

LRCW 4
Late Roman Coarse Wares,
Cooking Wares and Amphorae
in the Mediterranean

Archaeology and archaeometry

The Mediterranean: a market without frontiers

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ARCHAEOLOGY AND ARCHAEOMETRY IN LATE ROMAN GREECE: THE CASE OF MAINLAND AND INSULAR SETTLEMENTS, WORKSHOPS AND IMPORTS

CHARIKLEIA DIAMANTI¹, KALLIOPI KOUZELI², PLATON PETRIDIS³

¹Ministry of Culture, 2nd Ephorate of Byzantine Antiquities, 2 Klepsydras Str., 10555 Athens, Greece
hdiaman@yahoo.gr

²Ministry of Culture, Stone Conservation Center, 79 Piraeus Str. Athens; kelli_kouzeli@yahoo.gr

³University of Athens, Department of Archaeology and the History of Art, University Campus Zographos
ppetrid@arch.uoa.gr

In the last few years interdisciplinary scientific collaboration has successfully combined archaeological information and the results of archaeometric investigation revealing a number of new workshops, widening thus our knowledge about the late Roman productions in Greece. Nevertheless, a comparative study of the different production centers has not yet been suggested. Into the framework of this paper the results of the archaeological study and archaeometric analysis of the pottery produced or imported on some sites in Central Greece and islands of the Aegean Sea are presented. The information gathered will contribute to the elaboration of a methodological tool for the study of newly discovered production centers on the basis of petrographic and chemical analyses.

KEYWORDS: MAINLAND AND INSULAR LATE ROMAN GREECE, POTTERY WORKSHOPS, ARCHAEOLOGICAL DATA, ARCHAEOMETRIC ANALYSES, DELPHI, KOS, PAROS, THASOS

Introduction

The late Roman pottery found in mainland and insular regions of modern Greece has not yet contributed to the economic history of early Byzantine times as it could, for two well known reasons: the published archaeological remains of pottery workshops in Greece are rather rare and pottery examination has not yet been carried out in large scale. The existing knowledge about the local productions and the financial activities they witness remain therefore incomplete.

The aim of this paper is to present comparatively the archaeometric results and the archaeological interpretation of two characteristic cases of recently published pottery workshops situated in insular and mainland Greece respectively. The material from two more insular sites, in Paros and Thasos, in Central and Northern Aegean respectively, is currently under interdisciplinary examination and will soon be compared with the results from the first two cases.

These two cases are the mainland site of Delphi (Fig. 1) in Central Greece and one of Kos' harbours, Halasarna (Fig. 2). The two sites share some common historical features like the progressive expansion of their urban plan in the 5th and mainly the 6th century and their abandonment during the 7th century. But, against a widely spread opinion, the data from the study of pottery show that the last decades of the cities' life are not characterized by poverty and isolation (Petridis 2007, 53; 2010, 141-143).

One could also observe an important difference between these two medium-sized cities: the harbour of Halasarna on the island of Kos might be a crossroad on the main

route to and from Constantinople, while Delphi is a town situated in the relatively "marginal" (at that time) area of Central Greece. They also belong to two different spheres of influence: Delphi mainly imported pottery from North Africa all over the late Roman period (Petridis 2010, 139), while Halasarna imported mainly from Asia Minor.

In both cases laboratory examination of tiny pieces of sherds has been carried out. All the analytical techniques available at Stone Conservation Centre of the Hellenic Ministry of Culture for fabric examination have been used. More specifically:

- Observation of fresh fractures and smooth (polished) sections under the stereoscope.
- Petrographic examination (examination of thin sections under the polarizing microscope) that provides information on the nature, size, shape, number and distribution of the mineral grains present.
- X-Ray Diffraction
- FT-IR Spectroscopy
- Chemical analysis for major and minor elements by Flame Atomic Absorption Spectroscopy (fusion with lithium metaborate-mixed standards).

Delphi-Archaeological Data

The late Roman ruins of Delphi have been unearthed mainly during the "Grande Fouille" conducted from 1892 to 1903 by the French School of Archaeology at Athens; at that time, pottery was not preserved. Almost a century later, systematic excavations by the French School have

investigated thoroughly, from 1990 to 1997, two secular buildings of the archaeological site; one of them was public, the *Roman Forum* (usually called *Roman Agora*) and the other one was private, the so-called *South Eastern Villa* (Petridis 2009, n. 18). From both these excavations derives the main *corpus* of the studied pottery, although a smaller quantity also comes from the *Xystos* of the ancient *Gymnasium*, excavated in the late 1980's by the French School and the Greek Archaeological Service. Finally, in the necropolis of the late Roman town and in some of its houses (for the late Roman houses of Delphi see Petridis 2005; 2008, 251-252) lamps and tableware of great interest have been found (Fig. 3).

