
JOHN H. KROLL

EARLY IRON AGE BALANCE WEIGHTS AT LEFKANDI, EUBOEIA

Summary. This report analyses the 16 stone balance weights and fragments recovered in 1994 from the ninth-century BC Tomb 79 in the Toumba cemetery at Lefkandi, Euboea, the tomb of the 'Warrior Trader'. In material, shapes, and mass standards, the weights are for the most part virtual duplicates of common LBA balance weights from Cyprus and the Levant and attest to (a) the long-term continuity of maritime trading across the Bronze/Iron Age divide in the Cypro-Levantine world, and (b) the active participation of Euboeans in this commercial sphere no later than the early ninth century. Discussed also is the relationship between some of these weights and the later Euboeic weight standard.

Among the burials in the revelatory Early Iron Age Toumba cemetery at Lefkandi, Euboea, Tomb 79 has attracted an understandable amount of attention because of its exceptional implications for understanding early Greek society and maritime activity. It is the tomb of a cremated male whose remains had been placed in a Cypriot bronze cauldron and whose plethora of grave offerings included local Euboean pottery; pottery from Attica, Cyprus and Phoenicia; an heirloom north Syrian cylinder seal of the early second millennium, iron weapons (sword, spearhead, two knives and 34 arrowheads), the remnants of a bronze object that may have been a weighing balance, and 16 stone balance weights. One of the later interments in the Toumba cemetery, the burial dates to Sub-Protogeometric II (= Early Attic Geometric II), roughly the second quarter of the ninth century BC.

Within a year of its discovery, the excavators published a preliminary account of the tomb, dubbing it the tomb of '[a] Euboean Warrior Trader' (Popham and Lemos 1995). Other interpretations followed. John Papadopoulos (1997, 203–7) insisted that the buried warrior-trader was not Euboean but should rather be recognized as a Phoenician. Subsequent commentators have been generally disposed to accept the initial identification of the tomb's occupant as a member of the local Euboean elite, while widening the possibilities for interpreting his pursuits. For instance, Carla Antonaccio (2002, 28–9) suggested that the burial might have been that of a *proxenos*, a notable responsible for locally assisting the interests of Eastern merchants (cf. Lemos 2003, 191). And in a recent survey of early Greek commerce, raiding, piracy, and mercenary activity in the eastern Mediterranean, Nino Luraghi (2006, 34, with reference to Humphreys 1978, 165–7) cites the wealthy individual of Tomb

79 as fitting the profile of early Greek *pirate*-traders, adventurers who with their ships and men opportunistically sought their fortunes overseas by violence as well as by peaceful means.¹

The presence of balance weights was fundamental to all of these interpretations. Yet, although Mervyn Popham and Irene Lemos (1996, 204, pl. 149) published the masses of the 13 complete and nearly complete Tomb 79 weights along with good photographs in *Lefkandi III*, a volume of plates with captions, the weights had remained unstudied until now. Generously encouraged by Dr. Lemos to examine these intriguing artefacts, I here present observations on them and their metrological implications in advance of the final publication of the Toumba cemetery currently in preparation.

ANALYSIS AND COMPARANDA

A conspectus of the weights by shape, condition, mass, mass standard and denomination is provided in Table 1. Figure 1 illustrates the objects at actual size. Since the weights had been put on the funeral pyre and burned with the dead man, along with the bronze (?)scale, his weaponry, the cylinder seal, and some of the vases, nearly all of the weights have been discoloured and fractured by fire. They were then placed in the tomb chamber, except for four of the smaller ones (1–3, 15) that were excavated from the filling of the tomb shaft, apparently having been dropped during removal from pyre to the tomb chamber. From single fragments of three weights (4, 8, and 12) it is clear that other fragments have been lost altogether.

Quite apart from their discovery in a rich assemblage involving other exceptional grave goods, the Toumba weights are a singular find in their own right as they happen to be the only balance weights that survive in Aegean Greece from between c.1200 and the sixth century BC. This is not to say, however, that they lack good comparanda. Similar stone balance weights from the eastern Mediterranean have been excavated and published by the hundreds, although nearly all of them date to the Late Bronze Age or earlier. So fully do the Lefkandi weights in all general respects replicate conventional trade weights of the Bronze Age Levant and Cyprus that if, for example, they happened to appear without provenience on the international antiquities market, they would have been dated to the fourteenth or thirteenth century, labelled Cypro-Levantine, and would have stirred little scholarly interest in so far as extant balance weights from that period and region are commonplace. Like most of these hundreds of other Bronze Age weights, the Toumba weights are made of haematite, a black, iron-bearing stone of exceptional hardness. The shapes of most of the Toumba weights repeat popular Bronze Age shapes. And the mass or weight standards to which they are adjusted are, in all measurable cases, weight standards that were commonly employed in the Levant and Cyprus during the second millennium.

