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## Exotic raw materials in Early Minoan Crete: cetaceous ivory and amber. A connection with the Iberian Peninsula?

### ABSTRACT

The study of prestige materials is one of the best approaches to obtain information on different aspects of a society, such as internal complexity or, due to the exoticism of many materials, the external relations and mobility of groups. Of those high-value materials, ivory is especially useful due to its restricted provenance and its availability to characterize its source relatively easily, both visually and by spectrometric techniques.

Ivory from the Early Minoan period has been mainly identified as hippopotamus ivory, the product of trade with the Syrian area or Egypt. Our recent investigation of 35 ivory seals from the Early Minoan tholoi shows that ivory supply was less homogeneous than previously thought. Four of the seals, from Ayia Triada and Archanes, have been identified as cetaceous ivory, while one amber seal from the tholos of Platanos has also been identified.

During the same period (3rd millennium B.C.), the use of cetaceous ivory is only identified in the Iberian Peninsula, where it is possible to identify the presence of similar typologies, such as the anthropomorphic folded-arm figurines and the important number of tholoi present in the south of the Iberian Peninsula. These typologies, together with the sharing of the same prestige material supplier, support the existence of long-range contact around the Mediterranean World at this early date.

**KEYWORDS:** Ivory, amber, mobility, Early Minoan, Iberian Peninsula, tholos, folded-arm figurines, wrist guards, Raman spectroscopy

*να σταματήσεις σ' εμπορεία Φοινικικά,  
και τες καλές πραγμάτειες ν' αποκτήσεις,  
σεντέφια και κοράλλια, κεχριμπάρια κ' έβενους,  
και ηδονικά μυρωδικά κάθε λογής,  
όσο μπορείς πιο άφθονα ηδονικά μυρωδικά*

K. ΚΑΒΑΦΗΣ

*may you stop at Phoenician trading stations  
to buy fine things,  
mother of pearl and coral, amber and ebony,  
sensual perfume of every kind  
– as many sensual perfumes as you can*

C. CAVAFY

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### INTRODUCTION

The history of contacts during the Cretan Early Bronze Age dates back to the very beginning of the era. Due to the central position and early social development of Crete, contacts with Near East and Egypt, as well as the South of Italy, are well known.

The development and spreading of Archaeometry has provided new tools to continue exploring this topic (Kristiansen 2014). Recent discoveries in the south of the Iberian Peninsula have reopened the debate about contacts across the Mediterranean. In different settlements of this area, where ivory items are common finds, the raw material was Asian elephant ivory, from the taxon potentially inhabiting Syrian territory at the time. Furthermore, amber has been discovered in a similar context and its origin is not Baltic but Mediterranean, probably Sicily (Murillo Barroso, Martín Torres 2012, 187-216).

A third piece of evidence is the presence of a red type of pottery with no clear local parallels. This ceramic has been petrographically characterized as well as typologically studied, leading to the conclusion that its origins are in Anatolia, which shows parallels with potteries from Troy I-II, Lerna and other Aegean areas (Gonzalez Prats et al. 1992-94, 7-38).

### THEORETICAL AND METHODOLOGICAL PREMISES

Prestige and exotic materials play a very important role in traditional societies and have a specific weight in the context of social relations, both in showing group identity to other groups and within internal discourse. During Late Prehistory, when most Mediterranean societies are already sedentary and all are developing different processes, increasing their complexity, the presence of these materials experiences an important increase in the whole area.

The concept of “prestige materials” includes many kinds of object, both local and exotic: high quality pottery types, engraved stones, bones and horns, and metals are usually local to most areas, but other materials such as amber, some pigment types or ivory derive from restricted areas and their “exoticism” assures us of their importance in the prehistoric social discourse (Van de Noort 2012, 61-79).

A middle-long distance interchange/trade existed to supply the necessary stock of exotic materials needed by the elites to develop their role, creating an implicit network of social contact with characteristics which we will not examine here. The identification of the provenance of those materials will provide us with extremely valuable information on the organization of those contact networks in a context where written sources provide very little.

### WHY CHOOSE IVORY AND AMBER?

Ivory and amber have been chosen as the topic of this work due to their exotic character during Late Prehistory in most parts of the Mediterranean.

