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**Craft Specialisation, Workshops and Activity Areas in the Aegean
from the Neolithic to the end of the Protopalatial Period.**

Volume II of II

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Rebecca Helen Richardson

Submitted to the Department of Classics, University of Durham
for the Degree of Doctor of Philosophy

1999



20 MAR 2001

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Notes

The initials of authors have been specified to avoid confusion where several authors share the same surname.

Full details of the classification system are provided in Volume I. The list below is a summary of the classifications of working areas or other craft-related finds:

- A. workshop (including furnaces)
- B. probable workshop
- C. possible workshop
- D. activity area
- E. possible activity area
- F. no definite location
- G. kiln
- H. hoard
- I. stray find
- J. craftsman's grave
- K. insufficient detail
- L. general statement or inference
- M. other

Catalogue of sites

A. MACEDONIA

A1. *Ayios Mamas, Chalcidice (Macedonia): Pit D, in Northwest corner*

Workshop type: Kiln

Date: EBA

Sources: Heurtley 1939: 5-7

Finds: *Specialised permanent production installation:* kiln: circular floor, 1.2 m. diameter, centre slightly lower than the sides, walls c. 20 cm. above the base, domed roof would have been c. 90 cm. high. To the NW a combustion chamber: opening 42 cm. wide, sides marked by two stones set in the clay wall, clay floor. Indistinct remains of perhaps a flue to the south of the oven. Walls and floor of coarse red clay, lined on the inside with a thin coat of fine white material.
Unfinished products or finished products: several pots *in situ*, three nearly perfect, two more could be reconstructed, fragments of several others.
Other: stone axe in one of the crushed pots.

Comments: The kiln collapsed during firing, part of the debris was left *in situ* and levelled over. The eastern corner was greatly disturbed.

Analysis: Although Rutter (1993b: 19) asserts that there are no EH potters' workshops or kilns, this example, if correctly identified, would prove him wrong. Heurtley's diagnosis is partly reconstructed from indistinct remains. A likely G.

A2. *Dikili Tash (Macedonia)*

- Workshop type:** Shell ornaments
- Date:** Neo
- Sources:** Karali-Yannacopoulos 1992: 159-64.
- Finds:** *Production debris:* debitage of certain shells from making beads, bracelets or pendants; broken and cut up bones too.
Finished products?: pendants, beads (disc-shaped, cylinder, globular, converted shells), bracelets.
- Comments:** There seems to be local production: the frequency of the bracelets might be explained by the existence of a workshop and there is waste, “Mais on manque d’indications pour identifier un atelier” (Karali-Yannacopoulos 1992: 159). The condition of the site makes conclusions difficult.
- Analysis:** CF/DF.

A3. *Dikili Tash (Macedonia)*

- Workshop type:** Stone (flint) tools
- Date:** MN
- Sources:** Seferiades 1992: 60-1, 74-5.
- Finds:** *Production debris:* abundant, diverse debitage: cores, tablets, non-retouched flakes, blades, crested bladelets, generally of local or regional flint.
Finished products: 240 tools (from a total of 680 cut stone pieces) thought to be made on site.
- Analysis:** Local production in the MN is likely because local flint was used for tools and debitage is present, but none has been found localised in a particular place. Perhaps blades were fashioned as, where, and when

needed in various places, or more recent activity has disturbed the strata. The waste suggests DF. There were 112 tools but no waste from LN strata, and the flint was from the Dobrudja. This suggests a shift in exchange patterns, and a corresponding change in the production system.

A4. Dikili Tash (Macedonia): W30 (fig. 1)

- Workshop type:** Metal
- Date:** MN, level XIV
- Sources:** Blécon et al. 1992: 21, 23; Treuil 1992: 41-2, 44; Matsas 1995: 244; Nakou 1995: 4.
- Finds:** *Permanent (specialised production?) installations:* 3 circular cavities of diameter c. 20 cm., of which two were joined, perhaps connected with metallurgy.
- Production debris, finished products, or other?:* small amorphous copper lumps, possibly beads (Nakou 1995: 4).
- Production debris?:* alternate layers of burnt earth and cinders in the pits.
- Analysis:** The evidence for metallurgy is slim. Similar cavities in X30 were suggested by Treuil to be rubbish pits. Both Treuil (1992: 41-2) and Matsas (1995: 244) are unconvinced of a metallurgical use for the cavities. The copper lumps might be beads made at another site. Probably M.

A5. *Dikili Tash (Macedonia): south-east angle of X 30*

- Workshop type:** Kiln
- Date:** MN, level 11
- Sources:** Deshayes 1973: 466-7; Blécon et al. 1992: 23; Treuil 1992: 41, 43-4; Andreou et al. 1996: 587-8.
- Finds:** *Specialised permanent production installation:* simple type of kiln, with a base of sherds and stones, a circular chamber and a collapsed vault.
- Unfinished products?:* vases deformed by fire lying on stones (the fire that deformed the vases was probably the one that destroyed the building and kiln).
- Production debris:* ashes in the kiln.
- Other:* in the north part of X30, two joined circular cavities containing a heap of white ashes and a zone of hard burnt earth with pebbles, sherds and fragments of tools of bone and flint: perhaps pits for ashes and other rubbish; in the southwest part, a silo containing a heap of lentils and other carbonised matter.
- Comments:** This is the oldest kiln yet discovered in the Balkans and the Aegean (Treuil 1992: 43). The firing pit resembles other ovens in the site, apart from its contents, and implies that regular households fired pottery (Andreou et al. 1996: 588).
- Analysis:** The kiln's construction and unusual contents support the suggestion that it was a kiln. It is sufficiently different from other structures at Dikili Tash identified as ovens to be classified as G.

A6. *Dikili Tash (Macedonia): Building 4, all three rooms*

Workshop type: Kilns, pottery

Date: LN (c. 4500 B.C.)

Sources: Koukouli-Chrysanthaki, cited in *AR* 42 (1995-1996) 29.

Finds: *Specialised permanent production installations:* kilns in all 3 rooms opposite the entrances, with curved upper side and a semi-circular opening.

Specialised? permanent production installations?: basin-shaped clay structures or solid benches attached to the walls, beside the kilns.

Unfinished products: large storage jars of unbaked clay in the rooms, with reference to the kilns.

Finished products or other?: vessels.

Other: objects 'related to nutrition': stone pestles, plates, pots with lugs, remarkable miniature cups and incised deep bowls.

Analysis: Koukouli-Chrysanthaki's opinion of the function of the basin-shaped clay structures is not given: either they are benches, as suggested, or, from this description, they could be for levigating raw clay prior to potting.

The objects 'related to nutrition' need not necessarily have been used for that purpose; pestles could have been used to grind pigments to prepare paint for decorating the vessels. It is odd that a number of kilns were in a roofed house; the pollution and fire hazards would surely have made this infeasible. Nevertheless, assuming the identification of kilns is correct, with a value of at least 21, the three kilns were surely producing for more just household needs, this is A, and G.

A7. Dikili Tash (Macedonia): 'principal sector'

- Workshop type:** Metal
- Date:** EBA/MBA
- Sources:** Daux 1962: 919; Branigan 1974: 131; 198, 201.
- Finds:** *Production debris:* EBA bronze slags (Branigan 1974: 131, 201).
Other finds in this sector: include gold cylinder, bronze needle, brass needle, lead object, all in the same layer; from various layers figurines, obsidian *etc.* (Daux 1962: 919).
- Analysis:** The only indication of metal work is slag: I = AF.

A8. Dimitra (Macedonia)

- Workshop type:** Shell ornaments
- Date:** Neo
- Sources:** Nikolaidou 1997: 181; cf. Karali-Yannacopoulos in Grammenos (ed.) *Dimitra* (in press).
- Finds:** No information is available until *Dimitra* is published.
- Analysis:** Nikolaidou mentions that shell ornament making is better documented at Dimitra than Sitagroi, at least in the Neolithic period, which is not treated separately from the EBA in the publication. He gives no other information. (C/D) K, F.

A9. Kitrine Limne (Western Macedonia): Megalo Nesi Galanes site

- Workshop type:** Pottery
- Date:** Late LN
- Sources:** AR 43 (1996-1997) 76; Andreou et al. 1996: 568-70.

Finds: *Specialised permanent production installation?:* a small heap of stones beside the clay and a large, shallow circular pit of c. 2.3 m. diameter, filled with successive layers of ash.

Raw material?: a quantity of clean, unfired yellow clay.

Comments: An increase in pottery and proliferation in fabrics and shapes suggest the ceramic craft expanded rapidly and the products were used for more activities, a sort of ceramic revolution (Andreou et al. 1996: 569).

Analysis: It is difficult to be certain that a pit, of which many have been found at Neolithic sites, was for the specific function of firing pottery, which is what Fotiadis and Chondrogianno-Metoki, the excavators, imply by suggesting that this “may represent a late LN workshop area” (AR 43 (1996-1997) 76). It is possible that the ash in the pit was the result of domestic use for cooking food and occasional firing of pots; but this could be said of any Neolithic ash-filled pit. The presence of wasters would be more suggestive of a pottery-firing area. The find of raw clay nearby lends credence to the idea that this area may have been used for potting, but to suggest a *workshop* from this evidence is optimistic. No related architecture is mentioned, and the fact the identification of this place as a working area is so tentative, it is unlikely that if potting was done, it was on such a scale as to suggest a workshop. At the most this can be E.

A10. Makri II (Thrace) : centre of settlement, in storage area

Workshop type: Pottery

Date: EN-MN

Sources: AR 44 (1997-1998) 97.

- Finds:** *Specialised permanent production installations?:* clay installations for heating; hearths with remains of fire.
Unfinished products?: many large, carefully-made, unbaked vessels set upright in the floor.
Other: storage pits.
- Comments:** Dimension of storage area: 40 m².
- Analysis:** This locus was defined by Efstratiou, the excavator, as a storage area rather than a workshop. The presence of unbaked vessels, however, suggests pots being dried prior to firing and the heating installations might have assisted in drying the pots or even in firing them. More information is necessary before a more confident classification than E or storage (M) may be put forward.

A11. Makrygialos: Agiasma (central Macedonia)

- Workshop type:** *Spondylus* jewellery
- Date:** LN
- Sources:** AR 43 (1996-1997) 73.
- Finds:** *Finished products?:* “considerable variety in jewellery of stone and shell, particularly of spondylus” (AR 43 (1996-1997) 73).
- Analysis:** *Spondylus* was, according to the excavators, Bessios and Pappa, “being worked at the site” (AR 43 (1996-1997) 73). No further information was given. (C/D) K, F.

A12. Mandalo (Macedonia)

- Workshop type:** Metal
- Date:** FN

- Sources:** Andreou et al. 1996: 571ff.; *AR* 44 (1997-1998) 87.
- Finds:** *Tools:* clay crucible.¹
Finished products: various copper objects: needle, chisel, copper sheet and axe “from both the fifth- and third-millennium deposits” (Andreou et al. 1996: 572, n.256).
- Comments:** Papaefthymiou-Papanthimou and Pilali-Papasteriou, the excavators, report that copper was already being worked in the FN here, as proved by various copper objects and a clay crucible (4,200-4,000 BC) (*AR* 44 (1997-1998) 87); “toward the close of the fifth millennium, a coppersmith appears to have lived there” (Andreou et al. 1996: 572).
- Analysis:** More information is required before a more certain classification can be made for Mandalo. Was there any metal or slag adhering to the crucible? Perhaps further excavation will reveal traces of furnaces or ovens used for metallurgy with associated slag and perhaps moulds. BF, K.

A13. Nea Nikomedeia (Macedonia): Cutting A (Rodden 1962: 269)

- Workshop type:** Kilns? (Demoule and Perlès 1993: 375)
- Date:** EN/MN
- Sources:** Rodden 1962: 269-71, 273; Demoule and Perlès 1993: 375; Rodden and Wardle 1996: 50-2.
- Finds:** *Specialised permanent production installations?:* 2 ovens, roughly cylindrical, set in a basin, opened at the top (Demoule et al. 1993: 375), at depth 30-45 cm., poorly preserved, partly collapsed, filled with burnt debris. Fragments of oven wall of baked clay with a large

¹ Zachos (1996: 143) mentions FN clay crucibles, but is probably mistaken, as the excavators refer only to one (*AR* 44 (1997-1998) 87).

admixture of straw and vegetable matter. Oven X, outside the north wall of the main house, was constructed after the pit complex in the western half of Cutting A had been infilled; Oven Y was near another mud-walled structure in the eastern half of the excavated area. Both were probably associated with the adjacent structures.

Production debris?: burnt ash, rubble, little charcoal (Rodden 1962: 269-71).

Comments: Demoule and Perlès (1993: 375) state that these structures were probably for cooking, but a use as kilns cannot be ruled out. Others refer to them as “ovens”, with no mention of their use as kilns (Rodden 1962: 270; Rodden and Wardle 1996: 51).

Analysis: The poor state of these structures does not allow definite identifications of kilns. Finds of a kiln floor or wasters would have assisted in identifying kilns. (G?) or ovens (M).

A14. Olynthus (Chalcidice): southeastern end of settlement (figs. 2 and 3)

Workshop type: Kiln, pottery

Date: LN?

Sources: Mylonas 1929: 12-18; Heurtley 1939: 9-10; Jones 1986: 776-7.

Finds: *Specialised permanent production installations:* **Kiln:** oval floor area of burnt clay (the kiln floor was made by placing a cradle of beams and twigs plastered with clay above the fireplace), 1 m. by 0.7 m., with one straight side. Below the depression in the centre (which allowed heat and flames to enter the kiln), 75 cm. diameter, a quadrangular pit, the fireplace, c. 0.7 m. by 0.55 m. diameter, c. 0.5 m. deep. No permanent dome, no signs of walls rising from the floor. Channels from the fireplace to the surface covered by bases of cooking pots to regulate the draught (Heurtley 1939: 9-10). **Clay**

preparation area?: round hole, 80 cm. diameter, dug in the rock, 60 cm. deep, near northern end of the kiln, full of ashes, sherds, carbonized matter. Probably used by the potter in the preparation of clay (Mylonas 1929: 17).

Comments: Mylonas (1929: 14) is certain that this is a small kiln; he points out that the red basin is the floor of the kiln, its colour and texture resembling floors of modern kilns where the fire is not built in the floor of the oven. The kiln was not in use when destroyed, hence no complete vases on the floor. Theories asserting that this was not a kiln do not explain the channels and the red basin. "It testifies to the great knowledge of the potter in using draughts and fire for the baking of vases" and "is the earliest kiln discovered in Greece"² (Mylonas 1929: 16, 17). If the nature of the sherds found on the baked floor were known, this would remove doubt about the date of the kiln; pottery from Neolithic Olynthus is all LN (Heurtley 1939: 10).

Analysis: The interpretation of this structure as a Neolithic "elaborate kiln" (Heurtley 1939: 9) has been questioned unconvincingly by Jones (1986: 776-7), who cites Vitelli (1974: 26, 29-30) and Scott (1954: 395) also objecting on archaeological and technical grounds. Jones states that the sherds taken to be Neolithic were not illustrated nor were their descriptions diagnostic: this does not necessitate their not being Neolithic. The kiln was found in an area where there were only Neolithic and Byzantine sherds, and the fact that it was below a Byzantine wall suggests that it is pre-Byzantine. Technical doubts concerning the suitability of the kiln for firing express an inadequate depth of the pit and only one hole in the kiln floor. Presumably the concern is with insufficient temperatures, and yet if this elaborate structure was inadequate for firing, the question arises of where pots

² The MN kiln at Dikili Tash (A5) is earlier.

were fired. Bonfires and ovens were no doubt used in the Neolithic, and if such primitive conditions were sufficient to fire pottery, then surely an elaborate structure such as this, with its channels to regulate temperature, could be used for firing too. Jones' final argument is that the structure is not a kiln because of its similarity to Greek ovens used today for cooking and baking. Admittedly, the kiln is unusual for its period, but kilns have also been identified at Dikili Tash and Dimini, and the absence of dome a feature of Vitelli's prediction of Neolithic firing places with temporary domes which were destroyed after firing. Raw clay and diagnostic, published wasters would have been conclusive evidence for a Neolithic kilns, and if the clay preparation areas is correctly identified, this further supports the area's use for producing pottery. This is argued here to be G. C/E and G.

A15. Petralona (Macedonia)

Workshop type: Founder's hoard?

Date: EB II (dating based on typology)

Sources: Branigan 1969: 10-11; 1974: 59, 72, 76, 134; Renfrew 1972: 327-8.

Finds: *Tools: either:* 18 flat axes, 2+ chisels, 3 single axes (Branigan 1969: 10) **or** 19 chisels, 4 single axes (Branigan 1974: 134) **or** 10 flat chisels (analogous to those of the Kythnos hoard); 2 chisel fragments; 3 shaft-hole axes (of form seen in Poliochni hoard) (Renfrew 1972: 327).

Comments: The hoard was mostly of arsenical bronzes and 3 lead-bronzes; no items were tin bronze (Branigan 1974: 59, 76). The find circumstances are not known (Branigan 1969: 11). The hoard is

similar in its basic content to the Kythnos hoard (Renfrew 1972: 327).

Analysis: The hoard contains broken objects, probably scrap to be melted down, and “may well be a founder’s hoard, the earliest known in the Aegean” (Renfrew 1972: 328). H.

A16. Polichrono (Chalcidice): outer limit of the settlement post-dating the terrace walls

Workshop type: Kiln

Date: EB II-III

Sources: Andreou et al. 1996: 583.

Finds: *Permanent specialised production installation:* “small pit interpreted as a potter’s kiln”.

Finished products?: pottery: bowls, tankards, cups, pithoi.

Comments: Two similar firing pits have been found in central Macedonia at Ayios Mamas and Sindos (Andreou et al. 1996: 583, n. 337).

Analysis: Andreou et al. are cautious about offering agreement on the identification of the kiln. Pending further information, this is (G) K.

A17. Saratse (Macedonia)

Workshop type: Metal

Date: EBA - MBA

Sources: Casson 1926: 66; Heurtley 1929: 144; 1939: 88; Davies 1939: 253.

Finds: EBA:

Production debris: piece of gold slag; piece of copper slag.

Tools: fragment of crucible.

Finished products or other: copper blade; gold twisted-wire hair ring (Heurtley 1929: 144; 1939: 88; Davies 1939: 253).

MBA:

Production debris: piece of copper slag; unstratified (MH?) piece of gold slag; unstratified piece of copper slag (Heurtley 1929: 144; 1939: 93).

Tools: broken stone mould for a metal pin (at stratum 11 b at depth 3.65 m.) (Casson 1926: 66).

Finished product or other: unstratified copper blade (?) (Heurtley 1929: 144).

Analysis: I = AF in both eras.

A18. Sitagroi (Macedonia): Bin Complex

Workshop type: Metal

Date: Phases II-Vb (LN-EBA)

Sources: Renfrew 1970: 300; 1973: 190, fig. 127; 1986: 188, 215; McGeehan-Liritzis 1983: 153; Muhly 1985: 110, 114; McGeehan-Liritzis and Gale 1988: 199-225. cf. C. Renfrew "Metal objects and evidence for metallurgy" and E. Slater in *Sitagroi II* (in press).

Finds: Phase II (LN, 5200-4600 B.C.)

Production waste: copper slag or piece, and fragment (McGeehan-Liritzis and Gale 1988: 202).

Square MM, layer 20, Phase III (LN-FN, 4600-3500 B.C.)

Production debris: "concentration of sherds with traces of solidified copper or copper slag adhering to them"³ in Square MM, layer 20.

³ These are presumably what Renfrew (1973: 190) referred to as slag on 2 crucible sherds (4000 B.C. or earlier). A 'concentration' of sherds implies that more were found; unfortunately Renfrew (1986) does not specify the number.

Other occurrences lower in the same square and in square ML (Renfrew 1986: 215).

Tools: crucible fragments with adhering slag (Renfrew 1973: fig. 127), the earliest known from the Aegean and neighbouring lands (Muhly 1985: 110).

Finished products?: from Sitagroi generally (not just Square MM): copper awl; wire or pin; piece of lead; 2 beads; as-cast pieces of copper; piece of corroded copper; pin.

Bin Complex in QO 8: layers 7-9 Phase Vb? (EBA 2700-2200 B.C.)

Production debris: 2 pieces of slag.

Tools: clay crucible Phase Vb.

Other: 18 pots; 23 spindle whorls; loom weight; 2 spools; 2 clay anchors; clay slingstone; figurine fragment probably Phase III; fired clay support; bone needle; 2 bone awls; 6 flint blades; stone axe; 4 stone pounders; 3 miscellaneous stone objects (Renfrew 1986: 188).

Comments:

“Sitagroi appears to have been involved in copper-working, in some way, throughout the whole LN period” (McGeehan-Liritzis 1983: 153). Smelting at Sitagroi has been inferred from the presence of slags (Renfrew 1970: 300; 1973: 190; Nikolaidou 1997: 182), which are not automatic proof of smelting and probably represent melting instead (Stos-Gale 1998: 720). There is, in fact, no evidence for extractive copper metallurgy at Sitagroi yet. A furnace has not yet been found, perhaps because only a small part of the site has been excavated (McGeehan-Liritzis and Gale 1988: 220).

Metal finds of unalloyed copper, similar to those found on contemporary Balkan sites, are common in phase III and are the earliest yet reported from the Aegean (Renfrew 1970: 300).

Analysis:

Phases II-III: by 4000 B.C. there is positive evidence for metallurgy (crucibles and slag) at Sitagroi (Renfrew 1973: 190). The slag and sherds in Squares MM “are among the most important indications of

metalworking on the site, and there can be little doubt that the metal was worked very close at hand or indeed in this very area” (Renfrew 1986: 215). B (= AF).

Phase Vb: Again the presence of a crucible and slag indicates metalworking in the vicinity. B (= AF).

A19. Sitagroi (Macedonia): Bin Complex (QN 7 and QO 8)

Workshop type: Textile

Date: Phase III (4500 - 3800 B.C., LN)

Sources: Renfrew 1986: 187-8; see *Sitagroi II* (in press, author unspecified by Renfrew).

Finds: QN 7:

Tools: 17 spindle whorls; clay spool; 3 loom weights.

Tools or other: bone tools; stone axes; stone rubbers; flint blades.

QO 8:

Tools: 23 spindle whorls; loom weight; 2 spools; bone needle; 2 bone awls.

Tools or other: 6 flint blades; stone axe; 4 stone pounders; 3 miscellaneous stone objects; pots; (and other finds listed in A18).

Analysis: Renfrew (1986: 187-8) emphasises that loom weights, “numerous finds of spindle whorls and other weaving-related artifacts” were found in the Bin Complex. As an example of this, he cites QN 7. Although he did not cite QO 8 as a locus of textile working, it is included here because it contains more textile-working tools than QN 7. D.

A20. *Sitagroi (Macedonia): Burnt House, Oven 2 (figs. 4 and 5)*

Workshop type: Kiln?

Date: Phase Va (3100-2700 B.C., EB II)

Sources: Renfrew 1972: 309-10; 1986: 190-203, plan of Oven 2 figs. 8.7, 8.10, 8.11, 8.13, Pl. XXX: 2, XXXI: 1-4; Elster 1997: 19-36, especially 30-31, Pl. Va; cf. E. Gardner in *Sitagroi II* (in press).

Finds: *Specialised permanent production installation?*: oven or kiln “of unusual form”, horse-shoe shaped, superstructure not well preserved, aperture of diameter 14 cm. on southeast side, replastered sides, baked floor (Renfrew 1972: 309-10; 1986: 199, fig. 8.13).

Other: 41 pots in total from the house (“a remarkable assemblage” (Renfrew 1986: 199), scattered about were a few bone tools, spindle whorls, baked clay objects, sherds, kitchen refuse (Renfrew 1986: 199ff.; Elster 1997: 19ff.).

Analysis: The function of Oven 2 is unclear. Although the aperture suggests a controlled draught, there are no wasters to suggest its use as a kiln nor metal slag or splashes to indicate metallurgy. Both uses are possible, “but a domestic function seems more likely in view of its context in the apsidal kitchen area of the house, beside the querns and grindstones” (Renfrew 1986: 199). Elster (1997: 26-7, n. 54) argues that its construction (too small to be a kiln), shape, and location (some traditional houses on Amorgos have a second oven for meat, next to the bread oven) suggest food preparation. She does not provide the reasoning for why its shape suggests food preparation; many kilns have also been horse-shoe shaped. Moreover, traditional lifestyles are not necessarily representative of prehistoric lifestyles several thousand years earlier, so Elster’s ethnographic argument is unsafe. It would be wiser to compare this house with other Phase Va houses at Sitagroi to determine whether it

was usual to have two ovens, both with no indications of use as a kiln or furnace, in one dwelling. The size of the structure is admittedly rather small (c. 40 cm. by 70 cm.) for a kiln, though perhaps not for a furnace. The use of this structure must remain open to speculation; the classification here, however, is possibly G, probably an oven (M) because of its size and lack of wasters and metal waste.

A21. Sitagroi (Macedonia): ZB (EBA) and elsewhere

Workshop type: Ornaments, especially shell.

Date: Neo - EBA

Sources: Nikolaidou 1997: 179-83. cf. N.J. Shackleton in *Sitagroi II* (in press).

Finds: *Unfinished goods:* a few unfinished shell examples (Nikolaidou 1997: 182).

Finished products?: >800 Neo. ornaments; 101 EBA ornaments (Phase IV: 63; Phase V: 38), of clay, stone, bone, metal, shell, especially spondylus. Area ZB (EBA) yielded more items than all other units together.

Comments: Neighbouring communities such as Dikili Tash and Dimitra, where ornament working is better documented, may have supplied the ornaments found at Sitagroi, at least in the Neolithic. Alternatively, they could have been manufactured at Sitagroi, and manufacturing knowledge is attested at Sitagroi for other crafts (Nikolaidou 1997: 180-3). Miller argues for EBA local production because of the scarcity of preforms and poor preservation of finished material. The excavations of Neolithic Sitagroi may not have covered ornament production areas or dumps (Nikolaidou 1997: 182 n.39). Nikolaidou

infers specialised production for at least standardised and long-established forms of ornaments (cylindrical, tubular, biconical, and segmented beads, bangles, and copper items).

Analysis:

“The available evidence about the village layout and organisation suggests that ornament production at Sitagroi was a part-time specialised household craft. But we cannot know whether there was a separate ornament craft, or specialists in certain raw materials ... produced different kinds of artefacts, including ornaments” (Nikolaidou 1997: 183). The latter point begs the question of whether, in the Neolithic and EBA, there were craftsmen specialising in products or materials. A specialist producing one type of product from a variety of materials would have to gain knowledge of working them, which might take more time than a part-time household producer would have available. Production loci, if found, might settle this issue by revealing raw materials, waste or unfinished ornaments of various materials together or of only one material. The value is 9, and this, coupled with the volume of finished products suggests CF/DF for whichever period yielded the unfinished products.

A22. Toumba Nea Anchialos (Macedonia): area of the Archaic cemetery

Workshop type: Kiln

Date: EBA

Sources: Andreou et al. 1996: 581.

Finds: *Specialised permanent production installation:* “possibly the remains of an EBA pottery kiln”.

Finished products: “a third-millennium pottery deposit”.

Comments: Andreou et al. referred to Andreou forthcoming in *Deltion* volume (Apothetis kerameikis eis tis Mroimis Epochis tou Chalkou sti Sindo

Thessalonikis), where there is presumably more detail, but they did not specify the date of the publication or page numbers.

Analysis: (G?) K.

A23. Vardaroftsa (Macedonia)

Workshop type: Metal

Date: EBA+

Sources: Heurtley and Davies 1927: 195-7.

Finds: Period A:

Production debris: gold slag (Settlement I (S. 35)); piece of (probably gold) slag from (Settlement 5 (S.30(2))).

Finished product or other: fragment of copper or bronze pin from (Settlement 5 (S.30(1))).

Period C:

Production debris: piece of (probably gold) slag (Settlement 16 (VI.10 (1))).

Finished product or other: 2 fragments of bronze blades (Settlements 10 (IX.22(1)) and 11 (IX.20(1))).

Period D:

Production debris: piece of (probably gold) slag (Settlement 18 (11.7 (1))); possibly piece of gold slag (Settlement 20 (VI.5)).

Analysis: I = BF.

B. THESSALY

B1. Achilleion (Thessaly): adjacent to floor of the earliest house construction, Square B (figs. 6 and 7)

- Workshop type:** Lithic blades
- Date:** Phase IB (late), EN
- Sources:** Gimbutas et al. 1989: 34-5, figs. 4.4, 4.5.
- Finds:** *Production debris:* chipped stone debitage and waste flakes.
Finished products or rejects?: lithic blades.
- Comments:** The “work area” “had a hardened surface with traces of a chalky material found on the floor” (Gimbutas et al. 1989: 34).
- Analysis:** Presumably the types of blade allegedly produced here were of local stones such as jasper, because Elster (1989: 300) denies that obsidian blades were manufactured at the site, despite finds of the cortex of a nodule of raw material. She argues that obsidian blades were procured by exchange, probably down-the-line, yet she also states that conserving behaviour for obsidian was reflected in controlling the size and form of the tool produced. How was this controlled if blades were not produced on the site? The blades and lithic waste flakes were scattered in the area, designating E or a dump (M) (= DF) for tool production from at least local stone and perhaps obsidian.

B2. Achilleion (Thessaly): probable courtyard in square B (fig. 8)

- Workshop type:** Unspecified
- Date:** Phase IIA (Proto-Sesklo), EN
- Sources:** Gimbutas et al. 1989: 36-7, figs. 4.7, 4.9, 4.10.

Finds: *Tools:* “various food processing tools” surrounding oven: 4 quern fragments, 2 hand grinders, 2 stone balls, 1 scraper, 1 axe; “many tools” on the plastered surface “included 7 chert blades, 3 obsidian blades, 2 antler tools, and a palette”.

Non-specialised permanent installation: small bench or platform; domed oven with attached clay bench; pit near oven; plaster floor.

Other: pregnant female figurine on oven bench; animal figurine; 14 pottery discs.

Analysis: “A major work and food preparation area” pertained to the post house in square A or an unexcavated dwelling (Gimbutas et al. 1989: 37). The food preparation area surrounds the oven; the work area seems to be associated with the plastered surface. The type of work is not specified, and the tool assemblage is probably what most Neolithic houses would have contained for various tasks. At most, E.

B3. Achilleion (Thessaly): squares A, B, C and D (fig. 9)

Workshop type: Unspecified; stone tools

Date: Phase IIB, EN

Sources: Gimbutas et al. 1989: 37-42, figs. 4.11, 4.14.

Finds: Squares A and B:

Courtyard for the production of tools and burning refuse or other activities requiring a large fire, such as firing pottery. Preparation of tools in Square B.

Non-specialised permanent installations: large circular hearth (Square A).

Production debris: large amount of chipped stone debitage from preparation of stone tools: 90 waste flakes; 6 cores.

Square C:

Posthouse perhaps with roofed outdoor area attached to it; tools and equipment “generally neatly distributed in various activity areas”.

Specialised permanent production installations?: large circular hearth immediately outside the house, perhaps for firing pottery; semi-domed oven to the east adjoining an area of great activity.

Tools: 4 awls; quernstone; 2 chert blades; obsidian blade. Near the broken hearth: spool; pottery discs; stone ball; 2 hand grinders; pestle; scraper.

Square D (“an important workshop area” perhaps roofed):

Raw material: 6 antler or horn core fragments (with bone tools).

Stone tools: In area d (see fig. 4.11d), chipped stone tools including 5 obsidian blades, 5 chert blades; whetstone; 2 palettes; hammerstone; bone (knife?) handle (fig. 4.11d,g).

Bone tools: In area g (fig. 4.11g), a concentration of many bone tools. In area e (fig. 4.11e), 4 awls, 7 needles, an antler hoe, a bone spatula, and a bone artifact perhaps for a belt and buckle, near burned clay or daub rubble.

Variety of tools not characteristic of any special activity: 2 perforated discs, perforated bone tool ornament, 3 axes, various blade tools and fragments, 3 scrapers and figurines (fig. 4.11e).

Isolated finds with no particular context: a ceramic axe and a spindle whorl.

Analysis:

Courtyard (A and B): Although Gimbutas et al. call Square D a workshop, the courtyard contains more signs of production activity. E or a dump (M) (= DF).

Square C: “The material suggests another work area” in the NW corner of Square C. The tools “probably indicate a secondary indoor work area at the east end of the house”. Probably activity areas for household tasks. E.

Square D: Gimbutas et al. identify Square D as an “important workshop area” where tools were used and stored, the “concentration of tools found in this workshop was greater than in any other architectural context excavated at Achilleion”, there is no suggestion of what the workshop actually produced. The concentration of tools indicate an area of storage (M) or E in which no waste or raw material was found. The vagueness of details eliminate the possibility of calling this a workshop.

B4. Achilleion (Thessaly): Square A (fig. 10)

Workshop type: Pottery

Date: Phase IV A (Early), EN-MN

Sources: Gimbutas et al. 1989: 58-9, figs. 4.33.

Finds: *Specialised permanent production installation?:* large, circular pit-type hearth with deep central depression for pottery for firing. Plastered floor bordered the hearth.

Tools: obsidian blades on reed mat near hearth; spool, some blade tools on the plastered floor.

Comments: Possible wooden roofed construction nearby.

Analysis: “As in phase III, the principal baking or pottery firing area was located in Square A. The large, circular, pit-type hearth, relined at least three times, was constructed with a deep central depression into which pottery could be placed for firing” (Gimbutas et al. 1989: 58). The authors do not give evidence to support the idea that pottery was fired in the hearth; no mention is made of wasters or finds of raw clay. The blades nearby may have assisted in pottery production, but similarly could have had a multitude of other purposes. A value

cannot be reached for this 'workplace' because the integrity of the tools and hearth as indicators is questionable. E.

B5. Achilleion (Thessaly): two-room 'temple' (Square C) (figs. 11 and 12)

Workshop type: Pottery decoration and probably figurine production

Date: Neo Phase IV A (Middle), EN-MN

Sources: Gimbutas et al. 1989: 60-1, 216-17, figs. 4.39, 4.40, 7.76.

Finds: *Tools:* "tools for pottery decoration and making of figurines" (Gimbutas et al. 1989: 216); near hearth: palette, polisher made from a rib, perforated disc, spool, ladle.

Finished products?: painted vases and plates on altar with figurines; bowls and fine ware on mat at altar. 10 figurines.

Other: perforated bone ornament; rhyton.

Hearth in corner of room, probably for warmth.

In a pit just south of the house:

(Production?) debris: an abundance of broken tools and debris; 14 figurines.

Comments: Two rooms, one a shrine with a stone bench (Square A), the smaller one a workshop (Square C). In the pit south of the house, "the concentration of bones, painted pottery, and cultic equipment was extraordinary" (Gimbutas et al. 1989: 61).

Analysis: From the finds Gimbutas et al. (1989: 261) infer "a workshop mainly for decorating pottery and probably for making figurines". While this is possible, the 'tools' do not point exclusively to pottery and figurine decoration. No undecorated or unfinished goods or colouring matter were found. Rather E than A.

B6. *Dimini (Thessaly): House N and Space g (fig. 13)*

Workshop type: Shell

Date: LN

Sources: Tsuneki 1989: 13; Halstead 1993: 603-9.

Finds: House N:

Unfinished goods: 8 worked fragments, presumably unfinished rings.

Tools: querns and grinding stones suitable for making rings.

Finished products: more than half the total *Spondylus* rings.

Space g:

Rejects: 5 worked fragments probably discarded in the production of small objects.

Tools: stone drills, perhaps piercing instruments for small objects, in Space g and its vicinity.

Finished products: 85% of the *Spondylus* buttons and most of the cylinder beads.

Comments: *Dimensions:* House N = 10 m. by 5 m.

Analysis: Tsuneki cautiously categorises some finds as unfinished or rejects, and it is not possible to say whether the 'tools' really had been used for shell ornament production. One might consider why the same types of tools were not found in both 'workplaces' if they were both producing similar items from the same material. If, however, Tsuneki's attributions are correct, House N has a value of 13 (D/C), and Space g has a value of 9 (D/C). If one omits the doubtful tools, the respective values are 9 (D/C) and 5 (C/E), and if the questionable unfinished finds and rejects are further omitted, the values are 1 and 1 (E). These places were either *spondylus* workshops, places where products were stored prior to distribution, or they represent areas of unequal accumulation (Halstead 1993: 607ff.). As production waste was scattered around the settlement (see plan), Halstead suggests a

more dispersed production. These areas, therefore, are C/E or places of consumption or storage (M), representing CF/DF.

B7. Dimini (Thessaly): in 3rd and 4th surrounding wall, NW side of village, area C (fig. 14)

Workshop type: Kiln

Date: LN

Sources: Hourmouziades 1977: 207-25; Davaras 1980: 120, n.10; Demoule and Perlès 1993: 391; Andreou et al. 1996: 544.

Finds: *Specialised permanent production installation:* circular kiln of clay, thick tiles and schist slabs, sunk into the ground without a dome. The bottom of a stone domed structure was found, with a small dip in the middle where the pots were put, with the fire above. A small wall kept the fire within the space and prevented misfiring (Hourmouziades 1977: 207-11).

Production debris: rough and burnt clays, seeds, sherds and soils with black ash, within a radius of 3-4 m. around the structure.

Analysis: The wide distribution of sherds and waste around the structure led Hourmouziades to conclude not only that it had functioned as a kiln, but also that it had produced pottery for the settlement and beyond. He deduced that this was a specialist workshop from the following: the shapes and decoration of the pottery were specialist (characteristic of the settlement, rather than Neolithic communities as a whole); the standardisation of decoration reflects standardisation of production and probably mass production; the surrounding wall suggests the experience of the producer; the decision to build a kiln which would be able to make a large amount of pottery, when kilns in other parts of the site were simple and unspecialised. Davaras

(1980: 120) also categorised this as a kiln; Demoule and Perlès (1993: 391), however, seem less sure. From the available information, Hourmouziades' arguments sound convincing. G.

B8. Dimini (Thessaly)

Workshop type: Metal

Date: FN

Sources: Tsountas 1908: 354; McGeehan-Liritzis and Gale 1988: 201 and 215, 222, 223; Nakou 1995: 6.

Finds: *Finished product:* one piece of bronze wire in the fill of Dimini (Tsountas 1908: 354); copper earring with typological parallels to LN Sesklo earring. Axes, whose dates are not specified, worked with lithic techniques after casting (McGeehan-Liritzis and Gale 1988: 210).

Analysis: McGeehan-Liritzis and Gale suggest metal artifacts were made on site from smelted metal (Nakou 1995: 6). None of the finds, however, suggest metalworking in FN Dimini. M.

B9. FS 30 (North Thessaly): Pliocene Terrace of Peneios River, at entrance of the Stena Rodias

Workshop type: Stone tools

Date: Middle/Lower Palaeolithic

Sources: Runnels, cited in *AR* 36 (1989-1990) 50-1.

Finds: *Finished products?:* flint tools (Middle Palaeolithic); quartz flake tools (a different industry); flint chopping tools (Late Palaeolithic).

Analysis: In 1987 “It was concluded that this place was an atelier where Middle Palaeolithic stone tools were manufactured from flint cobbles obtained from the old terrace” (*AR* 36 (1989-1990) 50). The idea of an ‘atelier’ as early as the Middle Palaeolithic is implying specialised production and organisation, which is unlikely at such an early date. If this was a production locus (and little evidence is given other than presumably the finished products), this is far more likely to be an activity area. E.

B10. Klithi (Epirus)

Workshop type: Bone and stone

Date: Mainly Lower Palaeolithic

Sources: Bailey, cited in *AR* 30 (1983-1984) 40-2, *AR* 32 (1985-1986) 52-4, *AR* 33 (1986-1987) 29-31.

Finds: *Raw material:* pieces of ibex horn core and large unworked or abandoned nodules of flint.

Production debris: flint debitage, usually removed by stone percussion.

Tools: large river pebbles used as anvils; hammerstones.

Finished products: worked bone and teeth including drilled red deer canines, bone awls and needles, incised bones, worked antler tine; “a stone industry dominated by backed bladelets” (*AR* 30 (1983-1984) 41).

Comments: Primary manufacturing techniques were splintering of bone, longitudinal scraping, transverse or annular grooving and snapping, transverse incising, biconical drilling and gouging (*AR* 32 (1985-1986) 53).

Analysis: Bailey alleges “considerable evidence of personal decoration and bone work” (*AR* 30 (1983-1984) 41) and provisionally interprets the drop zones (stony deposits rich in bone and flint) as “localized areas of activity, favoured locations around the hearth for sitting, eating and working raw materials” (*AR* 33 (1986-1987) 30). Given a value of 13, this is a workplace, and the early date suggests D.

B11. Larisa (Macedonia)

Workshop type: Metal

Date: EN

Sources: Heurtley 1939: 66.

Finds: *Tool?*: flat piece of schist with channels on both faces like a mould and traces of ochre perhaps, on one of the broken sides.

Analysis: A dubious mould is the only indication of possible metalwork. I = (CF?) or it is not a mould, (M).

B12. Lianokladhi III (Malis): the Lianokladhi III house

Workshop type: Weaving

Date: MBA

Sources: Wace and Thompson 1912: 187-91; Nordquist 1987: 59.

Finds: *Textile-working tools*: “eleven large, coarse clay balls ... pierced longitudinally” (Wace and Thompson 1912: 191, fig. 126ff.; see below); 4 flat terracotta whorls, one made of an Urfirnis sherd; 5 conical whorls; 1 double conoid whorl; 2 spools.
Other tools: stone: 2 bored celts; 3 curved knives; 4 saws; flint chip; 3 saddle querns. 1 sharpened bone and 2 bone scrapers.

Storeroom: 6 pithoi.

Comments: The house is a combination of two houses or a single house with extensions added at different times, in different styles. The central room was a storeroom, a large chamber lead off this, and perhaps a further room. Other than the pithoi, the rooms from which the finds originated are not specified.

Analysis: While Nordquist writes of a loom with at least 11 spherical weights, Wace and Thompson (1912: 191) are less assertive about the purpose of “these remarkable objects” and do not mention a loom. E (= DF).

B13. Megalo Monastiri region (Thessaly): 6 findspots

Workshop type: Flint?

Date: Lower Palaeolithic

Sources: Runnels, cited in *AR* 38 (1991-1992) 41.

Finds: *Obsidian at 6 findspots:* total of 49 cores, flakes and flake tools.

Analysis: The presence of cores suggests production of blades somewhere. No blades, obsidian or chert artifacts were found, so one assumes that flint is the material. E or a dump (M).

B14. Pefkakia Magoula (Thessaly)

Workshop type: Unspecified

Date: MBA

Sources: Andreou et al. 1996: 546-8.

Finds: *Specialised permanent production installations:* “a few industrial installations”.

Analysis: The page numbers in Maran (1992) referred to by Andreou et al. shed no light on what these ‘installations’ are, where they were, or what purpose they served. K.

B15. Pefkakia Magoula (Thessaly): House 316B, the W-space (fig. 15)

Workshop type: Metal

Date: MBA, Phase V

Sources: *AR* 18 (1971-1972) 14; Maran 1992: 20-1, 63, plan VIIA.

Finds: *Tools:* 2 crucibles, one small and whole (in Qu. E VIII 49 near northwest corner of the area), one large and fragmentary (in Qu. E VIII 60).

Analysis: The crucibles indicate probable metal working somewhere at the site. Milošević (cited in *AR* 18 (1971-1972) 14) reports that an oven was found in another room of the house; this is not mentioned in the site publication (Maran 1992). Maran does note Oven 471, which could be a baking oven, furnace or kiln, probably the latter because no wasters or slag were associated with it. This, however, belongs to House 315, Phase 6. There is no indication that metallurgy in the area of House 316B continued after Phase 5. I = BF.

B16. Rakhmani (Thessaly): house Q

Workshop type: Textiles

Date: FN

Sources: Wace and Thompson 1912: 43-53, fig. 28f; Halstead 1989: 77.

Finds: *Tools:* 19 conoid whorls, 2 with incised decoration on the flat side; 2 flat whorls, one with incised decoration. 1 double conoid whorl.

Other: bone implements: 3 hammers, 2 pins, 2 scrapers; *stone implements*: 1 hammer, 2 celts, 4 pounders, 3 grinders or rubbers, 2 saddle querns, 2 flint knives; *other*: lump of red ochre, pottery, figurines (Wace and Thompson 1912: 43-53).

Analysis: The “cache of 22 spindlewhorls in a final neolithic house ... hints at a large-scale centralised production of yarn (J. Carrington-Smith personal communication)” (Halstead 1989: 77). John Younger (pers. comm. Aegeanet 1999) has suggested that this number of spindle whorls indicates usual household production (see section 5.3). This find might even signal the production of spindle whorls, rather than yarn. The house was no doubt the storage place for the whorls that were probably used in various locations because spinning was a labour-intensive craft fitted in between other tasks. Storage (M) indicating DF rather than A or B.

B17. Sesklo (Thessaly): “Potter’s Workshop” House 11-12 (fig. 16)

Workshop type: Pottery

Date: MN IIIB (Andreou et al. 1996: 541)

Sources: Tsountas 1908: 86-7, fig. 18; Theocharis 1968: 27-30; 1973: 66, figs. 5, 183 and 184; Andreou et al. 1996: 541.

Finds: *Associated storerooms*: storeroom with plastered walls, containing vases.

Area 11:

Specialised permanent production installation?: on floor of Delta 3: 2 small walls of clay and slabs 25-30 cm. high, one 1.2 m. long, one 1.8 m. long, crossing in the middle to make four corner sections. Near one, there is a smooth slab of stone on which something was rubbed or flattened.

Rejects: many sherds twisted and misshapen by firing near the slab.

Finished products: some complete vases near the slab.

Slightly further to the north in 12:

Unfinished goods?: a heap of clay slingstones, many of which seem to be raw or carelessly baked (Tsountas 1908: 86-7).

Comments: The ‘workshop’ was “partly excavated by Tsountas” (Theocharis 1973: 66).

Analysis: Demoule and Perlès (1993: 375) mention an oven or possible kiln in the ‘Potter’s Workshop’, citing Theocharis 1973, in which no oven or kiln is mentioned.

Tsountas wrote, ‘From these finds, I guess that a potter lived here and that the walls making the four divisions and the smooth stone were linked to his work’ (1908: 86-7); Theocharis agreed, calling this a “Pottery workshop” (1973: 66). Taking the area as a whole, it has a value of 26 or 15, depending upon whether the stone slab and walls are categorised as specialised or non-specialised permanent production installations respectively. Although some may argue that the early date suggests D, and this happens to be a rare instance of a clear identification of a pottery working area, the conclusion here is A.

B18. Sesklo (Thessaly)

Workshop type: Hoard?

Date: LN

Sources: Branigan 1974: 134; Tsountas 1908, figs. 292 and 293.

Finds: *Tools*: 2 flat axes (Branigan 1974: 134).

Analysis: Two axes are a small number of tools to constitute a hoard. H?

B19. Sesklo (Thessaly)

- Workshop type:** Stone
- Date:** LN - FN
- Sources:** Demoule and Perlès 1993: 401; Devetzi 1996: 135.
- Finds:** *Unfinished products:* LN half-finished stone bowl (Devetzi: 1996: 135); FN unfinished perforated axe of polished stone, with hole made by tubular hollowed drill (Demoule and Perlès 1993: 401, citing Tsountas 1908 [no page reference given]).
- Analysis:** “The unfinished bowl shows that stone vase-making was a local activity employing the raw materials at hand” (Devetzi: 1996: 135). No findspots are specified for the unfinished items, which give a value of 8. I = CF/DF.

B20. Sesklo (Thessaly)

- Workshop type:** Kiln?
- Date:** EBA?
- Sources:** Cook 1961: 65.
- Finds:** *Specialised permanent production installation?:* kiln or oven.
- Analysis:** There are two problems: firstly the date is uncertain; Cook presumes that it is EBA, citing Theocharis (pers. comm.) who alleged that the construction must be later than the Neolithic structures around it (Cook 1961: 65 n.13). Secondly it is possible that the ‘kiln’ may be an oven. No further details are given which might resolve the matter. G or oven (M), K.

B21. Sesklo (Thessaly)

- Workshop type:** Metal
- Date:** MBA (late?)
- Sources:** Tsountas 1908: 333-5, 349, figs. 264-7, 288; Banks 1967: 226; Branigan 1974: 70, 202-3.
- Finds:** *Production debris:* scoriae on the crucible (Tsountas 1908: 349).
Tools: two halves of a schist double mould for double axe found 30 cm. from the surface by the wall of a BA house (Tsountas 1908: 333-5, fig. 264)⁴; near these at a depth of 45 cm., one part of a bivalve mould for a spearhead of the same type as one from tomb 56 (Tsountas 1908: 335, fig. 265); in the area, at a depth of 45 cm., two halves of two other schist moulds for rods-like shapes (ingots? - Branigan 1974: 202) which were probably hammered afterwards (Tsountas 1908: 335, figs. 266-7); clay crucible with traces of copper scoriae, found near the moulds, capacity c. 100 c.c., with a socket to take a long handle, presumably of wood (Tsountas 1908: 349, fig. 288; Branigan 1974: 70, 203).⁵
- Comments:** The double axe moulds are analogous to those from Mallia Polythyron III, 7 (Chapouthier and Demargne 1942: 62 n.1).
- Analysis:** The finds are scattered about the site, and some are of uncertain date. Value is 8; I = BF.

⁴ Branigan catalogues two double axe moulds (M 83 and M 83A) and refers to Tsountas figs. 333 and 334, which do not exist. He probably is referring to the two halves of the double axe mould described on pages 333-4, fig. 264.

⁵ Nordquist (1987: 44) refers to crucibles at Sesklo, citing Tsountas 1908 fig. 285. While this bears a slight resemblance to fig. 288, which is more commonly accepted to be a crucible, it has no pouring spout and no socket in which to insert a handle as fig. 288 does. Moreover, Tsountas describes it as a ladle rather than a crucible.

B22. *Tsangli (Thessaly): Houses P and T*

- Workshop type:** Various
- Date:** MN
- Sources:** Wace and Thompson 1912: 121, 125, 130; Halstead 1994: 203; Halstead 1995: 13.
- Finds:** House P:
Stone tools: 1 Delta type celt; 4 chisels; pounder; 2 very long pestles; 7 chert knives; small spearhead.
Horn and bone tools: 7 pins or awls; well polished bone needle with hole; 1 bone gouge.
Terracotta: 2 double conoid whorls.
- House T:
Stone tools: Gamma type celt; 2 Delta type celts; 1 chisel; 2 very long pestles.
Horn and bone tools: 4 pins or awls, 3 bone gouges.
Terracotta: 1 double conoid whorl (Wace and Thompson 1912: 121, 125, 130).
- Comments:** *Dimensions of houses:* 50-60 m².
- Analysis:** Halstead (1995: 13) writes of a full Neolithic toolkit in two quickly abandoned houses, which implies craftwork, whereas in a previous work (1994: 203) he termed it “a full inventory of domestic equipment, including fine pottery, storage vessels and tools for grinding, spinning, leather-working and carpentry” and refers to Wace and Thompson who simply list the finds, rather than stating that there were any toolkits. Household production: D/H.

B23. Volos Kastro (Thessaly)

- Workshop type:** Metal (smelting); mining?
- Date:** EBA (Davies 1929: 98)
- Sources:** Davies 1929: 98; Forbes 1950: 244; Branigan 1974: 57, 62.
- Finds:** *Mine:* presence of a copper mine inferred by Davies from local copper working represented by the slag. “The exact site of the mine is uncertain” but it is probably the part of the hill near Gatzea, East of Volos, which has been cut away; due to a landslip, it is impossible to see whether there is any prehistoric pottery there. No other hills nearby show any sign of quarrying (Davies 1929: 98).
Production debris: copper slags (Branigan 1974: 62), or, according to Davies, one piece of slag (Davies 1929: 98).
- Comments:** The slags “contain too little copper to be anything but slags from smelting operations” from oxidised copper ore (Branigan 1974: 57, 62).
- Analysis:** Although smelting at the site seems certain (Branigan 1974: 57, 62), there is no real evidence for the EH date (Dickinson pers. comm. 1999) and Davies’ arguments for the mine are circumstantial.
Metalworking: AF, date uncertain; mining possible but unlikely.

C. CENTRAL GREECE

C1. Aliveri (Euboea): Makria Rakhi and Mesonisi Hill

Workshop type: Obsidian

Date: Neo - EH

Sources: Sackett et al. 1966: 69; Sampson 1985: 95, 364-5.

Finds: Aliveri: Makria Rakhi, north of Mylaki:

Production debris: large number of obsidian blades, cores, and flakes (Sackett et al. 1966: 69).

Finished products: many blades (Sackett et al. 1966: 69).

Aliveri: slopes and foot of Mesonisi hill:

Production debris: blades, flakes and chippings.

Finished products: blades.

Tools? or other: stone implements.

Other: sherds.

Analysis: Sackett et al. (1966: 69) describe “an astonishing number of obsidian tools, including blades, flakes, and chippings, which point to a local obsidian workshop” at Mesonisi, without specifying the actual amounts of cores and flakes. Sampson’s caveat (1985: 95) that although production areas undoubtedly occur in the region of Aliveri, their chronology is not always certain, seems not to apply in these cases because of the association with Neo-EH pottery. Sampson is more certain that Pontikos, near Aliveri, was EH, and that an EH obsidian workshop should be searched for there (1985: 364ff.). The term ‘workshop’ is probably ambitious; it would be helpful to know the quantity of obsidian, so that the number of man-hours could be calculated. C/D.

C2. *Askitario (Attica): House E (fig. 17)*

Workshop type: Metal

Date: EH II

Sources: Theocharis 1953-54: 75, fig. 25; 1954a: 112; Banks 1967: 226; Branigan 1974: 69, 82, 109; Muhly 1977: 155; McGeehan-Liritzis 1983: 164.

Finds: *Raw material or finished product?:* lead 'ingot' perhaps plano-convex in section (Branigan 1974: 69).

Tools: one half of schist bivalve mould, preserved length 12-15 cm., with a hole for binding together the two halves, for production of spearheads or lanceheads with a Cycladic type of tang (Theocharis 1953-54: 75; 1954a: 112)⁶; funnel [i.e. pouring cone] (Muhly 1977: 155).

Finished products?: pure copper needle or pin; lead laurel leaf shape; fragment of bronze or copper sheet; tube-like lead rivet or binder (Theocharis 1953-54: 75).

Other: mass of blades and cores of obsidian and flint; part of a figurine; parts of stone vases; rubbers; millstones; polished stone axe (Theocharis 1953-54: 75).

Analysis: Theocharis pointed out that the only actual evidence of metalworking on the spot is the schist mould; this is misguided because moulds are portable and do not necessarily indicate work on the spot. The pouring cone lends further support for metalworking in the vicinity.

I = BF.

⁶ Branigan (1974: 201, catalogue no. M 4) mistakenly lists an open mould, possibly clay, for a flat axe, citing as his reference Theocharis 1953-4, fig. 25, which actually shows a ceremonial hearth, decorated around the edges. It seems that this is a case of misinterpretation of the illustration or the Greek.

C3. *Ayios Dimitrios (Euboea): Almiropotamos*

- Workshop type:** Obsidian
- Date:** EH II
- Sources:** Sackett et al. 1966: 77; Sampson 1985: 95.
- Finds:** *Production debris:* cores, blades, flakes (Sackett et al. 1966: 77).
Finished products?: large concentration of obsidian blades (Sampson 1985: 95). “A few coarse sherds indicate prehistoric occupation” (Sackett et al. 1966: 77).
- Analysis:** Jacobsen (1964: 119, cited in Sampson 1985: 95) believes there was an obsidian workshop and Sackett et al. (1966: 77) find the abundance of obsidian “sufficient to indicate a significant local workshop”. Without more information regarding the volume of debris or any architectural associations, the classification of A is premature; E or dump (M) (= DF) is preferable.

C4. *Ayios Kosmas (Attica): Area O (circular depression near Grave 30)*

- Workshop type:** Obsidian
- Date:** EH II
- Sources:** Mylonas 1959: 106, 112, 144, fig. 167A.
- Finds:** *Production debris:* core with signs of extracted flakes on one side, other side flat, one edge chipped carefully to be toothed like a saw; 89 blades and chips.
Finished products or rejects: blades, average length 9 cm., broken although edges sharp and seem unused, many were flaked off the core.
- Comments:** The depression was 0.4 m. by 0.3 m.

Analysis: Mylonas (1959: 144) writes “so many chips [of obsidian] were found that Mr. Geroulanos has called that depression a “workshop”. It seems... that the depression was caused by a bomb during the last war, since it did not exist before 1940; but the area could have been used as a place where blades were made to be placed as gifts in graves.” E or grave goods (M) (= DF).

C5. Ayios Kosmas (Attica): House F, Room F3 (figs. 18 and 19)

Workshop type: Obsidian

Date: EH II

Sources: Mylonas 1959: 31-4, fig. 8.

Finds: *Obsidian:* 215 chips; 23 fragments of blades.
Other: variety of potsherds, fine and coarse wares represented; 2 stone celts; hammer head or grinder, perhaps used as a loom weight; quern fragment; terracotta zoomorphic stand; 4 bones.

Comments: *Dimensions:* NS c. 4.45 - 4.6 m., EW c. 2.45 - 2.75 m.

Analysis: Although Mylonas writes “so many obsidian chips and blades were found in this room that the laborers called it “the obsidian workshop” (Mylonas 1959: 31), the presence only of waste and finished products relating to obsidian production gives this a value of 5, which is insufficient for such a classification. It is probably D.

C6. Ayios Kosmas (Attica): House F, Room F4 (figs. 18, 19 and 20)

Workshop type: Unspecified

Date: EH II (later than room F3)

Sources: Mylonas 1959: 32-4, fig. 8.

- Finds:** *Stone tools:* pestle found with cylindrical vase; 5 querns and a fragment; 3 grinders.
Pottery: variety of potsherds; fine and coarse wares represented; spouted jug with handle and neck similar to metal technique.
- Comments:** *Dimensions:* NS c. 1.85 - 2 m., EW c. 2.8 - 3 m.
- Analysis:** “In F4 were found five querns, indicating perhaps the use of the room as a small workshop” (Mylonas 1959: 32). Unfortunately, Mylonas does not specify what was produced so it is difficult to assess the attribution of this area as a workshop. Querns could have been used in food preparation, as could grinders, pestles and pots, or perhaps Mylonas means that the ‘workshop’ actually produced querns. No waste or raw material is mentioned, however, so the conclusion here is M (food preparation) rather than A.

C7. *Ayios Kosmas (Attica): House H, Room H'3 (figs. 18 and 20)*

- Workshop type:** Unspecified
- Date:** EH II
- Sources:** Mylonas 1959: 35-8, figs. 9 and 11.
- Finds:** *Stone tools:* 3 complete querns; 3 fragments of querns of which 2 belong to a special type; 2 grinders.
Pottery: coarse ware: bowl on last floor level; single-handled goblet on last floor level with smoke around foot.
Obsidian: chips.
- Comments:** *Dimensions:* NS 4.5 m., EW c. 2.15 - 2.7 m.
- Analysis:** Mylonas gives does not specify what the alleged workshop made. No specific items amongst the finds suggest that this room was a workshop and Mylonas’ reasoning for an attribution of A is unclear. This is M. Room H'2, in fact, has similar finds: pottery; spindle

whorls; zoomorphic stand; stone pestle, 2 fragments of querns; obsidian chips and blades; 5 bones; 3 sea shells, so why does Mylonas not call this a workshop too? See also C8 (below).

C8. *Ayios Kosmas (Attica): House J “house of the mylonas” (miller) (fig. 18)*

- Workshop type:** Food?
- Date:** EH II (later than House H)
- Sources:** Mylonas 1959: 32-4, figs. 1 and 12.
- Finds:** *Tools:* 5 stone querns; obsidian blade.
Production debris?: 18 obsidian chips.
Other: 2 fine ware sauceboats.
- Comments:** *Dimensions:* Length c. 7.5 m., greatest width c. 3.25m.; the building was triangle-shaped.
- Analysis:** “Because of the millstones, the laborers called the structure “the house of the mylonas” or the miller. Perhaps it served as a workshop; but we have no other evidence proving the function of this building which...is unique in Helladic architecture” (Mylonas 1959:41-2). Mylonas is oddly cautious about defining this area as a workshop (presumably for food processing) while he has previously called Room F4, House F, and Room H’3, House H, workshops on the basis of 5 and 6 querns respectively. This is unlikely to be a craft workshop. M.

C9. *Ayios Nikolaos (Euboea)*

- Workshop type:** Metal
- Date:** MH

Sources: Davis 1992: 714.
Finds: *Finished products?:* bronze artefacts, lead pottery clamp.
Other: Grey Minyan and matt-painted pottery.
Analysis: Davis writes that “finds include plentiful evidence of metalworking” (Davis 1992: 714) but does not specify what or where these finds were. (A) K, F.

C10. Eretria (Euboea): Vouratsas plot, near the northeast corner of the later agora

Workshop type: Kiln
Date: EH? (Davis 1992: 719)
Sources: *AR* 28 (1981-1982) 18; Davis 1992: 719.
Finds: *Specialised permanent production installation:* well-preserved kiln (Davis 1992: 719), 1 m. diameter; clay floor, pierced with holes of diameter 3-4 cm., supported on a clay pillar. The firing chamber is at present below water level (*AR* 28 (1981-1982) 18).
Analysis: Although much of the associated pottery was of EH types (Davis 1992: 719), the excavators (reported in *AR* 28 (1981-1982) 18) and Davis state that the exact date is uncertain and needs further confirmation. This is G with a questionable EH date.

C11. Eutresis (Boeotia)

Workshop type: Metal
Date: EH?
Sources: Branigan 1974: 69.
Finds: Not specified; similar features to those of Raphina (Branigan 1974: 69).

Analysis: Branigan refers to Goldman (1931: 12), where there is actually no mention of any metalworking. Perhaps Branigan meant page 11 concerning Hut Z in Pit V that contained a large hearth on one level that stood in the open. Nevertheless, this does not reveal any connection with metallurgy. M.

C12. Eutresis (Boeotia): Pit V

Workshop type: Hoard

Date: EH II

Sources: Goldman 1931: 215, fig. 287; Branigan 1969: 10; 1974: 134; Renfrew 1972: 327-8.

Finds: *Tools:* 1 heavy flat axe of copper; 1 narrow chisel of copper alloyed with 6% lead; 1 adze-axe of copper alloyed with 6% lead; 1 copper trowel or spatula (Branigan (1969: 10) classifies it as the latter) with a thin blade and narrowing towards the top for insertion into a wooden handle (Renfrew 1972: 327). Branigan (1974: 134) later changes the classifications to 2 flat axes, 1 axe-adze, 1 razor.

Comments: The hoard was found *in situ*, probably very much as it was used (Renfrew 1972: 328).

Analysis: This is H and perhaps had ritual associations; it was found in a bothros in a room that had several unusual features, probably a domestic shrine (Branigan 1969: 11).

C13. Eutresis (Boeotia)

Workshop type: Weaving

Date: MH

Sources: Goldman 1931: 192; Nordquist 1987: 59.

Finds: *Tools:* cylindrical loom weights (Nordquist 1987: 59).

Analysis: Nordquist states that there was a loom, and cites Goldman (1931: 192) who only refers to loom weights without actually inferring the presence of a loom. Goldman does not specify the “very numerous” amount of loom weights nor the findspots. Photographs are provided of 8 EH and 7 MH weights. If there was a loom, it was possibly stored rather than in use. DF, K.

*C14. Eutresis (Boeotia): House E (fig. 21)*⁷

Workshop type: Bone, mother of pearl

Date: MH, Level II

Sources: Goldman 1931: 52-4, 180-1, 210, 213-4, 220.

Finds: *Unfinished goods?:* partially shaped bones.
Raw material?: some (2?)⁸ pieces of mother-of-pearl.
Tools: large number of bone punches; fragmentary fire box which “may have been part of the craftsman’s equipment” with signs of burning round the edge; chisel of finely worked, highly polished black stone, with carefully bevelled point.
Tool or finished product: polished, sharply pointed bone pin.
Finished products: set of (13?) boar’s tusk ornaments pierced with 2 holes at either end for sewing onto material, probably to make a helmet; flat piece of bone broken at both ends with 13 irregularly-spaced perforations, probably a personal ornament.

⁷ House E consists of 2 rooms and a paved area to the north. Dimensions: Room I: 3.9 m. by 4.6 m.; Room II: 1.6-2 m. by 4.5 m.

⁸ The numbers in brackets are inferred from the illustrations on p.220; Goldman does not actually state any numbers, nor does she specify which room(s) of House E contained the finds.

Comments: *Dimensions:* Room I: 3.9 m. EW by 4.6 m. NS; Room II: 1.6 - 2.0 m. EW by 4.5 m. NS.

Chronology: Dickinson (pers. comm. 1999) comments that the pottery is closer to LH I, if not contemporary, which may suggest a date later than MH for this 'workshop'.

Analysis: "Partially shaped bones lay about, as if some craftsman had been interrupted at his work" (Goldman 1931: 54). From the description of the area, it is difficult to determine what sort of status the artefacts had, for example, whether the pieces of mother of pearl were raw material, partially worked, worked and ready for inlaying, or kept for some other purpose. The status of the 'tools' as bone-working implements is not certain. The doubt surrounding the workplace indicators suggest C/E for bonework; the evidence for work with mother of pearl is much slimmer, probably M rather than C/E.

C15. Kirrha (Phocis): valley (fig. 22)

Workshop type: Metal and ?mining

Date: EH - MH

Sources: Davies 1929: 89-99; Forbes 1950: 244; Dor et al. 1960; Benton 1964: 138; Branigan 1974: 62, 64, 66.

Finds: Mining evidence:

Mines: open cast tin mines, completely worked out, dug into veins in some places; principal mine on East side of valley contains an EH sherd and a piece of slag high up; nearby, another mine, probably MH.

Metalwork evidence:

Production debris: at least 6 large slag-heaps of high-temperature slag on the plain; contained ferric oxide and traces of arsenic, no copper, lead or tin.

