 233 for which we lack information about the borders and thus the size of the territory.

In the *Inventory* the *poleis* with known territory are organised into five categories: (1) 25 km^2 max., (2) 25–100 km^2, (3) 100–

200 km^2, (4) 200–500 km^2, (5) 500 km^2 min. (*Inventory* 7; *Shotgun* 18). The 636 *poleis* with known or estimated territory are distributed as follows (*Shotgun* 19, table 1.4):

Territory	Attested *poleis*	
1	93	= 15%
1 or 2	109	= 17%
2	198	= 31%
3	100	= 16%
4	69	= 11%
5	67	= 10%
Total:	636	=100%

If we assume that in the second half of the fourth century B.C. there were 1,000 *poleis* altogether and that the territories of the remaining 364 *poleis* had the same distribution as the 636 with known size of territory, we would get the following totals (*Shotgun* 21, table 1.6):

Territory	Attested *poleis*	All *poleis*
1	93 = 15%	150
1 or 2	109 = 17%	170
2	198 = 31%	310
3	100 = 16%	160
4	69 = 11%	110
5	67 = 10%	100
Total:	636 =100%	1000

This extrapolation, however, has been questioned by Peter Hunt (*BMCR* 2007.04.58). Hunt argues that larger cities are more likely to have had the extent of their territory estimated, and he hypothesises that all large *poleis* are among the 636 *poleis* of known territorial size, *viz*., 136 *poleis* altogether of which 69 had a territory size 4 and 67 a territory size 5. The 364 cities whose size is not known would then contain no large *poleis*. They would belong to the four categories of smaller *poleis* (1, 1 or 2, 2, and 3), and, as an experiment, Hunt adds 91 cities to the number in each of the four categories of smaller cities (since 4 x 91 = 364 *poleis*). The total urban area deriving from such a distribution would be significantly smaller than my estimate, *viz*., 42,135 instead of 50,510 hectares inhabited space, and the total population comes to 5.5 million instead of my 6.8 million. This perspicacious line of argument is rounded off with a *caveat*:

"Naturally, if Hansen can show that large cities do exist among those 364 cities whose territories have not been estimated then this objection would have to be withdrawn."

For the 166 unlocated *poleis* it is impossible to get any further, but I can show that a substantial number of the 233 *poleis* recorded in the *Inventory* as having a territory of unknown size are, in fact, likely to have had a territory of over 200 km^2 and that some are even likely to have had a territory of over 500 km^2. The members of the Polis Centre team of scholars were cautious and many preferred in their chapter in the *Inventory* to put a query after the heading "size of territory" even in cases where the *polis* in question was likely to have had a territory of size 4 or 5.

As set out in Appendix B *infra*, the evidence we possess indicates that no less than 29 of the 233 *poleis* had a territory of over 200 km^2, i.e. size 4, and that a further 9 may have had a territory of over 500 km^2. A closer inspection of the sources we have and/or new evidence may result in a further increase of these numbers.

Supposing that the 233 had the same distribution as the 636 with known territory we should expect 26 (= 11%) to have a territory size 4 and 23 (= 10%) to have a territory size 5. Thus, there is reason to believe that *poleis* with a territory size 4 constituted the same proportion of the 233 *poleis* with unknown territory as of the 636 *poleis* with known or estimated territory. On the other hand, Peter Hunt is probably right in his assumption that most of the *poleis* with a territory size 5 are to be found among the 636 *poleis* with known or estimated territory. For this group I am prepared to assume a lower percentage among the 233 with unknown size of territory than among the 636 with known or estimated size of territory. Accordingly, as the evidence stands, I am prepared to reduce the number of *poleis* of size 5 to be included when extrapolating from 636 to 1000 *poleis*, and now suggest the following distribution:[4]

[4] Among the added *poleis* I have reduced those with a territory size 5 from 33 to 13 and distributed the 20 *poleis* equally among the *poleis* size 1, 1 or 2, 2, and 3.

territory size	attested *poleis*	added *poleis*	total *poleis*	population
1	93	62	155	139,500
1 or 2	109	66	175	413,875
2	198	117	315	956,025
3	100	65	165	909.975
4	69	41	110	1,699,500
5	67	13	80	2,184,000
Total:	636	364	1000	6,302,875

The reduction of the total from 6,789,750 (*Shotgun* 24, table 1.10) to 6,302,875 must be balanced against the evidence that suggests that we may have to assume a total of, say, 1,100 instead of 1,000 *poleis*. To conclude: I still think that in the second half of the fourth century B.C. the total number of Greeks came to a minimum of 7 million excluding Epeiros and Makedonia and 7.5 million if these two regions are included.

3. *The evidence of the texts*

To control the reliability of the investigation I have conducted I shall compare the population figures obtained by the shotgun method with population figures calculated on the basis of written sources. For over a score of Archaic and Classical *poleis* we possess information that allows us—roughly—to calculate the number of adult male citizens, sometimes the number of adult males. The missing women and children can be filled in by applying an appropriate model population and thus —using a different kind of shotgun—we can get a rough idea of the total population of these *poleis*.

In almost all cases the information we find in our sources concerns the size of armed forces, usually the number of hoplites that fought in an army or the number of triremes which a *polis* could man. For Athens we have information about the number of citizens required to run the democratic political institutions in accordance with the prescribed rules, and from Eretria we have substantial fragments of some large inscriptions which seem to have recorded the names of all adult male full citizens.

For this comparison I do not use the averages—i.e., that a *polis* with a territory size 5 had, on average, an urban centre with an intramural area of 182 ha of which a third was in-

habited by 150 people per ha (*Shotgun* 22–23, 37–47). Instead I use what we actually know about the *polis* in question—e.g., that Eretria, a *polis* with a territory size 5, had an urban centre with an intramural area of 81.5 ha. We presume that about half of that was inhabited space, so that we reach an urban population of 6,100 people. However, for one of the *poleis*, Chios, we have no information about the size of the urban centre and here I have—for want of specific information—to apply the average for the relevant size of territory. To calculate the corresponding rural population, I use for all *poleis* the average percentages—i.e., in *poleis* with territories size 1–3 a third of the population was settled in the hinterland, for *poleis* size 4 a half, and for *poleis* size 5 no less than two thirds.