In recent decades, understanding of the typology and metrology of LBA balance weights has been greatly advanced by the publication of several major lots: the 566 LBA weights excavated at Ras Shamra/Ugarit on the Syrian coast (Courtois 1990); 156 LBA weights from the excavations at Enkomi on Cyprus (Courtois 1984); some smaller assemblages from other Cypriot sites and cemeteries (cf. Petruso 1984; Lassen 2000); and, especially important, the well-studied material from the two LBA shipwrecks excavated off the coast of South-West

¹ For a parallel characterization of many early Greek (and, in the Odyssey, Phoenician) seafarers as 'pirates/merchants engaged in the piratical, opportunistic model of trade', see Figueira 1981, 204, with full Homeric references.

TABLE 1
The Tomb 79 balance weights

Nos. ¹	Condition	Mass ²	Denomination and shekel standard
<i>SPHENDONOID SHAPE</i>			
1. (A)	fractured but complete	4.1 g	$\frac{1}{2}$ (c.8.4 g) shekel (= c.4.2 g)
2. (B)	small chip missing	5.9 g [6.0]	$\frac{3}{4}$ (c.8.4 g) shekel (= c.6.3 g) or $\frac{2}{3}$ (c.9.4 g) shekel (= c.6.26 g)
3. (C)	fractured but complete	8.3 g	1 (c.8.4 g) shekel
4. (–)	middle fragment of small sphendonoid, like 1–3		
5. (F)	fractured but complete ³	25.0 g	3 (c.8.4 g) shekels (= c.25.2 g)
6. (I)	heavily fractured, chip missing	44.9 g [46.0]	5 (c.9.4 g) shekels (= c.47.0 g)
7. (H)	heavily fractured, several crumbs and a chip missing ⁴	38.8 g [40.7]	5 (c.8.4 g) shekels (= c.42.0 g) <i>or</i> , allowing for the additional mass of the missing lead plug, 5 (c.9.4 g) shekels (= c.47.0 g)
8. (–)	end fragment of sphendonoid larger than 6 and 7 but smaller than 9		Probably from a 10-shekel weight of either the c.8.4 g or c.9.4 g shekel standard
9. (M)	fractured, four chips missing ⁵	159.7 g [167.2]	20 (c.8.4 g) shekels (= c.168.0 g)
<i>ROUNDED-END SPHENDONOID</i>			
10. (K)	fractured but complete	89.9 g	10 (c.9.4 g) shekels (= c.94.0 g)
11. (L)	heavily fractured, many pieces missing; identical in size to 10	75.0 g [90.0]	10 (c.9.4 g) shekels (= c.94.0 g)
12. (–)	end fragment of a similarly shaped weight, originally about the size of 10 and 11		Probably from another 10-shekel weight on the c.9.4 g standard
<i>LOAF SHAPE</i>			
13. (E)	chips missing	21.9 g [23.0]	3 (c.7.4–7.8 g) shekels (= c.22.2–23.4 g) <i>or</i> a double (c.11.5 g) shekel (= c.23.0 g)
<i>DOMESHAPE</i>			
14. (J)	missing many fragments, which made up more than half of the original mass	29.3 g [?60.0]	Probably a 10-shekel weight; uncertain standard
<i>BEVELLED BAR SHAPE</i>			
15. (D)	complete	10.5 g	1 (c.10.5 g) shekel
16. (G)	crumb missing	30.1 g	3 (c.10.5 g) shekels (= c.31.5 g)

¹ Including the letters (A through M) assigned to the weights in *Lefkandi III*, pl. 149.² As recorded in *Lefkandi III*, p. 204, including [in brackets] M. Popham's estimates of the original mass of those specimens with missing pieces.³ Drilled suspension hole near one end.⁴ A large, 9–10 mm diam. hole drilled in the bottom to receive a lead plug; cf. similar plug holes in three of the Uluburun weights (Pulak 2000, W 94, 101 and 104), all 10-shekel weights on the c.9.4 g standard.⁵ Drilled through, like 5, with a suspension hole near one end.