Pottery workshops have been discovered at two points of Delphi. The most ancient among them came partially into light in the *Xystos* area of the ancient *Gymnasium* (for the pottery workshops discovered at Delphi see Petridis 2004; 2007; 2010, 35-38). Coins and typological analysis of the pottery date them to the second half of the 4th c. AD. Rests of two kilns in a very bad condition have been discovered there, along with a rectangular pit and two small cisterns. One of the kilns, 4m long, is constructed with bricks; the other is smaller and contains *spolia* from earlier buildings (Fig. 4). Kiln-wasters have been discovered around as well as a small number of kiln supports.

The *Southeastern Villa*, the largest to-date excavated architectural complex in late Roman Delphi, was used as a residence from the beginning of the 5th c. until the last quarter of the 6th c. Stratigraphy shows that, around 590 AD workshops of pottery, metalwork and tannery or dye-works were installed inside the quite recently abandoned villa. The most important installations belong to pottery workshops (Fig. 5). Six kilns have been unearthed. They are all of small dimensions (the larger measures 2x2m²). They are square or rectangular in shape and they are built with bricks and small stones; they lay partly on the walls of the villa (even the apse of a *triclinium*) or on the rock; bricks or half-broken *pithoi* necks have been used to support their grills. Three of the kilns have been constructed inside the same room, side by side, but they must have not functioned simultaneously. Additional installations belonging to the workshops have been also discovered around the kilns: a cistern, basins, water-pipes and deep pits serving in a second use, probably, as clay-working pits; two of the rooms of the villa, were transformed into deposits (Fig. 6). Thousands of kiln-wasters, moulds of lamps or moulds of metal objects and kiln supports have been found into the deposits (Fig. 7).

The local production comprises all kind of pottery destined to cover many indoor and outdoor needs (Fig. 8). The clay is of quite good quality, generally light red to pink, well fired with a lightly soaped external surface of light red, light brown or reddish yellow colour. A slip of red or weak red colour covers the upper part of the vases leaving intentionally large tears descending vertically or obliquely to the bottom.

Taking into account that the samples from the late Roman excavations at Delphi belong to objects that were not

manufactured at the same time and were destined for various domestic uses, classification in two groups according to the analysis was proposed:

Delphi-Archaeometric Data

The forty one (41) sherds from the late Roman excavations at Delphi that have been examined at the Stone Conservation Centre (for detailed results see Kouzeli 2010a, 175-180), can be classified in three groups, I-III.

GROUP I (Figs. 9-10)

Nine (9) samples belong to this group. Their fabric is very fine-grained, a texture that imposes chemical analysis. The results of analysis by Flame Atomic Absorption Spectroscopy for major and minor elements confirmed the classification in this group (Fig. 33).

Fragments of feldspars, quartzitic rock, older ceramic material and pyroxenes usually smaller than 30µm are present. Occasionally tiny mica particles have been observed, while calcite is always absent.

GROUP II (Figs. 11-12)

Group II consists of eighteen (18) samples, including clay sample from the floor of local late Roman kiln from the area of the *Southeastern Villa*.

The samples of this group are coarser-grained since they contain numerous particles larger than 30 microns that imposed petrographic examination. Feldspars, micas, quartzitic rock fragments and grains of older ceramic are systematically observed in analogous grain densities.

GROUP III (Figs. 13-14)

The samples of group III are also coarse-grained since they contain numerous particles larger than 30 microns. Feldspars, micas, quartzitic rock fragments and grains of older ceramic are systematically observed in grain's densities similar to group II.

On the other hand, calcareous microfossils are systematically observed in the samples of group III which is in accordance with higher calcium content in this batch of samples (Fig. 33).

A significant number of samples are classified in the previously described three groups. Although very fine-grained, two samples (No 34 and 35) are not classified in group I because of their texture and chemical composition. On the basis of the archaeological information these two samples belonged to imported *Central Greek Painted Ware* (a detailed study of the Central Greek Painted Ware in Petridis 2009b) manufactured most probably at Nea Anchialos (or Thessalian Thebes).

The samples 5 and 6 are coarse-grained and differ from all samples examined in texture as well as in mineralogical and chemical composition. They are not classified in any group, which is in agreement with the archaeological examination according to which these samples belonged to an *African Red Slip* plate and a lamp respectively.

Consequently, local products are clearly distinguished from the imported ones like the *Red Slip Wares*, mainly from Tunisia or the more close geographically *Central Greek Painted Wares* the interdisciplinary analysis of which showed the non Delphic origin of the type.

