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RESEARCH CENTRE FOR GREEK AND ROMAN ANTIQUITY  
NATIONAL HELLENIC RESEARCH FOUNDATION

ΜΕΛΕΤΗΜΑΤΑ

42



**WEIGHT AND VALUE  
IN PRE-COINAGE SOCIETIES**

**AN INTRODUCTION**

**Anna Michailidou**

ATHENS 2005

DIFFUSION DE BOCARD - 11, RUE DE MEDICIS, 75006 PARIS



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ΚΕΝΤΡΟΝ ΕΛΛΗΝΙΚΗΣ ΚΑΙ ΡΩΜΑΪΚΗΣ ΑΡΧΑΙΟΤΗΤΟΣ  
ΕΘΝΙΚΟΝ ΙΔΡΥΜΑ ΕΡΕΥΝΩΝ

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photo by P. Atzaka

*To the people of Egypt*

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## PROLOGUE

The project on *Weight and Value* deals mainly with metrology and trade in the Bronze Age in relation to societies in the Eastern Mediterranean and the Near East whose economies were at that time in a pre-coinage stage. Although the main thrust of the project was and is the metrology and economy in the Aegean era, it employs documentation from Egypt and the Near East, necessary to the understanding of the main theme.

The project started some years ago, while I was studying in the rich library of the Griffith Institute of Oxford, and continues today in the libraries of the Deutsches Archäologisches Institut in Rome and Berlin, the university libraries of Heidelberg and last but not least the university library of Crete in Rethymnon. It has been partially but repeatedly supported by the Institute for Aegean Prehistory in Philadelphia and owes a lot to the hospitality provided by these institutions; it will soon result to a volume that greatly relies on material and textual evidence from the Orient.

This introductory volume was prepared under the aegis of the programme *Aristeia* assigned to the Centre for Greek and Roman Antiquity by the Greek Ministry of Development. The aim of the book is to provide a first approach to the subject, by presenting three aspects of the field and offering the tools to be used; it is addressed to scholars specializing in the Archaeology of the Aegean with a particular interest in Bronze Age economics and metrology.

With regard to the state of studies in Near Eastern metrology, first, the on-going work by Italian scholars such as Nicola Parise, Carlo Zaccagnini, Mario Liverani, Alfonso Archi, and their followers should be mentioned. As for studies on the ancient economy in general, one may point, for example, to the immense work by Oppenheim, Leemans, Powell, Waetzoldt, Moorey, Postgate, Janssen, Veenhof, Renger, Diakonoff, Vargyas, Joannès, Michel, Limet, Muhly, van de Mierroop and Silver Morris. This list, of course, does not include many other important names, which, however, will generally be found in the bibliography of this volume. I will only add here the name of Don Evely, the Aegean archaeologist whose book on Minoan crafts and techniques gave me my own starting point.

In fact, the present work maybe regarded as an attempt to respond to the plea as addressed – and documented – by Cynthia Shelmerdine in one of the Conferences on Aegean Archaeology. She said: “I simply close with a plea to colleagues who work in all these areas to be as aware of each other as were the people they study. Further advances in knowledge are sure to result if we continue to study trade from both ends, and if we broaden our view of these various ancient cultures to include the larger world in which they surely lived”. Of course, moving east to understand the other end of trade networks, certainly involves risks for the Aegean archaeologist, inexperienced as he or she is in such matters; but if occasional misinterpretations are unavoidable, the voyage is certainly worth the effort.

The book starts with three chapters that give three aspects of the research project.

First, the overall picture of the subject is presented. The introductory chapter takes the reader from the point of departure, the study of the simple stone and metal balance weights, to the ultimate destination, that is a system of exchange involving metals that, in the words of Pare 2000, “make the world go round”.

Second comes the line of enquiry that we will follow. We select three commodities whose modes of exchange present particular interest: a pair of shoes, a craft item in demand, cloth, a trade good par excellence, and the cleaning of garments, a humble everyday requirement.

In the third chapter, we offer a case study designed to illustrate the difficulties that arise when more complex levels of production and exchange are involved. The case study consists of people possibly working as servants or slaves, in the Aegean, Egypt and the Near East. After dealing with the problems of terminology and of status definition, we present a selection of evidence on the exchange value of humans and address some questions regarding the Mycenaean evidence on ‘slave contracts’.

