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EVIDENCE FOR METALLURGICAL ACTIVITIES
AT THE SOUTH SLOPE OF THE ATHENIAN ACROPOLIS
DURING THE FINAL NEOLITHIC.
A PRELIMINARY REPORT*

VASILIKI ELENI DIMITRIOU

«Leseul véritable voyage, le seul bain de Jouvence,
ce ne serait pas d'aller vers de nouveaux paysages,
mais d'avoir d'autres yeux [...]»

(M. Proust, *À la recherche du temps perdu*,
Vol. V, 1923, La Prisonnière)

Riassunto. Le ricerche condotte da D. Levi sulle pendici meridionali dell'Acropoli di Atene nel 1922 portarono in luce importantissime testimonianze riguardo l'uso dell'area durante il periodo preistorico. Una parte dei reperti fu presentata in una breve pubblicazione. Sulla base dello studio del materiale archeologico e dell'evidenza stratigrafica Levi ipotizzò che l'area da lui scavata nel 1922, tra l'Odeion di Erode Attico e il tempio di Asclepio, fosse una capanna del periodo Neolitico. Basò tale conclusione sul rinvenimento di un focolare e di ceramica datata al Neolitico Medio e Recente. Nel corso di una nuova analisi dei materiali archeologici fu individuata anche ceramica del Neolitico Finale. Un nucleo di reperti fittili si distingue dal resto dei ritrovamenti per le sue specifiche caratteristiche, diverse da quelle individuate da Levi nella sua pubblicazione. Si tratta di frammenti perforati che appartenevano probabilmente a un camino di fornace a fossa in uso per processi metallurgici. Le analisi tecnologiche e archeometriche in corso potranno confermare in futuro tale interpretazione.

Περίληψη. Οι έρευνες του D. Levi στη Νότια Κλιτύ της Ακρόπολης της Αθήνας το 1922 έφεραν στο φως σημαντικές πληροφορίες για την Προϊστορία της περιοχής. Μέρος των ευρημάτων παρουσιάστηκε σε μια σύντομη δημοσίευση μερικά χρόνια αργότερα. Από τη μελέτη του υλικού και από τη στρωματογραφία ο Levi διαμόρφωσε την ιδέα πως η περιοχή που ανέσκαψε το 1922 μεταξύ του Ωδείου του Ηρώδη του Αττικού και του Ασκληπιείου, ανήκε σε καλύβα της Νεολιθικής Περιόδου. Σε αυτό το συμπέρασμα τον οδήγησε η εστία που ήρθε στο φως και η κεραμική που έδωσε μια χρονολόγηση στη Μέση και τη Νεότερη Νεολιθική. Κατά τη νέα μελέτη του αρχαιολογικού υλικού αναγνωρίστηκε και κεραμική της Τελικής Νεολιθικής. Μία ιδιαίτερη ομάδα κεραμικής που ξεχωρίζει, φαίνεται πως είχε διαφορετική χρήση από αυτή που αναφέρει ο Levi στη δημοσίευσή του. Πρόκειται για όστρακα που φέρουν οπές. Η νεότερη μελέτη τους συντείνει πως πολύ πιθανόν πρόκειται για τμήματα διάτρητης λακκοειδούς καμίνου σε χρήση για πυροτεχνικές δραστηριότητες όπως πιθανότατα η εκκαμίνευση μεταλλευμάτων. Οι αρχαιομετρικές και τεχνολογικές αναλύσεις που έχουν δρομολογηθεί θα μπορέσουν να διερευνήσουν μελλοντικά μια τέτοια ερμηνεία.

Abstract. During D. Levi's excavations at the south Slope of the Athenian Acropolis in 1922 significant evidence for a prehistoric occupation of this area came to light. Some of this material was published later in a brief article. From the study of the finds and from the stratigraphic evidence, Levi thought that the area he excavated in 1922, between the Odeion of Herodes Atticus and the Temple of Asclepius, was a Neolithic hut. His reason was based on the hearth he found and the ceramics belonging to the Middle and Late Neolithic. During a recent study of the archaeological finds from the excavations, pottery dated to the Final Neolithic has also been recognized. Among these finds from the "Neolithic hut", a specific group of fragments now seems to have had a different use from that hypothesized by Levi in his publication. Those are perforated clay fragments, that were probably part of a chimney from a shaft furnace/furnaces in use for metallurgical activities. Technological and archaeometric analysis in progress will investigate the validity of this interpretation.

* I would like to thank the Directors of the Italian Archaeological School in Athens, E. Greco and E. Papi. I also thank the *Ephoreia tis Polis ton Athinon* and the Director E. Banou. My grateful thanks are also extended to Dr I. Bassiakos and Dr E. Filippaki for much important information on archaeometallurgical issues, discussions related to the paper and for the archaeometrical analysis of the Acropolis

material. Special thanks to A. Cazzella, professor of Paletnology at the Sapienza Università di Roma. Finally, I wish to thank P. Tomkins for comments and discussions about the Acropolis material, the archaeologists E. Gianakopoulou, I. Papaloi for their support and encouragement and the conservator A. Dimitriadou for the restoration of the ceramics.