Tools: coarse, hard, clay crucible fragments.

Comments: The slag was found on the plain which shows that the main smelting works must have been there; there was a small stream close by, for crushing and washing ore first (Davies 1929: 93).

Analysis:

1. Questionable date of mines: Davies (1929: 93ff.) and Branigan (1974: 62) are certain that the ores were exploited in pre-LBA times. The slags contained ferric oxide and arsenic traces, but no copper or lead, which is usually found in early slags. Ferric oxide might indicate the mining of iron, which could mean a date of LBA at the earliest. The presence of a single sherd in one mine does not constitute watertight evidence for EH use: it could be intrusive. More sherds and other indications are needed to provide a safe date, such as those found at Mine 3, Thorikos (see C39).
2. Improbability of tin mines: Davies defends his idea that tin was mined, arguing that it was not found in the slag because it was probably counted in the silica and therefore escaped notice, or it had all been extracted at the high temperature the slag was worked at because it has a low melting point (Davies 1929: 93). His evidence for the presence of tin is the stannic oxide on the inside of a crucible. This suggests that tin was worked here, but not necessarily mined. Scholars now reject the notion of tin mines in Greece (Benton (1964: 138) cites geologists who state that tin ore in Greece is a physical impossibility).
3. Probability of metalwork: Dor (1960: 99) doubts that there was mining and metallurgical activity at all. In Branigan's opinion, however, the slag-heaps and crucible fragments demonstrate "beyond

reasonable doubt” that ore was mined and worked at Kirrha (Branigan 1974: 62). While they confirm the working of metal here, they do not prove that local ores were used: there have been cases where ores have been smelted away from the source (eg. FN Kephala; MM I Nichoria; MM II - III Quartier Mu, Mallia; where both ore and slag is found; EC II+ Ayia Irini, EC Leondari contain litharge). The presence of slag alone does not prove smelting (McGeehan-Liritzis and Gale 1988: 209). The date, again, is questionable. If there was mining, it was not for tin, and the date may be questioned. Regarding metallurgy, it was certainly practised at Kirrha, but the date is uncertain, thus C.

C16. Kirrha (Phocis): I. and M. Koureli plots: House 2, large room; Plot B (figs. 23 and 24)

Workshop type: Kilns

Date: MH

Sources: Chatzimichail-Skorda 1989: 205-7, fig. 10.

Finds: House II:

Specialised permanent production installations: 2 kilns, α (later) and β (earlier), oval, built of mudbricks, brick bench along centre for supporting items for firing; kiln chamber was the same as the firechamber (all one level); row of small stones N-S from E wall of α represents a stoking tunnel.

Production debris?: heap of ash to the south, probably belongs to the hearth.

East side of Plot B:

Specialised permanent production installation: large circular kiln, carefully built of mudbricks, well-preserved. The lower part of kiln

chamber survives, and so do a large part of firing floor (inner diameter 2.3 m.) with circular holes and triangular holes around edge, the firechamber (85 cm. high) and part of the stoking tunnel. Thick layer of clay plaster inside the chamber; 4 parallel small walls of mudbrick support the firing floor and create 5 channels. Many fragments of kiln dome outside the inside and around the chamber.

Production debris: lumps of fired clay, many MH sherds in fill of east channel; layer of ash 5 cm. thick.

Comments: Kiln β : dimensions 1.2 m. by 1 m., orientated E-W. Kiln α : dimensions 1.3 m. by 0.9 m., more angular, orientated N-S; came into use when β went out of use.

The Plot B kiln may be Davaras' Type B, and perhaps late MH (Dickinson 1999 pers. comm).

Analysis: The text asserts that kilns α and β were found in House II, but the plan (Chatzimichail-Skorda 1989: fig. 10) suggests that they were in House I. All these structures must be G.

C17. Kitsos cave (Attica): Sondage 2, level III

Workshop type: Metal

Date: FN (3400 B.C.)

Sources: Lambert 1970: 761, cf. also 705 and 762; 1971: fig. 31; Coleman 1974: 339.

Finds: *Raw material?:* small shapeless pieces of copper oxide.

Finished product?: copper pin.

Other: decorated pottery; a scoop.

Comments: The metalwork here bears a close parallel to that at Kephala (Coleman 1974: 339).

Analysis: The presence of copper oxide does not necessarily indicate anything more than I. Copper oxide may be smelted copper which has become oxidised or a type of copper ore (cuprite and melaconite) (Tottle 1984: 55). An analysis of the oxide and pin might show whether they are connected, but there would still be very little evidence from which to propose a workshop. I.

C18. Kolonna III (Aegina): 'Dyer's House' (Färberhaus), West of the North Gate, near house 22

Workshop type: Purple dye production

Date: Period III (2400 - 2300 B.C.) EH II - III

Sources: Walter 1983: 53, fig. 38; Felten and Hiller, cited in *AR* 43 (1996-1997) 17.

Finds: *Production debris?*: heap of *murex* shells (Walter 1983: 53).

Comments: *Dimensions*: house over 10 m. wide, c. 15 m. long. The building seems to have had important dimensions, approximately the same as the 'Weisses Haus', and 3 rooms (Felten and Hiller, cited in *AR* 43 (1996-1997) 17).

Analysis: Walter (1983: 53) assumes that the *murex* was used for dye rather than food, even though no other indications of dye-work are noted and the amount of shells - which should be very large if used for dye-production - is not specified. He also assumes that with this dye women coloured clothes. He has no evidence to support his claims. Further information about other finds in the house is needed. C/E, K or household waste (M).

C19. *Kolonna IV (Aegina): area west and south of the temple of Apollo (AR 1969-79: 7)/ main (large) room of Weisses Haus (Walter 1983: 58) (fig. 25)*

Workshop type: Bronze

Date: EH II - III, 2300 - 2200 B.C. (Walter 1983)

Sources: Walter, cited in *AR* 16 (1969-1970) 7; 1983: 58-63; Walter and Felten 1981: 27; McGeehan-Liritzis 1983: 164; L. Platon 1988: 321-2.

Finds: *Specialised permanent production installation?: “(?) Metalworking furnace”* (McGeehan-Liritzis 1983: 164): foundation of clay bricks, on which was an oven basket (the melting oven), and underground was a grill, a channel for the metal to pour down, an area where the metal was cast into bar moulds. The bricks retain heat even when the fire is out, so the metal did not harden while flowing down (Walter 1983: 59). Part of another conduit in association with the kiln was probably for air circulation (Platon 1988: 321-2).

Comments: The Aegina chamber is unique in Greece (Walter 1983: 62). It is not known why the metal melting facility was in the main room of the Weisses Haus (Walter 1983: 58).

Analysis: Walter writes “In the lowest layers, on bed rock, EH house walls and a workshop with ovens, probably connected with metal workings, were found” (*AR* 16 (1969-1970) 7). His suggestion (1983: 59) that smelting was carried out here seems to be based on his interpretation of the remains, rather than on more solid evidence of metallurgy; no slag is cited, and McGeehan-Liritzis, on the other hand, maintains a cautious stance. Nevertheless, it is hard to imagine what else these unusual finds might represent. C.

C20. Kolonna V (Aegina): Werkplatz (figs. 26 and 27)

- Workshop type:** Kiln and pottery?
- Date:** EH III (2200 - 2050 B.C.)
- Sources:** Walter and Felten 1981: 38-9, fig. 33; Walter 1983: 72, figs. 41, 46; Rutter 1993b: 19, 29 n. 4.
- Finds:** *Specialised permanent production installations?*: oven or kiln; large pit nearby, perhaps for levigation of clay, (Rutter 1993b: 19, citing Pullen 1985: 227-8), 40 cm. deep, almost round (Walter and Felten 1981: 39).
- Comments:** In periods IV-V, there was a craftsmen's quarter on the south slope of the settlement, where the bread-oven and pit were located (Walter 1983: 72, fig. 41).
- Analysis:** Walter and Felten (1981) and Walter (1983) only refer to the structure as a bread-oven, and they state that the levigation pit was unconnected and therefore suggests that a kiln must have been in the vicinity. The presence of the pit leads Pullen to consider the possibility that this was a kiln, an hypothesis which is later discounted because there were no holes in the surviving lower portion to facilitate the circulation of air, and there was no production debris (wasters). It seems odd that the levigation pit, a permanent structure, should be located away from the hypothetical kiln but near a 'bread-oven', and perhaps a multiple function for the 'bread-oven' should be considered. Other alleged kilns have no wasters (e.g. Palaikastro, Eretria, Ayios Mamas, Olynthus, Dikili Tash), and if the lack of holes for air circulation permitted the baking of bread, why could pots not also have been fired or perhaps just dried here? The doubtful identifications of a levigation pit and a kiln suggest C, G? or oven (M).

C21. Kolonna (Aegina): remains of an earlier building in House VIII

Workshop type: Kiln?

Date: EH III - MH

Sources: Felten and Hiller, cited in *AR* 40 (1993-1994) 13.

Finds: *Specialised permanent production installation?:* kiln?

Rejects or finished products?: “a thick layer of sherds, mostly the upper parts of painted amphorae”, surrounding the ‘kiln’. Black polished pottery sherds, including a perforated incense or perfume burner.

Analysis: “Perhaps the house included a pottery kiln” (*AR* 40 (1993-1994) 13): the uncertainty about the presence of a kiln is not explained, nor are further details provided about the alleged structure. Moreover, it would be odd to have a kiln, with its fumes and risk of fire, in a house. G?, K.

C22. Koropi (Attica): North edge of town (AR 39 (1992-1993) 11)

Workshop type: Metal

Date: EH II - III

Sources: McGeehan-Liritzis and Gale 1988: 207; *AR* 39 (1992-1993) 11.

Finds: None given.

Comments: The excavator is O. Kakavoyiannis.

Analysis: McGeehan-Liritzis and Gale (1988: 207) list this amongst unpublished metal-working sites, while Kakavoyiannis (cited in *AR* 39 (1992-1993) 11) alludes to ‘clear evidence of lead and bronze working’ at Koropi. (A) K.

C23. Laurion village (Attica)

- Workshop type:** Metal: lead, silver and copper working (McGeehan-Liritzis 1983: 164).
- Date:** EH II (McGeehan-Liritzis 1983: 164)
- Sources:** McGeehan-Liritzis 1983: 164; McGeehan-Liritzis and Gale 1988: 199-225. cf. Gale and Stos-Gale 1981: 169-224 for isotope analysis.
- Finds:** None given.
- Comments:** The excavator is V. Kakavoyiannis.
- Analysis:** McGeehan-Liritzis and Gale (1988: 207) list this amongst unpublished metal-working sites, and McGeehan-Liritzis writes “there is now evidence that a metallurgical centre existed in EH II Laurion” (1983: 170). With no further information, this is (A) K, F. See also *C39*.

C24. Lefkas

- Workshop type:** Metal
- Date:** EH II
- Sources:** Dörpfeld 1927; McGeehan-Liritzis 1983: 164, 169.
- Finds:** None given.
- Analysis:** Although McGeehan Liritzis lists Lefkas as a place with evidence of metalworking and mentions a “distinctive metal industry implying the practice of local copper or bronze metallurgy” (1983: 164), Dörpfeld (1927) gives no evidence of a workshop location. McGeehan-Liritzis’ supposition is made from inferences: “The number of finds and the implied volume of metal implies a steady supply... Overall, this implies a well-organised supply system...” (1983: 169). L.

C25. *Lepoura Magoula (Euboea)*

- Workshop type:** Metal
- Date:** EH? (or Myc?)
- Sources:** Sackett et al. 1966: 71.
- Finds:** *Production debris:* some pieces of slag.
Pottery: “thin scatter of worn coarse sherds” including sherds from the EH and Mycenaean eras.
Other: many fragments of a hard quartzite, apparently brought from elsewhere.
- Comments:** “This was probably a small Bronze Age farming settlement...”, now heavily eroded.
- Analysis:** “There are some pieces of slag which may indicate early metalwork (Sackett et al. 1966: 71); presumably Sackett et al. are referring to an EH date. If the EH date were secure, this would be classified as I = AF. The date, however, is uncertain and could be Mycenaean.

C26. *Lithares (Boeotia): Rooms 34 and 45 (fig. 28)*

- Workshop type:** Spinning
- Date:** EH II
- Sources:** Tzavella-Evjén 1985: 47.
- Finds:** *Tools:* spindle whorls “found at all levels and in all houses, with a significant accumulation in rooms 34 and 45”; 11 loom weights.
- Comments:** “The impressive number of spindle whorls is characteristic of the activities and economy of the inhabitants”. The small number of loom weights compared to spindle whorls is perhaps indicative that other, perishable, materials were used, or that spindle whorls doubled as loom weights.

Analysis: Probably D.

C27. Lithares (Boeotia): area of Houses M, N, X (fig. 28)

Workshop type: Obsidian (and flint?)

Date: EH II

Sources: Tzavella-Evjen 1985: 20, 40.

Finds: *Production debris:* 167 obsidian cores; 11.5 kg. obsidian discards; several kg. of flint discards.

Finished products: 2,333 obsidian knives; 200 denticulated tools.

Analysis: “The tool processing was done locally, judging by the large amount of flint discards and tools” (Tzavella-Evjen 1985: 40). Tzavella-Evjen does not discriminate between flint and obsidian, and seems to be using both terms to refer to obsidian. C/E or dump (M), (= CF/DF).

C28. Lithares (Boeotia): Sanctuary of the Bulls (fig. 28)

Workshop type: Terracotta figurines

Date: EH II

Sources: Tzavella-Evjen 1972: 467-9; 1985: 94-5; Spyropoulos and Tzavella-Evjen 1973: 171-5.

Finds: *Finished products?:* 17 figurines, mostly bulls, in middle of room near pile of burned earth.

Comments: *Dimensions:* 3.7 m. by 4.8 m. The room is the most monumental of the four-room complex; its entrance to the south opens onto what seems to be a large paved court. The room is well paved with small stones topped with fine clay.

Analysis: Tzavella-Evjen (1972: 469) proposed that this room may “not [be] a sanctuary but an art studio for the manufacture of animal idols” and called for further excavation for more information. She later (1985: 20) confirmed that the room is no longer tentatively, but definitely, called a sanctuary. M.

C29. *Manika (Euboea)*

Workshop type: Metal

Date: EH II

Sources: McGeehan-Liritzis 1983: 164; 1988: 105ff.; Hägg and Konsola 1986: 13.

Finds: *Production debris:* bronze slag (Hägg and Konsola 1986: 13; McGeehan-Liritzis 1983: 164).

Finished products?: 50 metal artifacts found at EBA Manika, all from graves, amongst which probable local products include 3 copper or bronze [?] chisels, silver tweezers, silver and copper razors, copper spiral bangle, copper torque necklace, copper ring, copper sheet.

Analysis: The suggestion that some of the metal finds are local products is deduced from a lack of parallels elsewhere. The presence of copper sheet apparently “testifies to the manufacture of sheet copper at the site” (McGeehan-Liritzis 1988: 106). While these arguments are not water-tight, the presence of slag (no location specified) is the most certain indication of metalwork. I = AF.

C30. *Manika (Euboea): Sector V: House K. Tsotsou: Rooms A and B (south edge of settlement); Area G (east edge of settlement) (figs. 29 and 30)*

Workshop type: Obsidian.

Date: EH IIA (-B).

Sources: *AR* 30 (1983-1984) 17; *AR* 37 (1990-1991) 39; Sampson 1985: 93-5, 389-90; Carter 1994: 139.

Finds: Rooms A and B:

Production debris: thousands of pieces of obsidian; many cores (Sampson 1985: 93).

Area G:

Production debris: obsidian cores and many flakes (Sampson 1985: 95).

Comments: Rooms A and B had paved floors; B may have been a yard. The quantity of obsidian pieces and cores, especially in contrast with the rarity of obsidian in other areas of Manika, suggests to Sampson that this structure was a workshop. He argues further that the structure and layout of the building does not suit a dwelling and agrees with the definition of a workshop. Area G, also containing obsidian waste, appears to be connected with the workshop (Sampson 1985: 93-5). "It seems that Manika had taken over the supply and in particular the working of obsidian, catering for the communities of central and northern Euboea and also for the large centres of Boeotia and Phthiotis and perhaps even of Thessaly. I believe that during EH this material was distributed by well organised carriers in the context of an exchange trade rather than of ... chance and isolated visits... which may have been the case in the early stages of the Neolithic" (Sampson 1985: 389-90).

Analysis: Carter (1994: 139) describes the production locus as a small, non-domestic industrial area with bronze-working associated nearby.

Sampson calls Rooms A and B a working area, a workshop (1985: 93), an “industrial (? and commercial) site” and a tool-making manufactory for obsidian (Sampson, cited in *AR* 30 (1983-1984) 17), making no distinction between these very different functions. Having argued that it is a workshop, he asks what else could we expect of a structure to define it as such. For obsidian production, the most one could expect would be raw nodules, cores, debitage (from core and blade preparation), finished products, and perhaps tools, which are rarely found. It is unclear whether the ‘pieces of obsidian’ are waste or products; one would not expect a large mass of waste in a workshop unless it had been hastily deserted just after a large amount of work and before the workers had taken the waste to a dump. It is also unclear whether the cores were worked out or whether they were ready to be worked. It is possible that this was either C/E or dump (M) (= CF/DF).

C31. Marathon (Attica): Plasi

Workshop type: Kiln and industrial installations

Date: MH

Sources: Marinatos 1970a: 66; 1970b: 154-5, fig. 2; 1970c: 5ff.

Finds: *Specialised permanent production installations*: kiln and ‘industrial installations’.

Comments: Traces of the kiln and cist-graves lie beneath the floor at the north boundary of the large MH building described by Marinatos (1970b: 154) as ‘a kind of palace’. Besides the kiln, “other industrial installations” (1970b: 155) were also discovered, of which no details are given in the reports.

Analysis: Until further information is available to support these claims of a kiln and industrial installations, one cannot make any firm judgements. (G) K.

C32. *Nea Makri (Attica)*

Workshop type: Stone bowls

Date: EN

Sources: Weinberg 1970: 581; Warren 1989: 53.

Finds: *Finished products:* unusually large number of stone vessels.

Comments: Possible specialisation in stone bowl makers of Nea Makri (Warren 1989: 53).

Analysis: Specialised production of stone vessels is suspected by scholars because of the large number of finished products at this site. No areas of production, however, have actually been located. L.

C33. *Porto-Boufalo (north of Almiropotamos, Euboea)*

Workshop type: Obsidian

Date: EH

Sources: Sampson 1985: 95.

Finds: *Finished products? or production debris?:* a mass of obsidian blades.

Analysis: In Sampson's opinion, the possibility that this represents a workshop cannot be excluded (1985: 95). He makes no mention of other finds, such as cores and waste flakes, without which the likelihood of a workshop is improbable. The volume of blades is not specified, nor is the amount of wear on the blades. Rather than (A) K, this is

probably an area where blades were used, stored or deposited. At the most, C/E.

C34. *Raphina (Attica)*

Workshop type: Metal

Date: EH II

Sources: Theocharis 1951: 78, 80-1; 1952: 130-5, figs. 2 and 3; Banks 1967: 226; Muhly 1977: 153-7; 1985: 125; McGeehan-Liritzis and Gale 1988: 199-225; L. Platon 1988: 322-4.

Finds: *Specialised permanent production installations:* “two areas for the smelting of copper ore, containing slag, fragments of the flat bottom of a furnace, bivalve moulds and tuyères” (Muhly 1985: 125). See 2 and 3 (below).

1. The ‘waste pit’ (Theocharis 1951: 80):

Dimensions: 2 m. by 2.5 m., 0.5 m. deep.

Production debris: many lumps of waste from smelting copper ore around the mouth of the bothros and especially inside it.

Tools: small clay funnel like contemporary Trojan examples; fragments of clay smelting furnace; other remains of ore-smelting and copper pouring.

Tools?: numerous fragments of clay ladles and pans, and fragments of four-legged clay utensils, linked to the hearth.

Other: many EH vase fragments.

Not all was excavated; it was hoped that the metalworking establishment for which this bothros was the rubbish pit will be found (Theocharis 1951: 80-1; 1952: 131; Platon 1988: 322).

2. Larger cavity (Trenches I-II):

Dimensions: 4.4 m. by 3.4 m., depth c. 1 m., oval, equally sloping sides and virtually horizontal bottom. On the North side, a row of stones forms a ledge 12 - 15 cm. high, on which the clay disc floor of the smelting furnace was probably set.

Production waste: numerous pieces of copper waste.

Debris or tools?: the remains of the working of ore in all its stages.

Tools: 3 clay funnels for pouring metal into clay moulds;⁹ many fragments of the clay disc-shaped floor of the smelting furnace, some of which have holes on which there are clear signs of contact with the liquid metal (it was not yet possible to reconstruct the feature).¹⁰

Finished products?: copper items.

Other: sherds of EH vases, some painted. The pit's regular shape, equal slope of sides and level base suggest it was the floor of a pit-shaped copper-working establishment. Comparable hollows, however, have been interpreted elsewhere as the floors of primitive houses. We do not really know what the form of such a workshop was like. No indication of a wall or post holes around the pit was found (Theocharis 1952: 130-3).

3. Cavity Trench III:

Pit similar to large cavity: 15 m. south of Trench II; 2.2 m. depth from surface. Cave-like cutting in soft rock, oval-shaped, with disturbed fill, EH mixed with LH III sherds. Notch in apsidal western end, 10 cm. high, the equivalent of the stone bench in the 'other workshop' (the large cavity). The height and shape of the notch agree with the thickness and form of the clay disc of the smelting

⁹ It is unclear whether Theocharis means that these were found in this cavity or the waste-pit.

¹⁰ Platon (1988: 322) mentions fragments of crucibles (not mentioned by Theocharis) and of four-legged clay pots, which are only referred to by Theocharis in the other cavity; Platon is likely to be wrong as the site has not been re-excavated since Theocharis' work there.

furnace, of which fragments were found in the neighbouring pit containing waste (i.e. in Trenches I-II).

Production debris: some pieces of copper waste mixed with EH sherds (Theocharis 1952: 133-4).

Nearby, in the settlement:

Production debris: slag in houses (Muhly 1977: 155).

Tools: fragments of a stone mould in a house (Banks 1967: 226).

Houses outside the settlement:

Production debris: slag.

Tools: pieces of a stone mould; a funnel.

Settlement:

Finished products?: copper fishhooks and pins; considerable amount of lead, some clamps for repairing broken vases (Muhly 1977: 155).

Raphina was probably a centre of copperworking in Attica in the time of the first use of copper in Greece (Theocharis 1951: 81).

Comments:

Theocharis concluded that the cavities in Trenches I-II and III were copper working establishments and points to traces of lead-working which need further investigation: many lead items were found in houses in Raphina and the Laurion source is nearby (Theocharis 1952: 134-5). McGeehan-Liritzis and Gale (1988: 206) add that this is the only EBA metallurgy furnace known on the mainland. Platon (1988: 323) states that the percentage of bronze in the slags is very low, which probably suggests great experience among the smiths, and that more slags found in houses suggests that they belonged to bronze-smiths. He concludes that residents of the whole of Raphina seem to have been exclusively involved in bronze-working and perhaps specialised guilds of craftsmen existed as early as the EBA.

Analysis:

Problems:

1. There is confusion over whether Raphina has one furnace (McGeehan-Liritzis 1988: 206), or several furnaces (Branigan 1974:

89) and over *which* of the cavities were metalworking furnaces. Platon (1988: 322-3) refers to two cavities: the 'large' one (Trenches I-II) and a 'smaller' one, to which he attributes some details of the 'workshop' cavity in Trench III (Theocharis 1952: 133-4) and of what Theocharis (1951: 80-1) calls the waste pit, apparently confusing the two. He also ascribes to the cavity in Trenches I-II, crucibles, which are not mentioned by Theocharis, and four-legged vessels which Theocharis only ascribes to the 'waste pit'. Muhly (1977: 155) is also inconsistent, stating that there were "two areas for the smelting of copper, consisting of slag, pieces from the ... furnace, bivalve moulds, and funnels..." and continuing, "The smelting area consisted of a horse-shoe shaped pit..", now suggesting that there was only *one* smelting area.

2. The cavities have been termed in various ways: furnaces that establish the presence of metalworking shops (Branigan 1974: 89), workshops (Theocharis 1952: 134), and a bronze factory (Banks 1967: 226). The term 'factory' perhaps suggests a scale too large for EH II, and Platon's claims of an entire metalworking village might be ambitious.

3. Muhly (1977: 155) has noted confusion regarding the finds and their identification: Branigan (1974: 131) refers to crucibles from Raphina, whereas Theocharis makes no mention of them. Muhly suggests that what Branigan and Theocharis would call pouring cones, *he* would call tuyères, and Branigan omits all the moulds from Raphina from his catalogue. Compounding the problem is the brevity of Theocharis' report, the paucity of illustrations, the lack of examination of the finds by a metallurgy specialist, and the possibility that finds thought to be important now, may have been discarded in these earlier excavations. Unfortunately the present location of the finds is uncertain.

4. Finds of slag inside houses outside the settlement suggest to Muhly that they could represent the residences of metalworkers (Muhly 1977: 155). It is relevant to ask why a waste product of metallurgy should be found in houses at all, and whether its presence necessarily indicates that the occupants worked metal. Surely metallurgists were not smelting or melting metal at the necessarily high temperatures, in their own dwellings, when there were specialised installations nearby? It is possible that to those who did not know the technology of metallurgy, it was exciting to find and possess pieces of waste metal, a rare material produced by a seemingly mysterious process.

Conclusion:

Despite the misunderstandings, there is enough evidence to state with some certainty that metallurgy was practised at Raphina on a relatively large scale for the EBA. The two cavities, in Trenches I-II and III, were probably furnaces; the former contains more conclusive evidence than the latter, whose similarity to it assures its identity also as a furnace. The proximity of ores at Laurion may not be coincidental; analysis of the metals is needed to identify whether this is so. Taking Theocharis' evidence, Raphina scores 21: A, and is perhaps "the most important Early Helladic smelting site known from the Aegean" (Muhly 1977: 155).

C35. Rouf (Attica)

Workshop type: Metal
Date: LN/EBA?
Sources: McGeehan-Liritzis and Gale 1988: 207.
Finds: None given.

Analysis: McGeehan-Liritzis and Gale (1988: 207) describe Rouf as a metal working site, but give no further details as the site is unpublished by its excavator Petriakis. (A) K.

C36. Territory of Stratos (Acarmania): valley of the Lepenous

Workshop type: Flint

Date: Prehistoric

Sources: *AR* 44 (1997-1998) 45.

Finds: None given.

Comments: “[F]lint workshops in the valley of the Lepenous” are reported in *AR* 44 (1997-1998) 45.

Analysis: The date is imprecise, and ‘workshops’ is probably an optimistic term. (A) K.

C37. Thebes (Boeotia)

Workshop type: Hoard

Date: EH II/III

Sources: Branigan 1969: 10; 1974: 23, 134; Renfrew 1972: 327-8.

Finds: *Tools:* 2 flat axes; 2 chisels; one double axe; 2 or more awls; one single shaft-hole axe (Branigan 1969; 1974) of a type occurring in the Poliochni and Petralona hoards (Renfrew 1972: 327).

Comments: They were found in a large pottery vessel, which is unusual for a BA hoard; examples could be quoted for many areas and periods in European and Mediterranean prehistory, where some seem to be votive hoards, others founders hoards.

Analysis: The use is not known for the Thebes hoard (Branigan 1969: 11). Renfrew (1972: 328) states that the tools were found *in situ*, probably very much as they were used (Renfrew 1972: 328), which is not enlightening. H.

C38. *Thebes (Boeotia)*

Workshop type: Weaving

Date: MH

Sources: Nordquist 1987: 59; E. Barber 1991: 388.

Finds: *Tools:* loom with cylindrical weights (Nordquist 1987:59).

Analysis: Nordquist is probably optimistic in suggesting a loom here, as she was for Eutresis. E. Barber does not include Thebes in her catalogue of groups of at least four loom weights that might indicate looms or their storage. DF, K.

C39. *Thorikos (Attica): Mine no.3, 30 m. west of the theatre (figs. 31 and 32)*¹¹

Workshop type: Lead mining

Date: EH II

Sources: Spitaels 1984: 151-74.

Finds: *Mine:* underground gallery (“geological examination proved that the cavity was completely man-made” (Spitaels 1984: 152) and the debris suggested it was a mine gallery, similar to those at Laurion); an area of open-air working where there had probably been an

¹¹ The names *Thorikos* and *Laurion* are commonly used to denote the same area. It should be made clear that the Thorikos mine (C39) uses the Laurion ore source.

outcrop of ore on the hillside, which attracted the attention of the first prospectors.

Tools: hammers, usually broken, most of hard metamorphic rocks, some perhaps local.

Other: fauna in the mine, mainly domestic; waste products of the manufacture of bone implements, including pieces of red deer antler; obsidian; potsherds; shells.

Comments:

Evidence for dating: working during the BA extended c. 20 m. into the interior; most of the EBA sherds were found in the exterior zone and the first 7 m. of the interior. Two patches of red soil on the rock floor proved EBA mining: the fillings contained an obsidian flake, some scraps of shells and bones, and thirty-five small EBA sherds. Sealed veins were found, worked only by stone tools, in which EBA pottery was discovered; one vein had been worked for c. 18 m. Further EBA evidence included a series of stone mining tools, some were probably those which left traces in the mine veins. The exploitation of Mine no. 3 extends throughout the Late Early Bronze Age from at least the end of EH II. "Evidence for the *mining of lead and silver* at this period remains very sparse and has been based mainly on prospection and on auxiliary scientific investigation" (Spitaels 1984: 170). "The irregular "cave-like" form of the opening of the gallery testifies not only to the probable richness of the metalliferous deposits which must have attracted the attention of prospectors but also to the tentative nature of their methods." For evidence for the use of argentiferous lead, see *C40*.

Analysis:

The evidence for the EBA use of this mine is convincing.

C40. *Thorikos (Attica): house, east slope of Mt. Velatouri*

- Workshop type:** Lead
- Date:** MH
- Sources:** Verdelis and Mussche, cited in *AR 14* (1967-1968) 6; Binjen 1967: 30; Servais 1967: 20-4; Branigan 1974: 131; Gale 1979: 29; Spitaels 1984: 171.
- Finds:** *Production debris:* 4 flat cakes of lead, fallen and fused when they hit the earth; several pieces of litharge (Servais 1967: 22); slag (*AR 14* (1967-1968) 6).¹²
Other: piece of MH Grey Minyan and MC type potsherds; obsidian flakes, stone and bone tools nearby (Servais 1967: 23).
- Comments:** The house contained two floors; these remains were on the later floor (*AR 14* (1967-1968) 6).
- Analysis:** The chronology is difficult to ascertain: suggestions have included MH ('unexpectedly early' (*AR 14* (1967-1968) 6)) and the end of 16th century B.C. (Servais 1967: 23). Gale (1979: 29) agrees with Servais' date, pointing out that this is the earliest date for cupellation in Attica. It is also difficult to claim that this was a 'leadworking shop' as Branigan (1974: 131) does: there are very few finds altogether from the house. Although the litharge and slag are definite indications of cupellation and metalworking (Binjen 1967: 30; Servais 1967: 22-3; Spitaels 1984: 171), there are no other accompanying finds to suggest metalworking at that location. These are I = AF.

¹² Gale (1979: 29) uses the term scoriae; it is possible that the pieces of slag or scoria are the same as the items identified as 'flat cakes' of lead by Servais.

D. THE PELOPONNESE

D1. Alepotrypa (Laconia): cave

Workshop type: Hoard?

Date: Phase 5 (LN? - Branigan 1974: 97-8).

Sources: *AR* 8 (1961-1962) 10; Renfrew 1972: 311; Branigan 1974: 97-8, 166, 188, 200; Demoule and Perlès 1993: 402.

Finds: *Tools:* bronze “tools” (*AR* 8 (1961-1962) 10); 2 bronze flat axes (Renfrew 1972: 311).

Other: silver bangle (Branigan 1974: 98); **or** 4 gold bracelets; gold necklace; silver pendant; all like Bulgarian types (Demoule and Perlès 1993: 402); tools of stone and obsidian; shell bracelets; much pottery (*AR* 8 (1961-1962) 10).

Analysis: It is unclear whether the “tools” are separate from or include the axes; Branigan (1974: 166, 200) catalogues them separately. Mrs. A. Petrokhilou (cited in *AR* 8 (1961-1962) 10) reported “tools”, with no further detail, and Mr. B. Phelps reported to Renfrew (1972: 311) the presence of two axes; whether the latter had been discovered since the original report, or whether the “tools” were later analysed and proved to be axes, is uncertain. Possible H.

D2. Asine (Argolid): ‘many places’ (Nordquist 1987: 39)

Workshop type: Horn, bone and antler

Date: MH

Sources: Frödin and Persson 1938: 253ff.; Nordquist 1987: 38-9, 114-5.

Finds:

“Pieces of worked horn, bone and antlers, as well as semi-finished and finished objects were found in many places in the Asine excavations” (Nordquist 1987: 39).

Lower town:

Raw material: MH(?) stags' antlers.

Finished products: MH worked horn and boars' tusks.

House B:

Tools?: MH II/III: obsidian blade (in SE part); retouched obsidian tool; worked red chert.

Finished products: MH II/III worked horn; MH worked? tusk.

House D room XIX floor I:

Tools?: MHII/III? obsidian fragments; MH II? obsidian flakes in other rooms, MH? possible flint saw in house.

Finished products: MH polished tusk.

Other: MH II? fragments of bronze.

Terrace III NW of house T:

Tools?: obsidian flakes and blades NE and SW of house T.

Finished products: 2 MH fragments worked horn.

House E:

Raw material: MH? tusk.

Terrace III NE of house T:

Raw material: 2 MH tusks.

Tools: MH? obsidian flakes and blades, MH grey chert.

House T room VII:

Raw material: MH I tusk.

Tools?: obsidian flakes in other rooms.

House U:

Tools?: MH/LH obsidian flakes and blades.

Finished product: MH worked tusk.

House Pre-D?:

Raw material: MH? tusk.

Barbouna area:

Tools?: MH? obsidian

Finished product: MH/LH worked horn.

Comments: No clear working assemblages were found, although semi-finished and unworked antlers were found in many places. Simpler objects were probably made in every household (Nordquist 1987: 38). Bored implements of antler were not uncommon in Thessaly but are very unusual elsewhere in Greece (Frödin and Persson 1938: 253).

Analysis: Perhaps Asine was a centre of antler tool production, unless excavation biases have caused this difference and make this suggestion tenuous. The details are imprecise and the locations scattered; E (= DF).

D3. Asine (Argolid): House D and House T

Workshop type: Stone

Date: MH

Sources: Frödin and Persson 1938: 244ff.; Nordquist 1987: 40-1.

Finds: *Unfinished goods:* bored greenstone axe associated with House C; 2 unfinished stone axes on Terrace III (stray finds - I).

Production debris: more than 30 drill-cores, at least 18, mainly greenstone, from securely MH contexts. Many from or near houses D and T.

Analysis: It is possible that there was an A or D in houses D and T. Frödin and Persson do not offer any enlightenment and make no suggestions concerning what these finds might indicate, other than stating that a proportionally large number of bored axes (all MH), a large number

of drills (more than 20), chipping stones and hammers which are all used for making stone implements, and grindstones were found at Asine. Is the implication that Asine produced such axes for itself and the surrounding area? Pending further information about the finds and their contexts, these houses are C/D.

D4. Asine (Argolid): Lower town generally, House D, Terrace III, acropolis, Barbouna area

Workshop type: Obsidian

Date: MH

Sources: Frödin and Persson 1938: 242-3; Nordquist 1987: 43.

Finds: Lower town; above house D; house D room XIX floor level I; acropolis (EH/MH); Barbouna area outside building 1:
Production debris: obsidian cores.

Terrace III NE of house T:

Production debris: obsidian cores; flakes.

Finished products?: obsidian flakes and blades.

Analysis: “Obsidian and chert were worked in the village. In MH and mixed contexts, especially on terr. III were found a number of obsidian waste flakes, prismatic blades and occasional cores... which may indicate a production centre in this area...” (Nordquist 1987: 43). There were probably a number of workspots: Terrace III is a more likely candidate for a working area: E or dump (M) (= DF).

D5. *Ayios Stephanos (Laconia): N-G1; H*

Workshop type: Obsidian

Date: EH-MH, especially MH

Sources: Tylour 1972: 205ff.; Kardulias 1992: 441.

Finds: N-G1 (N=89) and H (N=82):

Production debris or finished products?: areas with concentrations of flaked stone.

Analysis: Tylour (1972: 211, 262) observed that obsidian was very common here, found all over the site. Kardulias (1992: 441) speculates that these examples may reflect flaking stations but the small amounts could have been made by a single flaking episode. Such meagre evidence cannot support full-time specialisation; the level of skill, however, suggests significant technical expertise, thus probably part-time specialisation. From Kardulias' comments, one may surmise that the concentration of flaked stone consists of debitage and perhaps blades. The nature and quantity of the finds should have been made clear. These areas may be E or dumps (M) (= DF).

D6. *Corinth (Corinthia): Temple Hill*

Workshop type: Metal

Date: EH

Sources: Walker Kosmopoulos 1948: 46, 65; McGeehan-Liritzis 1983: 164.

Finds: *Raw material:* Period III piece of stone, identified as copper ore by Prof. Renz (Walker Kosmopoulos 1948: 65).

Production debris: EH slags (McGeehan-Liritzis 1983: 164).¹³

¹³ Are these slags the Period III "formless lumps of copper or bronze" mentioned by Walker Kosmopoulos (1948: 65)?.

Tools: possible Period II mould (Walker Kosmopoulos 1948: 46, plate IIIf)¹⁴; possible EH crucible (McGeehan-Liritzis 1983: 164).

Finished product?: part of copper or bronze dagger with midrib from Period II (Walker Kosmopoulos 1948: 65, fig. 22).

Comments: “The absence of metal in Periods IV-V, as well as its rarity in Periods II-III, must be fortuitous” because at other sites, metal is usually found in graves, of which Corinth has virtually none (Walker Kosmopoulos 1948: 65).

Analysis: Walker-Kosmopoulos (1948: 65) finds “no indication that Corinth itself was a prehistoric centre of metal working”, and suggests that the Period III finds might not be prehistoric. McGeehan-Liritzis, however, lists Corinth amongst ‘Sites with evidence of EBA metalworking’, but gives no further details. If the slag is correctly identified, this is AF. Although the value is 13, it is not known whether the dagger is a finished product from Corinth, the identifications of the crucible and mould are tentative, and those of slag and ore also seem to be dubious. Although the findspots were not made explicit, so it is unclear whether or not these items were found together, and the identification of some of the finds is uncertain, the variety of possible metalworking finds suggests BF.

D7. Fourni: F32 (Argolid)

Workshop type: Obsidian

Date: Mainly EH II

¹⁴ This is described as a “curious object in Proto-Minyan fabric, with open incision on its sides...[which] may well have been a mould... but there is no obvious trace of use” (Walker Kosmopoulos 1948: 46). Plate IIIf does not particularly resemble a mould, and this identification must remain tentative.

- Sources:** Runnels and van Andel 1987: 314; van Andel and Runnels 1987: 90-1; Kardulias 1992: 430, 437, 441; Jameson et al. 1994: 362-3; Kardulias and Runnels 1995: 92, 107-8, fig. 93.
- Finds:** *Obsidian:* 2106 pieces obsidian, 98.7% of the total chipped stone; 28 pieces chert, 1.3% of the total chipped stone (Kardulias and Runnels 1995: 92).
- Production debris:* 43 cores (Kardulias and Runnels 1995: 107, fig. 93), cores rare on other magoules (c. 1 each) (Runnels and van Andel 1987: 314).
- Raw material:* the cores and cortical debris indicate chunks of raw obsidian were prepared here, although none were found (Kardulias 1992: 430). The numbers of blades (84) and blade cores (43) suggest the production of uniform blanks, “as was the case at Lerna..., Phylakopi..., and Agios Stephanos in the Bronze Age” (Kardulias and Runnels 1995: 107).
- Finished products:* tools, mostly fashioned from flakes; 84 blades, many unused or retouched into specific tool types (Kardulias and Runnels 1995: 92, 107-8).
- Comments:** There is a marked dominance in the distribution of cores and blades in the southern Argolid at F32 (Kardulias 1992: 437, 441); there are more cores, debris, and flakes than at all the other Bronze Age sites in the Hermionid together, which suggest to van Andel and Runnels (1987: 90-1) that obsidian was worked on a large scale. The localisation of debitage (cores and cortical pieces) and the concentration on the production of a specialised type of artefact (long regular blade) suggest craft specialisation (van Andel and Runnels 1987; Kardulias 1992: 441; Jameson et al. 1994: 363). “Perhaps we can speak of F32 as an obsidian emporium in the Bronze Age” (Kardulias and Runnels 1995: 108) or “a major obsidian processing centre, which if it did not control certainly had a

major input into the exchange network involving obsidian, and probably other commodities as well” (Kardulias 1992: 437). The inhabitants of this area may have imported raw obsidian from Melos, and produced cores and perhaps blades for the region (Jameson et al. 1994: 362).

Analysis: It is agreed that obsidian nodules were imported to F32 and worked into cores and limited types of blades. Although no particular working locus has been proposed, the concentration of debris at this site and the sparse signs of obsidian working at other sites suggest larger scale production at F32 and regional trading of its products. CF/DF.

D8. Franchthi (Argolid): Paralia, especially Trench L5

Workshop type: *Cerastoderma* (cockle shell) beads¹⁵

Date: EN

Sources: Miller 1996: 7-37; Shackleton 1988: 52-3, 99-103; Van Andel and Runnels 1988: 236-7; Perlès 1992b: 130.

Finds: Paralia generally:

Finished products and unfinished products: 604 worked *C. edule* shell objects from unperforated bead blanks to fine polished finished products (Miller 1996: 10); 555 cockle shell beads in Paralia trenches only (Miller 1996: 33, n.3).

¹⁵ *Cerastoderma edule* is also referred to as *Cerastoderma glaucum*. Other worked shells at Franchthi include: *Dentalium*: most shells show no obvious signs of work; some, however, have been smoothed at one or both ends, and some have red pigment rubbed over them; *Cyclope neritea*: almost ready-made beads, various uses; *Columbella rustica* and *Conus mediterraneus*: almost ready-made beads, many have been worked further; *Spondylus gaederopus*: worked and partially worked examples; *Pinna nobilis*: worked pieces are generally pendants (Shackleton 1988: 52-3).

Unfinished goods: 36.7% of cockle blanks had not been worked beyond Miller's step 1 (Miller 1996: 18). Hundreds of blanks (Perlès 1992b: 130).

Finished products: 23 (4%) beads are finished, of which 6 are chipped or broken (Miller 1996: 20).

Raw material: evidence for raw material procurement; unmodified unworn *C. edule* shells found in abundance in all ceramic Neolithic levels of the cave (Miller 1996: 11).

Production debris: some of the above may be debris from first step in bead manufacture (Miller 1996: 33, n.3).

Tools: over 1000 small *chipped stone micropoints* ("thousands of specialized flint implements" (Perlès 1992b: 130)), more suited than obsidian for drilling and percussion against shell: 10% of chert points show wear traces of rotational activity (Perlès pers. comm., Miller 1996: 12) so were probably drill bits; 3 *millstones*, "rather small for the production of large quantities of ground grain", most from the cave, one from area with dense cockle bead debris; perhaps grindstones though not found in direct association with shell bead material; 3 anvils (Miller 1996: 11-13).

Trench L5, especially L5: 33 and L5: 42: *C. glaucum*:

Unfinished goods: roughly shaped bead blanks.

Rejects: many blanks broken at the drilling stage of production.

Tools: stone tools from L5 peak in quantity in approximately the same units and many have been used as drills.

Finished products: beads, usually at least 5 mm. diameter, 1-2 mm. thick, relatively large central hole, bright white marble-like appearance and polish. Fewer than 30 beads: surprisingly few from the site as a whole, compared to c. 300 blanks from L5 (Shackleton 1988: 99-103).

Comments:

In the second half of the EN, a considerable portion of the Paralia was devoted to the production of small, flat cockle-shell beads (Perlès 1992b: 130). There was a concentration of unfinished beads and blanks in L5, clustering between L5:23 and L5:42 (Shackleton 1988: 99; Miller 1996: 23). Even so, there was a great deal of shell waste from eating *Cerastoderma* and food was probably the primary reason for collecting the shells (Miller 1996: 11-13).

Experiments revealed that the average time taken for producing a bead was one hour ten minutes and very little apprenticeship was probably required to produce the fine beads (Miller 1996: 20, 26).

Analysis:

Paralia: dump or workshop?: Most of the shell finds (94.5%) and eight stages of production were represented in the Paralia, as opposed to 5.28% of shells and five production stages in the cave. The percentage, however, of finished beads was much greater in the cave than in the Paralia. Miller (1996: 23) concludes that the concentration of material in the Paralia represents not a workshop but a dump of material from one or several production loci. If this is the case, why were the tools found in the 'dump'?¹⁶ It is not stated that the tools are worn out or broken, which one would expect if they were in a dump. The low percentage of finished beads found in the Paralia could argue both for a dump (where finished products would be unlikely) or for the working area, from which finished beads would be taken away for use elsewhere. Certainly, it is usual for debris to be cleared away from living areas, but if production is in an open area outside the living quarters (i.e. in the Paralia), and limited amounts of harmless waste are involved, debris may not be taken elsewhere. The value of the Paralia finds is 21, surely A rather than a dump (M).

¹⁶ There is a close correlation between concentrations of micro-points and bead manufacturing debris (Perlès pers. comm., Miller 1996: 12).

In accordance with this classification, other authors have offered similar suggestions of specialised production at Franchthi (Shackleton 1988; Van Andel and Runnels 1988; Perlès 1992b). Van Andel and Runnels (1988: 236-7) even argue that Franchthi was sited as an emporium in a small-scale trade network, perhaps contributing cockleshell jewellery, Spondylus bracelets, salt from local lagoons and wool. Perlès (1992b: 130) views it as one of the best examples of an export workshop. If this is the case, with whom was it trading? Little is known about the distribution of Franchthi's products. These beads have not been recovered at other EN sites, which might be due to poor recovery; nevertheless Miller disagrees with the export workshop theory and states that the number of beads does not seem to exceed the needs of the community (Miller 1996: 28-30). What *were* the needs of the community? And why would they spend so many hours (cf. Miller 1996: 20, 28) in production if only to supply their own community? Perhaps it was to denote status or to distinguish themselves before other communities.

The evidence at Franchthi suggests specialised production of shell beads, on a scale worthy of terming the production locus or loci in the Paralia as workshops. This suggests that consumption was not confined to the settlement, whether this was via exchange to other settlements (the evidence for which remains to be found in more detailed excavations) or by conspicuous consumption by the Franchthi residents before other communities. A.

D9. Franchthi (Argolid)

Workshop type: Weaving

Date: MN

- Sources:** E. Barber 1991: 387 (citing Carington-Smith Ph.D. diss. University of Tasmania 1975: 136-8).
- Finds:** *Tools:* 5+ spherical weights, each weighing 100+g.
- Analysis:** E. Barber lists these amongst groups of loom weights that may represent looms or stored sets for looms. No findspot is specified, thus this is DF, assuming the weights have been correctly identified.

D10. Franchthi (Argolid)

- Workshop type:** Pottery
- Date:** Neo
- Sources:** Vitelli 1989: 19; 1993b: 208.
- Finds:** *Production debris:* “deposits which can be interpreted as resulting from potters’ activities”; ash; “sherds which can be interpreted as wasters”.
- Tools:* “objects which could have served as potters’ tools”.
- Analysis:** Vitelli rightly admits that “All of these - tools, deposits of ash, clay, and numerous overfired and underfired, warped, spalled and other defective pieces can, of course, also be explained in other ways”. Moreover, they were not found together in any single deposits. This would indicate EF. Other criteria, however, suggest local production at Franchthi (Vitelli 1989; 1993a), and coupled with these finds suggest DF. Vitelli does not mention the pits found by Jacobsen (see *D11*).

D11. Franchthi (Argolid): Paralia, northern sector

- Workshop type:** Pottery
- Date:** FN
- Sources:** Jacobsen, cited in *AR* 24 (1977-1978) 29.
- Finds:** *Specialised permanent production installations?*: several pits, whose contents and “associated deposits have suggested the existence of an “industrial” area (possibly even an open-air potter’s quarter).”
- Analysis:** A ‘potter’s quarter’ carries connotations of the abode of one or more potters, which is unlikely and over-ambitious for the Paralia. Unfortunately this information is vague. (E) K.

D12. Kastria (Achaea): Limnon Cave: Test B in entrance of cave

- Workshop type:** Kiln?
- Date:** Late LN I
- Sources:** Sampson 1992: 690-1; *AR* 44 (1997-1998) 41.
- Finds:** *Specialised permanent production installation?*: large pieces of unbaked clay, some with holes in them, probably from a kiln floor.
Finished products?: many sherds, mainly from large storage vessels with rope or other plastic decoration.
- Comments:** The great quantity of the large pithos-like vessels in the cave and the variety of decorative motifs perhaps show the existence of a local workshop (Sampson 1992: 691).
- Analysis:** The excavators (cited in *AR* 44 (1997-1998) 41) reported that there were indications that the sherds could have been locally made. Unfortunately, these indications are not specified; the unbaked clay pieces are suggestive rather than decisive evidence for a kiln, and sherds of large vessels are insufficient indications for production

here. The alleged kiln's location in the entrance of the cave is surprising; one would expect it to be further away, to prevent smoke polluting the cave. An analysis of the clay proving it to be of local origin and finds of wasters would provide confirmation of work here.
G?

D13. Lerna (Argolid)

- Workshop type:** Flaked stone (obsidian, flint)
- Date:** EH II-III
- Sources:** Runnels 1985a: 362, 364, 367, 374, 382; Kardulias 1992: 430.
- Finds:** *Production debris:* small number of debris pieces.
Finished products: low rate of error; coefficient of variation shows efficiency and skill (Runnels 1985a: 362, 364).
- Comments:** Lerna IV (EH III) provided the largest sample of lithics. Chert tools were increasingly made on the site. Lerna V (MH): the use of obsidian dropped again (Runnels 1985a: 374, 382). “[M]any blades were being produced ... but few of these in our sample were ever used” (Runnels 1985a: 367).
- Analysis:** The number of cores and type of cortical debris indicate that natural chunks of obsidian were prepared at the site (Kardulias 1992: 430). Runnels identifies possible craft specialisation in flint-knapping at Lerna but no actual workshop locations. The amount of production waste is small and suggests DF. Further deposits of debris no doubt remain to be found or published.

D14. Lerna (Argolid): House BD-47, floor deposit

Workshop type: Metal

Date: EH III, Lerna IV

Sources: Caskey 1958: 125-44; Banks 1967: 223-4; McGeehan-Liritzis 1983: 164.

Finds: *Tools:* intact stone (schist?) mould, perhaps half a bivalve, for long, slender, slightly truncated triangular chisel, with a shallow pour channel near the centre of the rim at the broader end of the mould; on the convex side was a single horizontal incision, probably to facilitate tying on the other half of the mould; blackened on the edges from handling or fire (Banks 1967: 223-4).

Other: part of a coarse strainer-brazier (which is fairly common at Lerna and cannot be linked exclusively with metallurgy (Banks 1967: 224)).

Lerna (location unspecified):

Tools: “metalworking equipment including crucible” (McGeehan-Liritzis 1983: 164).

Analysis: Except for the mould, there were no other metallurgy-related finds from the house, but part of the house was left unexcavated (Banks 1967: 223, 225). Metalworking must have been practised somewhere at the site: the finds of a mould and a crucible give a value of 4. Until a furnace is found, the exact locus of metalworking remains unknown. I? = BF.

D15. Lerna (Argolid): House A-M, 3rd and 4th floor

Workshop type: Horn and bone

Date: MH II

Sources: Banks: 1967: 474-6; Nordquist 1987: 38.

Finds: *Raw material:* piece of horn, perhaps raw material for an awl or other implement.
Finished products?: bone whorl; bone awl.
Other: terracotta whorl; terracotta disc (Banks 1967: 474-6).

Analysis: Nordquist states that the worked horn and raw material were a working assemblage. Very little evidence is presented and is too slim to suggest a workshop; the only indicator of a working area is the raw material and that is only tentatively identified. Probably M.

D16. Lerna (Argolid): House GA-CA (Banks 1967: 442)

Workshop type: Textiles

Date: MH

Sources: Banks 1967: 422-7, 441-2; Nordquist 1987: 39.

Finds: *Tools:* many bone pins (Nordquist 1987: 39); from Lerna IV and V: bone tubes grooved or worn, especially inside, perhaps holders for pigment, or perhaps employed in the manufacture of thread or cloth if the agent that produced the peculiar notches at the ends was thread (Banks 1967: 441-2).

On floor of House GA-CA:
Tools: 3 tubes, 2 terracotta weights (possibly loom weights), a terracotta whorl (Banks 1967: 422).

Lerna IV: Floor Deposit (House G-CU):
Tools: bone needle, with 2 horizontally pierced spools “which perhaps held the thread or yarn used in the needle; bone polishers or scrapers on both floors which produced needles, perhaps for the preparation of skins which were sewn together with the needles; awl

found with bone needle (in BE pit) “could have perforated the skins to facilitate the passage of the needle” (Banks 1967: 426-7).

Analysis: Nordquist (1987: 39) writes “the number and the quality of the bone pins indicate a specialized production or clothing tradition” and refers to Banks 1967: 370-420. Pins were probably used as ornaments on clothes or in hair, and are not strong indicators of craft work. The presence of the other textile-working items, however, gives a value 4. Probably D.

D17. Lerna (Argolid): trench BE, body 137 Ler

Workshop type: Textiles

Date: MH I-II

Sources: Angel 1971: 54, 89.

Finds: *Female skeleton:* “arthritic changes in the right shoulder joint and biceps groove”; “stress enlargement of scalene muscle insertions on the first rib”.

Comments: The woman was 150.3 cm. tall, 28 years old.

Analysis: This was “probably a weaver” because the wear patterns suggest occupational strain “as if from some activity involving abduction and then sharp internal rotation of the shoulder, such as throwing the shuttle through the shed of the warp on a loom” (Angel 1971: 54, 89). Dickinson, however, has objected that most adult female skeletons would surely show similar signs of wear if studied in detail (pers. comm. 1999). Although this is a significant concern, this catalogue entry has been included because so few craftworkers’ skeletons have been identified, no doubt more through lack of research, certainly in the case of weaving, rather than because there were very few of them. J?.

D18. Lerna (Argolid): grave DE-35, skeleton 181 Ler

- Workshop type:** Metal
- Date:** MH
- Sources:** Angel 1971: 58-9.
- Finds:** *Male skeleton:* particular bone-wear patterns, deformations and arthritis.
- Comments:** The man was 163.5 cm. tall, fairly muscular.
- Analysis:** The wear patterns suggest “a smith or other occupation, not necessarily servile, involving the heavy use of the torso and arms” (Angel 1971: 58-9). Although one must take Angel at his word for this identification, this entry is included for the same reason as skeleton 181 Ler. Possibly J.

D19. Lerna (Argolid): Squares G7-8, south of House M (Area A) (fig. 33)

- Workshop type:** Unspecified
- Date:** MH
- Sources:** Caskey 1956: 160.
- Finds:** Caskey found “another workshop, from which we recovered a duck-like askoid vessel in dark gray ware with incised and punctuated decoration, related to the Early Cycladic type.” No further details are given.
- Analysis:** This has been included in the catalogue as an example of how ‘workshops’ should not be reported. The function of the ‘workshop’ is not even specified. (A) K.

D20. Lerna (Argolid): South Central Area (same district as kilns (D21))

Workshop type: Furnace

Date: MH

Sources: Caskey 1955: 42; 1956: 159.

Finds: *Specialised permanent production installation:* horseshoe-shaped structure, (furnace?) with stone walls, chamber 2.7 m. by 1.8 m. with a large rectangular pillar inside which divided the space into two compartments. Clay coated the walls inside. Signs of intense continued burning on walls and floor, which was blackened.

Production debris: chambers full of ash that contained a “vitrified green substance and some green matter, perhaps the residue from molten copper”. Outside the open end of the horseshoe, a fan-shaped layer of burnt matter: layers of black ash and hard white crusts (Caskey 1956: 159).

Tools: Area G, near the furnace, “a rough heavy crucible with an oval bowl, spouted at one end, and with a projecting socket into which a handle had once been inserted... The inside of the bowl is coated with a smooth white substance, and its rim is vitrified by the extreme heat to which the vessel was exposed. We presume that it was used in the smelting of metals” (Caskey 1955: 42).

Comments: This structure was similar to the kilns (see *D21*), with more substantial walls.

Analysis: Like the kilns this structure was found among remains of houses. “Evidently this was a furnace of some kind, raked out and refired successively. Tentatively we have called it a foundry” (Caskey 1956: 159). Nordquist (1987: 44) is more certain, calling it a complicated metal oven. The nearby crucible is evidence of metalwork somewhere; as a candidate for the location, this structure with its ash and green substances, possibly slag or copper splashes, is the most

likely. Until analysis of the green matter provides confirmation, or otherwise, of a furnace, this is B.

D21. Lerna (Argolid): South Central Area

Workshop type: Kilns

Date: MH

Sources: Caskey 1956: 158; Davaras 1980: 125.

Finds: *Specialised permanent production installation:* Type B kiln (Davaras 1980: 125) at the north end of the excavated area, amongst buildings, near a street: an oval construction, 2.50 m. by 1.60 m., with a thin surrounding brick wall, a central rectangular clay pillar which might have supported an upper floor or a domed roof, and an opening c. 1 m. wide, partly blocked by stone barrier (Caskey 1956 Pl. 41a). Beyond this, eastwards, was a similar structure.

Analysis: Some signs of burning suggest that these may have been large ovens, perhaps kilns (Caskey 1956: 158). Since he has made extensive studies of kilns, Davaras' opinion that one of the structures was a kiln is encouraging; it is odd, however, that he does not mention the other structure too, since this was similar. Finds of wasters and pieces of a kiln floor would have supported the identification of kilns. The location amongst buildings, however, might be argued to suggest ovens rather than kilns because of the pollution from fumes. Ovens, however, would also produce fumes, and would probably have been used more often than kilns albeit for shorter periods of time, so proximity to dwellings is not a conclusive argument. Possible G.

D22. Malthi (Messenia): A41-43 and A46-7 (fig. 34)

Workshop type: Pottery and bronze

Date: MH - late LH?

Sources: Valmin 1938: 54, 97, 101-5, 97-113; Hope Simpson and Dickinson 1979: 174.

Finds: A 39 and A 40:

Raw material?: the MH stratum over EH walls in A 39 and A 40 was lighter in colour than the other layers and was probably a deposit of clay used for making vases.

A 41 - storeroom or shop:¹⁷

Tools: 6 grinders; 4 spindle-whorls; 2 horn awls; 3 bone needles.

Other or raw material: 3 boar's tusks.

Other or finished product: 1 bone button.

A 42 - 'probable workshop' or connected with it:

Tools: 4 whetstones; 4 spindle-whorls; 1 pierced lid.

A 43 - 'forge':

Specialised permanent production installation?: forge?: a square enclosure formed by upright slabs and covered with ashes and pieces of charred wood; the sides measured 1.10 m.

A 46:

Tools: 5 spindle whorls; 1 pierced mace head; 5 whetstones; 7 cubic weight-stones.

A 47:

Tools: 6 grinders; half a bored stone axe; 2 large whetstones; 2 large and 3 smaller spindle-whorls; 2 flint knives; 1 bone awl; 2 bone flat borers.

¹⁷ Later, Valmin (1938: 102) asserts that A 41 was probably an MH storeroom for vases manufactured on the acropolis.

Other: 1 terracotta horn from a statuette of an animal; many animal bones, some worked.

Comments: *Dimensions:* A 41: NS 4.4 m., EW 3.4 m.; A 42: NS 4.4 m., EW 3.8 m.; A 43 only had 2 walls in S and W; A 46: NS 5.4 m., EW 3.6 m.; A 47: NS 5 m., EW 4 m.

Analysis: *Problems with Valmin's conclusions:*

1. Valmin suggests that A 41, 42 and 43 are connected; the finds “indicate that they were used by persons who seem to have been at the same time smiths and potters”, evidently “jacks-of-all-trades” (Valmin 1938: 102). Virtually no evidence is given for the ‘forge’; the vague description of its structure does not lend credence to its identification, when it is compared with other BA furnaces, and its use as a forge is not supported by finds of slag, crucibles or other indications of metallurgy. A very dubious C, probably M.

2. Rooms A 46 and A 47, nearby, also had an “industrial character” (Valmin 1938: 104). This statement is vague. Although the rooms contain a wide variety of tools, Valmin does not go further to suggest which crafts, other than potting and metallurgy, were practised here. No other evidence for craftwork is listed, other than some worked animal bones; it is uncertain whether Valmin is suggesting bone-working here too. E? K.

3. The four rooms A 41, 42, 46 and 47 and the forge “form a unit which was used by workmen; the rooms A 36 and 37 were probably the living-rooms” (Valmin 1938: 105). Valmin does not explain how he reached the latter conclusion, and House A 36 (second stratum) in fact contained the only unfinished item, a bored celt, from this area.

4. The northern part of the central terrace is regularly planned and its “finds characterize its houses as workshops and the whole quarter as an industrial one” (Valmin 1938: 54, 97). An industrial quarter is possible, in theory; this area, however, needs much more evidence to

prove its identity as such. Valmin's following statements become even more ambitious: "It very probably belonged directly to the ruler, and may be compared with similar quarters in other prehistoric towns" such as Knossos and Thebes. "[W]e may suggest that these ... [people] worked on behalf of the ruler of the town. It is not impossible that they were his personal slaves" (Valmin 1938: 98). These theories must be approached with caution, especially since the identification of a forge is dubious.

5. Valmin states that these rooms were used from the MH to LH. Hope Simpson and Dickinson, however, propose a late MH to LH date for the earliest phase of the settlement (1979: 174).

Conclusion: Valmin's arguments are largely unsubstantiated by solid evidence. The proposed working areas can only be termed C/E, and the date is probably post-MH.

D23. Malthi (Messenia): Room B 109 (fig. 34)

Workshop type: Bronze

Date: Later MH? (Valmin 1938: 158).

Sources: Valmin 1938: 156-8; Hope Simpson and Dickinson 1979: 174.

Finds: Room B 109:

Tools?: 3 hammer-like stones worked down at the centre.

Other: 1 spindle whorl; 11 sherds.

Higher level just outside B109:

This was a cavity enclosed by a curving row of rocks (dimensions: 3 m. NS, c. 1.3 m. EW, depth c. 1 m.).

Specialised permanent production installation?: conically shaped construction, c. 2 m. diameter, built of thick clay walls baked more or less resistant, found mostly inside and above the stone base. Walls

were 8-10 cm. thick, had at least 7 pierced holes of c. 5-7 cm. diameter; a powerful draught must have been obtained.

Production debris or part of kiln/oven/furnace?: some lumps of baked clay in B109 that had fallen down from here.

Nearby and in B110:

Raw materials or tools?: 18 more or less worked 'ironstones' containing various metals, mainly iron, sometimes other metals, rarely copper.

Other: relatively large number of sherds, including pithoi.

Comments:

B 109: NS 5 m., EW 2.8 m. Valmin argues that the oven could not have been just a baking oven because the latter do not have more than one opening; there are no traces of potter's activity around it and potters had no need of such an oven; there was a need for great heat here, so it must be a melting-oven. There was probably a smithy on the central terrace; the smith had gathered ironstones near his workshop and large fire-place. The stones contain mainly lead and iron, sometimes other metals, and explain the oven (Valmin 1938: 157-8).

Analysis:

If this was a furnace, an identification made more doubtful by the absence of slag, metal splashes or other finds specifically related to metallurgy, the opinions of Hope Simpson and Dickinson (1979: 174) suggest that it is post-MH. C, with questionable date.

D24. Menelaion (Laconia): midway down south flank of Aetos hill (fig. 35)

Workshop type: Kilns

Date: MH

Sources: Catling in *AR* 27 (1980-1981) 16-17, fig. 23.

- Finds:** *Specialised permanent production installations:* 2 small kilns. One, better preserved, was of bottle-shaped plan. The other revealed fragments of clay floor pierced by large holes. Both were built of pisé, fire-hardened by use, and assumed to be updraught kilns.
Finished products?: local MH type pottery.
- Analysis:** Catling seems certain of the validity of the “two small potter’s kilns”, even though little pottery was found in association with them.
G.

D25. Midea (Argolid): lower town, between Ayios Thomas and Kiafa, Trench P

- Workshop type:** Copper
- Date:** MH
- Sources:** Åström 1983: 14; Nordquist 1987: 44.
- Finds:** Lower skeleton:
Production debris: a number of green stones, which the geologist, Dr. Fritz Brotzen, identified as copper slag (Åström 1983: 14).
Other: potsherds.
- Analysis:** The slag is “important evidence of copper working at Dendra in the Middle Helladic period” (Åström 1983: 14). AF. Whether or not this is a metalworker’s grave remains to be determined. J?

D26. Nichoria (Messenia): Area V (figs. 36 and 37)

- Workshop type:** Metal
- Date:** MH I
- Sources:** AR 19 (1972-1973) 16-17; Cooke and Nielsen 1978: 123, 211; Howell 1992: 18ff.; McGeehan-Liritzis 1983: 164.

Finds: Area V in general (Group C):¹⁸

Specialised permanent production installations: 2 horseshoe-shaped structures which could have been used as bowl furnaces, in Dpq¹⁹; hearth or oven formed by a circle of stones c. 0.6 m. diameter in Dq²⁰; bothros (V-3); ash-filled pit (Pit V-2) cut into the bothros (a later feature therefore).

Production debris: cupreous slag; metal fragments; pieces of burned clay or mud in ashy soil, associated with the pit (Cooke and Nielsen 1978: 211).