Different ivories and substitutes were used during the 3rd and 2nd millennia in this region, with the exception of true elephant ivory. Hippopotamus, boar tusk, sperm whale and fossil ivories have been detected in different archaeological contexts across Europe, and all provide clues to different supplying areas and potential contacts.

The same is true of amber; it is possible to distinguish at least between Baltic and non-Baltic, due to the levels of succinic acid present in the sample. The main ambers used during the period that concerns this study are the Baltic and Sicilian kinds, which are easily distinguishable (Murillo Barroso, Marti3n Torres 2012, 187-216).

Amber is not common during the Early and Middle Minoan periods, in contrast with the Helladic horizon (Czebreszuk 2005, 25-26). No amber materials are known in Prepalatial Crete except for two nuclei discovered by Xanthoudides (1924) during his excavations in Tholos II of Porti, and not preserved due to the destructive analyses carried out by Mosso after the excavation. Those nuclei were not convincing for Evans, who proposed that they were just a solid resin used for the fumigation of the tholos (Cultraro 2012, 169-189).

### MATERIAL STUDIED

Thirty-five seals from six Minoan tholoi (Moni Odigitria, Lebena, Archanes, Platanos, Porti and Ayia Triada) were studied by permission of the Archaeological Museum of Herakleion and the 23rd Ephorate of Prehistoric and Classical Antiquities. The visual inspection showed that many of them were burnt, and all were covered by conservation treatments.

A preliminary visual inspection was performed on all the samples studied in this work. A first separation between bone and ivory was easily achievable due to the presence of traces of Harvesian channels in carved bones, natural shapes from articulations and in general a more wrinkled surface. As expected, the material was predominantly hippopotamus ivory (Krzyszowska 1990). Four of the seals showed an extremely white color and the characteristic concentric pattern found in sperm or killer whale ivory (Espinoza and Mann 1992, 15-16). This presence of cetaceous ivory only has a contemporary parallel in the Iberian Peninsula (Schuhmacher 2012, 45-68)

Concerning the seal HM1064 from Platanos, its resinous appearance led us to identify it as amber.

To better characterize the material, a selection of 11 especially significant seals (including the four that showed the cetaceous pattern) were studied under a Dino-Lite Pro HR digital microscope, confirming the results obtained from the naked eye inspection.

The results were as follows:

SEAL No	PROVENANCE	MATERIAL
HM2823	Moni Odigitria	Unidentifiable
HM2826	Moni Odigitria	Hippopotamus
HM2868	Moni Odigitria	Unidentifiable
HM2835	Moni Odigitria	Hippopotamus
HM2837	Moni Odigitria	Hippopotamus
HM2838	Moni Odigitria	Unidentifiable
HM2841	Moni Odigitria	Hippopotamus
HM2842	Moni Odigitria	Hippopotamus
HM2843	Moni Odigitria	Hippopotamus
HM2008	Lebena	Unidentifiable

#### 4 ΠΕΠΡΑΓΜΕΝΑ ΙΒ' ΔΙΕΘΝΟΥΣ ΚΡΗΤΟΛΟΓΙΚΟΥ ΣΥΝΕΔΡΙΟΥ

SEAL No	PROVENANCE	MATERIAL
HM2011	Lebena	Wild boar
HM1998/Seal IIα2	Lebena	Uncertain (bone or hippopotamus ivory?)
HM2002/Seal IIα6	Lebena	Hippopotamus
HM2288/III Seal3	Lebena	Unidentifiable
HM1975/II Seal2	Lebena	Unidentifiable
HM1916/I Seal4	Lebena	Hippopotamus
HM 1917/I Seal5	Lebena	Hippopotamus
HM1918/I Seal6	Lebena	Hippopotamus
HM1928/I 57	Lebena	Hippopotamus
HM1929/I 61	Lebena	Hippopotamus
HM1930/I 60	Lebena	Hippopotamus
HM1931/I Seal20	Lebena	Unidentifiable
HM1933/I Seal22	Lebena	Probably hippopotamus
HM1936/I 77	Lebena	Hippopotamus
HM1940/I Seal 30	Lebena	Hippopotamus
HM1973/Seal II 3	Lebena	Hippopotamus
HM1974/Seal II 4	Lebena	Hippopotamus
HM1978/Seal II 8	Lebena	Hippopotamus
HM2012 AN Unnumbered	Lebena	Hippopotamus
HM1940	Lenda	Hippopotamus
HM2252	Archanes	Cetaceous
HM1129	Platanos	Hippopotamus
HM1064	Platanos	Amber
HM648	Porti	Hippopotamus
HM480	Ayia Triada	Cetaceous
HM443	Ayia Triada	Cetaceous
HM482	Ayia Triada	Cetaceous