Turkey, the Cape Gelidonya wreck of around 1200 BC with 60 balance weights (Bass 1967), and the earlier ship that went down at Uluburun around 1400 with 149 weights, about half of them well enough preserved for careful metrological analysis (Pulak 2000).

J. and A.G. Elayi's (1997) catalogue of 472 Phoenician weights from the eighth through the third centuries BC invaluable supplements the mass of published material from the later second millennium. Their study demonstrates (1) that stone balance weights of rounded Bronze Age shapes had largely disappeared by the eighth century, having been replaced by metal weights, many of them inscribed, in rectilinear shapes, such as cubes, pyramids, truncated pyramids, and plaques, and (2) that despite this change in the material and appearance of Phoenician weights, their mass standards remained unchanged, that is to say that the main mass standards employed at Tyre and elsewhere in the Phoenician world after 1200 BC were a continuation of three common mass standards of the LBA Levant and Cyprus.

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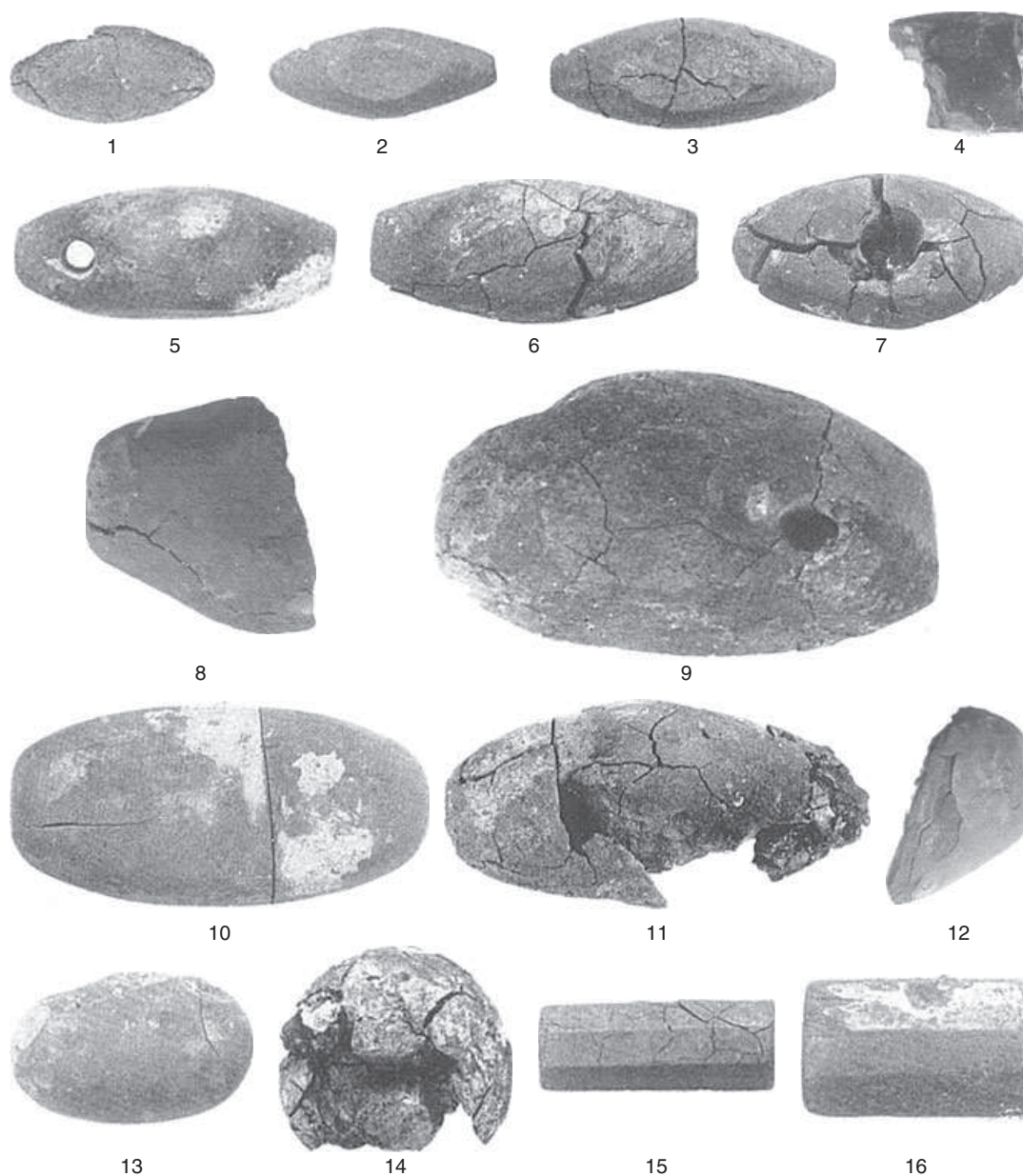


Figure 1

The Tomb 79 balance weights. Photos, except for those of the fragments nos. 4, 8, and 12, are reproduced from *Lefkandi* III, pl. 149.

