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Pottery Production in Iron Age Crete Viewed in the Context of Regional and External Trade Networks: A Ceramic Petrology Perspective

In Crete, the study of Early Iron Age coarse wares falls somewhat behind the advances that have been made of the Cretan Bronze Age. Early Iron Age ceramic scholarship is still dominated by the study of painted fine wares, particularly those that have turned up in burials rather than the scattered well and other domestic deposits. This paper represents the first results of a research project designed to redress this comparative neglect. We are systematically addressing a number of research questions concerning raw material procurement, clay paste technology, consumption of locally produced coarse wares, and identification of imported coarse wares. In the period under study, Central Crete witnessed first the gradual winding down of palatial networks in the 12th c. BC, and later the precocious appearance of temple architecture, renewed contact with the Levant, and the appearance of a (partly) Orientalising style of painted pottery¹. Outside of Euboea and the Euboean gulf there is no area of Greece that is more connected to other parts of the late ninth- and early eighth-century Mediterranean than Crete.

The synchronic dimension of our project is based on the Early Iron Age ceramic repertoire of two archaeological sites: In north-central Crete, Knossos, a major centre with continuity of occupation from the Neolithic onwards and, in west-central Crete, Thronos Kephala (ancient Sybrita), a settlement only established in 12th c. BC (fig. 1).

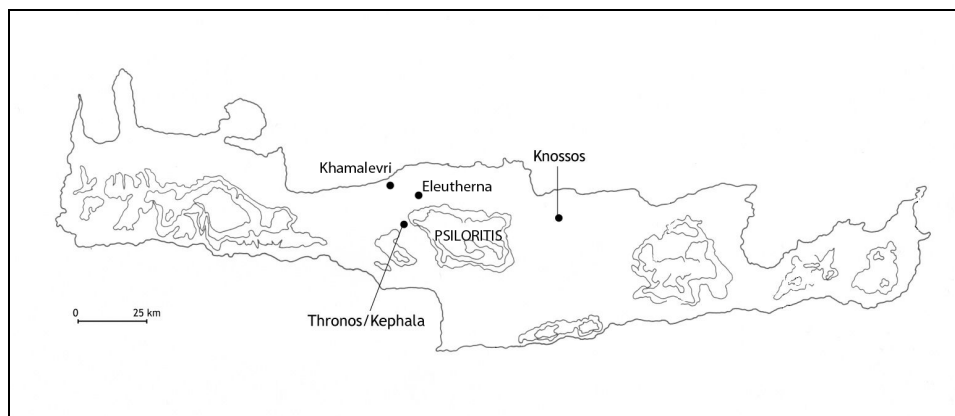


Fig. 1 – Map of Crete.

¹ D'AGATA 1999, 1997-2000; DEGER-JALKOTZY, LEMOS 2006; NOWICKI 2000; WHITLEY 1991, 1997, 2001, 2004.

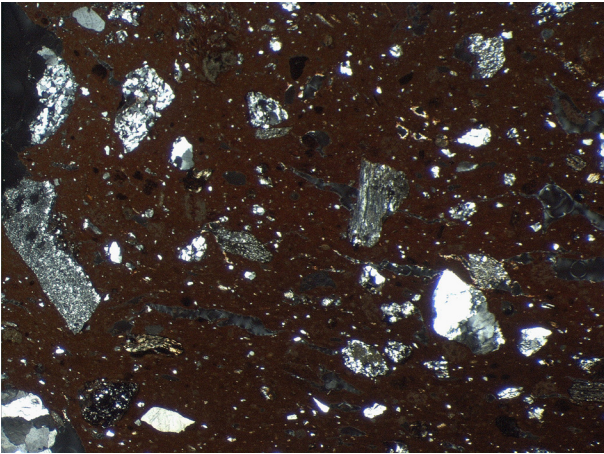


Fig. 2 – Knossos Fabric Group 1, local coarse wares, low-grade metamorphic (KN137, XP, image width = 5.9 mm).

