

About the Distribution of Metal Objects in Prepalatial Crete

Borja Legarra Herrero

Institute of Archaeology, UCL

Although metal objects have been used as evidence in different interpretations of the socio-economic changes identified in Prepalatial Crete (c.3100-1900 BC), they constitute an understudied category of material. This paper argues that metal objects on Crete were subject to complex processes regarding the creation of meaning; a more comprehensive appraisal of metal objects on the island may cast new light on these issues. Copper-based, gold, lead and silver objects are investigated from their ore extraction locations outside Crete to their final deposition, linking the different steps of the process of creating an artefact with different layers of meanings for the metal and, subsequently, for the finished objects. This study evaluates differences in the use of metals, with a particular focus on their intra-island depositional patterns. It seeks to identify differences in the roles of metals within Cretan communities as well as regional fashions in the use of metal objects. It is suggested that metals had different characters since their depositional patterns vary, and that people consciously chose certain metals to make specific objects and also used metal objects in different ways, reflecting the socio-economic context for each region.

Keywords

Crete, Early Bronze Age, metallurgy, Prepalatial, regionalism

Introduction

Studies of Bronze Age metal (copper-based, gold, lead and silver) objects in the Aegean are somewhat paradoxical. On the one hand, metalwork has played an important role in the interpretations of Bronze Age Aegean societies. It has been argued that control over the production, exchange and consumption of metal was an important source of socio-economic control for the emerging elites during this period (Branigan 1974: 135, 141-146; Gilman 1981; Renfrew 1972: 308, 483-496; Sherratt and Sherratt 1991). On the other hand, any interpretation regarding this material lacks the compensative context of monographic studies dedicated to other materials such as ceramics or seals. This paradox is particularly evident in the case of Crete. During the period stretching from Early Minoan I (EM I) to Middle Minoan IA (MM IA), also known as the Prepalatial period (see Table 1 for absolute chronology), Cretan society underwent a series of changes that were conspicuously materialised in the creation of 'palaces' in the Middle Minoan IB period (MM IB), (see Haggis 2002; Hamilakis 2002; Schoep 2004) centuries earlier than other regions of the Aegean. Different theoretical explanations for these changes have placed significance on the production, exchange and consumption of metal objects as key elements for the negotiation of social changes within Cretan communities (Branigan 1968a: 57, 1974: 135, 141-146; Manning 1994: 243-246; Nakou 1995; Renfrew 1972: 308, 483-496). However, Prepalatial metalwork has been the subject of much less study than any other material on the island, and in many ways conceptions about metalwork are still based on analyses of the data established in the late 1960s and early 1970s (Branigan 1967, 1968a, 1968b, 1969, 1974; Davaras 1975; Junghans *et al.* 1968).

Period		Start	End
Final Neolithic	FN	c.4500 BC	3100–3000 BC
Prepalatial	EM I	3100–3000 BC	2700–2650 BC
	EM IIA	2700–2650 BC	2450–2350 BC
	EM IIB	2450–2350 BC	2200–2150 BC
	EM III	2200–2150 BC	2050–2000 BC
	MM IA	2050–2000 BC	1925–1900 BC
Protopalatial	MM IB	1925–1900 BC	1900–1875 BC
	MM II	1900–1875 BC	1750–1720 BC
Neopalatial	MM III	1750–1720 BC	1700–1680 BC

Table 1. Cretan Early and Middle Bronze Age absolute chronology (after Manning 1995).

Value has to be considered as a social and cultural construct (Appadurai 1986), and it must be understood within the cultural particularities of each society, in this case Prepalatial Cretan societies. Recent research focused on a broader Aegean context has suggested that metals only acquired value through social and symbolic actions. The whole *chaîne opératoire*, from the extraction and distribution (Broodbank 1993, 2000: 292-298) until the final transformation into a symbolically important object (Nakou 1995: 12-13), may have embedded a string of meanings into the metal that contributed to the formation of its value. Following these suggestions, metalwork on the island needs a comprehensive new evaluation, departing from the traditional economic-based theories of value, in order to understand its role in Cretan societies.

Metalwork offers a unique insight into prehistoric Cretan societies, as its potential economic value, due to its rarity as a raw material on the island, is matched by its potential to construct symbolic and social values. It has been suggested that metalwork from different regions in Crete shows variations in both production and consumption characteristics (Branigan 1968a: 20, 26-29, 56, 1968b: 222). Copper, gold, lead and silver are versatile materials that can easily be re-melted and re-shaped into new objects, offering the archaeologist a particularly good opportunity to recognise differences in how individual communities adapted metal to locally meaningful objects. A large number of Prepalatial metal objects have been recovered from sites across Crete (Fig. 1), with the exception of west Crete (see discussion below), which allows for a preliminary evaluation of the role of metal on the island, taking into account the limitations of the archaeological record.

The Imperfect Record

Before a preliminary appraisal of the evidence can be undertaken, we must first take into consideration the limitations of the archaeological record for the Prepalatial period.

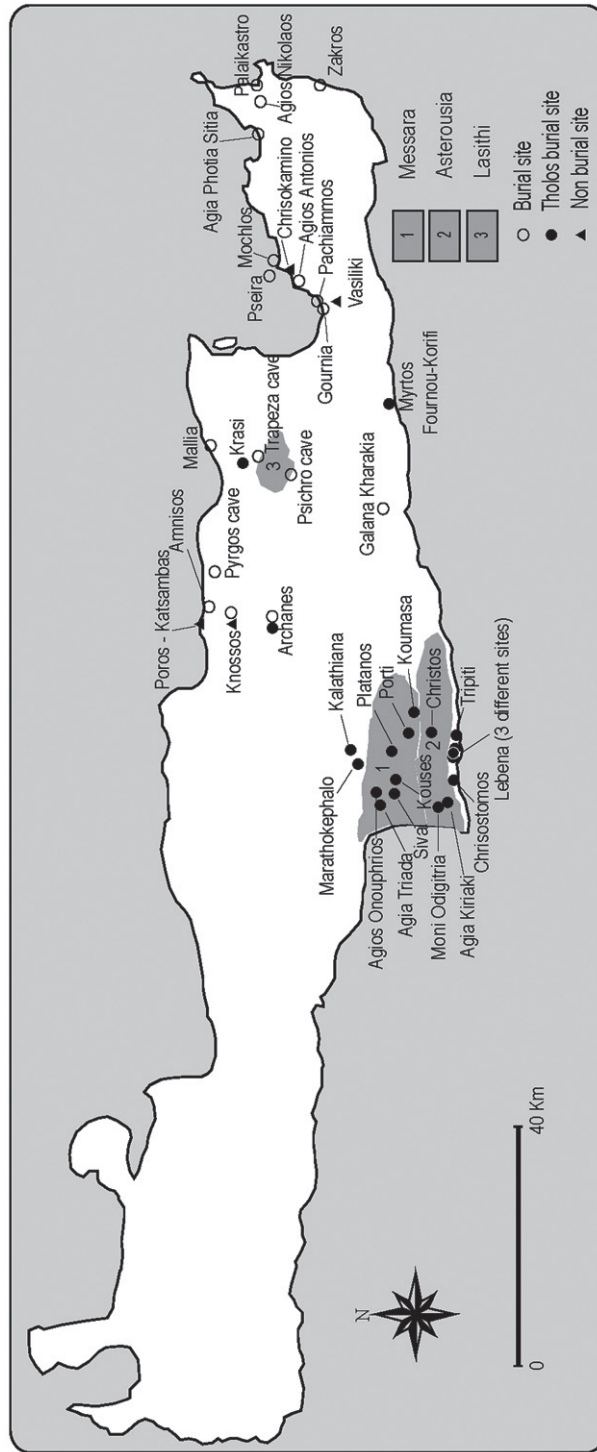


Figure 1. Map of Crete with sites mentioned in the text.

Most of the material included in this research comes from funerary contexts. However, burials in Prepalatial Crete were normally communal and were used over long periods of time; many of them have been robbed in both ancient and modern times, resulting in mixed deposits. As a result, we have been left without a clear understanding of the archaeological context for most metal objects, especially their chronologies. Chronological classifications of metal objects have traditionally been based on their typology rather than on their archaeological context, often assuming that complex types are later than simple ones. This assumption cannot be valid unless corroborated by stratigraphic evidence, which usually has not been possible, and therefore the chronological basis of comparison must be considered with caution. New data from recent excavations, such as at Archanes (Maggidis 1994, 1998; Panagiatopoulos 2002; Papadatos 2003; Sakellarakis and Sapouna-Sakellarakis 1997), as well as reassessments of old excavations such as Agia Photia Sitia (Stos-Gale and Gale 2003: 90-91, table 5), help to shed new light on the chronology of metal objects and improve chronological resolution, allowing a more comprehensive interpretation of the extant material.