The comparative material is information in written sources mostly concerning the size of armies, and it is in particular the number of hoplites that is mentioned in the texts. I shall therefore describe how I convert information about the number of hoplites into a population figure. Allowing for a number of citizens unfit for military service or exempted for other reasons, cautiously assessed at 20% of all,[5] I assume that a force of 1,000 citizen hoplites aged 20–49[6] corresponds to a "hoplite class" aged 20–49 of 1,250. To the hoplites must be added the same number of light-armed,[7] so that the adult male citizen population aged 20–49 comes to 2,500. In the model population I use (Princeton tables model west, mortality level 4 and growth rate 0.5%)[8] males aged 20–49 constitute 41.8% of all

[5] M. H. Hansen, *Demography and Democracy* (Herning 1985) 16–21; *Shotgun* 5–6.

[6] M. H. Hansen, *Three Studies in Athenian Demography* (Copenhagen 1988) 23 n.12; T. Figueira, *Athens and Aigina in the Age of Imperial Colonization* (Baltimore 1991) 203 with n.93. More sources can be added, e.g. Xen. *Hell.* 6.4.14: Sphodrias and his son are killed in the same battle. If the son was twenty his father must have been in his forties (or older). If with, e.g., A. H. M. Jones, *Athenian Democracy* (Oxford 1957) 163–164, we assume that the field army comprised the year classes 20–39, calculations on the basis of numbers of hoplites leads to much higher and, in my opinion, unrealistic population figures.

[7] Hdt. 9.29; Thuc. 4.93.3, 5.57.2; cf. *Shotgun* 84.

[8] Hansen, *Demography and Democracy* 11–13; *Shotgun* 55. It does not make a great difference if, like some historians, I prefer mortality level 3. In that case

males. The 2,500 male citizens aged 20–49 correspond to a total of 5,980 or, in rounded numbers, 6,000 males of all ages and, adding the women, the total citizen population comes to 12,000 people. To this figure must be added an unknown number of free foreigners and slaves. To be on the safe side I estimate that slaves and foreigners taken together constituted 10% of the total population.[9]

In *Shotgun* Appendix 1 (93–96) I adduced eight case studies, each comparing the population of a *polis* calculated on the basis of the intramural area of the urban centre with the population calculated on the basis of information in written sources about the armed forces of the *polis* in question. In this section I add the following fourteen case studies:

CHIOS (*Inventory* no. 840) covers an area of 825 km^2. It was a *polis* with a territory size 5, and accordingly its (average) population is estimated at 27,300 (*Shotgun* 24, table 1.9). Chios was fortified (Aen. Tact. 11.4) but the modern town covers the ancient and therefore no remains of the town wall have been found.

The best sources we have for the size of the population concern the size of the fleet of Chios: the Chians contributed 100 ships to the Ionian fleet in 494 and there were 40 elite Chian *epibatai* on board each ship, i.e. a total of 4,000 (Hdt. 6.15.1). In 412 the Chians could muster 60 triremes (Thuc. 8.6.4, cf. A. W. Gomme, A. Andrewes, K. J. Dover, *A Historical Commentary on Thucydides* V [Oxford 1981] 27–30) apparently manned with Chians, both free and slaves (Thuc. 8.15.2). The crews of 60 triremes add up to 12,000, and if we assume that they were between 20 and 50 (= 42% of all males, cf. Hansen, *Demography and Democracy* 12) the total male population of citizens, foreigners, and slaves of all ages came to 28,500 and the total population to 57,000, and that is a minimum. Thus the shotgun figure constitutes at most half the Chian population in the Classical period.

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the percentage goes down by 0.5 only, from 41.8 to 41.3, and 1,000 hoplites correspond to a total of 12,100 citizens, see A. J. Coale and P. Demeny, *Regional Model Life Tables and Stable Populations* (Princeton 1966) 126 and 128.

[9] A more realistic estimate would be 20% or even more. In *Shotgun* 56–57 I assumed that there was, on average, half a slave per household. The implication is that household slaves constituted 10% of the population. Thus public slaves, slaves working in the mines, etc., are not taken into account.

HERMIONE (*Inventory* no. 350) was a *polis* with a territory size 4 (ca. 276 km²) and accordingly its (average) population is estimated at 15,450 people (*Shotgun* 24, table 1.9). Its fourth-century walls enclosed an intramural area of 22.5 ha of which 17 ha were available for habitation. We can estimate the urban population at 2,550 people (17 x 150) and the total population at 5,100.

Alternatively we can calculate the population of Hermione on the basis of the 300 hoplites from Hermione who fought at Plataiai in 479 (Hdt. 9.28.4). They correspond to a citizen population of ca. 3,600 and a total population of 4,000.

HIMERA (*Inventory* no. 24) was a *polis* with a territory size 5 (ca. 700 km²) and accordingly its (average) population is estimated at 27,300 people (*Shotgun* 24, table 1.9). Its walls enclosed an intramural area of ca. 82 ha. Assuming that half of that area was inhabited space (*Shotgun* 47) we can estimate the urban population at 6,150 people (41 x 150) and the total population at 18,450.

When in 409 Himera was attacked by the Carthaginians under Hannibal, 3,000 Himeraians were killed in the battle outside the city (Diod. 13.60.7) and after the conquest 3,000 adult male Himeraians were picked out among the prisoners and killed (13.62.4). Yet, some Himeraians survived and ca. 1,000 of them joined Hermokrates in his attack on Syracuse (13.63.3). Assuming that Himera's armed force numbered ca. 7,000 men before the Carthaginian attack, and that it was a combined force of hoplites and light-armed, the total citizen population can be estimated at ca. 42,000 people and the total population at ca. 46,000.

IASOS (*Inventory* no. 891) was a *polis* with a territory size 2 and accordingly its (average) population is estimated at 3,035 people (*Shotgun* 24, table 1.9). Its fourth-century walls enclosed an intramural area of ca. 26 ha. Assuming that half of that was inhabited space (*Shotgun* 47) we can estimate the urban population at 1,950 people (13 x 150) and the total population at 2,925.

Alternatively we can calculate the population of Iasos on the basis of the 800 adult males of military age killed by Lysander in 405 when he conquered the city and exposed its population to an *andrapodismos* (Diod. 13.104.7). 800 adult males of military age correspond to a male population of 1,650 and a total population of 3,300, but that is a minimum. All sources show that whenever a *polis* was exposed to an *andrapodismos* a substantial number of inhabitants must have escaped (*Inventory* 122); moreover Iasos had been exposed to an *andrapodismos* in 412 (Thuc. 8.28.4) and it is unlikely that the population in

405 had grown to the size it had before the first *andrapodismos* (*Shotgun* 9–10).