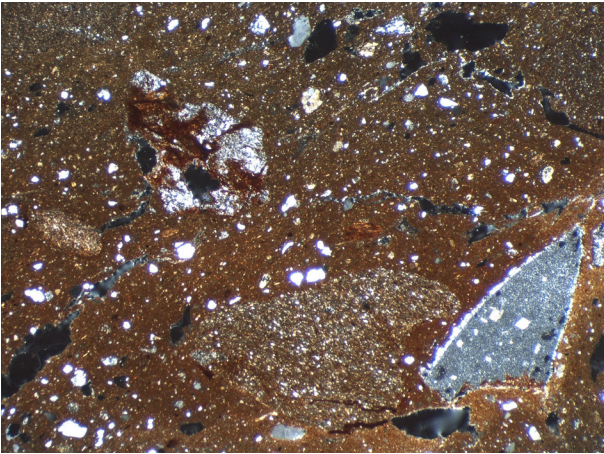


Fig. 3 – Knossos Fabric Group 3, local cooking pots, mix of metamorphic, sedimentary and altered igneous rock fragments (KN146, XP, image width 5.9 = mm).

The material from Knossos has come from a variety of Early Iron Age deposits, which have largely been investigated as a by-product of projects whose principal interest is in the Bronze Age, or, more directly, as a result of rescue excavation. By contrast, the Thronos Kephala Early Iron Age material has been carefully collected and studied, and an articulated typology is under construction.

One of the strengths of petrographic analysis is that it allows us to examine production, consumption in some detail, and from the bottom up. Moreover, comparison between the two different communities of Knossos and Thronos Kephala allows us to shed some light on broader processes, such as the extent to which there was basic continuity in the production and consumption of cooking wares during this period, and the degree to which production is geared to local consumption. Finally, the degree to which either Knossos or Thronos Kephala is importing coarse wares either from within Crete or from elsewhere in the Aegean and the Mediterranean can be assessed.

Excavations at Knossos have brought to light whole vessels from the tombs of the North Cemetery that provide a ceramic repertoire quite different in terms of shape, style and fabric from the Knossos town pottery which is clearly of domestic character, mainly used for cooking and storing activities². Five deposits, from both funerary and domestic contexts, were selected: the Southwest Houses³, the Geometric Well⁴, Little Palace North⁵, Villa Dionysus⁶, and a selection of tombs from the North Cemetery⁷. Greek-Italian excavations at the site of Thronos Kephala,

generally identified with the Classical polis of Thronos Kephala, have uncovered a settlement showing continuous occupation from the 12th to the 7th c. BC⁸. Twenty-nine deposits, from both ritual and domestic contexts, were sampled.

Petrographic data⁹, based on 416 pottery samples, shows, as expected, that the majority of the Knossos and Thronos Kephala coarse and cooking pot wares are consistent with the regional geology and were thus produced locally or within the broader vicinity of each site¹⁰. Knossos is located in the Heraklio basin, characterised by Neogene limestones, marls and clays, while metamorphic outcrops of the phyllite-

² COLDSTREAM 1972, 2000, 2001.

³ COLDSTREAM, MACDONALD, 1997.

⁴ COLDSTREAM 2000: 279–284.

⁵ HATZAKI *ET AL.*, forthcoming.

⁶ COLDSTREAM, HATZAKI 2003.

⁷ COLDSTREAM, CATLING, 1996; COLDSTREAM, 2001.

⁸ D'AGATA 1999, 1997-2000, 2001, 2003, 2007 forthcoming a, b.

⁹ A second phase of the project, in collaboration with V. Kilikoglou (NCSR 'Demokritos' Athens) and funded by a 2008 INSTAP grant, on the geochemistry of clays and finer-grained ceramics is currently underway. Neutron activation analysis is being performed on a sub-sample of 203 sherds and 12 clays.