The fact that most metal objects come from funerary contexts might also be beneficial to this research. Crete's funerary deposits share some general characteristics, which allow an island-wide comparison. Burial practices appear to have played an important role in Cretan Prepalatial communities. Funerary contexts have produced a significant quantity of objects, with examples of high quality craftsmanship. This is particularly true for metalwork, as few metal objects have been found in the handful of well-known Prepalatial settlements such as Vasilike (Boyd Hawes *et al.* 1908) or Myrtos Fournou-Korifi (Warren 1972). Interestingly, cemeteries also show considerable diversity in typology around the island: round tholos tombs are mainly found in the Mesara region (Fig. 1), while rectangular house tombs are found mainly in the north and east. These typological variations can be compared with the patterns of deposition of the metal objects.

Drawing conclusions about a society from mortuary evidence alone can be risky, but the consistency with which metal objects were deposited in cemeteries enables us to explore differences in the patterns of deposition between areas of the island, and therefore differences in the way the material was interwoven with local social and symbolic meanings.

Copper-based Artefacts

Technical Information

Copper and bronze work are very similar in the Prepalatial period, sharing the same basic raw material, coming from the same sources, and going through the same procedures of extraction, smelting and casting (Evely 2000: 323-334; Gale and Stos-Gale 1981). The only material difference between the two is that bronze objects include more than 2% arsenic in their composition, changing some of the physical characteristics of the metal. Arsenical bronzes, well documented in Early Minoan times, are not as frequent as copper artefacts (Junghans *et al.* 1968 Part 2: 264-267; Mangou and Ioannou 1998: 93, table 1). Very little evidence exists for tin bronze in the Prepalatial period, and it was not widespread on the island until the Protopalatial period (Mangou

and Ioannou 1998: 94-95, table 1; Muhly 1985: 126; Stos-Gale 2001: 201, fig. 10.3). Production techniques did not change greatly during the Prepalatial period and seem to be very similar across the island (Branigan 1968c; Mangou and Ioannou 1998; Muhly 1985).

Recent scientific analyses have shown that most of the copper ore used during the Prepalatial period originated from the Cyclades and Cyprus, with the Peloponnese, Anatolia and central Iran as other possible minor sources (Stos-Gale 1993, 1998, 2001); only a small percentage might have come from local sources near Chrisostomos in southern Crete (Stos-Gale 1993: 125, 1998: 725; Stos-Gale and Gale 2003) (Fig. 2). The *chaîne opératoire* seems to have been quite elaborate, since different parts of the process might have been carried out in distant geographical places. On the site of extraction some preliminary processing of the ore took place (crushing and smelting), and slag on the islands of Kythnos and Seriphos (Fig. 2) correspond with metal deposited on Crete (Stos-Gale 1993: 120, 124, 1998: 720). During the EM II period, the worked ore was probably transported to Crete through Cycladic exchange centres such as Dhaskalio-Kavos or Phylakopi (Fig. 2) (Broodbank 1993). In the EM III period, this pattern of exchange seems to change (Broodbank 2000: 350-361; Renfrew 1972: 455-456).

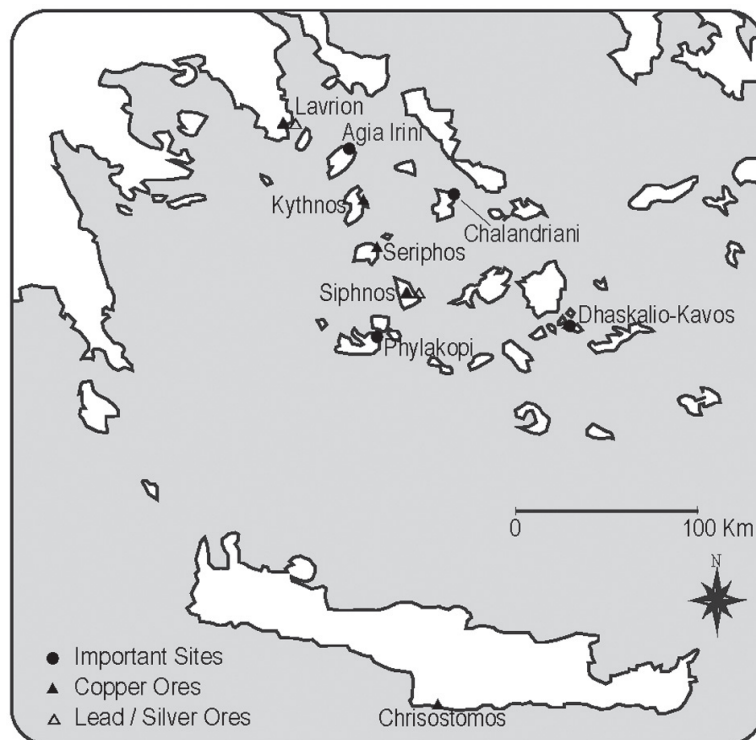


Figure 2. Map of the Aegean with metal ore sources and important exchange centres mentioned in the text.

We can assume that the metals arrived in Crete along the north coast, since the elongated shape of the island makes other routes from the Cyclades unlikely. This is corroborated by new archaeological evidence from the site of Chrisokamino on the north coast, a small processing site with evidence for ore importation; the presence of slag and furnaces points to smelting activity but no melting or casting (Betancourt *et al.* 1999). This contrasts with other evidence that points to melting rather than smelting activities (Stos-Gale 1998: 720), suggesting the arrival on the island of metal and not ore. Melting activity is evidenced at different settlements around the island: one crucible at Agia Photia Sitia and a possible one at Agia Kyriaki (Evely 2000: 347, 351), possible slag at Knossos of the MM I period (Evely 2000: 353), and two moulds, one at Vasilike (Renfrew 1972: 316) and another at Koumasa (Evely 2000: 358). Differences from nearby settlements in the Mesara region in the composition, dimensions (Branigan 1968a: 56, 102-103, graphs 1 and 2) and the origin of the metal used (Mangou and Ioannou 1998: 99; Stos-Gale 1998: 725) also point to the local production of the finished objects.

Types and Distribution

Until recently, the only copper object found on Crete dated earlier than EM II was a flat axe at Knossos from the Final Neolithic (Branigan 1974: 97; Muhly 1985: 116-117), but recent studies of the material from the cemetery of Agia Photia Sitia dated most of the metal artefacts from this site to the EM I period (Day *et al.* 1998: 136; Stos-Gale 1998: 720, 2003). A recently published dagger from Lebena Yerokambos has also been dated to EM I (Alexiou and Warren 2004: 136, object 544). However, it is only during EM II that we find a wide distribution of copper-based objects around the island. Concentrations of copper-based objects were deposited in large cemeteries such as Mochlos and Koumasa (Seager 1912; Xanthoudides 1924), but smaller numbers of artefacts can generally be found in any well-known site during this period (Fig. 3). EM III is problematic and it is difficult to identify in stratified deposits (for further discussion about the EM III period see Haggis 1999: 57; Manning 1997: 158-160; Momigliano 1991, 1999: 70-71; Watrous 1994: 717-720, 2001: 221-223), but it seems clear for the MM IA period that mortuary contexts contain far fewer copper-based objects, even in cemeteries of large communities such as Gournia (Soles 1992), Mallia (Demargne 1945; Van Effenterre and Van Effenterre 1963) and Archanes (Maggidis 1994; Panagiatopoulos 2002).

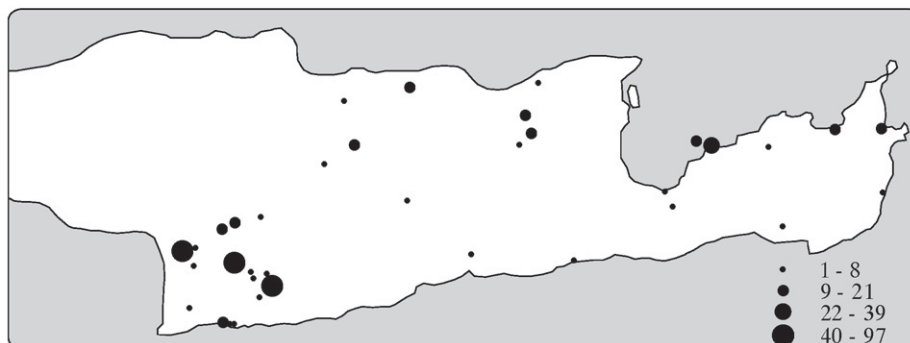


Figure 3. Distribution of copper-based items in Prepalatial Crete.