INTRODUCTION

In the Aegean, the evidence for metallurgical activities, mainly concerning the use of copper theoretically marks the dawn of the Early Bronze Age. Nevertheless, recently evidence for copper smelting a little bit earlier, during the FN¹, also came to light in the islands: in the Cyclades, at Kephala, Paoura and Ag. Eirini at Kea, in the Dodecanese, at Giali in Nisiros and in Crete at Kephala Petras². On the Greek mainland, on the other hand, such evidence for copper metallurgical activities for this period comes from the settlement of Sitagroi³ in Macedonia. The new study of the archaeological material from the excavation held by D. Levi and the Italian Archaeological School in Athens in 1922/23 at the south slope of the Acropolis⁴ brought to light a special group of clay fragments that in a first moment were interpreted as grills or strainers due to the large perforations that they have⁵. Recent archaeometric studies have shown that identical clay fragments from other sites in the Aegean belong to shaft furnaces for copper or lead-silver-ore smelting⁶ (Figs. 10-12). The macroscopic studies of these clay fragments from the “Neolithic hut” at the Acropolis of Athens gave very strong indications that they were part of metallurgical shaft furnace/furnaces too. In this case, this will be the first indication until now of the presence of such furnaces in Attica during the Final Neolithic period. Usually this type of furnace is present in the Aegean during the following phases of Early Bronze Age except for Kephala (Kea) where similar fragments are dated to the Final Neolithic. In this article, some preliminary results and observations will be presented referring to these ceramic fragments from the “Neolithic hut” of the Acropolis.

1. THE SITE. AREA OF THE NEOLITHIC “HUT” AND STRATIGRAPHY

The Neolithic “hut” came to light during a brief excavation held by the Italian Archaeological School and D. Levi in March and April 1922 at the Acropolis of Athens. The remains of the hut were identified in the SW of the south slope of the Acropolis area, between the angle of the polygonal wall and the edge of the wall of the Stoa of Eumenes, between the Odeion of Herodes Atticus and the Temple of Asclepius (Fig. 1). Its presence was identified by a narrow trench of 0.65 m wide running in an E-W direction (Fig. 2). After highlighting the contours of the “hut”, the excavation continued in its interior. Levi distinguished the inner stratigraphy⁷, dividing it into four sectors 1. NE, 2. NW, 3. SE, 4. SW, and two main layers:

- a. the upper (superficial) layer: from the modern surface to the “hut” floor, with thickness of 0.30 m;
- b. the lower (deeper) layer: from the pavement of the “hut” to the natural rock.

The total thickness of all layers, from the modern surface to the natural rock in the SW angle, was 1.26 m.

The “hut” was built into a natural depression between two rock ridges of the upper calcareous formations of the Acropolis. The rock towards south appeared in a slight slope; to level the ground a filling layer was created consisting of small stones, pebbles and earth (Fig. 3). To hold this layer towards the south a yellow clay retaining wall was raised, posed obliquely. The buildings of the Stoa of Eumenes cut away part of the “hut” towards the south, so its size and shape in that direction are unknown. The pavement was made of yellow clay (Fig. 3). Above it, in some parts, a thin layer of carbonaceous earth was visible. At some points above it there was another layer of 0.10 m, consisting of red clay and small charcoal forming thin carbonaceous veins. This red clay layer was visible mostly all around the edges of the “hut”, while in the center it almost disappeared. Most likely, it was the layer of the collapse of the walls probably built in clay, that was altered by fire. It is possible that these walls were not tall walls around the pavement to form a covered hut, but a fence wall, as in that there is no evidence for postholes, neither inside the “hut” or along it. Similar areas have been found in the prehistoric site of Nea Makri in East Attica⁸. In the center of the pavement a hearth came to light (Fig. 3). It was of a circular plan made of well-connected stones inserted all around into an artificial concavity.

¹ From this moment, the chronological periods will be: Middle Neolithic = MN, Late Neolithic = LN, Final Neolithic = FN, Early Bronze Age = EBA, Early Helladic = EH, Middle Helladic = MH, Early Cycladic = EC, Early Minoan = EM, Middle Minoan = MM.

² PAPANATOS 2007, 155; *Id.* 2008, 269.

³ MUHLY 2002, 77-82.

⁴ DIMITRIOU 2016, 15-33.

⁵ LEVI 1930/31, 432-434.

⁶ BETANCOURT 2006, figs. 7.4-6, 2008, fig. 3; *Id.* 2008; BASSIAKOS *et alii* 2007, figs. 2.4b-c.

⁷ Using all the information that could be found regarding the stratigraphy a 3D reconstruction of the hut will be attempted in the future.

⁸ ΠΑΝΤΕΛΙΔΟΥ-ΓΚΟΦΑ 1991, 18-21.



Fig. 1. View of Acropolis S slope. H: Neolithic “hut”, C: The small caves.