¹⁰ For a preliminary discussion of the local fabrics, see BOILEAU, D'AGATA, WHITLEY 2009.

quartzite series are found at the southern and western edges of the basin¹¹. Three main fabric groups (figs. 2-3), comprising pithoi, amphorae, basins and cooking pots dating to the 12th-7th c., exhibit a mix of sedimentary, metamorphic and altered igneous rock fragments that are consistent with the geological deposits in the broad vicinity of Knossos as well as with published studies of earlier Neolithic and Bronze Knossian ceramic fabrics¹². Thronos Kephala is located in an area mainly characterised by Neogene continental deposits of conglomerates, sandstones, clays and outcrops of the Phyllite-Quartzite series with shale, phyllites, quartzphyllites, and quartzite immediately to the north of the site¹³. The majority of ceramic samples fall into four main local fabric groups (figs. 4-5), each characterised by very low to low-grade metamorphic mineral and rock inclusions consistent with the local rock formations of the Phyllite-Quartzite Series but exhibit differences in firing technologies, amount and sorting of coarse inclusions. At both sites, there is a good degree of continuity in the raw materials exploited and in clay paste preparation throughout the periods of the Early Iron Age. Nevertheless, small diachronic changes are visible in the clay paste technology. For example, there is a higher calcareous content in the groundmass of the later period samples while inclusions in the earlier periods are coarser-grained and set in a more reddish calcareous-poor groundmass. Firing at lower temperatures, as shown by optically active groundmasses, is also more common in the later periods. Furthermore petrographic results show that, in general, the functional ceramic range is clearly reflected in the methods of clay preparation: coarse wares, cooking pot wares and finer-grained wares have distinct clay paste technology. There is also evidence for the practice of levigating, mixing and tempering clays, as well as using different clay pastes for different parts of the same vessel. Beyond these local groups, regional and extra-regional imports were also identified. At Knossos one fabric group of 12th-7th c. pithoi is characterised by large rounded inclusions of grey siltstone set in a very fine-grained groundmass. Even though we cannot exclude a local production at or around Knossos, such fabrics are quite common in the Mesara in south-central Crete. Another imported pithos from the Mesara has a fabric characterised by large inclusions of very altered igneous rock fragments, grey siltstone inclusions and vegetal temper set in a bright red and very fine groundmass. The Red Coarse Micaceous fabric group, composed mainly of 9th-7th c. cooking pots, represents a very interesting case. It is characterised by a coarse fraction of muscovite

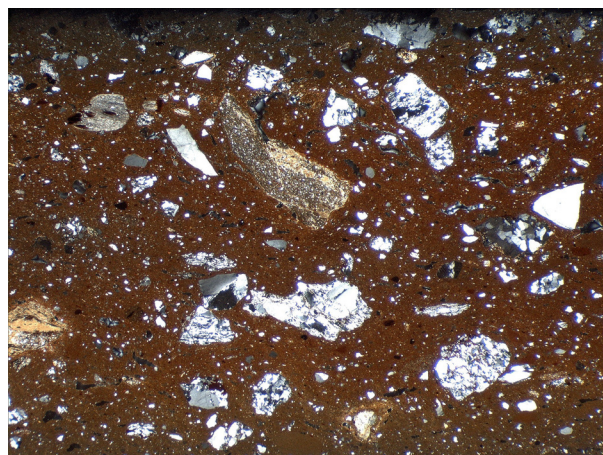


Fig. 4 – Sybrita Fabric Group 1a, local coarse wares, low-grade metamorphic (SY111, XP, image width = 9 mm).