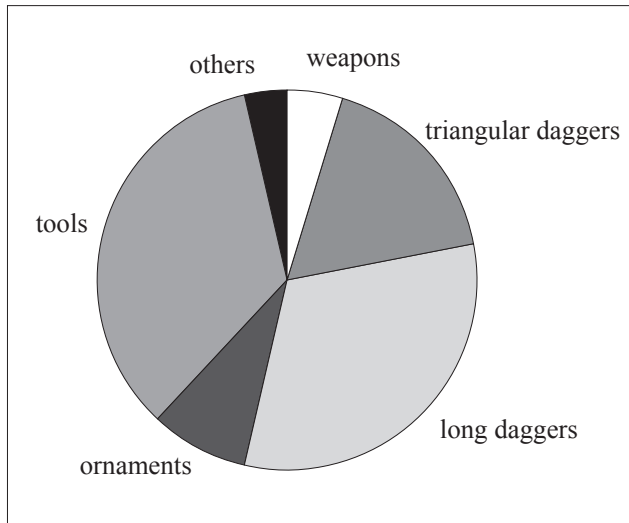


Figure 4. Types of copper-based artefacts in Prepalatial Crete.

Copper-based objects found on the island can be arranged into three broad categories: ornaments, tools and weapons/daggers (Fig. 4). Tools such as chisels, scrapers, tweezers and borers are characteristically copper-based; very few tools are found in any other metal. These objects were widely distributed around the island (Fig. 5). This distribution has two peculiarities. Firstly, most copper-based objects are found in the Mesara region (Fig. 3), although

this could be explained by the larger number of tombs known in this area. Secondly, tools occur in many sites across the island, and even if there are concentrations of tools in large sites (e.g. Platanos, Agia Triada and Mochlos), these are not as extreme as other concentrations (see daggers and gold objects below).

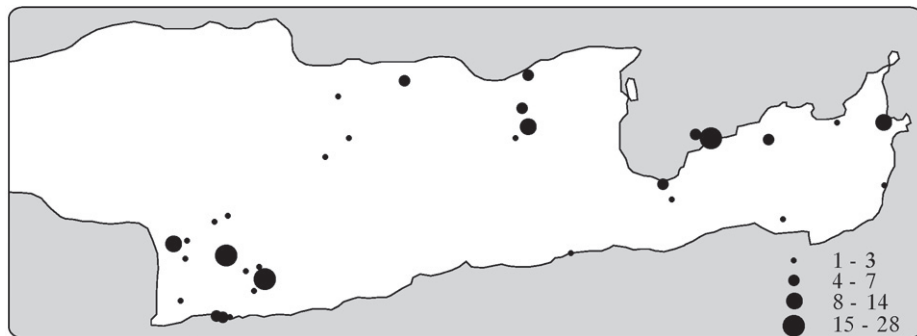


Figure 5. Distribution of copper tools in Prepalatial Crete.

Weapons, with the exception of daggers, were not very common in Prepalatial times (Fig. 4). With the exception of two examples from Marathokephalo (Xanthoudides 1918: fig. 6) and one from Porti (Xanthoudides 1924: 66), spearheads date primarily to Palatial times (Stos-Gale and Gale 2003 for the Agia Photia Sitia example). Axes were rare: 19 are listed by Branigan (1968a), although the Palaikastro examples are probably Protopalatial (Bosanquet and Dawkins 1923: 118) and might be interpreted as tools rather than weapons.

Daggers were very common throughout Crete (Figs. 4 and 6) and were mainly of two types: long daggers and triangular daggers (Fig. 7), the latter a local type to the island (Branigan 1974: 124; Renfrew 1972: 321). Xanthoudides (1924: 107) suggested that long daggers evolved from the triangular type, and therefore are of later date. Branigan (1968a: 26-27), however, demonstrated that the first long daggers appeared on the island as early as the triangular type, although he agreed that in general triangular daggers pre-date long daggers. Recently published examples of long daggers show that these seem to be common in the EM II period (Alexiou and Warren 2004: 136-137, objects 546-548).

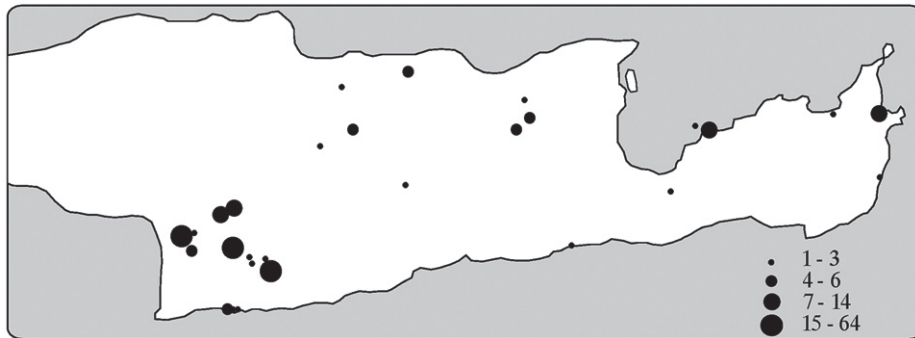


Figure 6. Distribution of all daggers in Prepalatial Crete.

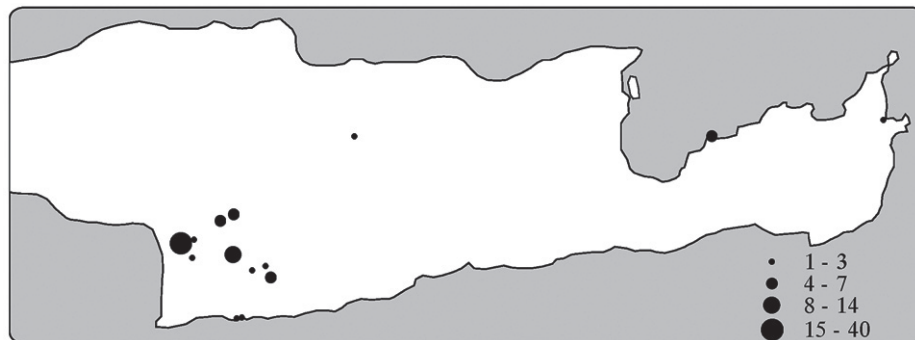


Figure 7. Distribution of triangular daggers in Prepalatial Crete.

Triangular daggers might have been in use longer than previously thought: there are large numbers in Tholos A at Agia Triada, a context with a major component of MM I items (Banti 1933), in association with some triangular daggers (Fig. 8, area A). Triangular daggers are also abundant in the lower stratum of Tholos A at Platanos, a deposit that cannot be dated more precisely than EM II-MM I (Xanthoudides 1924: 89). It seems that both types of dagger may have co-existed for a long period, and therefore their distribution must be explained by reasons other than chronology.

Interestingly, the distribution of daggers is very uneven throughout the island. Although they are found in many different sites, including small sites like the EM II hamlet of Myrtos Fournou-Korifi (Warren 1972: 213), and in most burial contexts, there is

an abnormally high concentration of daggers in the Mesara tombs (Table 2, Figs. 6 and 7). This is especially true of the triangular daggers, which are almost exclusive to the Mesara area (Table 2, Fig. 7).