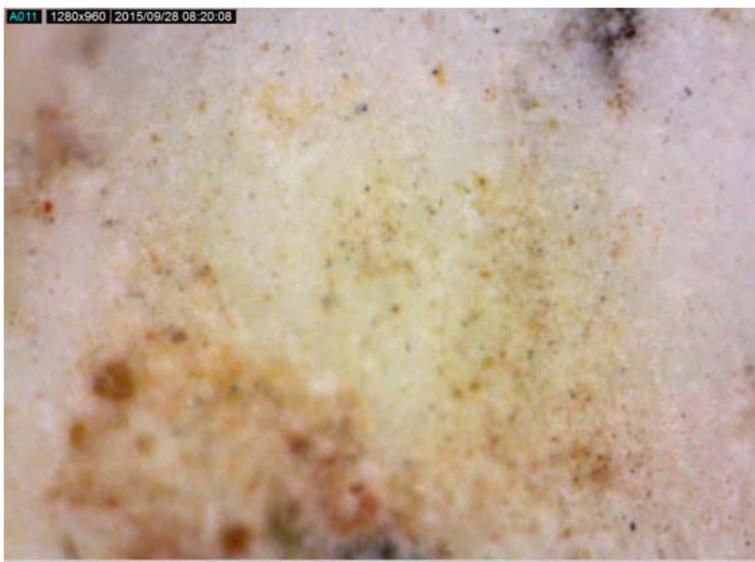


Fig. 1. Pattern of wild boar ivory.



Fig. 2. lamellae pattern of cetaceous ivory.



Fig. 3. lamellae pattern of hippopotamus ivory.



Fig. 4. Amber.

The analytical study was performed with the support of IESL-FORTH, using a compact mobile Raman spectrometer (IESL-FORTH) with excitation at 785 nm. The beam power on the sample was in the range of 4-40 mW. Typical exposure time was 10-20 sec per scan, with an average of 2-5 scans.

Due to the conservation of the material and the treatments present on the surface, it was not possible to record a Raman spectrum. Instead, a fluorescence profile appeared.

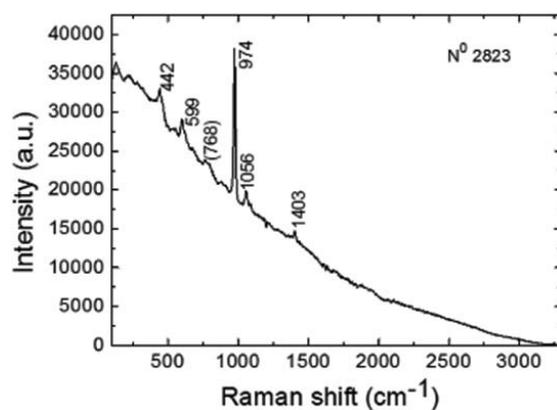


Fig. 5. Fluorescence from HM2288/III Seal3.

In the case of seal HM1064, although the fluorescence was still quite high, it was possible to obtain a weak signal of resinous material confirming that it is actually amber, but its origin was impossible to establish.

#### OTHER PARALLELS:

Together with the use of cetaceous ivory and amber such as in the Iberian Peninsula and the mentioned presence of Eastern raw materials in the Western Mediterranean, there are some parallels that suggest the existence of a recurrent contact across the whole Mediterranean Basin.