Kos-Halasarna-Archaeological Data

Since 1985, the University of Athens has carried out excavations and surface research at Halasarna of Kos (Figs. 2, 15) (Kokkorou-Alevras *et al.* 2006, 46-67; Diamanti 2010c, 23-29, 193-196). The evidence provided by this research indicates that from the beginning of the 5th c., a flourishing settlement, extending over the old pagan sanctuary of Apollo, developed at Halasarna. The settlement was occupied until the Arab invasions (middle of the 7th c. AD). As demonstrated by the ceramic evidence, Halasarna became deeply enmeshed in the economic life of the late Roman state as a commercial node on the East Aegean maritime routes. In addition to amphora, fineware and lamp imports (from Asia Minor, Cyprus, Aegean Sea centres, North Africa and Palestine), local production took place in the late Roman settlement (Figs. 16-23). The waste deposits of distorted and misfired examples implied local production of amphoras. According to Ch. Diamanti's PhD study results on the koan amphoras of late Roman Halasarna, the settlement was an important production centre of the cylindrical LR 1 and ovoid LR 13 amphora types from the end of the 6th until the first half of the 7th c. (Diamanti 2010a, 146-7; 2010c, 80-114, 207-216, 331-399; S/N 359-617, fig. 87-139, pl. 11-19. For a nearby late Roman kiln located by the Archaeological Service, see Poulou and Didioumi 2010). Production of these amphoras on a large scale as well as their stamps depicting the emperor provide evidence that they were destined for export of the settlement's agricultural goods as part of a tax to the state in kind. This is the first time that a workshop of stamped late Roman amphoras can be identified with certainty, at least as far as the Aegean is concerned. We have suggested elsewhere that the stamps were part of a state mechanism of financial control performed by *Kommerkiarioi* (commercial inspectors), (Diamanti 2010b, 1-6; 2010c, 106-7, 214-5; 2012; forthcoming b). The standardization and state-involved production of Koan amphoras is supported by the fact that morphologically they follow strictly the well-known and widely distributed shapes of late Roman Amphoras 1 and 13 which is a different case of the locally produced late Roman amphoras from Delphi presenting strong individual characteristics (Pétridis 2010, 45-53).

Macroscopically the local fabric is reddish orange, bearing inclusions. Often the outside surface of the

amphoras is covered by a white-pink wash, which in some cases, because of the fire of the vase, is more green or yellow.

Kos-Halasarna-Archaeometric Data

Forty two (42) samples of amphora sherds from the late Roman excavation at Halassarna have been examined.

The systematic presence of inclusions in the matrix of all Halasarna samples examined, imposed petrographic examination. The following classification in three main groups on the basis of the laboratory data is proposed (for detailed results see Kouzeli 2010b, 137-149, 218-219):

GROUP I (Figs. 24-25)

The majority of the samples examined (twenty-six samples) presents strong similarities concerning the nature, size, distribution and density of inclusions, consisting thus one group (Diamanti 2010c, 142-149, 219 "group B", the samples of which on the basis of the archaeological information belong to the local amphora types, LRA 1 and 13). More specifically, angular plagioclase particles, angular quartz grains, muscovite in elongated thin needles and thicker flakes as well as rather rare calcareous grains of various uneven shapes (often weathered fossils) are distributed in the fine-grained matrix. Despite the fact that in the same amphoras the mineral grains' density varies from place to place, that reflects to the chemical composition, the density of the inclusions in the samples examined was similar. Plagioclase, quartz and mica grains of similar size, distribution and density are present in the glassy matrix of the dull grey-green misfired pottery samples, classifies them to group I, confirming that are of local production. Chemical analysis is in accordance with the results of petrographic examination (Fig. 34).

Furthermore, sherds belonging to this group present similarities to Hellenistic fabric from the same site and local clay samples (after the appropriate laboratory treatments), concerning the nature and amount of the mineral phases present, the Hellenistic being the finer-grained. The members of group I are clearly distinguished from a number of samples from the same excavation also examined here:

GROUP II (Figs. 26-27)

The six samples of Group II bear a much higher number of inclusions compared to Group I: calcareous rounded particles, very short flakes of mica, feldspars, silicate rock fragments, quartz and older pottery grains in minor quantities are evenly distributed. The sherds of this group are archaeologically considered as belonging to amphoras of type LR 1 imported from Asia Minor and Cyprus (Diamanti 2010c, 141-142, 218 "group A1"). The chemical composition differentiates them from those of Group I (Fig. 34).

GROUP III (Figs. 28-29)

Although also characterized by the presence of numerous inclusions, the samples of this group present differences from group II, concerning the shape of quartz grains, the number of calcite particles as well as in chemical composition (Fig. 34). According to the archaeological classification the sherds of group III belonged to imported Palestinian amphoras of types LR 4 and 5 (Diamanti 2010c, 142, 218-219 “group A2”).