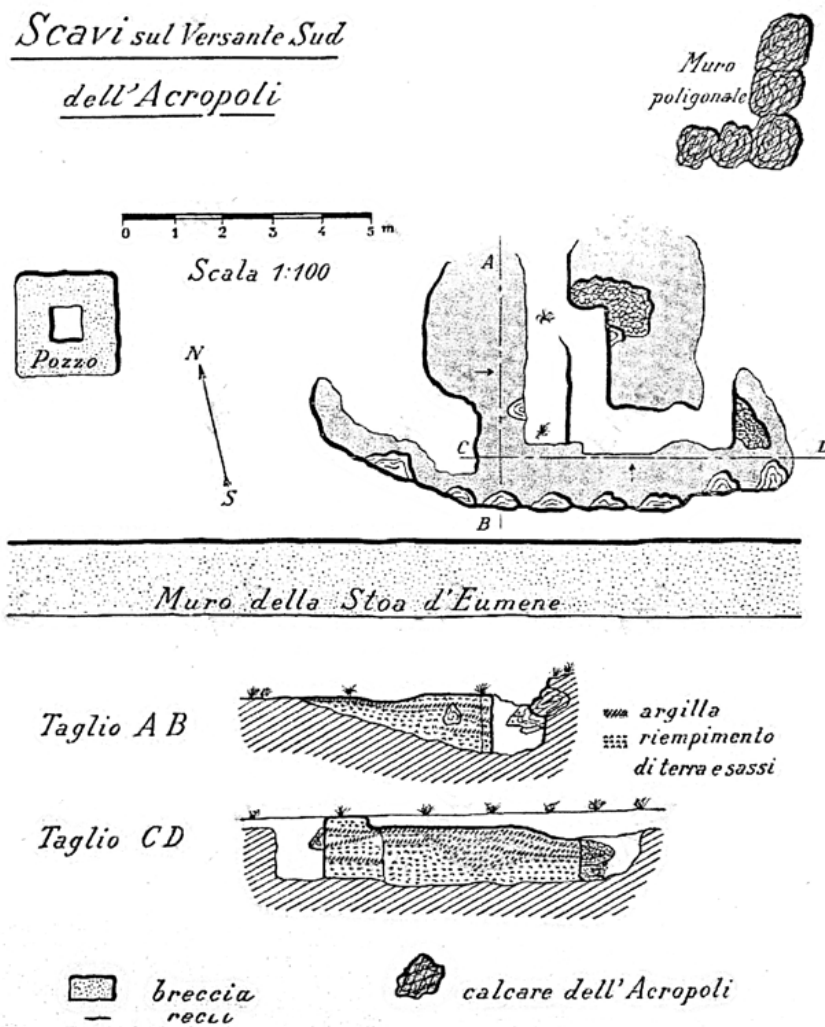


Fig. 2. Neolithic “hut”. Plan and section (LEVI 1930/31).



Fig. 3. The balk left at the S of the Neolithic “hut”, section of the pavement: fill layer with small stones (part of the Lower/Profound layer) and above the layer of the pavement in yellow clay. In the center the hearth area unexcavated (Photo: Fototeca Scuola Archeologica Italiana di Atene).

Fragment	Nos. of holes and their diameters	Distance between the perforations	Fragment thickness	Outer surface	Inner Surface	Inclusions
1	Remains of 4 holes on edge of fragment (Diam. 1.5-2.0 cm)	2.5-3.0 cm (Length max. 10.5 cm)	0.8-1.0 cm	Red/orange color, black close to hole	Yellow color, burn traces; straw marks black patina (slag?)	Small black inclusions
2	1 (Diam. 2.0 cm), 1 more on edge of fragment (Diam. 1.5 cm), remains of 2 holes on edge of fragment	1.5-3.0 cm (Length max. 8.5 cm)	1.0 cm	Grey/pink color	Grey/pink with black in areas	Small inclusions, burnt out straw marks
3	Remains of 2 holes on edge of fragment (Diam. 1.0-1.5 cm)	5.0 cm (Length: 6.0 cm)	1.0 cm	Red/orange color 2 very big red inclusions (Grog)	Yellow color, black in areas, some ribs probably formed during initial construction	Small red and green/black inclusions. Big inclusion of dark red color
4	Remains of 3 holes on edge of fragment (Diam. 1.5 cm)	1.0-1.5 cm (Length max. 4.0 cm)	1.5 cm	Orange/pink color	Black color, extensively burnt slag?	Very small red color inclusions
5	Remains of 1 hole on edge of fragment (Diam. 2.0 cm)	(Length max. 8.0 cm)	1.0 cm	Yellow/pink color, black in areas, burnt out straw imprints	Yellow/pink	Very few small inclusions
6	Remains of 1 hole on edge of fragment (Diam. 1.5 cm)	(Length max. 3.0 cm)	1.0 cm	Dark red color, weathered	Pink color	Many medium size red and black inclusions

Table 1. The group of clay fragments from the Acropolis Neolithic “hut”.

From the excavation made to delimit the contours of the “hut” pottery was found from various periods, including Middle Helladic Minyan ware. The lower layer of the “hut” gave MN ceramics, typical of the Sesklo culture, with the characteristic “flame pattern” decoration, and ceramics of the LN, Dimini culture, while red and black burnished ware fragments typical of FN were discovered in the upper layer. One piece of black pattern-burnished ware came to light at the west contour of the “hut”.

Besides ceramics, stone artifacts were found, including obsidian chipped stone industry like flakes and small cores, along with blades and arrowheads¹⁰, as well as ground stone products, like grinders and millstones. Very important is the presence of malacofauna, including *Cardium Edule* shells together with animal bones to be considered possible remnants of a meal. They all present traces of burning. More about the types of ceramics and other materials found in the excavation is presented in the preliminary report in *Annuario*¹¹.

2. THE METALLURGICAL EVIDENCE. MACROSCOPIC OBSERVATIONS

Among the ceramic material that came to light there is a group consisting of six ceramic fragments that all present some common characteristics (Figs. 4-9; Tab. 1). The first common feature is that they all bear perforations. The macroscopic observations indicate that the perforations were made while the clay was still fresh and they don't have a slope. The diameter of the perforations in all of them ranges between 1.5-2.0 cm while the thickness of the pieces varies from 1.0 to 1.5 cm. Three of them are slightly curved. Furthermore, they are all made of coarse fabric (clay) with visible traces of organic remains and highly tempered. They were dried in the open air and not fired in a pottery furnace (Tab. 1). In a second phase this clay was “fired” non-intentionally but due to contact with the fire and, as a result, all the fragments have a red orange/slightly pink color (Tab. 1). This implies that the object the perforated fragments came from was in use for pyrotechnological activities. Some of these fragments also present traces of burning on the inner surface, which in some cases are visible on the outer surface too (Figs. 5-9) while in other fragments the inner surface is entirely covered by a kind of black patina, possibly slag traces (Fig. 7). Even though these fragments generally preserve the same characteristics, it is not certain if all of them were part of the same object mainly because of some observed differences in the temper and the consistence of clay.