Standards of mass

Strikingly, these three main Phoenician standards happen to be the same three that, with but one exception, were employed in the better preserved weights from the Toumba grave. They are:

- (a) The Mesopotamian or Babylonian standard, based on a shekel unit mass of *c.* 8.4 g, a standard that went back to Sumerian times.² To judge from the numerous weights found at Ugarit (Courtois 1990, 120–2) and Enkomi (Courtois 1984, 115, 131–2) and in the Uluburun shipwreck (Pulak 2000, 259, 265 n. 12), it was the second most common standard in use in the Levant and Cyprus during the LBA. Continued use after 1200 is documented at Tyre in the eighth and fourth centuries BC (Elayi and Elayi 1997, 319–21). It is represented in four to six of the measurable Toumba weights (see **1–3, 5, 7, and 9**), all sphendonoid in shape.
- (b) The Syrian or Egypto-Syrian standard, based on a shekel unit mass of *c.* 9.4 g, originally the Egyptian *qedet*. It is referred to in some Near Eastern texts as the shekel ‘of Ugarit’ (Alberti and Parise 2005, 381, pl. lxxxiii a). By a large margin it is the most frequently represented standard among the abundant LBA weights from Ugarit (Courtois 1990, 120–2), Cyprus (Courtois 1984, 116, 132–3; Petruso 1984) and the Uluburun and Gelidonya ships (Pulak 2000, 259, 265 n. 11; Bass 1967, 139, 142).³ Although the later Phoenician weights on this standard collected by Elayi and Elayi (1997, 320) are Hellenistic in date, recent excavations at the predominately Phoenician emporium of Huelva/Tartessos on the southern coast of Spain have brought to light four lead weights on this standard belonging to the early phase of the emporium in the ninth and early eighth centuries BC (González de Canales *et al.* 2006, 23, fig. 36).⁴ At Lefkandi the standard is represented in three to five of the measurable Toumba weights (see **2, 6, 7, 10, and 11**), all sphendonoid or quasi-sphendonoid in shape.
- (c) The Palestinian or Syrian *neseḫ* standard, based on a shekel unit mass of *c.* 10.5 g (Alberti and Parise 2005, 384–5). Missing from the harvest of weights from Ugarit and the Uluburun shipwreck, the standard is nevertheless attested in a modest number of LBA weights on Cyprus (Courtois 1984, 116, 133) and the Gelidonya ship (Bass 1967, 139), and in weights from Tyre of the eighth and fourth centuries (Elayi and Elayi 1997, 319–20). The standard is represented in the two bevelled-bar Toumba weights **15 and 16**.

The exceptional Toumba weight (**10**) is unique not only in belonging to a different shekel system but also in its pillow-like loaf shape. Its mass is derived either from a *c.* 7.4–7.8 g shekel – the shekel ‘of Karkemish’ (Alberti and Parise 2005, 381, n. 1, pl. lxxxiii), called in the older metrological literature the Palestine *peyem* shekel (cf. Pulak 2000, 259, 261, 265 n. 13) – or from the *c.* 11.5 g ‘Hittite’ shekel (Alberti and Parise 2005, 381, n. 1, pl. lxxxiii; cf. Courtois 1984, 117, 133). Apart from attestations of both shekel systems in LBA Levant and Cyprus, a

2 For the 8.4 g value, I follow Alberti and Parise 2005, 381, n. 1, pl. lxxxiii b. Powell (1990, 509–11) gives as a ‘conventional’ average 8.333 g for the shekel, while noting that in the Achaemenid period, the shekel falls in the range of 8.3–8.4 g. For a convenient synopsis of much of the evidence from inscribed Mesopotamian balance weights, see Skinner 1967, 14–16, 23, 37, 50, 52.

3 On the probable use of this standard in balance weights excavated from the LBA Kadmeion at Thebes, Petruso 2003, 288–90.