MYTILENE (*Inventory* no. 798) was a *polis* with a territory size 4 (ca. 450–500 km²) and accordingly its (average) population is estimated at 15,450 people (*Shotgun* 24, table 1.9). But the late Classical walls enclosed an area of 140 ha. Following the method suggested in *Shotgun* 21–24 we get an urban population of 10,500 (70 x 150) and a rural population of the same size (*Shotgun* 24, table 1.9), i.e. a total population of 21,000.

As restored, a fourth-century inscription (Tod, *GHI* 163) grants Mytilene the right to an annual import of 100,000 *medimnoi* of grain from the Bosporan kingdom, enough to feed ca. 20,000 persons. Since the territory of Mytilene comprised large stretches of arable land, a total population of 20–25,000 must be an absolute minimum.

PHLEIOUS (*Inventory* no. 355) was a *polis* with a territory size 3 (ca. 135 km²) and accordingly its (average) population is estimated at 5,515 people (*Shotgun* 24, table 1.9). Its fourth-century walls enclosed an intramural area of 60 ha. Assuming that half of this was inhabited space (*Shotgun* 47) we can estimate the urban population at 4,500 people (30 x 150) and the total population at 6,750.

Xenophon quotes the Lakedaimonians for the statement that Phleious had 5,000 adult male citizens (*Hell.* 5.3.16), but that must be an exaggeration. 5,000 adult male citizens correspond to ca. 17,500 citizens of both sexes and all ages and to a total population of ca. 19,500 people. Phleious, with a territory of ca. 135 km², will then have had a population density of 145 per km², which I find unlikely for a small *polis* with a predominantly agrarian economy. To have close to 100 inhabitants per km² is already a remarkable number, but we must take into account that the 135 km² were fertile arable land along the upper reaches of the river Asopos (*Inventory* 613). Herodotos (9.28.4) reports that 1,000 Phleiasian hoplites fought at Plataiai in 479. They correspond to a citizen population of ca. 12,000 and a total population of 13,300.

PLATAIAI (*Inventory* no. 216) was a *polis* with a territory size 3, and accordingly its (average) population is estimated at 5,515 people (*Shotgun* 24, table 1.9). Its fifth-century walls enclosed an intramural area of 10 ha. Assuming that half of that was inhabited space (*Shotgun* 47) we can estimate the urban population at 750 people (5 x 150) and the total population at 1,125.

However, Thucydides' account of the nocturnal attack on Plataiai

in 431 points to an urban population of over 2,000 people,[10] and accordingly a total population of over 3,000 people.

No less than 600 Plataian hoplites fought at Plataiai in 479 (Hdt. 9.28.6), and that corresponds to a citizen population of ca. 7,200 people of both sexes and all ages and a total population of ca. 8,000. The small size of the urban centre must be related to the fact that the territory of Plataiai accommodated three dependent *poleis*, *viz*., Erythrai, Eteonos/Skaphai, and Skolos (*Inventory* nos. 203, 204, 219), all, we presume, with a territory size 1. Also it must be taken into account that the fourth-century walls enclosed an area of no less than 80 ha.

SAMOS (*Inventory* no. 864) was a *polis* with a territory size 5 (the island covers 470 km^2 and the Samians had a *peraia* of unknown size). Accordingly its (average) population is estimated at 27,300 people (*Shotgun* 24, table 1.9). The intramural area of Samos city was 103 ha and, following the method suggested in *Shotgun* 21–24, we get an urban population of 5,100 (34 x 150) and a rural population of 10,200 (*Shotgun* 24, table 1.9), i.e. a total population of 15,300 only.

A passage in Thucydides, however, leaves no doubt that the population was much larger. When Samos revolted against Athens in 440 a naval battle was fought off Samos between the Athenian fleet and a Samian fleet consisting of fifty warships (ναῦς) and twenty troop-carriers (στρατιώτιδες) (Thuc. 1.116.1). The fifty ships were probably triremes, each with a crew of 200 men. The crew of a troop carrier was probably of the same size as that of a trireme; the difference may have been that many of the crew were hoplites who served as rowers during the transport but left the ship when it reached its destination (cf. Gomme/Andrewes/Dover *ad* 6.43). If so, the seventy Samian ships were manned by ca. 14,000 rowers, sailors, and soldiers. Some were citizens, some free foreigners, and some slaves. Given the desperate situation for the Samians, it can be inferred that the majority of those who manned the fleet lived in Samos.[11] 14,000 adult males aged 20–50 corresponds to a total male population of ca. 33,000 and a total population of 66,000. If the rowers were in the age group 20–39, we get even higher figures.

SIKYON (*Inventory* no. 228) was a *polis* with a territory size 4 (ca. 360–400 km^2) and accordingly its (average) population is estimated at

[10] M. H. Hansen, "The Polis as an Urban Centre. The Literary and Epigraphical Evidence," in M. H. Hansen (ed.), *The Polis as an Urban Centre and as a Political Community* (Copenhagen 1997) 9–86, at 27–28.

[11] G. Shipley, *A History of Samos 800–188 BC* (Oxford 1987) 14.

15,450 people (*Shotgun* 24, table 1.9). Its walls enclosed an intramural area of 175 ha. Assuming that only a third of this was inhabited space (*Shotgun* 47) we can estimate the urban population at 8,750 people (58.3 x 150) and the total population at 17,500.

Sikyon provided 3,000 hoplites at Plataiai in 479 (Hdt. 9.28.4) and 1,500 at Nemea in 394 (Xen. *Hell.* 4.2.16). At Nemea neither Sikyon nor Corinth seems to have sent out the field army in full force. A field army of 3,000 hoplites corresponds to a population of ca. 36,000 citizens of both sexes and all ages and a total population of 40,000 or more.

TANAGRA (*Inventory* no. 220) was a *polis* with a territory size 5 (ca. 530 km^2). and accordingly its (average) population is estimated at 27,300 people (*Shotgun* 24, table 1.9). Its walls enclosed an intramural area of ca. 60 ha. Assuming that only half of that was inhabited space (*Shotgun* 47) we can estimate the urban population at 4,500 people (30 x 150) and the total population at 13,500. A large part of the population living in the hinterland was probably settled in the small dependent *poleis* that belonged to Tanagra: Mykalessos and Pharai (*Inventory* nos. 212, 215).

The Oxyrhynchos historian reports that in the 390s Tanagra provided one out of eleven boiotarchs and a force of 1,000 hoplites and 100 horsemen to the federal army (*Hell.Oxy.* 19.3). That corresponds to a citizen population of 13,200 and a total population of close to 14,700 people.