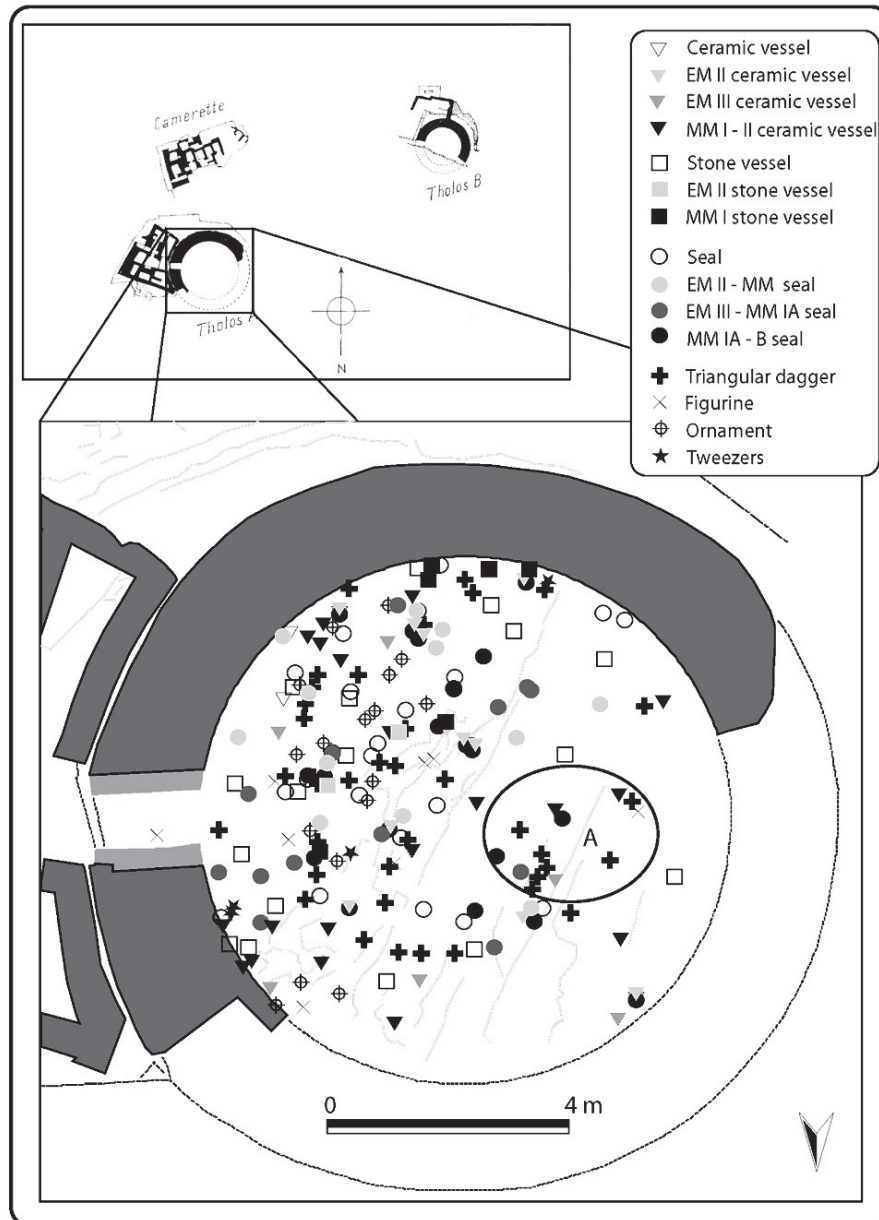


Figure 8. Agia Triada Tholos A (based on data from Banti 1933).

Site	Long daggers	Triangular daggers	Total daggers
Mesara, Asterousia and coast south of Asterousia			
Christos	0	0	0
A. Kyriaki	0	0	0
Lebena Yerokambos	5	0	5
Lebena Papoura	1	1	2
Lebena Zervou	0	1	1
A. Onouphrios	0	1	1
Platanos	50	14	64
Siva	2	2	4
A. Triada	8	40	48
A. Irini	0	1	1
Koumasa	31	5	36
Salame	2	0	2
Porti	1	2	3
Kalathiana	4	5	9
Marathokephalo	3	6	9
Vorou	0	0	0
Pezoules Kephalas	0	0	0
Kouse Sopata	0	0	0
Trypiti	0	0	0
Moni Odigitria	0	0	0
North Coast and Lasithi			
Knossos	1	0	1
Archanes	3	3	6
A. Nikolaos	0	0	0
A. Antonios	2	0	2
Gournia	0	0	0
Krasi	3	0	3
Vasiliki	2	0	2
Chamizi	0	0	0
A. Photia	3	0	3
Mallia	0	0	0
Mochlos	7	7	14
Pseira	2	0	2
Amnisos	0	0	0
Pyrgos	6	0	6
Psychro	4	0	4
Trapeza	4	0	4
East Crete			
Maronia	0	0	0
Zakro	3	0	3
Palaikastro	7	1	8

Table 2. Distribution of daggers in Prepalatial Crete.

Site	Long daggers	Triangular daggers	Total daggers
Central and South Crete			
Kanli Kastelli	3	0	3
Galana Kharakia	2	0	2
Myrtos F-K	1	0	1
Archaolochori	2	0	2

Table 2 cont. Distribution of daggers in Prepalatial Crete.

In the Mesara, daggers are particularly prominent in the assemblage, and there are local differences in their chemical composition (Branigan 1968a: 56), their dimensions (Branigan 1968a: 102-103, graphs 1 and 2) and the origin of the metal used for the artefacts (Mangou and Ioannou 1998: 99; Stos-Gale 1998: 725), suggesting that daggers may have been produced locally in each settlement. There are also visible typological differences in the daggers deposited at each site. Agia Triada's tholoi contained almost exclusively triangular daggers (Banti 1933), while the Koumasa cemetery mostly had long daggers (Xanthoudides 1924: 25-26, pl. XXIVb). Platanos is a very interesting case, as almost all of the triangular daggers came from the lower stratum of Tholos A, as opposed to the upper stratum of the same tomb and other areas of the cemetery, which contained long daggers (Xanthoudides 1924: 106-107). Although these are clearly stratified as two chronologically differentiated events that might point to an evolution in the types, it is also possible that the change in design responds to changes in the affiliation of the buried. This change might have been marked by the episode of fumigation evidenced in this tomb (Branigan 1993: 126). The distinction between triangular daggers and long daggers might be related to competitive display between different groups, especially since both types of daggers were used contemporaneously.

This evidence points to daggers having a special status in the Mesara. As has been suggested, this could be related to the socio-symbolic role of the daggers in the communities of this area (Nakou 1995:10-13; Whitelaw 1983: 336, n.16). The localised nature of production and the typological differences throughout the Mesara could also suggest that daggers (and the social positions they marked) might have also played a role in competitive strategies between polities within the region (Murphy 1998; Sbonias 1999).

Gold

Technical Information

There are no sources of gold on Crete (Branigan 1974: 63, 1991: 100; Vasilakis 1996: 43-50), and therefore raw materials were imported onto the island. The exact origin of the gold used on Crete is unclear, but Macedonia and Euboia have been suggested as possible sources (Branigan 1991: 100). The production technique consisted mainly of hammering native metal to create sheets and wire that would later be hammered again or cut to shape (Branigan 1983; Vasilakis 1996: 62-65). This set of techniques is similar around the island and changes little during the Prepalatial period. Casting and soldering techniques only appeared on a small scale in Protopalatial times (Branigan

1974: 92; Vasilakis 1996: 64). Decoration techniques were also quite simple, with *repoussé* predominating. Granulation and plating of materials such as bone or wood are only evidenced during Middle Minoan times (Politis 2001; Vasilakis 1996: 69-76).

Types and Distribution

Goldwork appears on Crete in significant quantities during EM II. Although it is still found at important sites in EM III-MM I times, such as in the Area of the Rocks at Archanes (Sakellarakis and Sapouna-Sakellarakis 1997: 233-236), it seems that the quantities deposited in the cemeteries of north and central Crete decline. This is reflected in the MMI ossuaries at Palaikastro (Dawkins 1904, 1905; Duckworth 1903) and Gournia (Boyd Hawes *et al.* 1908; Soles 1992). In the Mesara, the lack of a fine chronological resolution impedes a clear identification of changes in the deposition of metal objects, but it seems that during the MM I period important amounts of gold items were deposited in the large cemetery of Platanos (Xanthoudides 1924: 110-112), and probably at Agia Triada (Banti 1933: 194-198) and Koumasa (Xanthoudides 1924: 29).

The types of gold objects found around the island are quite similar: ornamental items such as small beads, pins, chains, pendants and diadems. The shapes are simple, with floral and vegetal motifs being very popular (Davaras 1975: 102; Effinger 1996). Diadems are the only objects displaying local particularities, with some unusual types at Mochlos (Davaras 1975: 109-111). One of the Mochlos diadems have two eye-shaped *repoussé* decorative motifs (Seager 1912: 27, figs. 8 and 9, object II.5), and others have attachments for antennae; unusual characteristics leading to suggestions of local production (Branigan 1991: 100).

Gold objects are not found as widely in the archaeological record as copper-based ones (Fig. 9); the former seem to be concentrated at Mochlos on the north coast, Archanes in central Crete, and Platanos and Agia Triada in the Mesara (Table 3, Fig. 9).

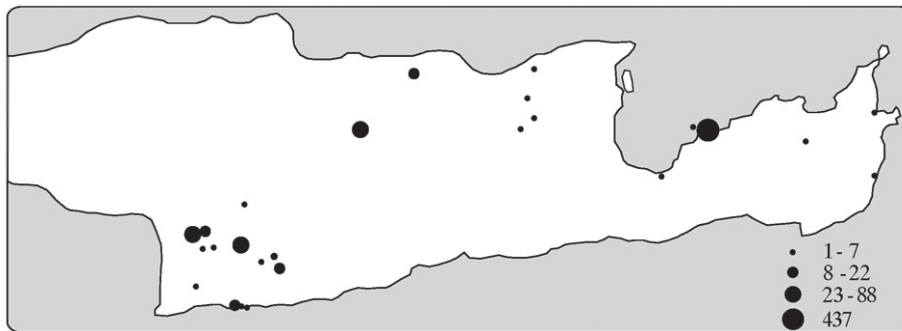


Figure 9. Distribution of gold items in Prepalatial Crete (after Vasilakis 1996).