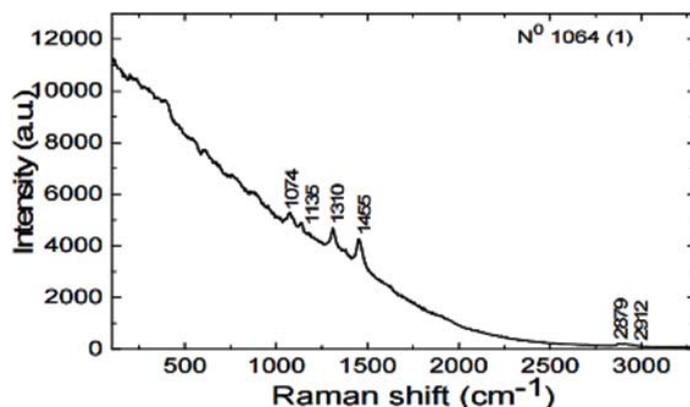


Fig. 6. HM1064 spectrum.

## THOLOI

The tholos tomb is a well-known and characteristic Cretan collective burial typology, characterized by the use of round masonry structures with an extremely long period of utilization (in some cases, around 1000 years, including reutilizations in later periods after initial abandonment). However, although there are slight variations in the way that the structures are covered, i.e. vaulted cover or not, or different kinds of covering systems, the homogeneity of the tholos tomb is indisputably a cultural phenomenon, even far away from the Messara nucleus. But, although more than 70 tholoi have been discovered and studied more or less in depth, the geographical and cultural origins of this structure remain unknown. Cycladic, Libyan, Eastern and indigenous origins have been proposed with varying degrees of success (Branigan 1970). But there is also a strong similarity between the Cretan and the Iberian tholoi of the Chalcolithic period, especially the examples from the southeast of the Iberian Peninsula, related to the cultural horizon of the Almería Culture, whose main site is Los Millares. In fact, this typological similarity was first suggested by Branigan in his book *The Tombs of Mesara* (1970), but the author does not pay close attention to this typological similarity and instead bases it on the great geographical distance. In fact, the parallel is quite strong, not only in terms of typology but also in the ritual activity involved.

The site of Los Millares was founded ca. 3300 BC in the Andarax Valley (Almería, Spain), with three walled enclosures and a citadel controlling a cistern and a water conduit, and the later addition of 13 fortresses to increase the control of the territory (Molina Gonzalez and Cámara Serrano 2010). From the foundational moment this site included a tholos necropolis that grew to almost 80 tholoi, with some internal differences related with the social complexity of the site and presumed social division and inequality, possibly masked by the collective burial ritual (Cámara Serrano, Molina González and Alcaraz Hernández 2010, 325-340).

The circular tombs of Los Millares can be divided into three subtypes, and while in one of them the walls of the tholoi were built with orthostats (following the Megalithic tradition), in the other two they are made with masonry based on the same technique as in the Cretan tholoi, showing the same dichotomy of vaulted coverings and probable timber covering (Branigan, 1970; Calvín Velasco 2014, 1-13). These tholoi present an antechamber before the entrance where *betils* and other ritual items are usually unearthed, as well as traces of ritual banquets held during the burial ritual, as in the Messara tholoi (Branigan 1987, 43-51). However, there are three significant differences between Iberian and Cretan tholoi: firstly, the corridor present in the Iberian tombs instead of the rooms of the Cretan tholoi; secondly, the location of removed bones and items; and thirdly, the fact that the Iberian tholoi were always covered with a tumulus connected to social status (Calvín Velasco 2014, 1-13). However, two tombs from Los Millares have a funerary area in the antechamber related with a similar activity of secondary burial, and in fact, the antechambers of the Cretan tholoi were normally built at a later date than the first burials (Petit 1987, 35-42)

Tholos tombs are also present in the Guadalquivir Valley and the south west of Iberia, with strong similarities (masonry walls, vaulted coverings) but also significant regional features

(basically a noticeably longer corridor). In fact, in this area there is a higher form of complexity in the burial typology, and similarities are more traceable in terms of the ritual developed inside, which we will comment on below.

As in the Cretan Messara, almost all Iberian tholoi are collective burials, with an average of 100 individuals per tomb. Concerning the funerary rituals, both areas show surprising similarities. Collective burial in Crete is probably related to the earlier Neolithic burials in caves, but the particular process of removing, breaking and reorganizing the bones, with special attention paid to the skulls in the Cretan tholoi has no local nor close strong parallels, while in Western Europe similar rituals are well known with a stronger development process during the Megalithic horizon (Branigan 1970). In the Iberian Peninsula, a special role attributed to the skulls can be proposed for the southwestern site of Valencina de la Concepción, where the skulls play a preferential role in secondary burials in the Necropolis area as well as in the domestic area of the site; this can be similarly observed in Camino de las Yeseras (Madrid) in Central Spain (Liesau et al. 2014, 137-148; Branigan 1970).