Tools: slag adhering to fragments of terracotta crucibles associated with the pit (McDonald, cited in AR 19 (1972-1973) 17; Cooke and Nielsen 1978: 211).

L23 Dopq:

Specialised permanent production installations: 2 horseshoe shaped hearths²¹, #3 and #4 (possibly contemporary): many fragments of clay daub, some fired, in the vicinity, perhaps part of the original superstructure. #3 was constructed of coarse red-fired clay, the oval bowl lined inside with yellow clay, 48 cm. by 35 cm.; funnel-like channel at S end. Total length: 0.87 m. N-S by 0.5 m., interior 0.48 m. by 0.35 m. #4: similar construction, slightly larger, less well

¹⁸ Metallurgy finds also date back to Group A and B deposits. Fill from the gully in L23 includes signs of burning, ash, large lumps of burned clay impregnated with slag, perhaps parts of furnaces, perhaps two crucible fragments, and Group A slag, one indicating tin-bronze was used here in earliest MH I [Rutter (1993a: 773) suggests that the earliest pottery at Nichoria may be late EH III rather than MH I]. Group B finds include slag, malachite, vitrified pottery, crucible rim with adhering copper, which might belong to Group A; even so, the indications seem to imply that metallurgy continued through Group B.

¹⁹ The two main horseshoe-shaped hearths (nos. 3 and 4) are in L23 Dpq. Cooke and Nielsen (1978: 211) describe the location of a third as c. 12 m. west of the bothros in L23 Dopq. Oddly, there is no bothros in L23 Dopq, nor any hearth in the vicinity. Howell (1992: 36, 40 n. 23) acknowledges a possible fragment of a third hearth, 0.3 m. north of Hearth #4, which may actually have been part of the superstructure of one of the other hearths.

²⁰ This must be the same structure as the stone ringed hearth located, according to Cooke and Nielsen (1978: 211), in L23 FGopqr, where there is, in fact, no such structure.

²¹ Perhaps contemporary with Unit V-1.

preserved; set on a layer of small irregular stone blocks; does not have a yellow clay lining; contained ash and charcoal; total length: 0.93 m. NNW-SSE by 0.74 m.; interior 0.75 m. by 0.52 m. The MH I layer covering the hearths contained charcoal, fired clay and slag.

In the vicinity of the hearths:

Production debris: pieces of slag, charcoal and small lumps of fired clay, apparently “the refuse from metallurgical operations”, were found near the kilns (Howell 1992: 27). Lumps of bronze with relatively high tin content (*raw material?*) and slag in the MH I deposit at the north of the trench nearby.

Tools?: sherd with copper adhering (part of a crucible?) in the MH I deposit at the north of the trench.

Other: small potsherds and stones (Howell 1992: 26-8). The position on a windy ridge means high temperatures would have been reached without needing bellows or tuyères (Cooke and Nielsen 1978: 211).

L 23 FGop Bothros (Pit V-3):

Tools: rim fragment of crucible (lowest level).

Production debris: ash probably from smithing activities nearby (upper level).

L23 FGop Pit V-2:

Tools: two large crucible fragments, one with copper adhering.

Other: pebbles, ashy earth and miscellaneous small finds.

Unit V-1:

Tools: 11 fragments of crucibles.

Production debris: several small fragments of slag (Cooke and Nielsen 1978: 184); charcoal, overfired potsherd, bronze tubular bead.

Other: bone implements, obsidian and chert flakes.

Surface levels around Unit V-1 produced 3 fragments of bronze, copper strip, fragment of bronze sheet, 8 fragments of crucibles, some vitrified material.

NE of Unit V-I:

“considerable evidence of metallurgical activities” (Howell 1992: 24):

Raw material: fragment of malachite.

Production debris: several pieces of slag, copper spatter.

Tools: crucible fragment.

SE of Unit V-1:

Lower deposit:

Raw material: 2 fragments of malachite.

Production debris or finished products?: 2 bronze fragments.

Tools: 2 crucible fragments.

Upper deposit:

“a notable concentration of finds associated with metallurgy, probably from the dump of gray ashy material over the top of Pit V-2” (Howell 1992: 24)²²:

Production debris: slag adhering to crucibles,²³ prills, spatters.

Tools: over 40 pieces of crucibles, many with adhering slag.

Finished products?: pieces of metal, possible fragments of metal artefacts.

Other: miscellaneous finds including shells beads, stone tools (some stone hammers could possibly have been used in metallurgy) and pebbles.

²² It is unclear why finds from Pit V-2 should be found here.

²³ Copper and bronze artefacts were being manufactured (Howell 1992: 24).

SW of Unit V-1:

Tools: crucible fragments, one from lower level and 2 from upper level.

Other: miscellaneous small finds.

Unit V-2:

Tools and production debris: fragment of crucible with adhering slag.

Analysis:

One of the original reasons for establishing the settlement here may have been its suitability for smithing, lying close to the mouths of two rivers in a position to receive imported raw materials (Howell 1992: 36). While this is possible, there are many other sites with easy access to the sea for importation of goods.

“Unit V-1 may tentatively be interpreted as the dwelling of a bronzesmith, in which case Unit V-2 may have been the workshop.” This is unlikely, considering that Unit V-2 revealed far fewer metallurgy-related finds than Unit V-1. Alternatively, Howell suggests Unit V-1 was a slightly earlier dwelling destroyed by fire. It is possible that one of these buildings was a workshop; finds to indicate a workshop are scattered all over Area V, however, so to interpret any one building as a workshop would be precipitous.

The stratigraphy of hearths #3 and #4 is unclear (Howell 1992: 26) but is probably MH I. The two Nichoria excavation volumes are confusing, with some incorrect cross-referencing. It seems that Pit V-2 was also involved in Group A period metallurgy (Cooke and Nielsen 1978: 123, 211, Howell 1992: 22, 36)²⁴, if only, perhaps, as a waste dump, though waste was seemingly dumped near the hearths in Trench Dopq. The two hearths must certainly be furnaces, and

²⁴ The contents of lowest MH I layer L23 FGop, Gqr, Fqr “suggest that the fill was derived from an area of metal-working activity” (Cooke and Nielsen 1978: 123). Area V finds “surely indicate that the pit was connected with metal-working activities.” (Cooke and Nielsen 1978: 211, citing Howell 1975).

together with the large volume of metallurgy-related finds here, suggest a major centre of metallurgy. A.

D27. Perachora (Corinthia): Lake Vouliagmeni

Workshop type: Pottery

Date: EH II

Sources: *AR* 19 (1972-1973) 8-9; Fossey 1973: 149-51; Jones 1986: 783-4; cf. Fossey 1969: 53-69 for pottery details.

Finds: *Raw material:* natural subsoil of this part of the site is grey clay which “provided some of the fabric for the pot manufacture” (Fossey 1973: 150).

Production debris: many wasters in a deposit up to 2.5 m. deep of potsherds, many from shallow bowls, small saucers with ring bases, sauce boats (Fossey 1972-73: 9) and jars (Fossey 1973: 150).

Comments: *Chronology:* there were 3 phases of EH II occupation, of which this was the earliest (*AR* 19 (1972-1973) 9).

Analysis: According to Fossey, the excavator, the wasters represent the accumulated rejects and waste from a kiln outside the limits of the excavation (*AR* 19 (1972-1973) 9; Fossey 1973: 150). The pottery production area can hardly be far away and its investigation could be of considerable importance to our understanding of ceramic techniques in the EBA (Fossey 1973: 150). A proton magnetometer survey of the promontory and hill behind it suggests that wherever the kilns were, they were small and temporary (Jones 1986: 783-4). BF and GF.

D28. *Sakovouni (Arkadia): East part of the excavated area*

Workshop type: Obsidian

Date: Neo

Sources: Spyropoulos and Spyropoulos, cited in *AR* 43 (1996-1997) 35.

Finds: *Production debris:* masses of obsidian blades and cores.
Finished products: obsidian blades.

Analysis: The excavators concluded that the East part of the excavated area was an “industrial sector of the Neolithic settlement” from the finds listed above. It is not only inappropriate and anachronistic to apply the term “industrial sector” to the Neolithic period, but the locus of the work place, the nature of the products and substantiating evidence remain unspecified. An unspecified number of obsidian cores is the only evidence for working; from the available information, DF is inferred. DF, K.

D29. *Sallou (Ayioritika Mantineias, Arkadia): Alemis' Plot, just above the village*

Workshop type: Metal

Date: EH II - MH I (c. 2500-1750 B.C.)

Sources: Spyropoulos and Spyropoulos, cited in *AR* 43 (1996-1997) 29.

Finds: *Specialised permanent production installations:* “A large metallurgical kiln”, the lower part preserved to a height of 1.90 m., made from large, roughly cut stones forming a circle (diameter 9.5 m.), the inner face of which is covered with a thick layer of mud. Associated installations well dated to the EH II - MH I period, when there was a violent destruction, annexed to the kiln, for treating and washing the ore.
Production debris: scoriae; ashes; carbonised wood.

Comments: There are well-preserved remains of intense metallurgical activity (bronze?) covering several acres (see also *D30*).

Analysis: The excavators label this as a metallurgical centre. With a value of 17, this is A. This appears to be part of the general Ayioritika area of metalworking, which also includes Steno; the excavators do not specify this.

D30. Steno (Arkadia): village area

Workshop type: Metal

Date: EH

Sources: Spyropoulos, cited in *AR 37* (1990-1991) 26.

Finds: *Specialised permanent production installations:* 6 metallurgical kilns. One was fully excavated: made of mud brick, with 2 ellipsoidal chambers and an apsidal roof.

Production debris: thick layers of rust or slag attached to the walls of the chambers; an equally thick layer of ashes by the entrance.

Tools: clay mould.

Other: various open vessels.²⁵

Comments: *Dimensions:* 14 m. long, 2 m. high.

Analysis: “These are apparently the most ancient metallurgical kilns in Greece and their number suggests an amazingly intensive activity in the area in which lies the settlement of Agiorgitika (2 km E)” (*AR 37* (1990-1991) 26). Value of c. 20. A. See also Sallou (*D29*).

²⁵ The excavators would presumably have mentioned specifically any vessels which might have been used as crucibles.

D31. Tiryns (Argolid): R 197

- Workshop type:** Metal (lead)
- Date:** EH II
- Sources:** *AR* 28 (1981-1982) 21-3; McGeehan-Liritzis 1983: 170; Hägg and Konsola 1986: 13.
- Finds:** *Raw material?*: lead bun ingot(s).
- Comments:** Kilian refers to lead buns, McGeehan-Liritzis specifies two buns, whereas Hägg and Konsola (1986: 13) mention only one.
- Analysis:** Kilian, the excavator, takes the lead buns, besides obsidian, as “evidence of industrial activity” (*AR* 28 (1981-1982) 21-23) and McGeehan-Liritzis infers the import and working of metals at Tiryns. It is unclear whether the buns were effectively raw material, awaiting working into products. I = CF.

D32. Tiryns (Argolid): West corner of R 185; R 197

- Workshop type:** Obsidian
- Date:** EH II
- Sources:** Kilian, cited in *AR* 28 (1981-1982) 22.
- Finds:** West corner of R 185 (room in a large building consisting of rooms 180-185):
Finished products or production debris?: “a large collection” of obsidian.
R97:
Apparently R197 contained an obsidian working area; no obsidian finds were specified by Kilian, the excavator.
Other: lead buns.

Analysis: In the W corner of R 185 a large collection of obsidian was found suggesting a workshop to Kilian. A collection of obsidian does not necessarily constitute a workplace unless it contains cores, debitage and is associated with architecture, which lessens the possibility of it being a dump. Although it is associated with architecture, Kilian should have stated whether waste was present to substantiate his claim. Moreover to state a workshop rather than a working area on such ill-defined evidence is dangerous. Rather than A, this is E. “R 197 has an obsidian-working area [D], while finds of lead ‘buns’ are further evidence of industrial activity [see *D31*]” (*AR* 28 (1981-1982) 22); again this statement is insufficient to prove anything. R 197 is (D) K.

D33. Tiryns (Argolid): rooms in LXII 39/40

Workshop type: Obsidian

Date: EH II

Sources: Kilian, cited in *AR* 28 (1980-1981) 14.

Finds: *Production debris and finished products?*: “obsidian waste”, cores, flint and obsidian blades.

Other: metal needle; chisel; remains of lead [*waste?*]; much pottery; rock crystal; Cycladic type stone tray.

Analysis: Kilian is correct to point out that “Obsidian waste argues for a local lithic industry”. Little detail is given regarding the number of cores and the type and amount of waste, so the scale of the production is not known. E or dump (M) (= DF).

D34. Tiryns (Argolid): Room XVI

- Workshop type:** Bronze
Date: EH II/III
Sources: AR 31 (1984-1985) 21.
Finds: EH finds included:
Tools: part of a bronze-worker's crucible.
Finished products or waste: bronze fragments.
Other: much pottery, clay "anchors".
Analysis: I = BF.

D35. Zygouries (Corinthia): House U (figs. 38 and 39)

- Workshop type:** Metal (lead)
Date: EH II
Sources: Blegen 1928: 184; Renfrew 1979: 91; McGeehan-Liritzis 1983: 164.
Finds: *Raw material or production debris?:* "thick flat lump [of lead] of irregular outline", 1265 g. (Blegen 1928: 184).²⁶
Comments: The lead lump was perhaps raw material: Blegen (1928: 184) writes that it was "probably a reserve supply from which a small quantity could be cut from time to time when needed" and Renfrew (1979: 91) states it was "evidently held in reserve" for rivetting pottery. McGeehan-Liritzis (1983: 164) on the other hand, classified it as *lead waste*.
Analysis: The lead was probably used as raw material; I = BF.

²⁶ Renfrew (1979: 91) gives a different weight of 1200 g.

E. CYCLADES

Dhespotikon

E1. Cheiromylos

- Workshop type:** Lead
- Date:** EC I (Grotta-Pelos)
- Sources:** Tsountas 1898: 176; Renfrew 1972: 517; 1979: 91.
- Finds:** *Finished product or debris?*: 2 fragments of lead.
Other: EBA potsherds (Renfrew 1972: 517).
- Comments:** Cheiromylos is a small site on a rock, which has a four-sided building and some sherds (Tsountas 1898: 176). In Renfrew's opinion (1979: 91), this was perhaps the earliest sign of metallurgy in the Cyclades, and Ayios Georgios was not far away, where galena is still mined.
- Analysis:** The evidence for metallurgy is thin: it is unclear whether the fragments of lead are by-products from production or pieces chipped from finished products, and the nearby undated mine bears no evidence of exploitation in the EBA. I, probably indicating M.

Keos

E2. Ayia Irini

- Workshop type:** Metal
- Date:** FN
- Sources:** Caskey 1972: 360; Coleman 1977: 4; Nakou 1995: 6.
- Finds:** *Tools and production debris*: small fragment of crucible rim, interior fused, with traces of metal, presumably copper, oxidised green

(Caskey 1972: 360). Nakou (1995: 6), however, refers to crucibles, in the plural.

Analysis: I = BF.

E3. Ayia Irini: Area J (fig. 40)

Workshop type: Kiln

Date: EC II (Period III)

Sources: AR 13 (1966-1967) 17; Caskey 1971: 372; Georgiou 1986: 2.

Finds: *Specialised permanent production installation:* potter's kiln "neatly built of small stones and clay" on rock, just outside the fortification wall; western side is missing; plan would be heart-shaped. Roughly circular chamber, diameter c. 1.50 m., had 3 cylindrical pillars, presumably supports for a raised floor, of which no trace is preserved. Inner face of chamber reddened but not fused.
Production debris?: fragments of large jars with plastic decoration, inside the kiln (Caskey 1971: 372).

Analysis: Georgiou (1986: 53) writes that pottery production was possibly the one example of specialist production at Ayia Irini, probably by part-time craftsmen, perhaps in family workshops. The classification is probable G; if the sherds in the kiln are wasters the identification of G would be certain.

E4. Ayia Irini

Workshop type: Weaving

Date: EC II

- Sources:** E. Barber 1991: 388 (citing Carington Smith Ph.D. diss. University of Tasmania 1975: 233-4).
- Finds:** *Tools:* 16 egg-shaped weights.
- Analysis:** E. Barber lists these amongst groups of loom weights that may represent looms or stored sets for looms. DF.

E5. Ayia Irini: various

- Workshop type:** Lead, silver, bronze
- Date:** EC II - MC
- Sources:** Caskey 1962: 273; Caskey, cited in *AR* 20 (1973-1974) 28-9; Gale et al. 1984: 403-4; Overbeck 1989: 75, 118, 127, 165.
- Finds:** *Production debris:*
- Period II: litharge.
- Period III: litharge; over 6 pieces of lead, one large; 4 clamps for mending pottery; lead cylinder.
- Period IV: litharge (late Deposit AE (square G8)); piece of lead (Deposit CI).
- Period IV-V: lump of bronze, slag? (Group BB in west of square E8); 2 small shapeless lumps of bronze, probably slag, one magnetised (Deposit BD); lump of bronze slag (?) (Group CH, beneath House A) (Overbeck 1989: 75, 118, 127, 165).
- Period V: 3 pieces litharge; small bar of lead (Gale et al. 1984: 403-4).
- Unspecified period:
- Tools:* large series of crucibles in which metals were smelted (*AR* 20 (1973-1974) 29).
- Comments:** Ayia Irini has well-dated evidence for the smelting of lead and extraction of silver, from EC II onwards (Gale et al. 1984).

Analysis: The location of this work has yet to be ascertained as the finds are scattered about the site. Finds from various periods of litharge and bronze slag suggest that there were several workshops. AF.

E6. Ayia Irini: Area A (figs. 40 and 41)

Workshop type: Stone

Date: MC

Sources: Caskey 1962: 272.

Finds: *Production debris:* “considerable numbers” of cores, presumably bored in the process of hollowing vessels.

Analysis: Only probable production debris was found; this is C or dump (M), indicating BF.

E7. Ayios Simeon: below church

Workshop type: Metal

Date: EC?

Sources: Caskey et al. 1988: 1741-4; Stos-Gale 1998: 719ff.

Finds: *Production debris:* considerable amount of copper slag scattered over the slopes around the church.

Other: sherds from Classical to Roman periods, some coarse wares were perhaps earlier but undiagnostic. Near these, 200 m. northwest of the church, were some prehistoric sherds.

Analysis: Caskey et al. (1988: 1743-4) relate the composition of the ores smelted here to those from Laurion but discount Laurion and Makronisos as sources because it is odd that the ore was transported across the island rather than worked on the side facing those places;

they also discount a source at Kythnos with unconvincing arguments and conclude that local sources were used. Stos-Gale's analysis is more thorough and credible: although copper ore sources exist at Orkos (Keos), the analysis of the Ayios Simeon slag is consistent with some Skouries slags rather than Orkos ores. Slag at Ayios Simeon, Kephala (Seriphos) and Skouries was formed during smelting of copper ores from the same occurrences (Stos-Gale 1998: 719, 723-4).

The furnace at Ayios Simeon was probably near the slags and the source of water on the slope of the hill. It is difficult to estimate the amount of the slag because, due to weathering and the slope of the land, it is widely scattered. The metalworking, however, probably covered only local needs. There was definitely smelting here: copper globules were found within the slag (Caskey et al. 1988: 1742-3).

If the slag is dated by the associated sherds, it is difficult to assign it to a particular period. Its association with well-dated EBA slags elsewhere suggests that it was used in the EBA. BF.

E8. Kephala: Area D, E, G, L, cemetery

Workshop type: Metal

Date: FN

Sources: Caskey 1971: 391; Coleman 1974: 339; 1977: 4; Branigan 1977: 117; Conophagos 1977: 113. cf. McGeehan-Liritzis 1983: 147 ff.

Finds: *Production debris:* slags (Coleman 1977: 4; Conophagos 1977: 113), from various places on the hillside in surface contexts in the cemetery and Areas D, E and G.

Tools: fragments of 2 crucibles (Conophagos 1977: 113); at least 7 fragments of burnt clay from furnace-linings or crucibles, subjected

to intense heat, slag adhered to 3, the other fragments resemble them, 2 from the settlement (Areas G and L) and the rest, non-funerary, from the cemetery (Area F) (Coleman 1977: 4).

Finished products: copper awl; fragments, probably from sharp-edged tools, one analysed being almost pure copper (Coleman 1974: 339).

Analysis:

Coleman (1977: 4) writes that the burnt clay from furnace-linings or crucibles and the slag “testify that copper was actually extracted from ore at Kephala...” rather than just melted. This, however, is not necessarily evidence for smelting (McGeehan-Liritzis and Gale 1988: 209). From the small size of the crucibles, Conophagos (1977: 113) infers that the ore was copper-rich, and the small quantities of slag suggest that metallurgy was small-scale. In fact, small crucibles with slag rich in copper are more indicative of *melting*.

Coleman (1974: 339) states that simple tools were made here²⁷, but the only tool is an awl identified by Branigan (1977: 117) as a pin and as the only product of the “small, primitive copper-working industry here”. Coleman’s degree of certainty regarding the products is unsupported by evidence in the form of moulds, which would have confirmed what was made.

Coleman’s (1977: 108) opinion that because the evidence for metallurgy is not extensive, copper working was probably not particularly important in the life of the site, is simplistic. Evidence for metallurgy is comparatively rare: it does not occur at every site and this is not always for lack of thorough excavation. Therefore a degree of importance must be accorded to any site with signs of metallurgy, and the scarcity of metal finds and workshops make it likely that it provided surrounding sites with products. Moreover, it is unusual to find “extensive” evidence for metallurgy, however the

²⁷ A close parallel to this metalworking activity is the Kitsos cave (Coleman 1974: 339).

extent is supposed to be judged, and the finds at Kephala are not inconsistent with finds from other metalworking sites. Unfortunately the finds are scattered, so the location of the workshop cannot be pinpointed. Value 9; I = BF.

E9. Kephala: Highest concentrations in Northern and Western area of site

Workshop type: Obsidian

Date: FN

Sources: Coleman 1977: 5-6; Whitelaw 1991: 202, 207.

Finds: *Production debris:* 2864 pieces of obsidian (from 215 sample circles on a 10 m. grid; estimate for whole headland is c. 23,000 pieces) (Whitelaw 1991: 202), all over the promontory, mostly waste varying greatly in size; fragments of cores not uncommon, some of considerable size (Coleman 1977: 5).

Other: coincidentally, 2864 pieces of pottery (from 215 sample circles on a 10 m. grid; estimate for whole headland is c. 23,000 pieces) (Whitelaw 1991: 202).

Comments: Pottery is concentrated on South-Eastern slope; substantial quantities of obsidian are in areas peripheral to the main concentrations of pottery and obsidian, indicating functional specialisation of different parts of the site. Specialised working or dumping areas were beyond the occupation area (in the southeast part) to the north and west (Whitelaw 1991: 207). Coleman, however, gained the “impression that the industry was crude and not highly specialized, especially as compared to that of Saliagos”, nor was it centralised (Coleman 1977: 6).

Analysis: The debris reveals that blade production occurred; Whitelaw is justifiably cautious in classifying the obsidian-rich areas as A

(‘specialised working areas’) or M. The degree of specialisation is hard to define, the total volume of obsidian being based on estimation. The concentrations of dangerous, sharp obsidian chips were located outside the occupation area: they may have been dumps from workshops or activity areas, or workplaces located there for ease of safe waste disposal. Torrence’s (1986) method of calculating man-hours could be useful here. C/E or dump (M) (= CF/DF).

E10. Kephala: Site 39 (near Kephala)

- Workshop type:** Obsidian
- Date:** FN
- Sources:** Sutton et al. 1991: 101.
- Finds:** *Production debris or finished products?*: 132 unretouched obsidian artefacts; 1 retouched flake.
- Analysis:** Sutton et al. (1991: 101) term this a “Knapping site?”. No location is specified for the workplace, no cores are mentioned, and the obsidian artefacts are not stated to be debris. Probably a dump (M) rather than E.

E11. Paoura

- Workshop type:** Obsidian
- Date:** FN
- Sources:** Coleman 1977: 157; Whitelaw 1991: 213-4.
- Finds:** *Production debris*: a used core; a piece of waste (Coleman 1977: 157).

Finished products?: pointed tools; parallel-sided blades; scrapers (Coleman 1977: 157).

Total obsidian: 648 pieces of obsidian (and 479 sherds) from 271 sample circles on a 25 m. grid, which suggests c. 57,000 pieces of obsidian (and c. 42,000 sherds) on the surface of the site (Whitelaw 1991: 213).

Analysis: There has been no excavation at Paoura (Whitelaw 1991: 214) so Coleman's (1977: 157) conclusions of a local obsidian industry similar to that at Kephala must be tentative. The location of the finds is not given, the volume is inferential, and Whitelaw does not mention debitage or cores: Coleman only mentions one of each. Therefore this is M rather than a local industry.

E12. Paoura: P45-47

Workshop type: Copper

Date: FN

Sources: Coleman 1977: 4, 157; Nakou 1995: 6.

Finds: *Production debris or raw material?:* small shapeless piece of copper or copper oxide from P45.

Production debris: piece of copper-rich slag from P46; piece of slag from P47 (Coleman 1977: 157).

Finished products: (unspecified by Nakou 1995: 6).

Comments: These finds are similar to those from Kephala (Coleman 1977: 157). The evidence for copper working from Paoura, however, is less secure than at Kephala (Coleman 1977: 4).

Analysis: Slag indicates that metalworking was practised at the site, possibly around the P45-47 area. AF.

Kythnos

E13. Ayios Ioannis: Tsoulis (promontory east end of Ayios Ioannis) (figs. 42 and 43)

Workshop type: Copper mine

Date: EC II

Sources: Hadjianastasiou and MacGillivray 1988: 31, 34.

Finds: *Mine:* mine.

Production debris: broken lumps of iron ore with traces of copper adhering, on the lower slopes.

Tools: pounding tools of stone.

Tools or other: obsidian.

Analysis: There was virtually no pottery, but an EC II type fragment near the stone tools suggested the mine was used in EC II and could have been one of the sources of copper smelted at EC II Skouries. This was confirmed by lead isotope analysis of copper from the mine and slag at Skouries. The analysis also matches the tools of the Kythnos hoard dated typologically to EC II. An EC II date for the mine seems safe.

E14. Skouries: hillside (figs. 42 and 43)

Workshop type: Copper smelting

Date: EC II (Hadjianastasiou and MacGillivray 1988: 31).

Sources: Gale et al. 1985: 81-102; Hadjianastasiou and MacGillivray 1988: 31-4; Stos-Gale et al. 1988: 23-34; Stos-Gale 1998: 719ff.

Finds: *Specialised permanent production installations:* many fragments of furnace linings, 3 cm. in width, largest intact piece suggests diameter

of 0.5 m. (Gale et al 1985: 85); 2 stone structures (see 'Building 1'), built of schist slabs in a manner characteristic of Cycladic architecture, perhaps shelters for furnaces inside (Hadjianastasiou and MacGillivray 1988: 32).

Raw material: many pieces of oxidised copper ore (Gale et al. 1985: 85).

Production debris: much slag, largely copper stained, mixed with furnace linings and pottery; many fragments of quartz (abundant nearby, perhaps used for flux) (Gale et al. 1985: 85).

Other: fragments of obsidian blades and points (Hadjianastasiou and MacGillivray 1988: 31), probably EBA; many undecorated brownware pottery sherds (Gale et al. 1985: 85)

Building 1:

Dimensions: 3.85 m. diameter, walls 50 cm. thick. Earth outside red, apparently burnt, with fragments of mud brick. Inside: walls seem to be lined with upright slabs; sandy soil, perhaps a tempering agent for maintaining a high temperature.

Specialised permanent production installation: pit underneath a horizontal slab contained the same sandy soil with slag; lined with stone and clay, probably a furnace (dimensions are similar to those recovered from furnace fragments on the hillside of slag) (Hadjianastasiou and MacGillivray 1988: 32).

Production debris: fragments of slag and copper inside the building and in the pit.

Comments:

“The lack of pottery and artifacts usually associated with settlements supports the hypothesis that the cluster of buildings was dedicated to smelting copper and that the metal workers dwelt elsewhere” (Hadjianastasiou and MacGillivray 1988: 32). The settlement contemporary with the copper smelting and mining (see *E13*) was probably on Geronimos hill, southeast of Skouries.

The size and analysis of copper prills suggests primitive EBA smelting (Gale et al 1985: 85). Estimated furnace temperature was c. 1250° (Stos-Gale et al. 1988: 25). “The amount of slag ... indicates exceptionally intense activity for such a remote location (fig. 3). The site was excavated only in a most preliminary way, but the surface survey shows that the smelting of metal was well organised and different activities were performed on different parts of the site” (Stos-Gale 1998: 719); smelting, for example, was on the windy, exposed part of the cliff, while manual metal extraction from slag was in a sheltered position. This site was “the earliest proven industrial metallurgical site in the Aegean”, and produced arsenical copper (Stos-Gale 1998: 719).

Analysis:

It is interesting to note that an analysis of the slag revealed that some did not originate from known sources on Kythnos, and tentative suggestions, yet to be confirmed, for possible sources include Siphnos, and rare ores at Orkos (Keos) and Kondouro (Seriphos). If slags from Kephala and Ayios Simeon did not originate from local sources but had a similar composition to slags from Skouries, all three slags were perhaps smelted from the same copper ores (Stos-Gale 1998: 723-4); the origin of the ores was probably not Orkos and Kondouro, unless Stos-Gale means that the slags at Kephala and Ayios Simeon did not correlate only to that source because, like the Skouries slags, the ores came from a number of sources from different islands.

The presence of furnaces, raw material, slag, and other production aids (sand, quartz) suggests specialised work and supports the classification A.

Kythnos hoard: see Naxos, E25

Makronisos

E15. Leondari: lower floor of House C IX

- Workshop type:** Lead
- Date:** EC
- Sources:** Lambert 1973: 9-10; Spitaels 1983: 171, 174 n.39.
- Finds:** *Production debris:* 2 small blocks of litharge associated with the lead weight between 2 E-W walls; in zone C, an appreciable quantity of slag.
Finished product or other?: weight in the form of a bobbin, 99.1% lead.
Other: 2 grey polished stone conical beads; fragment of green-blue stone bead; disc of perforated pottery in the same sector.
- Comments:** Locals call the place Provatsa, located just opposite Thorikos (Spitaels 1983: 174 n.39). “In 1981 several fragments of litharge were found stratified in an Early Bronze Age house at Makronisos ... this must be directly related to the Early Helladic mine discovered at Thorikos” (Spitaels 1983: 171).
- Analysis:** No metallurgy equipment was found, the only indicator of metalwork was an appreciable quantity of litharge. I = BF.

Melos

E16. Demenegaki (figs. 44, 45 and 46)

- Workshop type:** Obsidian quarrying and working.
- Date:** Unstratified. Meso+?

- Sources:** Renfrew 1972: 44; Torrence 1982: 193-221; 1984: 49-55; 1986: 166ff., 182, 204-5, fig. 35, 38, 41, 49.
- Finds:** *Raw material:* obsidian outcrops.
Production debris: c. 1 km.² littered with debris from quarrying and core manufacture. Very dense concentrations of debitage and eroded cobbles up to 1 m. thick in some places, adjacent to the largest outcrops. Smaller scatters on surrounding slopes and on the tops of all the hills in the area. Estimated surface debitage: 31,750,564 flakes; estimated macrocore production: c. 3 million, yearly production 1,028, 51 person-days per year (Torrence 1986: 204-5).
Tools: general purpose tools, produced and used expediently (Torrence 1986: 182). Some of the abundant larger, irregular unretouched obsidian flakes could have been used for digging (Renfrew 1972: 44, cited in Torrence 1984: 54), but very few digging tools were found (Torrence 1982: 205).
- Comments:** Working areas are indicated by well delimited regions on density maps. There are no structural remains or indications of temporary occupation (pottery, refuse etc). The small sample of crude quarrying tools made on the spot suggests largely unorganised, expedient, obsidian extraction with little energy and minimal investment of technological skill (Torrence 1984: 49ff; 1986: 181).
- Analysis:** Torrence uses the terms “very extensive obsidian quarry-workshop” site (1984: 49) and “Working areas” (1984: 51). Raw material and debitage from its processing, besides the tools, confirm open-air obsidian quarrying and working over a large area. One may hazard a guess as to the date, which probably ranges from the Mesolithic onwards.²⁸ Whether or not this can be called a ‘workshop’ site depends on the nature and scale of production at specific times, and

²⁸ This may be surmised because obsidian had been taken from Melos since the Mesolithic age and seafarers from all eras may well have wanted to limit weight by carrying out some preliminary work on the obsidian before setting sail.

how the products were distributed. No indications of control over access to Melian obsidian have been found, and if obsidian was partially processed by visitors on the spot, this area is D rather than A.

E17. Phylakopi: (J2 for copper waste and crucible)

Workshop type: Copper (and lead?)

Date: Unstratified, EC II (Renfrew 1972), MC? (Branigan 1974), MC (Davies 1935) or advanced MC (Dickinson pers. comm. 1999).

Sources: Bosanquet and Welch 1904: 190-1, fig. 161; Davies 1935: 262; Banks 1967: 226; Branigan 1974: 131, 202.

Finds: *Production debris:* lump of copper waste [no date given] (Bosanquet and Welch 1904: 190).²⁹

Tools: 2 undated bivalve moulds for double axes (Banks 1967: 226), simpler one of micaceous stone, for a double axe with 2 flattish depressions in the lip where a core was inserted to form the haft-hole, and another depression near one end as a duct for the metal. It had a cover that may have been lashed. The more complex mould, of schist, probably for an axe, had 4 holes for keying it to the other half; badly damaged by fire (Bosanquet and Welch 1904: 191); crucible “made of very coarse clay” with “pieces of copper ore adhering to the bottom” (Bosanquet and Welch 1904: 190) [no date given].³⁰

Other or finished products or raw material: 3 lead ingots (unstratified) (Branigan 1974: 198).

Analysis: No location is given for the finds or potential workshop. The date is likely to be MC. I = AF.

²⁹ Branigan (1974: 131) mentions the possibility of more waste.

³⁰ There was perhaps more than one crucible (Davies 1935: 262; Branigan 1974: 131).

E18. Phylakopi: Room B5, 3; Room B5, 18; areas 1 and 2 in C4 (figs. 46 and 47)

Workshop type: Obsidian

Date: EC (Torrence 1986: 149) or EC IIIB - MC I (Dickinson pers. comm.).

Sources: Smith 1897: 3, 8 (cited in Torrence 1986); Mackenzie 1898: 24; Bosanquet 1904a: 218-22; Mackenzie 1904: 244-5; Sampson 1985: 95; Torrence 1986: 147-150, 155, fig. 31; L. Platon 1988: 304-5.

Finds: Room B5 18:

Production debris: large deposit including cores; large quantity of obsidian chips.

Finished products or debris: large deposit including obsidian knives.

C4:

Finished products?: a “plentiful hoard of obsidian implements”.

Room B5: 3:

Raw material: “lumps of obsidian in the rough” beneath room 3 (Smith 1897: 3, cf. Torrence 1986: 149).

Production debris: bed of cores, used or refuse flakes, chips, at least 0.2 m. thick (Bosanquet 1904a: 218).

Square B5 as a whole:

Raw material: obsidian nodules.

Rejects: used or rejected blades and flakes, some with secondary working.

Production debris: rejected cores, thick concentration of debitage (Torrence 1986: 148). All stages of blade production are represented (Torrence 1986: 150). Estimate for total deposit = 7,775 kg. of which 7289.7 kg. = waste, 303,738 cores, c. 25 million blades and c. 300 years of work (Torrence 1986: 155).

Comments: General area of obsidian is 100-150 m.², open air. Further quantities of obsidian were found throughout western end of site below walls,

associated with Second City pottery. The precise location of the deposit is not recorded; Torrence concludes the concentrations were probably in the NE sector of B5 and areas 1 and 2 in C4 (Torrence 1986: 147-8).

The skill of the workers was not great and they were wasteful with obsidian. Few finished products were found, and only a beautiful but broken blade shows what their best work was like (Bosanquet 1904a: 220).

Analysis:

Workshop or dump?: Room 18 has been termed the “great obsidian workshop” (Mackenzie 1898: 24), and the quarter containing B5 has been termed a “factory” of obsidian implements (Smith 1897: 17), as has, more specifically, B5: 3 (Bosanquet 1904a: 218). Broodbank (1992: 64) calls it a formal discard zone, Mackenzie (1904: 245) a waste heap, and Torrence argues it is a dump away from the settlement, or perhaps the workers worked outdoors, as no structures or workshops are directly associated with the deposit (Torrence 1986: 148). Platon (1988: 306-7) contradicts himself, arguing that an area for discard is unlikely because “there is no need for the careful gathering of the whole waste material for discard in a particular area” and then suggesting that it was probably the waste area of a workshop of a large working group, not functioning at the time of destruction.

Because obsidian is an awkward material from which to judge A, D or M (dump), by virtue of the immense size of this deposit, this may represent A or AF. Platon’s arguments do not hold; there *is* need for the careful disposal of sharp obsidian debitage away from populated areas, so this area *could* be a dump. It is unlikely that this amount of waste could have built up within a workshop. It is, however, possible that this was an open area where knappers worked on the edges of the waste to save the effort of transporting waste elsewhere,

hence the gradual spreading of the area to an immense size. C or dump (M) (= AF).

E19. Sta Nychia (figs. 46, 48 and 49)

Workshop type: Obsidian quarrying and working

Date: Unstratified. Meso+?

Sources: Torrence 1982: 193-221; 1984: 49-55; 1986: 166ff., 182, 204-5, fig. 23, 24, 36, 37, 39, 40, 48.

Finds: *Raw material:* obsidian outcrops.

Production debris: c. 1 km.² littered with debris from quarrying and core manufacture. Very dense concentrations of debitage and eroded cobbles up to 1 m. thick in some places, adjacent to the largest outcrops. Smaller scatters on surrounding slopes and on the tops of all the hills in the area. Estimated surface debitage 50,398,661 flakes; estimated macrocore production: 4,895,870 cores, 1,632 per year; 82 person-days per year (Torrence 1986: 204-5).

Rejects: most rejected incomplected artifacts are large blade cores or macrocores.

Tools: probable quarrying tools are simple, general purpose implements, produced and used expediently (Torrence 1986: 182); rare, crudely made, largely irregularly formed, possible digging tools. Some of the larger, irregular unretouched obsidian flakes could have been used for digging (Renfrew 1972: 44, cited in Torrence 1984: 54), but very few digging tools were found (Torrence 1982: 205).

Comments: Working areas are indicated by well delimited regions on density maps. There are no structural remains or indications of temporary occupation (pottery, refuse etc). The small sample of crude quarrying

tools made on the spot suggests small amounts of energy, largely unorganised, were invested in the extraction of obsidian here.

Analysis: Torrence uses the terms “very extensive obsidian quarry-workshop” site (1984: 49) and “Working areas” (1984: 51). Raw material and debitage from its processing, besides the tools, confirm open-air obsidian quarrying and working over a large area. Whether or not this can be called a ‘workshop’ site depends on the nature and scale of production at specific times, and how the products were distributed. No indications of control over access to Melian obsidian have been found, and if obsidian was partially processed by visitors on the spot, this area is D rather than A.

Naxos

E20. Aila: Grave 23

Workshop type: Carpentry or leatherwork

Date: MC?

Sources: Papathanasopoulos 1961-1962: 129-30, pl. 62; Renfrew 1972: 344.

Finds: *Tools:* crescentic two-edged knife; 2 narrow chisels; saw (Renfrew 1972: 344).

Other: small lump of lead (Papathanasopoulos 1961-62: 129-30).

Analysis: Renfrew writes that these “must be viewed as the tool kit of a deceased carpenter or leather worker”. J.

E21. Apollona: Grave 38

Workshop type: Carpentry

Date: EC II (Hope Simpson and Dickinson 1979: 326)

Sources: Papathanasopoulos 1961-1962: 129-30, 144-7, pl. 77; Renfrew 1972: 147, 344; Hope Simpson and Dickinson 1979: 326.

Finds: Lower grave (Grave 38 B):

Tools: marble vase; palette and rubber; knife; unusually, a narrow chisel (Renfrew 1972: 344). The knife, or dagger, has silver rivets. The mortar had a deepening in the middle, probably from use.

Upper grave (Grave 38 A):

Tools: 3 flat axes, probably used for wood working.

Comments: “The grave was a double one, with upper and lower parts, a custom which in other cases has plausibly been interpreted as indicating successive internments in a family grave” (Renfrew 1972: 344).

Analysis: The grave hints at a family craft tradition; “One possible interpretation is that the two successive graves contained father and son, both carpenters” (Renfrew 1972: 344). Given the quantity of tools interred, this seems to be a double J.

E22. Avdheli: the house

Workshop type: Stone figurine

Date: EC II

Sources: Doumas 1977: 124; Hope Simpson and Dickinson 1979: 327; Oustinoff 1984: 39.

Finds: *Tools?:* piece of emery; obsidian blade; grinder; lump of red ochre.
Other: fragments of coarse pottery.

Analysis: Avdheli, which is in the heart of the emery-bearing mountains of Naxos, was perhaps settled to mine the nearby emery (Doumas, cited in Oustinoff 1984: 39). Although Oustinoff did not describe this as a workshop, she did mention it in the context of findspots of materials

used for figurine production. The items listed above could have been used as tools; C/E.

E23 Zas Cave

- Workshop type:** Hoard?
- Date:** FN
- Sources:** Zachos 1990: 30-2; Demoule and Perlès 1993: 402.
- Finds:** *Tools:* 2 flat copper axes; awls; spatulas; a gold strip (of a type common in Varna) (Demoule and Perlès 1993: 402). Zachos (1990: 30) states that the metal implements (other than gold strip) are bronze, and adds pins.
Other: pottery; animal bones; “a considerable number of obsidian tools”; marble bowl; 2 bone bird’s heads. (Zachos 1990: 30-2).
- Comments:** The cave was probably used for short visits (Zachos 1990: 32).
- Analysis:** The numbers of artefacts are not specified. Probably H.

E24. Naxos: no locations specified

- Workshop type:** Hoard?
- Date:** EC (- MC) (probably EC II - Dickinson pers. comm. 1999)
- Sources:** Branigan 1969: 5-6, 10.
- Finds:** The Naxos hoard:
Tools: 6 copper and bronze tools from Naxos (entered in the Athens National Museum as if a single hoard): 3 EBA flat axes; 3 narrow-bladed chisels. Perhaps part of the hoard: 2 axe-adzes and, more probably, 2 double axes (type DA III).

Other groups of tools: 2 awls in bone handles, displayed alongside the 3 chisels from the Naxos hoard, but not considered by Branigan to be part of the hoard; 2 flat axes which could be the remains of another hoard.

Comments: The find circumstances of the tools are not known.

Analysis: Strangely, Branigan (1974: 134), in a table of EBA and MBA hoards of carpenters' tools, lists Naxos as having only 2 flat axes and 1 chisel (Copenhagen National Museum).

The hoard must be classified as dubious because of its uncertain provenance: it is not known whether the tools were found together or not. H?

E25. Naxos: 'Kythnos hoard'

Workshop type: Hoard?

Date: EC II

Sources: Branigan 1969: 10; 1974: 134; Fitton 1989: 31-7.

Finds: *Tools:* 3 chisels, 3 flat axes, 2 shaft hole axes, 1 double axe, 1 axe-adze (Branigan 1969; 1974) *or* 3 flat axes, 3 chisels, 2 shaft-hole axes; perhaps also: 2 flat axes, 1 chisel, 1 shaft-hole axe (Fitton 1989).

Comments: The find circumstances are unknown (Branigan 1969: 11). The hoard was first reported as 10 objects from Kythnos. Later, it was added that numbers 1-8 (3 chisels, 3 flat axes, 2 shaft-hole axes) were found in a cave some distance from Naxos town; the others probably did not belong. Other pieces from Naxos, probably part of the hoard, are 2 flat axes, 1 chisel, 1 shaft-hole axe (Fitton 1989).

Analysis: Fitton's revised group has less variety than the old one, so it would be a less flexible group of tools for a carpenter, though it still

contains the essentials. It may have been a tradesman's hoard: it contains near-duplicate tools, some perhaps some new, some second-hand. It was probably found in the cave, having been hidden by the owner (Fitton 1989: 37). H?

Paros

E26. Avyssos

Workshop type: Bronze

Date: EC I-II

Sources: Tsountas 1898: 176, 192; Renfrew 1972: 515; Hope Simpson and Dickinson 1979: 319; Muhly 1985: 118; L. Platon 1988: 321.

Finds: *Production debris:* 5 pieces of copper slag (Tsountas 1898: 176).

Tools: moulds; clay crucibles.

Finished product?: bronze item (see below).

Analysis: Tsountas (1898: 192) makes the following inferences:

1. The bronze item may have been made on the spot. He gives no reason why this should be so. It was not stated to be found with the slags; no locations are given for the finds.
2. The fragments of waste seem to show that the islands knew how to smelt copper. Slag may be from melting, however, besides smelting.
3. The source of copper ore near Naoussa could have been used and was perhaps smelted there. This seems very unlikely (see *E27*).

The finds were scattered throughout the site so it was hard to define the precise location of the workshop (Platon 1988: 321). The slag could represent a nearby work locus or a dump, and indicates BF.

E27. Naoussa: to east of Naoussa

- Workshop type:** Copper mine
- Date:** BA?
- Sources:** Davies 1935: 264.
- Finds:** *Raw material:* “an overgrown pit whence malachite has been extracted.”
Other: obsidian knife nearby.
- Analysis:** Davies uses the unconvincing argument that the complete removal of the mineral is paralleled at Chrysokamino and suggests a BA date (see Chrysokamino, *F5*). The identification of a mine is as unlikely as its alleged BA date.

E28. Pyrgos

- Workshop type:** Metal
- Date:** EC I-II
- Sources:** Hope Simpson and Dickinson 1979: 320-1; Renfrew 1991: 108.
- Finds:** None specified.
- Analysis:** ‘Indications of metalwork’ is the only information volunteered by Renfrew. K.

Saliagos

E29. Saliagos (near Antiparos): outside main building, K4, N3, Q1, S4

- Workshop type:** Obsidian core preparation
- Date:** LN - FN

- Sources:** J.D. Evans and Renfrew 1968: 48, 54-6, 61; Perlès 1992b: 128.
- Finds:** *Production debris and finished products:* in S4: “high concentration of parallel-sided blades”; in squares such as K4, N3, Q1, S4: higher concentration of waste flakes and blades and well-worked obsidian; cores (J.D. Evans and Renfrew 1968: 56, 61).
- Comments:** Obsidian was imported in the form of large cores: some are the largest found outside Melos. The small size of the core remains indicate that it was not used wastefully (J.D. Evans and Renfrew 1968: 48). “[L]evel 7 of trench S4 at Saliagos has all the characteristics of a workshop for the preparation of blade cores, all of which, except for occasional fragments broken during work, were exported (data from the author’s observations)” (Perlès 1992b: 128).
- Analysis:** As J.D. Evans and Renfrew (1968: 48) point out, the large quantity of waste shows that obsidian was worked on the site. The density, however, of waste and well-worked artefacts “was so great over much of the island that it did not prove easy to recognize any specific localities which might have been used for the actual working of obsidian” (1968: 61). It is puzzling why Perlès specifies Level 7 S4 as a workshop because it contained 344 obsidian pieces including 3 parallel-sided blades, 2 cores, 22 worked pieces, whereas Phases 4 and 5 contained much more obsidian (20 and 27 parallel-sided blades, 7 cores, 28 and 24 worked pieces, 259 and 168 total, respectively) (J.D. Evans and Renfrew 1968: 12, Table 1). Perhaps Perlès focused on S4 because it has good stratigraphy. J.D. Evans and Renfrew do not focus particularly on S4 as an obsidian working area. K4, N3, Q1, S4 are likely to be working areas because they contain raw material, waste and finished products, giving a value of 9. It is difficult to tell the scale of the operation: C/D.

Seriphos

E30. Near Kephala (fig. 42)

Workshop type: Metal

Date: EC

Sources: Gale and Stos-Gale 1981: 188-9; Stos-Gale 1998: 719ff., figs. 1 and 9.³¹

Finds: *Production debris:* slag heap (much smaller than that on Kythnos).

Analysis: Although the slag heap has not been excavated or dated as at Kythnos, the appearance of the site and the chemical composition suggest an EBA date (Stos-Gale 1998: 720). Rare sources of copper ore exist at Kondouro³² (see Gale and Stos-Gale 1981: 188-9), but analysis shows that the slag at Kephala does not correlate with this (Stos-Gale 1998: 723). The slags here, at Ayios Simeon and at Skouries were probably formed during the smelting of copper ores from the same sources (Stos-Gale 1998: 724). BF.

³¹ Stos-Gale (1998: 720) also mentions slag (a smaller amount than at Kephala) below the church of Ayios Simeon on Keos; the date of this find is not specified, and sherds in the vicinity include prehistoric, Classical, Hellenistic and Roman (Caskey et al. 1988: 1741).

Siphnos

E31. *Ayios Sostis: northern slope near ridge of peninsula*³³ (fig. 50)

- Workshop type:** Silver and lead mining and smelting
- Date:** EC I-II
- Sources:** Gale 1979: 44; Wagner et al. 1980: 70-2, 77; Gale and Stos-Gale 1981: 217-21; Davis 1992: 728-9; Stos-Gale 1998: 723ff. Cf. Gropengiesser 1986: 1-39; 1987: 1-54 for further reading.
- Finds:**
- Mining:
- Mines:* 2 mines (Mines 1 and 2) for lead, galleries filled with loose rock and ore waste ('Versatz').
- Mining tools?:* several crushing stones or celts and hammers (Wagner et al. 1980: 70, 77) of granite similar to those at Kythnos, found with slag in EC lead-silver mines (Stos-Gale et al. 1988: 24). Although marks on the walls suggest tools of bone or antler were used, tool marks on the harder rock faces suggest metal chisels or picks (Gale and Stos-Gale 1981: 199).
- Smelting:
- Specialised permanent production installations?:* ancient smelting furnaces probably represented by the slag and ceramics (Wagner et al. 1980: 70).³⁴

³² Only Seriphos and Syros have evidence for early (but undated) lead-silver mining; Siphnos is dated to the EBA with certainty (Gale and Stos-Gale 1981: 195, cf. 189-190: the ores could in theory have easily been extracted in the Bronze Age). There is no indication of the earliest date for extraction here.

³³ There are galleries at Kapsalos with some marks possibly of bone or antler tools. Deposits of gold and silver exist in the Ayios Ioannis area, and numerous scattered obsidian flakes and an archaic potsherd on the surface "may indicate ancient working" (Gale and Stos-Gale 1981: 198, 200). Plati Yialos yields litharge, slags and abundant obsidian flakes (no mines). Obsidian flakes were virtually ubiquitous and their presence cannot be used to assert chronology. These areas have yet to be assigned a date for their use. They probably reflect ancient activity, if not necessarily prehistoric. Moreover, all EC metal artefacts except two fall within the Laurion or Siphnos isotope field (Gale and Stos-Gale 1981: 211), so are unlikely to contain ores from other sources.

Production debris: scattered slags and ceramic fragments occur frequently on the surface, concentrated on northern slope near ridge of peninsula; some fragments of litharge; many dumps with rock and ore flakes chipped off by hammer-and-sledge (Wagner et al. 1980: 70); regions with heavy lead-bearing slag and litharge on the peninsula to the NE of the new church.

Tools: crucibles and tuyères (Davis 1992: 728).

Other: coarse sherds; obsidian including an arrow head (Gale 1979: 44).

Stone tool production for mining?

Production debris?: obsidian flakes, probably the remains of prehistoric fabrication of stone implements used by miners (Wagner et al. 1980: 75).

Comments: Several lead and silver mines in other parts of the island may have been used in prehistoric times. The scarcity of slags raised the possibility that metal was smelted elsewhere (Davis 1992: 728-9). Evidence shows ore was sorted from gangue³⁵ often inside the mines (Gale and Stos-Gale 1981: 199).

Analysis: *Chronology*: the 6-sided stone hammers and triangular crushing stones or celts apparently originate from the first miners (Wagner et al. 1980: 77), and pick marks below the old church show that the iron reserves had been ignored by workers (Gale 1979: 43). Some FN and a considerable amount of EBA ceramics on the surface in the vicinity of the mines, most mixed with mining debris, and datable pieces from the deposit of Versatz inside Mine 2 (Davis 1992: 728) make the EC dating of mining secure.

³⁴ *N.B.* These are hypothesised and have *not* been architecturally identified.

³⁵ Gangue is defined as minerals of no economic value which are associated with metallic ores in primary and secondary deposits (Tottle 1984: 118).

The presence of furnaces is suggested by tuyères rather than actual installations, and slag. Although the slag is not conclusively dated, if there was EC mining here it is reasonable to assume EC smelting too, in order to reduce bulk and weight before the metal was exported. Mine; smelting: AF (date not certain but taken to be EC here).

Syros

E32. Chalandriani: south side of Chalandriani

Workshop type: Cinnabar mine

Date: EC II?

Sources: Davies 1935: 264.

Finds: *Mine:* “an old working 6 feet deep by 3 by 3 feet, following a thin vein of cinnabar”.³⁶

Analysis: Branigan writes that the same techniques for exploiting cinnabar could have been used to exploit a cupriferous ore. Davies acknowledges that the date of the mine is uncertain, and suggests it may have been contemporary with the settlement. This doubt suggests a classification of a possible mine.

³⁶ Cinnabar, or red mercuric oxide, can be used as a pigment, for example for paint or cloth-dyeing.

E33. *Kastri: Room 11*³⁷ (fig. 51)

Workshop type: Metal

Date: late EC II - EC IIIA

Sources: Tsountas 1899: 124-6; Bossert 1967: 60-3; Renfrew 1972: 176-7, 315; 1991: 108; Branigan 1974: 134, 201, 203.

Finds: *Specialised permanent production installation?*: hearth or fireplace with baseplate and 2 vertical stone sides (Bossert 1967: 60).

Production debris: charcoal and bronze slag³⁸ in connection with the fireplace.

Metallurgy tools: fragment of coarse clay crucible with the remains of casting copper or bronze on the inside, in ashes connected with the fireplace (Bossert 1967: 61-3).³⁹

Finished products or tools: hoard of metal objects: thick bronze instrument, 2 bronze awls, 9 bronze chisels, metal file, metal blank or chunk, piece of bronze saw (Bossert 1967: 61-3).⁴⁰ All these were on the floor in front of or in the niche in the wall just off the east end of the southwest wall, except for the saw found between two stones in the same wall as the niche (Bossert 1967: 65).

³⁷ Unlike the excavators, Tsountas and Bossert, who describe where the items were found, later authors often document finds from rooms 11, 20 and 5 incorrectly, confusing the finds or listing them together as if found at one spot. Fitton (1989a: 57) is an example, writing that *Kastri* revealed remains of furnaces and crucibles which were found along with moulds: the author knows of no such 'furnaces'; if Fitton was referring to the one hearth, in Room 11, this was not found with moulds. Branigan (1974: 79) writes "three moulds from *Chalandriani* were all found together with two crucibles" whereas only two moulds were found, and he lists only two in his catalogue.

³⁸ The slag is arsenical copper from remelting, rather than smelting (Gale and Stos-Gale 1981: 193).

³⁹ R. Barber (1987: 112) mentions several crucibles from room 11, one with traces of lead. He has surely misunderstood Bossert, who describes only one crucible with *bronze* or *copper* traces from Room 11, and crucibles with traces of lead from Rooms 5 and 20. R. Barber also mistakenly assigns 2 open moulds, clay and stone, for casting axes and chisels, to Room 11. He must be referring to those from Room 20.

⁴⁰ Alternative opinions of the hoard's contents are: 2 pins (and a bone handle for one), 2 awls with quadrangular section, 8 narrow chisels, and the blade of a saw (Renfrew 1972: 315), or 9 chisels, 2 awls, a saw and a spool (Branigan 1974: 134). Bossert's original report is maintained here.

Other tools: 6 obsidian blades, one with metal adhering; 5 stone rubbers; rubber, apparently metal (Renfrew 1972: 315), on floor in front of niche or in niche in wall just off the east end of the southwest wall (Bossert 1967: 61-3).

Other: burnt sherds and piece of stone with the crucible, ashes and fireplace.

Comments:

Dimensions: c. 2 or 3 m. in diameter.

Analysis:

Bossert (1967: 61ff.) suggests this was the workshop of a metalworker: most metal objects seem to have been freshly made except the files and blades, which have signs of use. The niche was a store place for the craftsman; the saw was probably part of the same collection. Renfrew also states that it is beyond doubt that “copper was smelted in this room - apparently without a specialised kiln, although it is conceivable that a kiln, no longer preserved, may originally have existed” (Renfrew 1972: 315).

Renfrew (1972: 315) writes that this was the tool kit of a craft specialist, perhaps a carpenter or lapidary: this tool-kit is as close as we come to a Cycladic sculptor (Renfrew 1991: 108). In stating this, Renfrew does not take into account the newness of some of the tools, which suggests they were products of a smithy hereabouts. The more worn tools could have been used for other crafts, in which case this room was probably a store-room for the tools rather than the workplace, given the lack of indications of stone-work: no debris, raw material, or finished products of stone are mentioned. Woodwork, of course, would usually leave no traces other than the tools, and cannot be entirely ruled out. There are other reasons that used tools could be present in a room intended purely for metalworking; perhaps the metalworker used them in metalworking, or was going to melt and recast them.

This room was certainly associated with metalworking; associations with other crafts are unproven by any evidence. One wonders whether the necessary temperatures for melting bronze would really have been reached in such a simple hearth, or whether a furnace nearby has not been detected or was destroyed, hence B (value = 9, or 21 if the hearth was for melting).

E34. Kastri: Room 20⁴¹ (= structure iota - Tsountas 1899) (figs. 51 and 52)

Workshop type: Metal

Date: late EC II - EC IIIA

Sources: Tsountas 1899: 124-6; Bossert 1967: 53-76; Renfrew 1972: 315, fig. 16.3; Branigan 1974: 79, 201, 203; Stos-Gale et al. 1984: 23-43.

Finds: *Production debris:* fragment of copper waste nearby in Tower B.

Tools: 2 open moulds near room 20: schist with matrices on both sides for 2 flat axes and 2 chisels (Tsountas 1899: fig. 35, 35a), one clay with matrices for flat axe, chisel and a shorter point (Tsountas 1899: 36); 2 clay crucibles (one (Tsountas 1899: fig. 37) has thick walls and is covered inside with copper waste (see analysis below); the other crucible fragments are similarly coated); crucibles covered with lead.

Other: many pithos fragments near Room 20.

Comments: *Dimensions:* c. 1.5 m. by 1.5 m. Room 20 was a one-roomed isolated hut (Bossert 1967: 59).

Analysis: *Lead-working:* "Tsountas at Chalandriani ... found evidence for the actual working of lead on the site, with rivets, ingots and the use of a flat sheet of the metal, apparently to repair a broken pot"

⁴¹ Behind Room 5 (room eta - Tsountas 1899), which is near to Room 20, was another crucible (Tsountas 1899: fig. 37a) with lead inside (Bossert 1967: 60-61), see next footnote.

(Renfrew 1967: 4). Lumps of lead (Renfrew 1972: 176-7) and a lead ingot (Branigan 1974: 198) were found at Kastri (findspots unspecified). Evidently, copper *and* lead were worked at Kastri. The evidence supports melting bronze and lead, rather than extractive metallurgy (Stos-Gale et al. 1984: 31).

Lead sources on Syros: Rozos, in the south, holds a massive deposit of galena. A grotto there contains an old mining gallery 25 m. long, with abundant gangue on floor. At the end of the gallery were sherds, some of which strongly resembled others from a secure EH II context at Makronisos. "It is too early to be sure but this gallery seems to represent old mining and possibly Bronze Age mining" (Gale and Stos-Gale 1981: 194). Other galena deposits at Komito, in the southwest, with open cast pit workings, a small older gallery, EBA sherds and obsidian in the vicinity, might have been used in the EBA, but this is not proved by certain evidence. There is definite evidence for BA lead-mining only on Siphnos; Seriphos and Syros have the only other possible early, but undated, mines (Gale and Stos-Gale 1981: 194-5).⁴²

Conclusions: The value is 8; the presence of both a crucible and moulds, and slag nearby, suggests that this hut was either used for working the metal after casting or for storing the equipment, and suggests metalworking in the vicinity: C or storage (M) = AF. Whether the finds in rooms 20 and 11 both indicate a single furnace somewhere nearby, or whether they represent two separate workshops, remains to be seen.

⁴² Branigan (1968b) mentions that sources of lead ore are widely distributed in the Cyclades and lists further sources in Crete. However, convincing evidence, not yet apparent, for their use in prehistory should be given before further discussions may attach importance to them and draw conclusions.

F. CRETE

F1. Ayia Kyriaki (S. Central Crete): the tomb, just south of Ayia Kyriaki

Workshop type: Metal

Date: EM

Sources: Branigan 1974: 203; 1995: 37; Blackman and Branigan 1982: 27, 34, 36, fig.15.

Finds: *Tools:* unstratified, unused crucible (No. 175) made in a slightly coarser and thicker but otherwise similar ware to cooking pot ware (Blackman and Branigan 1982: 27, 34, 36).

Analysis: Blackman and Branigan (1982: 34) describe this find as a “crucible (?)”; elsewhere Branigan seems more certain of its identity. If the crucible was put in the grave “to assert the identity of the bronzesmith” who had used it in life (Branigan 1995: 37), this is J.

F2. Ayia Photia (E. Crete)⁴³: cemetery

Workshop type: Metal

Date: EM I - IIA

Sources: Davaras 1971: 397; Branigan 1988a: 239; Day, Wilson and Kiriati 1998: 133-49.

Finds: *Tools:* crucibles, similar to examples from Thermi and Chalandriani (Branigan 1988a: 239).

Finished products?: bronze daggers, up to 7% arsenic, possibly Cycladic; spearhead; knives; fish-hooks; adzes or chisels; bracelets; 2 lead zoomorphic pendants (Davaras 1971: 397).

⁴³ cf. Tsipopoulou 1989 for further information about Ayia Photia.

Analysis: The style of the moulds, tomb architecture, lithics and ceramics show strong links to the Cyclades (Day et al. 1998: 136-7), which might indicate Minoan imitations, a Cycladic colony, or other ties: the Cycladic-style pottery was probably imported (Day et al. 1998: 138). It is possible that the manufacture of obsidian blades was part of the funerary ceremony, underlining the “power of technological knowledge as a prestige activity” (Day et al. 1998: 145, citing Carter pers. comm.). If some goods found at Ayia Photia were purely funerary, symbolic rather than utilitarian, these crucibles may not indicate the local production of metal goods as Branigan (1988a: 239) suggests, but could be Cycladic imports symbolising the prestige of metallurgical knowledge. J?

F3. Ayia Photia: Kouphota (East Crete) (fig. 53)

Workshop type: Metal

Date: MM IA/B

Sources: Tsipopoulou 1999.

Finds: *Ground stone tools:* 159 tools, including hammers, whetstones, polishers, querns.
Raw material or production debris?: a few scraps of metal.

Comments: The finds were associated with a structure of incomplete plan with stone foundations.

Analysis: Dierckx (reported in Tsipopoulou 1999) argues that the number of stone tools was too great for domestic needs and may have been associated with metalworking. Until further details are provided, this is classed as (CF) K or stone tool storage prior to distribution (M).

F4. Ayia Photia: Kouphota (East Crete): large rectangular building (fig. 53)

Workshop type: Obsidian

Date: MM IA/B

Sources: *AR* 35 (1988-1989) 102; Tsipopoulou 1988: 31-47; Tsipopoulou 1999.

Finds: *Finished products and production debris?*: 135 pieces of obsidian, mainly small blades, also cores and flakes.

Other: great number (77) and variety of stone tools: 16 pieces of pumice; rubbers; mortars or querns; axes; some broken tools of unclear function; copper, lead and arsenic axe or chisel; various implements of clay; 1 loom weight.

Elsewhere within the area surrounded by wall were 510 implements and 317 obsidian pieces.

Comments: The building was 18 m. by 27 m.

Analysis: Doumas' opinion, that the building consumed rather than produced blades, is contradicted by Tsipopoulou who writes that the preparation of obsidian blades was the only certainly identifiable function, apart from food preparation, in specific areas (Tsipopoulou 1988: 46-7). 60% of the 659 pieces of obsidian were cores and flakes: a very high proportion (Tsipopoulou 1999), which suggests that this was D.

F5. Chrysokamino (East Crete): area XA, on a headland 500 m. from the habitation site (Betancourt et al. 1997: 374)

Workshop type: Smelting; mining?

Date: EM III

Sources: Mosso 1910: 287-92; Forbes 1950: 364; Hutchinson 1962: 40, 47; Branigan 1968a: 50-1; Nakou 1995: 17; Betancourt, cited in *AR* 43 (1996-1997) 113-14; Betancourt, cited in *AR* 44 (1997-1998) 117; Betancourt et al. 1997: 374; Stos-Gale 1998: 720-7, figs. 10-12.

Finds: 1. Views of early authors and Branigan:⁴⁴

Working area:

Specialised permanent production installation: postulated presence of furnace fragments (Mosso 1910: 291-2).

Raw material: piece of metal, apparently native; Mosso (1910: 287) refers to a cave which he calls a prehistoric copper mine, and ‘mines’ in the plural, which allegedly ‘proved’ to have been worked from the Early Minoan age but elsewhere (1910: 291-2) he seems less sure: “we may assume the existence of a copper mine” (Mosso 1910: 287, 289, 291-2).

Production debris: two pieces of black, spongy scoriae and cinders (Mosso 1910: 289).

Tools?: sherds, probably smelting crucibles (Mosso 1910: 289); Branigan terms the sherds domestic coarse ware (Branigan 1968: 50).

2. View of Betancourt et al.:

Area XA: Hut - “a metallurgy workshop engaged in the smelting of copper” (Betancourt, cited in *AR* 43 (1996-1997) 113):

Specialised permanent production installations: small fragments of furnaces which were probably small cylinders open at the top, only used once and then broken to remove the copper from the slag; pieces of pot bellows used for the draft; a hearth.