As regards the context where they were found inside the hut, confronting what it is known from Levi's publication with the recent study of the material in the laboratory, it came out that four were found in the upper part of the lower layer which corresponds to the pavement of the “hut”, one in the lower part of the upper layer (in contact with the pavement of the “hut”) and one without specification. All six fragments derive from contexts in which FN pottery was found. In the majority, they were found in the south Sector of the hut (four), while two came to light in the north-western Sector (Tab. 2). These ceramic fragments with the characteristic features that are described above have very close parallels with other similar perforated pieces with slag remains from some prehistoric sites in the Aegean (Figs. 11-12). Archaeometallurgical analysis of slag adhering to these pieces indicates that in most cases they relate to copper production, except one case from SE Siphnos where they relate to lead/silver production¹².

3. PERFORATED FURNACES FOR METALLURGY IN THE NEOLITHIC AND EARLY BRONZE AGE AEGEAN

In the Aegean, the oldest testimony found until now concerning the use of a perforated shaft furnace for the smelting of ores comes from the site of Kephala, a settlement and cemetery situated at the homonymous headland in the Cycladic island of Kea. There, some perforated ceramic fragments came to light probably belonging to shaft furnace chimneys for copper smelting¹³ together with other evidence of metalworking such as crucibles dating to FN (Fig. 10). In the same chronological period the use of crucibles

⁹ For the ceramic repertoire of the “hut”: DIMITRIOU 2016, 15-33.

¹⁰ In Levi's publication, there is no distinction between the obsidian artifacts from the “hut” and from the caves. In total the number is approximately 50 pieces.

¹¹ See n. 9.

¹² The site of Kasela near the Akrotiraki settlement at the SE Siphnos (GEORGAKOPOULOU 2016, 55, tab. 1).

¹³ COLEMAN 1977, 40-42, 66, 79, 88, 95, pl. 22.



Fig. 4. Furnace fragment N. 1. External and internal surface (photo by the A.).



Fig. 5. Furnace fragment N. 2. External and internal surface (photo by the A.).



Fig. 6. Furnace fragment N. 3. External and internal surface (photo by the A.).



Fig. 7. Furnace fragment N. 4. External and internal surface (photo by the A.).



Fig. 8a. Furnace fragment N. 5. External and internal surface (photo by the A.).



Fig. 9a. Furnace fragment N. 6. External and internal surface (photo by the A.).

Fragments	Excavation Context
1	SE Sector Stratum under the red clay Lower Layer
2	SW edge of the hut Stratum under the clay cover Lower layer
3	S Sector
4	SW Sector Upper Layer
5	NW Sector Lower Layer
6	NW Sector Lower Layer

Table 2. Excavation context of the furnace findings in the Neolithic “hut”.

is attested at Kephala-Petras¹⁴ (Crete), Giali at Nisyros¹⁵ (Dodecanese) and in the FN levels at Sitagroi¹⁶ (Macedonia), Sitagroi III, where, too, the presence of slag testifies to metallurgical activities.

The shaft furnace is a complex structure (Figs. 13-14). Its basic form includes a circular cavity on the ground (or hearth) with a diameter of c. 30-40 cm, which was often lined with earth or refractory stones, and a clay furnace. The latter was shaped and used as a chimney; it had a cylindrical or truncated cone shape often with perforations. The chimney usually had a diameter between 30 to 50 cm with an open top and base. Significantly important for the smelting procedure were the bellows or pot bellows. These were usually connected to the furnace by clay pipes, the so-called nozzles (*tuyères*) that would be “buried” in the ground and would be “sealed” with clay to avoid air escaping (Fig. 15). The bellows were used to drive air into the furnaces. The perforations of the chimney were apparently made to facilitate the entrance of the

¹⁴ PAPADATOS 2007, 154-167.

¹⁵ DAVIS 2001, 66.

¹⁶ MUHLY 2002, 77-82.