TEGEA (*Inventory* no. 297) was a *polis* with a territory size 4 (ca. 395 km^2) and accordingly its (average) population is estimated at 15,450 people (*Shotgun* 24, table 1.9). Its fourth-century walls enclosed an intramural area of 190 ha. Assuming that only a third of this was inhabited space (*Shotgun* 47) we can estimate the urban population at 9,450 people (63 x 150) and the total population at 18,900.

Alternatively we can calculate the population of Tegea on the basis of the 1,500 Tegean hoplites who fought at Plataiai in 479 (Hdt. 9.28.3). They correspond to a citizen population of ca. 18,000[12] and a total population of over 20,000.

THEBES (*Inventory* no. 221) was a *polis* with a territory size 5 (ca. 650 km^2). and accordingly its (average) population is estimated at 27,300 people (*Shotgun* 24, table 1.9). Its walls enclosed an intramural area of

[12] B Forsén, "Population and Political Strength of Some Southeastern Arkadian *Poleis*," in P. Flensted-Jensen (ed.), *Further Studies in the Ancient Greek Polis. Papers from the Copenhagen Polis Centre* 5 (Stuttgart 2000) 35–56, at 38.

ca. 350 ha. Assuming that only a third of this was inhabited space (*Shotgun* 47) we can estimate the urban population at 17,550 people (117 x 150) and the total population at 52,650.

The Oxyrhynchos historian (19.3) reports that in the 390s Thebes provided four out of eleven boiotarchs and a force of 4,000 hoplites and 400 horsemen to the federal army. That corresponds to a citizen population of 52,800 and a total population of close to 59,000 people. Two of the boiotarchs and two regiments were provided by the Thebans themselves, the two others by a number of small dependent *poleis* dominated by Thebes, *viz.* Erythrai, Plataiai, Potniai, Skaphai, Skolos (*Inventory* nos. 203, 216, 217, 204, 219). At the beginning of the Peloponnesian War the population of the dependent *poleis* and some other small places had been moved to Thebes in connection with a major synoecism, by which the urban population of Thebes was doubled (*Hell.Oxy*. 20.3).

When in 335 Alexander the Great sacked Thebes, 6,000 soldiers were killed and 30,000 prisoners sold as slaves (Diod. 17.14.1; Plut. *Alex*. 11.12). But a substantial number of Thebans survived the conquest and the ensuing *andrapodismos* and took part in the refoundation of Thebes in 316/5 (Diod. 19.53.2, 54.1; Paus. 9.7.1).

THESPIAI (*Inventory* no. 222) was a *polis* with a territory size 4 (ca. 425 km^2) and accordingly its (average) population is estimated at 15,450 people (*Shotgun* 24, table 1.9). But it consisted of one principal *polis*, Thespiai, and four smaller dependent *poleis*: Chorsiai, Eutresis, Siphai, and Thisbai (*Inventory* nos. 202, 205, 218, 223). Taken together the five *poleis* had an intramural area of ca. 150 ha, and that corresponds to an urban population of 11,250 persons. If we add half as many settled in the hinterland of the *poleis* we reach a total of 16,875. If, instead, we divide the territory between the five *poleis* and use the averages (*Shotgun* 24, table 1.9) we reach a total of 15,865, *viz.* Chorsiai (size 2) 3,035 inhabitants, Eutresis (size 1) 900, Siphai (size 3) 5,515, Thespiai (now size 3, cf. *Inventory* p.457) 5,515, and Thisbai (size 3) 5,515.

These totals of 16,875 and 15,865 can be compared with some army figures reported by Herodotos in his description of the battles of Thermopylai and Plataiai. 700 hoplites from Thespiai fought with Leonidas at Thermopylai in 480 (Hdt. 7.202). They were killed (Hdt. 7.222, 226; *Anth.Gr.* 3.19) and the 1,800 men provided by Thespiai at Plataiai in 479 were all light-armed (Hdt. 9.30). These 2,500 men were probably the entire force which Thespiai was able to deploy during the Persian War. A total of 2,500 hoplites and light-armed corresponds to a population of ca. 15,000 citizens of both sexes and all ages and a total population of 16,700. A century later, in 395,

Thespiai and its dependencies contributed two regiments to the Boiotian federal army (*Hell.Oxy*. 19.3). These 2,200 men correspond to a citizen population of 26,400 and a total population of 29,300.

TROIZEN (*Inventory* no. 357) was a *polis* with a territory size 4 (ca. 354 km^2) and accordingly its (average) population is estimated at 15,450 people (*Shotgun* 24, table 1.9). Its walls enclosed an intramural area of ca. 40 ha. Assuming that half of this was inhabited space (*Shotgun* 47) we can estimate the urban population at 3,000 people (20 x 150) and the total population at 6,000.[13]

Troizen provided 5 triremes at Salamis in 480 (Hdt. 8.43) and 1,000 hoplites at Plataiai in 479 (Hdt. 9.28.4). The 1,000 hoplites correspond to a citizen population of 12,000 and a total population of 13,300.

Summing up the evidence: the following list comprises both the eight examples adduced in *Shotgun* 93–96 and the fourteen examples discussed above. The left column records the urban population calculated on the basis of the intramural area of the *polis* in question. The right column lists population figures obtained from written sources.

calculated from	*territory size*	*written sources*
Territory size 5 (average population 27,300):		
Argos	31,000	56,000–70,000
Athens	77,000	150,000–250,000
Chios	27,300 (average)	57,000
Eretria	18,300	15,500
Himera	18,450	46,000
Korkyra	29,250	55,000–70,000
Samos	15,300	66,000
Tanagra	13,500	14,700
Thebes	52,650	59,000 (390s), 36,000+ (335)
Territory size 4 (average population 15,450):		
Ambrakia	19,500	30,000+
Hermione	5,100	4,000

[13] Troizen is not among the 232 walled *poleis* analysed in *Shotgun* because the walls are traditionally dated to the Hellenistic period (G. Welter, *Troizen und Kalaureia* [Berlin 1941] 12–13). As noted by F. G. Maier, *Griechische Mauerbauinschriften* (Heidelberg 1959) *ad* no. 32, however, the date is pure guesswork, see Piérart in *Inventory* 616–617. There is reason to believe that the preserved walls are the same—or at least enclose the same area—as those that protected Troizen in 369/8 B.C. (Diod. 15.69.1). Both John Camp and Marcel Piérart find that a fourth-century date is plausible.