Production debris: large quantities of slag (Betancourt) *or* small quantities of primitive copper slag (Stos-Gale 1998: 720).

⁴⁴ These views are not accepted here but are included because they are commonly cited. Betancourt and his co-authors’ views are the most reliable accounts, since they are responsible for the latest excavations and the most recent reports.

Tools: stone tools.

Other: EM III sherds; animal bones (*AR* 43 (1996-1997) 113-4; Betancourt et al. 1997: 374).

Comments:

1. *Working area:* c. 13 m. by 40 m. The deposit of slag, ashes, cinders and crucible fragments is c. 80 cm. deep at the thickest (Branigan 1968: 50). The remains of smelting were 6 m. from the sea, and in the cave (52 m. long) was crockery: EM II cup, MM III small pot, pieces of crucibles with copper ore residue (Mosso 1910: 288-91).

2. *Hut:* 2.6 m. by 3.5 m.; small, apsidal, of perishable materials, with three EM III soil floors (Betancourt, cited in *AR* 43 (1996-1997) 11).

Analysis:

The origin of ore: samples of rock from the cave did not contain copper ore; this would suggest that the cave was therefore not a mine. Mosso (1910: 288-92) argued unconvincingly that this was because it had all been worked out. No trace of copper ore was found in the vicinity, and the ore was probably brought in by sea (*AR* 43 (1996-1997) 114). Lead isotope analysis points to Laurion and the Cyclades as sources, though further confirmation is needed (Stos-Gale 1998: 724-5).

Smelting or melting?: Although Tylecote (1976: 19, table 19 cited in Nakou 1995: 24 n.5) and Branigan (1968a: 50-1), using old sources of information, claim the slag was from remelting, other more recent reports argue for smelting, which is more likely (Betancourt, cited in *AR* 43 (1996-1997); 1997; Stos-Gale 1998).

Date?: Branigan (1968a: 50-1) rightly suggests that Mosso's ideas need "a thorough re-appraisal". He argues from the quantity of metallurgical debris that the site was used for a short period of time, and concludes that itinerants worked bronze here in LM II-III. Hutchinson (1962: 40) and Forbes (1950: 364) suggest an MM date. Betancourt (*AR* 43 (1996-1997) 113-4; Betancourt et al. 1997: 374)

mentions EM III sherds. Stos-Gale (1998: 721) reports that the coarse sherds, thought to be from furnaces, have been dated to c. 2710-2420 B.C. and states that Chrysokamino “may well have been a small Early Bronze Age copper smelting operation”.

Conclusion: although there is controversy surrounding the date, the most recent reports are the most reliable, and with a value of at least 16, this suggests A.

F6. Gavdos (W.Crete)

- Workshop type:** Copper mine and metal
- Date:** Unspecified
- Sources:** Mosso 1910: 296-7; Davies 1929: 99; Xanthoudides 1971: 27; *AR* 44 (1997-1998) 125.
- Finds:** *Raw material:* vast deposit of copper ore (reported by Mosso 1910: 296-7).
Production debris: slag (Davies 1929: 99).
- Analysis:** The island was inhabited from LN - EM I onwards (*AR* 44 (1997-1998) 125). Although Xanthoudides (1971: 27) writes “there is a copper mine that is being worked to-day”, and Mosso (1910: 297) speculates that when the Chrysokamino mines were exhausted, ore was probably brought from here, this is not supported by any evidence of prehistoric exploitation. This cannot be classified because the date is uncertain.

F7. Gournia (East Crete)

- Workshop type:** Copper
- Date:** EM-MM?
- Sources:** Soles 1979: 150; Cadogan 1992: 104-11.
- Finds:** *Production waste:* copper slag (Soles 1979: 150).
- Analysis:** Soles writes that copper slag on the site and the later importance of the Neopalatial town as a metal working centre suggest that there were important sources of copper in the adjacent area, perhaps in hills to the south (Soles 1979: 150). He not only assumes a local source without a geological basis but also does not make it clear whether this slag belonged to the early or Neopalatial town, nor does he express the findspot of the slag. If the slag is pre-Neopalatial, this is I = AF, but the date of this is questionable.

F8. Region of Ierapetra (SE Crete)

- Workshop type:** Hoard?
- Date:** No later than MM I - II
- Sources:** Mosso 1910: 310; Branigan 1969: 5.
- Finds:** *Tools:* 2 pure copper single axes (like some from MM I - II ossuaries at Palaikastro) (Branigan 1969: 5).
- Analysis:** Possible hoard of uncertain provenance; probably from a single cemetery rather than a hoard (Branigan 1969: 5). Mosso, however, (cited in Branigan) mentions a pure copper axe from Ierapetra and another in the 'Cave of Chirocumadia' at Ierapetra (Mosso 1910: 310). Two artefacts would be too few to constitute a hoard, even if the axes had been found together. The controversy over their findspot leaves the possibility that they could have been grave goods

in a craftsman's grave (J). The category of these tools must remain open to debate. H? or J?

F9. Khamaizi (East Crete): Area 1 (fig. 54)

- Workshop type:** Hoard
- Date:** MM IA (Gesell 1985: 14).
- Sources:** Davaras 1972: 287; Branigan 1969: 1-12; 1974: 22, 25, 134, 162, 164, 165, 168, 169; Gesell 1985: 14-15, 83; Warren 1989: 72.
- Finds:** *Bronze tools:* 2 double axes; 1 axe-adze; 1 chisel (Branigan 1974: 134; Warren 1989: 72).⁴⁵
- Comments:** Branigan states that the hoard must be associated with ritual practice as it was found on the site of a peak sanctuary (Branigan 1969: 11), yet later he lists it amongst hoards of carpenter's tools (1974: 134). He is incorrect for three reasons: the site was believed by the excavators to be a farmhouse rather than a sanctuary, and this view is now widely accepted⁴⁶; the findspot was not the oval house (as Branigan (1969: 2) writes) but Area 1 outside it (Gesell 1985: 83)⁴⁷; and the tools "are all of practical size, so the double axes are not likely to have been cult objects" (Gesell 1985: 83). Warren suggested that the hoard belonged to a carpenter (Warren 1989: 72); this

⁴⁵ Also found at Khamaizi but probably not part of the hoard: an EM II - MM I bronze saw (unpublished) and an MM I spearhead (Branigan 1974: 162, 168); these dates are uncertain because they are assigned on the basis of typology (Dickinson pers. comm. 1999).

⁴⁶ e.g. Davaras 1972: 284-86; Gesell 1985: 14-15; Niemeier 1997: 17. The number and variety of figurines are large for a house but small for a peak sanctuary; finds of domestic pottery and loomweights suggest that it was a house with a domestic cult deposit (Gesell 1985: 14-15).

⁴⁷ Warren (1989: 72) alleges that this area was earlier than the oval house. Gesell's plan of Chamaizi (1985: 83) suggests this too, but she does not enter into any detail about this or the date of Areas 1-3 outside the Oval House. The tools are of types which had existed since the EBA. All the finds were scattered, so the tools may have fallen from an upper storey of the house. Gesell's MM IA date, albeit

cannot be proved or disproved, so the question of the hoard's use must remain open.

Analysis: The associations of the hoard are disputed but its identity as a hoard seems safe. H.

F10. Khania (West Crete): the Plateia, Ayia Aikaterini: House I, Room E (fig. 55)

Workshop type: Obsidian

Date: EM II

Sources: Tzedakis and Hallager 1983: 7; L. Platon 1988: 304.

Finds: 60 pieces of obsidian, including:

Production debris: some obsidian cores.

Production debris or finished products?: many obsidian flakes and some complete blades.

Tools: 3 percussion stones, one with clear striking marks.

Other: relatively thick layer of ash over most of the room; small shallow hearth or oven; two small pieces of bronze (not very common in western Crete this early) (Tzedakis and Hallager 1983: 7).

Comments: Map scale suggests Room E is 2 m. by 2 m. The room was divided into two parts by a wall. "On the W side...were found clear traces of workshop activities" (Tzedakis and Hallager 1983: 7).

Analysis: Tzedakis and Hallager (1983: 7) write "we think that it could be a possible obsidian workshop" (C) whereas Platon lists it as a workshop (A). The value is possibly 9 if the tools are correctly identified. It is unclear whether the obsidian flakes are believed by Tzedakis and Hallager to be debris, and their precise quantity is not

perhaps applicable only to the Oval House, is maintained here until further information becomes available.

given. The small number of cores, tools and flakes suggest D. The presence of possible tools for obsidian work makes a classification of M (dump) less appealing.

F11. Khania (West Crete): the Kastello (Plateia Ayias Aiketerinis), Trench 1 below 2 m. depth.

Workshop type: Pottery

Date: MM I-II

Sources: Tzedakis 1966: 425-7; *AR* 15 (1968-1969) 37.

Finds: *Specialised permanent production installations?:* 4 circular pits full of clay at bedrock level, levigation tanks perhaps?

Raw material: fragments of clay.

Rejects?: hundreds of poor quality uncoloured and undecorated cup fragments, probably rejects.

Analysis: Tzedakis writes that since some of the sherds are of poor workmanship and were perhaps disposed of immediately after firing because they were undecorated and were found in great quantity with fragments of clay, and there are the pits full of clay, this is probably close to a pottery workshop at the height of the Protopalatial Period. The finds suggest to the excavators (cited in *AR* 15 (1968-1969) 37) that “this was the site of a potter’s factory”. The value for this area would be 16, indicating A, if the pottery fragments were rejects, and if the circular pits were for clay levigation or storage prior to pottery production. The uncertain identification of these indicators, however, means that the diagnosis must be reduced to B instead.

F12. Knossos (North Central Crete): Stratum IX, area AC (J.D. Evans 1964: 146)

- Workshop type:** Pigment?
- Date:** EN
- Sources:** J.D. Evans 1964: 132-240; Renfrew 1972: 311.
- Finds:** *Raw material:* small lump of malachite and two small lumps of azurite (J.D. Evans 1964: 146). Renfrew mentions a piece of copper ore (probably one of the above) possibly used as pigment (Renfrew 1972: 311).
- Analysis:** Value is 4. It is a very early context (EN) for metal use, unless the stratigraphy is confused. Potentially this find could have been used for metal extraction, which would be most unlikely, for pigments, as decorative 'talking points' or for some other use. This is I, indicating an unlikely EF.

F13. Knossos (North Central Crete): Stratum III, Ext BD.7 and F (under later central court) (fig. 56)

- Workshop type:** Weaving
- Date:** MN-LN
- Sources:** J.D. Evans 1964: 180-2, 184-8, 190, 192, 233-4; *AR* 16 (1969-1970) 27-8; E. Barber 1991: 100, 387.
- Finds:** Stratum I (FN)⁴⁸:
Tools: parts of 2 terracotta shuttles (in C.3 and D.5); shattered group of loom weights (in F); parts of 3 or 4 unstratified terracotta shuttles (in A-D and AC); 1 decorated and 35 undecorated clay spindle whorls (locations not specified) (J.D. Evans 1964: 190, 192).

⁴⁸ Strata I and II are included for interest.

Stratum II (MN-LN):

Tools: parts of 2 shuttles, clay and terracotta (in D.9 and AC.2); 1 terracotta loom weight (in D.8); 102 spindle whorls (1 of stone, 3 decorated, 1 pottery disc, 97 of clay) (locations unspecified) (J.D. Evans 1964: 184-8).

Stratum III (MN-LN):

Tools: 7 box weights 200-300 g. (in Ext. BD.7); 13 box weights 350-635 g. (in F), besides the usual miscellany of weights scattered around the site,⁴⁹ decorated terracotta shuttle (in B.10); 33 spindle whorls (2 of stone, 25 of clay, 6 of pottery discs) (in B.10) (J.D. Evans 1964: 180-2).

Analysis:

Stratum I: possible loom or storage of weights in F: E or storage (M) (= DF).

Stratum II: no concentrations of tools emerge, perhaps because the locations are not specified.

Stratum III: E. Barber lists the two groups of Stratum III loom weights in Ext. BD.7 and F amongst possible representations of looms or stored sets for looms. This is perhaps the same location as that described in AR 16 (1969-1970) 27-8: the compartment of an MN house (of dimensions 11 m. NS and EW) under the central court, containing loom weights and shuttles which “seems to have been used for weaving, or at least for storing weaving equipment” (AR 16 (1969-1970) 28). E or storage (M) (= DF).

⁴⁹ E. Barber (1991: 387) makes this comment, but J.D. Evans 1964 (to whom she refers) notes only 3 other possible loomweights from Stratum III.

F14. Knossos (North Central Crete): South side of the Royal Road, trench F (in a house - Platon 1988: 303)

Workshop type: Obsidian

Date: EM IIA (Torrence 1986; Broodbank 1992).

Sources: Warren 1972b: 392-8; Torrence 1979: 77-8; 1986: *passim*; L. Platon 1988: 303-4; Broodbank 1992: 64.

Finds: 5.4 kg. of obsidian (Torrence 1986: 153).

Production debris: a “dense concentration of hundreds of tiny chips and flakes of obsidian” (Warren 1972b: 393); small flakes from preparation or rejuvenation of striking platform; fragment of a core (Torrence 1979: 78). 540 g. of waste; 23 cores had been worked (Torrence 1986: 155).

Finished products: irregular secondary blades, tertiary blades, crested prismatic blades, many parallel-sided blades (Torrence 1979: 78); 1909 blades (Torrence 1986: 155).

Non-specialised permanent installation: possible bench (white mudbricks on stone foundation); small hollow used as hearth (Warren 1972b: 393).

Other: sherds, including sauceboat fragments (Warren 1972b: 393).

Comments: *Dimensions:* NS 2.54 - 1.32 m., EW 4.4+ m. (Warren 1972b: 393).

Type of work: the cores were already partially prepared, and further preparation was done here. Only one fragment of a core was found; cores were worked till exhausted or removed for further use (Torrence 1979: 78; 1986: 152). Torrence (1986: 150ff.) states that the pattern of waste in the middle of the room and most of the blades around the sides corresponds with Mallia; Warren thought the knapper put finished artefacts along the wall, leaving the waste where it fell; Evely (1979: 217) believed the deposit was merely a pile of debris pushed into a corner prior to final sifting and disposal.

Workshop or working area?: Warren wrote that this “can only be the remains of a workshop”, believing that this was an unusually large concentration of obsidian (Warren 1972b: 393). Broodbank (1992: 64) refers to it as an activity area *and* a workshop. Torrence (1986: 152ff.) strongly argues that the quantity of obsidian points to a “relatively low intensity of use” and “is too small to be considered the by-products of a full-time knapper.” Part-time specialisation is possible, and while the blades are not more standardised here than elsewhere in the site, they are made more economically. The waste reflects 57.5 estimated person-hours, probably from a single knapping event or deposition after the room was abandoned. Torrence concedes that the room “may have been systematically cleaned of its waste, but until a large quantity of waste is recovered from a single special purpose deposit, suggestions of anything more than very casual production of blades cannot be sustained.”

Analysis:

The calculation of 57.5 person-hours shows that even if this room had been kept exclusively for obsidian preparation, used just for an hour every day, the room would only have been a workshop for less than two months. The evidence is insufficient to confirm Platon’s (1988: 303) and Warren’s (1972b: 393) beliefs of a workshop. The present remains, however, could be giving a misleading picture if waste was periodically cleared away. The separation of the waste and blades into different zones in the room argue against this being a dump: if obsidian were just dumped here, why should the waste and blades be kept separate? One hesitates to assert a classification of D, however, because such concentrations of obsidian, although smaller than Torrence would wish for in order to be called a workshop, are rare, and no other larger deposits are found at Knossos or the surrounding area; the only other similar deposit is at Mallia. In comparison with the usual finds of obsidian waste, which are much

smaller than this and not associated with architectural features, this find appears special. Therefore the classification is C/D.

F15. Knossos (North Central Crete): north side of Royal Road, west of the Arsenal

Workshop type: Stone

Date: MM

Sources: Warren 1967: 195-201; 1969: 157-8; L. Platon 1988: 266-7.

Finds: *Production debris:* over 52 bore cores, with fine horizontal rings made by tubular drills; 4 had traces of abrasive powder (emery); 48 were of serpentine, 2 of gabbro, 1 of breccia and 1 of banded tufa (Platon 1988: 266-7). Waste pieces in a variety of stones, mostly of steatite (Warren 1967: 199).

Analysis: The finds were suggestive to Warren of a “stoneworkers’ quarters” but an actual workshop was “not defined architecturally” (Warren 1967: 199). Although it seems that Warren would call this AF, the only evidence for a workshop is production waste, which gives a value of just 4. This, taken with the fact that there was no architectural context for the finds, suggests that although there was a stone vase-maker’s workshop somewhere in Knossos (AF), this actual location is C or little more than a dump (M).

F16. Knossos (North Central Crete): in the South of the site, Trench W and Trench P

Workshop type: Metal

Date: MM IB

Sources: Branigan 1974: 131, 201; Warren, cited in *AR* 28 (1981-1982) 53.

Finds: *Production debris:* slags (Branigan 1974: 131). MM IB slag (unpublished) (Branigan 1974: 201). No findspots are specified for these.

Tools: fragments of crucibles in Trench W. Similar MM fragments in Trench P (AR 28 (1981-1982) 53).

Analysis: From the finds of crucible fragments in Trench P, Warren concludes that “it is probable that there were MM metal-working areas here” (B). It would be helpful to know the related architectural context for the workshop and to know where the slags were found. The finds suggest at least one metal workshop somewhere. I = AF.

F17. Knossos (North Central Crete): Old Palace, beneath the chamber containing the miniature frescoes (fig. 57)

Workshop type: Stone

Date: MM II A (Warren 1969: 136).

Sources: A. Evans 1921: 87, n.l.; Warren 1969: 136; Branigan 1987: 248; illustrations in Mosso 1910: 285, fig. 180 (Italian edition), 1910: 363, fig. 198 (English translation).

Finds: *Raw material:* unworked (A. Evans 1921: 97) block of Yiali obsidian, c. 42 cm. high (Warren 1969: 136; Branigan 1987: 248), or of liparite from the Aeolian islands (A. Evans 1921: 97).

Production debris: “one waste piece [of Yiali obsidian] from an MM IIA context and two from MM III contexts” (Warren 1969: 136); A. Evans identifies these as liparite (1921: 23).

Analysis: According to Branigan (1987: 248) this evidence “probably points to the existence of a lapidaries [*sic*] workshop in the palace in MM II” (B). A value of 8 is reached by the presence of raw material and waste, if indeed that is what they were. C (= AF).

F18. Knossos (North Central Crete): The 'Loom Weight Basement', upper storey (fig. 58)

Workshop type: Weaving

Date: MM II

Sources: A. Evans 1901-2: 24; 1921: 248-70; Branigan 1987: 248; L. Platon 1988: 363-4; McGillivray 1998: 41.

Finds: *Tools:* 400+ clay loom weights, pear-shaped in outline and flatter than the oval LM type, found in a heap.

Other: faience tablets; miniature pale blue faience vase with a thimble-like receptacle of gold plate; miniature painted clay "votive" vessels; small open votive clay bowl overlaid with fern-like sprays of thin gold plate and wire, containing a carbonised substance; small terracotta shrine; remains of painted plaster dadoes (A. Evans 1921: 249-53).

Comments: *Dimensions:* c. 5.8 m. by 4.3 m. [suggested by scale on map]. The basements consisted of a main chamber, a smaller compartment to the north, and 3 small spaces on the west (A. Evans 1921: 250). There was probably a sanctuary in one or more of the upper chambers (A. Evans 1921: 249).

Analysis: *Chronology:* while Branigan (1987: 248) gives an MM IB-II date, E. Barber (1991: 388) assigns an "MM III?" date. More recently, McGillivray (1998: 41) has confirmed that although there was an earlier floor (MM IIA) below this room, the loom weights were MM IIB, and could even have been deposited in the next phase (MM III). *Workshop or storage area?:* A. Evans' idea that the apartments belonged to women because they contained many loom weights (A. Evans 1921: 253) is questionable. Branigan is correct in assuming that the loom weights "surely point to weaving activities within the palace" (Branigan 1987: 248) (AF or DF). L. Platon (1988: 363-4),

however, labels the basements as a textile workshop (A). A. Evans does not make it clear which floor the loom weights came from, but seems to imply the upper storey, while Platon implies the basements. If the latter was the case, it would be more reasonable to think of looms being stored there: the lack of good light would have made weaving difficult. It is possible that looms could have been set up on the upper floors, where a combined use as a sanctuary as well as workplace would be interesting.

One must also take into account the number of loom weights; E. Barber (1991: 93ff.) provides estimates of twenty-thirty weights per loom in Scandinavia, twenty-thirty weights from Neolithic looms in Hungary, and six-thirty amongst finds of looms set up when destroyed. If the average is twenty loom weights per loom, this suggests c. twenty looms from this area at Knossos. There was not enough room for this number of looms to be set up here. Ethnographic and archaeological evidence suggests that when looms were out of use they were dismantled and stored away (E. Barber 1991: 101-2). As these weights were found in a heap, they were probably in storage at the time of destruction. This location is M (storage), = CF/DF.

F19. Kommos (South Central Crete): southeast corner of central court of AA

Workshop type: Purple dye production

Date: MM IB/II

Sources: Ruscillo 1998: 392.

Finds: *Production debris:* thousands of fragmentary *murex* shells found in concentrations.

Analysis: Over 20 kg. of marine and land molluscs were recovered from the excavations from 1991-1996. The quantities of *murex* suggest to Ruscillo “an active dye industry at Kommos”; this is certainly a possibility. A location for the supposed dye-works has not yet been found. The debris may have been found out of context, perhaps having been used as packing for the court surface (Ruscillo 1998: 392). M = CF.

F20. Koumasa (Mesara, South Central Crete)

Workshop type: Metal

Date: EM-MM?

Sources: Chapouthier and Demargne 1942: 62, n.1; Branigan 1974: 202; 1993: 114.

Finds: *Tools:* two-part stone mould for double axe (Branigan 1974: 202; Chapouthier and Demargne 1942: 62 n.1).

Analysis: Branigan argues (1974: 127-8; 1993: 114) that Koumasa had its own tradition and workshop because a distinctive repertoire can be seen there. No location is given for the mould; presumably it is from a tomb. I/J.

F21. Koumasa (South Central Crete): Tholos B

Workshop type: Wood

Date: EM IIA - MM IA

Sources: Xanthoudides 1971: 4ff., 25-9; Branigan 1968a: 31-2, 58, 89, 90; 1995: 37.

Finds: *Tools:* copper saw with slightly curved blade and very fine teeth on the convex side, length 14.3 cm. (Xanthoudides 1971: 29); chisel (Branigan 1995: 37) [Xanthoudides' broad two-edged knife blade?]; 2 miniature one-edged copper cutters or hatchets; 3 small tools, probably awls, borers or prickers (Xanthoudides 1971: 25-9).

Other copper items: c. 23 copper daggers; 3 tweezers (Xanthoudides 1971: 25-9).

Analysis: Branigan asserts that the chisel and saw were put there "to assert the identity of the ... carpenter" who used them in life. It is impossible, however, to ascertain to which burial the chisel and saw belonged; there are hundreds of interments and no skeletons may be recognised as complete, *in situ* (Xanthoudides 1971: 7). It is probable that one or more of the bodies was interred with the tools which denote an occupation as a carpenter; the presence of a saw, chisel and other assorted tools are unusual as grave goods. Further details about the status of the craftsman cannot be discerned because this grave, although rich in finds, was used for so many inhumations. J.

F22. Kouphonisi (island south of East Crete)

Workshop type: Purple dye production

Date: MM II

Sources: Bosanquet 1902-3: 276-7; 1904b: 321; Pendlebury 1939: 126; Renfrew 1972: 354; Reese 1987: 201-6; E. Barber 1991: 228.

Finds: *Production debris:* "very considerable quantities" (Renfrew 1972: 354) of broken (Reese 1987: 204) or "strategically crushed" *Murex Trunculus* shells (E. Barber 1991: 228).

Other: with the shells, MM II pottery (Renfrew 1972: 354), which Bosanquet describes as “a whole nest of Kamares pottery” (Bosanquet 1902-1903: 276-7); an MM jug (Reese 1987: 204).

Associated buildings: a hut wall (Reese 1987: 204).

Comments: Kouphonisi was explored in a cursory way (surface study) by Bosanquet and Currelly; an inscription described as ‘4th century’ [B.C.? A.D.?] by Bosanquet (1902-1903: 276) mentions a tithe of purple in connection with Leuke (Kouphonisi).

Analysis: E. Barber (1991: 228) boldly terms this “The earliest proof of a Minoan purple industry”, while Renfrew (1972: 354) is more cautious, writing that the finds “may well indicate a dyeing industry”. Pendlebury (1939: 126, 128) suggests they “may well be the relics of a royal industry”, basing this on a dubious idea of Knossos and Phaistos sharing “the lordship of the whole island”. Pendlebury (1939: 281) also refers to “the murex fisheries on Kouphonisi”, which would lend weight to the suggestion of a dyeing industry there; no evidence, however, is given to support the presence of fisheries. The only evidence of an industry is waste, which gives a value of 4. Dyeing requires facilities to boil the shells and collect the dye; it would be useful to know whether further excavations have revealed anything that might be interpreted thus. The quantity of *Murex* shells is not stated; an enormous amount is needed to produce just a small amount of purple dye. The evidence suggests CF, K, rather than EF, because the process of extracting dye would have been specialised, utilising so much raw material and time.

F23. *Lebena (South Central Crete)*

Workshop type: Copper mine

Date: EM or MM? (Branigan 1974: 66)

Sources: Faure 1966: 45-78; Branigan 1974: 66; Stos-Gale 1998: 720ff.

Finds: *Mine:* vertical and horizontal gallery, each seemingly following veins of cupriferous ore (Branigan 1974: 66); Faure (1966: 51) describes the former as the mine entrance or an aeration tunnel in the ore. There was a rich layer of malachite and azurite in schist with some pockets of limonite.

Other: large, coarse, heavily used sherds at the bottom of the cliff (Faure 1966: 51).

Analysis: Branigan calls this a “mine of possible EBA or MBA date” and notes EBA digging of galleries in the Levant and S.E. Europe (Branigan 1974: 66), which does not rule out the possibility of this in the Aegean as well. There was ‘certain’ mining in the neighbouring valley to the east, and an area of limonite and chalcocite with some malachite to the west of Lebena (Chrysostomos?) and on the edge of the area was the debris of a vast kiln and slags throughout the village (Faure 1966: 51-2). Faure does not, however, mention any dates and while this is a probable mine, the question of the date makes this a dubious entry in a catalogue of Neolithic to MBA working areas. Stos-Gale (1998: 720) states that the only occurrence of ores possibly used in the BA is at Chrysostomos, which is west of the Kalo Limenes bay, south of the Mesara (Chrysokamino having been discounted); she does not mention Lebena which is in the same area, perhaps because she considers them to be one and the same. The description of Chrysostomos, however, differs from that of Lebena; the former is described as a small area, “exploited on a very small scale by the open-pit technique in the last century” which may have

destroyed traces of earlier mining; malachite, azurite and iron are present, and above this are the remains of two large circular tombs. At Lebena, however, there are five EM circular tombs (cf. Branigan 1993: 145). BA use of Chrysostomos ores has not been proved by any smelting site or a corresponding composition in BA artifacts. Further analysis is required for confirmation of this, and excavation of the vicinity of Kalo Limenes may yield answers (Stos-Gale 1998: 724-6).

F24. Magasa (East Crete): house

Workshop type: House of a stone-tool craftsman.

Date: LN

Sources: Sakellarakis 1973: 136.

Finds: *Finished products:* group of c. 20 stone axes of local stone.

Analysis: “This house was possibly inhabited by a craftsman who produced tools, to whom belonged, no doubt, the twenty or so stone axes of local stone which were found in a group” (Sakellarakis 1973: 136). There are many potential explanations for a group of axes besides the residence of a craftsman. There were no indications that might suggest an actual workplace, such as raw material, debris or tools. M (house of craftsman or storage place).

F25. Mallia (N. Central Crete): Sondage K: small oval room (fig. 59)

Workshop type: Obsidian

Date: EM II

Sources: H. and M. van Effenterre 1969: 17-21; H. van Effenterre 1980: 85; Torrence 1986: 150-1; L. Platon 1988: 301; Evely 1993: 132.

Finds: *Raw material:* raw blocks of obsidian (supplies of the workshop) in Maison Delta alpha.

Production debris: in platform of Kappa alpha - exceptional density of obsidian chips; 85% are flakes with no traces of retouch; c. 20 conical cores which end in a point or are almost cylindrical; blades; retouched chips.

Rejects?: blades (Evely 1993: 132).

Tools: tools for percussion - perhaps some bones were used; 2 spherical blocks with flat bases (white marble and haematite) used for striking.

Finished products: c. 50 blades of triangular section, or trapezoidal flakes, turned into tools for cutting, scraping, and perforating.

Other: bones of small animals; with traces of fire; grey-blue sherds.

Comments: *Dimensions:* 3-4 m. by 3-4 m.

Workshop or working area?: the van Effenterres (1969: 20) noted the blades at the periphery, flakes scattered everywhere, and waste in the centre, with two heaps of waste, suggesting to them a craftsman and an apprentice working here, although there seems to be no difference in quality between the two piles (H. van Effenterre 1980: 85-6).

Although H. van Effenterre noticed that the material occupied a small layer, he did not revise his idea of a workshop here. Torrence, however, states that the quantity of material suggests an activity area where “all stages of core preparation and blade production, beginning with unmodified nodules of obsidian, took place”, rather than a workshop “in the sense of a structure used frequently for the production of stone tools for consumers” (Torrence 1986: 150-1).

Evely warns that it is unclear whether the finds “illustrate an actual knapping process frozen in time”, but does call it a “knapping area”.

Analysis:

See analysis for Knossos, south side of Royal Road, Trench F.

The quantities of material which Torrence presumably requires in order to call this a workshop could surely not build up in such a restricted place for reasons of space and safety. It is quite possible that there had been more waste produced here, which was periodically taken away and dumped elsewhere, but Torrence (1986: 153) argues that for this to be the case, one should find a large waste deposit elsewhere in the site, and none have been found. Much of the site, however, has yet to be excavated. Either this is C, and an obsidian waste deposit lies undetected at Mallia, or D.

F26. Mallia (North Central Crete): East terraces of Building A, the SE section (Quartier Mu) (fig. 60)

Workshop type: Pottery

Date: MM II

Sources: AR 38 (1991-1992) 64.

Finds: *Tools:* potter's wheel (of a type previously known only by a fragmentary example at Phaistos and Mallia Quartier Mu).

Finished products?: many vases: amphorae, jugs, small jars.

Analysis: Poursat states that the function of the building is unclear. With a score of 5, bearing in mind that potter's wheels are easily portable, and that vases are more or less ubiquitous at Minoan sites, this can only be a possible workplace C/E, K. Too few details are known to make a further diagnosis; the potter's wheel could have been stored here. Probably I = CF/DF.

F27. Mallia (N. Central Crete): Quartier Mu, Building A, Room I 9 (also rooms I 15, III 3b, III 8/9, III 11, III 1, I 13) (fig. 60)

Workshop type: Hoard

Date: MM II

Sources: Poursat 1985: 120-5; 1996: 71.

Finds: Room I 9:

Tools: 'carpenter's hoard': axe-adze (dimensions similar to Khamaizi ones); drill (like another from Mallia, Quartier Gamma); small saw (type characteristic of Quartier Mu where over 20 were found; identical ones at Gournia and Palaikastro); blade of large knife.

Other: pottery: cups, bowl, lamp, two amphorae; fragments of metal probably from copper vessel (Poursat 1985: 124).

Finds from other rooms:

Rooms I 15, III 3b, III 8/9: fragments of 'nails'.

Room III 11: tongs with rivets.

Room III 1: tweezers with rivets.

Room I 13: fragment of tool (Poursat 1996: 71).

Comments: The 'hoard' had fallen from upper storey in corridor I 9 (Poursat 1985: 120). A fifth tool, an awl, slightly further away, could have been a shoe-repairer.

Analysis: Poursat calls this a "depôt de charpentier" (1996: 71), of essential wood-working tools, stored by the masters of Buildings A and B for artisans (wood-workers and perhaps leather-workers) to carry out work there (Poursat 1985: 124-5). Another possibility is that the occupants of the houses were craftsmen. H.

F28. Mallia (N. Central Crete): Quartier Mu, Building B, Room IV 4 (also rooms IV 6 and IV 8), compartment C (fig. 60)

Workshop type: Hoard

Date: MM II

Sources: Poursat 1985: 122; 1996: 71.

Finds: Room IV 4:

Tools: 'carpenter's hoard': double axe (typical dimensions, like those at Khamaizi) and chisel (identical to those at Samba or Gournia) in Compartment C. Perhaps part of same group: small saw; adze (unusual type with odd handle-fitting not seen before in Crete) (Poursat 1985: 122). Also, fragment of tweezer; roll of copper ribbon or band; awl.

Other: abundant Kamares pottery; fragment of 'hieroglyphic' tablet; point of spear; large metal bowl; two fragments of other containers (Poursat 1985: 124).

Room IV 6:

Tools: assemblage of 7 small saws.

Room IV 8:

Tools: tongs; tweezers with rivets.

Comments: Fallen from upper floor. Dimensions of room IV 4: 8 m. by 4.25 m. Room divided into compartments by three walls (Poursat 1985: 122, 124).

Analysis: See analysis for Room I 9.

F29. Mallia (N. Central Crete): Quartier Mu, Building C, sector VI (Atelier C) (fig. 60)

Workshop type: Metal

Date: MM II

- Sources:** Poursat 1996: 69, 115-8.
- Finds:** *Tools:* schist mould for double axe (between east wall of VI 5 and west wall of H/J3), blackened towards interior and partially split, block roughly rectangular, 4 notches on one corner, 6 holes on the edges; saw (VI 4-VI 5); fragmentary saw (VI 2-VI 3); schist blade (VI 4?).
- In another part of the building:
- Finished products or other?:* 3 bronze tripod vases in a cache under magazine VI 1.
- Finished product?:* lead weight (perhaps made and not employed in the artisans' sectors; a balance pan near the weights of the Potter's Workshop could suggest use there).
- Remblai Sud (nearby):
- Tools:* 2 saws; pair of tweezers with rivets in immediate vicinity of ateliers, probably from Atelier Sud or Atelier C.
- Courtyard VI 4:
- Specialised permanent production installation:* 3 tuyères, partially blackened by fire, suggest a furnace.
- Comments:** This seems to have been an maison-atelier like the others from Quartier Mu (Poursat 1996: 69).
- Analysis:** With a value of 16, this is A.

F30. Mallia (N. Central Crete): Quartier Mu, Building D, Room VII 4 (?) (fig. 60)

- Workshop type:** Hoard
- Date:** MM II
- Sources:** Poursat 1996: 71.
- Finds:** *Tools:* assemblage of 4 small saws, very worn.
- Analysis:** H.

F31. Mallia (N. Central Crete): Quartier Mu, Building E, Room XII 2 (fig. 60)

Workshop type: Unspecified
Date: MM II
Sources: Poursat 1996: 71.
Finds: *Finished products or tools or other?:* fragment of small plate with 2 rivets; tool with bent blade; fragmentary shaft with square section.
Analysis: Poursat includes these in the chapter entitled 'Other remains of workshops', but these remains suggest M rather than A.

F32. Mallia (N. Central Crete): Quartier Mu, Building IX, "Atelier de Sceaux", Room IX 7* (upper floor)⁵⁰ (figs. 60, 61, 62)

Workshop type: Sealstone
Date: MM II
Sources: Dessenne 1957: 123-8; AR 24 (1977-1978) 63; Poursat 1983: 278; 1996: 15, 17-21, 103-10; 1997: 59; H. van Effenterre 1980: 551-61; L. Platon 1988: 293-7.
Finds: *Raw material:* many blocks of green steatite; miniscule fragments of other rocks: conglomerates, schists, pieces of rock crystal, obsidian and perhaps calcite crystals, ubiquitous at Mallia, were used too (Poursat 1996: 103). 2 obsidian cores to the east of the workshop indicate that blades were made here (van Effenterre 1980: 561; Poursat 1996: 103-4).
Unfinished goods: fragment of demi-cylinder rough-out of carnelian (imported stone) (Poursat 1996: 103); rough-outs without the final

⁵⁰ Poursat calls the whole building "L'Atelier de Sceaux", and room IX 7* was 'without doubt the work room of the artisan' (Poursat 1996: 20). He does not always differentiate between finds in the 'Atelier' house and the 'Atelier' room. The finds presented are generally from the work-room; finds from elsewhere are stated as such where possible. Most of the tools and raw material were from room IX 7*.

polishing; bone found partially sawn and cut (Poursat 1996: 104); 90% of unfinished seals were steatite, other materials were limestone, agate, rock crystal, obsidian and ivory (H. van Effenterre 1980: 553).

Production debris: considerable amount of steatite scraps (Poursat 1996: 105).

Rejects: a large majority of the pieces, more than 120 rough-outs, in the atelier are broken in the course of engraving (Poursat, cited in *AR* 24 (1977-1978) 63; 1996: 105).

Finished products: 35 seals in IX 7 upper floor, which provided the greatest number of seals (Poursat 1996: 15) [presumably including finished and unfinished seals]. Only 12 unbroken seals, 3 or fewer of which were apprentice's (Poursat 1996: 105).

Other: 'hieroglyphic' medallion found above the gutter with fragments of seals probably from the room; fragments of stone vases (Poursat 1996: 15, 22).

Room IX 5:

Tools: metal needle; metal tubular drill; 7 schist blades.

Finished products or debris?: 2 fragmentary steatite prismatic seals.

Room IX 6:

Tools: metal pin; clay weight.

Finished product or debris?: fragment of 'hieroglyphic' prism (Poursat 1996: 14).

In the sector of the atelier:

Tools: 3 drills; 2 metal saws; c. 15 polishers, generally schist but some limestone; 5 burins or points; perhaps 2 scrapers; 3 pins or needles; perhaps bone points; numerous obsidian blades; perhaps polished stone tools (Poursat 1996: 106-9).

Comments:

House 11 m. by 8 m.; atelier 3 m. by 3 m. Well lit. The room is divided into two compartments by a wall (Poursat 1996: 21).

More than ninety per cent of the seals were prismatic, with three or four sides. Other types included conical, semi-cylindrical, button-shaped, semi-barrel-shaped, flat-sided (van Effenterre 1980: 553).

Analysis:

How specialised?: Poursat claims that the production was organised almost entirely around a form (3 sided prism), a material (steatite), and a particular style, and that this is the only sealstone workshop found on Crete from this period; other contemporary seal workshops must have existed at Mallia (possibly in sector J4/J5) because seals in Buildings A and B show the existence of other forms and styles (Poursat 1996: 59, 103). This fallacious reasoning is rightly countered by Platon (1988: 296), who argues that the appearance of very specialised production could be due to the atelier's destruction at a time of a specific production order. While Poursat argues that this atelier was related to Buildings A and B, Platon is uncertain about direct relations to the palace or other administrative centres.

How many workers?: Dessenne detected many hands; van Effenterre (1980: 551) believed that a specialist in the family worked with an apprentice, as some pieces denote an inexperienced hand. Poursat (1996: 7) calls this a family house of artisans, with probably one or two craftsmen, yet later (1996: 110) disagrees with the findings of different hands, arguing that the space is insufficient for several craftsmen working side by side and the style is homogeneous.

That Building IX was home to an atelier is beyond doubt (value 25 = A); the size of the room argues for one or two workers. The houses suggest individual family units, and therefore craft practised within the family unit; this cannot be taken beyond speculation. The presence of an apprentice is possibly an idea influenced by more modern ways of working; differences in styles may equally be due to experimentation as to an 'inexperienced hand'. If it is possible to detect the same hand amongst different forms and styles of sealstone,

this would be well applied to see which places received seals from this workshop.

F33. Mallia (N. Central Crete): Quartier Mu, Building VIII, "Atelier de Potier" Room VIII 5 (upper floor) (figs. 60, 63, 64 and 65)*

Workshop type: Pottery and stone vases

Date: MM II

Sources: Poursat 1981: 964; 1982: 677-80, fig. 2; 1983: 79; 1996: 36-43, 70, 111-3.

Finds: Evidence for pottery production, Room VIII 5:

Tools: potter's wheel and fragment of another; 10 clay moulds including 2 with motif of the same dimensions on each; lower part of a bivalve mould; mould of triton?; mould of oyster; 2 moulds with fluted motif; mould of shell; mould with fluting; 2 tritons; 2 shells (models for moulds?); 11 weights: 9 spherical; 1 parallelepiped; 1 piriform.

Finished products?: 7 braziers; 2 (cooking) pots; pithos with corded decoration and painted bands; pithoid jar; large jar with closed neck; small open jar with relief; decorated vat; 2 vases; lid of jar; ovoid decorated amphora; neck of amphora with rope decoration; small handmade pot. Some vases appear unused so are probably products.

Other: slab of red and blue coloured stucco; corner of clay quadrangular slab.

Evidence for stone vase production:

Unfinished goods: rough-out of a vase? (block, broken at the top) grey limestone; grey serpentine rough-out.

Production debris: 2 serpentine bore cores, polished surface with line incised near end, reused as weights?

Tools?: fragmentary schist blade; fragment of sharpened stone; polisher; 2 small schist discs - weights? 2 fragments of metal shaft with square section; fragment of needle with twisted stem.

Finished products?: stone vases: bird's nest (Type Mu II, 1Bb) of grey veined limestone and fragment of another; bowl (type Warren P 119), violet veined with green; 2 grey serpentine bowls; large fragmentary serpentine cups; white limestone goblet with black stains; fragment of a pyxis or goblet; greenish serpentine lid with knob (type Mu XV, 2 A); lid (type MU XV, 1 A) grey veined limestone; knob of lid.

Other: corner of small table, green stone with flat surface and line incised round the edge; fragment of stalactite.

Room VIII 1:

Production debris: bore core.

Tools?: schist blade; metal point; burin; 2 metal cutters; 6 weights.

Finished products?: pottery; stone lid.

Room VIII 2:

Unfinished products: 'Petschaft'-type seal rough-out.

Tools: 9 weights; schist blades; stone polisher; large metal tubular drill; metal needle; fragment metal blade and perhaps nail.

Finished products?: pottery; stone vases.

Other: triton; pebbles.

Room VIII 3:

Tools?: 3 weights; sharpening stone.

Finished products?: pottery; stone vases.

Other: metal band; half a stone ring.

Rooms VIII 4:

Tools?: stone weights.

Finished products?: pottery.

Staircase VIII C:

Tools: small metal burin (Poursat 1996: 26-39).

From North Space, probably from this workshop:

Tool?: pair of tweezers with rivets (Poursat 1996: 70).

Comments: House 9.8 m. by 8.1 m.; workroom 3.4 m. by 2.9 m.

Analysis: According to Poursat, this workshop did not produce utilitarian vessels, for which other workshops existed at Mallia, but seems to have specialised in the production of moulds for making cultural artefacts for sanctuaries of the town (Poursat 1983: 79). The workshop as a whole scores 17, with stone vase working scoring 16 or 17 (some of the items are dubious indicators, but as they were all together, this increases the likelihood of their categorisation) and pottery working scores 5 or 6. The presence of so many moulds together with potter's wheels suggests B for pottery products, and all the indicators for stone vase working suggest A.

F34. Mallia (N. Central Crete): Quartier Mu, Building X, "Atelier de Fondeur", Room X 4 (lower and upper floor) (figs. 60, 66, 67, 68 and 69)

Workshop type: Metal

Date: MM II

Sources: Poursat 1996: 53-7, 115-8.

Finds: Room 4:

Tools: complete, large, multiple schist mould for bronze tools: on one side, moulds for 3 chisels, on other side, mould for a pick (axe) with a double point; schist mould for tool (hammer?), blackened on edges and interior, a hole on the edge.

Other: base of small pithos; amphora; bottom of pithoid jar.

Room 4a (off Room 4):

Tools: fragment of schist mould for tool, burnt on the inside, notch on outside; grey-blue conglomerate rectangular plaque (lid of mould?), long sides slightly incurved, indentation around an end, 2 large notches on exterior.

Production debris: slag.

Finished products?: bronze borer or drill; fragment of nail (?); fragment of semi-circular copper plaque; 2 fragments of a needle.

Other: elbow of ceramic pipework with lateral handles; fragment of a large serpentine lamp.

Room X3 (upper floor):

Tools: fragment of stone mould for double axe; clay weights.

Other: sherds; fragments of stone vases; hearth.

North Space:

Specialised permanent production installation: tuyères suggest a furnace.

Raw material: small block of copper (square B7).

Comments: House: 9.35 m. by 7 m.; workroom 4.4 m. by 1.6 m. Access by staircase from Room X1.

Analysis: Although the furnace is only indicated by the tuyères, it was probably located in the adjacent North Space, an hypothesis supported by the presence of slag in the Atelier de Fondeur, suggesting that metal was worked in the vicinity. Interestingly, on the other side of the North Space lies Building B where a crucible and block of galena were found. A value of 8/9, or 20/21 including the probable nearby installation, indicates B or A.

F35. Mallia (N. Central Crete): Quartier Mu, Building XI, "Atelier Sud", Room XI 4* (upper floor) (figs. 60, 70, 71 and 72)

Workshop type: Stone vase and metal

Date: MM II

Sources: Poursat 1996: 59-68, 70.

Finds: Stone vase production:

Reject: multiple vase (kernos), type Warren 4E, Karagianni II 1, grey serpentine, broken probably at the moment of piercing one of the holes.

Tools or finished products?: flattened grey limestone pebble; elongated sandstone pestle with circular section; schist blade; grey limestone grinder.

Tools for stonework or metalwork or finished products from metalwork?: 2 fragments of large saw with incised sign; 7 small saws; flat chisel with widened end; knife with 2 rivets; drill or nail, squared shaft terminating in a point.

Finished products or tools for metallurgy?: 2 stone moulds.

Finished products?: 2 fragments of large serpentine goblets with handles; bird's nest vase (?); lid (type Mu XV, 2A), grey limestone veined with white; lid with knob and bevelled edge, serpentine, broken knob; stone pyramidal seal; grey limestone half-ring.

Non-specialised permanent installation: fragment of ceramic circular hearth upper surface smooth and blackened.

Other: clay spherical weight; ceramics: goblets, cups, small jugs with trefoil mouth, miniature vases, lamps; ivory and bone discs; bone awls.

Metalwork:

Unfinished goods: pick?, one end preserved, came from a mould, has metal barbs.

Raw material: lump of copper ore.

Production debris: slag.

Metal goods - finished products?: point of spear; 3 needles in twisted wire, fragmentary, neither head nor point preserved; fish-hook, shaft broken; fragmentary foot of tripod; fragment of metal sheet (edge of vase?); 2 rivets; band of golden copper; tiny fragment of gold sheet.

Remblai Sud:

Tools: 2 saws; pair of tweezers with rivets in immediate vicinity of ateliers, probably from Atelier Sud or Atelier in Building C. Remains of bone work were also found here, which could correspond with either workshop.

Comments: *Dimensions:* House: 10.4 m. by 9 m., workroom: 6.7 m. by 0.7-1.5 m. The plan of the building is incomplete.

Analysis: *Stone vase production:* if the vases are finished products and if the stone, and perhaps metal, tools were used for stone vase production, this gives a score of 10. The only certain indicator is the reject piece. B.

Metalwork: whether the tools were finished products or used for metal or stoneworking, this has a value of at least 16. This is A; a furnace or crucible would provide further confirmation, but the finds and especially the slag suggest that if the metal was not actually smelted here, it was probably worked, for example by hammering into shape. The furnace perhaps in VI 4 might have been used both by Atelier Sud and Atelier C. It is not possible to identify a dominant specialisation here (Poursat 1996: 59). The argument for metalwork is stronger than that for lapidary work; the former, however, may have complemented and facilitated the latter.

F36. Mallia (N. Central Crete): Quartier Mu, sector J4/5 (fig. 60)

- Workshop type:** Stone (seal?)
- Date:** MM II
- Sources:** Poursat 1996: 70.
- Finds:** *Unfinished goods:* rough-out of seal in serpentine, face largely cleared, sections cut on the conical part.
Raw material: 4 blocks of green steatite.
Tools?: 'an unusual concentration of metal objects': knife; 4 fragments of tweezers; fragment of blade; ?metal ingot; schist blade.
- Analysis:** Value is 12 or 16 if some of the metal objects can be taken as tools. The association of these objects with each other is unclear, so the classification is B.

F37. Mallia (N. Central Crete): Quartier Theta

- Workshop type:** Kiln?
- Date:** MM I-II
- Sources:** H. and M. van Effenterre 1976: 33-4; Evely 1988: 404; Poursat 1996: 11.
- Finds:** *Specialised permanent production installation?:* kiln? in Phi: circular area covered by a layer of charcoal and cinders, to height of 0.55 m., in hemisphere shape, some stones on the perimeter. Arched layer of baked clay.
Tools: potter's wheel.
- Comments:** Diameter of kiln c. 1.1 m.
No datable objects or sherds were found with the 'kiln', just some bone debris mixed with the fill and small fragments of white stucco. There is no door or air channel to suggest it was a kiln. There was

nothing constructed like a hearth or a kiln vault. The whole region (Delta, Phi and environs) was poor in material finds (H. and M. van Effenterre 1976: 33-4).

Analysis: Evely believes that “a kiln and a cistern” were identified, and mentions that Maison Theta is on the periphery of the town, in a location suitable for a craft which required space and produced pollution from kiln fumes (Evely 1988: 404). Poursat (1996: 111) only mentions the potter’s wheel and suggests the presence of an atelier in Quartier Theta on this basis. Taken with the evidence for a possible kiln, this is more convincing evidence for pottery production in the area. The van Effenterres, however, state that the word ‘kiln’ is an ambitious word to describe this feature (H. and M. van Effenterre 1976: 33). Their arguments (above) are convincing, and until further evidence is produced in the form of wasters, fragments of perforated clay floor or other indications pertaining to a kiln, the identity of this structure must remain open to debate. G? or oven (M).

F38. Mallia (North central Crete): “Room” [probably the same as F39, though that is not a room]

Workshop type: Stone

Date: MM I

Sources: Warren 1969: 157.

Finds: *Raw material:* obsidian for razors; steatite for seals; chlorite for double axe moulds; block of white-spotted obsidian; block, possibly antico rosso.

Finished product?: several chlorite double axe moulds.

- Comments:** This MM I “room” “gave much evidence for stone-working” but none for stone vase-making other than blocks of obsidian and perhaps antico rosso. The obsidian may have been for vases, though we have no actual vases earlier than MM III.
- Analysis:** Warren does not specify where the room was, which is unhelpful. The value is 4 or perhaps 5. C/E, K (= BF).

F39. Mallia (N. Central Crete): North-West angle: border of the portico which goes along Quartiers III and IV: Polythyron III, 7 or 8 (figs. 73 and 74)

Workshop type: Stone vases and metal

Date: MM I - II or MM III

Sources: Chapouthier and Demargne 1942: 24, 53-66; Branigan 1968: 43-4; 1974; 1983: 26; 1987: 272; H. van Effenterre 1980: 476-81; Pelon 1987: 269-71; L. Platon 1988: 268, 282, 297, 313-5.

Finds: Stone vases:

Unfinished goods: crude blocks; semi-worked pieces; unfinished marble plaques, one sawn, one carefully roughed out, perhaps to be a casket lid (Chapouthier and Demargne 1942: 24, 55ff.); unfinished vases (H. van Effenterre 1980: 478).

Raw materials: unworked blocks of diverse shapes and sizes: much transparent greyish obsidian, for the production of scrapers (of which some fragments have been found); 2 small unworked blocks of steatite; much talc-schist, probably from Naxos, for the production of moulds; 2 very large blocks: one of pink quartzite or, more probably, antico rosso (Warren 1969: 157), one of obsidian, both for vase production (Chapouthier and Demargne 1942: 54ff.).

Finished products: fragments of carefully worked schist; marble lid, steatite vase (Chapouthier and Demargne 1942: 24, 56).

Metal:

Production debris: cupreous slag (Pelon 1987: 271).

Tools [see conclusion, below]: used (blackened) talc-schist moulds: 3 whole and 3 halves of bivalve moulds for double axes, one with some negligence in its production, repaired many times;⁵¹ mould with 4 faces (mould on each face) for an elongated tool, 2 pointed tools, tool formed of 2 triangles; mould with one face perhaps for elongated tool; mould for at least 2 objects; 3 moulds for flat discs, probably mirrors, one enormous (Chapouthier and Demargne 1942: 54ff.).

Other: MM I/II pottery (Platon 1988: 267).

Comments:

Dimensions: c. 5 m. by 10 m. (from scale on map).

Analysis:

Date: Chapouthier and Demargne (1942: 56ff.) give an MM I date and van Effenterre (1980: 476) agrees it is Protopalatial, which, according to Branigan (1968: 43), cannot be proved. The layer containing the moulds was MM II, and presumably the blocks of stone are also MM II. The burnt spot is between Protopalatial and last level Neopalatial, so Pelon (1987: 271) proposes a later date of MM III. The more recent excavations and Pelon's date are to be believed for metalwork here. Pelon is unsure whether the moulds, seemingly Protopalatial, may be related to the burnt patch and slag. A separate date for the stone and metallurgy workshops is probable (see below).

Location: a highly burnt spot revealing slag, near a column base just under the floor of the later portico, may be "the tenuous traces of a [MM III] smelting furnace", and slag under the present floor of the north-west courtyard, suggests the working spread to the east (Pelon 1987: 271). Branigan (1987: 272) argues that the burnt patch with slag was probably redeposited there, rather than being direct

⁵¹ To reuse the mould it must be repaired.

evidence for a furnace *in situ*, because it is too small. One wonders how a burnt patch could be redeposited. Of course, there could be other reasons for the burning, but the accompanying slag is suggestive of metallurgy there. While Chapouthier and Demargne (1942: 24) were convinced that here lay a workshop for metal and stone vases, the contemporaneity of the stone finds and slag is debatable, and Pelon (1987: 271) noted that “no architectural remains were connected with this deposit. However, the workshop itself ought not to be very far away”.

Products of the stone workshop: Platon (1988: 268) argues that the only evidence for stone vase production is two larger blocks of obsidian and rosso antico. He and Branigan (1983: 26) suggest seal-stone production from steatite, although there is no evidence to confirm this (Platon 1988: 282). “The impression is that of a permanent [lapidary] workshop, making several types of product from both local and imported materials”⁵² (Branigan 1983: 26); this is only inferred from the raw materials, however, rather than actual finds of unfinished and finished products. H. van Effenterre (1980: 476-8), however, mentions vases found in the course of production, and argues that moulds must also have been products as they were found next to them. This argument is unconvincing because the moulds had been used and were not obviously newly finished products of a stone workshop. H. van Effenterre attempts to explain this by suggesting that a metal-melting atelier was nearby. His argument is not logical.

Metallurgy: Platon (1988: 314) suggests, without supporting evidence, that the moulds were probably in storage at the time of destruction. Branigan (1974: 131-2) states that “the hoard of moulds

⁵² The types of stone found include grey-blue marble, indigenous steatite, pink quartzite, rhyolitic obsidian, and obsidian (H. van Effenterre 1980: 476).

from within the palace at Mallia can hardly belong to anything but a palatial workshop” which “presumably served only the occupants of the palace itself” because it is within the confines of the palace. Such assertions must remain speculative at this stage. The moulds seem to be MM II whereas the slag and burning are probably later. It is more likely that the moulds are associated with the metal rather than the lapidary workshop, and their apparently earlier date perhaps the result of disturbed stratigraphy.

Conclusion: the evidence for stoneworking and metalworking must be separated because they do not appear to be contemporary. The unfinished stone products and raw material suggest a Protopalatial lapidary workshop, value = 13, AF. The slag suggests metallurgy in the vicinity, AF, but later than Protopalatial.

The moulds, found with Protopalatial remains in an area of MM III metalworking, could be coupled with either workshop, as products or tools respectively. If the moulds are of talc-schist, a material that resists high temperatures, it is worth considering that pieces of unworked talc-schist were also found in the area, suggesting the manufacture of moulds here. The moulds *had* been used, however. Therefore it is tempting to associate them with the MM III signs of metallurgy, as Chapouthier and Demargne did before the date of the slag was reassessed. Either the stonework and metallurgy was contemporary, with the stratigraphy now too disturbed to distinguish whether this was Protopalatial or MM III, or perhaps both, or the moulds were the products of a Protopalatial lapidary, used for MM I-II metalwork whose traces have not been found, or the moulds are MM III and coincidentally found near earlier remains of a stone workshop. The opinion here is that the stratigraphy in this area is not entirely clear, and although a lapidary producing moulds would have complemented a metal-worker here, the two types of workshop

should be discussed separately until more conclusive evidence of contemporaneity is produced.

F40. Mallia (N. Central Crete): Room XVII 2 (fig. 73)

Workshop type: Stone vases

Date: MM I-II?

Sources: Chapouthier and Demargne 1962: 8; Warren 1969: 29, 103, 157, 161; H. van Effenterre 1980: 477; Pelon 1980: 212, 269; 1987: 269; L. Platon 1988: 269-71.

Finds: *Unfinished goods:* high-footed fruitstand, steatite, walls very thick, bottom only roughly worked; bridge-spouted bowl, grey-white mottled limestone, spout not carved, work had just begun on interior, drilling a large core. Both had handles shaped but not perforated.⁵³

Finished products: a number of stone vases.

Other: fill included a great amount of MM I pottery, besides MM III - LM IA (Chapouthier and Demargne 1962: 8).

Room XVII, 3:

Adjoining store-room?: full of vases, bucket jars, pithoi; balancing weight (Chapouthier and Demargne 1962: 8).

Comments: *Dimensions:* 3.55 m. by 1.15-1.35 m. (Pelon 1980: 212).

This was a small dog-leg room in the SW quarter of the palace. There were two periods of use, the second connected with a new architectural arrangement of the whole area: the staircase from adjacent area XVII, 1 was constructed (Platon 1988: 269).

Chronology: Protopalatial and Neopalatial remains were mixed. The stone vases are MM I style; Warren (1969: 103, 157) suggests that

⁵³ Chapouthier and Demargne (1962: 8) mention only one unfinished hydria from a huge block of limestone on the first floor, neither hollowed out nor polished, whereas Pelon (1980: 269) mentions two unfinished vases.

they were Neopalatial conservative style and gives the date MM I - LM I for the room, perhaps LM IB, simultaneously destroyed with the palace. Van Effenterre (1980: 476-7) initially describes this as a Neopalatial workshop, but later adds that it may have been a Protopalatial house annex remaining in use for a long time.

Analysis: Chapouthier and Demargne (1962: 8), Warren (1969: 157) and L. Platon (1988: 270) believe this is a workshop because of the presence of the unfinished vase(s). Pelon (1980: 212; 1987: 269) argues that architectural features, scarcity of clues and cramped dimensions suggest a storeroom rather than a workshop. Van Effenterre's opinion (1980: 477) is that this is the workshop of *one* vase-maker, because neither the available space in XVII, 2 nor the raw materials found to the north of III, 7, correspond to the needs of a large group. His arguments concerning the raw materials is hard to understand, because III, 7 is over 40 m. away, with uncertain chronology and no apparent link to room XVII, 2, and the amount of raw materials found there now would not necessarily reflect the amounts needed when a workshop was in use. The value is 9; this room is C or storage (M) (= AF), with an uncertain date, probably Protopalatial.

F41. Mallia (E.Crete): under great staircase VI 8 on western side of central courtyard (fig. 73)

Workshop type: Pottery
Date: MM II - III?
Sources: Chapouthier and Charbonneaux 1928: 24; H. van Effenterre 1980: 388; Pelon 1987: 269.
Finds: *Raw material:* heap of greyish clay.

Finished products?: quantity of cups; MM III rhyton.

Comments: The “architectural features ... and the scarcity of clues ... were such that it [the ‘potter’s workshop’, identified by Chapouthier and Charbonneaux, 1928] may be reasonably questioned” (Pelon 1987: 269). H. van Effenterre (1980: 388), noting the smallness of the space, comments that it hardly appears to be suitable for a potter’s workshop. The dimensions of the space are not given by the authors, so this cannot be commented on here.

Analysis: Chapouthier and Charbonneaux propose an atelier more tentatively than Pelon suggests. Pelon’s reasonable doubts suggest only C/E or storage (M) (= CF/DF), with an uncertain date.

F42. Marathokephalon (S. Central Crete): circular tomb

Workshop type: Leather

Date: EM I - MM I

Sources: Branigan 1968: 91; 1974: 199; 1995: 37.

Finds: *Tool:* flat bronze leather-cutters shaped like a single axe, 2 rivet holes, good condition (Branigan 1968: 91; 1974: 199).

Analysis: Not usual, so put there “to assert the identity of ... the leatherworker” (Branigan 1995: 37). Probably J.

F43. Mochlos (NE Crete): cemetery area

Workshop type: Obsidian

Date: EM IIB - III

Sources: Soles 1992: 84; Carter 1996.

Finds: EM IIB deposit:

Production debris: 237 exhausted cores; handful of blades (very small: none over 4 cm., most under 3 cm.) and flakes in the corner of the room (in Building N?).

Other: small Vasiliki ware jug.

EM III deposit:

Production debris or finished products?: 5,000 - 10,000 pieces obsidian (Carter 1996).

Tomb:

Production debris: obsidian core below middle of east wall of Tomb IX; a “large number of obsidian blades and cores litter the South Slope” probably associated with tomb deposits on the slope (Soles 1992: 84).

Comments: There was blade production in the cemetery area. The cores were remarkably small which was from deliberate choice rather than an economising measure; this is unique to Mochlos (Carter 1996).

Analysis: DF.

F44. Mochlos (NE Crete): location unspecified

Workshop type: Bronze

Date: EM - MM

Sources: Branigan 1968: 91; 1974: 198.

Finds: *Raw material?:* 2 bronze ingots, one with a hole in one corner (for suspension?), battered, unpublished.

Analysis: The ingots could be raw material for local bronze-working, or perhaps were buried with a craftsman. The findspot is not specified. I or J.

F45. Mochlos (NE Crete): Tomb I and elsewhere

- Workshop type:** Stone vase
- Date:** MM or LM (Branigan 1991: 99)
- Sources:** Seager 1912: 20; Branigan 1991: 99-100.
- Finds:** *Unfinished goods:* unfinished bowl, probably MM or LM, from settlement area; unfinished breccia bowl from Tomb I, perhaps MM III (Seager 1912: 20); miniature goblet apparently unfinished (Branigan 1991: 99).
Production debris: gabbro core from settlement area (Branigan 1991: 99).
- Comments:** The stone vase assemblage was the fourth largest in Crete, and was distinctive. Mochlos was plausibly a centre of production for EM II - III stones vases and goldwork. The distribution of dog-lid and relief-carved pyxides “favours production in the northeast of the island...” (Branigan 1991: 99-100).
- Analysis:** Branigan infers stone vase production at Mochlos from the finished products. Seager notes the unfinished vase in Tomb I and writes that it “would tend to prove that these vases were made in the town of Mochlos.” BF. He does not consider the possibility of J. Inferential and scattered evidence (I) points to a BF.

F46. Mokhos (E. Crete)

- Workshop type:** Hoard?
- Date:** EM II or MM I - II
- Sources:** Branigan 1969: 5; Hutchinson 1950: 62; pl. iv, 7-8.
- Finds:** *Tools:* 2 axe-adzes (Branigan 1969: 5).

Analysis: *Questionable dating:* the tools were found with EM II material, but resemble the axe-adze of MM I-II Khamaizi (Branigan 1969: 5), which makes Hutchinson's (1950: 62) typological dating of them to LM I/II rather surprising.

Branigan writes that it would be surprising to find two tools of this type together outside of a hoard. The number of tools, however, is somewhat small to be called a hoard, and another query rests with the dating. H or I.

F47. Myrtos: Fournou Korifi (S. Central Crete): Area 8, Rooms 10-12, Platform of Area 4 (figs. 75 and 76)

Workshop type: Dyeing

Date: EM IIA

Sources: AR 14 (1967-1968) 24; Warren 1972a: 23, 25-9, 262-3, figs. 15-16; E. Barber 1991: 239-41.

Finds: Area 4:

Specialised permanent production installation?: large rectangular stone platform perhaps a drying and working surface (Warren 1972a: 263).

Area 8. "Area of the Tub, Hole and Channel (Figs. 15-6)":

Specialised permanent production installation?: lekane, or large spouted tub, supported on stand of earth packing and two large flat stones. The spout was in a hole cut in natural rock just west of the tub. The tub was used for letting out water into the hole, or a pithos could have stood in the hole to collect liquid. Channel from hole cut in rock, discharging into 9 or 10. Area of flat stones as working surface behind the tub (Warren 1972a: 25-9). Use of tub: cooking (unlikely, as tub was not heated), wine press (unlikely, as liquid is

collected, not run off), olive oil separator (possible), wash tub for food (would not need so much water), for washing cloth (possible).

Room 10. "Room of the Water Stoup":

Tools and (specialised?) permanent production installation?: stoup, a rounded stone hollowed into a shallow bowl (0.4 m. by 0.45 m.), set on rock jutting out of wall with standing space in front of it. Presumably used for water or mixing substances like dyes. Series of large flat slabs running the width of the south wall.

Production debris?: tough white clayey deposit (roof or wall plaster or accumulated sediment connected with washing operations in 8).

Other: 3 large vases: fine pithos, amphora, piriform jar; tripod cooking pot; fragmentary large jug; part of curious low vase, probably had figurines attached; fragments including parts of 4 conical bowls, Vasiliki ware jug, incised knob of large lid (Warren 1972a: 25-9).

Room 12:

Specialised permanent production installation?: channel.

Production debris?: clayey deposit.

2 thin entrances, probably for leading water down the channel to Passage 13, rather than access for people. Washing operations in the east of the room or on the platform to the west could have used the channel, but it could have been just as easy to tip water straight into Passage 13. Alternatively it could have been an animal pen (Warren 1972a: 25-9).