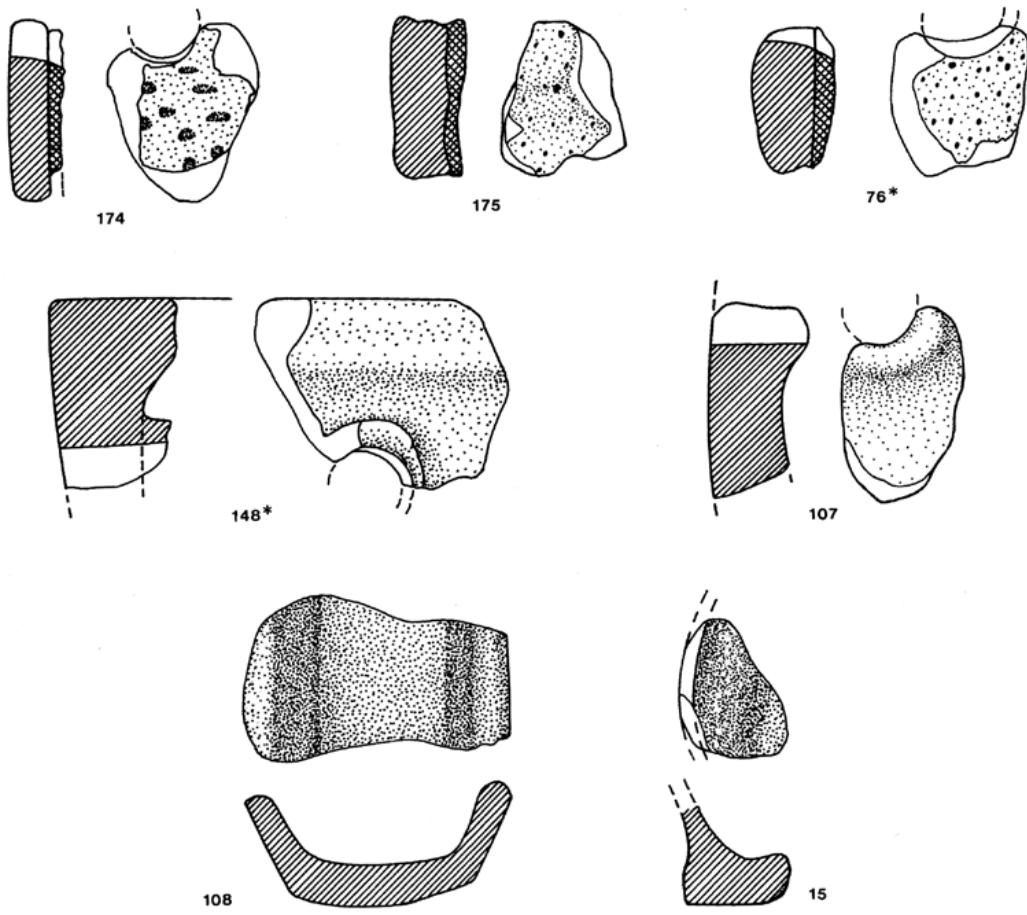


Fig. 10. Kephala (Kea): Furnace perforated fragments and crucibles (COLEMAN 1977).



Fig. 11. Sideri (Kythnos): a) Copper slag, b) Fragment of metallurgical furnace wall, c) Furnace fragments with perforations, d) Conical clay nozzle (internal side) (BASSIAKOS-PHILANIOTOU 2007).

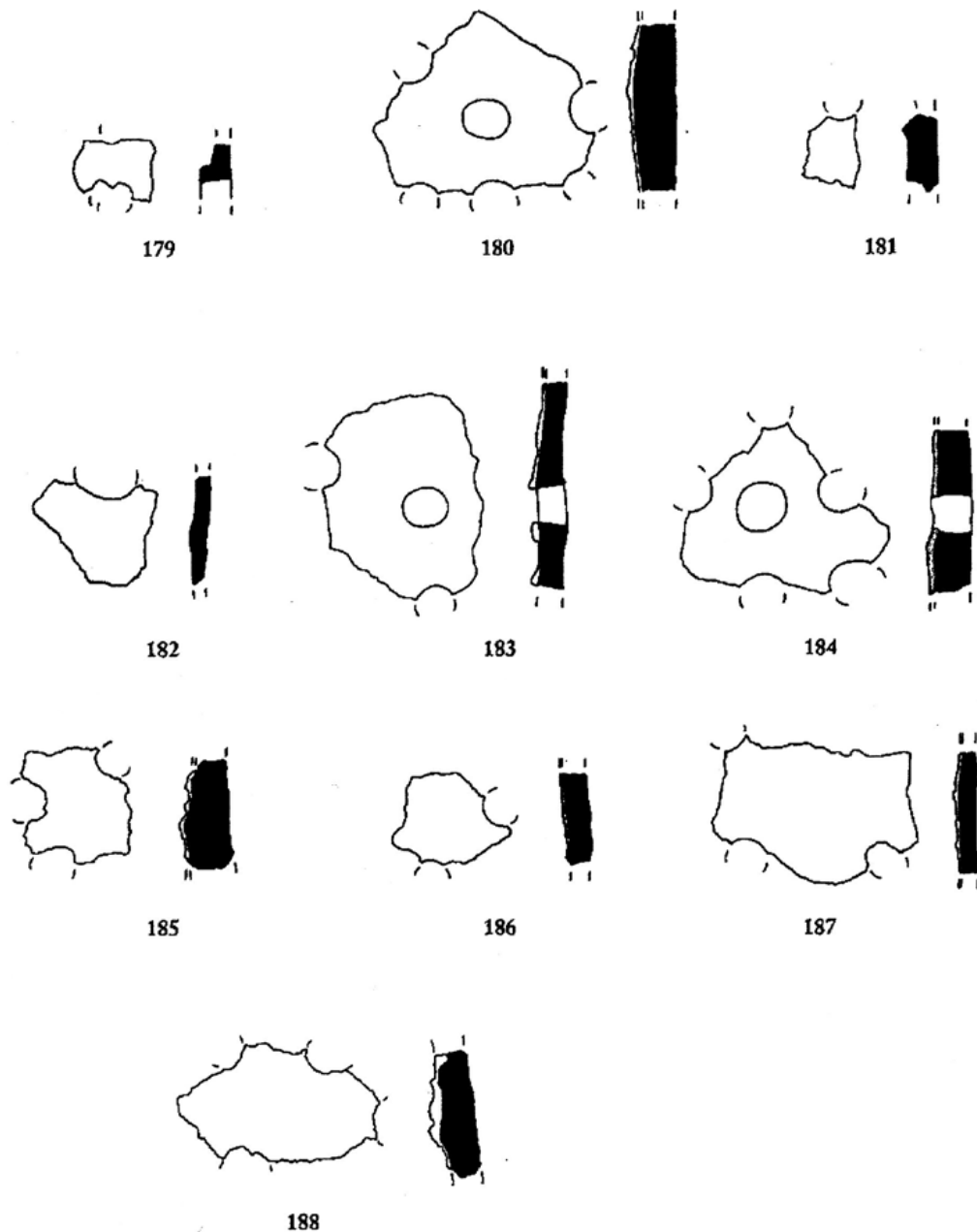


Fig. 12. Chrysocamino (Crete): Profile drawings of furnace fragments (not to scale; BETANCOURT 2006).

air into the furnace¹⁷ (Fig. 15). This was necessary for the fire to reach a high temperature (1200-1350°C) and create a reducing atmosphere in the furnace to begin the smelting process. The perforations trapped the strong blowing wind inside the furnace. The location of most sites where this kind of chimney was found is usually in the slopes of hills, ideal places for the strong summer north winds, or *meltemia*, that blow in the Aegean during mid-July and August. The perforated chimneys present some common features: a) the diameter of the perforations is about 1.5-2.0 cm; b) the thickness of the walls varies from 1.0 to 2.5/3.0 cm; c) the walls are slightly curved and their inner surface usually has intensive burn traces (or vitrification layers) and in some cases slag remains. Not all fragments preserve traces of metal and this depends on which part of the chimney they came from. If they are fragments from the upper part, not in direct contact with the smelting procedure, they don't usually preserve traces of slag on their internal surface. Whereas the fragments with adherent slag traces derive from the lower part of the chimney. The furnaces were frequently destroyed after the smelt to take out the final product.