The second part of the book, with the data bank of selected bibliography, consists of:

- a) The Alphabetical Catalogue by author and with an ID number for every entry. The bibliography represents the actual selection made during the progress of my work in the libraries mentioned. It is constantly being updated, and only those articles or books that I have personally consulted are included.
- b) The Thematic Catalogue rests on the Greek key-words of the data base inserted in two fields (one field for the title, in whatever language, and one for the content of the article or book, if it has been thoroughly studied). Under each word, the relevant bibliographical titles are represented by their ID numbers. The Greek key-words were specifically chosen to correspond in meaning to a variety of foreign words, attested in the titles of whatever language. Each key-word is linked to other key-words closely or more distantly related, thereby creating a functional rather than theoretical network; thus the reader may go from one theme to the next and so on, and even in cases where titles have not yet been inserted, the range of topics of interest is obvious (e.g. in the network around the word for grain). For this reason words with no titles under them will be found as part of the network; such words await the insertion of titles from material not yet consulted.
- c) The Guide to the Bibliography gathers the existing titles (by ID numbers) under key-words in English; each word represents a choice drawn from the existing bibliographical titles, which we consider to be the word most appropriate and functional. Next to it the corresponding Greek key-word is written in italics.

The second part of the book is offered here as a tool to aid for further reading; one may start from the key-words of one’s interest, or learn about an author who deals with certain topics, and then continue by searching in other resources for the rest of the author’s work.

The contributors to this book are mentioned in the appropriate place, but I must thank them here warmly for their speed and efficiency. I am also indebted to Aris Gerontas for following me with his camera inside the Tomb of the Two Brothers in Saqqara and to the

Deir el-Medina village on the West Bank of Thebes. This volume is dedicated to the people of Egypt for their hospitality and friendship. The picture depicts our first visit to Saqqara, with an Egyptian guide, who is proudly narrating the content of the wall decorations. I remember another guide who carefully accompanied me down to the catacomb at Alexandria, telling me all the time “Watch your step, madam” and was so delighted when I told him that, in my view, the Egyptian element in the tomb reliefs was dominant over any Greek or Roman trends. And from among my memories, I should also include a little boy with clever black eyes in the valley of the Kings; he sold me the card with the sites of the tombs, which we publish here, together with others: “Five Egyptian pounds, madam” he asked for them and he accepted no less for his merchandise.

ANNA MICHAILIDOU  
February 2005

## MATERIAL EVIDENCE AND THE RELATION BETWEEN WEIGHT AND VALUE

The project on Weight and Value is a study of the relationship between two concepts pertaining to pre-coinage societies of the Bronze Age in the Eastern Mediterranean and the Near East: *weight*, which can determine the degree of standardization for the quantity of a circulating commodity, and *value*, which represents the degree of the commodity's importance in the exchange network.

The great Greek archaeologist Christos Tsountas was the first to comprehend the special significance of weights and scales.<sup>1</sup> He expressed the view, reiterated very much later,<sup>2</sup> that weights stand one step before the invention of coinage. In fact, their production involves making objects of a desired, predetermined and codified weight. Arthur Evans contributed to this trend with his study entitled "Minoan weights and mediums of currency"<sup>3</sup> while Stylianos Alexiou,<sup>4</sup> Günter Kopcke<sup>5</sup>, Peter Warren<sup>6</sup> and Malkolm Wiener<sup>7</sup> are among those who have raised the crucial subject of mechanisms of trade in pre-coinage Minoan society. Colin Renfrew has defined the study of weight-metrology as one of the tasks of the so-named 'Archaeology of the Mind'.<sup>8</sup>