Megara	21,000	30,000+
Mytilene	21,000	20,000–25,000
Sikyon	17,500	40,000
Thespiai	16,875	16,700 (479), 29,000 (390s)
Troizen	6,000	13,300
Territory size 3 (average population 5,515):		
Orchomenos	10,000	20,000+
Phleious	6,750	13,300
Plataiai	1,125	8,000 (479), 3,000+ (431)
Tegea	18,900	20,000+
Territory size 2 (average population 3,035):		
Aigina	6,000	20,000–35,000
Iasos	2,925	3,300+

In sixteen cases out of twenty-two the total population calculated on the basis of information from written sources is much higher than the population calculated from what we know about the size of the urban centre. In twelve of the sixteen cases the alternative method leads to totals that are twice as high or even higher than those obtained by the shotgun method. The *poleis* in this group are Aigina, Argos, Athens, Chios, Himera, Korkyra, Orchomenos, Phleious, Plataiai, Samos, Sikyon, and Troizen.

In four cases the alternative method gives totals that are almost identical with or only a little higher than the totals derived from the shotgun method. These are Iasos, Mytilene, Tanagra, and Tegea.

In two cases only the shotgun method gives a higher total than the alternative method, *viz.* for Eretria and Hermione. Hermione calls for no further comments. Eretria's population, on the other hand, is surprisingly small. Is it believable that the average population density in a *polis* with a highly fertile territory of altogether 1,500 km^2 was as low as 10 persons per km^2? We must keep in mind that the rosters were drawn up at the beginning of the third century B.C. and presumably in the period during which Eretria had an oligarchic constitution.[14] In that case the ca. 4,000 citizens recorded on the stones were

[14] M. H. Hansen, *Studies in the Population of Aigina, Athens and Eretria* (Copenhagen 2006) 81.

only those who fulfilled the census requirement, and the total number of born citizens was much larger.

A further aspect that must be taken into account is the chronology of the information. Most of the army figures I convert into population figures come from sources that treat the fifth century, in particular the Persian War and the Peloponnesian War. Most of the information we have about the intramural area of walled *poleis* is based on remains of defence circuits of the fourth century and often the second half of the fourth century. Thus there is gap of 100 years, sometimes even 150, between the two types of information I compare. All the evidence we have indicates that the total population of the Greek world was growing in the course of the Classical period and peaked in the late fourth century.[15] Everything else being equal, we should expect the calculations based on walled *poleis* to show larger totals than the figures derived from army figures. The comparison testifies to the reverse

Finally, we must keep in mind that the totals we arrive at by using army figures are based on the assumption that the number of hoplites recorded in our sources constituted the full force which the *polis* could muster. But it is unlikely, for example, that in 479 the Peloponnesian *poleis* sent their full force of hoplites to the army that fought against the Persians at Plataiai. So in several cases the totals I have calculated are probably on the low side. This observation applies to Hermione, Phleious, Sikyon, Tegea, and Troizen. Similarly, it is unlikely that the regiments which the eleven districts of the Boiotian federation had to provide to the federal army represented the entire force which the *poleis* in question could muster in case they were attacked. This applies to Orchomenos, Plataiai, Thebes, and Thespiai.

From the totals obtained by the alternative method I infer that my shotgun calculations are based on assumptions that almost always are too pessimistic when they can be checked against other sources. The open areas inside the walls may have been smaller than 50% or for large *poleis* 66.6% of the

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

intramural space. There may have been over thirty houses on one hectare of inhabited space, and the average size of a household may have 5.5 persons rather than just 5. I have indeed aimed low with my shotgun, and the conclusion is that the urban population living behind the walls in all the ca. 1,000 *poleis* must have been larger, and presumably considerably larger, than the total of 3.3 million I suggest in *Shotgun* 24, table 1.10. Furthermore, there may have been ca. 1,100 poleis rather than the ca. 1,000 suggested in *Inventory* (*supra* 260–262). A total of 7.5 million must the minimum number of ancient Greeks in the age of Alexander and a total of one or two million people more seems to be more realistic.

4. *The size of families and households*

To use the intramural area of a walled city as a means to calculate the urban population presupposes that one can come up with satisfactory answers to three questions: (1) How much of the intramural space was used for habitation? (2) What was the average number of houses per hectare? (3) How big was the average household? All three problems are treated in *Shotgun* and will undoubtedly be debated again in future studies. In this context I restrict myself to a further comment on the average size of the Greek household, a problem discussed in *Shotgun* 52–60.

By far the best evidence we have for the size of ancient families and households is the Egyptian census returns of the Hellenistic and Roman periods. It is debatable, however, to what extent this material can be extrapolated and applied to the Hellenic world in the fourth century B.C. In *Shotgun* (58–59) I took a rather sceptical view of its applicability. Egypt was in many respects a peculiar province,[16] and another reason for being cautious was that in 2004 when I gave the Fordyce Mitchel Memorial Lectures the available material concerned the Roman period and had to be extrapolated 300–500 years to cover the Greek world in the age of Alexander.[17] In 2006,

[16] W. Clarysse and D. J. Thompson, *Counting the People in Hellenistic Egypt* (Cambridge 2006) II 342–343.

[17] In Lisbon (*supra* 260) Bruce Frier confirmed my suspicion that it would be unwise to assume that the evidence for Roman Egypt about the average size of

however, Clarysse and Thompson published *Counting the People in Hellenistic Egypt*. It is a precious study of 54 preserved census returns of which 48 belong to the third and 6 to the second century B.C. In many respects the authors arrive at conclusions about size of family and household which supplement and match those of the Roman period. But there is one important difference: for the Hellenistic period it is possible to distinguish between Greek and Egyptian households and we can perhaps expect the Greek households to mirror the conditions in other parts of the Greek world in the late Classical period. Therefore I feel obliged to take a closer look at the Egyptian material

(a) The material studied by Clarysse and Thompson consists of tax registers based on census returns almost all of the third century B.C. and almost all from the Arsinoite nome. These registers are drawn up for taxation purposes, and the most important of the taxes to be collected is a salt-tax. The census returns were drawn up according to household and by occupation.[18] Only adults are recorded and the material allows for the reconstruction of 427 households containing 1,271 adults.[19] The number of children can be estimated on the widely accepted assumption that the ratio of males aged 14–62 (poll tax payers) to the total population was 1 to 2.909.[20] Of the households, 38.9% were Greek and 61.1% Egyptian. Including children, the size of a Greek family was 4.4, an Egyptian family 4.0. Adding non-kin members of the household we get an average household size of 5.0 for Greek but 4.0 for Egyptian.[21] But the material shows that some houses were inhabited by more than one household;[22] Greek houses were often larger than the Egyptian. On average a house seems to have been

a household could be extrapolated and applied to the rest of the Greek world in the Classical period.