Paros (Zoodochos Pighi) and Thasos

In Paros island, in the Zoodochos Pighi inlet, the second, after Halasarna, workshop, which produced both LR 1 and LR 13 (Fig. 30) amphora types has been located (Diamanti forthcoming c), indicating that this co-production of the two famous late Roman amphora types could be a common practice in the Aegean Sea area of the second half of the 6th – 7th c. The amphoras were produced in a large scale and were obviously destined, in a big part, for export of parian agricultural goods. According to the preliminary results of observation of thin sections under the polarizing microscope this production is characterized by the presence of numerous inclusions up to 700µm (0.7 mm) unevenly distributed, calcareous, often heavily weathered particles among which are discerned bioclasts, plagioclase, orthoclase and quartz and mica grains with preferred orientation as well as silicic rock fragments are observed (Fig. 31).

This material as well as the pottery coming from an excavation of a late Roman villa in the island of Thasos (Fig. 32) are under investigation (joint project of the Greek Ministry of Culture, the French School of Archaeology of Athens, the National and Kapodistrian University of Athens, the University of Lille 3-Charles de Gaulle and CNRS-France). The thasian material studied so far is typologically and ceramologically very rich as one would expect from an island with such a strong pottery making tradition, situated near the Via Egnatia and on the maritime routes to Constantinople. The imported amphorae cover most of the well documented types of the Western and Eastern Mediterranean with a strong presence of the LR 2 type. Among the numerous finds of imported tableware, the Asia Minor productions are the best represented. Of great importance is the discovery of glazed pottery in surely dated 6th century contexts. Its presence contradicts the formerly expressed hypothesis of its first appearance in Greece during the 7th century (Blondé *et al.* 2011, 200; Petridis 2013, 16).

Conclusion

The comparative study of two late Roman sites the rather isolated marginal site of Delphi and the harbor of Halasarna has been attempted. The first results of a new project on the systematic interdisciplinary examination of Zoodochos Pigi at the isle of Paros have been also considered. The archaeological documentation has been

supported by the archaeometric examination of 94 samples. The correlation of archaeological, chemical and petrographic data reinforce the fact that two sites exhibited local production as well as import activity: According to the results of petrographic examination and chemical analysis for major and minor elements the sample from the local kiln at Delphi belongs to one of the three main groups of samples (Delphi - group II), while the distorted pottery from Halasarna belong to the same group with the majority of the samples examined (Halasarna - group I) that implies local production. On the other hand in both cases a significant number of samples are clearly distinguished from the local ones and according to the archaeological interpretation belonged to imported wares.

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Fig. 1. Delphi, residential remains of the late Roman period.



Fig. 2. Halasarna of Kos, Part of the late Roman settlement.

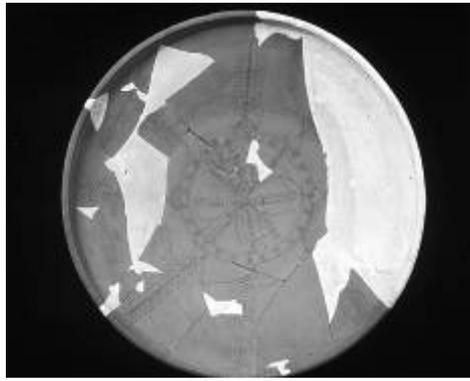


Fig. 3. Imported pottery found at Delphi: “Central Greek Painted Ware” plate.



Fig. 4. One of the kilns discovered at the Gymnasium area of Delphi.



Fig. 5.



Fig. 6.

Fig. 5. Pottery workshop inside a triclinium of the Southeastern Villa, Delphi. The entrances of two kilns and a levigating basin.

Fig. 6. Deposit next to the kilns of the pottery workshop, Southeastern Villa, Delphi.



Fig. 7. Clay mould for the manufacture of ‘North African type’ lamps locally produced at Delphi.



Fig. 8. Vase from the 6th–7th c. local production of Delphi

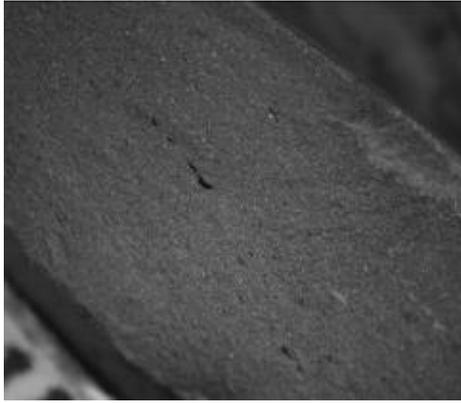


Fig. 9.

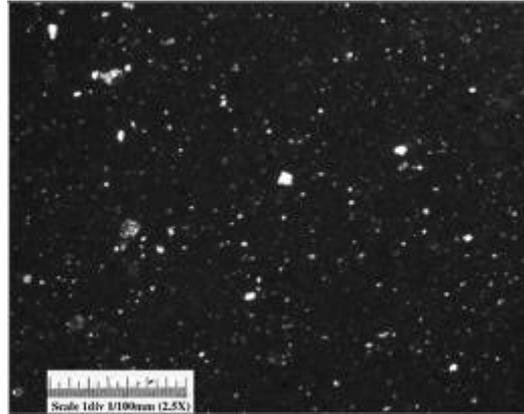


Fig. 10.