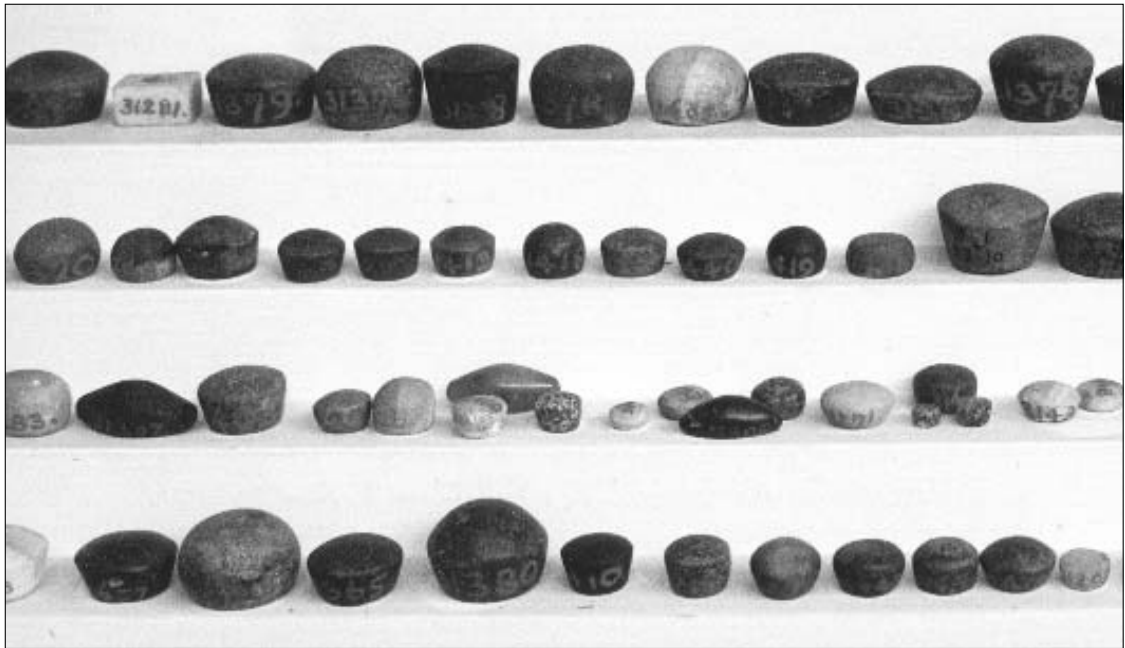
Weights are a far more common archaeological find than the scales with which they were used. Stone and lead discoid weights from several sites in Crete (Fig. 1) belonging to the so-called 'Minoan'<sup>9</sup> or 'Aegean'<sup>10</sup> metric system (based on a unit of 61 to 65.5 grams), Egyptian



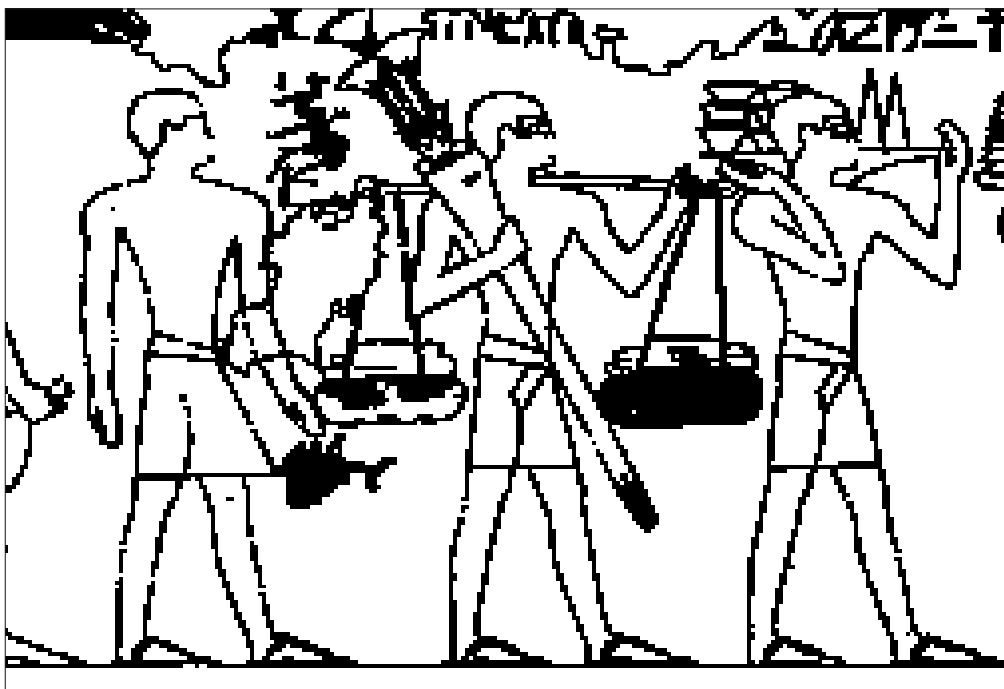
*Fig. 1. Stone discoid shaped balance weights from Knossos (Crete) (Courtesy of the Heracleion Museum)*

1. ΤΣΟΥΝΤΑΣ 1893, 121.
2. PETRUSO 1979, 139; KOPCKE 1987, 257; KEMP 1989, 248.
3. EVANS 1906; cf. MICHAILIDOU 2004.
4. ΑΛΕΞΙΟΥ 1953-54; ALEXIOU 1987.
5. KOPCKE 1987; 1990.
6. WARREN 1991.
7. WIENER 1987; 1991.
8. RENFREW 1983; see also RENFREW & ZUBROW 1994.
9. As PETRUSO 1992, 64, 67.
10. As PARISE 1986, 303.