4 Euboean pottery at the site (González de Canales *et al.* 2006, 19–21, figs. 21–4) suggests that Euboean ships were welcome at this emporium already in this early phase.

Phoenician inscription on a 11.7 g bronze weight of eighth-century date reveals that the heavier shekel came to be known also as a 'Sidonian shekel' (Elayi and Elayi 1997, 47 no. 3, 296, 319, 321).

Here it should be noted that while the shekel was the basic weight unit of the Semitic Levant and Mesopotamia, Greek speakers would almost certainly have referred to the unit in translation as a *stater*. In their respective languages, shekel and stater both have the identical root meaning, namely 'weight'; and the relative mass sizes of the several Eastern shekels, which range from about 7.5 g to 11.5 g, are essentially the same as that of early Greek staters. These, as known from coins, weigh from 7.5 g to c. 14 g, and demonstrate, as do the names or values of other Greek weight units, the mina (*mna*) and talent, that the weight systems of the Greeks were greatly indebted to the older metrological systems of the East. Despite the Euboean context of the Toumba weights, in the present analysis I have chosen to use the primary shekel nomenclature in order to underscore the origin of the standards and their principal area of use.

Shapes

All but one of the shapes of the Toumba weights are familiar from LBA weight assemblages.⁵ The most typical is the 'sphendonoid' shape of over half of the weights (**1–9**), so named because of the similarity of the shape to that of lead sling bullets (*sphendonai*). Such weights have a flattened surface on their undersides to keep them from rolling on the pan of a scale; and although their ends come nearly to a point, the tips are normally cut off or flattened. Employed especially for weight denominations at the lower end of the mass spectrum, sphendonoids are the most numerous of all weight types at the LBA sites of Ugarit and Enkomi and in the Uluburun and Gelidonya shipwrecks. Apart from Lefkandi sphendonoids, however, the only haematite weights of this shape recorded from a context later than 1200 are two from Early Cypriot Geometric tombs at Palaeopaphos-Skales, Cyprus, with one tomb dating no later than the middle of the tenth century and the other before the end of that century, or possibly very early ninth.⁶ The burial of the nine Toumba sphendonoids is later by a generation or two. Yet they are not quite the latest known weights of this type. That distinction belongs to an inscribed quarter-shekel sphendonoid from Samaria now in the Ashmolean Museum whose inscription is palaeographically dated to the eighth century BC (Elayi and Elayi 1997, 150–1, 281, 315, no. 452).

The quasi-sphendonoids with rounded ends (**11–13**) are a variant type, occasional specimens of which show up in the larger LBA weight assemblages, but which on the whole seems to have been a secondary shape, as was the loaf shape of the compact, cushion-like **10**, which stands apart also, as noted above, because of the c. 7.4–7.8 g or c. 11.5 g shekel standard of its mass.

In contrast, the dome or spherical shape of **14** was a popular LBA shape, second in frequency only to sphendonoids. For this reason, its minimal representation in the Toumba assemblage is notable. The fragmentary condition of the piece precludes identification of its denomination and standard.

⁵ Pulak (2000, table 17.1 with fig. 17.2) gives a useful, well-illustrated conspectus of these LBA weight shapes.

⁶ Karageorghis 1983, 315, no. 28 (45.6 g = apparently 5 [c. 9.4 g] shekels), from Tomb 89; and 165, no. 113 (102.9 g = 10 [c. 10.5 g] shekels), from Tomb 67; cf. Courtois 1983. I am grateful to Maria Iacovou for providing in correspondence the dating here given for these tombs.

Lastly, the two very well preserved weights in the form of bevelled bars, **15** and **16**, are apparently unique within the huge corpus of extant stone weights from the eastern Mediterranean. I have found no comparanda for their shape, which is that of a rectangular bar with three facets on its upper surface. Having no LBA antecedents, the shape therefore is likely an Iron Age creation. On the other hand, as mentioned above, there was nothing new about the two bars' c.10.5 g shekel standard with its Bronze Age ancestry and continued use in the Phoenician world long after 1200.

DEDUCTIONS

Working set(s) or funerary miscellany?

Balance weights were, and are, made and employed in sets. Because of the several mass standards in use, merchants in the ancient Mediterranean were obliged to travel with multiple sets. The 149 balance weights recovered from the sunken ship off Uluburun included nine or ten complete and partial sets: one set of sphendonoids on the c.7.4–7.8 g shekel standard, one or two sets of sphendonoids on the c.8.4 g standard, and seven sets (four of sphendonoids, three of heavier, domed weights) on the c.9.4 g standard (Pulak 2000, 261, 263, noting that the four c.9.4 g sphendonoid sets may indicate the presence of four merchants on the ship).