In all cases, inhumation is the general rule, and the presence of burnt bones, explained in the Cretan tholoi by the fumigations (Branigan 1987, 43-51), is also visible in Los Millares (Molina Gonzalez, F., personal communication). Concerning the role proposed for the antechambers of the Cretan tholoi in the putrefaction of bodies (Branigan 1970), a similar role has been proposed for the Western tholos corridors, often divided in different sections by stone ritual gates (Rodríguez López and Cara Barrionuevo 1985). The alignment with the rising sun is also shared in almost all cases, and the exceptions should be considered to be due to the builders' decision to direct the entrances towards another astronomical or even geographical reference point.

Stone blades are present in both areas, in obsidian in the Cretan tholoi, and in silex in the Iberian Peninsula. Another common feature is the preparation of the floor with a sand or earth layer over the older human remains prior to the deposition of new bodies (Murphy 1998, 27-40; Pajuelo Pando and López Aldana 2013, 281-291).

Finally, the most convincing parallel is directly related to the post-depositional treatment of the bodies. We have already commented on the importance of the removal of bones at both ends of the Mediterranean, with their consequent removal and breaking. In the tholos of Kaminospelio, a quernstone with traces of ground bones was unearthed (Branigan 1987, 43-51), showing that the human remains were ground into powder. During the same period in the south of the Iberian Peninsula, especially in the area of the Tajo and Guadiana rivers, the Bell Beaker pottery is decorated with a white paste that fills the impressions in the decoration. This paste was chemically analyzed with the surprising result that it was produced using charred and ground bones. Unfortunately, due to the charring process of the bones and the subsequent firing of the pottery, the apatite from the bones was too degraded and it was impossible to discern the species (Odriozola and Martínez 2007, 135-141); however, it has not been ruled out that they could be human. In that case, we would detect an extremely similar ritual in dealing with ancestral remains. Citing J. M. Murphy, *'the choices made by a society regarding the disposal of their dead reflect the ideologies, beliefs and social structures of that society'* (1998),

this fact, together with the coincidental use of sperm whale ivory, has allowed us to believe in a closer connection than previously thought, possibly extending into the area of ideology.

#### FOLDED-ARM FIGURINES

Folded-arm figurines are a representative element of the Aegean cultures, with a clear predominance of the Cycladic types, and some specific Cretan types. This kind of figure has clear precedents in the Aegean area but it is not the purpose of this work to elaborate on them. These figures are a rare typology in the Central Mediterranean, and the Egyptian or Beer Sheva parallels are older than the period considered in this study. Nevertheless, in the south of the Iberian Peninsula, during the Chalcolithic period, quite a close typology appears without clear local precedents.

Generally known as anthropomorphic figurines, folded-arm figurines can be carved in limestone or marble, bone and ivory, with a grouping of the ivory and bone types in the southern and eastern areas, while the stone types are restricted to the Guadiana River Basin. They have folded arms adhering to the body, with or without indication of hands. Feet when present are carved, and the head is rounded and flat, joined to the body by a short neck or directly placed on the shoulders. The sex is also marked with a schematic representation of a penis for males, and by the presence of the pubic triangle, and often breasts, for females. The face is represented following the Iberian tradition of schematic figurines, with roundish eyes and the nose and eyebrows indicated by a line. Ears are sometimes present as well as hair, and they present two parallel lines on both sides of the face, a characteristic Iberian representation traditionally interpreted as symbolic tattoos (Hurtado 1980). The parallel with the Cycladic figures, specifically the Keros-Syros type, has been already proposed by V. Hurtado (1980), together with other Mediterranean materials like the figures of the Badarian Egyptian figures, but not as deeply as this topic requires. The main difference is in the face, specifically the mentioned facial tattoo, which was in fact used to reject a direct connection between the Iberian and the Cycladic typologies. However, facial parallel marks are not unknown in the Cycladic figures, but painted in red instead of carved (Escacena 2016, 99-116).