*Fig. 2. Display of Egyptian stone balance weights of various dates and shapes in the Cairo Museum (photograph by Aris Gerontas)*



*Fig. 3. The practice of carrying objects suspended from the ends of a long pole resting on the shoulders of the bearer is often depicted in Egyptian wall paintings.*

weights,<sup>11</sup> mostly of stone and of various shapes (Fig. 2) and based on the early gold unit of 13 grams or the later – New Kingdom – unit of 9,1 grams, Mesopotamian,<sup>12</sup> Hittite and Syro-Palestinian weights<sup>13</sup> based on a Mina of 500 to 470 grams are some of the many examples found.

The balance very probably predates the invention of weights;<sup>14</sup> it was originally devised to counterpoise products while carrying them: the incline towards the heavier object would have been evident from bearing a wooden pole with a basket hanging from either end on the shoulders. (Fig. 3)<sup>15</sup> So, initially, comparison of mass by means of a balance must have aimed at achieving *equality*. Even in later representations (e.g. on black-figure vases) we still see this method of estimating mass by placing packages of the same product in the two scale-pans of a normal balance.<sup>16</sup> Balance weights were invented to measure mass absolutely, rather than simply to compare weights, and the current view is that they were first linked with the weighing of gold<sup>17</sup> (see for example Fig. 4). A stone was first used as a counterweight in weighing and so stones served as a codified balance weight, after they had been chosen and worked. This is evident both from the great number and antiquity of stone examples and from the corresponding names for the balance weight: *abnu* (= stone) in Akkadian and *f', n inr* (= weight of stone) or just *inr* (= stone) in Egyptian.<sup>18</sup>

Information on weighing rests on archaeological finds from all over the Eastern Mediterranean and the Near East, on iconography, mainly from Egyptian tomb-paintings, and on texts, of Aegean, Egyptian and Near Eastern provenance. The type of balance used was always the same: it consists of a beam, usually made of wood and for this reason normally absent from the archaeological record. From the ends of the beam hang scale-pans of sheet bronze (Fig. 5). The balances shown in the wall-paintings in New Kingdom tombs are large and will have permitted the use of heavy weights. The smaller, hand-held balance is more rarely depicted, perhaps because the context in which it was used is not normally a subject for monumental representation. In Egypt, small balances have been found, sometimes together with the wooden case in which they were kept.<sup>19</sup> There are even descriptions of constructional



Fig. 4. A stone balance weight of the Middle Kingdom date, with the hieroglyphic sign for gold and five strokes, denoting five Egyptian units of gold (total weight: 5 x 12.20 grams = 61 grams, equivalent to one Minoan unit)

11. PETRIE 1926, COUR-MARTY 1985.

12. POWELL 1971; 1979.

13. E.g. PARISE 1970-71; COURTOIS 1990; OTTEN 1954-56; ARNAUD 1967; ARCHI 1987a; ZACCAGNINI 1999-2001; ASCALONE & PEURONEL 2000; PETRUSO 1984 (for Cyprus) etc.

14. KISH 1965, 26; ΜΙΧΑΗΛΙΔΟΥ 2000; ΜΙΧΑΗΛΙΔΟΥ 2001c.

15. KISCH 1965, 26.

16. Folded textiles, for example, cf. ΤΖΑΧΙΑΗ 1997, fig. 158.

17. PETRUSO 1981, 45; SKINNER 1954, pl. 31b; ΜΙΧΑΗΛΙΔΟΥ 2000, 131, 138, 140-141.

18. For references cf. ΜΙΧΑΗΛΙΔΟΥ 2001c, 65.

19. E.g. ΜΙΧΑΗΛΙΔΟΥ 2000, 131-132, 139-140.



*Fig. 5. The weighing of gold ring ingots against a weight in the form of a bull's head, on the wall painting of a New Kingdom Theban Tomb (Courtesy of the Institute of Egyptology, Heidelberg)*

details in Egyptian texts: the parts, consisting of horizontal beam, vertical pivot and base of a balance 2 m. high and made of different kinds of precious wood, are recorded in the Papyrus Harris I, of the Ramesside period.<sup>20</sup> Of later date, but instructive on account of its large size, is the balance in a scene of weighing the tribute to the king, depicted on a Neo-Assyrian relief (9th century B.C.), the so-called Rassam Obelisk.<sup>21</sup>