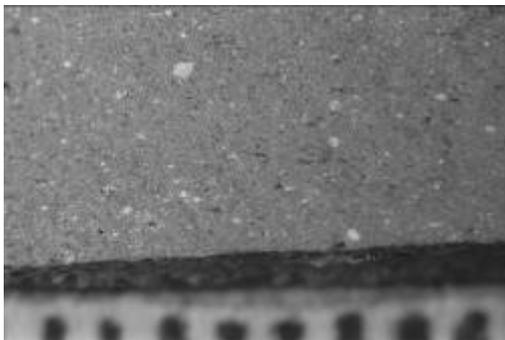


Fig. 11.

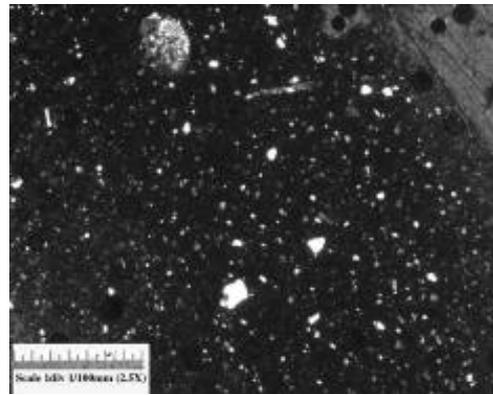


Fig. 12.

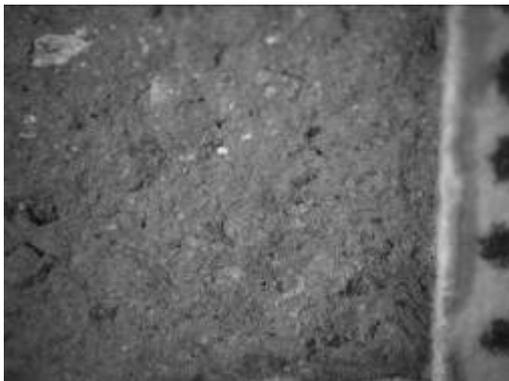


Fig. 13.

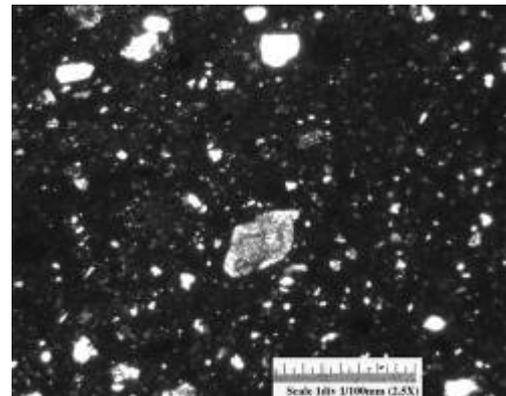


Fig. 14.

- Fig. 9. Delphi-Group I –fresh fracture under the stereoscope.
Fig. 10. Delphi-Group I –Thin section under the polarizing microscope (crossed prisms).
Fig. 11. Delphi-Group II – smooth (polished) section under the stereoscope.
Fig. 12. Delphi-Group II – Thin section under the polarizing microscope (crossed prisms).
Fig. 13. Delphi-Group III – fresh fracture under the stereoscope.
Fig. 14. Delphi-Group III – Thin section under the polarizing microscope (crossed prisms).