¹⁷ CRADDOCK 2000, 160-162.

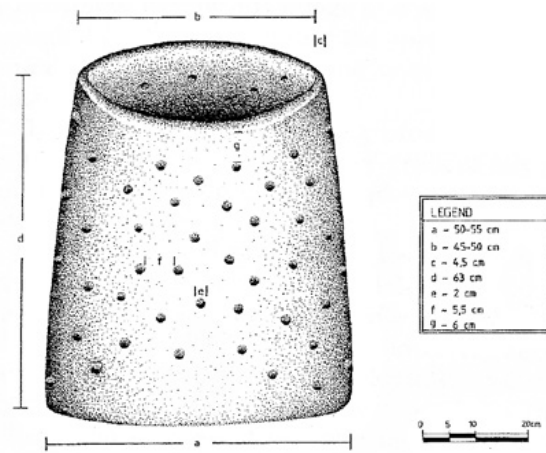


Fig. 13. Reconstruction of the perforated shaft furnace as derived from field and laboratory observations (Kythnos; BASSIAKOS-PHILANIOTOU 2007).

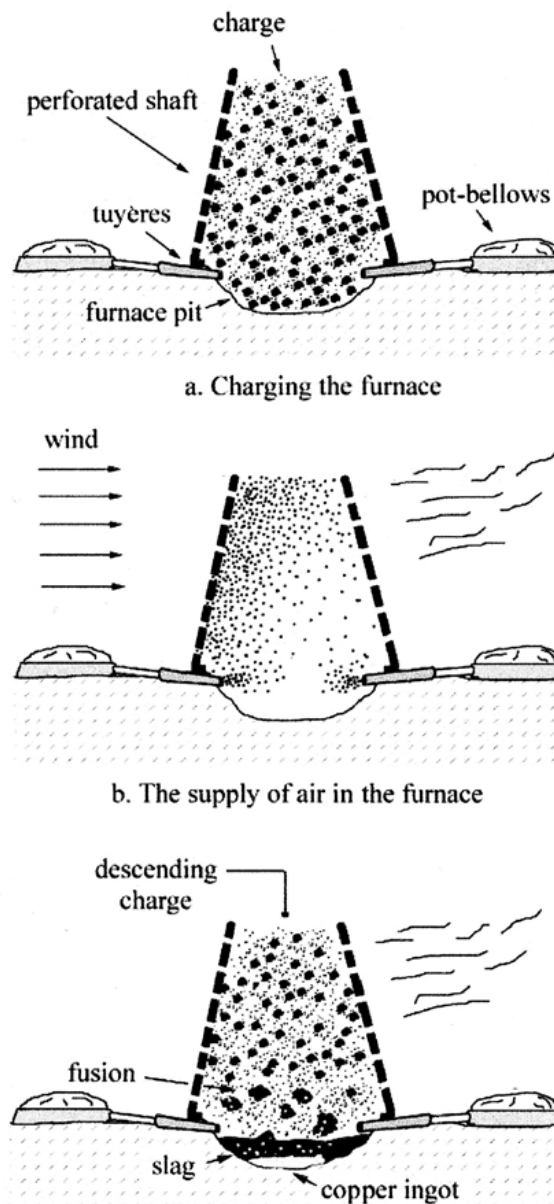


Fig. 14. Schematic representation of the smelting process at Chrysokamino (not to scale; CATAPOTIS-BASSIAKOS 2007).

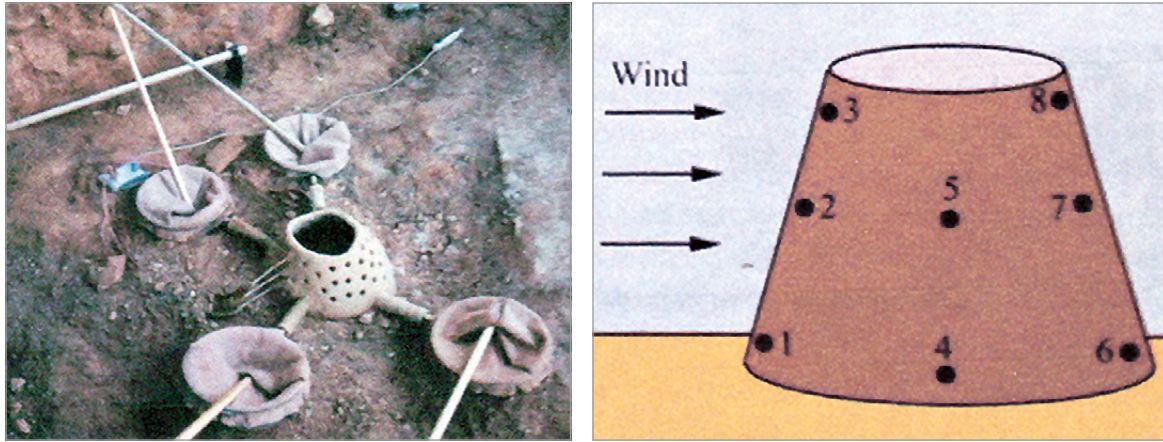


Fig. 15. On the left: reconstruction and position of the perforated shaft furnace and the pot-bellows, *tuyères* for the first smelting experiment. On the right: position of the perforations on the shaft wall (CATAPOTIS *et alii* 2008).



Fig. 16. Fragments of the internal surface of the reconstructed perforated furnace wall after the smelting experiment. The upper part of the furnace with the rim and slag traces, perforated fragments and fragment with slag (Courtesy Dr Bassiakos, Laboratory of Archaeometry 'Demokritos' NCSR).