Bronze scale pans are known from various parts of the Aegean; relics of a matting were found on some of the bronze pans from the Aegean settlement at Akrotiri on Thera (Fig. 6). The three gold balances (cf. Fig. 7), found in the shaft grave III at Mycenae and now in display in the National Museum at Athens, are non-functional. The ideological context of their purpose will not be discussed here.<sup>22</sup> The existing textual evidence does not preserve details of the weighing process; however, the results of weighing are recorded in many Linear B tablets where the quantities of certain products, primary metals and wool, are recorded after special ideograms-metrograms denoting units of weight. Furthermore, the *ta-ra-si-ja* mode of production recorded in the Mycenaean palace archives was based on weighing the raw material given to artisans, and subsequently the finished products returned. The Linear B ideogram \*118, a pictogram of the balance, denotes the largest unit of weight, the so-called talent (of around 30 kilos weight), as Arthur Evans was the first to interpret.<sup>23</sup>

From the Indus Valley to the Persian Gulf, Mesopotamia, Syro-Palestine, Cyprus, Egypt and the Aegean area, the balance was used to measure the material value of specific products:

20. GRANDET 1994, 139 n. 559.

21. KISH 1965, fig. 5; RENGER 1992, fig. on page 209; DERCKSEN 1999, fig. on the cover.

22. See, for example MIXAHAIΔΟΥ 2000, 141-147; cf. ALBERTI 2003.

23. EVANS 1906; cf. MICHAILIDOU 2004.



Fig. 6. One of the pairs of bronze scale pans found in the LBA settlement at Akrotiri (Thera); some traces of matting preserved on the surface of the scale pan indicate how they were stored in houses. The additional circular plate rivetted on one of the pans ensured the equilibrium among the two pans since they were made slightly different in size.



Fig. 7. A non-functional gold balance from Shaft grave III at Mycenae (courtesy of the National Archaeological Museum at Athens)

mainly metals, wool, ivory, some precious stones, certain spices, saffron etc.<sup>24</sup> Different metric systems were locally used, but certain equivalences between foreign systems facilitated merchants (who always carried their own balance weights)<sup>25</sup> in their inter-regional trade; the best example is provided by Ugarit. Parise has shown<sup>26</sup> the dependence of the Ugaritic weight system on foreign trade: in this important trading port, the same mina<sup>27</sup> – of 470 grams – was divided into 40 shekels for trade with the Hittite Empire (Hittite shekel of 11.75 grams), 50 shekels for domestic Ugaritic purposes and also for commercial relations

24. See SACCONI 1971 and MICHAILEDIOU 1999 for the Linear B references on weighed products.

25. Cf. PULAK 2000; see also S. RATNAGAR, *Theorizing Bronze-Age Intercultural Trade: The Evidence of the Weights*, *Paléorient* 29, 2003, 81.

26. PARISE 1981; 1984.

27. The mina (around 500 grams) and the shekel (8.4 grams) were the main weight units in Mesopotamia, whence they spread to various other places in the Near East, with certain variations in weight value.



with Egypt (the Ugaritic shekel of 9.4 grams being near to the Egyptian *qedet* of 9.1 grams), and into 60 shekels of 7.83 grams for relations with Karchemish. But this last value was also close to the value of 1/12 of the Egyptian *deben* (of 91 grams), and this special fraction of the *deben* was the weight (7.6 grams) of a special silver unit, called *shaty* (or *sniw*) by the Egyptians and used by them as an index of value or in some cases as a means of payment.<sup>28</sup> So in Ugarit, the mina of 470 grams, the so-called ‘Western’ or ‘Syrian mina’, as opposed to the Babylonian mina of 504 grams, represented the meeting point for four metric systems, with the differences beginning at the level of its division into shekels.<sup>29</sup>

Measuring is an economic activity related to the mode of production that also implies a degree of the product’s evaluation. All depends on the system that defines the value of commodities, since “Values determine production, and systems of production determine values”.<sup>30</sup> In pre-coinage economies, barter is considered to be the basis for the exchange of commodities and so measurement – by length, capacity or weight – was necessary at almost every step of such an economic process, the aim being to establish an equality in terms of value between the commodities exchanged. But how could equality be achieved?