Comments:

Dimensions: Area 8: EW 3.8 m., NS 3.04 m. *Room 10:* EW 2.1 m., NS 1.54 m. *Room 12:* small. *Area 4 platform:* EW 1.5 m., NS 2.88 m. *Area 8:* an area between North building and complex to south; not a room (Warren 1972a: 25-9).

Further evidence to suggest textile production:

1. Jarman's analysis of animal bones suggests that caprines were bred as much for wool as for meat (Warren 1972a: 262).
2. Looms set up nearby, in or above rooms 58, 73, 74 (see below) where spindle whorls, quern stones, or stone weights were found. Room 83 had a bowl with an interior handle associated with thread making (E. Barber 1991: 240). Loom weights, spindle whorls and perforated stone weights were common. Smooth rubbers of serpentine could have been for rubbing wool smooth (Warren 1972a: 262-3).

Analysis: E. Barber gives a suitable summary, "Although we cannot prove that the Myrtos facilities were dye-works, no crucial resource is missing and the collocation of all the necessary elements constitutes strong circumstantial evidence" (E. Barber 1991: 241). B.

F48. Myrtos: Fournou Korifi (S. Central Crete): Room 58, near south end of Area 74 (figs. 75 and 77)

Workshop type: Weaving

Date: EM IIA

Sources: Warren 1972a: 52-5, 221, 263, plan fig. 21; E. Barber 1991: 388; Dickinson 1994: 243-4.

Finds: Room 58. Room of the Loom Weights (Warren 1972a: fig. 21):

Tools: group of 9 heavy clay spherical loom weights: 3 in plaster fill near south wall, 4 on burnt floor towards south-east corner, 1 in fill of Area 56, 1 fallen into north-east corner of Room 60; pestle; 4 rubbers; pounder; stone with circular depression (door socket or spindle stand?). No pottery (Warren 1972a: 52-3).

Room 59:

Tools or installations suggestive of wool preparing: large spouted clay tub; large shallow baking plates for drying wool; long flat quernstone (would have been a good stand) (Warren 1972a: 52-5).

Comments:

A loom doubtless “stood hereabouts, either in 58 (but the space is small and the absence of light would have been a problem) or on the roof of 58 or on the platform of 57 to the north” (Warren 1972a: 53); the position of the weights suggest one of the latter two. The weights are relatively heavy and must have been for weaving heavier, stronger material, than the (fewer) loom weights associated with Area 73 where there was probably also a loom (Warren 1972a: 221). Stone tools must have been for preparing wool.

Analysis:

It is “unknown whether textiles were produced at Myrtos for home use only, or were exported. We may feel that the latter is possible, in view of the numbers of finds connected with textile manufacture in so small a settlement” (Warren 1972a: 263). Although one cannot imagine the scale of export being great as early as EM II, one must consider what Crete was trading in return for imported goods like metals; the relatively few Cretan goods preserved outside the island suggest that perishable goods, including textiles, were probably exported. One must also consider, however, that the production of textiles must have consumed a large portion of time in all households, and that the discovery of several looms does not automatically imply large-scale production for export. (C)/D.

F49. Myrtos: Fournou Korifi (S. Central Crete): Cell 48: Room 49 (Also Rooms 50 and 51) (figs. 75 and 78)

Workshop type: Pottery

Date: EM IIA

- Sources:** Warren 1972a: 18-20, 261, fig. 14; Branigan 1988a: 48.
- Finds:** Room 49. Potter's Workshop:
Tools: 8 potter's turn-tables.
Finished products?: sherds including fine and decorated ware.
- Room 50:
Non-specialised permanent installation: ashy patch against north wall, perhaps cooking place.
Other: 2 bowls (P31 and P3); sherds, including fine and decorated ware; tripod leg; possible sling stone.
- Room 51. "Room of the Potter's Pithoi":
Raw material: remains of 3 pithoi with interiors heavily lined with pale buff earth in places, like potter's clay used today.
Other: rectangular slab, roughly circular quern used as stand for vessels. Scraps of pottery.
- Comments:** *Dimensions: Room 49:* EW 1.08 m., NS 2.08 m. *Room 50:* EW 3 m., NS 1.5 m. *Room 51:* NS 1.5 m. "The main artefactual industry on the site seems to have been pottery manufacture" (Warren 1972a: 261).
- Analysis:** Both Warren and Branigan term Room 49 a "potter's workshop" (Warren 1972a: 18; Branigan 1988a: 48). While the presence of potter's discs and perhaps raw clay stored nearby suggest that pottery-making was practised in the vicinity, the diminutive nature of the room and its value of 4 or 5 argues against its use as a workshop. Potter's turn-tables are portable and their presence in this room does not guarantee that it is a workshop. Room 49 is probably a storeroom (M); the vicinity must have been used for potting although no kiln has yet been found. CF/DF.

F50. Myrtos: Fournou Korifi (S. Central Crete): 130 m. NW of the Myrtos buildings

- Workshop type:** Metal
- Date:** EM IIA
- Sources:** Branigan 1974: 62.
- Finds:** *Specialised permanent production installations:* “an area of fire debris and burnt stones, thought to be the remains of smelting ovens”, situated at the foot of an ore-bearing hill (Branigan 1974: 62).
Pottery: thick spread of pottery around the ‘smelting ovens’.
- Analysis:** Branigan makes a cautious diagnosis of this area (B or C). If there really were smelting ovens here, this would be A, with a score of 12. No further information, such as slag, crucibles or other metalworking equipment, is given to support the identification of smelting ovens. One assumes that the proximity to an ore-bearing area influenced this identification, unless more conclusive, unpublished, information was known. However, there is no proven EBA use of any ore sources near Myrtos. With the present amount of data, fire debris and burnt stones with a thick spread of pottery around them could equally indicate a residence or shelter, a feasting place, or a kiln. The diagnosis must remain C.

F51. Palaikastro (E. Crete)

- Workshop type:** Purple dye production
- Date:** MM II
- Sources:** Bosanquet 1904b: 321; Reese 1987: 204; E. Barber 1991: 228.
- Finds:** *Production debris?:* 2 deposits, similar to those at Kouphonisi, of pounded *Murex trunculus* (Bosanquet 1904b: 321), including 64

columella fragments, 17 *apical* fragments, numerous body fragments from at least 53 individuals (Reese 1987: 204).

Other: MM II pottery associated with the shells (Bosanquet 1904b: 321).

Comments: A 'filler', i.e. rhyton, from Palaikastro depicts *murex* shells clustered on rocks, "from which no doubt they were collected by divers in the fashion described by Pliny..." (Bosanquet 1904b: 321).

Analysis: As the shells were available locally and heaps of broken *murex* are not often mentioned, it is possible that purple dye was extracted here; enormous quantities are required, however, and without both knowledge of the quantity of shells found and associated installations to suggest a dye-works, one must err on the side of caution. Pending further information, and taking into account the lack of dyeing installations, this is classified as indicating a domestic or workshop dump, (M), indicating CF.

F52. Palaikastro (E.Crete): 300m. southeast of Roussolakos

Workshop type: Kiln

Date: MM (MacGillivray 1987: 276) or Neopalatial (Davaras 1980: 124; Jones 1986: 251).

Sources: Davaras 1980: 115-24; Jones 1986: 251; MacGillivray 1987: 276.

Finds: *Specialised permanent production installation*: type A kiln, "a simple circular structure with a bench around the sides" (MacGillivray 1987: 276). Regular shaft cut through soft rock, diameter 2.68 m., 1.3 m. deep, shelf 0.4 m. high and 0.34 m. broad, cut into rock all round inside. Arched entrance (a stoke hole or tunnel) and parts of walls consolidated by stones reinforced with

clay; smooth floor; clay lining around shaft by arch is strongly burnt. Kiln empty except fill of earth and stones.

Other: sherds of conical cups, of no relation to the kiln (Davaras 1980: 115-7).

Comments: MacGillivray comments that the kiln “would not have been adequate to fire high quality MM pottery evenly unless it were equipped with a perforated floor resting on the bench” (MacGillivray 1987: 276). Davaras, however, writes that it could manufacture pottery on a large scale, probably for all Palaikastro. It was cut into the ground for the highest degree of heat and better retention. It would have been domed, but no trace survives. It was probably sited here because of good clay nearby, plenty of water, and wood (Davaras 1980: 117-24).

Analysis: There are no ashes, charcoal, rejects or trial pieces. “Nevertheless it seems fairly certain that we are dealing with a regular pottery kiln and not a metal foundry” (Davaras 1980: 117-8). Without the above signs, however, this must be classed as a probable kiln, and the date is uncertain. G.

F53. Palaikastro (E. Crete): Block Xi and elsewhere

Workshop type: Metal

Date: Unstratified, probably EM-MM

Sources: Bosanquet and Dawkins 1923: 124, figs. 105, 106; Banks 1967: 225; Branigan 1974: 131, 201.

Finds: *Tools:* 2 stone open moulds, smaller one from Block Xi of uncertain stratum, larger one broken and of unknown provenance.

Analysis: Although the moulds are unstratified and Branigan does not date them, he does include them in EBA and MBA evidence for

metallurgy (Branigan 1974: 131). Branigan suggests the moulds were for ingots. I = AF.

F54. Patrikies (S. Central Crete): south boundary area

- Workshop type:** Pottery
- Date:** MM IA
- Sources:** Bonacasa 1967-68: 7-54; Levi 1976: 749-56; la Rosa 1984: 195; 1992: 232-43; MacGillivray 1987: 277; Watrous 1987: 67.
- Finds:** *Finished products?*: triangular-shaped (2 by 2 by 3.7 m.), very thick layer of pottery (average depth 15-30 cm.), including jugs, small jars, dishes, milk-jugs, tankards, and large numbers of teapots of a particular shape (Bonacasa 1967-68: 9-17).⁵⁴
- Analysis:** No buildings were found in connection with the deposit, which is thought to represent a workshop or a warehouse for religious or commercial use (Bonacasa 1967-68: 17-18). Other authors have since made more ambitious claims from the same evidence: Levi (1976: 749, 756), from the large quantity of teapots of the same type, with specific types and combinations of decoration, suggests this is debris from a nearby workshop specialising in teapots. La Rosa (1984: 232, 240) labels Patrikies as a “workshop settlement” and a “small craftsmen’s (?) settlement”. MacGillivray (1987: 277) writes of “Large scale potting” perhaps near Patrikies, “almost certainly ... carried out away from the settlement ... or in the foothills of Mount Ida near Kamares where the conditions resemble those at Silamos and where modern potters continue to work.” Watrous (1987: 67) should have supported with evidence his claim of “a potter’s

⁵⁴ Levi (1976: 749) mentions *two* categories of teapot shapes: 75% of the assemblage had a vertical handle; 25% had two horizontal handles.

workshop ... to make teapots for the funerary trade in the Mesara". The later theories all refer to back to Levi and Bonacasa, the only evidence for the 'large scale potting' and 'craftsmen's settlement' being a layer of sherds. No-one, apparently, has considered the possibility of this as an area of concentrated *consumption* of a particular product (tea-pots). With a value of 1, this is M (storage or dump), indicating CF (due to the size of the deposit).

F55. Peleketon Cave (E.Crete)

Workshop type: Bone tools
Date: Neo
Sources: Davaras 1983: 376; *AR* 37 (1990-1991) 71.
Finds: None specified.
Analysis: The only information given is that places of working and manufacturing bone tools, which are rare and appear to be of special importance, were identified (Davaras 1983: 376). (D) K.

F56. Petras (East Crete): on top of the major hill

Workshop type: Unspecified
Date: EM II
Sources: Tsipopoulou 1999.
Finds: *Specialised permanent production installations?*: basins cut out of and sunk into the bedrock, which might relate to industrial activity in this location.
Analysis: Further detail is required about this alleged workplace. (C/E) K.

F57. Phaistos (S. Central Crete): Unit B: 4 conjoined rooms on ground floor: LI, LIII-V, or possibly just LIII and LV (Branigan 1983: 26) (fig. 79)

Workshop type: Stone (and bone)

Date: MM

Sources: Levi 1976: 79-105; Branigan 1979: 102-6; 1983: 26; 1987: 246, fig. 1; 1988b: 14; L. Platon 1988: 272.

Finds: Unit B:

Raw material: included obsidian and steatite (Branigan 1987: 247).

Tools: 17 polishers or spatulae; a stone mortar; 3 bone awls; bronze chisel; bone tool handles (Branigan 1987: 247).⁵⁵

Finished products: 21 stone vases, 17 inlays.⁵⁶ Bone inlays were perhaps produced here and fixed into other products. Possible products: stone items relating to other crafts, including 14 stone loom weights, potter's wheel (Branigan 1987: 247).

Other: seals; fine and coarse ware; tablet fragments.

Room LIII (Levi 1976: 75-8):

Finished products?: 7 loom weights.

Non-specialised permanent installation: cupboard containing little tools and objects.

Other: 3 jars; stone lamp; brazier; lid; 5 cups; askos; fragment of amphora; 2 jugs; oil lamp; wide bowl; tripod pot.

Room LV (Levi 1976: 97-105):

Dimensions: 2.8 m. by 3.15 m. Paved with alabaster and limestone slabs (Levi 1976, fig. 125).

⁵⁵ Or 11 polishers, 3 rubbers, 2 bronze chisels, 2 bone handles for pronged tools (possibly the chisels) (Branigan 1983: 26).

⁵⁶ Or 15 stone vases, 4 lamps, 16 small stone inlays (Branigan 1983: 26).

Tools: West side of room: bronze chisel; massive fragment of fire-hardened clay, thought to be probably a mould for bronze vases; 18 fragments of obsidian; several stone burnishers; bone spatulae.

Non-specialised permanent installations: cupboards or shelves (indicated by different levels of finds).

Other, including finished products?: East side of room: 5 stone vases; 2 braziers; 4 amphorae; Kamares style vases; 2 rhyta; kitchenware; 2 horn vessels; 2 shells; fragment of small clay statue; steatite cylinder; basin. *West side of room:* pottery vessels.

Comments: Unit B stands out as a different area with below average density of pottery. Ninety of the palace's one hundred and forty five stone products were found here (Branigan 1987: 247). The combination of polishing tools, bronze implements, and three groups of finished products, suggests that the four small rooms constituted a single complex. Rooms LI and LIV may have been storerooms, yielding eleven vases and three tools; LV and LIII may have been the workshop, with lapidaries' and bone-workers' materials were concentrated there (Branigan 1979: 104; 1983: 26). LI was perhaps an office for the workshop, as it had eight clay sealings. Three other sealings were found in Unit B (Branigan 1987: 247).

Analysis: "One could make out a good case that this represents a lapidaries [*sic*] workshop" (Branigan 1987: 247). Platon, however, adds a question mark to 'workshop', without explaining why. Value = 9 or 10 for Unit B which should indicate B; Branigan's mention of raw material, however, is not taken as certain here because it was not specified as such in Levi's original publication. Therefore C.

F58. Phaistos (S. Central Crete): near Rooms LIII-LV? (fig. 79)

Workshop type: Metal

Date: MM?

Sources: Mosso 1910: 305; Pernier and Banti 1951: 369-71, figs. 235 a-d; Banks 1967: 225; Levi 1976: 103; Branigan 1974: 131, 201; 1979: 102-6.

Finds: *Production debris:* MM bronze slag (Branigan 1974: 201).

Tools: unstratified moulds: half a limestone bivalve mould⁵⁷ with a matrix for a blade⁵⁸ similar to that of a mould at Lerna (Pernier and Banti 1951: fig. 235a; Banks 1967: 225); schist mould for curved knife (sickle? - Branigan 1974: 201) (Pernier and Banti 1951: fig. 235b), limestone mould for double axe and rectangular implement⁵⁹ (Pernier and Banti 1951: fig. 235c), schist mould with a hollow on top for a rod or chisel and two on one side for chisels or burins (Pernier and Banti 1951: fig. 235d); clay model for cire-perdue casting near rooms LIII-LV (Branigan 1979: 104); massive fragment of fire-hardened clay, thought to be probably a mould for bronze vases in west side of Room LV (Levi 1976: 104-5).

Comments: *Chronology:* Branigan (1974: 131) includes the moulds as EBA and MBA evidence of metallurgy.

Mosso (1910: 305) explains that what appeared to be a piece of stone crucible, found amongst charcoal, to which a piece of a blade and some metallic scoriae were attached, was actually sulphate of

⁵⁷ Branigan (1974: 201) mistakenly lists all the examples as open moulds.

⁵⁸ Branigan (1974: 201) suggests a chisel.

⁵⁹ Branigan (1974: 201) incorrectly describes the mould as having one matrix for a chisel; although this might seem apparent from the picture in Pernier and Banti 1951 fig. 235c, their textual description details *two* matrices. Fig. 235d shows the fourth mould from an angle which reveals one of its three matrices. For this mould, Branigan again attributes only one matrix, possibly for an ingot, which is a plausible suggestion for the matrix shown in fig. 235d. In the text, however, Pernier and Banti describe *three* matrices.

lime or gypsum to which metal objects liquefied by the intense heat of the destruction fire had adhered.

Analysis: The clay model for cire-perdue casting which “should also indicate the nearby presence of a bronze-smith’s workshop” (Branigan 1979: 104) is a most unusual find. There is evidently some confusion regarding the nature of the finds. I = BF.

F59. Phaistos (S. Central Crete): Unit B (fig. 79)

Workshop type: Weaving

Date: MM IB - II

Sources: Branigan 1987: 247-8.

Finds: *Tools:* 14 stone loom weights from Unit B (could have been products of the lapidaries workshop) (Branigan 1987: 247).⁶⁰

Comments: Weaving activities within the palace are “documented at Phaistos in the first phase building” (Branigan 1987: 248).

Analysis: The loom weights may have been stored, produced or used in this area; the scale of production is unknown. E or storage (M) (= DF).

F60. Phourni, Archanes (central Crete): west of buildings 18 and 19

Workshop type: Obsidian

Date: EM

Sources: Orlandos 1976: 175-6, fig. 148; *AR* 24 (1977-1978) 63.

Finds: *Production debris:* hundreds of obsidian flakes.

Finished products: hundreds of fragmentary obsidian blades.

⁶⁰ Levi specifies c. 12 loomweights beneath the staircase (Levi 1976: 96) and 7 in room LIII (Levi 1976: 78).

Comments: In contrast to how obsidian is usually found scattered in Crete, there was a concentration here (Orlandos 1976: 176).

Analysis: The obsidian is found in an area with many remains of human burials and grave goods. Although Orlandos and Sakellarakis (cited in *AR* 24 (1977-1978) 63) have not proposed that this was a working area, Day et al. (1998: 133ff.), discussing Ayia Photia, suggested that the manufacture of blades may have been part of the funerary ceremony. This could have been the case here. E or dump (M) (= DF).

F61. Platanos (S.central Crete): grave (unspecified)

Workshop type: Weaving

Date: EM - MM

Sources: Branigan 1995: 37.

Finds: *Tools:* loom weights.

Analysis: The loom weights were in graves “to assert the identity of the ... weaver who had used them in life” (Branigan 1995: 37). It is possible that this is J.

F62. Platanos (S.Central Crete)

Workshop type: Metal

Date: EM I - MM II

Sources: Branigan 1968a: 91; 1974: 127-8; 1988a: 83; 1993: 114.

Finds: *Raw material or finished product?:* copper ingot, unpublished, 14.3 cm. long, 4.3 cm. max. width, 4.3 cm. thickness (Branigan 1968a: 91).

Analysis: Branigan argues that Platanos had its own metalworking tradition and workshop because a distinctive repertoire can be seen there. Platanos had its own peculiar variety of scalloped triangular dagger and an apparent lack of interest in arsenical bronze. The ingot could be a sign of local working. L.

F63. Platanos (S. Central Crete): circular tombs

Workshop type: Stone vases

Date: EM - MM

Sources: Xanthoudides 1971: 102; Branigan 1993: 114; 1995: 37.

Finds: *Unfinished goods:* 2 unfinished stone vases (Branigan 1995: 37). No. 1883 (from cemetery), square piece of blueish marble with white veins and a shallow cavity, “looks like a half-finished vase” (Xanthoudides 1971: 102).

Analysis: “The huge numbers of stone vases deposited at Platanos and Koumasa, almost all made with the tubular drill, is [*sic*] suggestive of specialist production in these villages” (Branigan 1993: 114). The presence of unfinished vases suggests local production somewhere; Branigan (1995: 37) believes they asserted the identity of the lapidary interred. J.

F64. Poros-Katsambas (N. Central Crete): prepalatial rooms, eastwards towards Kairatos banks, area 20 acres

Workshop type: Obsidian

Date: EM I - IIA, MM IA

Sources: Dimopoulou 1997: 434.

- Finds:** *Production debris:* obsidian debris, sometimes sealed by a bed of small stones over which manufacturing had been continued.
- Tools:* stone tools.
- Other:* stone vessels, bone implements, loom weights, beads, bones, seashells and EM I, EM IIA and MM IA type pottery.
- Comments:** Obsidian working was practised in a domestic environment, “apparently by the inhabitants.” The amount of material and extent of the working area (beyond settlement borders) perhaps suggests itinerant merchants-and-craftsmen and production partly for neighbouring or distant areas. The work “seems to surpass ... the limits of a small-scale household activity and to reach the level of an active industry, based on mutual trade interactions [*sic*] with the Cyclades, as also suggested by the imported contemporary Cycladic pottery.” This intensive activity suggests the settlement, from the EM, was a large-scale manufacturing centre and port.
- Analysis:** Some of Dimopoulou’s conclusions, such as itinerant merchants-and-craftsmen and an ‘industry’ catering perhaps regionally, are little more than speculations, without support from further evidence. She does not give the volume of obsidian found or the precise architectural associations (other than ‘pre-palatial rooms’) of the obsidian finds. This makes it difficult to classify this area as one of ‘intense industry’ (A), when it may be where production debris was dumped (M). The site’s function as a port and its Cycladic connections make it suitable as an obsidian-importing site which might trade the blades inland than many other sites in Crete. More precise data, such as the number of cores, core preparation flakes, volume of obsidian and nature of their findspots is needed before further conclusions than DF may be drawn.

F65. Poros-Katsambas (N. Central Crete): Trypeti hill area (500 m. west of Katsambas), especially Miliaras' plot, Psychogioudakis' plot and Sanoudakis' plot

Workshop type: Obsidian

Date: EM I, EM IIA, MM IA

Sources: Zois 1973: 60-2; Dimopoulou 1997: 433-4.

Finds: Trypeti hill area (in rooms or small areas):

Raw material: chunks of obsidian.

Production debris: abundant obsidian: cores; chips; waste flakes, mainly Melian, but some from Antiparos and very little from Yiali from Neolithic contexts only.

Finished products: flake tools; blades.

Sanoudakis' plot, EM I-IIA (14 kg. obsidian):

Raw material: unworked nodules.

Production debris: dozens of cores, showing various stages of preparation; thousands of waste flakes and chips.

Finished products: thousands of blades of all types; retouched flakes, shaped as small-size tools and implements.

Miliaras' and Psychogioudakis' plots, EM IIA - MM IA (17 kg. obsidian):

Decrease in size of by-products of core preparation, increase in secondly worked tools.

Production debris: waste.

Finished products: blades; flakes (Dimopoulou 1997: 433-4).

Comments: All plots had obsidian in EM I - EM IIA and MM IA layers. Miliaras' plot was mainly MM Ia. Psychogioudakis' plot and Sanoudakis plot were mainly EM I and EM IIA, more from the latter. Franchet (cited in Dimopoulou) concluded extensive working area of obsidian here, large in quantity and extent even compared to EM II workplaces at Mallia and Knossos (Dimopoulou 1997: 433-4).

Franchet (cited in Zois) found great quantities of obsidian in and around shallow cuttings which he took to be the floors of huts, amongst which were unworked fragments and microliths which are dissimilar to BA tools, so perhaps pre-BA (Zois 1973: 60). Similar microliths were found at Rousses too, many broken by their movement on the rocks; obsidian and limestone tools here show a Neolithic stone technology much older than that at Knossos. The BSA rejected this and no-one examined the finds (Zois 1973: 62). Zois' entry No. 209 describes an obsidian workshop in an area to the north of the shore, south of the road to Heraklion (Zois 1973: 61). No further detail is provided.

Analysis: Until non-lithic signs of Neolithic occupation are brought to light, one should take the date to be post-Neolithic, and Franchet's description of flakes broken by their movement on the rocks perhaps reveals the cause for the small size of the flakes he calls microliths. Whether Franchet's claims are taken seriously or not, it is generally agreed that this area is an extensive C/D.

F66. Poros-Katsambas (N. Central Crete): room in Skatzourakis' plot

Workshop type: Metal
Date: MM IIB
Sources: Dimopoulou 1997: 434-5.
Finds: *Production debris:* by-products of copper-melting, in a layer with much burnt material.
Tools: "fragmentary but sizeable crucible ... of the early type", "a deep pedestalled bowl, with slightly pulled spout and a rectangular perforation at the base to help lifting off the furnace, by means of a wooden rod."

Analysis: Value is 8; B.

F67. Pyrgos (S. Central Crete): North side of the hill, fill of cistern below the terrace walls and elsewhere (Cadogan 1977-78: 74)

Workshop type: Bronze

Date: Late MM II or III (Pyrgos III)

Sources: Cadogan 1977-78: 74, 76; L. Platon 1988: 319.

Finds: *Tools:* piece of a schist bivalve mould for a shoe-socket spearhead from cistern; 2 clay crucibles from 2 different places [unspecified], one pierced in the base so a square sectioned rod could be inserted to control pouring the metal.

Other: Marine Style sherds.

Comments: The cistern became a dump in LM I (Cadogan 1977-78: 74). Poursat (1996: 116) considers the crucible (he only mentions one) to be contemporary to that from MM II Quartier Mu.

Analysis: It is not possible to identify the precise location and chronology because these objects came from debris, not destruction layers (Platon 1988: 219). I = BF.

F68. (Rethymnon) Hamalevri (West Crete): Bolanis (figs. 80 and 81)

Workshop type: Obsidian

Date: MM IA

Sources: Andreadaki-Vlasaki 1997: 42.

Finds: *Production debris:* very little. No unworked raw material or by-products of initial stages of decortication and core shaping. Little waste from rejuvenation and reflection of cores.

Finished products: bladelets of obsidian and some indigenous flint; no regular tool types.

Analysis: Andreadaki-Vlasaki uses the term ‘working area’ for the locus of a chipped stone industry. This is odd because she also mentions that no raw material and little production waste was found; and these are the main indications of obsidian production. This is probably M, an area using or storing obsidian rather than D.

F69. (Rethymnon) Hamalevri (West Crete): Tzambakas house and Bolanis installation (figs. 80 and 81)

Workshop type: Weaving and dyeing

Date: MM

Sources: Andreadaki-Vlasaki 1997: 42.

Finds: Generally: “It is obvious that the Minoans of Khamalevri were occupied with weaving because of the abundance of clay loom weights (Pl. XIXc) revealed in the excavations” (Andreadaki-Vlasaki 1997: 42).

Tzambakas house:

Tools: loom.

Bolanis installation:

Tools: burnt utensils which “would be helpful for dyeing wool and linen”; clay spindle whorl on a special type of hearth with 39 impressions of branches with pointed leaves (linen?).

Permanent installation, perhaps related to textile work: clay gutter.

Site of the Bolanis installation on a high spot on a hill, which would be suitable for drying wool after washing.

Analysis: Although the residents of Khamalevri were ‘obviously’ involved in textile production, it is likely that this was the case in most villages. Concerning actual examples of workplaces, Andreadaki-Vlasaki (1997: 42) is cautious: “It *seems* that there was a loom in the Tzambakas house” (my italics), and her evidence for dyeing is tentative. The indications for dyeing in the Bolanis installation are largely circumstantial. If the impressions of branches with pointed leaves on the hearth at Tzambakas indicate some sort of control and organization of textile production (Andreadaki-Vlasaki 1997: 42) the area might be C. It is probably E (= DF), however, because weaving must have been an activity practised in most households.

F70. Samba (N.Crete)

Workshop type: Hoard?

Date: Probably c. EM II - MM II (possibly LBA).

Sources: Branigan 1969: 4-6, 11; 1974: 134, 165, 169, 170.

Finds: *Tools:* double axe; narrow-bladed chisel; round shafted chisel, all copper.

Comments: The case that these tools represented a hoard rests largely on their having been acquired together, from a site with no traces of BA graves or buildings from which they could have been looted. As a hoard, although small, they seem to fit into the composition pattern of the other early Aegean hoards (Branigan 1969: 5-6).

Analysis: The find circumstances for the hoard not known, which makes both the dating and their status as a hoard uncertain. Possible H.

F71. Selakanos (S.Crete)

- Workshop type:** Hoard?
- Date:** c. EM II - MM II
- Sources:** Branigan 1969: 2-4, 11; 1974: 23, 134, 165, 170.
- Finds:** *Tools:* 2 chisels; 4 double axes (Branigan 1969: 3-4). Branigan later lists these as 3 double axes, 1 pick, 2 chisels (Branigan 1974: 23, 165, 170).
- Comments:** The evidence that any or all of these formed a hoard is inferential, such as the order of purchase. No other BA material has been found at Selakanos, so the tools are more likely to be from a single isolated hoard rather than from separate graves or various parts of a settlement. Excepting the absence of flat axes, it could be called a typical Aegean hoard, and flat axes do not occur in Crete other than an example from Knossos (Branigan 1969: 2-4).
- Analysis:** It is odd that Branigan (1969: 3) refers to 7 tools, but later in the same article, mentions only 6. The find circumstances and date are not known. Possible H.

F72. Selino (West Crete)

- Workshop type:** Copper mine and metalwork
- Date:** Unspecified
- Sources:** Davies 1929: 99; Forbes 1950: 364.
- Finds:** *Raw material:* copper ore in west coast eparchy of Selino (Forbes 1950: 364).
Production debris: slag (Davies 1929: 99).
- Analysis:** No evidence suggests that this was actually exploited in prehistory.

F73. Silamos (N. Central Crete): about 600 m. from Silamos

Workshop type: Kiln or furnace

Date: MM I - II or Neopalatial.

Sources: MacGillivray 1987: 276; Day 1988: 504-5.

Finds: *Specialised permanent production installation:* collapsed kiln chamber.

Production debris: fragments of slag or vitrified firebox lining; tens of thousands of pottery wasters, mainly MM IIIB and LM IA, also some MM I and MM II.

Tools: part of potter's wheel disc.

Comments: Day (1988: 505) suggests that the find of this kiln strengthens the possibility that the nearby clay sources to the west of Phourni were involved in Bronze Age pottery production.

Analysis: Interestingly, the finds of both wasters and possible slag suggest the dual use of this structure as both kiln and furnace, which has not been recorded for any other kiln in this catalogue. The evidence is stronger for pottery firing because of the thousands of wasters. Evidence for metal melting is weaker because of the uncertain identification of the slag; analysis of this material would confirm or deny metalworking here. The classification here favours pottery firing: G, with an uncertain date.

F74. Vasiliki (E. Crete): "Big House" (house against the cliff on the NW side of the hill among objects belonging to Period III (Seager 1907: 116)) (fig. 82)

Workshop type: Metal

Date: EM IIB

Sources: Seager 1907: 116-7, fig. 2; Branigan 1968a: 30-1, 43, 89; 1974: 106, 132; Zois 1976: maps III-VII.

Finds: *Tools:* half a two-part bronze mould for type III double-axe, which has a socket into which a peg fitted to form shaft hole.

Comments: “The first Minoan example of a metalworker’s shop within the residence of a wealthy man may have been at Vasiliki, where the EM II mansion yielded the bronze double-axe mould” (Branigan 1974: 132) which attests to the practise of *cire perdue* casting in EM II (Branigan 1974: 106). There are no other EBA moulds from Crete (Branigan 1968a: 43). Similar moulds in steatite have been found at Gournia and elsewhere, but none in metal or so elaborate.

Analysis: Presumably Seager’s ‘house against the cliff on the northwest side of the hill’ is what Zois calls the West House; this is the only house in this area of EM IIB date⁶¹ (see Zois 1976, maps III-VII). Seager and Branigan take the EM II period of the site as a single phase, counting all the EM II buildings as one large mansion, whereas Zois divides EM II and its buildings into two phases, A and B.

This mould is unusual for two reasons: it is the only published bronze mould from the EBA-MBA Aegean, and it is the earliest two-part mould. The mould is so unusually advanced for the EM II period that one is tempted to suspect that the stratigraphy may have been confused during Seager’s excavations. The EM IIB stratum, however, was apparently pure, and a type III axe was found in an EM IIB - III deposit at Vasiliki (though this type was not popular until MM III - LM I) (Branigan 1968a: 30-1).

Branigan’s inference of A from one mould is hasty; without further evidence this mould is I = BF.

⁶¹ The North House, which is to the northwest of the site is EM IIA.

F75. *Vasiliki (E. Crete): in southwest, later EM IIB rooms and MM IA house X (fig. 82)*

Workshop type: Weaving
Date: EM IIB+
Sources: AR 28 (1981-1982) 57.
Finds: *Tools:* large deposit of EM IIB and later loom weights.
Analysis: E or storage (M) (= DF).

F76. *Zakro (East Crete): south side of road to harbour, area of space Phi, under east wing of New Palace (figs. 83 and 84)*

Workshop type: Metal
Date: MM I - II
Sources: N. Platon 1971a: 225ff.; 1973: 150ff.; 1992: 298; AR 20 (1973-1974) 39-40; AR 22 (1975-1976) 31; Davaras 1980: 120; Chrysoulaki and L. Platon 1987: 77-84; L. Platon 1988: 182-7; 1993: 118-9, fig. 16.
Finds: *Specialised permanent production installation:* well-preserved metalworking furnace (N. Platon, cited in AR 20 (1973-1974) 39-40; 1992: 298) with a 'good sized' firing chamber, 4 air ducts covered inside with burnt clay plaster, and scoriae similar to those found over the whole area (N. Platon 1971a: 225ff; 1973: 150ff.).
Production waste: scoriae.
Other: pottery; prismatic steatite objects similar to those found in the stone workshop.
Analysis: *Chronology:* while N. Platon (1971a: 225ff.) dates the installation to the Protopalatial era and speculates that this area could have made up the west wing of an earlier palace, other, later, discussions call it MM IIIA (Davaras 1980: 120) or MM IIIA-B/LM IA (L. Platon 1988:

182ff.)⁶². N. Platon (1971a: 225ff.) mentions analogous kilns at Knossos, Phaistos and Vathypetro, but these are Neopalatial. Nevertheless, if the installation was found *beneath* the east wing of the Neopalatial palace, this surely indicates that it pre-dated the new palace. Its similarity to the other, later, kilns can be explained by this being one of the first occurrences of a new type of furnace which is more widely seen in the Neopalatial era.

Products: N. Platon states that this was a metalworking furnace, whereas others (Chrysoulaki and L. Platon 1987: 82; L. Platon 1993: 119) describe this as a kiln whose type of product is under discussion. L. Platon (1988: 186-7) argues that the 'slags' have not been analysed yet, the presence of channels shows a difference from known types of pottery kilns but does not necessarily mean that this is a bronze furnace, and that it is unlikely that there would ever have been enough bronze to warrant a chamber of this size and it would have been easier to regulate the temperature in a smaller chamber. Although these arguments do not exclude a furnace, they do preclude a conclusive identification of one. The argument that casting without crucibles is unlikely is less persuasive; crucibles were perhaps not found because they were not kept or left there when the furnace went out of use. Presumably the alternative use of the installation which L. Platon supposes is firing pottery. This is unproven as no wasters or concentrations of sherds have been mentioned in the vicinity. On balance, the likely scoriae, although unanalysed, make it a greater probability that this was a metalworking installation.

⁶² Presumably they are referring to the same installation; various locations, all vague, are given which seem to refer to the same area: under the east wing of the New Palace (N. Platon 1971a: 225); on the south side of the harbour road (N. Platon 1973-74: 39-40); to the NE of central entrance of palace (L. Platon 1988: 182-87); near space Phi (L. Platon 1993: 119); just outside Zakro palace (Davaras 1980: 120); the NE part of the excavated area (N. Platon 1992: 298).

Conclusion: N. Platon appears to be correct in using the terms “metal workshop” and “industrial installation” (A) as this workshop has a score of 16.

F77. Zakro (E.Crete): area of Space Phi (neighbouring the metal workshop (above) (N. Platon 1973: 150ff.)) (figs. 83 and 84)

Workshop type: Stone

Date: MM I - II

Sources: N. Platon 1973: 150ff.; 1992: 292-301; L. Platon 1993: 119, fig. 16.

Finds: *Unfinished products:* stone with a core removed by a cylindrical drill.

Raw material: small fragments of unworked steatite.

Tools: bone awl; 2 bronze pliers or tongs; mortar.

Finished products: worked fragments of steatite; many small steatite prismatic objects (use unknown), which probably constitute the essential production of the atelier (N. Platon 1973: 150; L. Platon 1993: 119); fragments of stone vases, conical goblets without handles, 2 loom weights.

Comments: N. Platon (1992: 298) refers to ‘workshops’ in the northeast part of excavated area. The area next to the harbour road, just east of the NE gate of the palace, was probably exclusively used for various artisan activities. The large space Phi seems to have been used for a short time as an atelier for stone work (L. Platon 1993: 119).

Analysis: No architectural remains are mentioned in connection with these remains which surely point to the presence of a workshop somewhere nearby. Value = 17; AF.

F78. Zakro (E.Crete): Room H, Old Palace, upper floor (figs. 83 and 84)

Workshop type: Textile

Date: MM I - II or MM IIIB

Sources: N. Platon 1971b: 237; L. Platon 1988: 220-1.

Finds: *Tools:* several loom weights in the fill (cuboid, pyramidal, trapezoidal, parallel-sided, tongue-shaped, disc-shaped).

Other: pieces of stone vases, a rubber, a piece of stalactite, ordinary clay vessels.

Analysis: *Chronology:* although the loom weights were found in a layer dated to MM IIIB, basement room H belongs to a building which extended under East Wing of the new palace. N. Platon suggests that this is part of the Old Palace.

L. Platon rightly remains cautious about whether this represents a workshop.⁶³ The chronology is dubious: if the finds were in the MM IIIB fill of room H, this suggests that whatever the date of the building, the material that fell into it was later. Moreover, several loom weights do not mean a workshop. Probably M (storage?).

⁶³ N. Platon (1971b: 237) describes the contents of room H without suggesting that it was a workshop. He does go on to suggest that the neighbouring room to the east of room M (which is room N; room H is to the *west* of room M) was probably a workshop because it contains parts of stone tools and stone vase fragments. Presumably room N is also Protopalatial; the evidence for a (stone?) workshop there is not convincing.

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Maps

CENTRAL GREECE

1. Aliveri (Euboea) (Neo-EH)
2. Askitario (Attica) (EH II)
3. Ayios Dimitrios (Euboea) (EH II)
4. Ayios Kosmas (Attica) (EH II, MH)
5. Ayios Nikolaos (MH)
6. Eretria (Euboea) (EH?)
7. Eutresis (Boeotia) (EH-MH)
8. Kirrha (Phocis) (EH-MH)
9. Kitsos Cave (Attica) (FN)
10. Kolonna (Aegina) (EH II-MH)
11. Koropi (Attica) (EH II-III)
12. Laurion (Attica) (EH II)
13. Lepoura Magoula (Euboea) (EH?)
14. Lefkas (EH II)
15. Lithares (Boeotia) (EH)
16. Manika (Euboea) (EH II)
17. Marathon (Attica) (MH)
18. Nea Makri (Attica) (MN)
19. Porto-Boufalo (Euboea) (EH)
20. Raphina (Attica) (EH II)
21. Rouf (Attica) (LN/EBA?)
22. Territory of Stratos (Acarnania):
Valley of the Lepenous (Prehistoric)
23. Thebes (Boeotia) (EH II/III, MH)
24. Thorikos (Attica) (EH II, MH)

The PELOPONNESE

25. Alepoutrypa (Laconia) (LN)
26. Asine (Argolid) (MH)
27. Ayios Stephanos (Laconia) (EH-MH)
28. Corinth (Corinthia) (EH)
29. Fourmi: F32 (Argolid) (EH II)
30. Franchthi (Argolid) (Neo)
31. Kastria (Achaia) (LN, EH II-III)
32. Lerna (Argolid) (EH II-III, MH)
33. Malthi (Messenia) (MH-LH)
34. Menelaion (Laconia) (MH)
35. Midea (Argolid) (MH)
36. Nichoria (Messenia) (MH I)
37. Perachora (Corinthia) (EH II)
38. Sakovouni (Arkadia) (Neo)
39. Sallou (Ayiorytika Mantineias
Arkadia) (EH II-MH I)
40. Steno (Arkadia) (EH)
41. Tiryns (Argolid) (EH)
42. Zygoouries (Corinthia) (EH II)



Map 2. Sites in Central Greece and the Peloponnese



MACEDONIA

- 1. Ayios Mamas (EBA)
- 2. Dikili Tash (Neo; EBA/MBA)
- 3. Dimitra (Neo)
- 4. Kitrine Limne (LN)
- 5. Makri (EN-MN)
- 6. Makrygialos (LN)
- 7. Mandalo (FN)
- 8. Nea Nikomedeia (EN/MN)
- 9. Olynthus (LN?)

- 10. Petralona (EB II)
- 11. Polichrono (EB II-III)
- 12. Saratse (EBA-MBA)
- 13. Sitagroi (LN-EBA)
- 14. Toumba Nea Anchialos (EBA)
- 15. Vardarofsa (EBA+)

THESSALY

- 16. Achilleion (EN - MN)
- 17. Dimini (Neo)

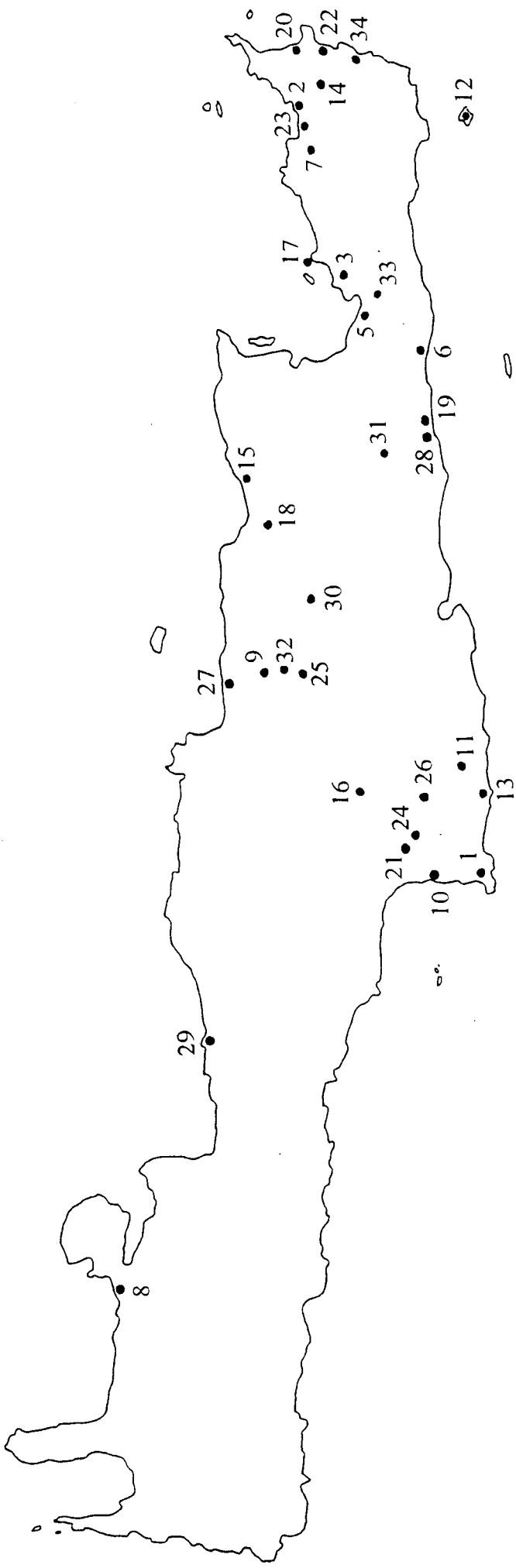
- 18. FS 30 (Middle/Lower Palaeo)
- 19. Klithi (Lower Palaeo)
- 20. Larisa (EN)
- 21. Lianokladhi (EH)
- 22. Megalo Monastiri region (Lower Palaeo)
- 23. Peřakia Magoula (MH)
- 24. Rakhmani (FN)
- 25. Sesklo (Neo, EMA, MBA)
- 26. Tsangit (MN)
- 27. Volos Kastro (EH)

Map 1. Sites in Macedonia and Thessaly



- | | |
|--|---|
| 1. Dhespotikon: Cheiromylos (EC I) | 13. Naxos: Aila (MC?) |
| 2. Keos: Ayia Irini (FN, EC, MC) | 14. Naxos: Apollona (EC) |
| 3. Keos: Ayios Simeon (EC?) | 15. Naxos: Avdheli (EC) |
| 4. Keos: Kephala (FN) | 16. Naxos: Zas Cave (FN) |
| 5. Keos: Kephala, Site 39 (FN) | 17. Paros: Avyssos (EC) |
| 6. Keos: Paoura (FN) | 18. Paros: Naoussa (BA?) |
| 7. Kythnos: Ayios Ioannis, Tsoulis (EC II) | 19. Paros: Pyrgos (EC?) |
| 8. Kythnos: Skouries (EC II) | 20. Saliagos: outside main building (LN-FN) |
| 9. Makronisos: Leondari (EC) | 21. Seriphos: near Kephala (EC) |
| 10. Melos: Demenegaki (Meso+) | 22. Siphnos: Ayios Sostis (EC) |
| 11. Melos: Phylakopi (EC-MC) | 23. Syros: Chalandriani (EC II?) |
| 12. Melos: Sta Nychia (Meso+) | 24. Syros: Kastri (EC II) |

Map 3. Sites in the Cyclades



1. Ayia Kyriaki EM
2. Ayia Photia (EM I-IIA, MMIA)
3. Chrysokamino (EM III)
4. Gavdos (unspecified)
5. Gournia (EM-MM?)
6. region of Ierapetra (up to MM I-II)
7. Khamaizi (MM IA)
8. Khamia (EM II, MM I-II)
9. Knossos (Neo, EM I/IIA, MM)
10. Kommos (MM IB/II)
11. Koumasa (EM-MM?)
12. Kouphonisi (MM II)

13. Lebena (EM-MM?)
14. Magasa (LN)
15. Mallia (EM II, MM I-II)
16. Marathokephalon EM I-MM I
17. Mochlos (EM-MM)
18. Mokhos (EM II/MM I-II)
19. Myrtos Fournou Korifi (EM IIA)
20. Palaikastro (EM-MM)
21. Patrikies (MM IA)
22. Peleketon Cave (Neo)
23. Petras (EM II)
24. Phaistos (MM)

25. Phourni (Archanes) (EM II)
26. Platanos (EM-MM)
27. Poros Katsambas (EM I-II, MM)
28. Pyrgos (MM II/ MM III)
29. Rethymnon (MM)
30. Samba (EM II-MM II/LBA)
31. Selakanos (EM II-MM II)
32. Silamos MM I-II/LM
33. Vasiliki (EM IIB+)
34. Zakro (MM I-II)

Map 4. Sites in Crete



Key

- inferred workshop
- two inferred workshops
- four workshops and three inferred workshops

Map 5. Distribution of MBA stone workshops



Key

- workshop/kiln
- three workshops/kilns

Map 6. Distribution of Neolithic pottery workshops



Key

- workshop/kiln
- inferred workshop/kiln
- two inferred workshop/kilns

Map 7. Distribution of EBA pottery workshops



Key

- workshop/kiln
- inferred workshop/kiln
- two workshops/kilns

Map 8. Distribution of MBA pottery workshops



Key

- kiln
- possible kiln
- at least two kilns
- two possible kilns

Map 9. Distribution of kilns



Key

- workshop
- inferred workshop

Map 10. Distribution of Neolithic metal workshops



Key

- workshop
- inferred workshop
- one workshop and one inferred workshop

Map 11. Distribution of EBA metal workshops



Key

- workshop
- inferred workshop
- three workshops and one inferred workshop

Map 12. Distribution of MBA metal workshops



Key

- mine
- possible mine

Map 13. Distribution of mines



Key

- possible house
- four houses

Map 14. Distribution of craftsmen's houses



Key

- possible grave
- two possible graves
- grave
- one grave and one possible grave

Map 15. Distribution of craftsman's graves



Key

- possible hoard
- hoard
- three hoards

Map 16. Distribution of hoards

Figures

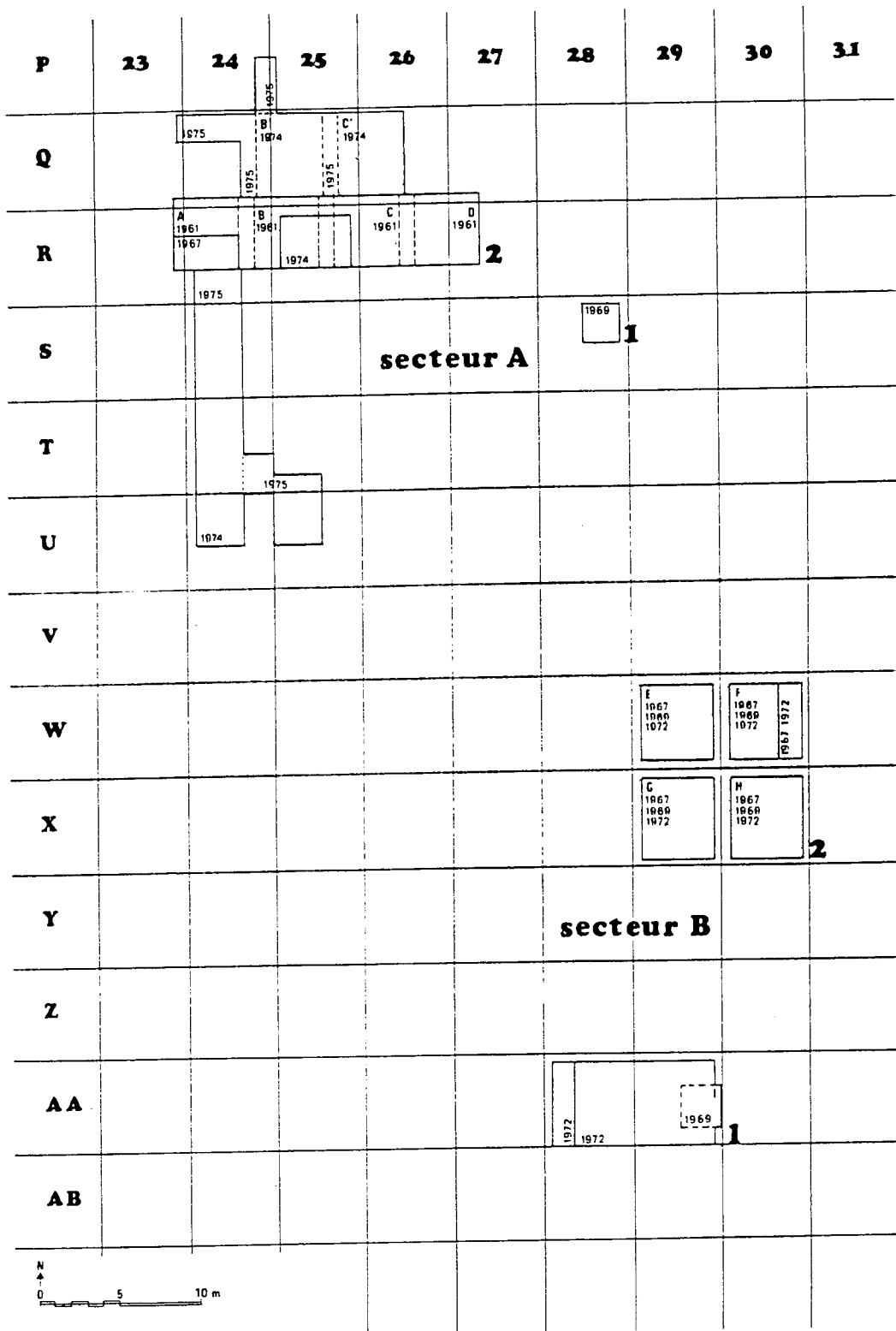


Fig. 1. Dikili Tash. Plan of the site. (Deshayes 1970, fig.1).

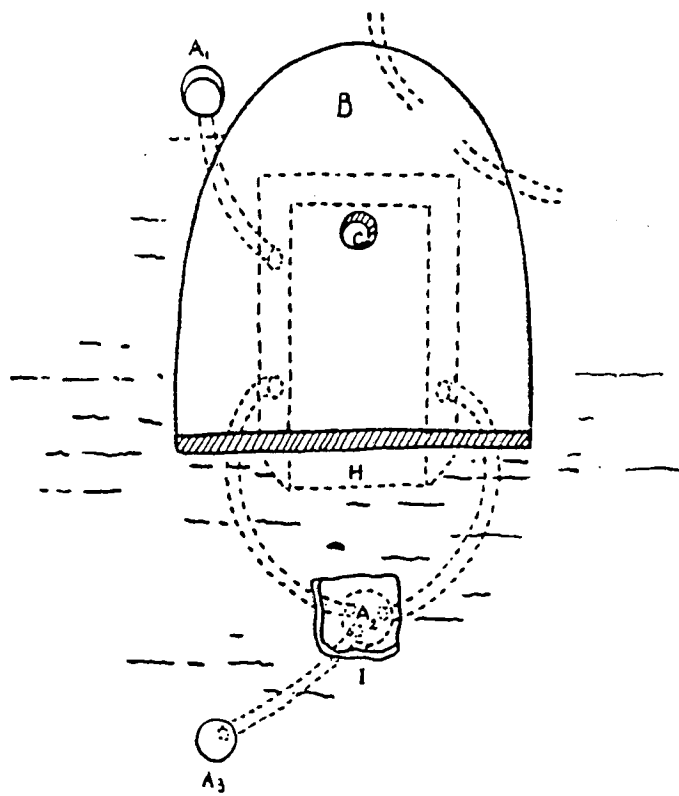


Fig. 2. Olynthus. Plan of the floor (B), fireplace (H) and channels of the kiln (Mylonas 1929, fig. 16).

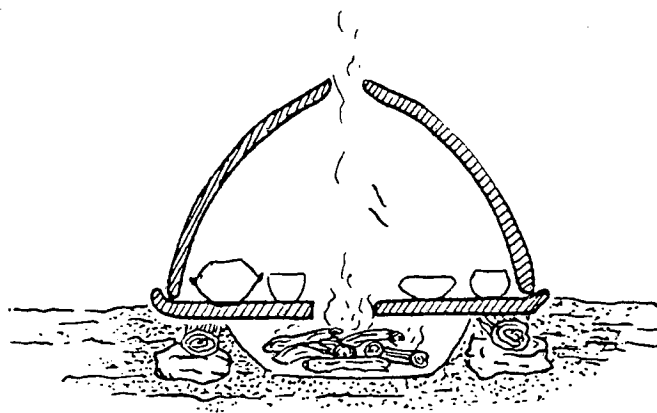


Fig. 3. Olynthus. Reconstruction of the kiln (Mylonas 1929, fig. 17).

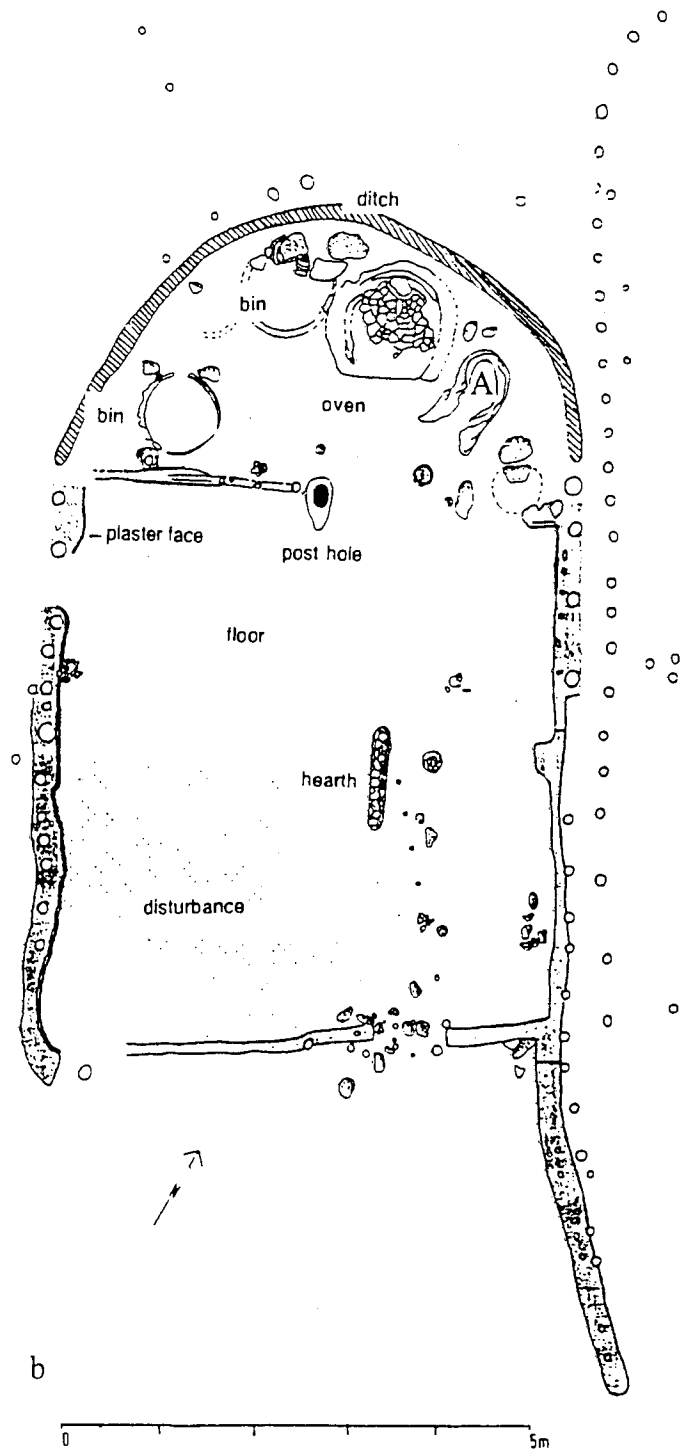


Fig. 4. Sitagroi. Plan of the Burnt House (after Elster 1997, Plate III).
Oven 2 marked A.

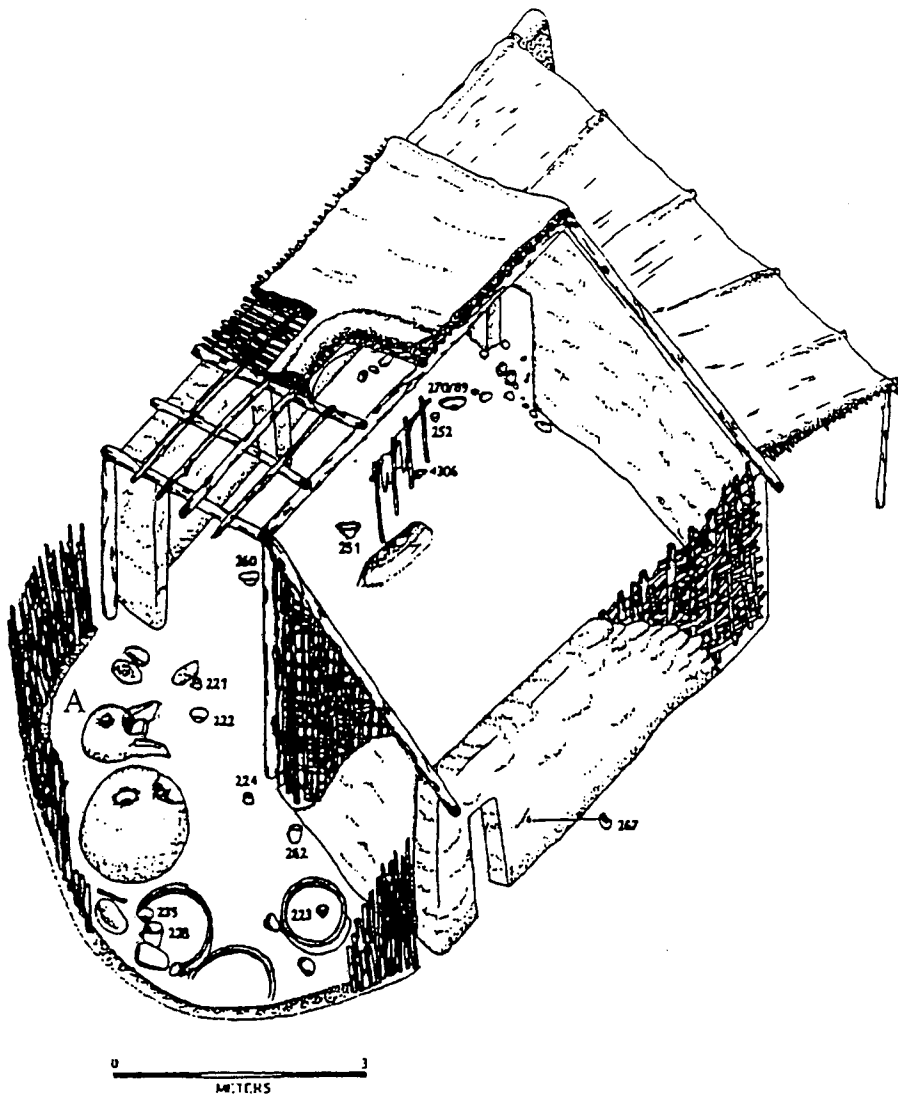


Fig. 5. Sitagroi. Reconstruction of the Burnt House (after Elster 1997, Plate III).
Oven 2 marked A.

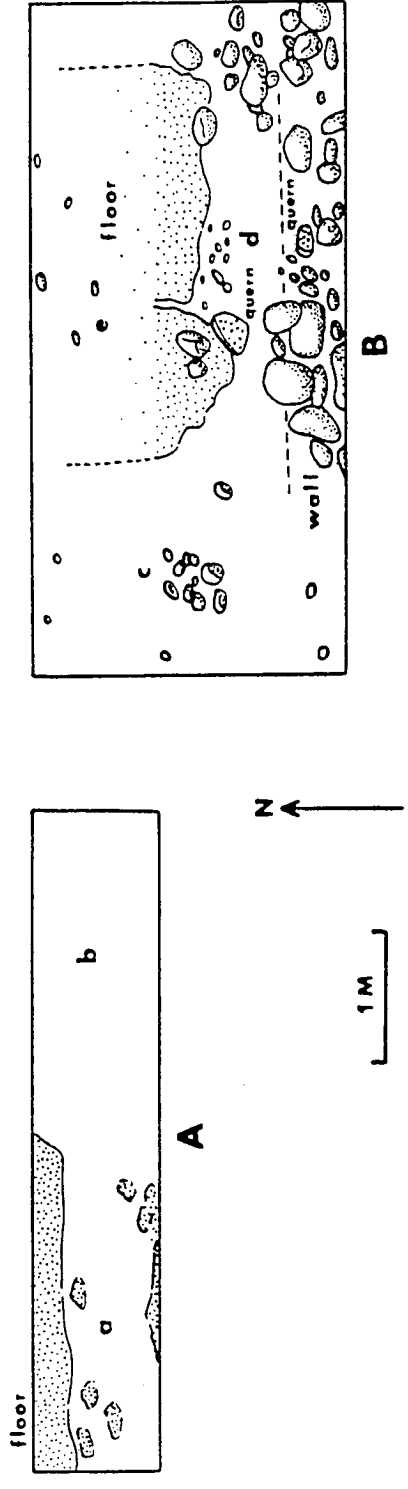


Fig. 6. Achilleion. Phase late IB, Squares A and B. (a) cluster of tools, (b) possible extension of work area, (c) work area, (d) food preparation area and tools, (e) figurines, plates and fine bowls (after Gimbutas 1989 fig. 4.4).

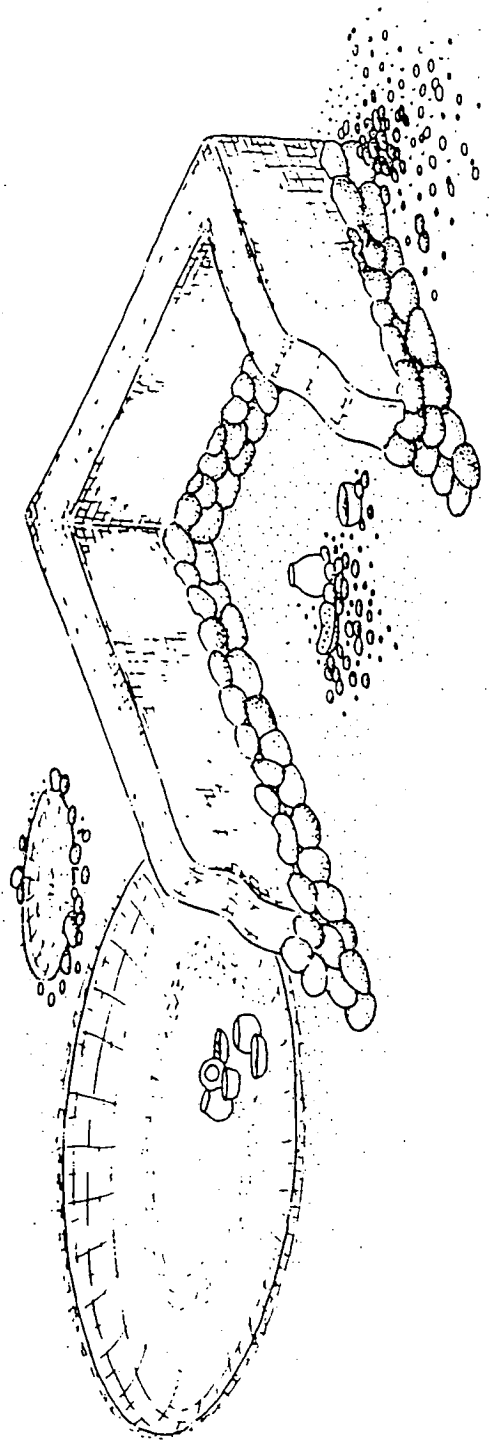


Fig. 7. Achilleion. Phase late IB, reconstruction of Squares A and B (Gimbutas 1989, fig. 4.5). Possible work area marked A.