The smelting operation with the use of shaft furnaces with perforated chimneys became clear in detail after the experimental reproduction of the whole smelting procedure at the Laboratory of Archaeometry in Demokritos, National Center for Scientific Research (Figs. 14-15). A series of experimental smelts, using raw materials and equipment similar to those witnessed at the site of Chrysokamino (Crete) (Figs. 14-16) allowed the study of the behavior of the perforated furnaces during smelting and offered the first detailed reconstruction of an early Aegean cooper-smelting technology (Figs. 13-16).

The use of the shaft furnace begins in the FN and continues almost until EBA III in the Aegean. For the moment, we have evidence for the use of such furnaces with the characteristic perforated chimney in the site of Kephala¹⁸ in Kea (FN), Kephala¹⁹ (EC I/EC II) and Avessalos²⁰ (EC) in Seriphos, Sideri and Palaiopyrgos-Aspra Spitia²¹ (EC) in Kythnos, at the site of Chrysokamino²² (EMIII-MMIA) in Crete and at the settlement of Raphina²³ (EH II) in Attica (Fig. 17). Some fragments from Fournoi (EC I/EC II) at

¹⁸ COLEMAN 1977, pl. 22.

¹⁹ PHILANIOTOU *et alii* 2011, 159.

²⁰ GEORGAKOPOULOU 2005, 11t.

²¹ BASSIAKOS-PHILANIOTOU 2007, 19-56.

²² BETANCOURT 2006, 109-123.

²³ ΘΕΟΧΑΡΗΣ 1951, 77-92.

Seriphos and from Skali (EC) at Siphnos don't have perforations. It is important to mention that this type of early cylindrical/truncated cone, perforated furnace is not known outside the Aegean²⁴.

4. THE SIGNIFICANCE OF THE ACROPOLIS EVIDENCE. CONCLUSIONS

As mentioned above, the earliest evidence for the use of perforated metallurgical furnaces related to the copper smelting process in Greece comes from the Cycladic Island of Kea and dates to the FN (Figs. 10, 17). The immediate implication of the Acropolis evidence is that for the first time we have the use of perforated chimneys in mainland Greece for the FN. The Athenian Acropolis is the second site where the use of perforated chimneys is attested during the FN in Greece and the first in the mainland. For the region of Attica, the only other evidence we have until now for the use of such objects comes from Raphina but it dates to the EH II (Fig. 17). The importance of this evidence for metallurgy in mainland Greece in such remote period is unquestionable.

The perforated clay fragments from the south slope of the Acropolis all have the main characteristics that are present in the metallurgical furnace fragments from other early sites coming from the Aegean islands and from the Raphina site, as already mentioned (Fig. 17). A problem that arises is identifying the structure of the "hut". The diary of the excavation cannot be found and the description of the basic stratigraphical evidence presented in Levi's publication is not very detailed. The combination of this information with the work of the present author in the laboratory enables a reconstruction of the stratigraphy as far as it is possible. However, is not certain that the area excavated by Levi was a "hut" because he doesn't mention the presence of postholes. No traces of clay masonry have been found, although traces of combustion have been found around the hut floor, which, according to the excavator, are the remnants of the superstructure of the wall made with mud bricks that was destroyed by fire. On the other hand, there are pavements and a hearth and residues of meals and ceramics, stone tools, obsidian but also the furnace fragments. The presence of fine pottery of Sesklo²⁵ dating the MN period ("Flame pattern ware"), probably imported, and few Polychrome ware fragments dated in LN in the lower layer indicates that perhaps in a first moment during MN and LN this area had a domestic use. For most of the LN it seems that the "hut" was not in use because of the small quantity of ceramics dating from that period. Later, during the FN the area was used again perhaps as a place for metallurgical activities like cooper smelting probably because of its location in the slope of the hill where the wind blows strongly. During that time, the hearth might have been used occasionally for the preparation of meals, given the burnt bones and sea shells found and as a hearth for metallurgical activities. Also, the ceramic assemblage for this later phase suggest that probably it wasn't an area of domestic use²⁶.

As far as the ceramic assemblage is concerned, a previous publication mentions that the ceramic repertoire of the NF "hut" includes fragments of the Kephala-Attica culture²⁷ such as black pattern-burnished ware. This evidence together with the pieces of Melian obsidian and the presence of perforated fragments from the Athenian Acropolis Neolithic "hut" are elements that relate Attica with the Cyclades and most particularly with Kea and the settlement of Kephala, part of the Kephala-Attica culture²⁸. This new evidence from the Acropolis shows that this kind of perforated furnace is perhaps linked to some specific ceramic wares²⁹, common features of the Kephala-Attica culture that mark the passage from the Neolithic to the Early Bronze Age and indicate contact between the Cyclades and mainland Greece earlier than the "koine" of the EBII³⁰. The role of Kea for this period of FN is very important. From the ceramic evidence, it seems that Kea has both mainland and Cycladic characteristics, as a common point between the Greek mainland and the islands also justified by its position.

All the evidence mentioned above from Acropolis of Athens indicates close contact with the Cyclades as far as the ceramics, metallurgy and obsidian are concerned. In addition the perforated furnace fragments, obsidian and stone tools inside the "hut", the limited quantity and the type of the ceramics as well as the lack of indications for postholes, demonstrate that Levi's Neolithic "hut" was in fact more an area used as a laboratory/workshop than a habitation at the end of the FN period. The presence of the hearth together with burnt bones and shells as remains of meals can also be explained considering that the hearth maybe

²⁴ DOONAN *et alii* 2007, 115.

²⁵ LEVI 1930/31, 436-450; DIMITRIOU 2016, 17.

²⁶ Lack of cooking pots, bowls and storage jars.