Site	Gold	Silver/lead
Mesara, Asterousia and coast south of Asterousia		
Christos	0	0
A. Kyriaki	0	0
Lebena Yerokambos	22	1
Lebena Papoura	2	0
Lebena Zervou	2	1
A. Onouphrios	22	0
Platanos	81	9
Siva	2	0
A. Triada	55	5
A. Irini	0	0
Koumasa	10	3
Salame	0	0
Porti	6	2
Kalathiana	5	0
Marathokephalo	0	0
Vorou	0	1
Pezoules Kephalas	0	0
Kouse Sopata	1	1
Trypiti	0	2
Moni Odigitria	5	0
North Coast and Lasithi		
Knossos	0	2
Archanes	53	12
A. Nikolaos	0	1
Agios Antonios	0	3
Gournia	3	8
Krasi	3	7
Vasiliki	0	0
Chamizi	0	0
A. Photia	0	2
Mallia	2	0
Mochlos	437	10
Pseira	1	1
Amnisos	0	3
Pyrgos	12	0
Psychro	1	0
Trapeza	7	2
East Crete		
Maronia	1	0
Zakro	2	1
Palaikastro	6	0

Table 3. Distribution of gold and silver/lead objects in Prepalatial Crete (after Vasilakis 1996 with additions).

Site	Gold	Silver/lead
Central and South Crete		
Kanli Kastelli	0	0
Myrtos F-K	0	0
Galana Kharakia	0	1
Archeolohori	0	0

Table 3 cont. Distribution of gold and silver/lead objects in Prepalatial Crete (after Vasilakis 1996 with additions).

Although less marked than the concentration of copper-based objects, the number of gold items in the Mesara area stands out, partly because many of the tholoi contain small quantities (Table 3). The north coast has the largest number of gold items (Fig. 10), but this figure is misleading as Mochlos constitutes a unique case, with more than 400 items.

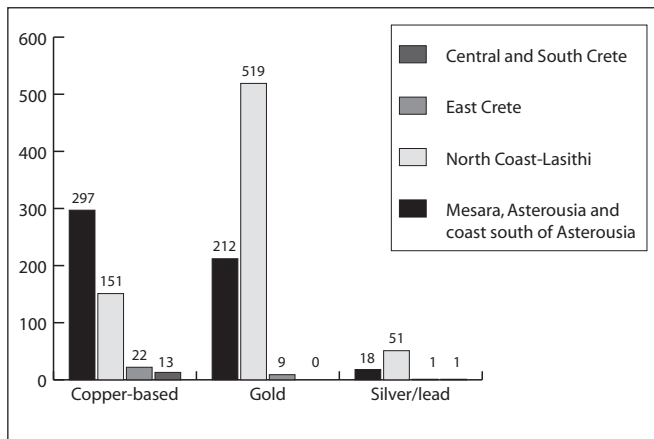


Figure 10. Distribution of metal artefacts on Crete.

The similarities between the gold objects around the island and their concentration in large cemeteries seems to support an explanation related more to the privileged socio-economic position of some areas than to regional symbolic relevance. Evidence from Mochlos reinforces this suggestion, as gold objects are mainly concentrated in two tombs, each a

complex of three rooms with more elaborate architectural features than any other tomb in the cemetery, marking socio-economic differences within the site during the EM II period (Branigan 1991; Soles 1992: 255ff; *contra* Watrous 1994: 713). Similar arguments for ranked societies have been made for Archanes during the EM IIA (Papadatos 2003) and MM I periods (Maggidis 1998), and Platanos, Koumasa and Agia Triada also for the MM I period (Murphy 1998: 38) – all large cemeteries with correspondingly large concentrations of gold items.

Therefore, gold objects may have had a very different social use than copper-based objects. While copper-based products are widely distributed in the archaeological record (with the exception of daggers in the Mesara), gold is concentrated in the larger cemeteries indicating a similar economic value across the island. This use of gold as a socio-economic differentiator seems clear in the internal dynamics of the Mochlos

cemetery. It could have had a similar use as an intra-site differentiator in the Mesara, but the mixed deposits of the tholoi do not allow us to understand how gold deposition is related to individuals (or groups of individuals). The widespread distribution of gold among different tholoi in the Mesara could, again, be the result of regional competition dynamics.

Silver and Lead

Technical Information

Lead and silver come from the same ore, although the smelting techniques are different. While lead can be extracted with techniques similar to those used for copper extraction (Gale and Stos-Gale 1981: 178), silver requires a particular technique called cupellation (Evely 2000: 403-404; Gale and Stos-Gale 1981: 175-176). The origin of the ores is similar to the copper ores – the island of Siphnos in the Cyclades and the area of Lavrion on the mainland (Fig. 2). As with gold, the *chaîne opératoire* that these metals underwent until their final deposition is not very clear.

Types and Distribution

Muhly suggested that a pendant from Amnisos could be dated as early as the Final Neolithic (Muhly 1985: 112), and recent dating of material from the Agia Photia Sitia cemetery (Day *et al.* 1998: 136) and a bead from the Agios Nikolaos burial caves (Tod 1903) have established that silverwork was known on the island in EM I. Some of the silver and lead items from the north coast, at sites such as Krasi and Tholos Γ at Archanes, and possibly the silver beads at the North Cemetery of Gournia (Marinatos 1932; Papadatos 2003; Soles 1992: 13, 16 object G I-23; Warren 1976), came from EM IIA deposits. In general, most of the items date to EM II-III (Branigan 1968b: 224; Warren 1976), but the material from the Mesara is more difficult to date. Only the disc from Platanos and the dagger at Galana Kharakia could belong to the MM IA period (Branigan 1968b: 222-223; Vasilakis 1996: 82).

There are three major categories of silver artefacts: ornaments, vessels and daggers. There are some unusual typologies for silver ornaments (Branigan 1968b: 224), with a large proportion of rings at Mochlos (Seager 1912: 39, III.h, 65, XIV.a) and at Krasi (Marinatos 1932: 121) and pins at Archanes (Sakellarakis and Sapouna-Sakellarakis 1997: 668) and Platanos (Xanthoudides 1924: 110). Nevertheless, other more common types are found, such as the curls at Agios Antonios (Haggis 1993; Hall 1914: 83-84) or the discs at Krasi and Platanos (Marinatos 1932; Xanthoudides 1924: 111).

Vessels are not found in any metal other than silver during the Prepalatial period (Branigan 1974: 126, table 15). In addition to the Gournia *kantharos*, which could be MM IB or MM II and therefore Protopalatial (Davis 1979), two silver cups at Mochlos (Davaras 1975: 107; Seager 1912: 52) and a lead bowl in the Trapeza cave (Pendlebury and Money-Coutts 1939: 19, 108-109) come from Prepalatial contexts.

Six silver daggers have been found on Crete: two at Knossos (Vasilakis 1996: 82-84), one in Galana Kharakia (Branigan 1968a: 63) and three in tomb Γ at the cemetery of Koumasa (Xanthoudides 1924: 47), all of them belonging to the long dagger type. Fur-

thermore, silver and lead occur in association with daggers in other ways: silver rivets were found on 10 daggers: eight at Platanos, one at Mochlos and one at Agia Triada (Branigan 1968a: 49; Xanthoudides 1924: 107); and some copper-based daggers are alloyed with small quantities of silver, although this could have been accidental (Branigan 1968a: 49). A recently published copper-based dagger from the cemetery of Agia Photia Sitia contains as much as 8% lead and can only be interpreted as a deliberate alloy (Mangou and Ioannou 1998: 95), though it might be a Cycladic import (Day *et al.* 1998). Only in Mochlos do we see a similar use of silver or lead for weapons in the form of two small double axes (Seager 1912: 36).

The distribution of silver objects shows a very interesting pattern (Figs. 10 and 11), as most are found around the north coast. Sites such as Mochlos, Krasi, Amnisos, Trapeza and Archanes yielded most of the silver and lead material found on the island. The presence of silver objects in the Mesara is restricted to the daggers at Koumasa, the rivets and a fragment of a pin at Platanos, some beads at Agia Triada, and an array of small items and beads at Tripiti, Kouses, Porti, Lebena Yerokambos and Lebena Zervou. This distribution has been explained by Cycladic influences on the north coast that would not have reached the Mesara region (Branigan 1968b: 225-226).

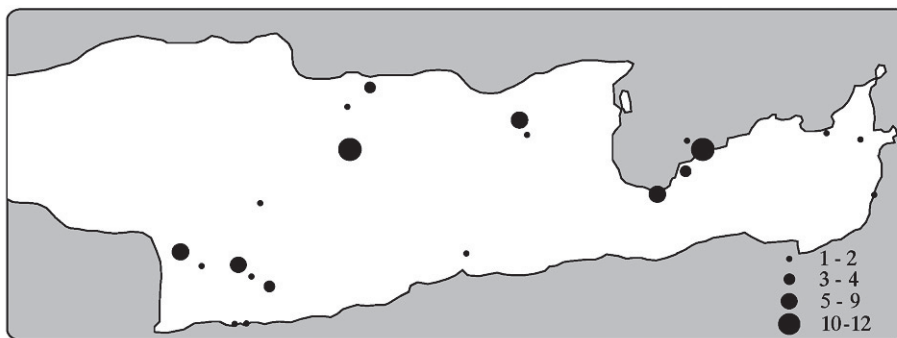


Figure 11. Distribution of silver and lead items in Prepalatial Crete (after Vasilakis 1996 with additions).