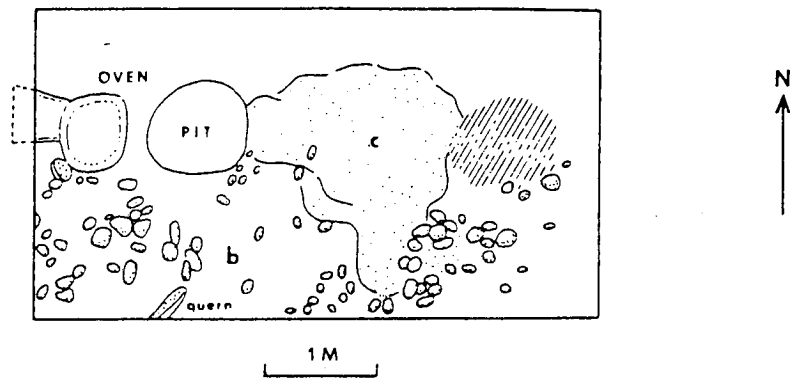


Fig. 8. Achilleion. Phase IIA, plan of Square B (after Gimbutas 1989 fig. 4.7).

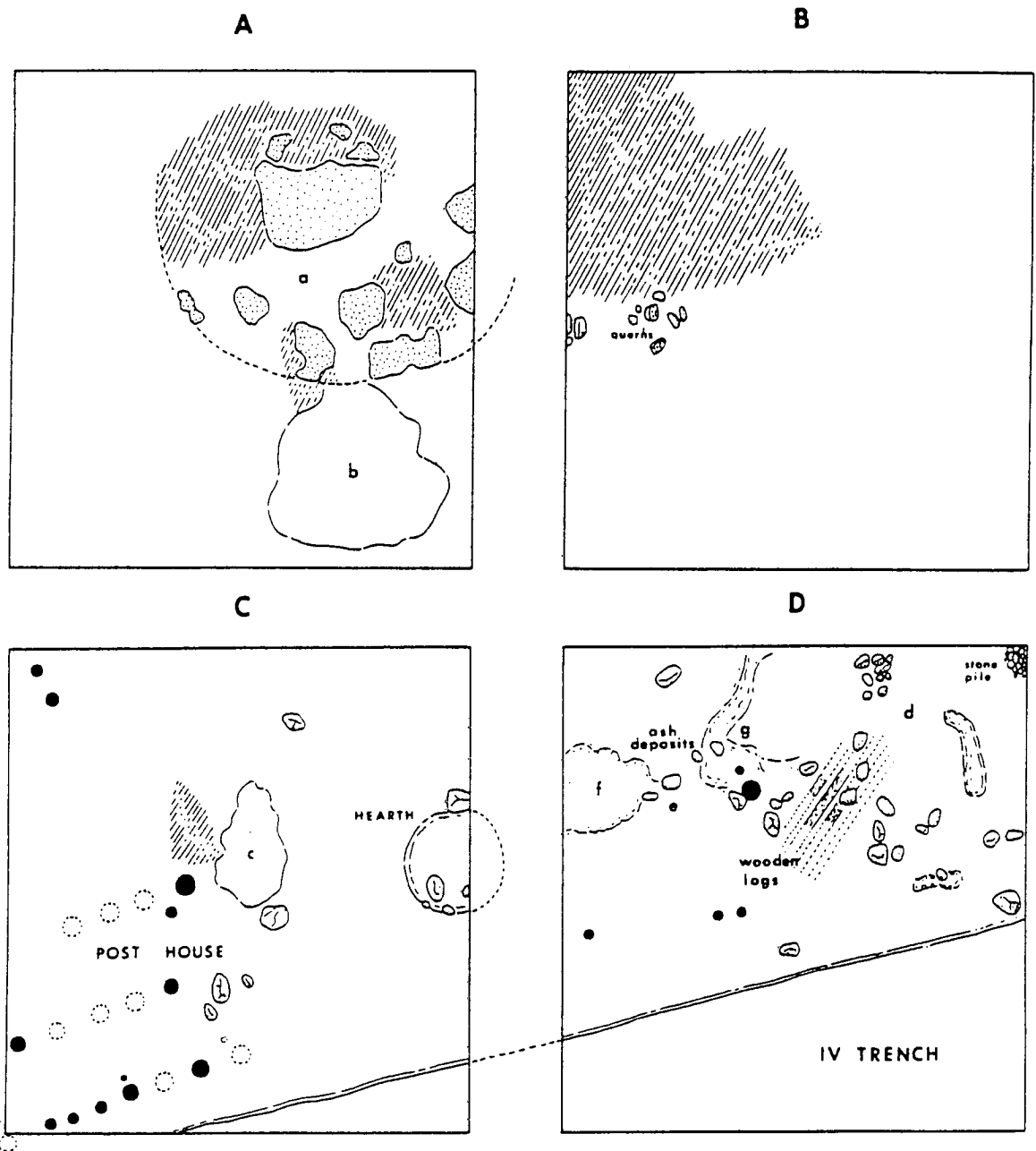


Fig. 9. Achilleion. Phase IIB, plan of Squares A to D. (a) large circular hearth, (b) hardened surface with food preparation equipment, (c) hearth surface, (d) concentration of chipped stone tools, (e) assortment of tools, (f) ash from hearth, (g) concentration of bone tools (after Gimbutas 1989 fig. 4.11).

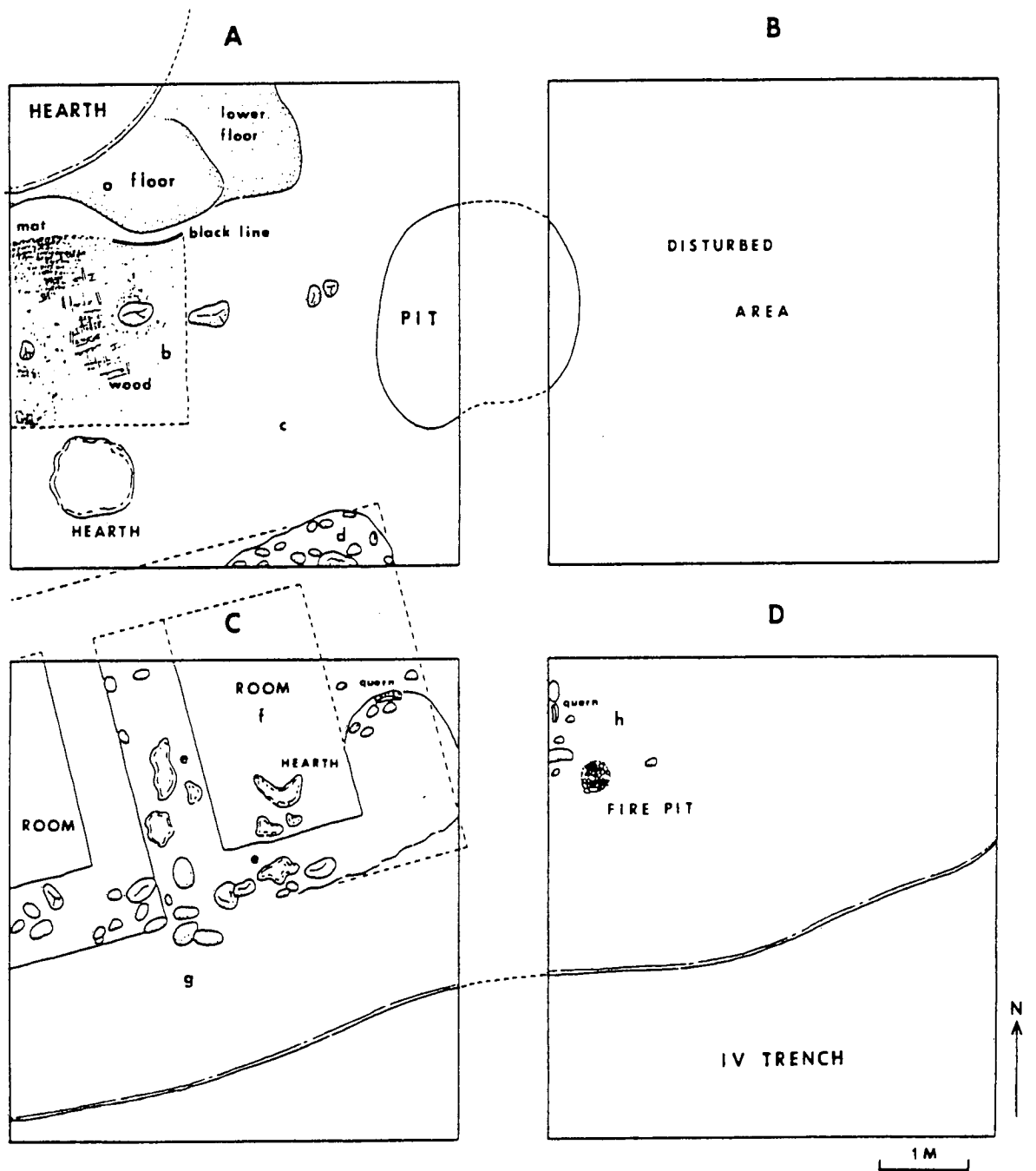


Fig. 10. Achilleion. Phase early IVA, plan of Squares A to D. (a) plaster floor with tools, (b) reed mat and wood remains, (c) courtyard, (d) foundation fill, (e) trenches with evidence of foundations, (f) blade tools and axe near hearth, fine pottery (g) refuse area, (h) work area: kitchen activities and tool preparation (after Gimbutas 1989 fig. 4.33).

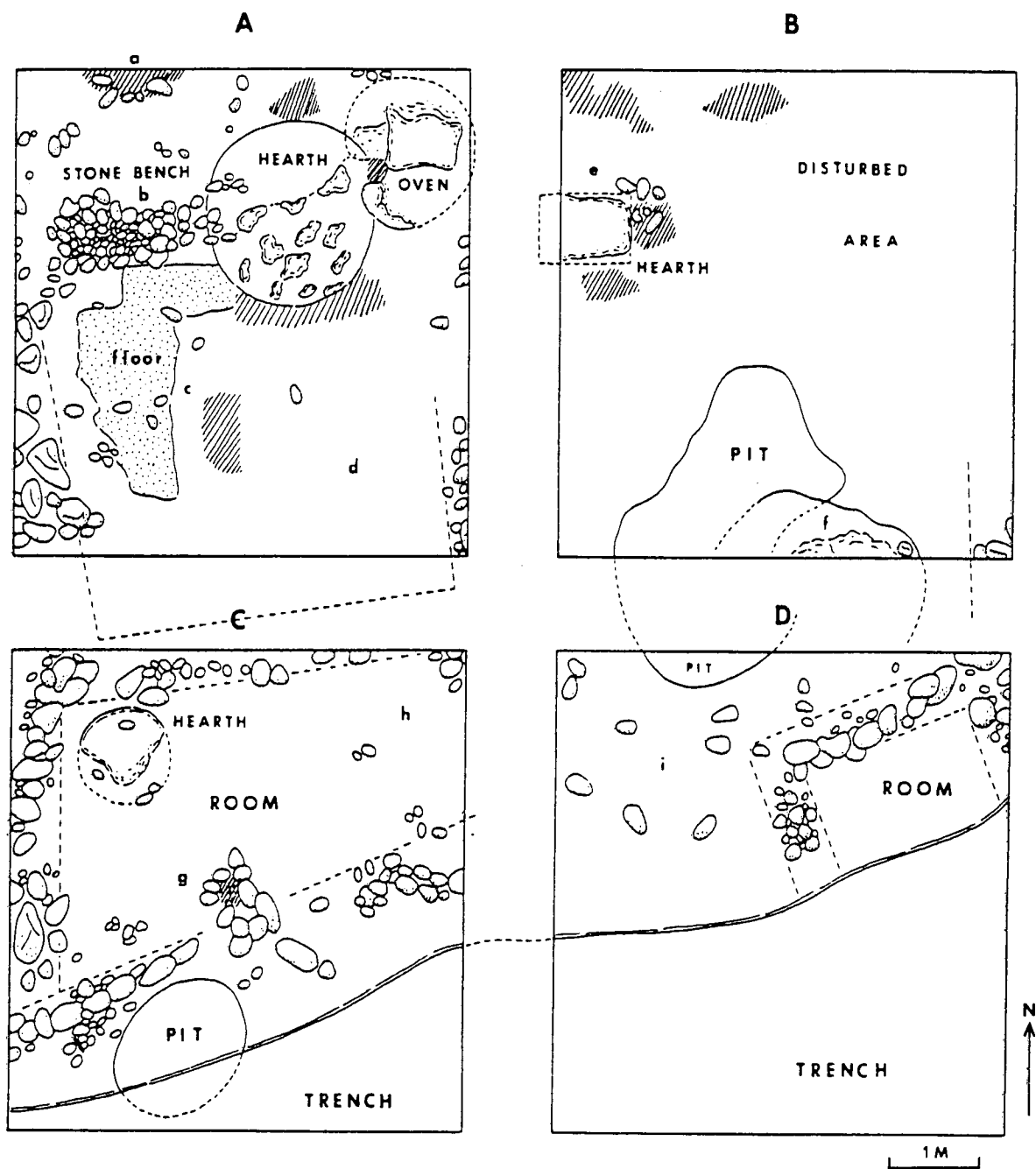


Fig. 11. Achilleion. Phase middle IVA, plan of Squares A to D. (a) burning area containing bones and burned pottery, (b) cluster of figurines and painted pottery on stone bench, (c) concentration of obsidian and chert blades on plaster floor, (d) room or courtyard full of refuse, (e) fire-blackened areas, (f) discarded hearth fragments in pit, (g) tools and figurines, (h) clean, empty part of house, (i) house rubble (Gimbutas 1989 fig. 4.39).

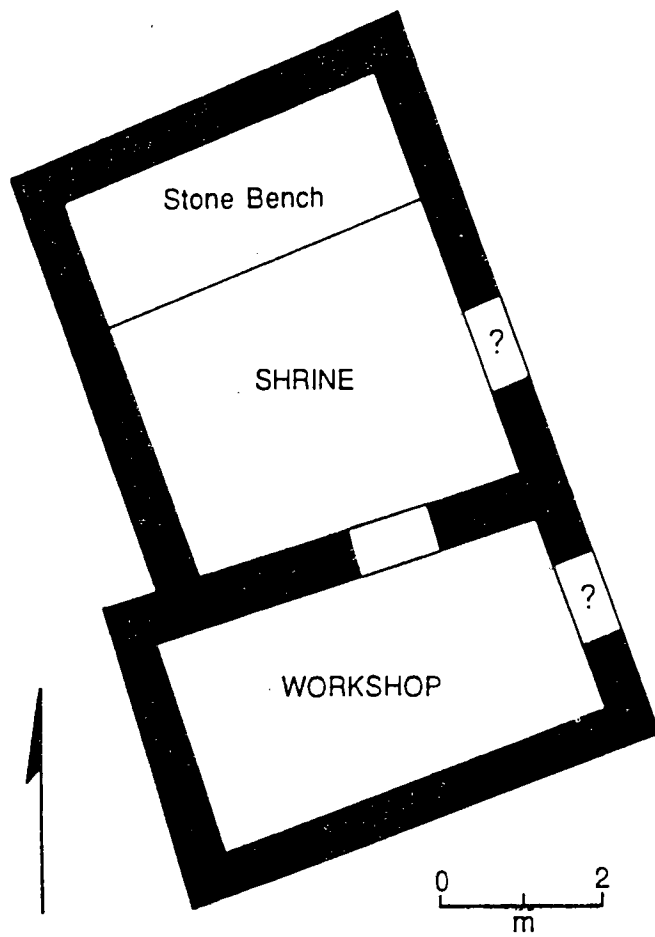


Fig. 12. Achilleion. Phase middle IVA, plan of temple (Gimbutas 1989 fig. 7.76).

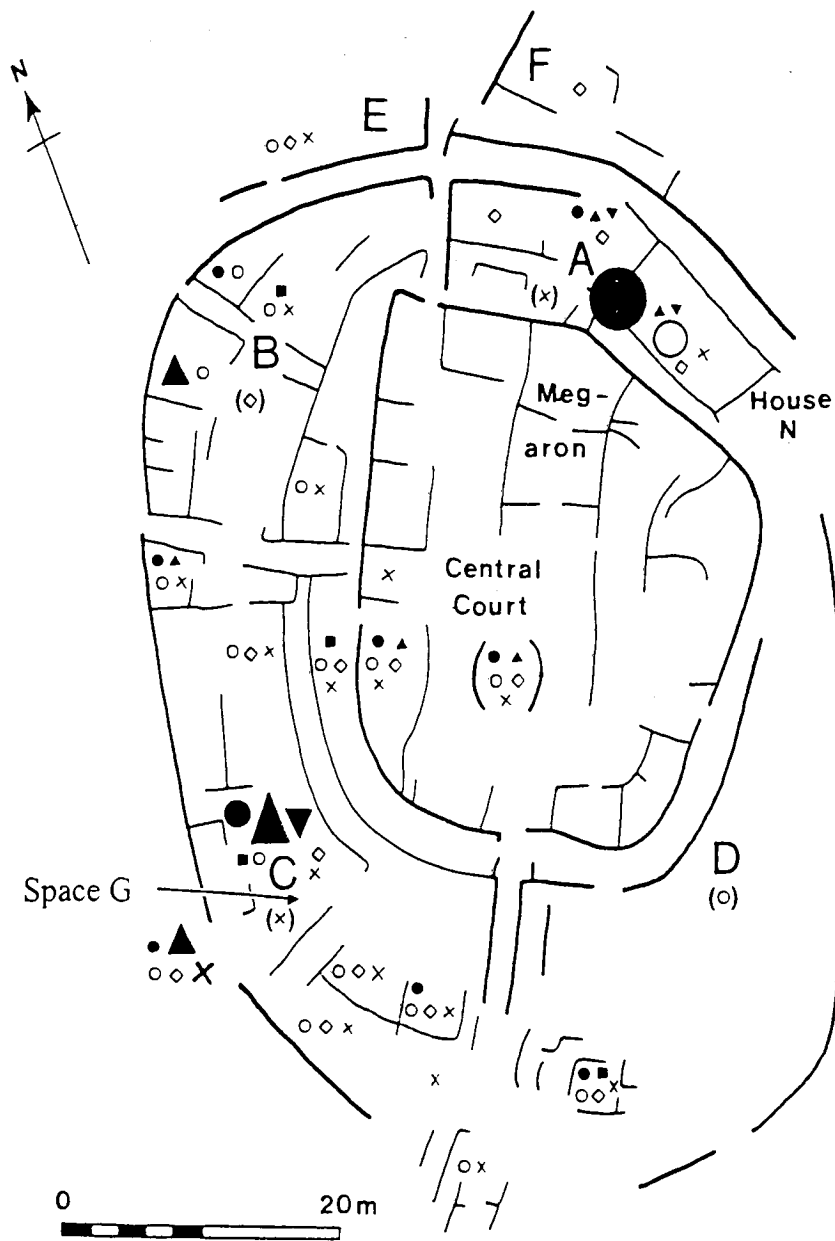


FIGURE 2. Plan of the recently excavated part of the late Neolithic settlement at Dimini, showing the distribution of *Spondylus* objects and manufacturing waste.

	1-5	6-10	>10 pieces
finished rings	•	●	●
finished buttons	▲	▲	▲
finished cylinder beads	▼	▼	
other finished pieces	■		
unfinished rings and manufacturing waste	○	○	
manufacturing waste from small objects	◊		
indeterminate worked <i>Spondylus</i> shell	x	X	
provenience approximate	()		
domestic areas A-F	A-F		

Fig. 13. Dimini. Plan of the LN settlement, showing the distribution of *Spondylus* objects and production debris (after Halstead 1993, fig. 2).

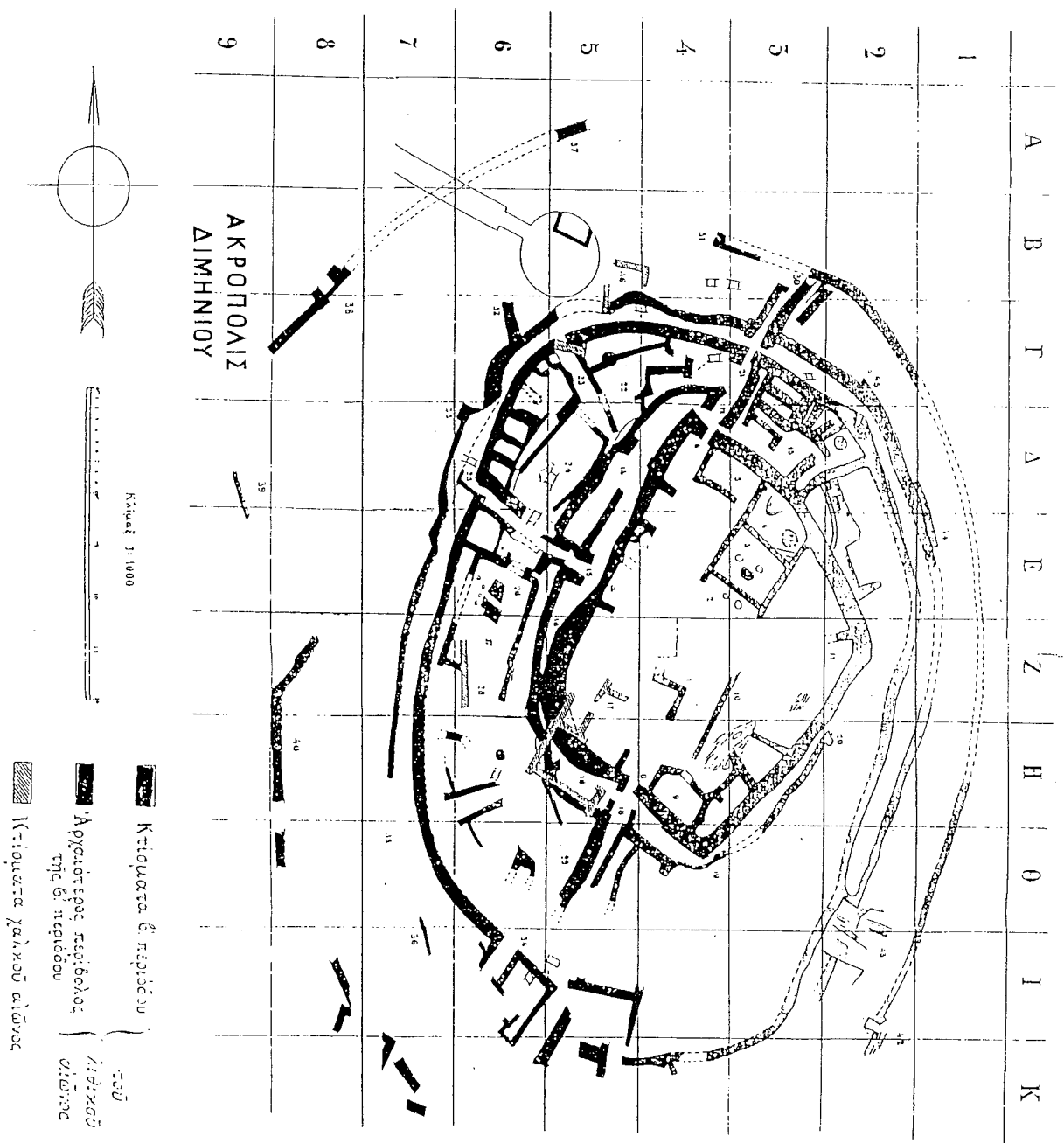


Fig. 14. Dimini. Plan of the settlement (after Tsountas 1908, plate II).

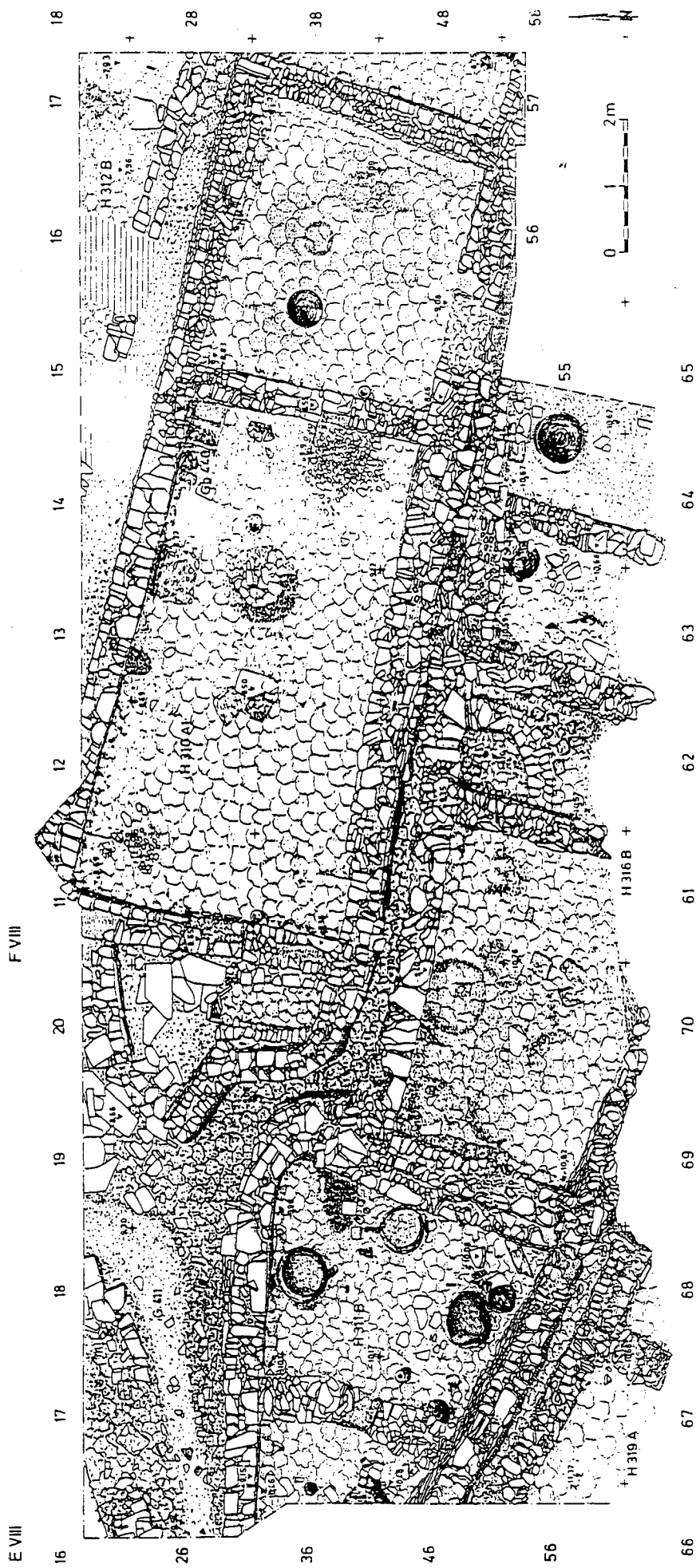


Fig. 15. Pefkakia Magoula. Plan of house 316B (Maran 1992, plan VIIA).

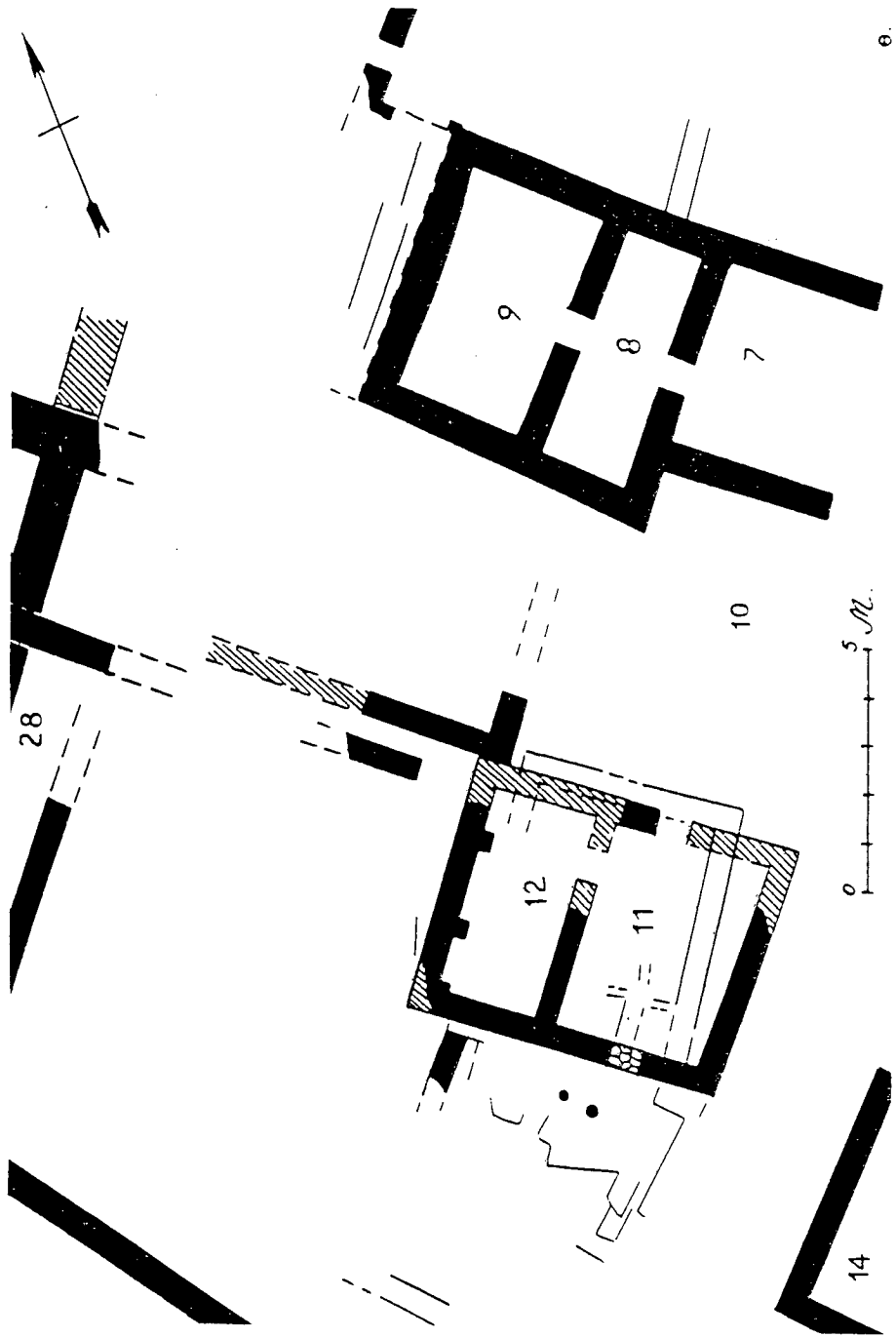


Fig. 16. Sesklo. Plan of House 11-12 (Theocharis 1968, fig. 2).



Fig. 17. Askitarion. Plan of the main area (Hägg and Konsola 1986, fig. 16).

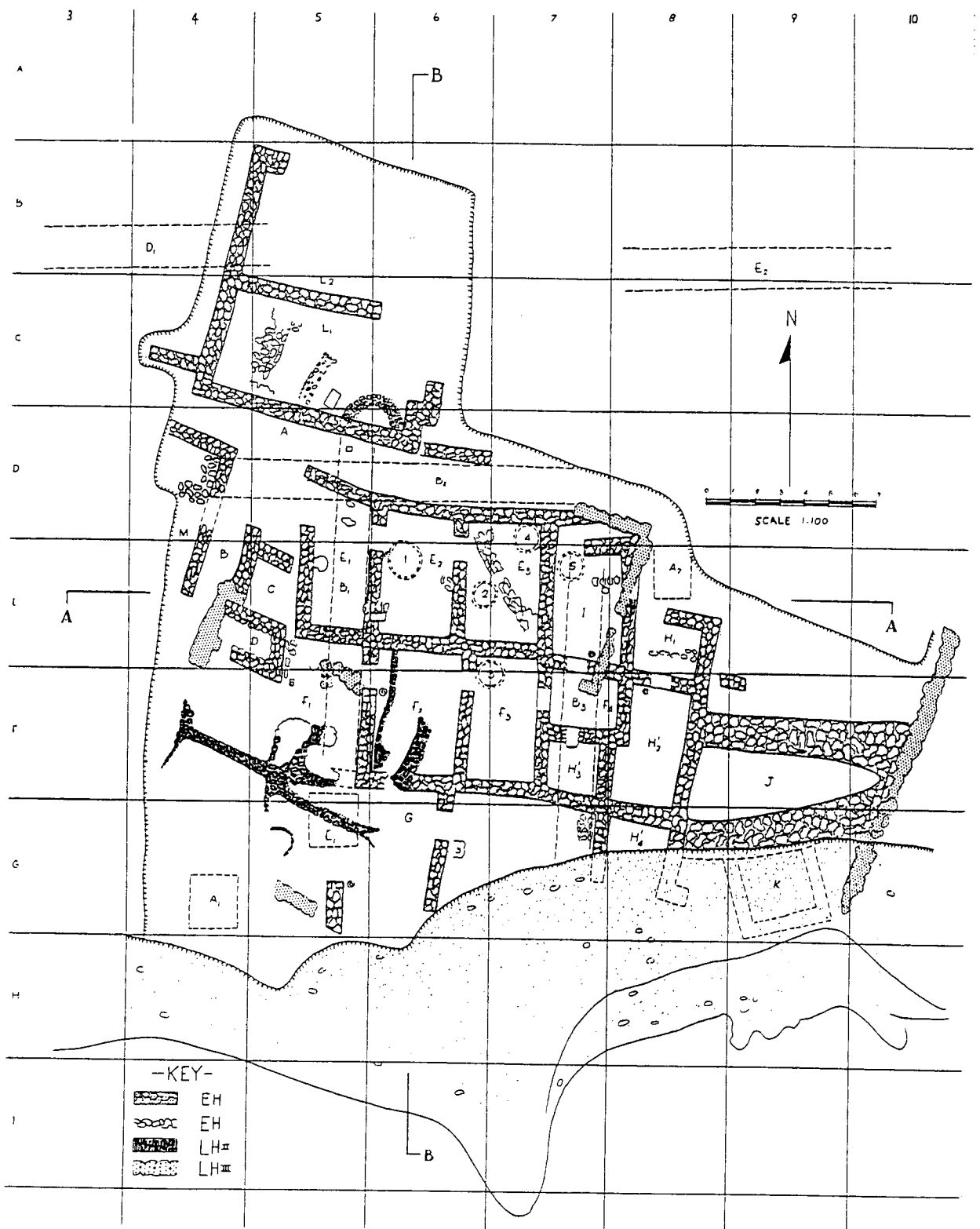


Fig. 18. Ayios Kosmas. Plan of the settlement (after Mylonas 1959, fig. 1).

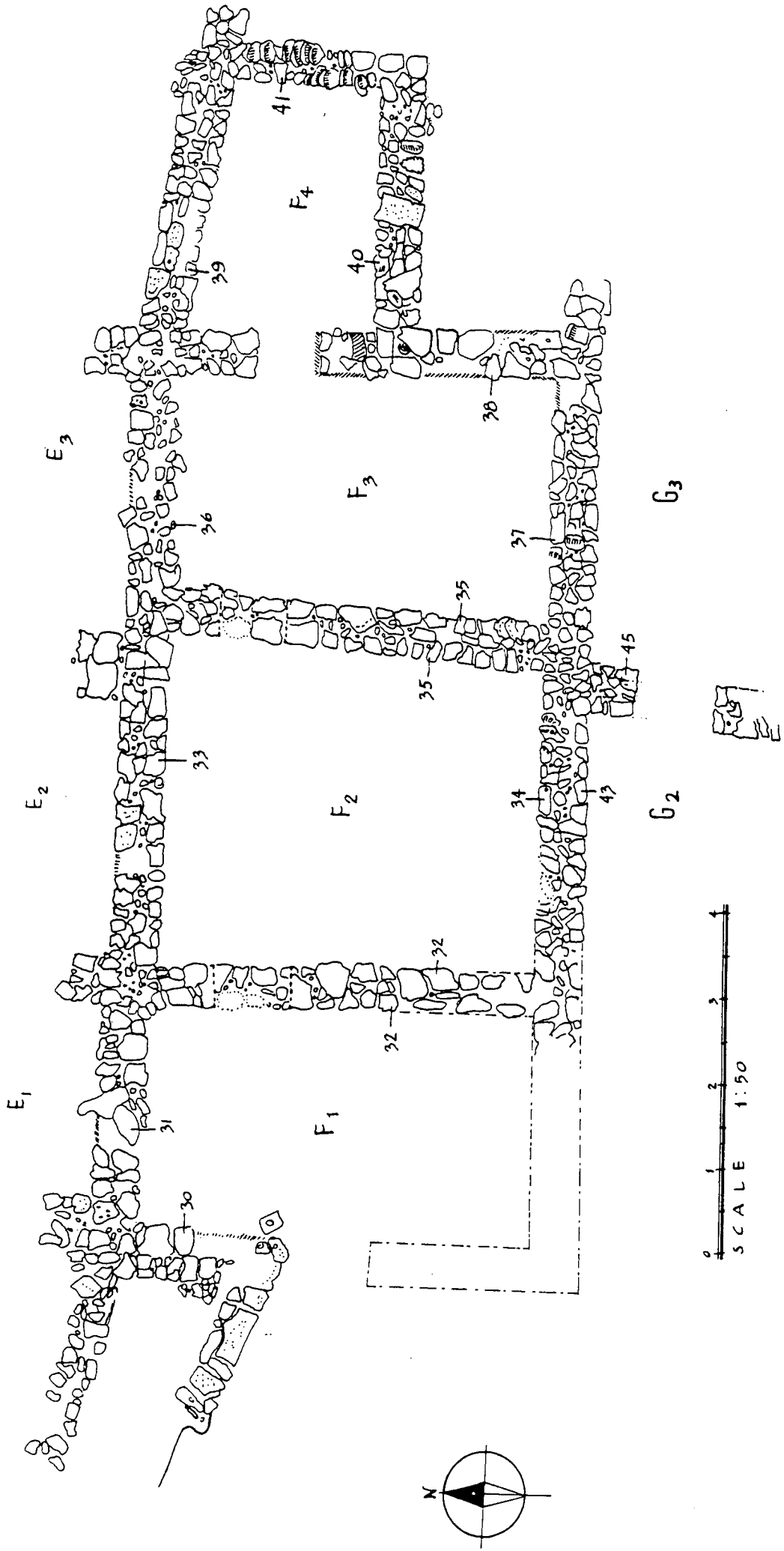


Fig. 19. Ayios Kosmas. House F (Mylonas 1959, fig. 8).

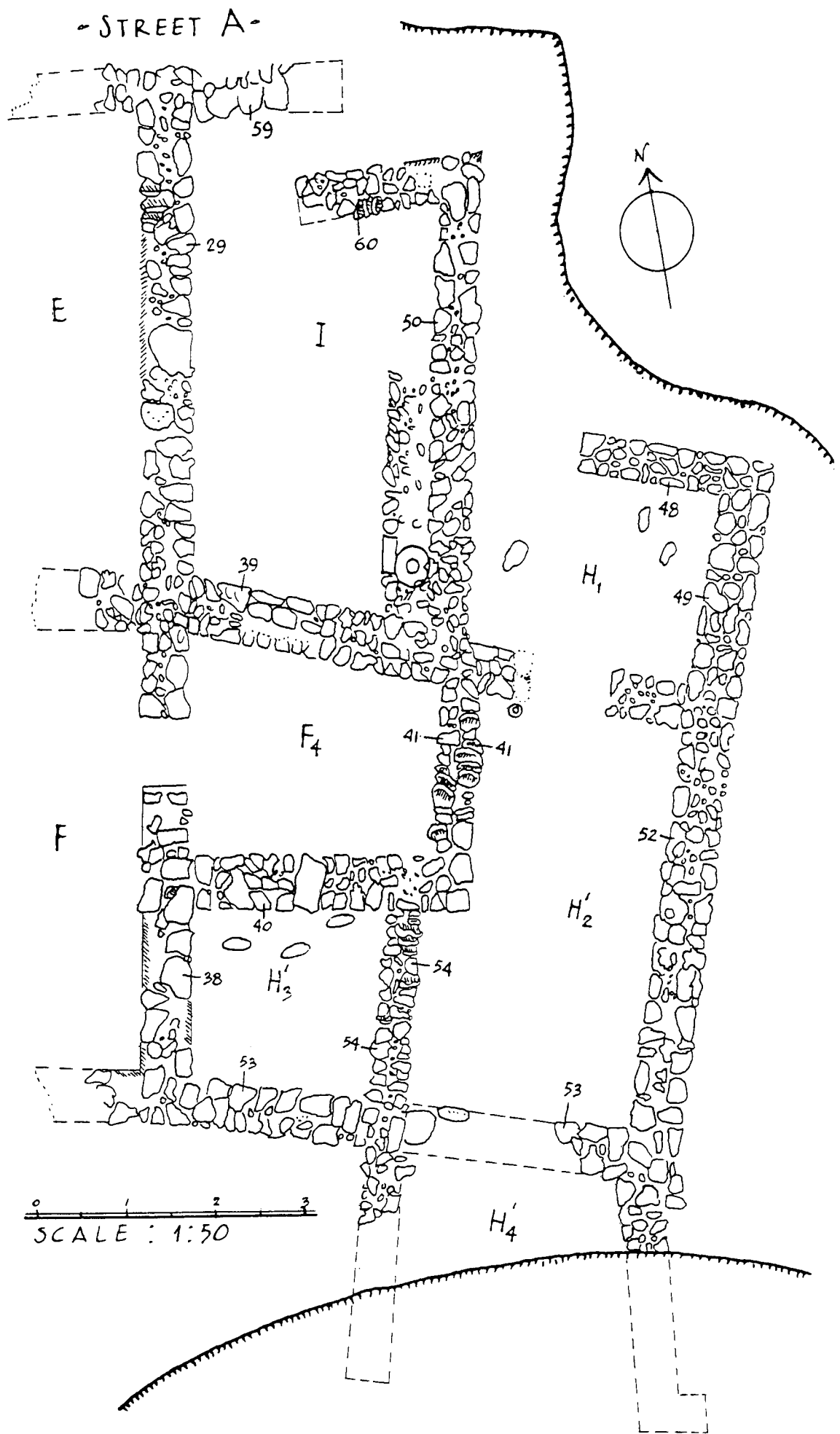
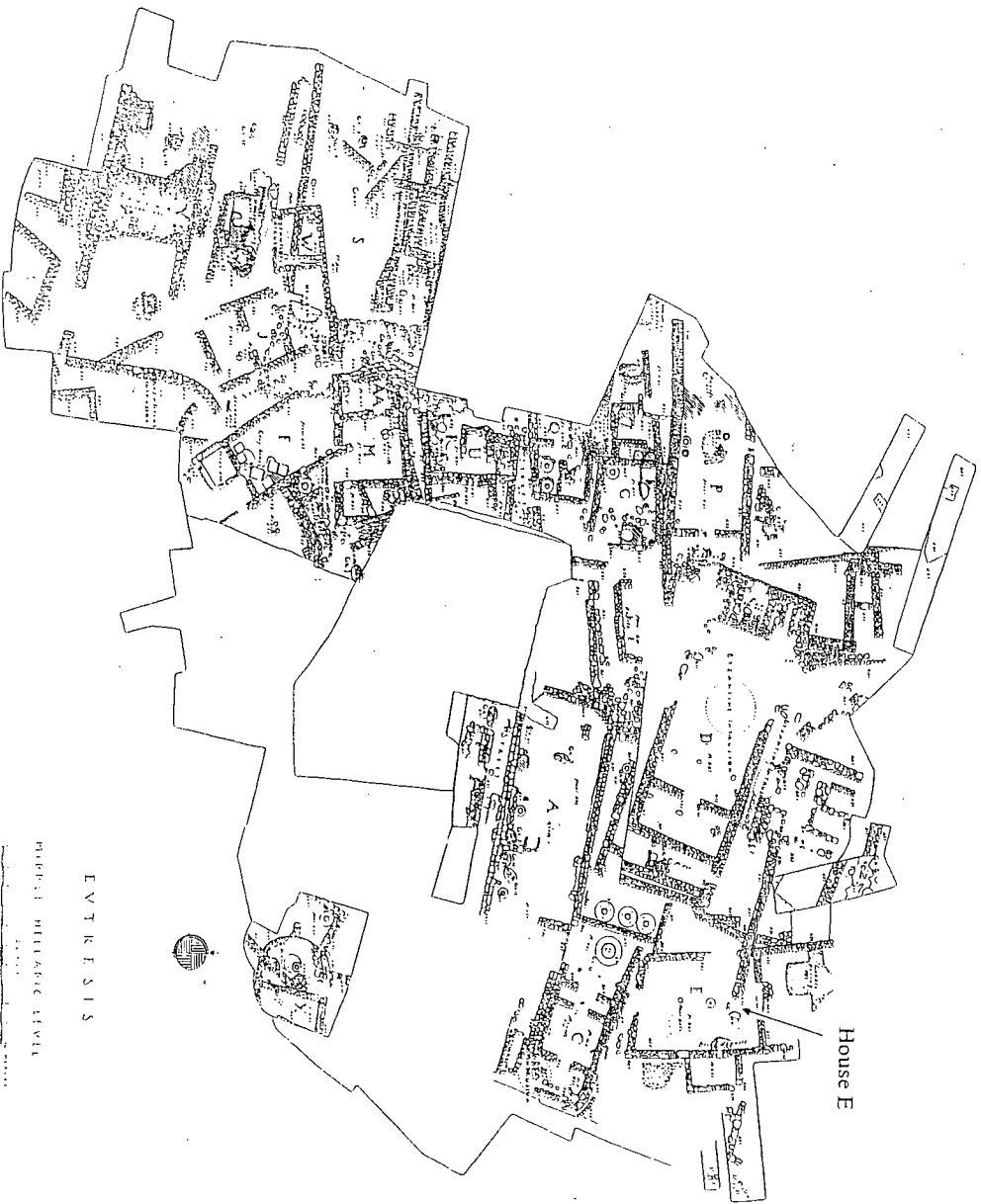


Fig. 20. Ayios Kosmas. House H (Mylonas 1959, fig. 11).



EUTRESIS

HIGHER MIDDLE LEVEL

Fig. 21. Eutresis. Plan of the site (after Goldman 1931, plan IIA).

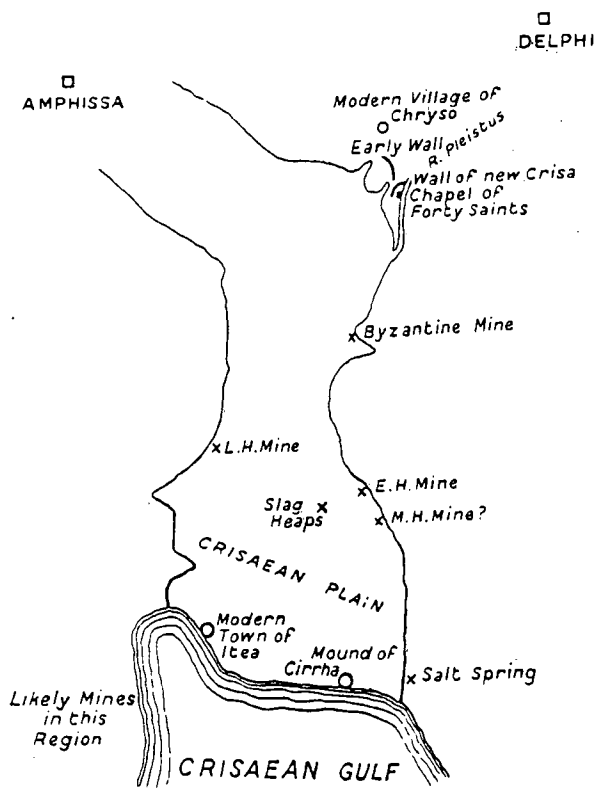


Fig. 22. Kirrha. Sketch plan of Kirrha showing mines and slag (Davies 1929, fig. 1).

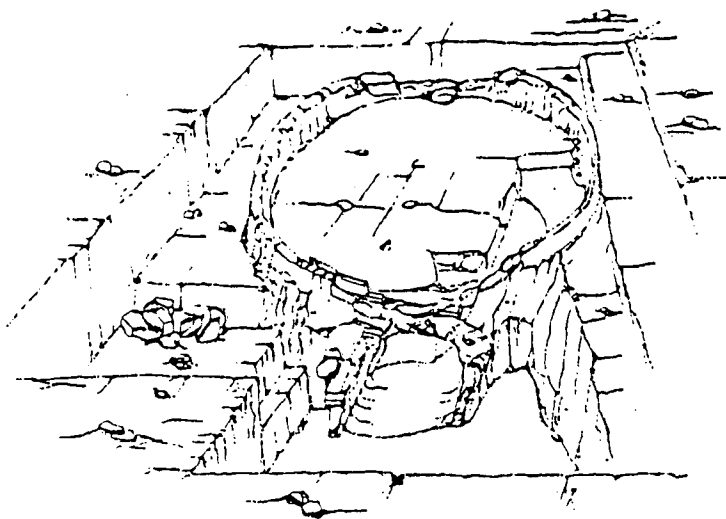


Fig. 23. Kirrha. Reconstruction of a kiln (Chatzimichail-Skorda 1989, fig. 10).

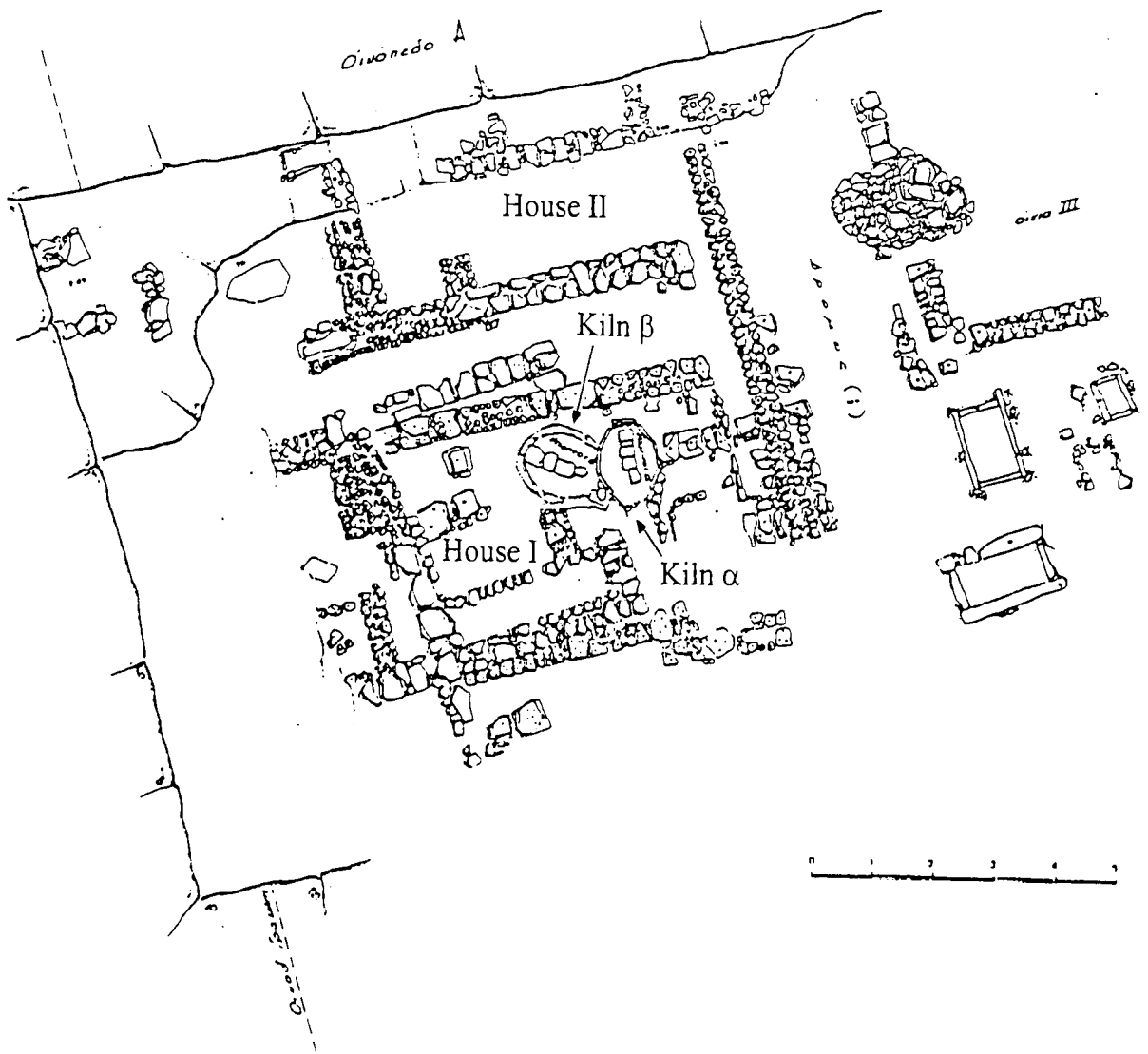


Fig. 24. Kirrha. Plan of Houses I and II (after Chatzimichail-Skorda 1989, fig. 10).

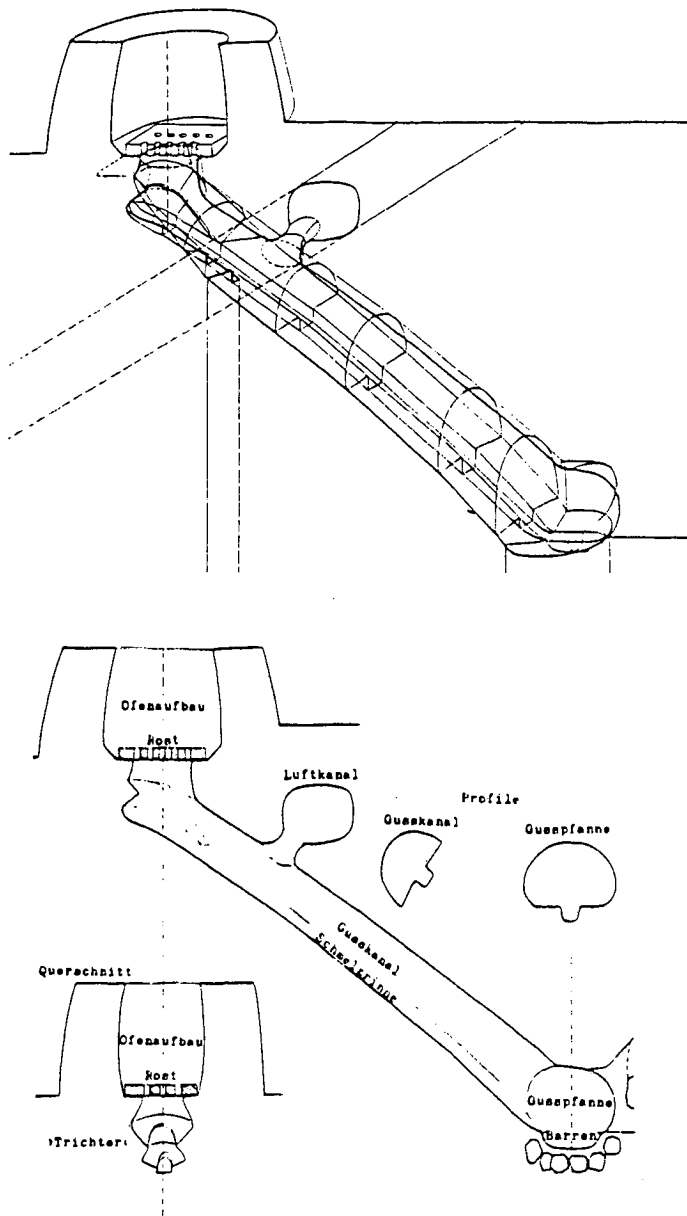


Fig. 25. Kolonna IV. Smelting oven, reconstruction (Walter 1983, fig. 39).

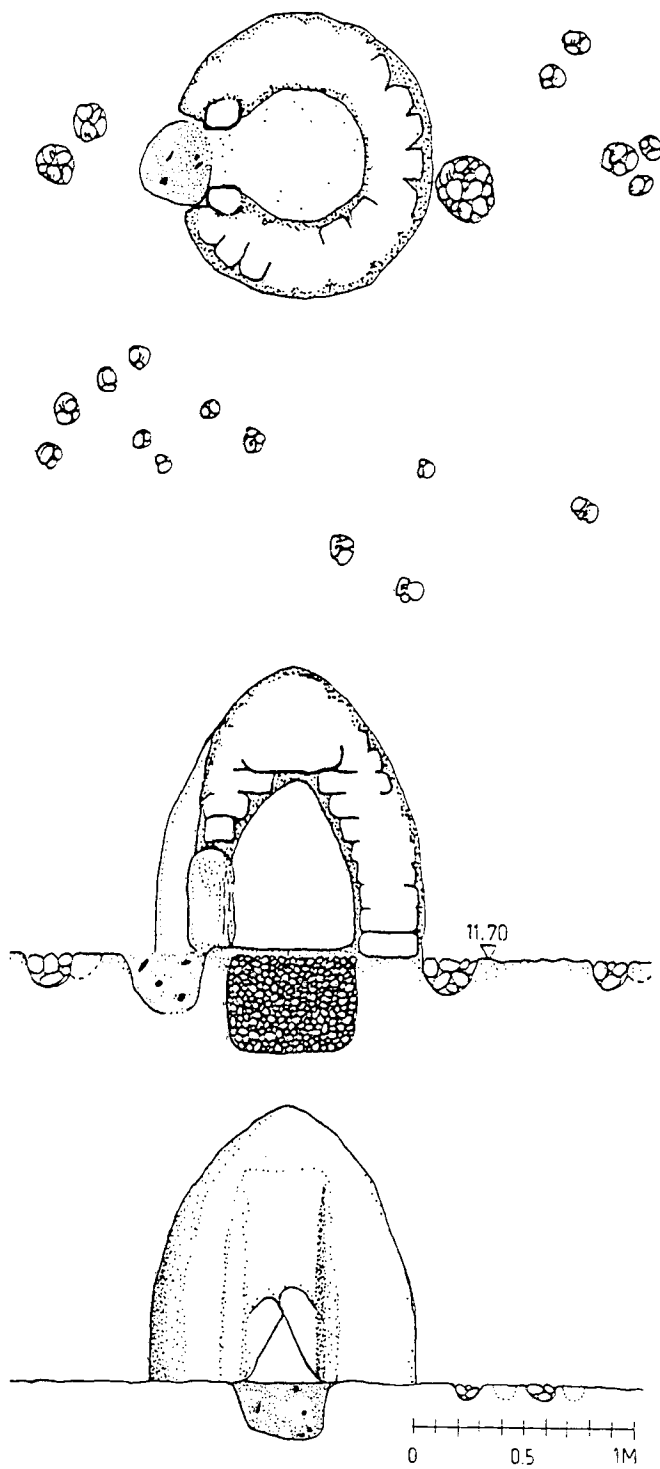


Fig. 26. Kolonna V. Bread oven or kiln, plan (top) and reconstructions (middle and below) (Walter and Felten 1981, fig. 33).

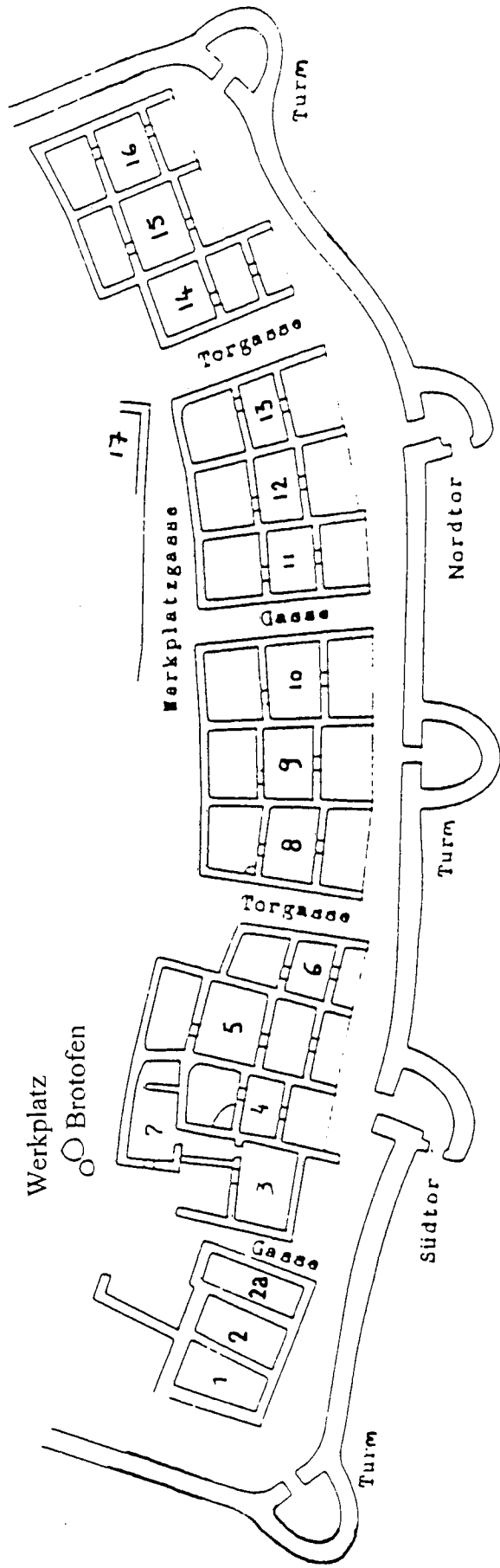


Fig. 27. Kolonna V. Plan of the fortifications and houses (after Walter and Felten 1981, fig. 21 and Walter 1983, fig. 41).

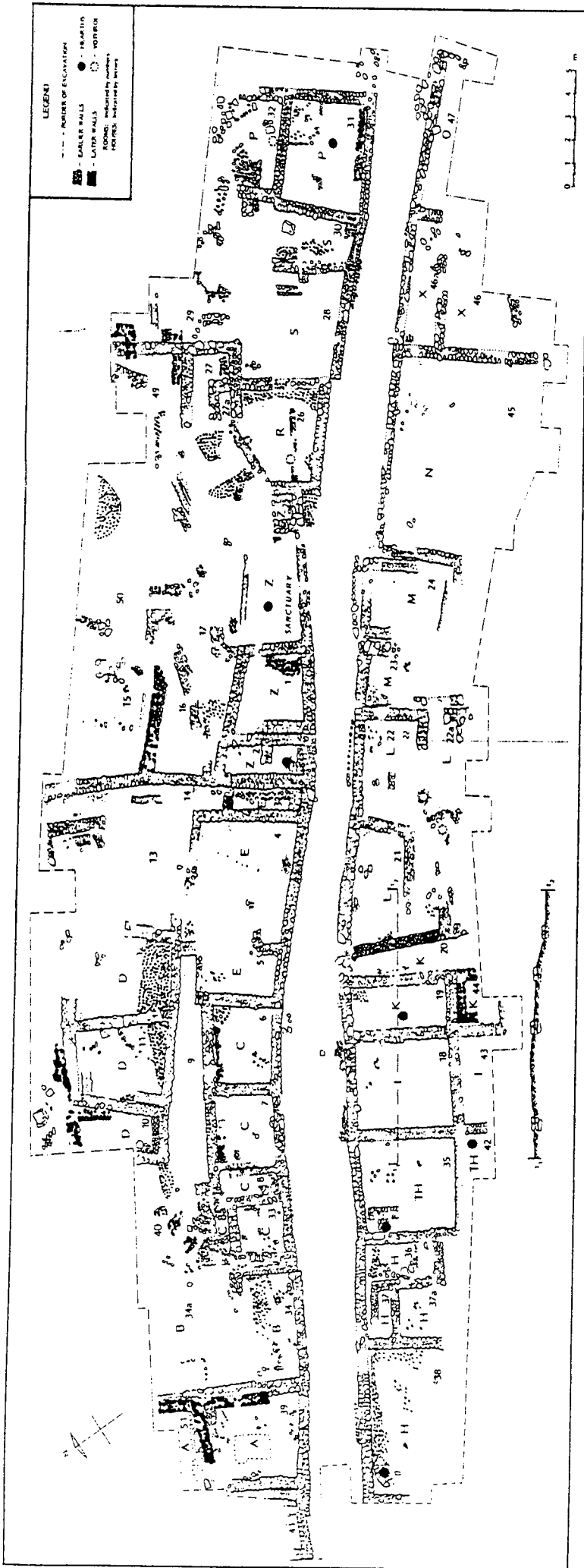


Fig. 28. Lithares. Plan of EH II settlement (Tzavella-Evjén 1985, fig. 5).