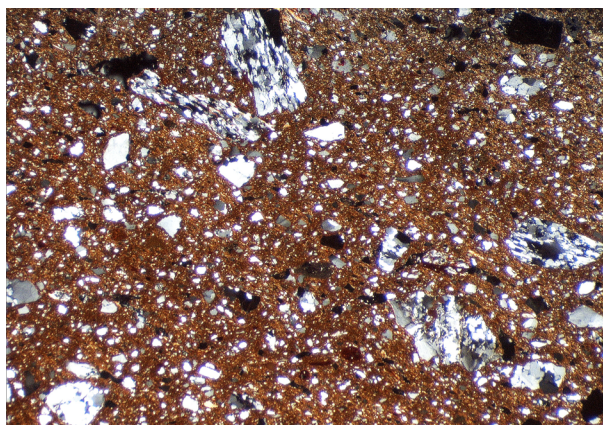


Fig. 5 – Sybrita Fabric Group 2, local cooking pots, red-firing with abundant silicate fine fraction (SY132, XP, image width = 5.9 mm).

¹¹ IGME 1996.

¹² DAY, 1988, 1995, 1997; DAY, WILSON, 1998; DAY *ET AL.*, 1999; HEIN *ET AL.*, 2004a, 2004b; JONES, 1986; LIDDY, 1996; QUINN, DAY, 2007; RILEY, 1983; TOMKINS, DAY, 2001; TOMKINS *ET AL.*, 2004; TOMLINSON, KILIKOGLU, 1998; WILSON, DAY, 1994, 1999.

¹³ IGME 1985 and 1991. To complement the geological information from these maps, a survey of geological materials was undertaken in the main drainages of west-central Crete (Potamos, Amari and Ayios Vassileos valleys). Twenty-eight samples of clays, sediments, sand and rocks were selected and prepared for microscopic analysis.

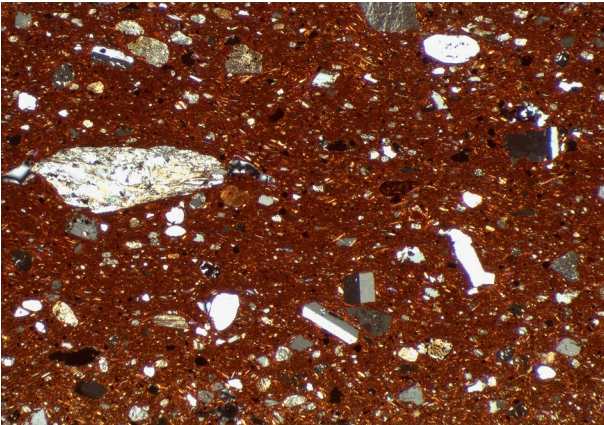


Fig. 6 – Knossos Fabric Group 4, non-local cooking pots, red micaceous fabric (KN92, XP, image width = 5.9 mm).

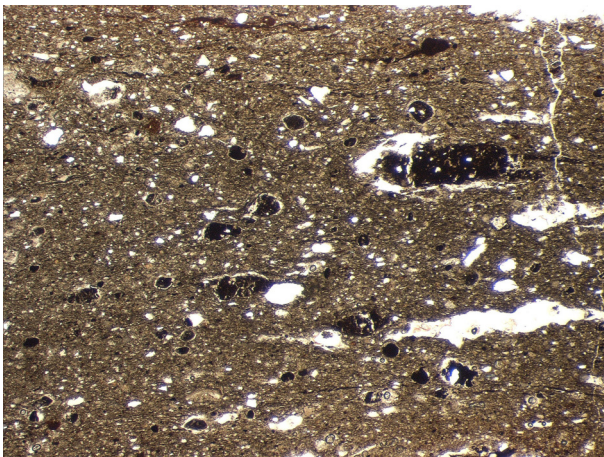


Fig. 7 – Sybrita Fabric Group 7, non-local fine wares from Eleutherna, black TCFs (SY118, PPL, image width = 3.7 mm).

mica inclusions, iron oxides, unaltered feldspars, rounded quartz, shimmer aggregates; a combination of minerals which has not been seen amongst the other local or regional fabric groups (fig. 6). While red micaceous fabrics are attested in the Mirabello area of east Crete the presence of unaltered volcanic elements along with mica in the fine fraction does not fit with the geology of Crete as a whole. In fact the petrographic characteristics of this fabric make a Cretan origin unlikely and point to an off-island origin of production. Some of the Cycladic islands, Naxos for example, have compatible raw material sources so it is very possible that these pots, along with the mica and brown phyllite fabric group, were produced on one of them.