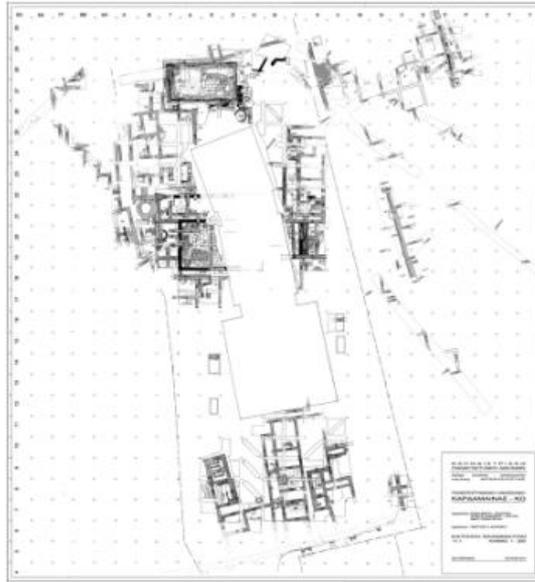
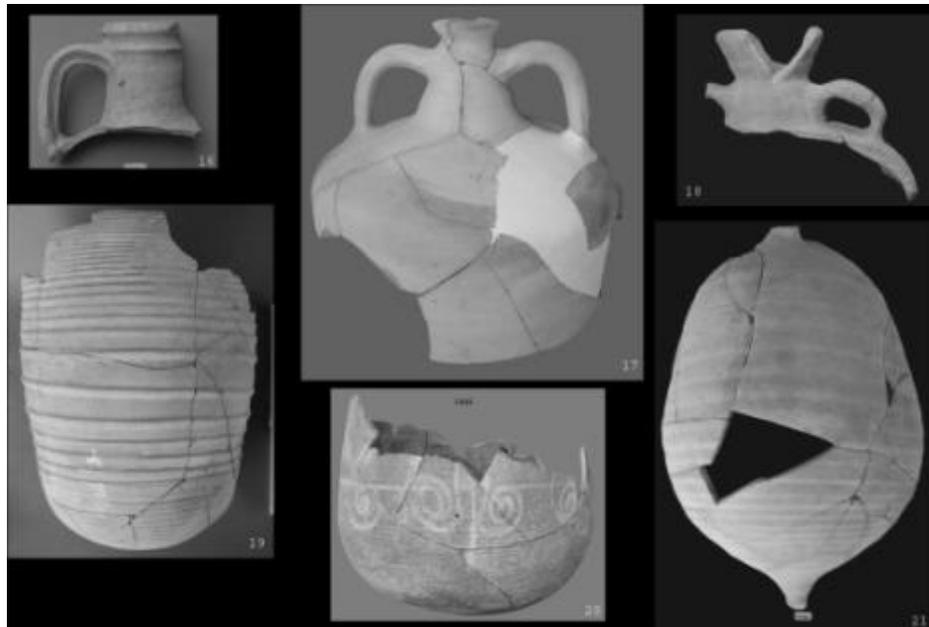


Fig. 15. Halasarna of Kos, General plan - Sanctuary of Apollo and Late Roman Settlement (Drawing by G. Antoniou).



- Fig. 16. Halasarna of Kos, Koan amphora of the LR 1 type (last quarter of the 6th -first quarter of the 7th c.).
 Fig. 17. Halasarna of Kos, Koan amphora of the LR 13 type (last quarter of the 6th -first quarter of the 7th c.).
 Fig. 18. Halasarna of Kos, imported (Aegean) amphora of the LR 2 type (late 5th – early 6th c.).
 Fig. 19. Halasarna of Kos, imported amphora of the LR 1 type (middle of the 6th-first half of the 7th c.).
 Fig. 20. Halasarna of Kos, imported (Palestinian) amphora of the LR 5/6 type (6th-7th c.).
 Fig. 21. Halasarna of Kos, imported (Aegean) amphora of the “Samos cistern” type (middle of the 6th c.).

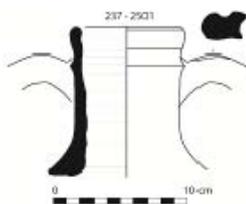


Fig. 22. Koan amphora of the LR 1 type (Drawing by Ch. Diamanti).

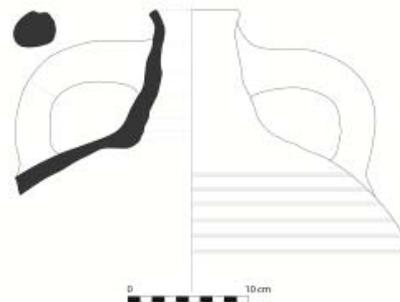


Fig. 23. Koan amphora of the LR 13 type (Drawing by K. Mpairaktaris).

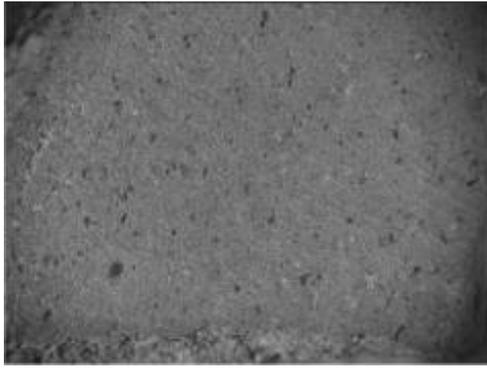


Fig. 24.

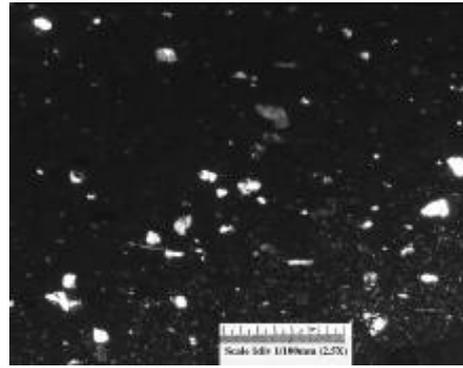


Fig. 25.