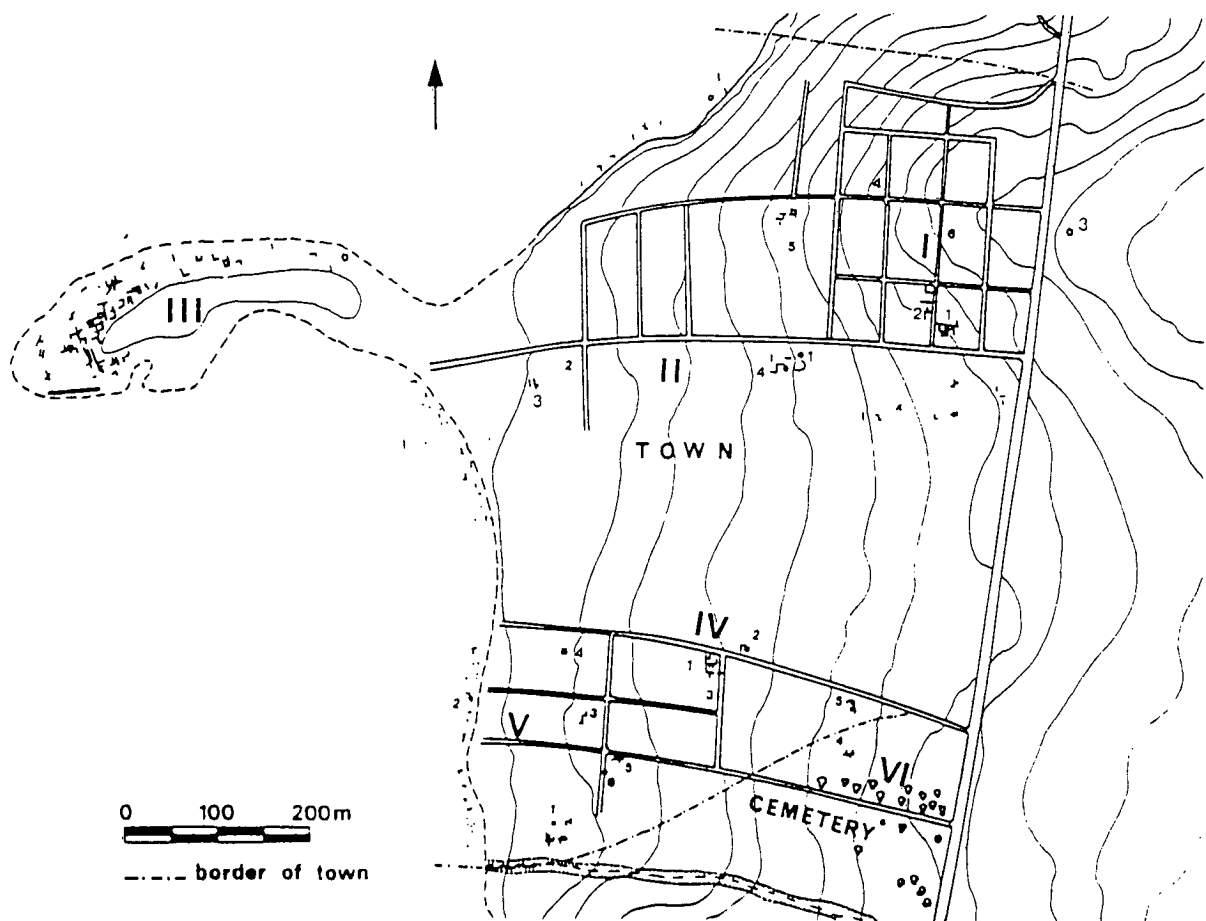


Fig. 29. Manika. Plan of the area (Hägg and Konsola 1986, fig. 37).

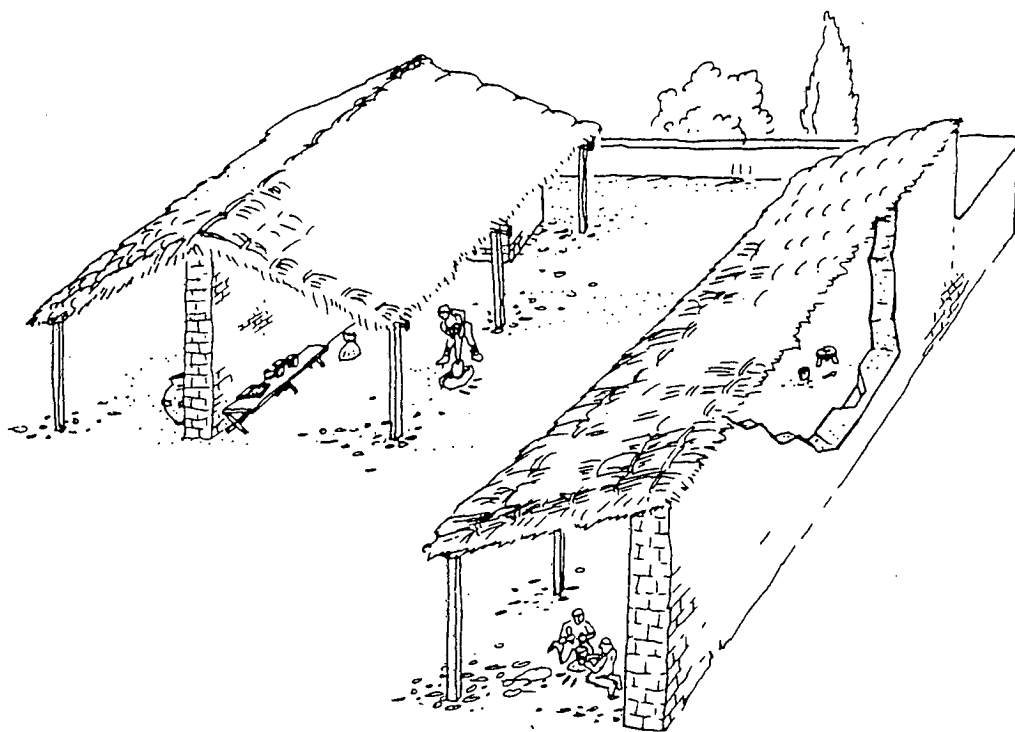


Fig. 30. Manika. Reconstruction of the obsidian workshop (Sampson 1985, fig. 25a).

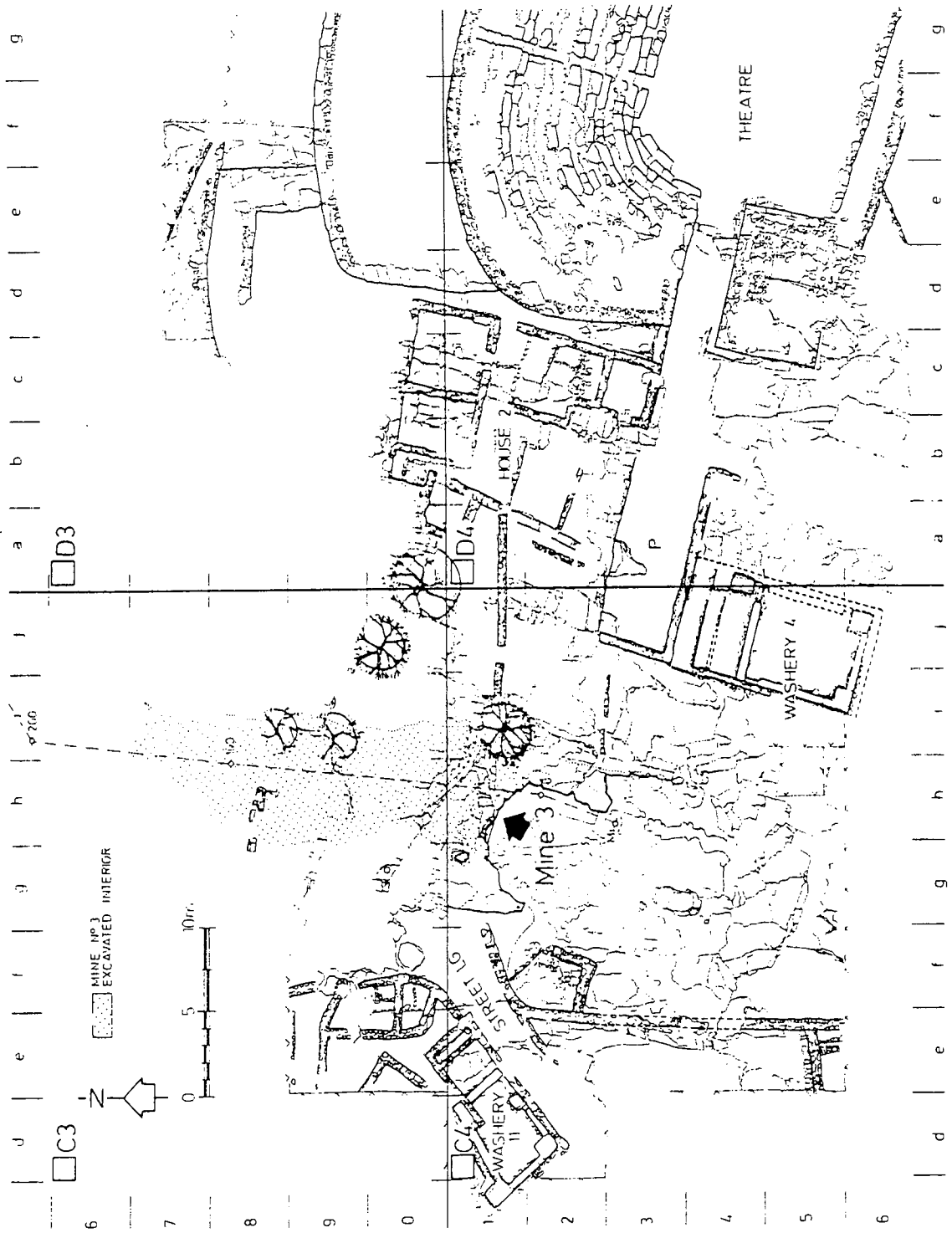


Fig. 31. Thorikos. General plan showing mine 3 (Mussche et al. 1984, fig. 97).

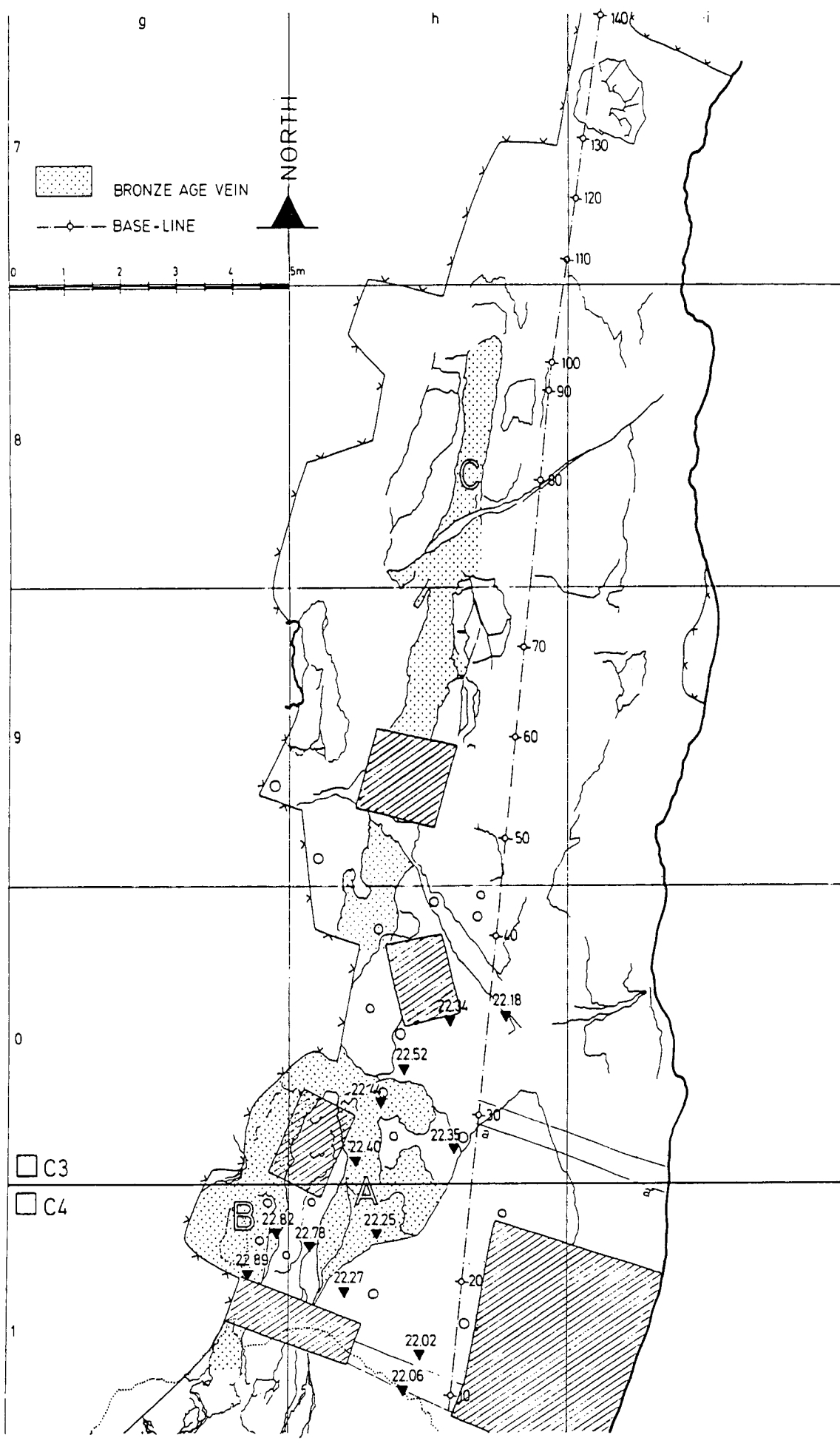


Fig. 32. Thorikos. Interior plan of mine 3, the shaded squares and circles represent modern rubble supports and wooden props (Mussche et al. 1984, fig. 99).

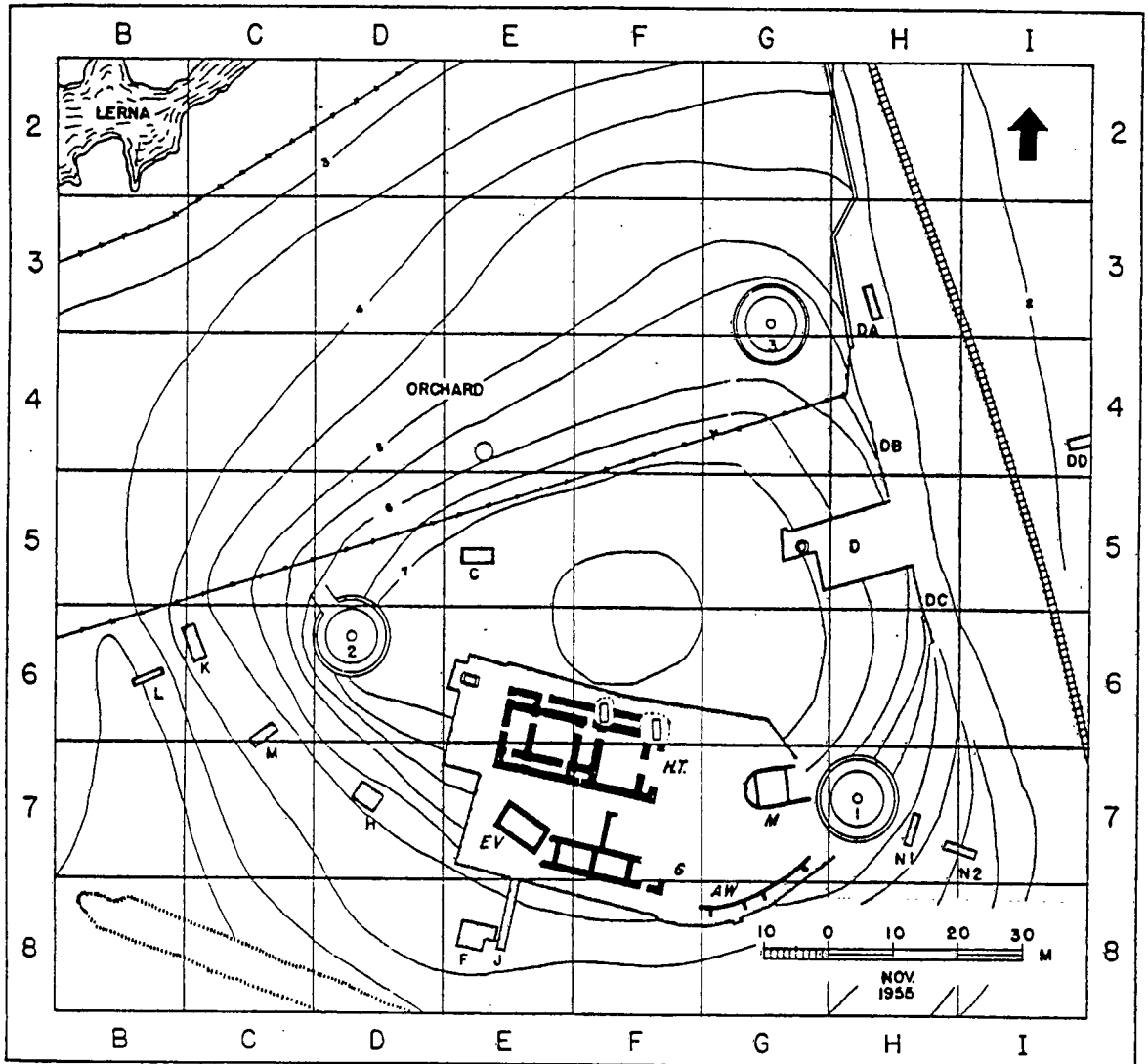


Fig. 33. Lerna. Plan of the site (Caskey 1956, fig. 1).

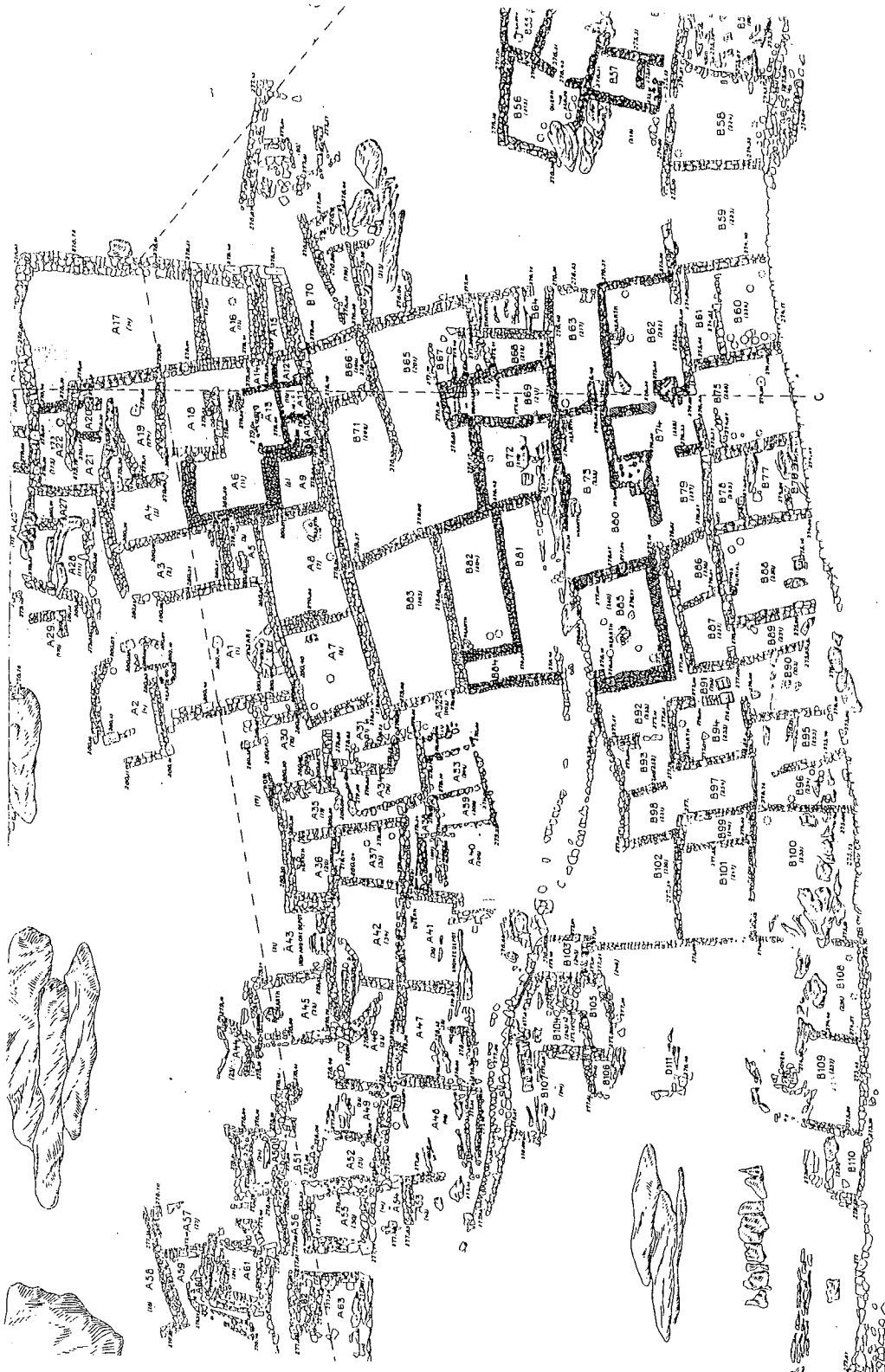


Fig. 34. Malthi. Plan of the site (after Valmin 1938).

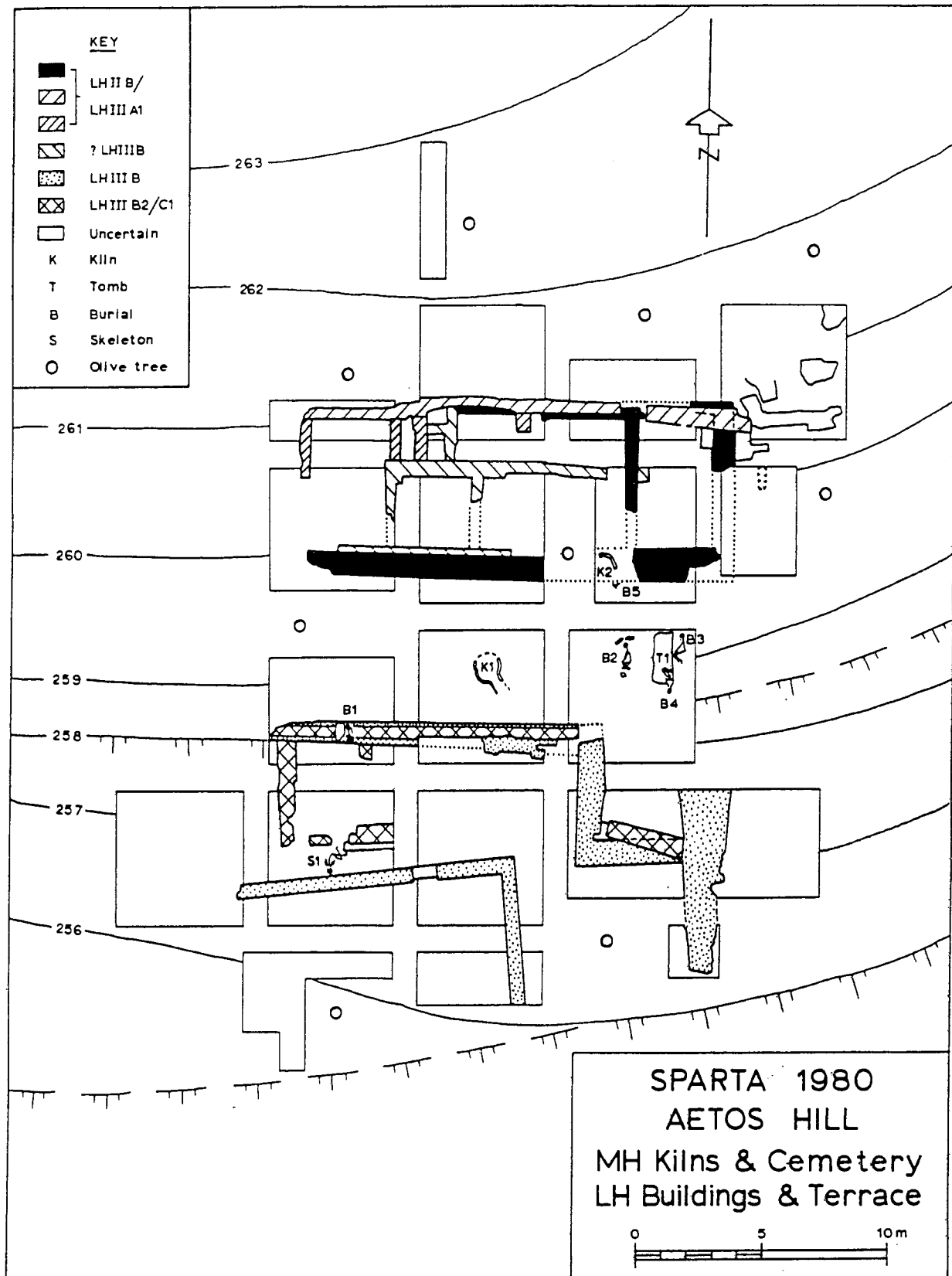


Fig. 35. The Menelaion. Plan of Aetos hill, kilns marked K1 and K2

(Catling, in *AR* 27 (1980-1981) fig. 23).

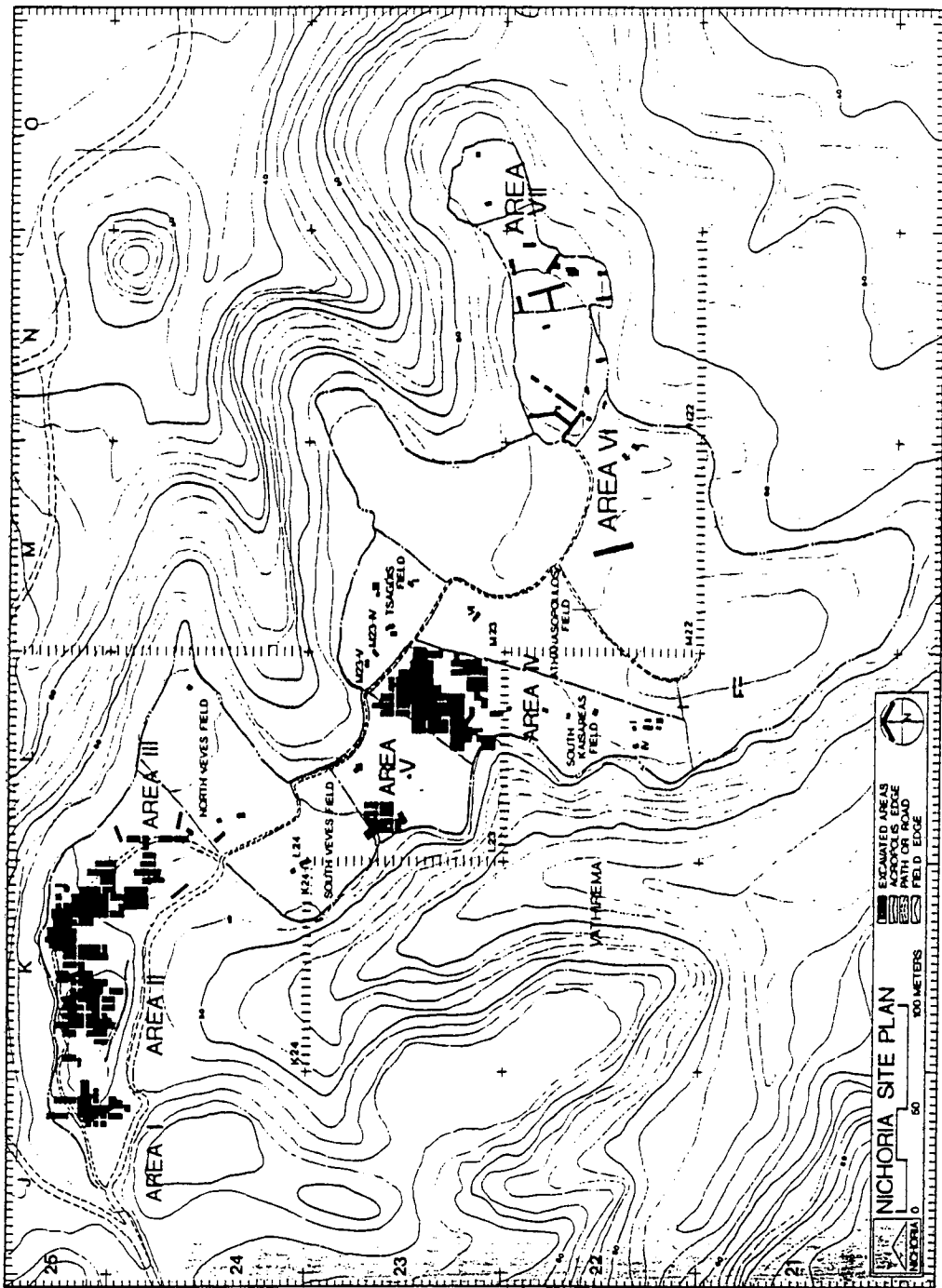


Fig. 36. Nichoria. Plan of the site (McDonald and Wilkie 1992, fig. A-2).

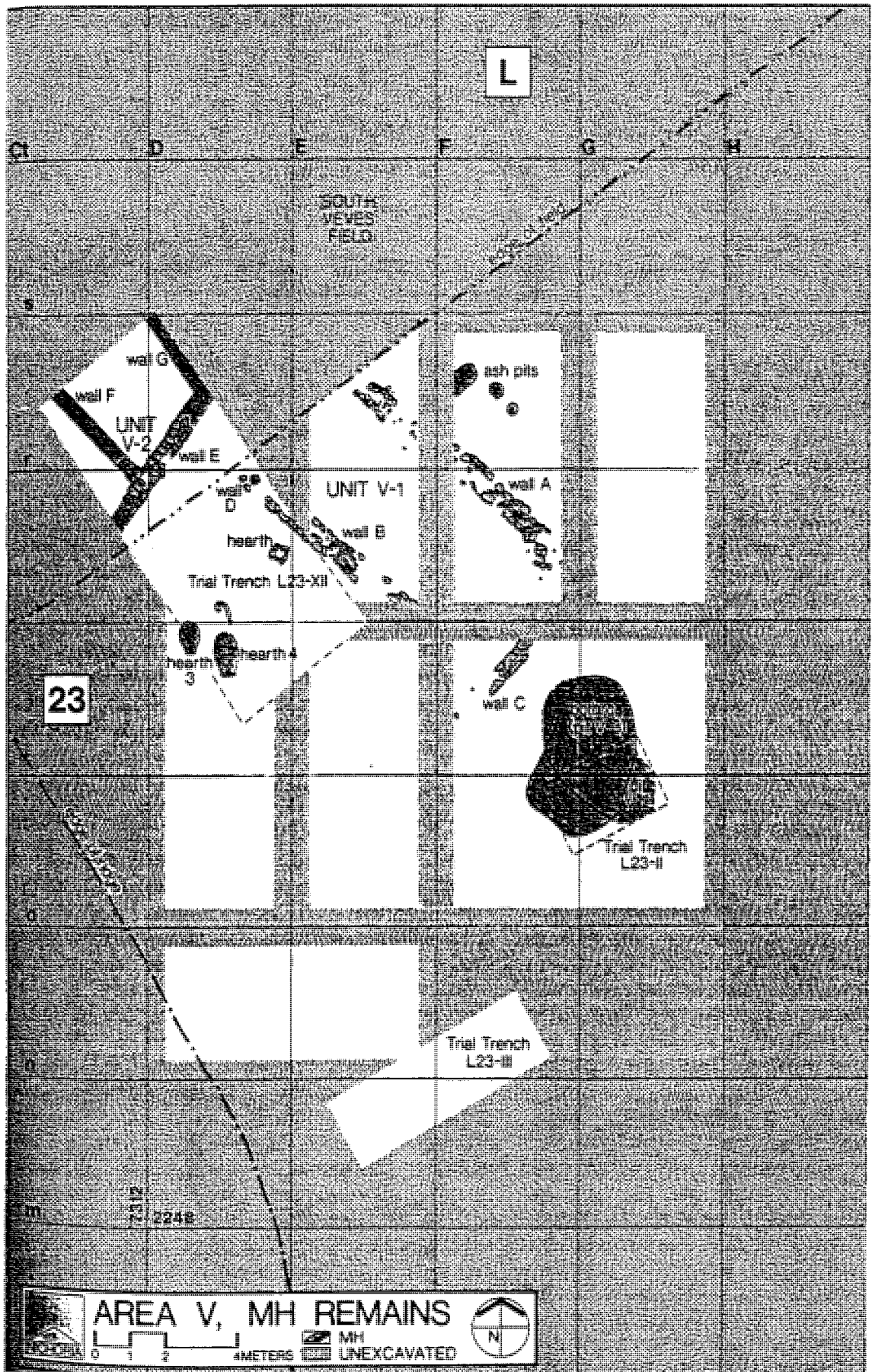


Fig. 37. Nichoria. Plan of Area V (after Howell 1992, fig. 2-1).

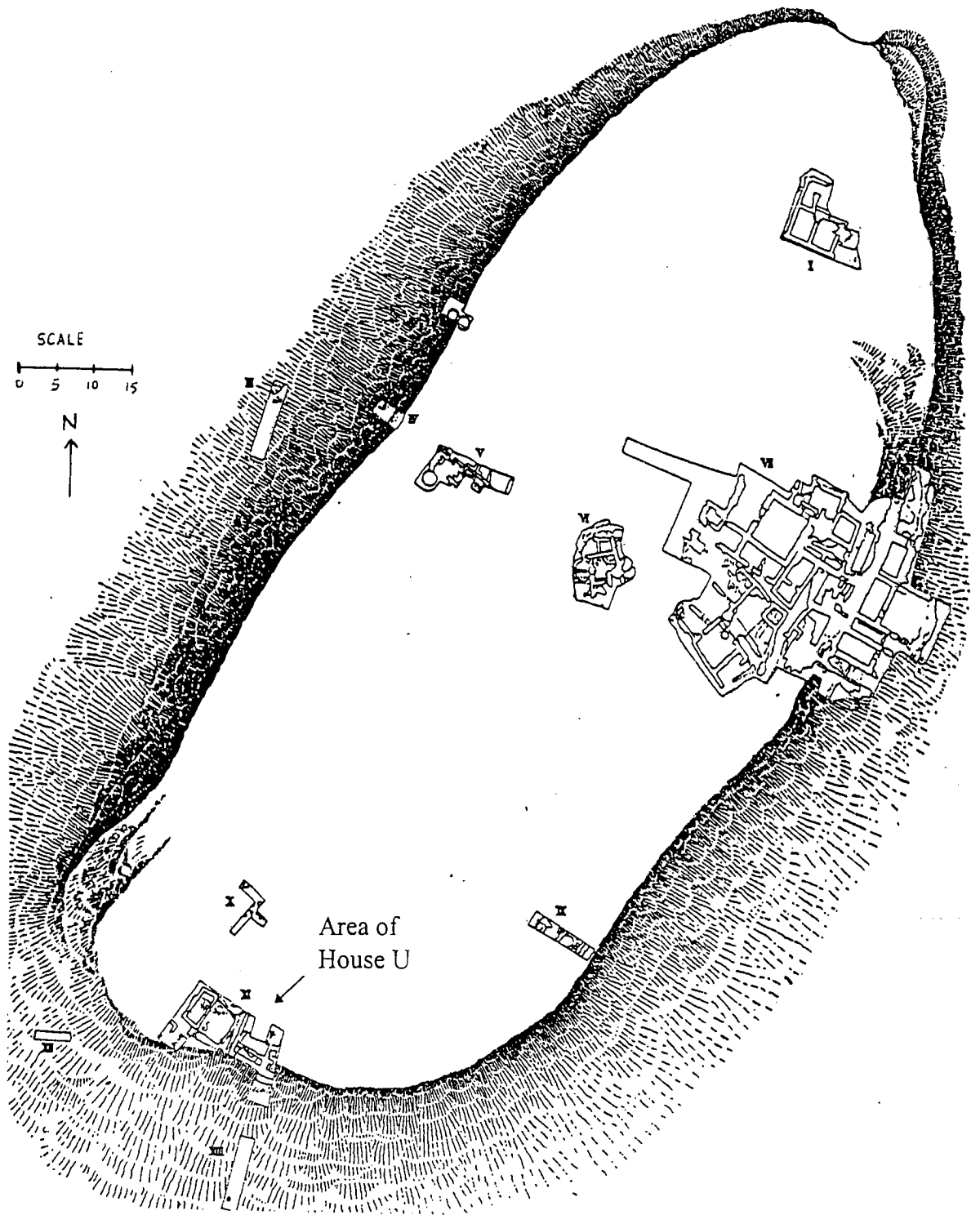


Fig. 38. Zygouries. General plan of the excavations (after Blegen 1928, plate I).

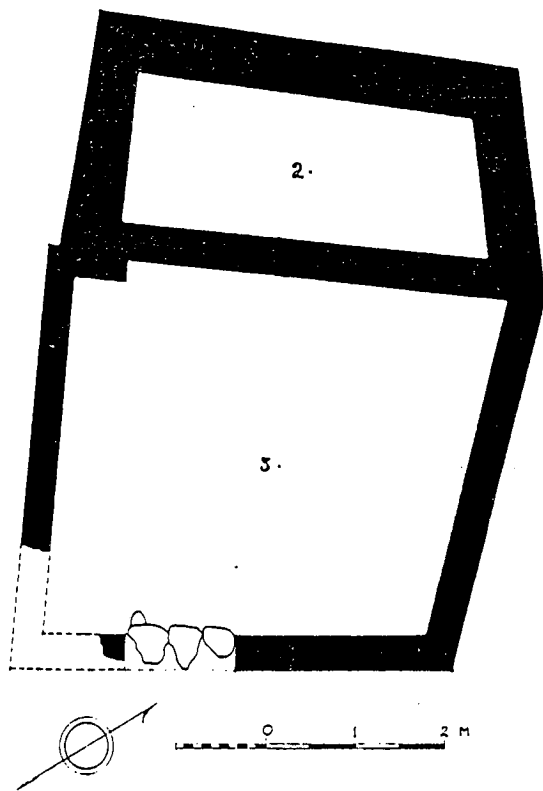


Fig. 39. Zygouries. Plan of House U (Blegen 1928, fig. 22).

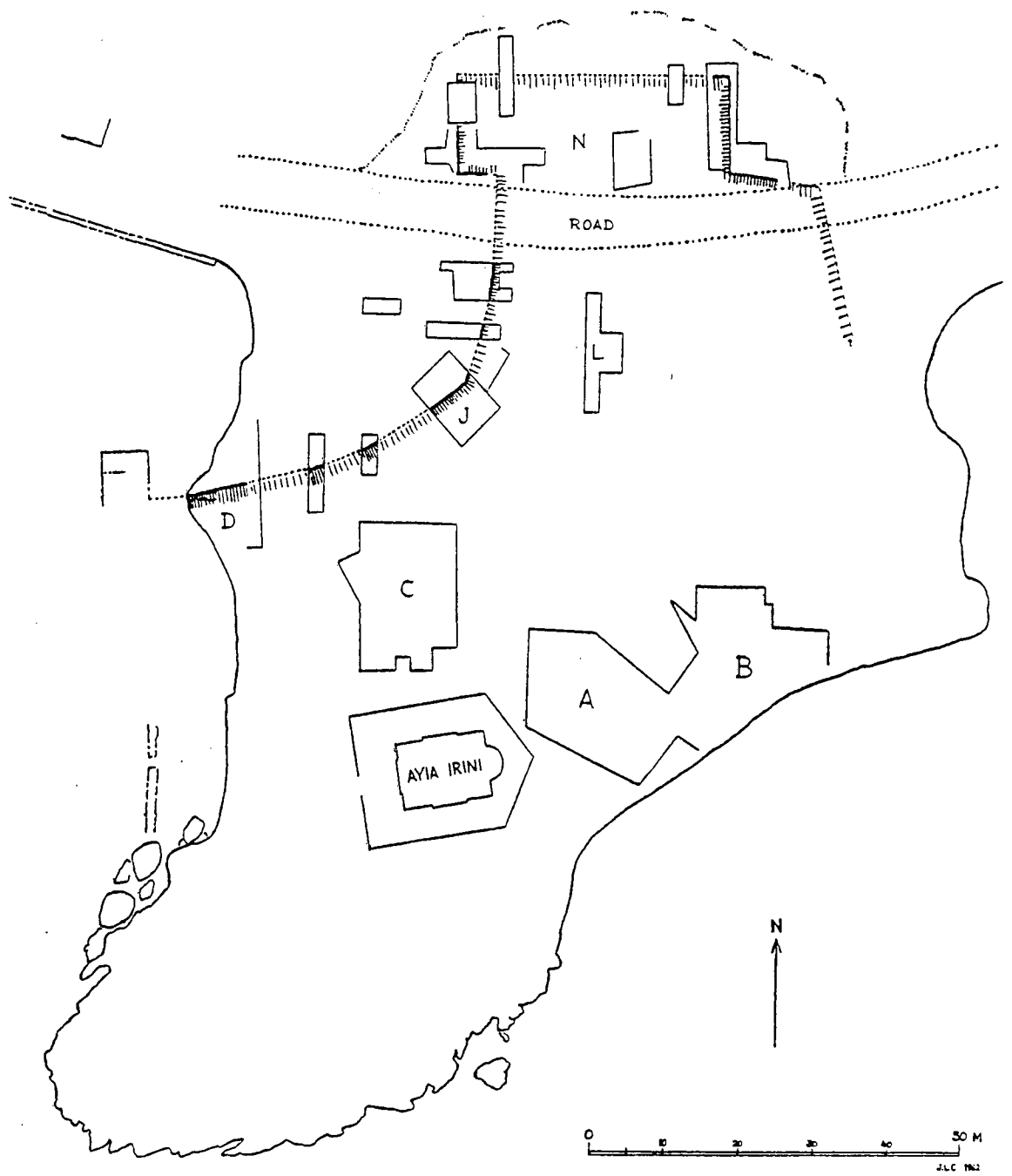


Fig. 40. Ayia Irini (Kea). The peninsula of Ayia Irini, showing areas excavated in 1960 and 1961 (Caskey 1962, fig. 1).

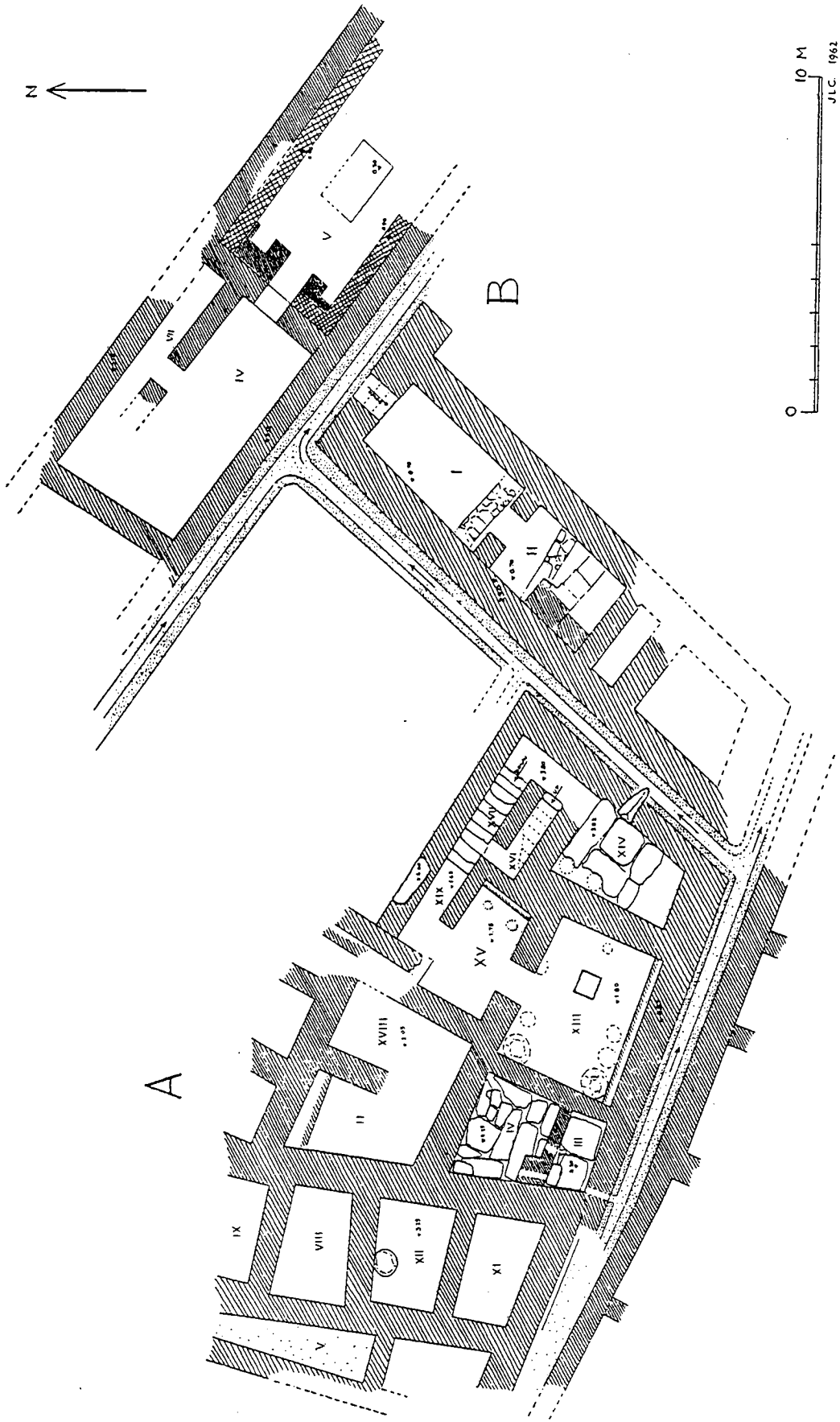


Fig. 41. Ayia Irimi (Kea). Plan of buildings in Areas A and B (Caskey 1962, fig. 2).

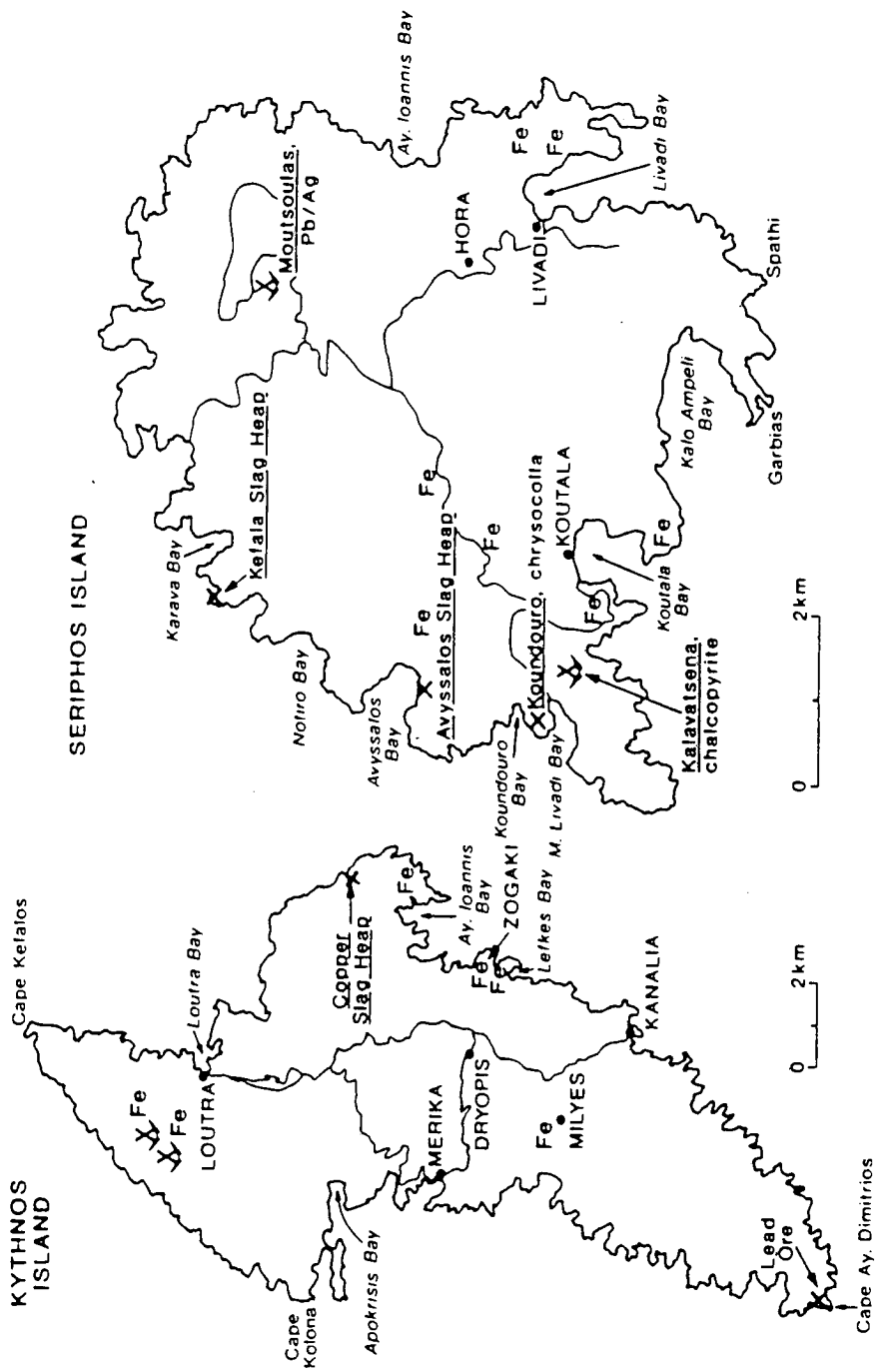


Fig. 42. Kythnos and Seriphos. Sketch maps showing locations of ore deposits and slag heaps (Stos-Gale 1998, fig. 1).

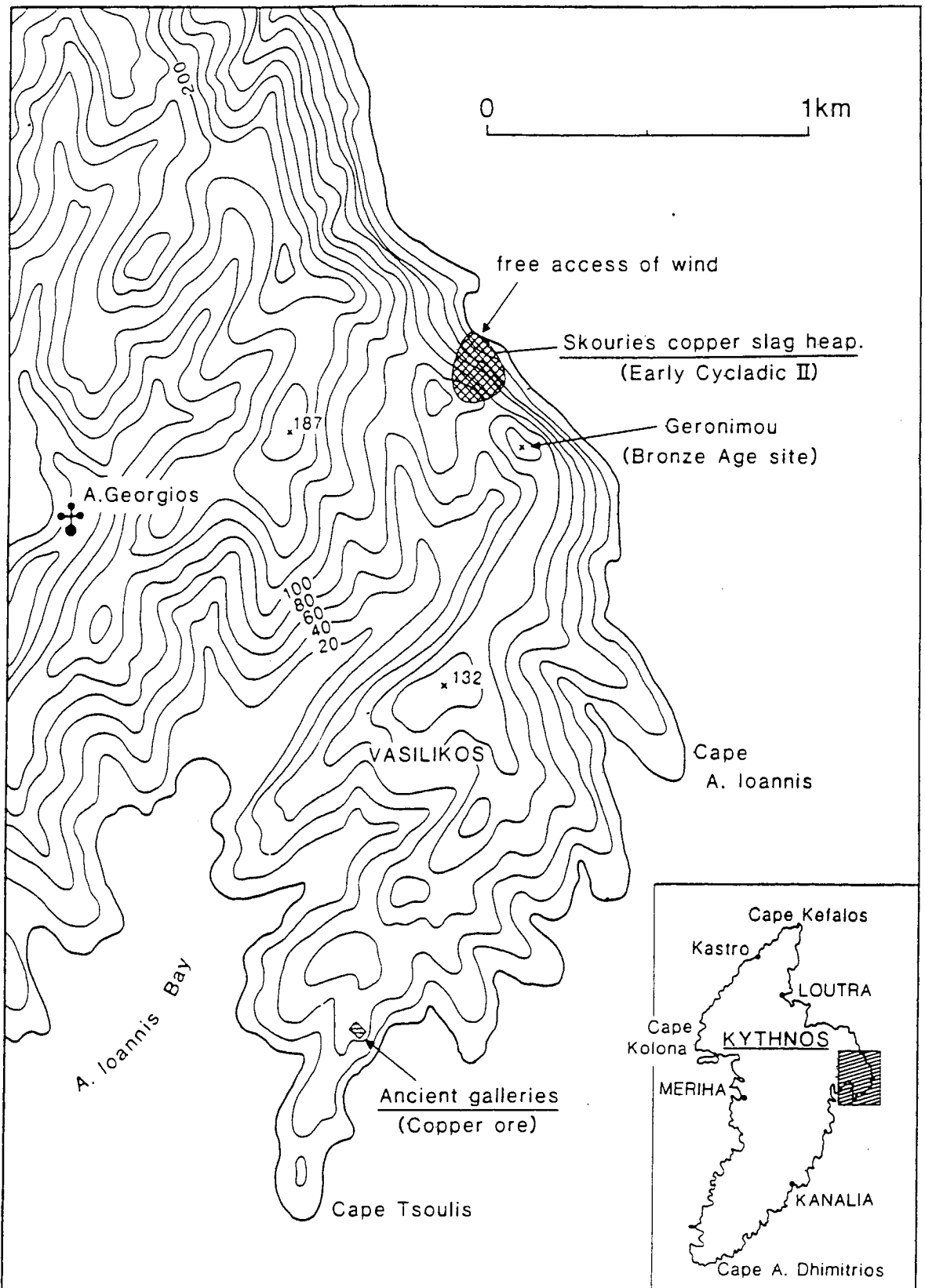


Fig. 43. Kythnos. Plan showing locations of Tsoulis and Skouries (Stos-Gale 1998, fig. 2).

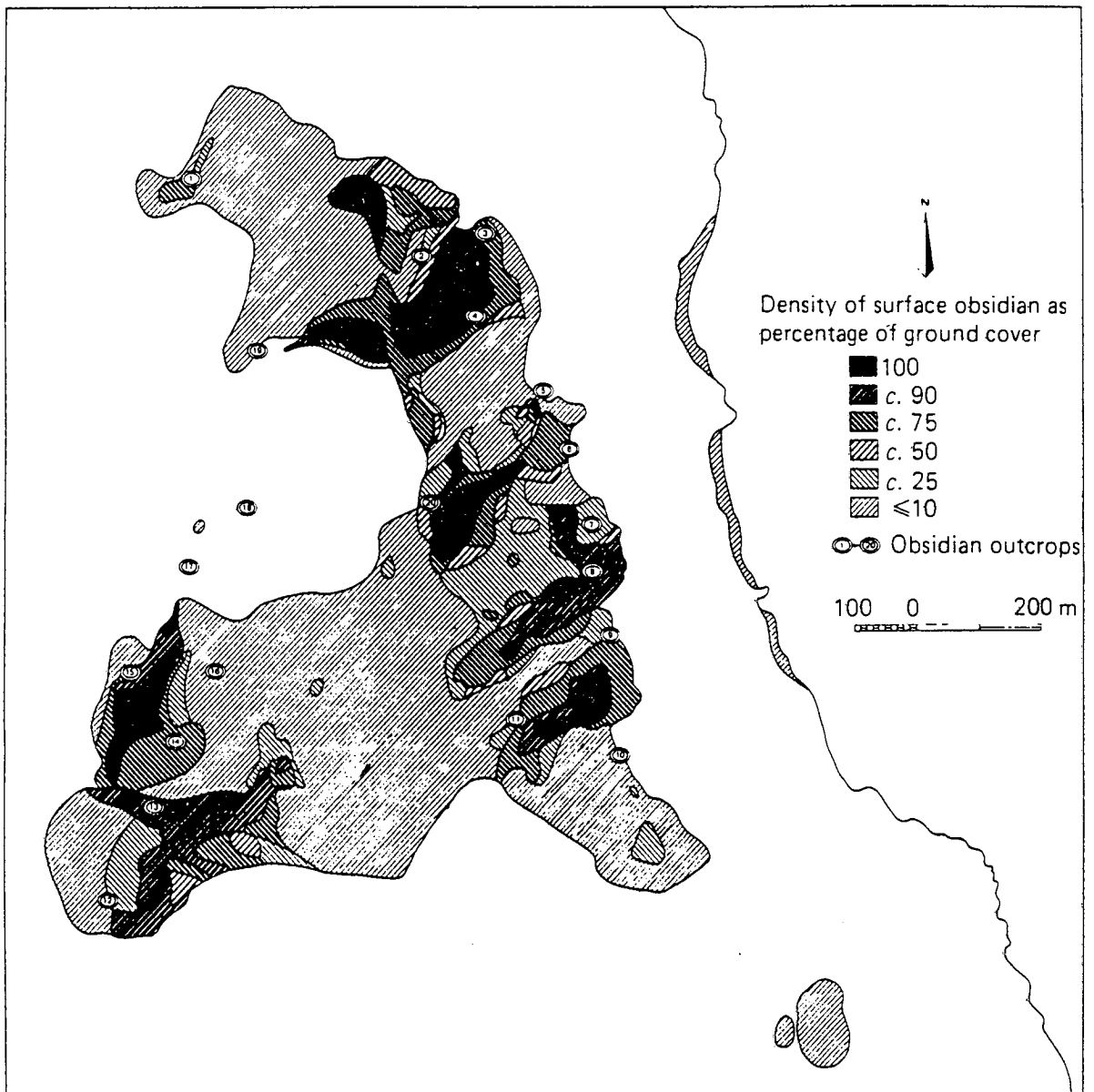


Fig. 44. Demenegaki (Melos). Density of surface obsidian and location of source areas (Torrence 1986, fig. 38).

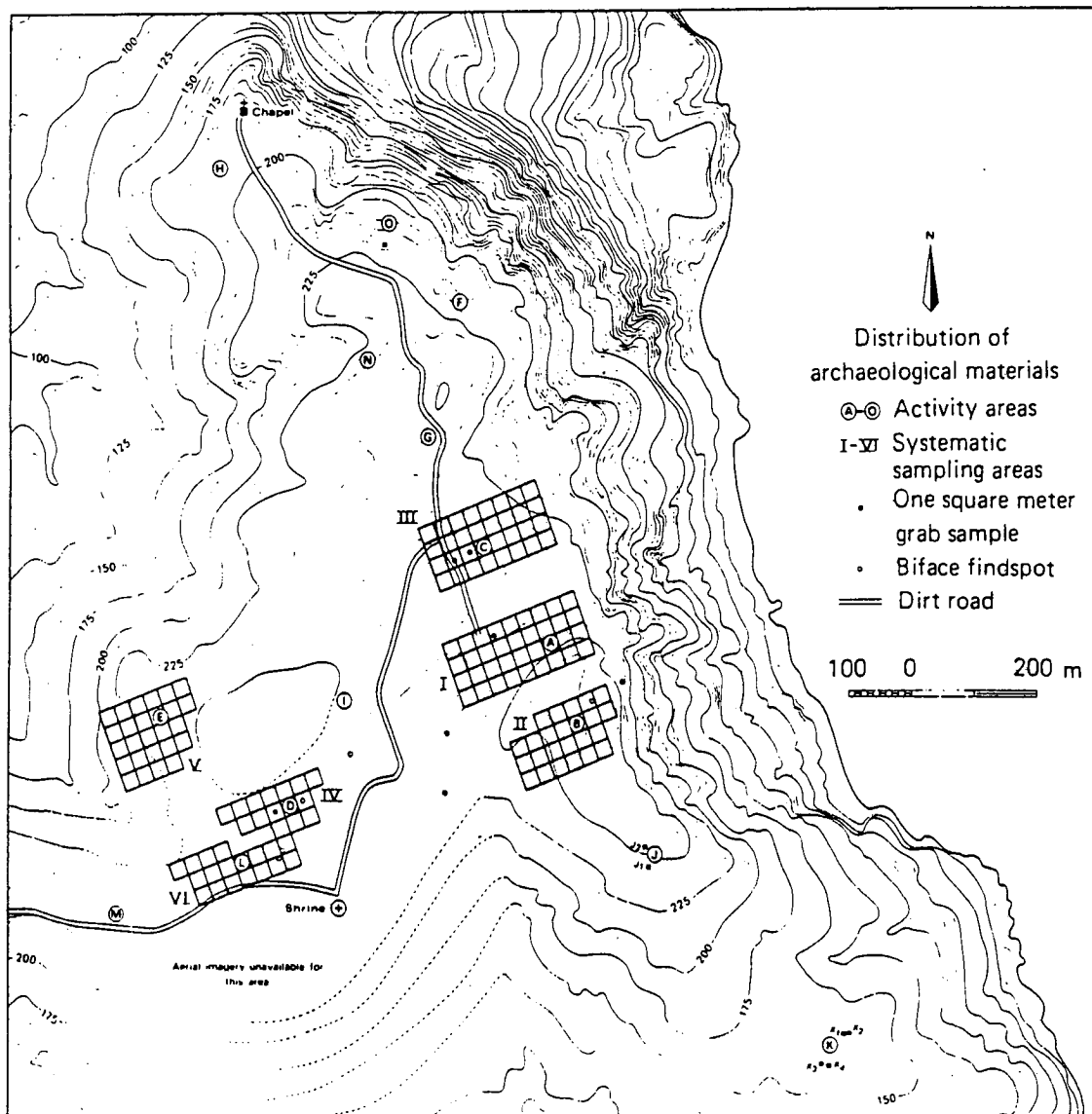


Fig. 45. Demenegaki (Melos). Location of sampling units, working areas and biface findspots (Torrence 1986, fig. 49).

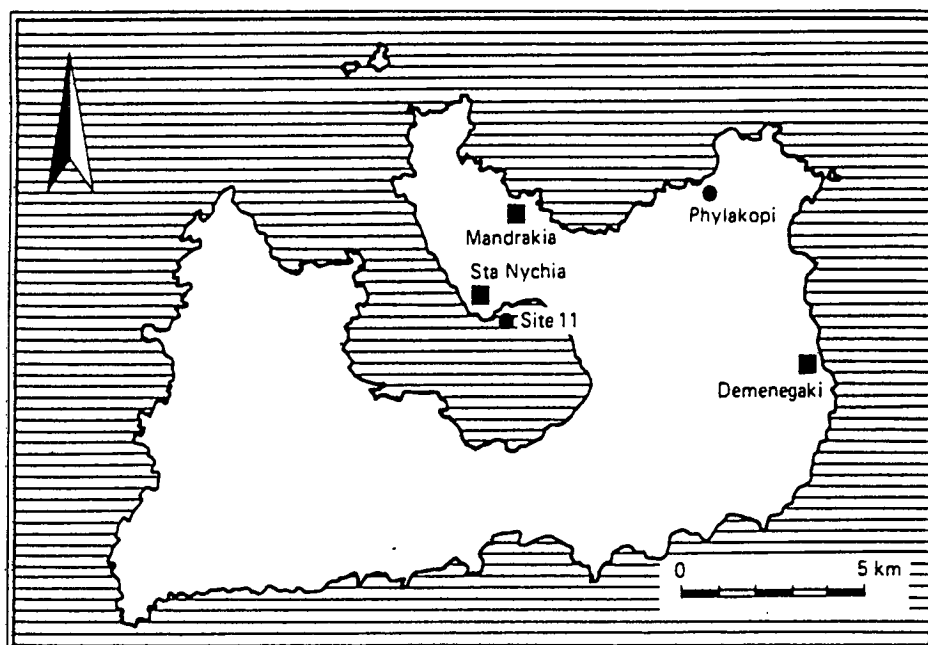


Fig. 46. Melos. Map showing locations of Phylakopi and obsidian outcrops at Sta Nychia and Demenegaki (Torrence 1986, fig. 21).

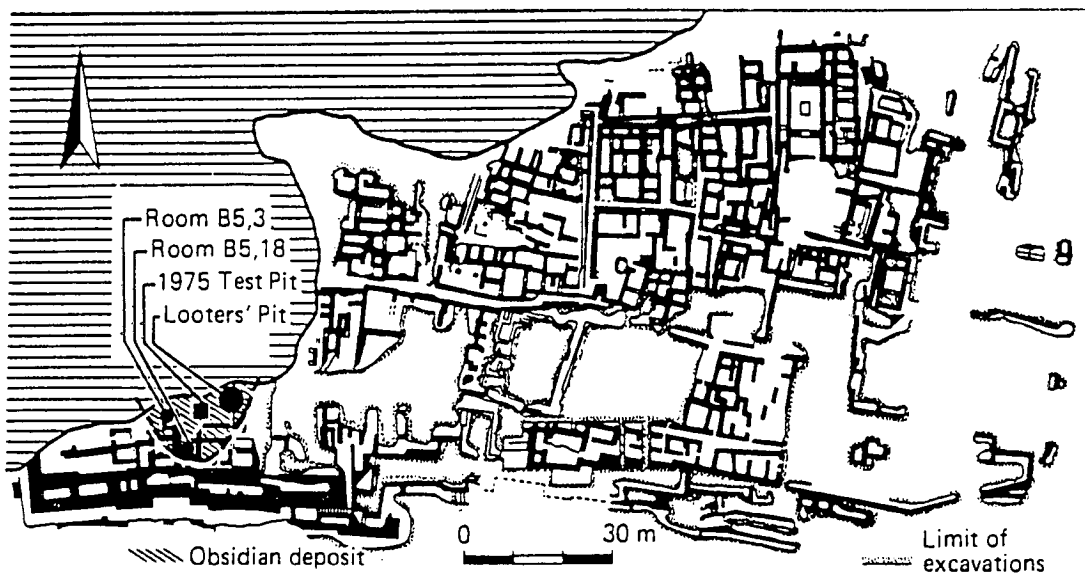


Fig. 47. Phylakopi (Melos). Plan of site showing area of the 'Great obsidian deposit' (Torrence 1986, fig. 31).