The presence of silverwork during the EM I-EM IIA periods might well have been related to the dominant role of some of the Cycladic settlements as trade centres during these periods (Broodbank 2000: 300-319; Day *et al.* 1998: 147; Renfrew 1972: 471-472), and silver might have reached the island with other Cycladic products such as ceramics or obsidian (Carter 1998; Wilson 1994: 39-41). However, this fails to recognise some characteristics of the distribution and chronology of silverwork on Crete. Silver is used quite differently on Crete compared to the Cyclades (Branigan 1968b: 225; Papadatos 2003). Gold was popular on the north coast of Crete but is almost absent in the Cyclades, and whilst silver and lead account for almost 40% of the Cycladic metal assemblage (Gale and Stos-Gale 1981: 181), it only constitutes a minority of the north coast assemblage. Silver and lead are used in Crete for different objects than in the Cyclades (Branigan 1968b: 225; Papadatos 2003). Within Crete the assemblages vary

across the regions – sites on the north coast have a characteristic repertoire of silver and lead items that include pins, rings and vessels, whereas in the Mesara, silver is strongly associated with daggers.

The distribution of silver and lead objects can be better explained as conscious decisions by Cretan communities. Although it is possible that some Cycladic influence contributed to the significance of silver and lead items on the north coast, their widespread use and certain peculiar types, such as the vessels or the double axes at Mochlos, could point to specific symbolic values in this area. In the Mesara region, the material was transformed into the locally significant daggers, and the values embodied in the silver as a raw material were reinterpreted and adapted to reinforce local ideas and social interactions, related to whatever the dagger expressed. Nevertheless, apart from their socially symbolic values, silver and lead were also of high economic value throughout the island, due to their scarcity (Davaras 1975: 107).

Discussion

Two data gaps appear at the geographical extremes of the island. The lack of data coming from the west of the island can be explained by the small number of archaeological investigations carried out in the region (Andreadaki-Blasaki 1997: 6-8). This is not the case for the east of the island, however, where various settlements and cemeteries are known, such as Agios Nikolaos and Agia Photia Sitia (probably EM I), and also Palaikastro and Zakros, although these are mainly late (EM III-MM IA). This dating might explain the scarcity of metal in the funerary record of the area (see below).

Both the EM I and MM IA periods have a paucity of evidence. Whilst the scarcity of metal in EM I can be explained by the gradual appearance of metalwork on the island (Muhly 1985: 118; Warren 1976), the scarcity of material in the MM IA period requires a more complex explanation. In this period, metalwork is not as commonly found in cemeteries as in previous periods. Copper-based objects are scarce, and silver is even more rarely found on Crete. Although important cemeteries for this period are known (e.g. Gournia, Palaikastro and Mallia), corresponding with a period of general growth on the island (Watrous 2001: 223), little metalwork is found in them (Sbonias 1999: 31). It is interesting that certain tombs in these cemeteries still stand out for having some gold objects, as is the case of Burial Building 7 at Archanes (Sakellarakis and Sapouna-Sakellarakis 1997: 206-208) and Chrysolakkos at Mallia (Demargne 1945). In the Mesara, however, evidence from the largest cemeteries such as Platanos (Xanthoudides 1924) and Agia Triada (Banti 1933) suggests that significant amounts of metal objects were still being deposited during the MM I period, showing a different pattern from other regions of the island. The example of the Mesara underlines the need to explain changes in metal deposition based on the specific context for each region and the way in which the relationship between mortuary rituals and social changes developed in each community.

Metals seem to embody different meanings and values, creating a different ‘personality’ for each metal in Early Bronze Age Crete. These personalities may be rooted in the particular physical/mechanical qualities of each metal, particularities of acquisition

and production techniques. Each metal followed a different succession of steps from extraction, to the way it was traded to the island and its conversion into a finished object, which would have determined the formation of this personality. The perception of each metal's personality (including both material and symbolic traits) as appropriate for certain activities might explain its association with different finished items: copper was used largely for practical objects (tools and daggers), only showing a peculiar depositional pattern in the Mesara region where this metal was related to the production of daggers, an item which had important social and symbolic values in the area (Nakou 1995: 10-13; Whitelaw 1983: 336 n.16). The physical qualities of copper made it the most suitable metal for this kind of object.

Gold seems to behave in a more 'economic' way, with concentrations of this metal only found in important cemeteries in both regions of the island. This does not rule out the possibility of gold having other values; its exclusive use as an ornament suggests symbolic roles as well as an economic one. Also, silver and lead might have been recognised as being of high value on Crete. Whereas gold artefacts had similar typologies around the island, silver and lead seem to have been incorporated differently into the local material assemblage of each region, such as the daggers in the Mesara or the vessels in the north coast. Silver seems to have been perceived differently from gold, and was specifically chosen to interlace with locally symbolic objects.

This connects with the existence of regional fashions, a second factor contributing to the diversity of the record. A common feature to all metals is that they arrived on the north coast of Crete. However, the north coast assemblage does not resemble those of contemporary Cycladic communities, challenging an explanation of the different regional particularities through the use of metalwork based on Cycladic influences on the north coast.

The distribution of objects can only be understood in terms of different regional choices. Although there are concentrations of copper-based artefacts at large sites, the north coast sites do not reveal particular differences in the deposition of copper-based objects. However, they do show an unequal distribution of gold and silver objects with large sites such as Mochlos in EM II or Archanes in EM III-MM I having the majority, especially of gold objects. We still find items, particularly silver, at less important cemeteries such as Agios Antonios in EM II, which probably related to the ornamental (symbolic) character of the silver artefacts. The Mesara shows a different pattern. Although the inhabitants of the southern sites were also interested in accumulating gold ornaments, they gave special emphasis to the consumption of copper in the form of daggers. The very restricted deposition of silver in this area also seems to be related to daggers, and the gold hilt of a dagger, probably from the Moni Odigitria tholoi (Vasilakis 1996: 86-87), shows that daggers embodied important social and symbolic meanings in the region, cross-cutting the different metals.

The different regional fashions represent a more complex issue than mere symbolic diversity among otherwise similar communities. Metals on the north coast come mainly from EM I-II contexts and are found concentrated at sites along the coastline, such as Mochlos or the Pyrgos cave, and in sites situated along inland communication routes

between the north and south of the island, such as Archanes on the Mesara route or Krasia on the route to the Lasithi plain. A similar pattern cannot be identified in the south, where the only site with an important concentration of material in a position equivalent to the northern sites is Lebena Yerokambos, a context with a large component of EM I and EM II ceramics (Alexiou and Warren 2004). By the MM I period, the deposition of metal objects at these sites seems to decrease.

In the Mesara, metalwork is found at several settlements densely clustered in this fertile valley, showing a rather different distribution to the north coast sites. Here concentrations of artefacts are also found in certain large cemetery complexes, namely Agia Triada, Platanos and Koumasa. However, a remarkable number of smaller sites such as Kalathiana and Siva also contained substantial numbers of items. The dense distribution of large cemeteries creates a different situation to that on the north coast and could point to competitive strategies in the area, as does the evidence for local production. Although it is difficult to date the material from these cemeteries, deposition of metal items might have continued during MM I, at least in the large cemeteries which played an important role in inter-settlement competition in the Mesara during this period (Murphy 1998: 38; Sbonias 1999: 47).

Conclusions

A preliminary look at the metalwork in EBA Crete suggests a complex scenario. Metalwork embodied several layers of symbolic meaning and social uses, endowing each metal object with a complex social persona. This persona differed radically between different metals due to the physical qualities of the metals and the various meanings attached to them. This could also be the case for each metal's *chaîne opératoire*, as the process of production might be intimately related to the ways metal was traded and consumed. It is critical to the study of Prepalatial metalwork (and of any other material on the island) to acknowledge the different constitution of meanings in different regions of Crete. The same material, and even object, might have been translated into each regional 'language' of meaning, and its social role may have varied from one region to another.