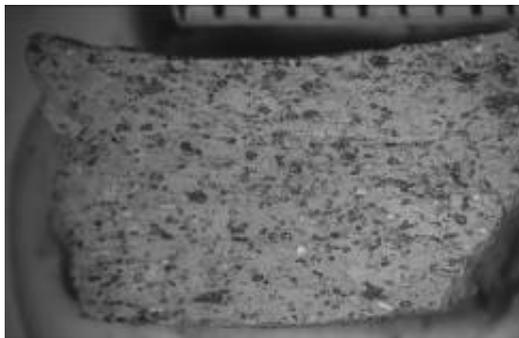


Fig. 26.

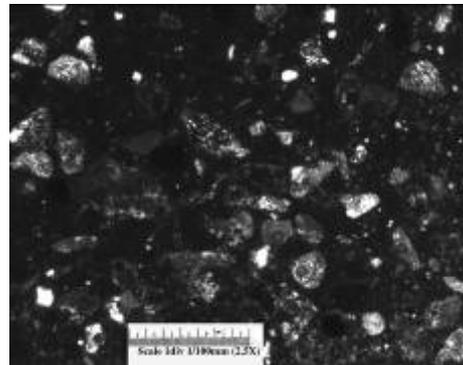


Fig. 27.

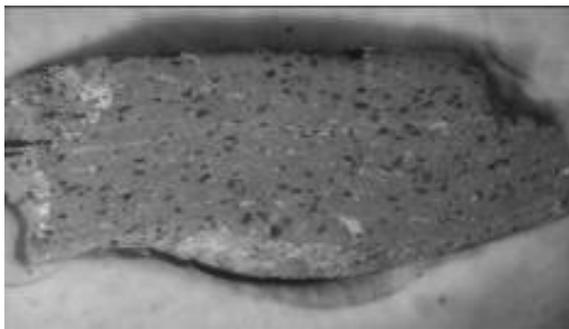


Fig. 28.

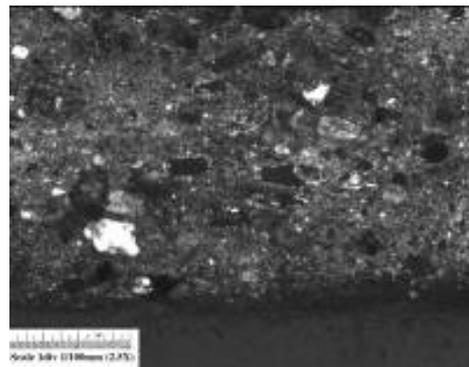


Fig. 29

- Fig. 24. Halasarna of Kos -Group I – smooth (polished) section under the stereoscope.
- Fig. 25. Halasarna of Kos -Group I – Thin section under the polarizing microscope (crossed prisms).
- Fig. 26. Halasarna of Kos -Group II – smooth (polished) section under the stereoscope.
- Fig. 27. Halasarna of Kos -Group II – Thin section under the polarizing microscope (crossed prisms).
- Fig. 28. Halasarna of Kos -Group III – smooth (polished) section under the stereoscope.
- Fig. 29. Halasarna of Kos -Group III – Thin section under the polarizing microscope (crossed prisms).

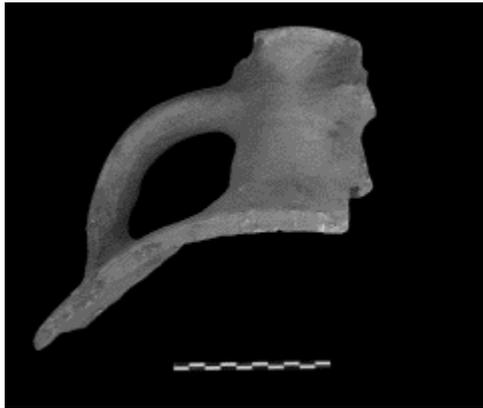


Fig. 30. Naoussa of Paros – Parian amphora of LR 13 type.

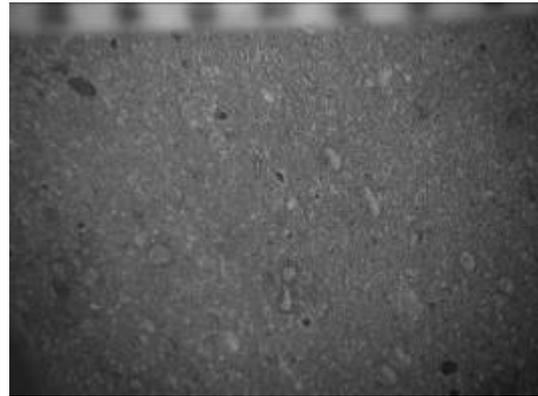


Fig. 31. Naoussa of Paros- polished section under the stereoscope.