As for Thronos Kephala, imports from other regions in Crete have been identified. For example, a 12th c. stirrup jar has a fabric characterised by a highly fired calcareous clay base tempered with water-worn grey siltstone inclusions is strongly related petrographically to fabrics from the western Mesara in south-central Crete¹⁴. Another fabric, from a cooking pot, is characterised by a mix of sedimentary and metamorphic rock fragments is closer to fabrics from north-central Crete and quite similar to those Knossian fabrics. A 12th c. deep bowl fabric rich in sponge spicules and other microfossils matches similar fabrics from the site of Khamalevri, also located in north central Crete¹⁵. The fabric group characterised by clay pellets set in a silicate-rich fine-grained groundmass (fig. 7), is considered an import

to Thronos Kephala as it compares to the local groups identified at Eleutherna¹⁶. The same is true for the shell-rich calcareous fabric. A final example is a coarse-grained fabric group, comprising 12th-10th c, pithos, amphorae, cooking pot, deep bowl and hydria, characterised by mica-epidote schist, mica schist, mica, serpentinite and metamorphic rock fragments. Petrographically, this group fits well with the mineralogy of the geological samples taken along the Ayios Vassileos valley¹⁷, south-west of Thronos Kephala, where outcrops of ophiolitic material are found. These fabrics could also come from the western Mesara¹⁸, where similar Bronze Age fabrics have been identified¹⁹.

Overall these results show that at Knossos, there are few fabrics from other regions within Crete: of 216 samples examined, there are 14 imported Cretan pieces, and 11 single-sample fabrics or loners while 21 pieces were imported from the Cyclades. This Red Coarse Micaceous fabric occurs first in deposits of the late ninth century BC and remains in use throughout the eighth. Its appearance thus coincides first with the appearance of locally-produced Orientalising metalwork and with the so-called Protogeometric B style, a

¹⁴ MYERS, BETANCOURT 1990; BUXEDA I GARRIGÓS, KILIKOGLU, DAY 2001; BELFIORE *ET AL.* 2007.

¹⁵ NODAROU in press; MOODY *ET AL.* 2003. On LM IIIc KHAMALEVRI, ANDREADAKI-VLASAKI, PAPADOPOULOU 2005.

¹⁶ NODAROU 2008. On Eleutherna, in general, see STAMPOLIDIS 2004.

¹⁷ On the archaeology of the valley, MOODY, PEATFIELD, MARKOULAKI 2000; AGELARAKIS, KANTA, MOODY 2001.

¹⁸ IGME 1984.

¹⁹ BELFIORE *ET AL.* 2007; BUXEDA I GARRIGÓS, KILIKOGLU, DAY 2001; MYERS, BETANCOURT 1990; SHAW *ET AL.* 2001; WILSON, DAY 1994 .

style of painted pottery whose motifs are (in part) inspired by such metalwork²⁰. The Mediterranean-wide connections of Knossos in this period are also marked by at least one Sardinian import²¹. All these imports and processes indicate wider connectivity, and suggest that trade in coarse-wares is a hitherto unnoticed dimension both of growing Mediterranean interaction and of the wider 'Orientalising' processes at work from the late ninth century onwards.