Aristotle (*Politics* I. iii. 14-15) states: “...for the purpose of barter men made a mutual compact to give and accept some substance of such a sort as being itself a useful commodity, which was easy to handle, in use for general life, iron for instance, silver and other metals, *at the first stage defined merely by size and weight* (my emphasis), but finally also by impressing on it a stamp in order that this might relieve them of having to measure it; for the stamp was put on as a token of the amount.<sup>31</sup> Thus Aristotle clearly specified quantities of metal *measured by size and weight* as the acceptable medium of exchange before the invention of coins (the latter being *counted* by number of items).

In recent times, there has been lengthy discussion on the subject of the invention of coinage<sup>32</sup> and on the possible pre-existence of a monetary system in the Near East. Powell, for instance, argues that minas and shekels themselves were “monetary terms in ancient Mesopotamia, as is evidenced not only by internal Mesopotamian usage but also by the fact that they turn up as words for monetary units in other languages” and he further insists that “it is precisely the ‘monetary’ economy that we do see in the documentary record. That is the reason we have it: it concerned ‘weighty’ matters like minas and shekels”.<sup>33</sup>

To conclude with the words by Colin Renfrew: “The value of goods, and hence wealth, is indeed largely a matter of convention whereby a society covets one commodity rather than another... Wealth, the ownership of desirable transferable goods, is as much a social phe-

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28. CASTLE 1992, 263-265.

29. MICHAILIDOU 2004, 316-317, with more references to this subject; Particularly instructive on the subject of metrological interconnections is the article by ZACCAGNINI 1999-2001.

30. DURENBERGER & TANNENBAUM 1992, 86.

31. «...ὁ γὰρ χαρακτὴρ ἐτέθη τοῦ ποσοῦ σημεῖον». The translation of the whole passage is by H. Rackham (Loeb Classical Library, Harvard University Press 1972, 43).

32. E.g. PARISE 2000, LE RIDER 2001, BALMOUTH 2001.

33. POWELL 1996, 228.

nomenon as an economic one.”<sup>34</sup> The view, summarized in the following terms by Sue Sherratt, is widely accepted: “In the second millennium, precious and base metals – primarily gold, silver, copper and tin – represent what may be regarded as prime or convertible value within the exchange systems of the eastern half of the Mediterranean.”<sup>35</sup> Even in Egypt, where the barter system was one in which goods were traded against goods, ‘value’ came in time to mean ‘metal value’, which is an almost monetary concept.<sup>36</sup> Clearly indicative of this are the ‘metal debens’ mentioned in a letter of the farmer Hekanakhte (of the Eleventh Dynasty period): according to James, the letter clearly refers not to ‘24 *deben* of copper’<sup>37</sup> but ‘24 copper debens’ which ought to signify 24 pieces of copper each weighing one *deben*. Here they have been sent as the payment of the land rent, as an easily portable and convertible commodity.<sup>38</sup> This begs the question of what form they came in. There is the possibility that “what we have here may be the coincidence of original and derived meaning in the form of copper rings perhaps weighing one *deben* each”.<sup>39</sup> Of course, it is gold and silver that are usually depicted in the form of ring ingots (Fig. 5). As regards the Near East, ring ingots are textually documented there, but we should also recall that the Sumerian sign for shekel is a stylized picture of an axe and the Sumerian word *gin* means both shekel and axe.<sup>40</sup> This – plus a textual reference from Mari – have given rise to a suggestion<sup>41</sup> regarding the Minoan environment: that perhaps models of double axes, in particular when made of precious metals (Fig. 8), functioned as gifts in return for services, and therefore as means of payment, whilst axeheads cut from copper plate (like those found in Juktas: Fig. 9) might have functioned as cheaper forms of currency.



Fig. 8. One of the miniature gold double axes from Arkalochori (Crete). Heracleion Museum

34. C. RENFREW, *The Emergence of Civilisation. The Cyclades and the Aegean in the Third Millennium B.C.*, London 1972, 370.