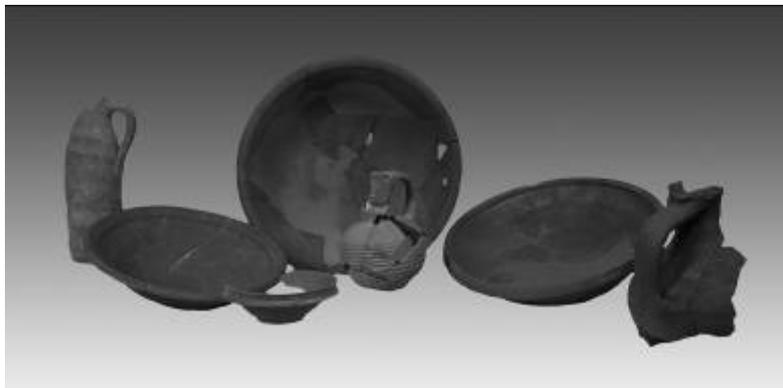


Fig. 32. Imported and locally produced tableware from Thasos (photo: G. Naessens, Halma-Ipel)

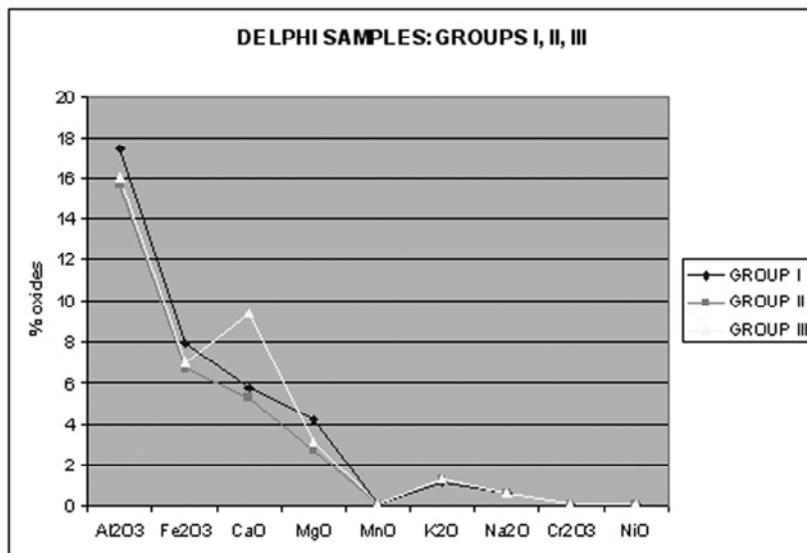


Fig. 33. Aluminum, iron, calcium, magnesium, manganese, potassium, sodium, chromium and nickel oxides (%) in Delphi samples (groups I, II and III).

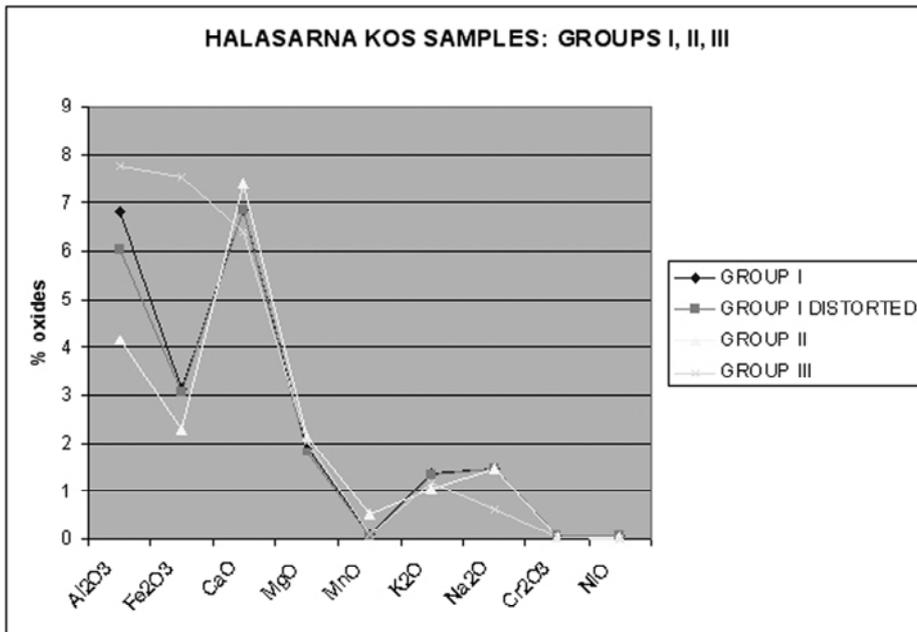


Fig. 34. Aluminum, iron, calcium, magnesium, manganese, potassium, sodium, chromium and nickel oxides (%) in Halasarna samples (groups I, I Distorted, II and III).