This analysis of metalwork also suggests important differences in two regions of the island, namely the north coast and the Mesara, not only in people's selection of metal objects, but also in the ways objects were deposited. These regional differences cannot be regarded simply as symbolic variations on a common theme, for they might provide evidence of social, political and economic variations in the organisation of communities within the different regions. Symbolism is intertwined with the social and economic aspects of a community – change in any one of these aspects affects the others. Therefore, more work needs to be done to assess the implications of regional differences in the Cretan archaeological record, including data from different artefact types such as seals, stone vessels or ceramics. Prepalatial Crete might be best characterised as a jigsaw puzzle of different regions with individual characteristics in their social, economic and symbolic organisation, rather than as a culturally uniform island (*cf.* Hamilakis 2002: 17; Momigliano 1999: 73-74). Only after assessing the tension between these regional differences and similarities can we move on to investigate how the island developed in the Palatial period.

Acknowledgments

I am grateful to the Basque Country Government for its financial assistance through the scholarship *Programas de Becas para Formacion de Investigadores*, for the development of research. I would also like to thank Dr A. Bevan for his help in the study of the Agia Triada assemblage, J. Cooper and the *PIA* team for their patience and help proofreading different drafts of this paper. Finally, my gratitude to Dr T. Whitelaw for the continuous discussion of the different ideas in this paper and his always useful comments.

References

- Alexiou, S. and Warren, P. 2004. *The Early Minoan Tombs of Lebena, Southern Crete*. Studies in Mediterranean Archaeology 30. Sävedalen: Paul Åströms Förlag.
- Andreadaki-Blasaki, M. 1997. *The Country of Khania Through its Monuments from the Prehistoric Period to Roman Times*. Athens: Archaeological Receipts Fund.
- Appadurai, A. 1986. Introduction: Commodities and the Politics of Value, in Appadurai, A. (ed.) *The Social Life of Things. Commodities in Cultural Perspective*. Cambridge: Cambridge University Press, 3-63.
- Banti, L. 1933. La grande tombe a tholos di Haghia Triadha. *Annuario della Scuola Archeologica di Atene e delle Missioni Italiane in Oriente XIII-XIV (1930-1931)*, 155-241.
- Betancourt, P. P., Muhly, J. D., Farrand, W. R., Stearns, C., Onyshkevych, L., Hafford, W. B. and Evely, D. 1999. Research and Excavation at Chrysokamino, Crete. 1995-1998. *Hesperia* 68, 343-369.
- Bosanquet, R. C. and Dawkins, R. M. 1923. *The Unpublished Objects from the Palaikastro Excavations 1902-1906*. London: Macmillan.
- Boyd Hawes, H. A., Williams, B. E., Seager, R. B. and Hall, E. H. 1908. *Gournia, Vasilike, and Other Prehistoric Sites on the Isthmus of Hierapetra, Crete. Excavations of the Wells-Houston-Cramp Expeditions. 1901, 1903, 1904*. Philadelphia: American Exploration Society, Free Museum of Science and Art.
- Branigan, K. 1967. The Early Bronze Age Daggers of Crete. *Annual of the British School at Athens* 62, 211-239.
- Branigan, K. 1968a. *Copper and Bronze Working in Early Bronze Age Crete*. Studies in Mediterranean Archaeology 19. Lund: Studies in Mediterranean Archaeology.
- Branigan, K. 1968b. Silver and Lead in Prepalatial Crete. *American Journal of Archaeology* 72, 219-229.
- Branigan, K. 1968c. A Transitional Phase in Minoan Metallurgy. *Annual of the British School at Athens* 63, 185-201.
- Branigan, K. 1969. Early Aegean Hoards of Metalwork. *Annual of the British School at Athens* 64, 1-11.
- Branigan, K. 1974. *Aegean Metalwork of the Early and Middle Bronze Age*. Oxford: Clarendon Press.
- Branigan, K. 1983. Gold and Goldworking in Early Bronze Age Crete. *Temple University Aegean Symposium* 8, 15-20.
- Branigan, K. 1991. Mochlos – An Early Aegean “Gateway Community”?, in Laffineur, R. and Basch, L. (eds.) *Thalassa: L’Égée Préhistorique et la mer: actes de la troisième Rencontre égéenne internationale de l’Université de Liège, Station de recherches sous-marines et océanographiques (StaReSO), Calvi, Corse, 23-25 avril 1990*. *Aegaeum* 7. Liège: Université de Liège, 97-105.
- Branigan, K. 1993. *Dancing with Death: Life and Death in Southern Crete c.3000-2000 BC*. Amsterdam: Adolf M. Hakkert.
- Broodbank, C. 1993. Ulysses Without Sails: Trade, Distance, Knowledge and Power in the Early Cyclades. *World Archaeology* 24, 315-331.

- Broodbank, C. 2000. *An Island Archaeology of the Early Cyclades*. Cambridge: Cambridge University Press.
- Carter, T. 1998. Reverberations of the "International Spirit": Thoughts upon "Cycladica" in the Mesara, in Branigan, K. (ed.) *Cemetery and Society in the Aegean Bronze Age*. Sheffield: Sheffield Academic Press, 59-77.
- Davaras, C. 1975. Early Minoan Jewellery from Mochlos. *Annual of the British School at Athens* 70, 101-114.
- Davis, E. N. 1979. The Silver Kantharos from Gournia. *Temple University Aegean Symposium* 4, 34-45.
- Dawkins, R. M. 1904. Excavations at Palaikastro III-2 Τα Ελληνικά and Early Minoan Discoveries. *Annual of the British School at Athens* 10, 196-201.
- Dawkins, R. M. 1905. Excavations at Palaikastro IV-3 An Early Minoan Ossuary. *Annual of the British School at Athens* 11, 268-272.
- Day, P. M., Wilson, D. E. and Kiriati, E. 1998. Pots, Labels and People: Burying Ethnicity in the Cemetery at Aghia Photia, in Branigan, K. (ed.) *Cemetery and Society in the Aegean Bronze Age*. Sheffield: Sheffield University Press, 133-149.
- Demargne, P. 1945. *Fouilles Exécutées à Mallia. Exploration Des Nécropoles (1921-1933) I. Études Crétoises VII*. Paris: Librairie Orientaliste Paul Geuthner.
- Duckworth, W. L. H. 1903. Excavations at Palaikastro II-12 Ossuaries at Roussolagos. *Annual of the British School at Athens* 11, 350-355.
- Effinger, M. 1996. *Minoischer Schmuck*. BAR (International Series) 646. Oxford: Tempus Reparatum.
- Evely, D. 2000. *Minoan Crafts: Tools and Techniques. An Introduction*. Studies in Mediterranean Archaeology XCII: 2. Jonsered: Paul Åströms Förlag.
- Gale, N. H. and Stos-Gale, Z. A. 1981. Cycladic Lead and Silver Metallurgy. *Annual of the British School at Athens* 76, 169-224.
- Gilman, A. 1981. The Development of Social Stratification in Bronze Age Europe. *Current Anthropology* 22, 1-23.
- Haggis, D. C. 1993. The Early Minoan Burial Cave at Ayios Antonios and Some Problems in Early Bronze Age Chronology. *Studi Micenei ed Egeo-Anatolici* XXXI, 7-34.
- Haggis, D. C. 1999. Staple Finance, Peak Sanctuaries, and Economic Complexity in Late Prepalatial Crete, in Chaniotis, A. (ed.) *From Minoan Farmers to Roman Traders. Sidelights on the Economy of Ancient Crete*. Stuttgart: Franz Steiner Verlag, 53-85.
- Haggis, D. C. 2002. Integration and Complexity in the Late Pre-Palatial Period. A View from the Countryside in Eastern Crete, in Hamilakis, Y. (ed.) *Labyrinth Revisited. Rethinking "Minoan" Archaeology*. Oxford: Oxbow Books, 120-142.
- Hall, E. H. 1914. *Excavations in Eastern Crete, Vrokastro*. University of Pennsylvania: The University Museum Anthropological Publications III. Philadelphia: University Museum.
- Hamilakis, Y. 2002. What Future for the "Minoan" Past? Re-thinking Minoan Archaeology, in Hamilakis, Y. (ed.) *Labyrinth Revisited. Rethinking "Minoan" Archaeology*. Oxford: Oxbow books, 2-29.
- Junghans, S., Sangmeister, E. and Schröder, M. 1968. *Kupfer und Bronze in der frühen Metallzeit Europas. Die Materialgruppen beim Stand von 12 000 Analysen*. Berlin: Gber. Mann Verlag.
- Maggidis, C. 1994. *Burial Building 19 at Archanes: A Study of Prepalatial and Early Protopalatial Funerary Architecture and Ritual*. Unpublished PhD dissertation. University of Pennsylvania.
- Maggidis, C. 1998. From Polis to Necropolis: Social Ranking from Architectural and Mortuary Evidence in the Minoan Cemetery at Phourni, in Branigan, K. (ed.) *Cemetery and Society in the Aegean Bronze Age*. Sheffield: Sheffield University Press, 87-102.
- Mangou, H. and Ioannou, P. V. 1998. On the Chemical Composition of Prehistoric Greek