The variety of fabrics, local and otherwise, to be found among the ceramic material of Thronos Kephala, prompts reflections on the role played by that centre in the regional trade dynamics within the island. No off-island importation has been firmly ascertained, which is in fact hardly surprising given the inland position of the site. The presence of material from other parts of the island is, however, of great interest: of 200 samples examined, there are 25 imported pieces, and 13 single-samples or loners. In terms of percentages, in comparison with the 80 percent of local material we have 13 percent imports and 7 percent of loners, among which more importations may be identified. Research is still in the initial stage, and we have yet, therefore, to process the data available in order to be able to advance a well-grounded interpretation. Nevertheless, there can be little doubt that one of the main reasons for the outward projection observed at the site is to be seen in the special position occupied by the hill of Thronos Kephala within the wild, variegated landscape hemmed in between the Psiloritis mountain to the east and mount Kedros to the south. Situated at the northern end of the Amari valley, and to the immediate north of the village of Thronos, the hill of Thronos Kephala stands at a natural crossroad upon which converge valleys and landscapes from various parts of the island²².

With regard to the local production of Thronos Kephala for the earlier phases, the most interesting set of material in terms of circulation and trade consists of the transport stirrup jars decorated with wavy bands. As is well known, transport stirrup jars in coarse ware are a typical Cretan product, presumably meant to contain olive oil and wine. In the 14th and 13th century BC transport stirrup jars, and especially those inscribed with Linear B signs, are among the best indicators for reconstructing organization of production and administration, and for understanding trade at local, micro-regional, i.e. within Crete, and macro-regional, i.e. within the Aegean and the Mediterranean, level²³.

On Crete production of these vases has been ascertained to have continued in the 12th century: the main difference at the typological level is the replacement of the octopus which often decorated it into a wavy band. From a more general point of view it is worth recalling that transport stirrup jars decorated with wavy bands and imported from Central Crete are to be found on the mainland attesting to the vitality of the off-island trade circuits in the aftermath of the fall of the Mycenaean palaces²⁴.

Although known to us only through fragments, transport stirrup jars decorated with wavy bands constitute a popular type of ware in the Thronos Kephala settlement, attested mainly in 12th c. contexts. Of the 22 fragments observed macroscopically²⁵, 18 proved local, belonging, that is, to the class of fabrics identified with petrographic analysis, while 4 (attributable to at least 3 vases) were found to have been imported, and are probably to be attributed to two different workshops, quite likely in Central Crete.

The evidence offered by Thronos Kephala, if confirmed petrographically, would represent a significant indicator of the fact that some workshops of Central Crete probably continued to produce transport stirrup jars, and that new workshops, like the one we can label 'Thronos Kephala workshop', were added to them. At the regional level imported stirrup jars to Thronos Kephala evidences that, after the collapse of the LBA territorial system of political entities, the circulation of and trade in oil and wine associated with the production of these vessels had remained active.

²⁰ BROCK 1957, 143 and 198-9; BOARDMAN 1967, 63-4.

²¹ VAGNETTI 1989.

²² In general, ROCCHETTI 1994.

²³ CATLING, KARAGEORGHIS 1960; HASKELL 1981; DAY 1988; DAY, HASKELL 1995; DAY 1999; HASKELL 2004; DAY, JOYNER 2005; HASKELI 2005; DAY, QUINN, KILIKOGLU, RUTTER forthcoming.

²⁴ MARAN 2005; MARAN, PAPADIMITRIOU 2006; STOCKHAMMER 2007.

²⁵ On macroscopic ceramic fabric analysis as a powerful tool for reconstructing patterns of trade and exchange of coarse ware in Aegean prehistory, MOODY *ET AL.* 2003.

In conclusion, several general points emerge. First, as far as coarse wares are concerned, Crete is not one region but several. Distinct patterns in the production and consumption of coarse wares for both cooking and storage are evident in both Thronos Kephala and Knossos and, in general, persist over the whole of the Early Iron Age. Moreover, each site has a distinct pattern of imports from other parts of Crete. This raises the question of what we mean by 'region' in Crete, in this as in earlier periods. The data from Thronos Kephala allows greater precision in our understanding of trade and interaction within Crete than we can yet achieve for Knossos. But the data from Knossos sheds new light on wider Mediterranean connectivity. Trade in coarse wares is a hitherto neglected aspect of that wider process, evident from the ninth century onwards, which has been variously labelled Orientalization or 'Mediterraneanization'.

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