²⁷ DIMITRIOU 2016, 17-19, 27-28.

²⁸ DIMITRIOU 2012, 368-370.

²⁹ The Kephala-Attica pottery.

³⁰ DIMITRIOU 2012, 334-337.

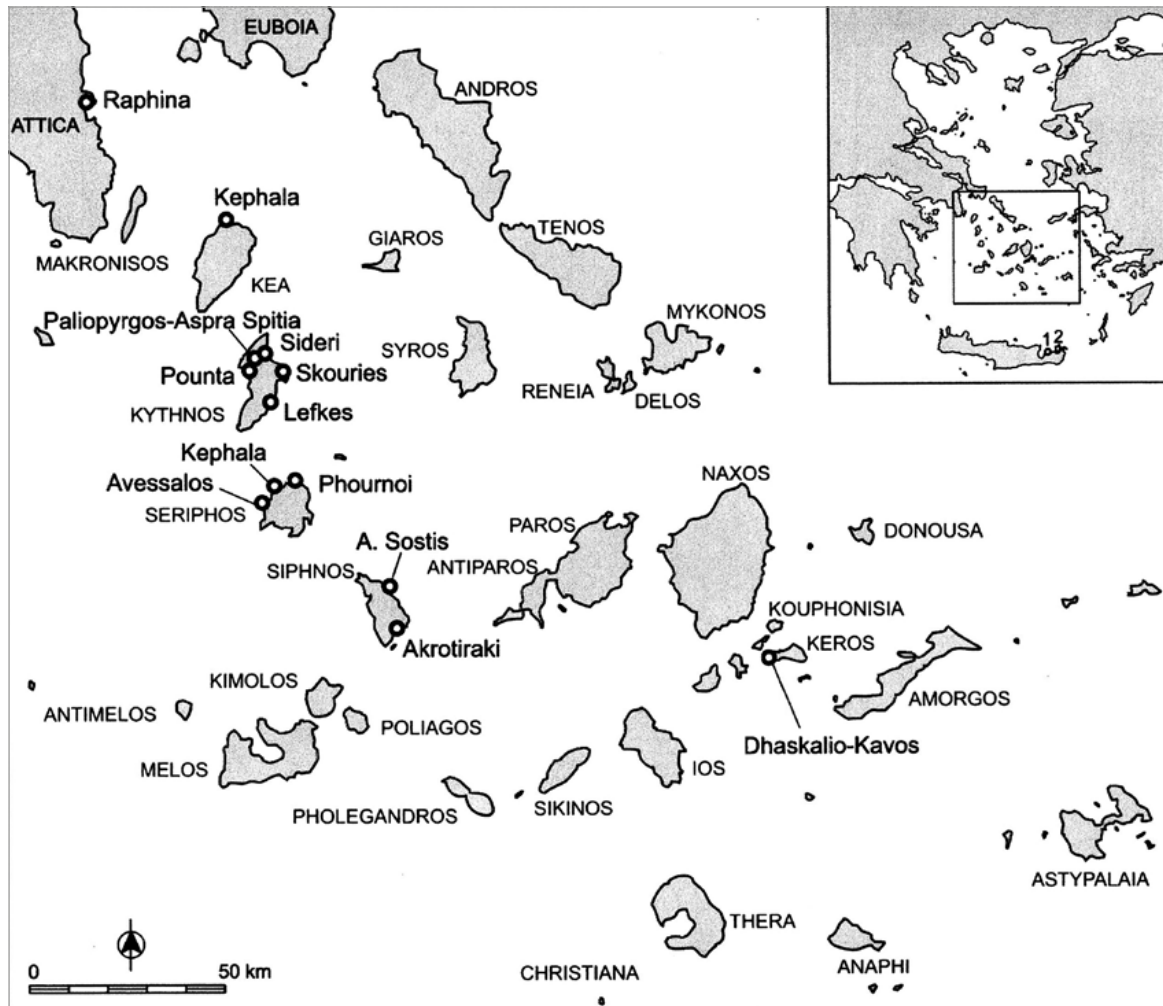


Fig. 17. Map of the Cyclades and the southeast Attica showing locations discussed in the text. In the smaller map the locations 1. and 2. in Crete correspond to Chrysokamino (1.) and Kephala-Petras (2.). (GEORGAKOPOULOU 2016).

was used for cooking meals occasionally, most likely before the metallurgical activities. The way that the hearth is built agrees with the type of hearths used for smelting activities³¹ but certain conclusions will be given by the final results from the analysis of the hearth remains. From the other hand, at this point is also important to add that for the moment there is no evidence of slag and other metallurgical ceramics as crucibles or *tuyères* except the perforated furnace fragments to indicate metallurgical activities. The study of the archaeological material as well as the archaeometrical analysis are in progress and their future results will be crucial for the use of the area during the FN.

A part of the discussion above, the presence of a perforated furnace for metallurgy opens a new series of questions related to such activity. First, the supply of raw materials, the kind of ore used and its source; whether it was from Laurion in Attica or imported from the Cyclades. The archaeometric analyses in progress at “Democritos” held by Dr Bassiakos and Dr Filippaki are expected to increase our knowledge and to shed light on the technological procedures and the kind of ore that was used³² for the metallurgical activities at Acropolis. It is acknowledged that a fuller discussion of this subject should develop after the archaeometallurgical analyses to examine the metallurgical process together with the settlement patterns and the possible contacts of the area with other contemporary sites in Attica and in Cyclades.

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³¹ For the metallurgical hearths see also ΓΕΩΡΓΑΚΟΠΟΥΛΟΥ-ΜΠΑΣΙ-
ΑΚΟΣ 2010, 427.

³² The results of this analysis will be presented at the 42nd International
Symposium on Archaeometry (ISA) in Mexico (Merida), May 20-26 2018.

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