The fractional and multiple denominations represented in the c.8.4 g Uluburun set or sets ($\frac{1}{2}$, $\frac{2}{3}$, *perhaps* $\frac{3}{4}$, 1, 3, 5, and 10) and the c.9.4 g Uluburun sphendonoid sets ($\frac{1}{2}$, $\frac{2}{3}$, 1, 2, 3, 5, and 10) are, on the whole, similar, and happen to be similar also to the denominations of the largest group of our Toumba weights, sphendonoids on the c.8.4 g standard. Including shekel units of $\frac{1}{2}$, 1, 3, and 20 (**1**, **3**, **5**, and **9**), and, *possibly*, $\frac{3}{4}$, 5, 10, and another small fraction (**2**, **7**, **8**, and **4**), these Toumba sphendonoids *could* constitute a functional set. It would hardly have been a homogeneous set, however, as both the 3-unit and the 20-unit pieces (**5** and **9**) had been drilled through with holes for carrying on a string and are presumably remnants of an earlier, original set of identically drilled weights. Moreover, the 5-unit piece (**7**), which was partially drilled with a wider hole to receive a lead plug, could have been used in a c.8.4 g set paradoxically only if the lead plug had been removed. Whether then we have in the c.8.4 g Toumba sphendonoids a single, graduated set, or random, left-over parts of several sets is open to question. But there can be no doubt about the other weights in the assemblage: even allowing for the loss of a few weights from fragmentation on the funerary pyre and during transfer from pyre to the tomb, they are too few and too varied in shape and standard to make up one or more series. Rather, they appear to be miscellaneous weights that were brought together specifically for funerary use, odds and ends from several old, broken sets that were contributed to the funeral pyre and burial as *symbolic* possessions or tokens of the deceased's way of life. It is probable therefore that the more numerous c.8.4 g sphendonoids should be understood similarly.

Were these weights collected for burial because they were thought to be no longer useful, even obsolete, allowing the deceased's precious working sets to be passed onto an heir? Could some of the weights have been funerary gifts from a number of individuals, which would explain the miscellaneous character of the full assemblage? Or should we assume that all the weights had been the personal property of the deceased, perhaps the contents of a box of mixed,

spare weights? One can only guess at the answers to such questions. What is certain is that whatever their funerary significance – memorial symbols or as implements intended for use in an imagined afterlife, or both – as a whole, the balance weights of Tomb 79 do not remotely comprise a kit of weight sets sufficient for practical use.

Eastern origin and use

Levantine/Cypriot in character, the Toumba weights were most likely Levantine or Cypriot in manufacture as well. There is no reason to suspect that they were made anywhere but on Cyprus or the Syro-Palestinian coast. The possibility cannot be ruled out that some of these weights may have been manufactured in the LBA and remained in use for centuries before being retired and placed on the funeral pyre in Euboea. Haematite weights were made to last, and must have been valuable enough to those who used them to have been passed down for generations. On the other hand, it seems implausible that the industry that specialized in the production of haematite balance weights before 1200 would have ceased to exist after that date. Since early Iron Age trade in the Cypro-Levantine world continued to be carried on with the traditional LBA mass standards of the region, demand for the manufacture of new weights ought to have continued as well. And, as mentioned above, the two bevelled bar Toumba weights, **15** and **16**, which lack LBA parallels are arguably products of the Iron Age, allowing that some, perhaps all, of the more traditionally shaped weights from the Toumba assemblage could also be post-1200.

Whatever the age of the Lefkandi weights at the time of interment, it should be emphasized that their place of origin and use has no bearing on the ethnicity of the well-armed trader with whom they were buried. Any outsider who traded in the easternmost Mediterranean would have needed balance weights appropriate for the area and would naturally acquire them within this trading sphere or elsewhere from others with established commercial experience there. The Toumba weights reveal that in the first half of the ninth century BC, merchants trading in the ports of Cyprus and the Levant were transacting business with the same kinds of weights as were used by eastern Mediterranean merchants four centuries earlier: that in this maritime commerce long-term continuity, not disruption, was the rule. More importantly, they reinforce, about as concretely as any kind of artefactual material can, awareness of how profoundly Euboeans were engaged in this eastward trade. Unlike the indirect, albeit abundant, evidence of ceramics and other transported goods, the Tomb 79 weights – the very instruments of commodity exchange – provide relatively direct, arguably even personalized evidence for active Euboean involvement in the Cypro-Levantine world.