[18] Clarysse and Thompson, *Counting* II 20.

[19] Clarysse and Thompson, *Counting* II 315.

[20] R. S. Bagnall and B. Frier, *The Demography of Roman Egypt* (Cambridge 1994) 103 n.35; Clarysse and Thompson, *Counting* II 240, 245.

[21] Clarysse and Thompson, *Counting* II 314–315.

[22] Clarysse and Thompson, *Counting* II 230, 286, 290.

occupied by 5.3 persons.[23] In this case the authors do not distinguish between Greek and Egyptian houses but it follows that, on average, a Greek house must have accommodated more than 5.3 persons.

(b) From the first to the third century A.D. the Roman authorities in Egypt regularly conducted a census of the entire population of the province to be used, in particular, for taxation purposes. The census took place at 14-year intervals and was conducted on a house-to-house basis. Out of millions of census returns some 300 survive, many in fragments, but 167 are almost completely preserved and convey information about the inhabitants of each house.[24] The basic unit was the household, including slaves,[25] but other persons are listed too, in particular lodgers who did not belong to the household.[26] Furthermore, in one case two apparently unrelated families are living together in one house.[27]

The census returns have been collected and exposed to an exemplary demographic analysis by Roger Bagnall and Bruce Frier. There is no need to go into detail here. In this context it suffices to state the results: the investigation shows that the average size of principal resident families is 4.3 persons, which is a weighted mean between 4.04 (in metropoleis) and 4.46 (in villages).[28] Since the survival rate for returns favours smaller families, the authors find that an average family size of between 4.3 and 5.0 is not unlikely.[29] But if we add lodgers and slaves the figures are 5.31 (in metropoleis) and 4.82 (in villages).[30] Since the survival rate for returns favours smaller families, we can infer that 5.0 is the minimum average household size.

(c) A different set of census returns has been studied by R. Alston. Most of them come from Philadelpheia and the date is

[23] Clarysse and Thompson, *Counting* II 316.

[24] Bagnall and Frier, *Demography* 58.

[25] Bagnall and Frier, *Demography* 70–71.

[26] Bagnall and Frier, *Demography* 65–66.

[27] Bagnall and Frier, *Demography* 63.

[28] Bagnall and Frier, *Demography* 68, table 3.3.

[29] Bagnall and Frier, *Demography* 68.

[30] Bagnall and Frier, *Demography* 68, table 3.3.

ca. 100 A.D. In this case only men are recorded, a total of 478 belonging to 226 households. The adjusted size of an average household is calculated to 5.5. By contrast with the material studied by Bagnall and Frier the village households are larger than the urban household.[31]

More important is Alston's study of the relation between house and household. In a substantial number of cases a household occupied only a fraction of a house, and the remaining fraction was presumably occupied by another household. Accordingly, Alston distinguishes between *household*—which normally consists of a family plus one or more non-kin members, usually of servile status—and a *houseful*—which in Alston's terminology denotes all the occupants of a house.[32] The 226 households in his material occupy 160 houses, and while the average number of persons in a household is ca. 5.5, the average number of occupants of a house is calculated to ca. 7.7.[33]

How reliable are the figures obtained from the Hellenistic and Roman census returns? First of all it must always be kept in mind that the purpose of conducting the census was invariably taxation, and there can be no doubt that attempted tax evasion resulted, if possible, in under-reporting the members of the household.[34] Second, both in the Hellenistic and in the Roman period the majority of the census returns come from the Arsinoite nome.[35] In the course of the Roman period this nome suffered climatic changes which resulted in a reduction in the amount of land under cultivation and in the number of

[31] R. Alston, *The City in Roman and Byzantine Egypt* (Cambridge 2002) 71–72.

[32] Alston, *City* 69–70. The term *houseful* was coined by Laslett, cf. P. Laslett, and R. Wall, *Household and Family in Past Time* (Cambridge 1972) 36–39. See also Clarysse and Thompson, *Counting* II 230.

[33] Alston, *City* 71.

[34] Bagnall and Frier, *Demography* 41–42; D. J. Thompson, "The Infrastructure of Splendour: Census and Taxes in Ptolemaic Egypt," in P. Cartledge et al. (eds.), *Hellenistic Constructs* (Berkeley/Los Angeles) 242–257, at 254–257; Clarysse and Thompson, *Counting* II 19 with n.44, and 110.

[35] Clarysse and Thompson, *Counting* II 3; Bagnall and Frier, *Demography* 6.

villages.[36] Furthermore marriage between full brother and sister seems to have been particularly common in the Arsinoite nome,[37] and over time that must have had a negative impact on fertility.[38]

If the figures for family and household size in Hellenistic and Roman Egypt have to be modified in the light of these caveats, they must be adjusted upwards. An average household size of 5 persons must be a minimum, and that applies to both the Hellenistic period and the Roman. If we dare take the further step and apply the Egyptian figures of the Hellenistic period to the Greek world at large in the age of Alexander the Great, the inference is that the Egyptian material supports the figure I have used in all my calculations: an average household size of 5 persons is a minimum figure and a household size of 5.5 seems to be a more realistic average.[39]

There is however one aspect of the Egyptian material which, perhaps, I have not taken sufficiently into account in *The Shotgun Method*. Without any discussion of the issue I assumed that each house accommodated one household, consisting of a family, often an extended family, plus in a number of cases one or more slaves. That is the usual assumption made by all who have studied the demography of the Greek world in the Archaic and Classical periods. But if Alston's distinction between household and houseful is as important as he believes and if it applied to the Greek world in general, we shall have to take into account that the average number of occupants per house may have been considerably higher than five and that even six may be a conservative estimate.

[36] Clarysse and Thompson, *Counting* II 3.

[37] Bagnall and Frier, *Demography* 50.

[38] Scheidel, *JHS* 123 (2003) 27; M. Golden, "A Decade of Demography. Recent Trends in the Study of Greek and Roman Populations," in P. Flensted Jensen et al. (eds.), *Polis and Politics* (Copenhagen 2000) 23–40, at 29.

[39] Hansen, *Polis* 59–60.

Appendix A

Members of the Delian League for whom membership in the League is the only reason (O) or the principal reason (P) for their inclusion in *Inventory*. Usual level of *phoros* given after name and *Inventory* number; AD = attested in an assessment decree only, not in the quota lists.