From our point of view, if it would be possible to argue for a direct relationship between the Cycladic and the Iberian figures. In the Early Minoan context, it would be easier to establish this connection. Specifically, the Cretan Siva and Trapeza types, with their smaller size, their preference for bone or ivory as a raw material and their direct connection with the Messara area where the other parallels are visible, make us think that the relationship is of the result of a higher level of contact than the sporadic sharing of a pan-Mediterranean religious concept.

#### WRIST GUARDS

An element that strongly attracted our attention is a kind of item consisting of a long, rectangular plaque, usually made of limestone, with two perforations at the ends. These elements clearly resemble the Western wrist guards, despite Xanthoudides' rejection of this connection, without arguing clear motifs (Xanthoudides 1924). The use of this item is also discussed in Western

European Archaeology (Turek 2015), but it is necessary to mention that their use as a protection for the archer's arm is now discarded because of the intrinsic characteristics of the item (Palumbo 2012), and current explanations consider a symbolic purpose. The correspondence between the Minoan whetstones has been proposed by V. Heyd (2008), but without an in-depth comparison. It seems interesting to mention that the majority of the Minoan whetstones have only two perforations instead of four like the majority of the Western and Central European wrist guards, but if we focus on the wrist guards found in the Mediterranean Basin, it is in this area that we find the majority of those with two perforations, again coinciding with the Minoan ones (Fokkens et Al. 2008, 112-140).

In fact, across the whole European continent and North Africa, wrist guards have been identified according to the typological criteria mentioned above; thus there is no reason to refuse this interpretation for the Cretan ones, following the same criteria as in other areas.

The recurrent discovery of these objects in burial contexts like the tholoi is again coincident with the majority (almost the totality) of the Western finds, and if it is not possible to identify the carrying position of those from Crete as with those in the continental findings (Palumbo 2012, 1-13), this is because of post-depositional ritual activities performed in the Cretan tholoi rather than a different function of the item. Considering these arguments, our opinion is that the *whetstones* had the same functionality as the Western wrist guards (whatever that was), and they can perfectly be considered part of an elite paraphernalia present in tholoi, together with other militarist/coercive elements like daggers.

## CONCLUSIONS

Despite the lack of Asian elephant ivory finds in Crete, hippopotamus ivory is by far the preferred raw material for the ivory industry in the island during the first half of the 3rd millennium. Considering that one of the origins of this raw material is the Syrian area, as is also the case for elephant ivory, cultural reasons for this absence seem more likely than a lack of availability of elephant ivory, especially if we bear in mind that the same supplier area was providing this material to the far Western Mediterranean (Schuhmacher 2012, 45-68; Morillo et al. 2018), and hippopotamus ivory was also present in Southern Spain.

The surprising presence of cetaceous ivory as a potential substitute for real ivory (like wild boar tusk), which had not been previously detected, suggests that in Crete, ivory was a highly valuable commodity *per se*, not only as a useful material for seals, in the same sense as in the Western Chalcolithic and Early Bronze Age. The implications of ivory as a luxury/symbolic material are beyond the limits of this work, but run in the sense of a pan-Mediterranean shared value system as early as the 3rd millennium.

The confirmation of the presence of amber is also extremely important to clarify earlier contacts of Cretan communities during this period. Whatever the provenance, Baltic or Mediterranean, its presence means an undoubted existence of long-distance contacts. According to du Gardin (1998), as mentioned by Czebreszuk (2005), amber reached the Mediterranean through the Beaker groups of Southern France. Whether the Minoan amber studied is Baltic, spread by the Western Beaker groups, or Sicilian, where the presence of Minoans and Western Beakers is

traceable at the same date, it confirms a potential interaction between different cultural groups along an East-West axis.

The presence of exotic raw materials with the same geographical origins at both extremes of the Mediterranean Basin, together with the typological and cultural parallels described above, is, in our opinion, enough evidence to reopen the debate about East-West interaction from the new point of view offered by the new archaeometric techniques, and far from the old diffusionist paradigm of *Ex Oriente Lux*. It is not our intention in this work to go deeper into the nature of Mediterranean relationships during the 3rd millennium BC, the possible hierarchies involved in the contacts and the kinds of link that developed between different groups, but to expose new evidence and the potential of following an old research path by using new approaches.

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