Relevance for the Euboeic mass standard

Besides documenting the metrological systems employed by Euboean seafarers in the first half of the ninth century, the Toumba weights provide helpful background data for reconstructing the origin of the most influential weight standard of Archaic and later Greece, the standard known as ‘Euboeic’. Numismatists have long recognized that this was not only the standard of the sixth century silver coins of Euboean cities and their colonies in Sicily and the Chalkidice, but more influentially was the standard employed by Athens and Corinth for their coins, and is found also around 600 BC in the early electrum coinage of Samos. In literary and epigraphical attestations, the standard is mentioned with reference to its larger mass units, the

Euboeic mina (*Euboïke mna*) and talent (*Euboïkon talenton*).⁷ Both are prominent in Herodotus' account of the tribute paid to King Darius of Persia. After explaining (at 3.89) that the tribute paid in silver was measured in Babylonian talents and that tribute in gold was reckoned in lighter Euboeic talents, Herodotus notes that the Babylonian talent was equivalent to 70 Euboeic minas and goes on to give the final total of the tribute in Euboeic talents (3.95). As recorded by Polybius and later by Livy and Appian (see notes 7 and 8), the Romans in the third and second centuries BC routinely assessed indemnities from Carthage and their defeated Greek opponents in Euboeic talents of silver.

The mass of this Euboeic/Attic talent was 25.920 kg.⁸ Since, like all Near Eastern and Greek talents, it was made up of 60 minas, the resulting Euboeic/Attic mina was a 432 g unit. This mina in turn was divided into 50 8.64 g staters.⁹

The retention of the label 'Euboeic' for the standard's talent and mina long after Euboean commerce had been eclipsed by other Greek economic powers implies that the standard originated, or had come to be identified, with Euboeans during their era of maritime trading and colonizing pre-eminence, which ended around 700, presumably because of exhaustion from the Lelantine War. David Ridgway (1992, 34, 95, 139) and Giorgio Buchner (1995, 127, fig. 155) are probably right in regarding a disk-shaped balance weight of 8.79 g that was excavated from an early seventh-century workshop context at Pithekoussai as evidence that by this time the standard was being employed in this Euboean or Euboean-Semitic commercial settlement in the western Mediterranean. Since the weight is made of lead set in a bronze ring and since lead over time tends to take on weight through oxidation (Petruso 1992, 2), there is nothing problematic about the slight discrepancy between the disk's mass and the norm of the 8.64 g Euboeic/Attic stater. However, the difference between the disk's mass and that of the Eastern c.8.4 g shekel norm, now documented in weights 1, 3 and 5 from ninth-century Lefkandi, is only a quarter of a gram greater; and since the present mass of the lead disk may be only an approximation of its original weight, can we really be sure which of the two nearly identical mass norms the disk represents? Or, are these two similar masses actually representative of a single norm?

7 Full references in Meville-Jones 1993, 404–9.

8 Calculations from three different sources give the same result.

1) Inasmuch as the Euboeic and the Attic mass units are the same, one can begin with the Attic (didrachm) stater of 8.64 g, a norm which is reliably documented by the precisely adjusted Attic-weight gold staters of Philip II and Alexander III of Macedon (Mørkholm 1991, 8). Fifty of these staters give an Euboeic/Attic mina of 432 g, of which 60 give the Euboeic/Attic talent of 25.920 kg.

2) In the terms imposed by the Romans on Antiochus III in 189 and 188 (Plb. 21.18.19, Livy 37.45.14–15, and 38.38.13–14; cf. Le Rider 1992), the Euboeic/Attic talent is equated with 80 Roman pounds. The mass of the Roman pound being ± 324 g (Crawford 1974, 590–2, 753), the Roman equivalence (80×324 g) again gives a 25.920 kg talent.

3) At the time of the Achaemenid empire, the Babylonian weight system was based on a shekel of 8.4 g, the mass of a Persian gold Daric (Powell 1990, 511; Le Rider 2001, 152–4; for the Daric norm, Regling 1915, 94–8). As there were 60 shekels in a Babylonian mina, and 60 of these minas to the talent, the resulting talent ($8.4 \text{ g} \times 60 \times 60$) had a mass of 30.240 kg. Herodotus' equation of this Babylonian talent with 70 Euboeic minas gives a Euboeic mina ($30.240 \text{ kg} \div 70$) of 432 g, hence a 60-mina Euboeic talent of 25.920 kg.