Euboia	
Athenai Diades (no. 364) 2,000–4,000 dr.	P
Diakres apo Chalkideon (no. 367) 800–3,000 dr.	O
Dion (no. 368) 1,000–2,000 dr.	P
Grynchai (no. 371) 1,000 dr.	O
Posideion (no. 376) 100 dr. AD	O
The Aegean	
Anaphe (no. 474) 1,000 dr.	P
Astypaleia (no. 476) 1.5–2 tal.	P
Eteokarpathioi (no. 488) ?	O
Kasos (no. 490) 1,000 dr.	O
Keria (no. 495) ?	O
Kimolos (no. 496) ?	O
Pholegandros (no. 513) 1,000 dr.	P
Saros (no. 516) 200–300 dr.	O
Syme (no. 522) 1,800 dr.	O
Telos (no. 524) 1–2 tal. AD	P
Mygdonia	
Bormiskos (no. 547) 1,000 dr.	O
Chalkidike	
Chedrolioi (no. 566) 500–1,000 dr.	O
Istasos (no. 574) 500 dr. AD	O
Kamakai (no. 576) 600 dr.	O
Kithas (no. 579) 3,000 dr.	O
Milkoros (no. 585) 500–1,000 dr.	O
Othoros (no. 590) 500–700 dr.	O
Pharbelos (no. 591) 500–1,000 dr.	O
Phegontioi (no. 592) 1,000–1,600 dr.	O
Pistasos (no. 594) 500 dr.	O
Pleume (no. 595) 1,000 dr.	O
Polichnitai (no. 596) ?	O
Posideion (no. 597) 1,000 dr. AD	O
Prassilos (no. 599) 900 dr.	O
Serme (no. 603) 500 dr.	O
Sinos (no. 606) 800–1,500 dr.	O
Skabala (no. 607) 1,500–3,000 dr.	O
Skapsaioi (no. 608) 1,000 dr.	O
Strepsa (no. 615) 1 tal.	O
Thestoros (no. 617) ? AD	O

Tinde (no. 619) ?	O
Zereia (no. 622) 500 dr. AD	O
Thrace, unlocated	
Aison (no. 623) 1,000–1,500 dr.	O
Kossaia (no. 625) ? AD	O
Thracian Chersonesos	
Deris (no. 662) ?	O
Limnai (no. 668) 500–2,000 dr.	P
Propontic Thrace	
Bisanthe (no. 673) ? AD	O
Daminon Teichos (no. 675) 1,000 dr.–2 2/3 tal.	O
Neapolis (no. 677) 300 dr.	O
Serrion Teichos (no. 680) ?	O
Tyrodiza (no. 681) 500–1,000 dr.	O
Pontos, the West Coast	
Orgame (no. 692) ?	O
Tomis (no. 693) ?	O
Pontos, Skythia	
Kimmerikon (no. 700) ?	O
Propontic Asia Minor	
Artaiou Teichos (no. 735) 1,000 dr.	O
Bysbikos (no. 738) 3,000 dr.	O
Dareion (no. 739) 400 dr. AD	O
Daskyleion (no. 740) 500 dr.	O
Didymon Teichos (no. 741) 1,000 dr.–2 tal.	O
Kolonai (no. 746) ? AD	P
Metropolis (no. 749) 1 tal. AD	O
Miletouteichos (no. 751) ? AD	P
Otlenoi (no. 754) 2,000 dr. AD	O
Pythopolis (no. 760) ? AD	O
Sombia (no. 762) 4,000 dr.	O
Tereia (no. 763) ? AD	O
Troas	
Arisba (no. 768) 2 tal.	O
Astyra Troika (no. 771) ? AD	O
Azeia (no. 772) 400 dr.	O
Palaiperkote (no. 787) 500 dr.	O
Polichna (no. 789) 500 dr.	O
Aiolis	
Karene (no. 813) ?	O
Ionia	
Boutheia (no. 839) 1,000 dr.–3 tal.	O
Dios Hieron (no. 842) 500–1,000 dr.	O
Elaiousioi (no. 843) 100 dr.	O

Isinda (no. 846) 1,000 dr.	O
Marathesion (no. 853) 2,000–3,000 dr.	O
Polichnitai (no. 860) 4,000 dr.–1.5 tal.	O
Pteleon (no. 862) 100 dr.	O
Karia	
Amos (no. 872) 2,250 dr.	P
Amynandreis (no. 873) 3,000–4,500 dr.	O
Aulai (no. 877) 500 dr.	O
Bargasa (no. 878) 500–1,000 dr.	O
Bargylia (no. 879) 1,000–4,000 dr.	P
Bolbai (no. 880) 1,000 dr.	O
Chios (no. 883) 2,000 dr.	O
Erineis (no. 884) 1,000–4,130 dr.	O
Euromos (no. 885) 2,500 dr.	P
Hydisos (no. 889) 1 tal.	O
Hymisseis (no. 890) 1,200 dr.	O
Idrias (no. 892) ?	O
Kalynda (no. 894) 1 tal.	O
Karbasyanda (no. 895) 1,000 dr.	O
Kasolaba (no. 897) 2,500 dr.	P
Kodapeis (no. 904) 1,000 dr.	O
Krya (no. 907) 2,000 dr.	O
Kyllandos (no. 908) 2 tal.	O
Kyrbissos (no. 909) 2,000 dr.	O
Lepsimandos (no. 911) 1,000–1,500	O
Narisbareis (no. 915) 1,000 dr.	O
Naxia (no. 917) 500–1,000 dr.	O
Olaieis (no. 918) 1,000 dr.	O
Olymos (no. 919) ?	O
Ouranion (no. 920) 500–1,000 dr.	P
Parpariotai (no. 921) 1,000 dr.	O
Pasanda (no. 922) 3,000 dr.	O
Peleiatai (no. 924) 3,000–4,000 dr.	O
Pyrnos (no. 928) 1,000 dr.	O
Siloi (no. 930) 1,500 dr.	O
Taramptos (no. 933) ?	O
Tarbaneis (no. 934) 1,000 dr.	O
Telandros (no. 935) 3,000 dr.–1 tal.	O
Termera (no. 937) 3,000 dr.–2.5 tal.	P
Thastareis (no. 939) 500 dr.	O
Thydonos (no. 940) 1,000 dr.	O
Rhodes	
Brikindara (no. 993) 1 tal.	O
Diakrioi (no. 994) 2 tal.	O
Oiai (no. 998) 3,300 dr.	O

Pedieis (no. 999) 2,000 dr.–1 tal.	O
Pamphylia	
Idyros (no. 1002) 4,000 dr. AD	P
Unlocated	
Erodioi (no. 1031) 500 dr.	O
Eurymachitai (no. 1032) 1,000 dr.	O

Appendix B

Poleis whose size of territory is unknown but seems to have exceeded 200 km², in some cases even 500 km².