- Copper-Based Artefacts from Crete. *Annual of the British School at Athens* 93, 91-102.
- Manning, S. 1994. The Emergence of Divergence: Development and Decline on Bronze Age Crete and the Cyclades, in Mathers, C. and Stoddart, S. (eds.) *Development and Decline in the Mediterranean Bronze Age*. Sheffield: John Collis, 221-270.
- Manning, S. 1995. *The Absolute Chronology of the Aegean Early Bronze Age: Archaeology, Radiocarbon, and History*. Sheffield: Sheffield Academic Press.
- Manning, S. 1997. Cultural Change in the Aegean c. 2200 B.C., in Nüzhet Dalfes, H., Kukla, G. and Weiss, H. (eds.) *Third Millennium B.C. Climate Change and Old World Collapse*. London: Springer, 149-171.
- Marinatos, S. 1932. Προτομνιοκος θολοτος ταφος παρα το Χωριον Κρασι Πεδιαδος. *Αρχαιολογικον Δελτιον* 12, 102-141.
- Momigliano, N. 1991. MM IA Pottery from Evans' Excavations at Knossos: A Reassessment. *Annual of the British School at Athens* 86, 149-271.
- Momigliano, N. 1999. Osservazioni sulla nascita sei palazzo minoici e sul periodo prepalaziale a Cnosso, in La Rosa, V., Palermo, D. and Vagnetti, L. (eds.) *επιποντον πλαζομενοι. Simposio italiano di Studi Egei, dedicato a Luigi Bernabò Brea e Giovanni Pugliese*. Roma: Scuola Archeologica Italiana di Atene, 69-74.
- Muhly, J. D. 1985. Beyond Typology: Aegean Metallurgy in its Historical Context, in Wilkie, C. and Coulson, W. D. E. (eds.) *Contributions to Aegean Archaeology: Studies in Honour of William A. McDonald*. Minneapolis: Center for Ancient Studies, University of Minnesota, 109-142.
- Murphy, J. M. 1998. Ideologies, Rites and Rituals: A View of Prepalatial Minoan Tholoi, in Branigan, K. (ed.) *Cemetery and Society in the Aegean Bronze Age*. Sheffield: Sheffield University Press, 27-41.
- Nakou, G. 1995. The Cutting Edge: A New Look at Early Aegean Metallurgy. *Journal of Mediterranean Archaeology* 8, 1-32.
- Panagiatopoulos, D. 2002. *Das Tholosgrab E von Phourni bei Archanes. Studien zu einem frühkretischen Grabfund und Seine Kulturellen Kontext*. BAR (International Series) 1014. Oxford: Archaeopress.
- Papadatos, Y. 2003. The 'International Spirit' and Interregional Interaction in the EBA Southern Aegean: The Evidence from Pre-palatial Crete (Abstract). *Bulletin of the Institute of Classical Studies of the University of London* 46, 232-233.
- Pendlebury, J. D. S. and Money-Coutts, M. B. 1939. Excavations in the Plain of Lasithi. I. The Cave of Trapeza. *Annual of the British School at Athens* 36, 5-132.
- Politis, T. 2001. Gold and Granulation: Exploring the Social Implications of a Prestige Technology in the Bronze Age Mediterranean, in Shortland, A. J. (ed.) *The Social Context of Technological Change. Egypt and the Near East, 1650-1550 BC: Proceedings of a Conference held at St. Edmund Hall, Oxford 12-14 September 2000*. Oxford: Oxbow Books, 161-193.
- Renfrew, C. 1972. *The Emergence of Civilisation: The Cyclades and the Aegean in the Third Millennium BC*. London: Methuen.
- Sakellarakis, J. A. and Sapouna-Sakellarakis, E. 1997. *Archanes. Minoan Crete in a New Light*. Athens: Ammos Publications, Eleni Nakou Foundation.
- Sbonias, K. 1999. Social Development, Management of Production, and Symbolic Representation in Prepalatial Crete, in Chaniotis, A. (ed.) *From Minoan Farmers to Roman Traders: Sidelights on the Economy of Ancient Crete*. Stuttgart: Franz Steiner Verlag, 25-52.
- Schoep, I. 2004. Assessing the Role of Architecture in Conspicuous Consumption in the Middle Minoan I-II Periods. *Oxford Journal of Archaeology* 23, 243-269.

- Seager, R. B. 1912. *Explorations in the Island of Mochlos*. Boston and New York: American School of Classical Studies.
- Sherratt, A. G. and Sherratt, S. 1991. From Luxuries to Commodities: The Nature of Mediterranean Bronze Age Trading Systems, in Gale, N. H. (ed.) *Bronze Age Trade in the Mediterranean*. Studies in Mediterranean Archaeology 90. Göteborg: Paul Åström, 351-386.
- Soles, J. S. 1992. *The Prepalatial Cemeteries at Mochlos and Gournia and the House Tombs of Bronze Age Crete*. Hesperia: Supplement XXIV. Princeton: American School of Classical Studies at Athens.
- Stos-Gale, Z. A. 1993. The Origin of Metal Used for Making Weapons in Early and Middle Minoan Crete, in Scarre, C. and Healy, F. (eds.) *Trade and Exchange in Prehistoric Europe. Proceedings of a Conference Held at the University of Bristol, April 1992*. Oxford: Oxbow Books, 115-129.
- Stos-Gale, Z. A. 1998. The Role of Kythnos and Other Cycladic Islands in the Origins of Early Minoan Metallurgy, in Mendoni, L. G. and Mazarakis Ainián, A. J. (eds.) *Kea-Kythnos: History and Archaeology. Proceedings of an International Symposium Kea-Kythnos, 22-25 June 1994*. Athens: Research Centre for Greek and Roman Antiquity, 717-736.
- Stos-Gale, Z. A. 2001. Minoan Foreign Relations and Copper Metallurgy in Protopalatial and Neopalatial Crete, in Shortland, A. J. (ed.) *The Social Context of Technological Change. Egypt and the Near East, 1650-1550 BC: Proceedings of a Conference Held at St. Edmund Hall, Oxford 12-14 September 2000*. Oxford: Oxbow Books, 195-210.
- Stos-Gale, Z. A. and Gale, N. H. 2003. Lead Isotopic and Other Isotopic Research in the Aegean, in Foster, K. P. and Laffineur, R. (eds.) *METRON. Measuring the Aegean Bronze Age. Proceedings of the 9th International Aegean Conference/ 9e Rencontre égéenne internationale. New Haven, Yale University, 18-21 April 2002*. Aegaeum 24. Histoire de l'art and archéologie de la Grèce antique. Liège: Université de Liège, 83-102.
- Tod, M. N. 1903. Excavations at Palaikastro II.10 Hagios Nikolaos. *Annual of the British School at Athens* 9, 336-345.
- Van Effenterre, H. and Van Effenterre, M. 1963. *Fouilles Exécutées à Mallia. Étude du site (1956-57) et exploration des nécropoles (1915-1928) II*. Études Crétoises XIII. Paris: Librairie Orientaliste Paul Geuthner.
- Vasilakis, A. 1996. Ο Χρυσός και ο Αργυρός στην Κρήτη κατά την Πρώιμη Περίοδο του Χαλκού. Ηρακλείον: Δήμος Ηρακλείου. Βικελαία Βιβλιοθήκη.
- Warren, P. 1972. *Myrtos. An Early Bronze Age Settlement in Crete*. Oxford: British School at Athens, Thames and Hudson.
- Warren, P. 1976. Review of *Aegean Metalwork of the Early and Middle Bronze Age*. By Keith Branigan. *Antiquaries Journal* 56, 93-95.
- Watrous, L. V. 1994. Crete from Earliest Prehistory Through the Protopalatial Period. *American Journal of Archaeology* 98, 695-753.
- Watrous, L. V. 2001. Addendum: 1994-1999, in Cullen, T. (ed.) *Aegean Prehistory: A Review*. Boston: Archaeological Institute of America, 216-223.
- Whitelaw, T. M. 1983. The Settlement at Fournou Korifi, Myrtos and Aspects of Early Minoan Social Organization, in Krzyszkowska, O. and Nixon, L. (eds.) *Minoan Society. Proceedings of the Cambridge Colloquium 1981*. Bristol: Bristol Classical Press, 323-345.
- Wilson, D. E. 1994. Knossos Before the Palaces: An Overview of the Early Bronze Age (EM I-EM III), in Evely, D., Hughes-Brock, H. and Momigliano, N. (eds.) *Knossos: A Labyrinth of History*. London: British School at Athens, 23-44.
- Xanthoudides, S. 1918. Πρωτομινωικοί ταφοί Μεσαράς: Μαραθοκεφάλον. Αρχαιολογικόν Δελτίον 4, 15-23.
- Xanthoudides, S. 1924. *The Vaulted Tombs of the Mesara*. London: Hodder & Stoughton Ltd.