9 This is the norm of the stater coins of Athens and Corinth. The 17.28 g stater unit of archaic coins of Euboean cities and colonies (Psoma 2006, 88–9) is effectively (i.e. in terms of an original shekel-stater) a double stater. Cf. Kroll 2001, 80, table 5.1 (which gives throughout slightly heavier mass values derived from an old reckoning of the Roman pound at 327.45 g. In light of the citations and arithmetical agreements presented in the preceding note, such heavier values should be corrected to the ones given here).

In fact, long before the discovery of the Pithekoussai and Toumba weights, it was recognized (e.g. by Hultsch 1882, 548; cf. Kroll 2001, 82, 88) that the Euboeic/Attic stater was probably a Euboean borrowing, through Phoenician intermediaries, of the Mesopotamian *c.* 8.4 g shekel. The Phoenician connection in this regard is most clearly implied by the circumstance that the mina in the Levantine and the Euboeic/Attic metrological systems was composed of 50 shekels/staters, whereas the traditional Babylonian mina of Mesopotamia remained a 60-shekel mina.¹⁰

It goes without saying that the discovery of the Toumba weights has greatly strengthened this line of deduction by confirming that early Euboean traders had indeed been using Levantine/Cypriot weights, including the Mesopotamian *c.* 8.4 g shekel. At the same time, however, the well-preserved and carefully-adjusted Toumba weights **1**, **3**, and **5** on this standard introduce a complication by underscoring the exactitude with which the *c.* 8.4 g shekel was maintained, and forcing us to recognize that the difference, however slight, between the *c.* 8.4 g shekel and the 8.64 g stater was nevertheless real and cannot be dismissed as the putative result of ancient imprecision in weighing or ignorance of the exact Mesopotamian norm. In later times, as known from coinage and inscriptions, weight standards were sometimes modified for reasons of transactional convenience or compatibility. Since the exact equivalence attested by Herodotus between 70 Euboeic minas and the Babylonian talent (of 60 Babylonian minas) was made possible by the difference between the Euboeic 8.64 g stater and the Mesopotamian/Babylonian 8.4 g shekel (see n. 8), it would seem that the Euboeans slightly raised the mass of the latter for their stater specifically to achieve a simple 6:7 convertibility ratio between the minas of the two systems.

When considered against the background of the Toumba material, the later weight values known as Euboeic raise another question. We now know that in the ninth century Euboean seafarers traded in the traditional Levantine manner using multiple weight standards. It is understandable that they would privilege one particular standard for a commodity or commodities in which they specialized and that in time this standard would come to be identified with them throughout the network of emporia where their ships regularly sailed. But one would like to know why they happened to choose the standard involving the *c.* 8.4/8.64 g shekel/stater over other mass standards. Could it have been the standard that was most closely associated with the weighing and exchange of precious metals?

Amid such uncertainties, two things remain undeniable: the propinquity of the *c.* 8.4 g shekel and 8.64 g stater, and the association of both, though at different times, with Euboean maritime trading. Documented at Lefkandi in the first half of the ninth century, the Mesopotamian shekel and the other shekels used with it belonged to the world of Levantine commerce in which Euboeans actively participated. Within the next century and a half, the Euboeans propagated the norm, adjusted upwards to 8.64 g, and its multiples in their ever-widening maritime ventures, prompting their trading partners to identify this weight system as Euboeic. Now independent of Eastern commercial domination and effectively Hellenized, the standard gained recognition in the Greek world to the extent that it was employed for the weighing of precious metals at Samos, Corinth, and Athens, probably well before these cities began to mint coins in the sixth century (Kroll 2001; 2008). The royal Persian use of the Euboeic talent and mina, as reported by Herodotus, is an indication of the values' continual spread, which

10 See Stern 1972, 382–3, referring to the 50-shekel mina as the 'Canaanite' mina.

was driven in the fifth and fourth centuries by the great demand for Athenian silver tetradrachms in Egypt and the East and augmented by Alexander the Great and most of his successors, who adopted the Euboeic/Attic standard for the minting of their massive gold and silver coinages. The result – a legacy of pioneering Euboean maritime enterprise – was the unparalleled international recognition of the standard throughout most of the ancient world.

Wolfson College
Oxford OX2 6UD

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EARLY IRON AGE BALANCE WEIGHTS AT LEFKANDI, EUBOEIA

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