Aitna (no. 8): According to Diod. 11.49.1 Aitna had a larger territory than that of Katane which came to ca. 400 km².

Heloron (no. 18): may have controlled a valley of over 400 km².

Henna (no. 19): bordered to the south on Mytistratos, Herbessos, and Morgantina, to the east on Agyrion, and may have had a territory of over 500 km².

Kentoripa (no. 31): bordered to the west on Agyrion, to the north on Engyon, to the east on Adranon, and is likely to have had a territory of over 200 km².

Kephaloidion (no. 32): bordered to the west on Himera, to the east on Alaisa, and is likely to have had a territory of over 200 km².

Morgantina (no. 37): bordered on Herbessos, Henna, Agyrion, and Kentoripa. It seems to have controlled part of the valley to the east, and is likely to have had a territory of over 200 km².

Tauromenion (no. 48): probably same territory as, formerly, Naxos, i.e. 200–500 km².

Siris (no. 69): is likely to have had the same territory as its successor, Herakleia, i.e. ca. 350 km².

Brentesion (no. 78): is likely to have had a territory of over 200 km².

Epidamnos (no. 79): bordered to the north on Lissos, to the south on Apollonia, and is likely to have had a territory of over 200 km².

Amantia (no. 86): If Amantia was the only site between Apollonia and Orikos (Ps.-Scyl. 26) it seems to have had a territory of over 200 km².

Bouthroton (no. 91): was the urban centre of the Prasaiboi and is likely to have had a territory of over 200 km².

Byllis (no. 92): The extent of the territory of Byllis has been determined by N. Ceka, "Le *koinon* des Bylliones," in P. Cabanes (ed.), *L'Illyrie méridionale et l'Epire dans l'antiquité* (Adosa 1987) I 135–149, at 135–136. It covered ca. 1,500 km².

Trichoneion (no. 156): Lying south of Lake Trichonia, its neighbours to the south were the *poleis* along the coast of the Korinthian Gulf: Pleuron, Kalydon, Chalkis, Makynea, and Molykreion. Thus the territory is likely to have covered over 200 km².

Dyme (no. 234): If the *chora* of Dyme in the Classical period included the *polichne* of Teuthea (Strab. 8.3.11) and the *phrourion* of Teichos Dymeion (Polyb. 4.59.4), the territory covered at least 300 km².

Edessa (no. 535): possessed a territory of over 200 km^2, cf. M. Hatzopoulos, *Macedonian Institutions under the Kings* (Athens 1996) I 112.

Apollonia (no. 545): If Apollonia's neighbours were Arethousa to the east and Kamakai to the south-west its territory must have covered over 200 km^2.

Therme (no. 552): If Therme's neighbours were Dikaia and Strepsa to the south, Chalestre and Lete to the north, its territory must have covered over 200 km^2.

Amphipolis (no. 553): Since Amphipolis controlled large resources of gold and timber (cf. Thuc. 4.105.1, 108.1) its territory must have comprised Mt. Pangaion (S. Hornblower, *A Commentary on Thucydides* II [Oxford 1996] 341) and covered an area of probably more than 500 km^2.

Anthemous (no. 562): bordered to the north, west, and south on Kalindoia, Strepsa, Kissa, Spartolos, and Olynthos; there is no clear borderline to the east. Anthemous seems to have had a territory of over 200 km^2.

Stagiros (no. 613): bordered to the north on Arethousa, to the south on Akanthos, and seems to have had a territory of over 200 km^2.

Trapezous (no. 734): may have controlled a long stretch of the coastline and seems to have possessed a territory of over 200 km^2.

Zeleia (no. 764): is likely to have controlled the Aisepos valley and possessed a territory of over 200 km^2.

Adramyttion (no. 800): bordered to the north on Astyra, to the south on Kisthenes, and seems to have had a territory of at least 300 km^2, cf. J. Stäuber, *Die Bucht von Adramytteion* I (*IGSK* 50 [Bonn 1996]) 11–12.

Aigai(ai) (no. 801): lay inland and there are no identifiable neighbours within a radius of 10 km. It may well have had a territory of over 200 km^2.

Atarneus (no. 803): bordered to the north on Karene, to the east on Teuthrania, and to the south on Autokane; the territory is likely to have covered over 200 km^2.

Magnesia (no. 820): bordered to the west on Temnos and to the south on Mt. Sipylos. There is no clear borderline to the north and east. The territory may have covered over 200 km^2.

Pergamon (no. 828): may have controlled a large stretch of the central Kaikos Valley and is likely to have possessed a territory of over 200 km^2, perhaps even over 500 km^2.

Magnesia (no. 852): bordered to the north-west on Ephesos, to the south-west on Priene, and to the east on Tralleis. It controlled the central part of the Maiandros valley and possessed a territory of over 200 km^2, perhaps over 500 km^2.

Smyrna (no. 867): lying west of Mt. Sipylos and Mt. Olympos, it bordered to the north on Herakleia, to the west on Klazomenai, and seems to have had a territory of over 200 km^2.

Alabanda (no. 870): may have controlled the central part of the Marsyas Valley and possessed a territory of over 200 km^2.

Kaunos (no. 898): controlled the estuary of the Kalbis River and the land north of the river, a territory of over 500 km^2, see C. Marek, *Die Inschriften von Kaunos* (Munich 2006) p.81.

Keramos (no. 900): bordered to the west on Bargasa and to the east on Pladasa; it may have possessed a territory of over 200 km^2.

Tralleis (no. 941): controlled part of the upper Maiandros valley and seems to have possessed a territory of over 200 km^2.

Xanthos (no. 943): The city controlled the Xanthos Valley and seems to have possessed a territory of over 200 km^2, perhaps over 500 km^2.

Aspendos (no. 1001): bordered to the west on Perge, to the east on Side, and seems to have possessed a territory of over 200 km^2, perhaps over 500 km^2.

Aphrodisias (no. 1005): controlled the Melas Valley and is likely to have possessed a territory of over 200 km^2.

Soloi (no. 1011): controlled the Liparis Valley and is likely to have possessed a territory of over 200 km^2.

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