35. SHERRATT 2000, 83.

36. JAMES 1984, 256 ff.

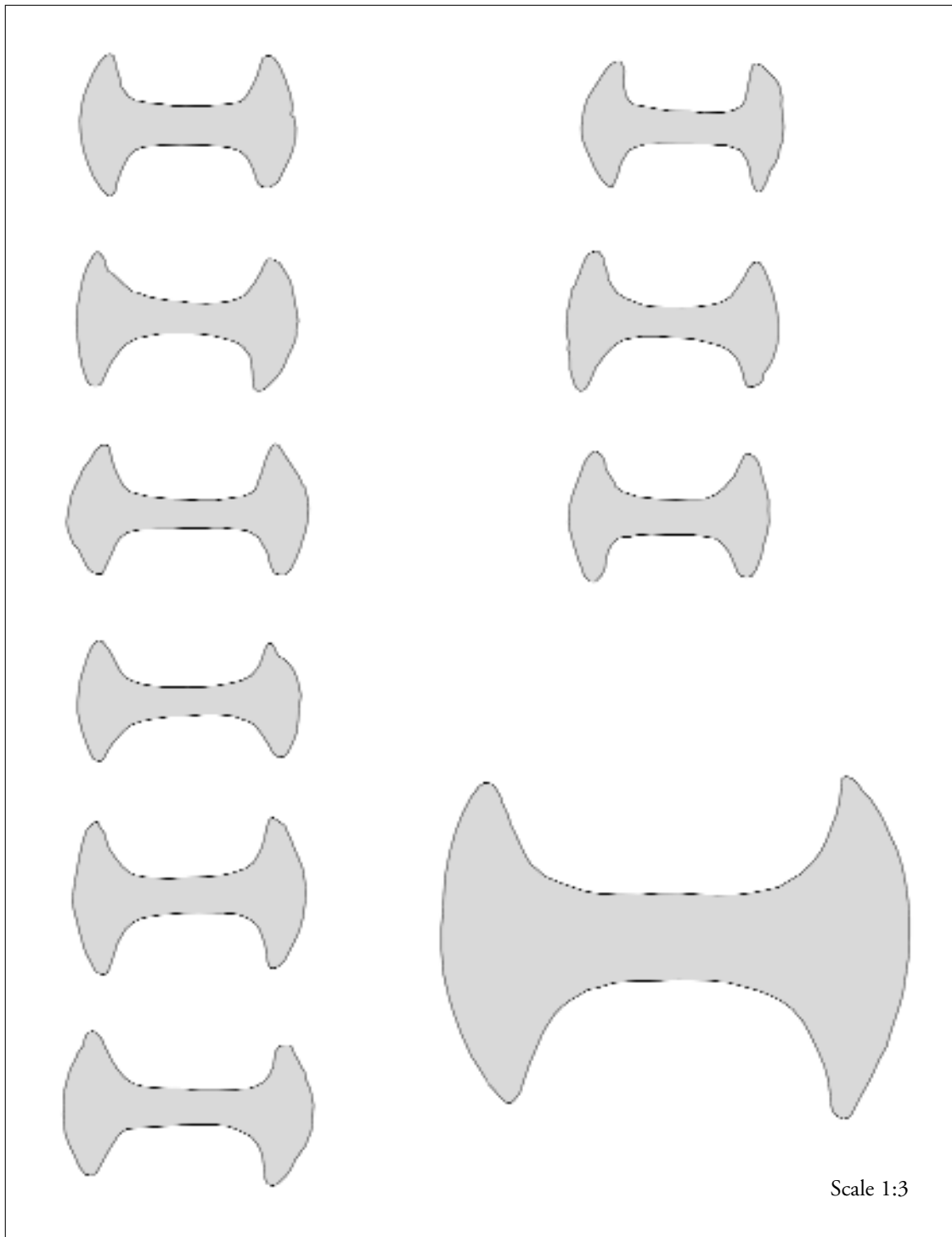
37. Which would refer to the total weight of a quantity of metal measured in the Egyptian unit *deben*.

38. JAMES 1962, 44, n. 57; 1984, 245 and 259.

39. CASTLE 1992, 264 with reference to JAMES 1962, 118.

40. POWELL 1996, 238.

41. By MICHAILIDOU 2003, with more on the subject of various forms of currency.



*Fig. 9. Nine of the small axeheads from Juktas (Crete), each manufactured from a single thin plate of copper/bronze, each weighing from 10 up to 20 grams, and one of the two larger axeheads, weighing 90 grams each, that is one and a half 'Minoan' unit or one New Kingdom Egyptian deben (Courtesy of Alexandra Karetsou)*