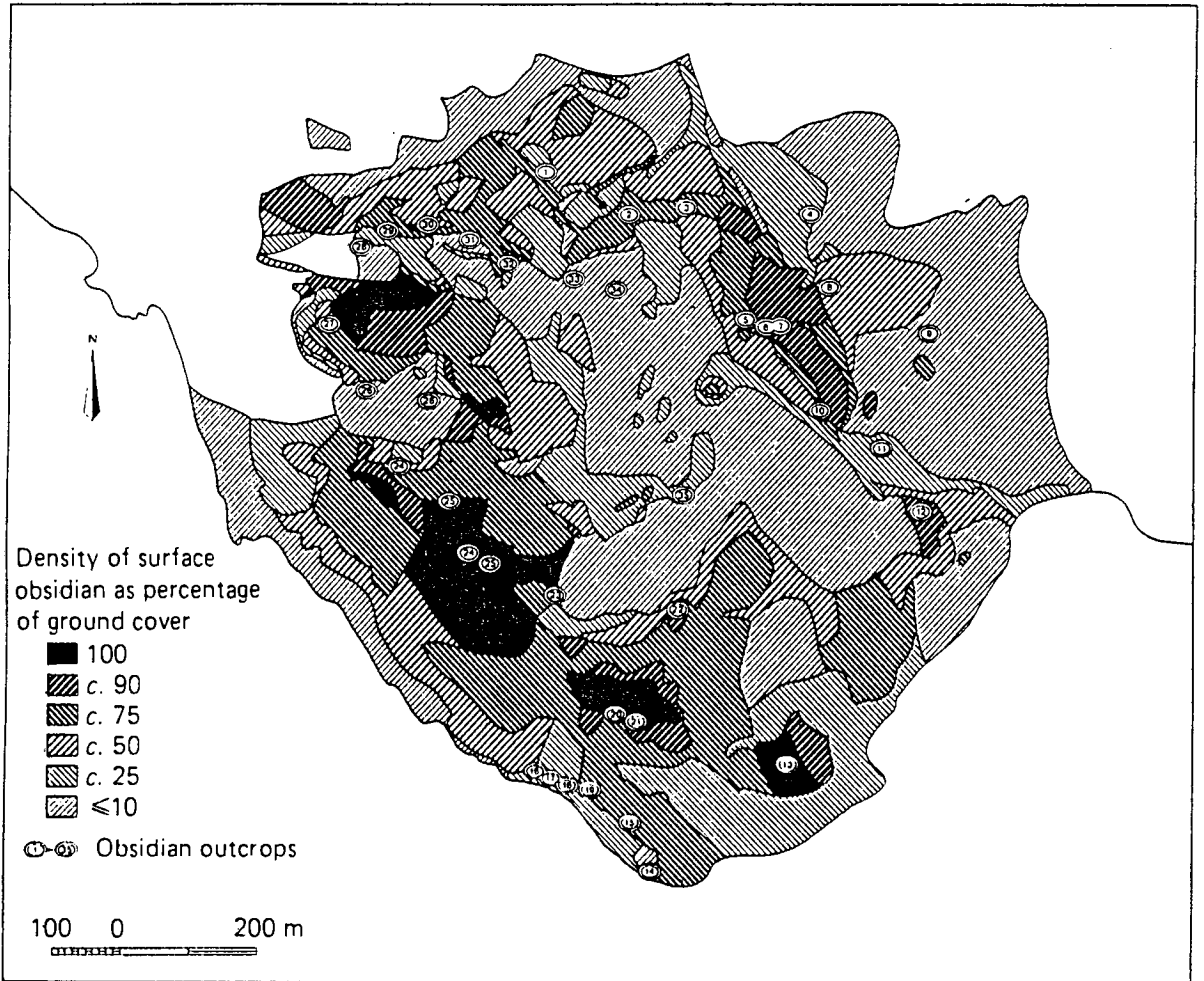


Fig. 48. Sta Nychia (Melos). Density of surface obsidian and location of source areas (Torrence 1986, fig. 37).

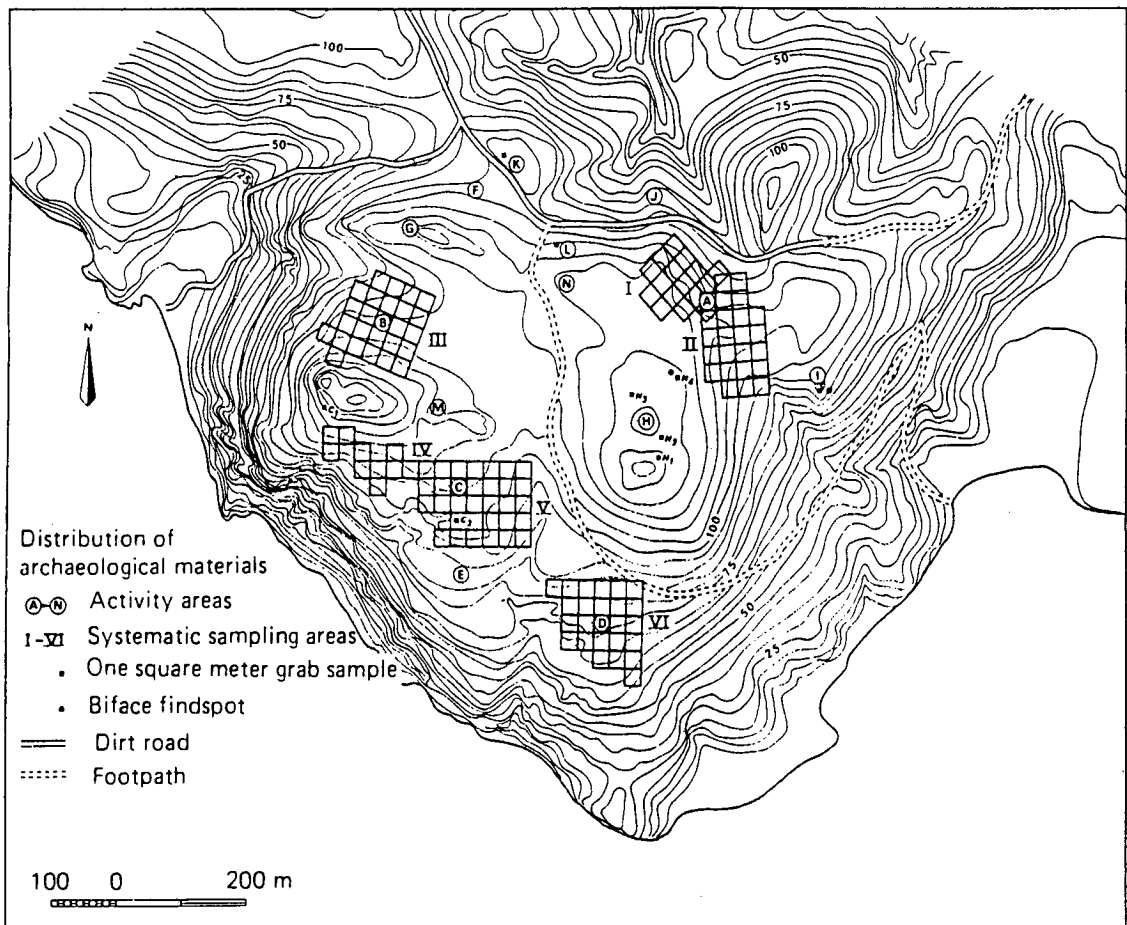


Fig. 49. Sta Nychia (Melos). Location of sampling units, working areas and biface findspots (Torrence 1986, fig. 48).

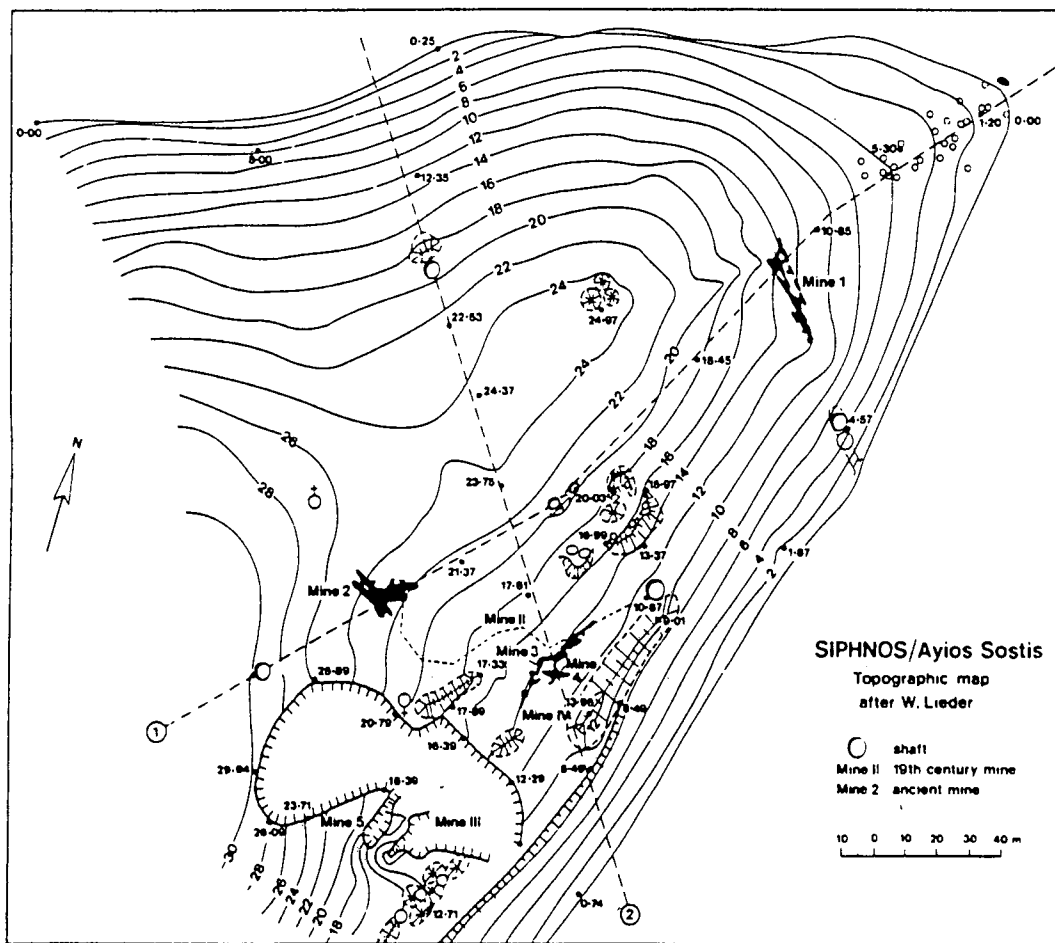


Fig. 50. Ayios Sostis (Siphnos). Map of the mining region (Gale and Stos-Gale 1981, fig. 9).

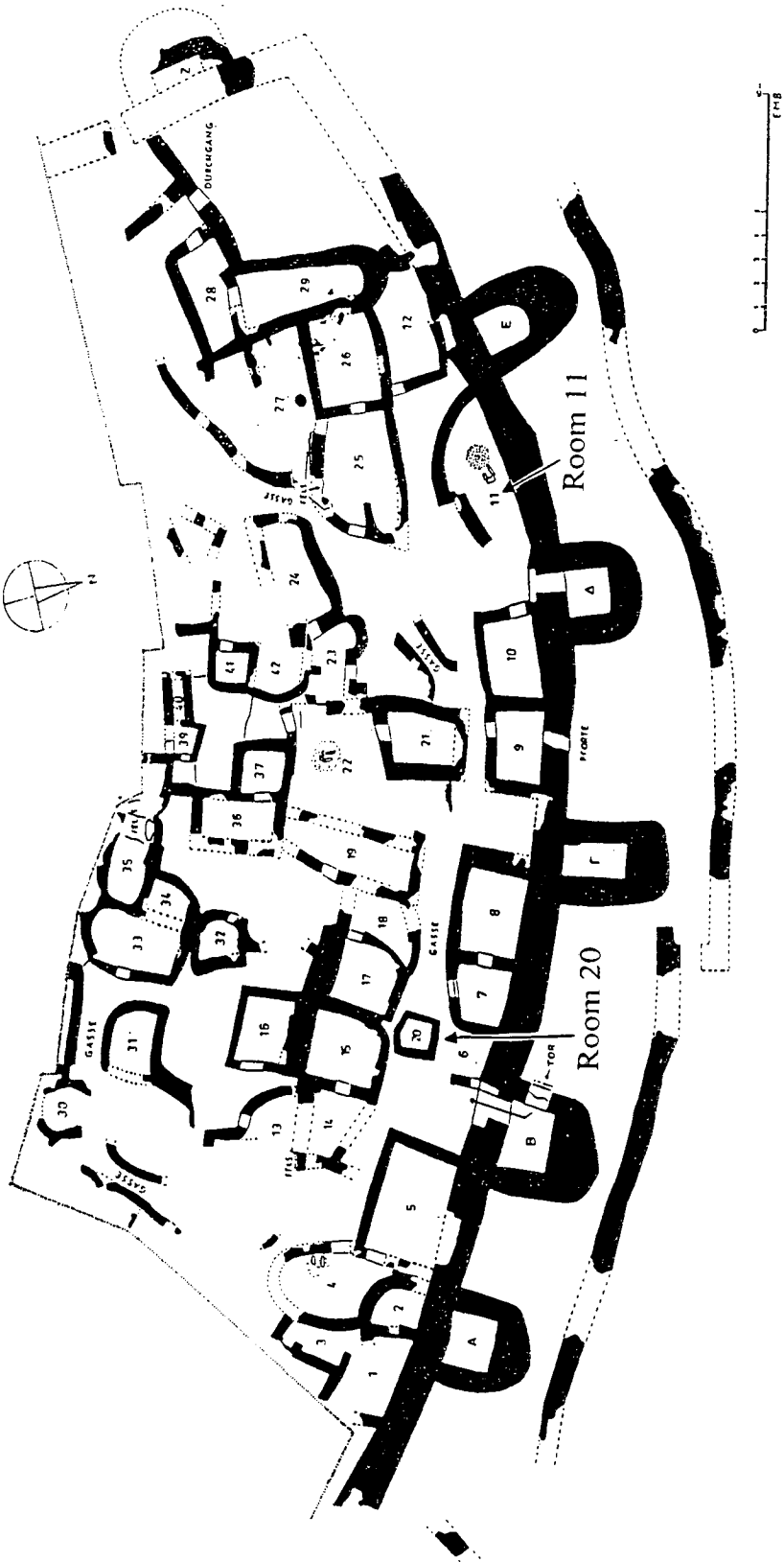


Fig. 51. Kastri (Syros). Plan of settlement (after Bossert 1967, plan 2).

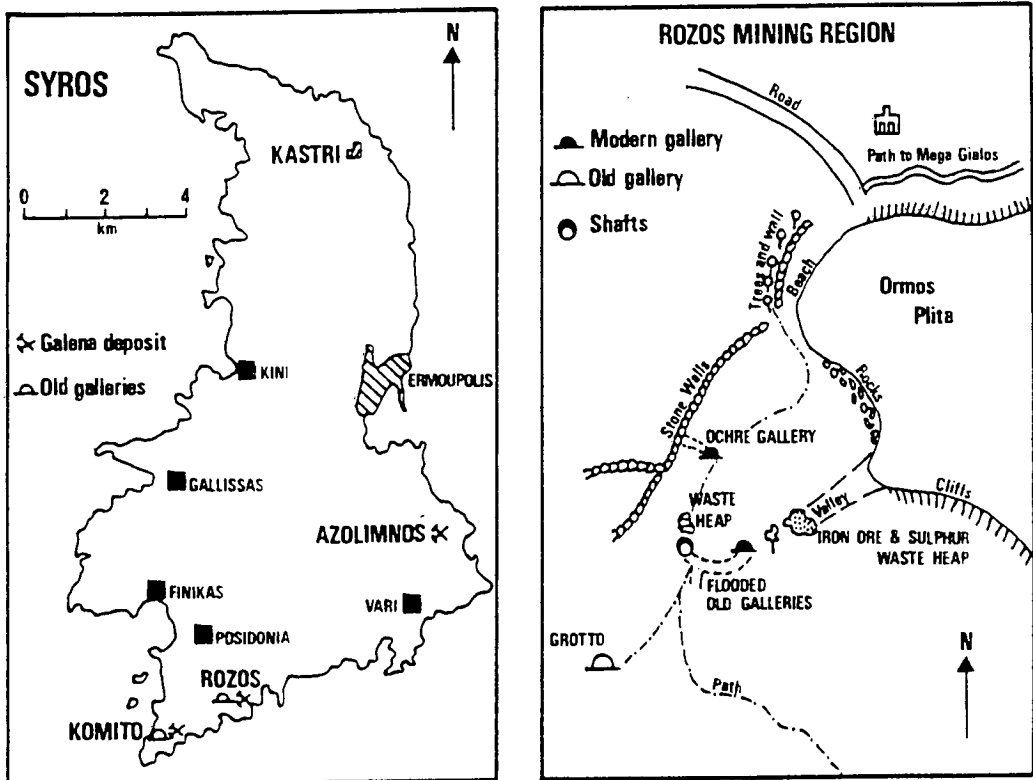


Fig. 52. Syros. Maps of Syros and the Rozos mining region (Gale and Stos-Gale 1981, fig. 7).

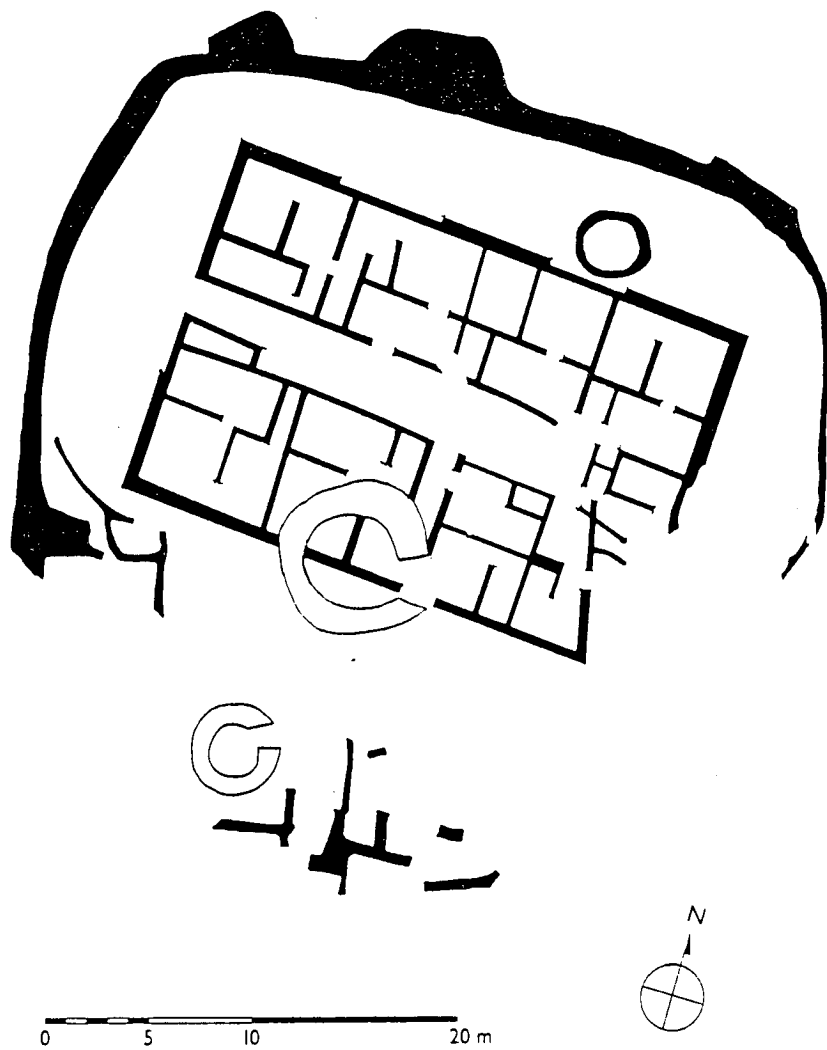


Fig. 53. Ayia Photia: Kouphota. Plan of the fortified building (Tsipopoulou 1992, fig. 6.1).

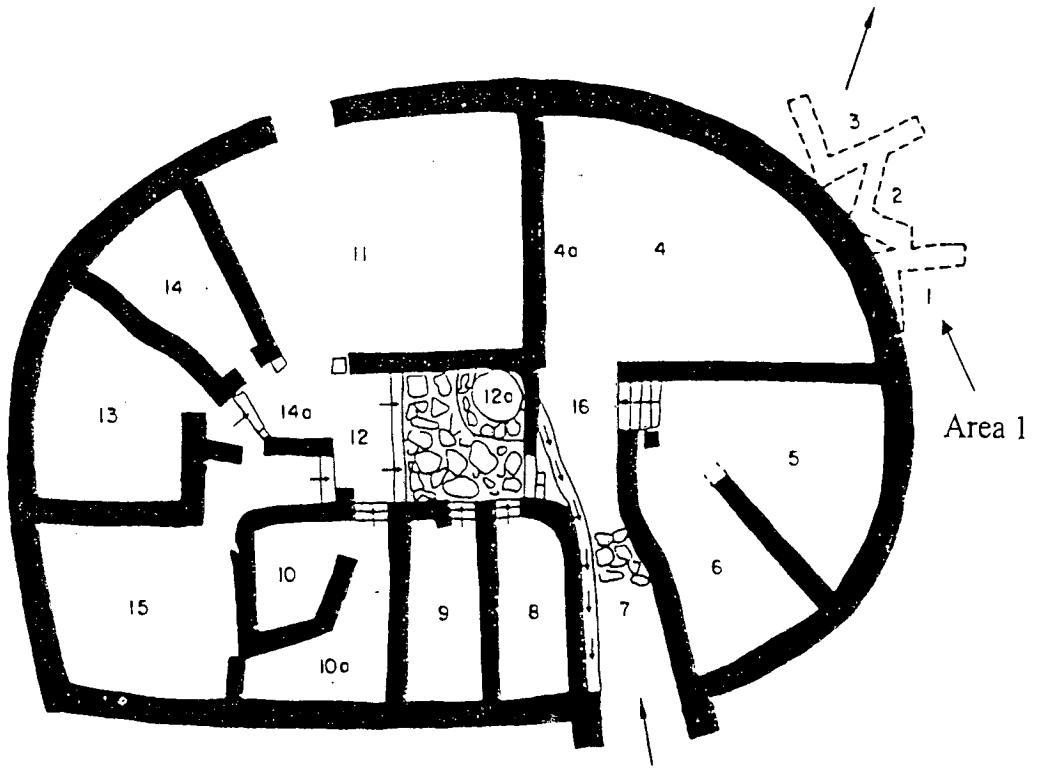


Fig. 54. Khamaizi. Plan of the Oval house and Areas 1-3 (after Gesell 1985, fig. 15).

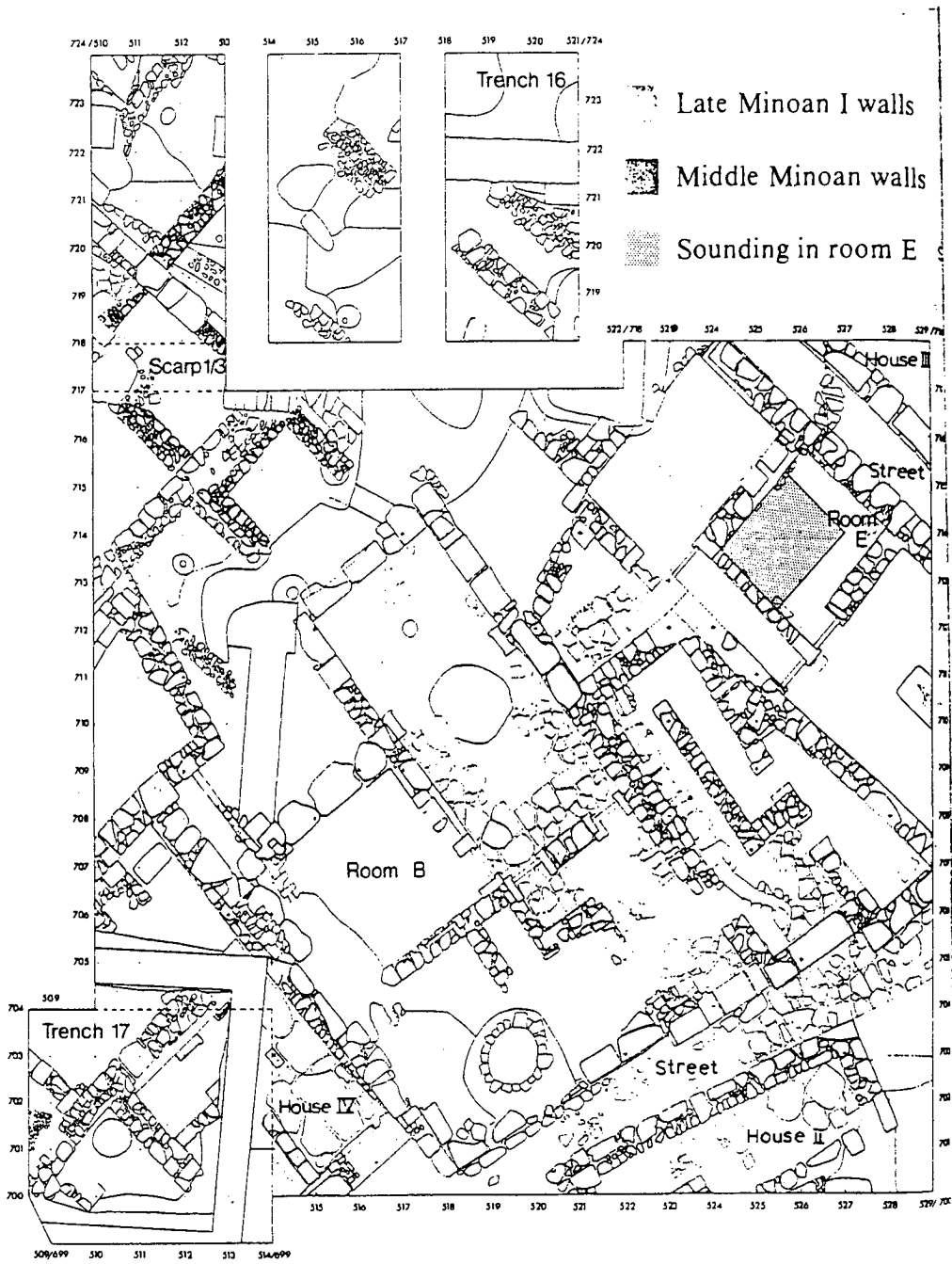


Fig. 55. Khania. Plan of the Plateia area showing position of House I, Room E (Tzedakis and Hallager 1983, fig. 1).

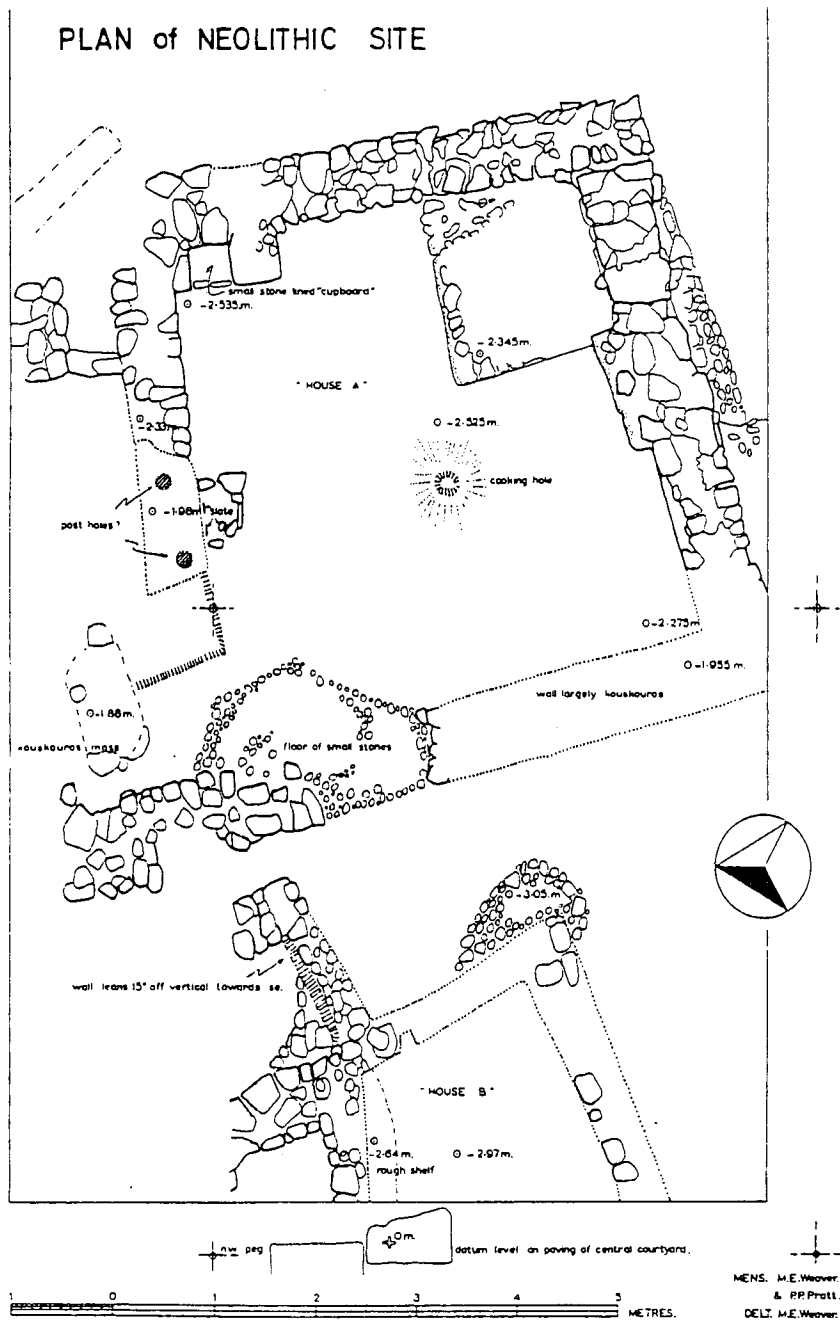


Fig. 56. Knossos. Plan of area BD and extension, stratum III A and B (Evans 1964, fig. 16).

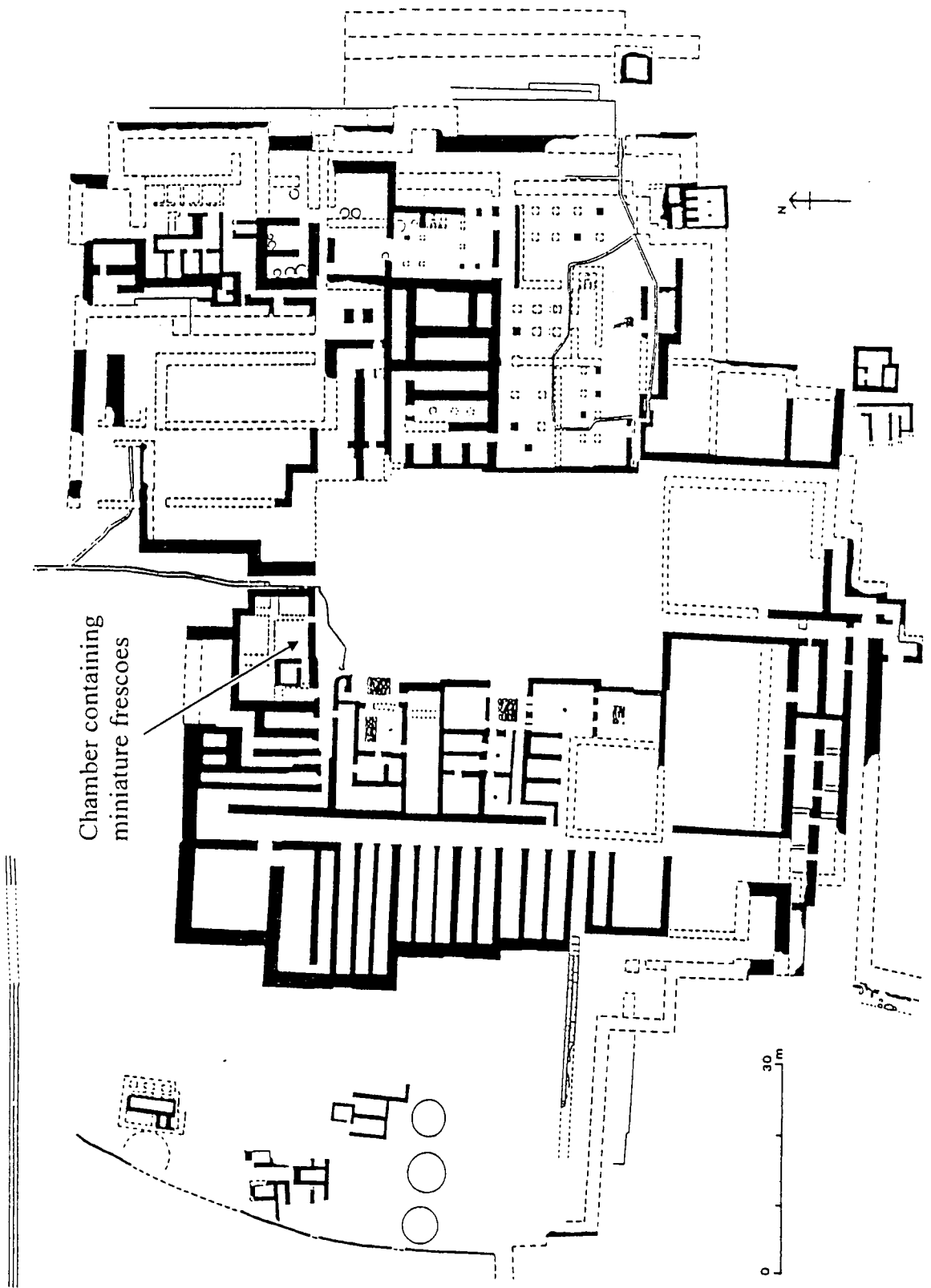


Fig. 57. Knossos. Plan of the Old Palace (after Cadogan 1976, fig. 2).

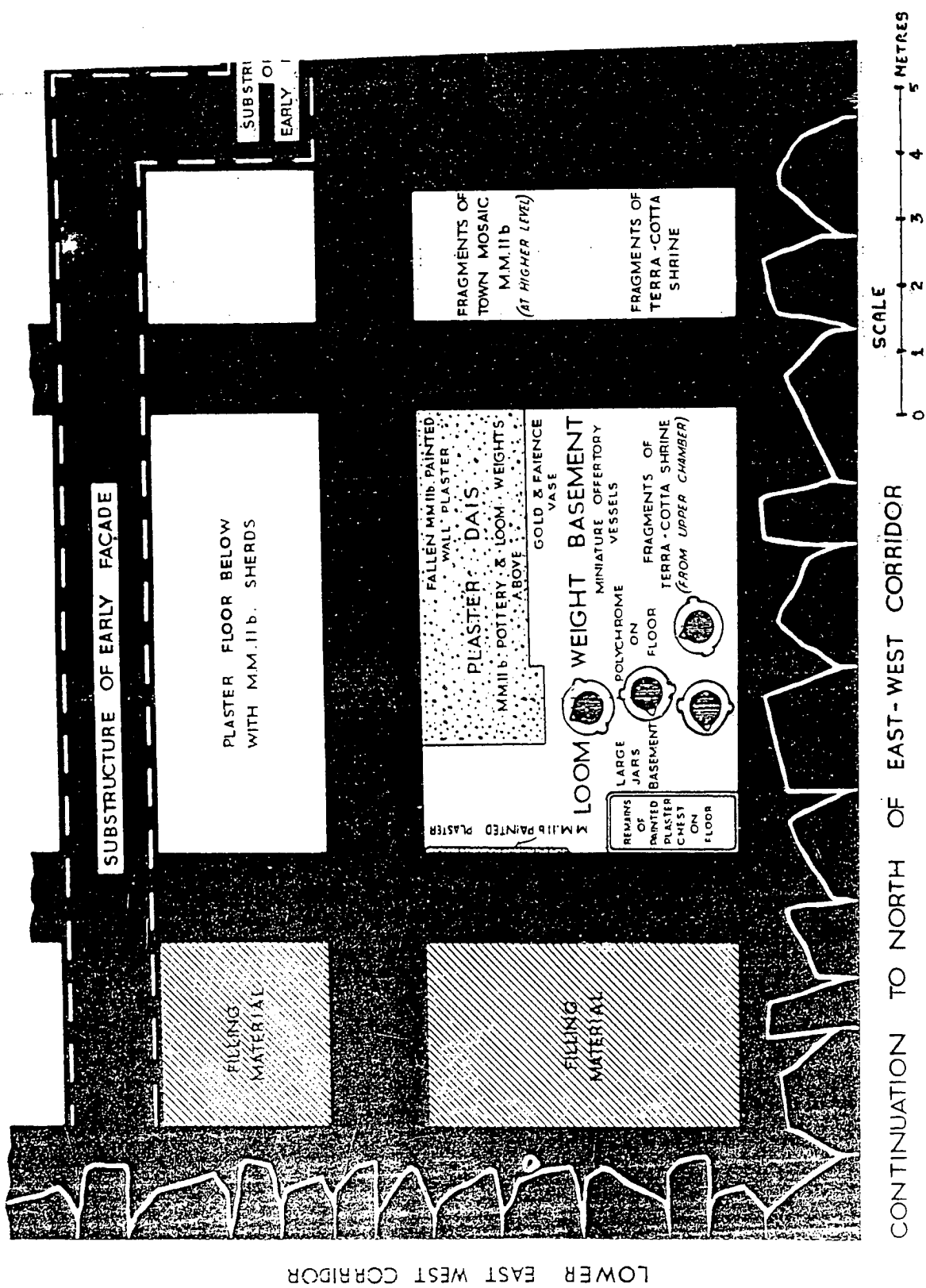


Fig. 58. Knossos. Plan of the Loom Weight Basin and adjoining areas (after Evans 1921, fig. 187a).

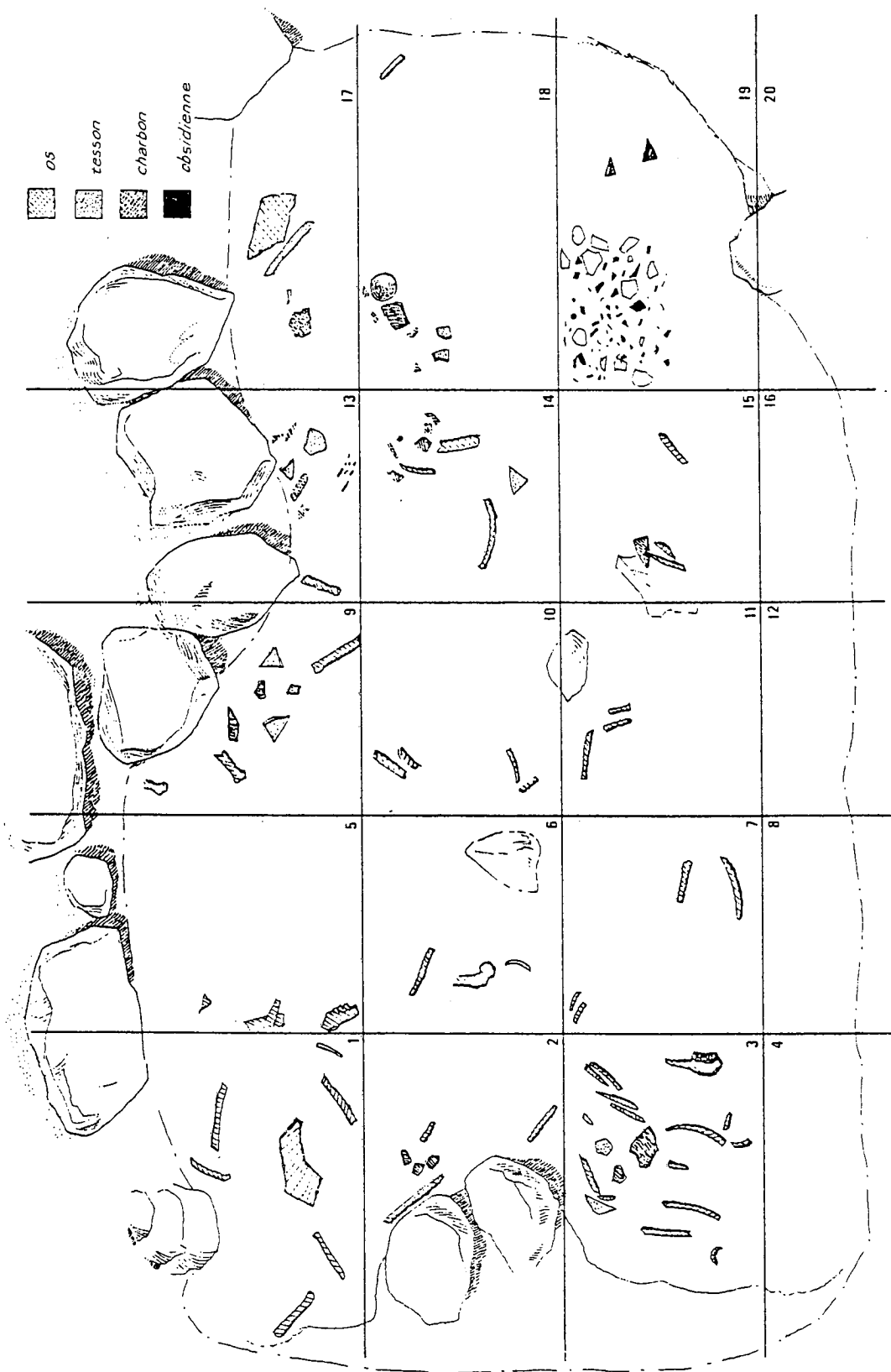


Fig. 59. Mallia. Plan of the 'obsidian workshop', Sondage K (H. van Effenterre 1980, fig. 110).

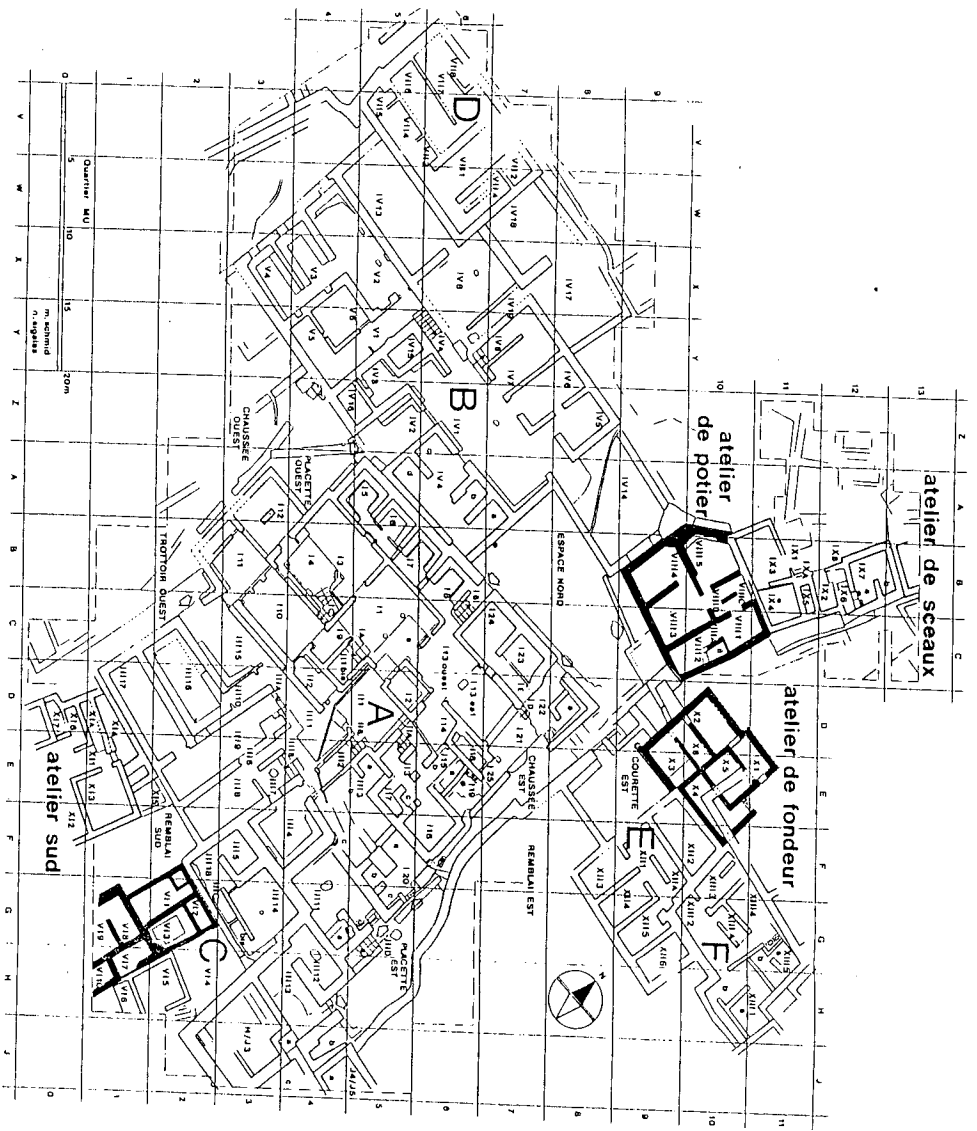


Fig. 60. Mailla. Plan of Quartier Mu, scale 1:400 (Poursat 1996, plate 81).

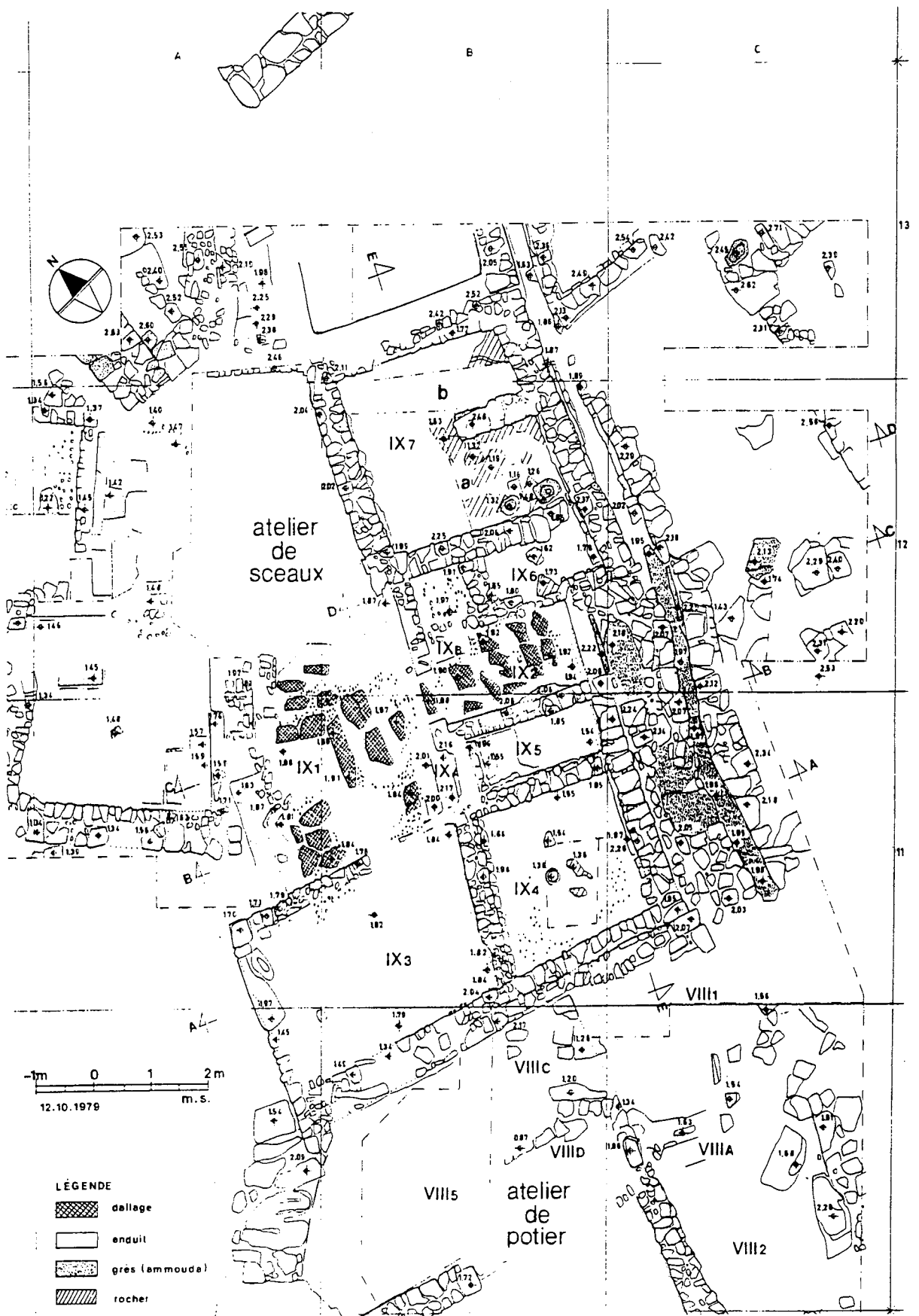


Fig. 61. Mallia. Atelier de Sceaux (Quartier Mu): plan, scale 1:100
(Poursat 1996, fig. 2).

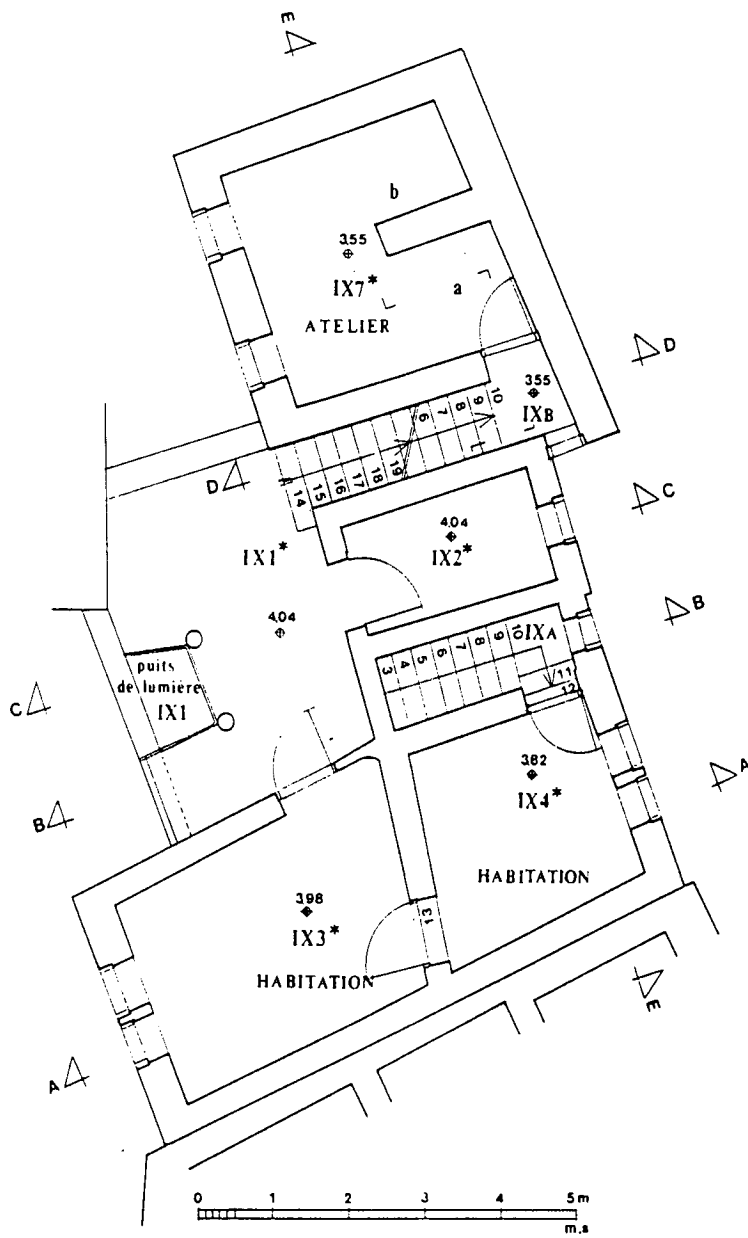


Fig. 62. Mallia. Atelier de Sceaux (Quartier Mu): plan of upper floor, scale 1:100 (Poursat 1996, fig. 4).

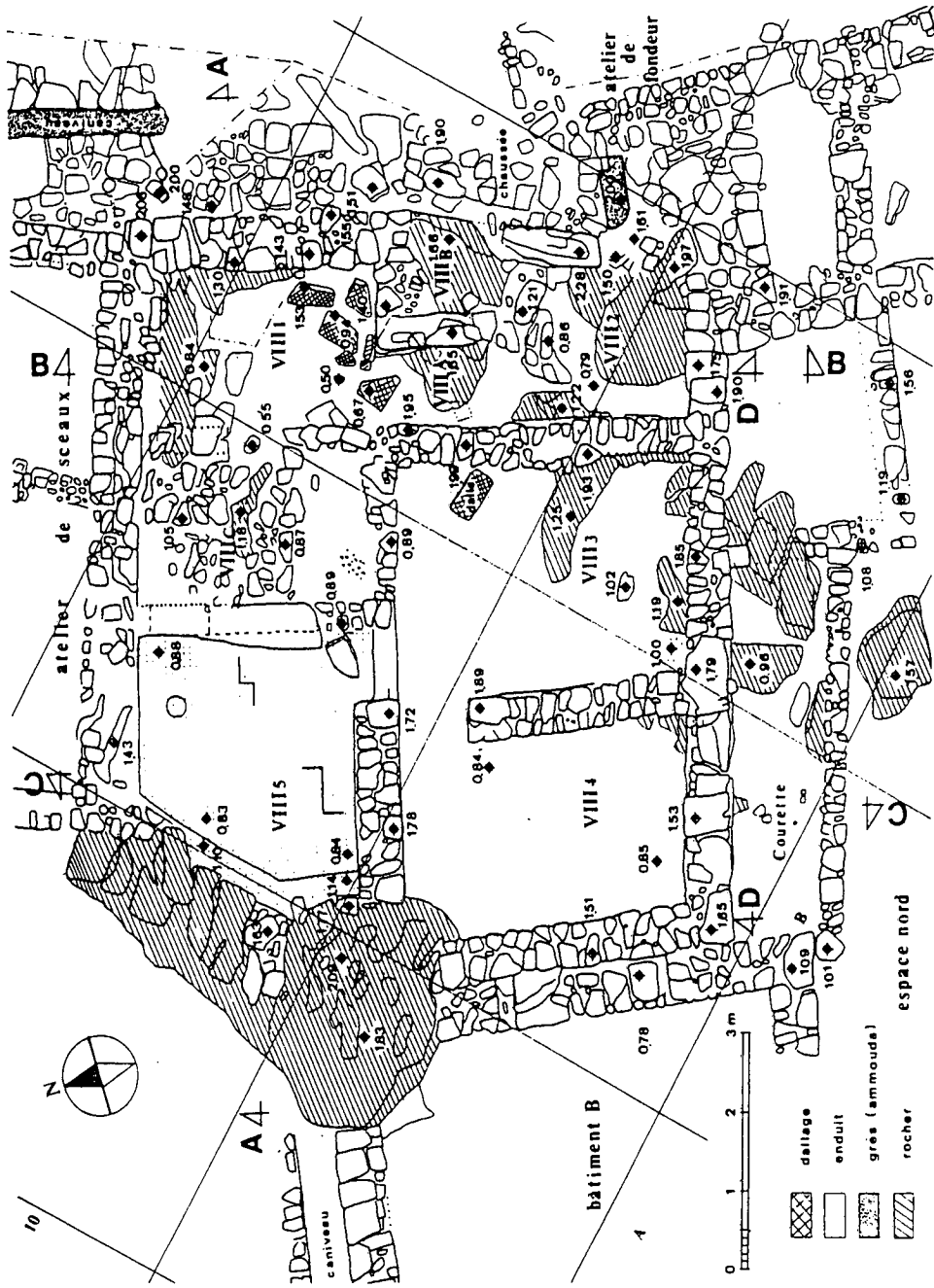


Fig. 63. Mallia. Ateliers de Potier (Quartier Mu): plan, scale 1:100 (Poursat 1996, fig. 10).

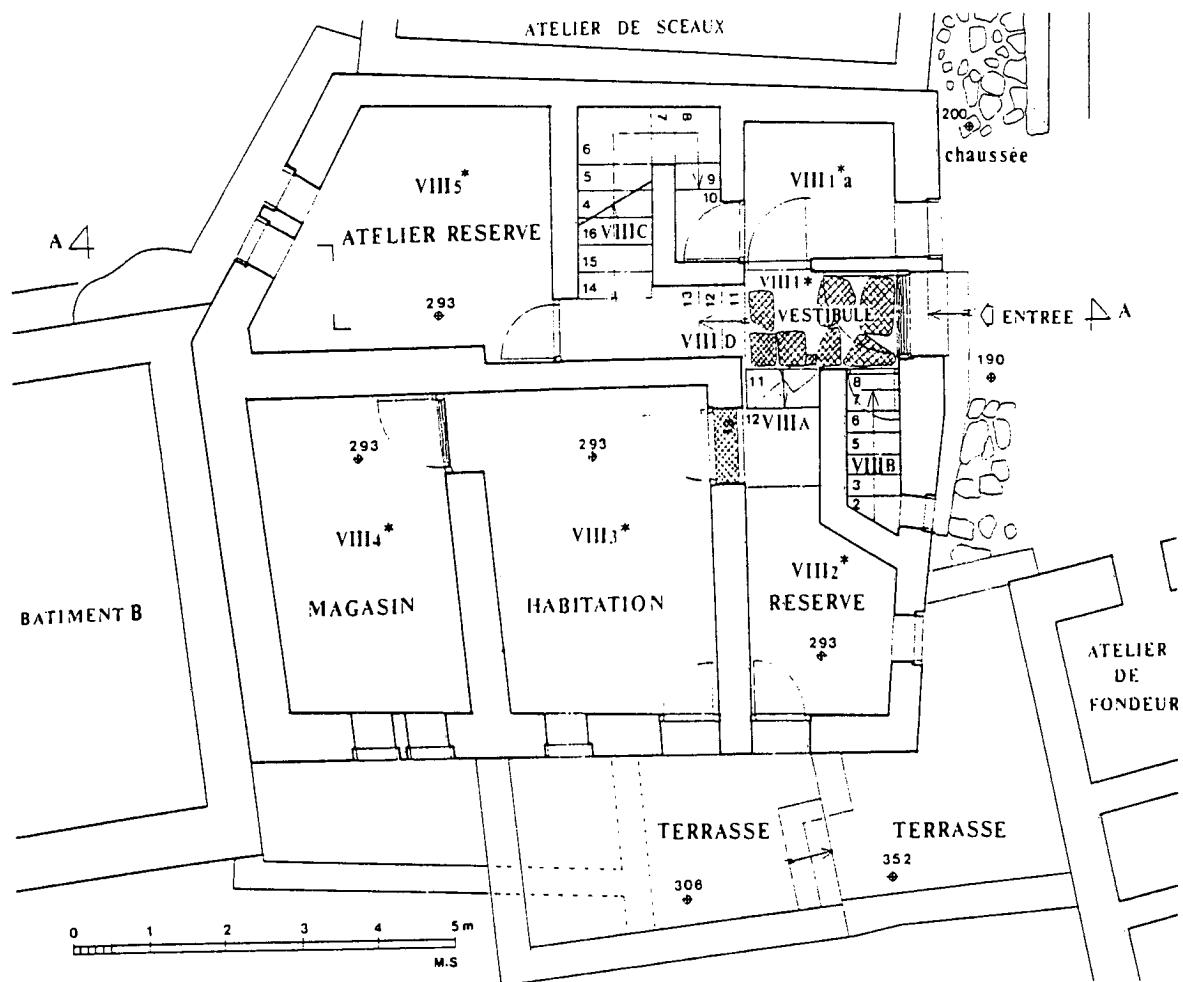


Fig. 64. Mallia. Atelier de Potier (Quartier Mu): plan of upper floor, scale 1:100 (Poursat 1996, fig. 14).

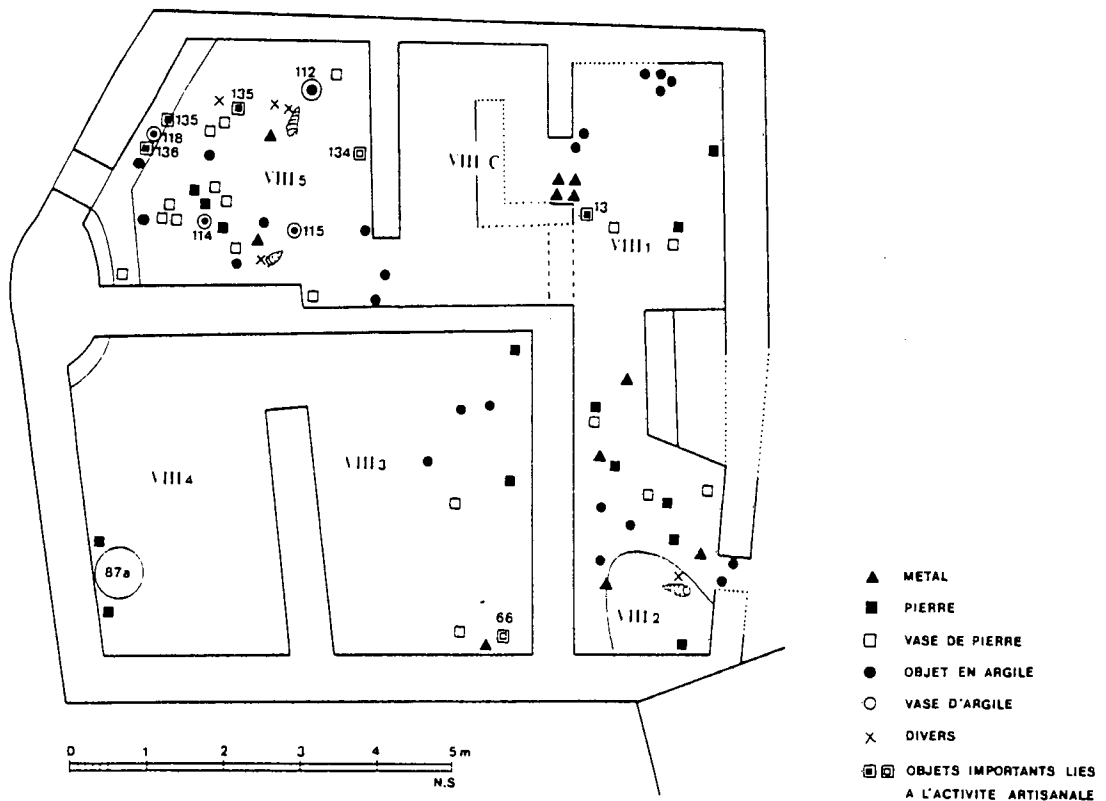


Fig. 65. Mallia. Atelier de Potier (Quartier Mu): plan of the distribution of artefacts on the upper floor scale 1:100 (Poursat 1996, fig. 18).

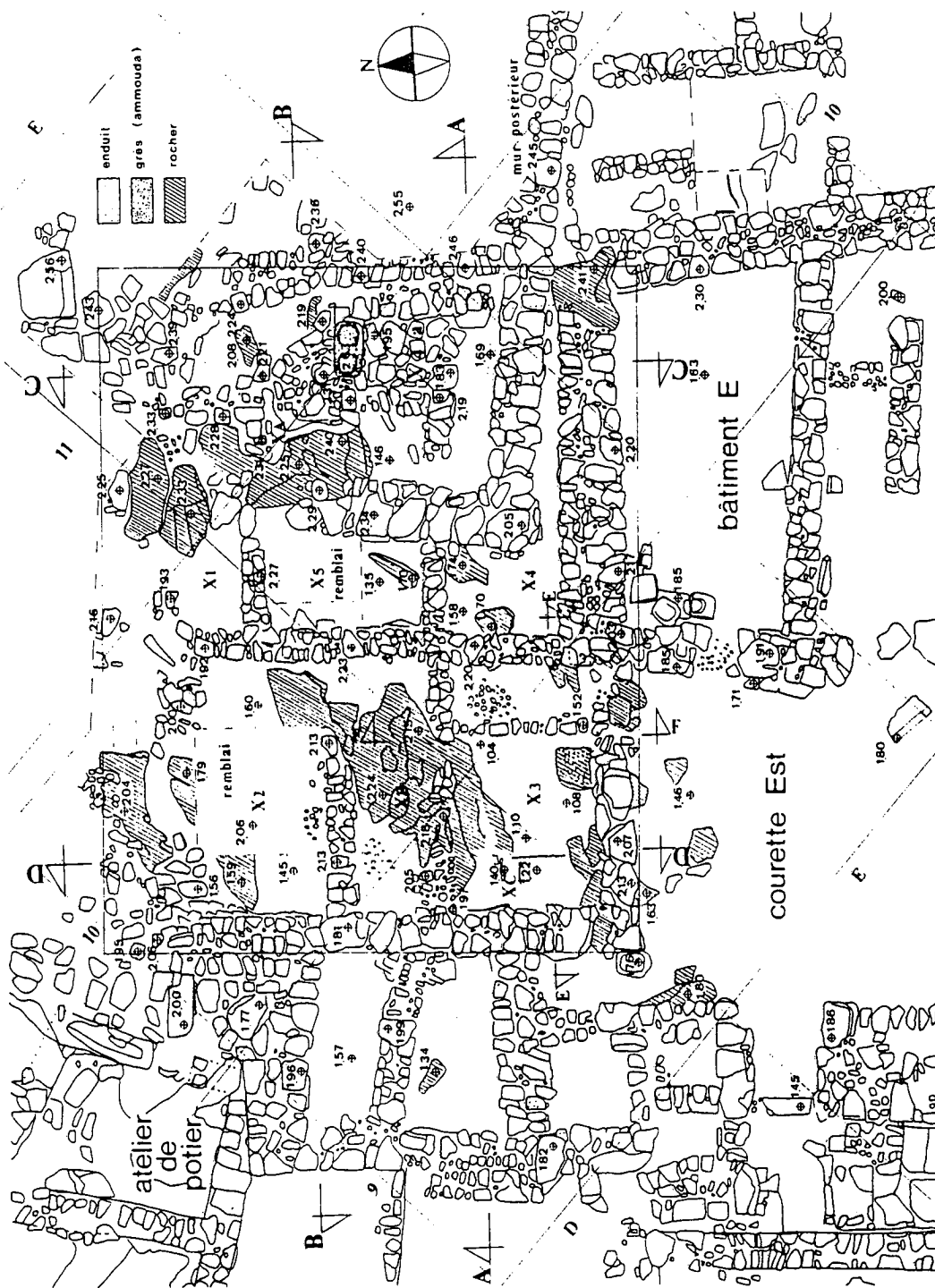


Fig. 66. Mallia. Ateliers de Fondeur (Quartier Mu): plan, scale 1:100
(Poursat 1996, fig. 24).

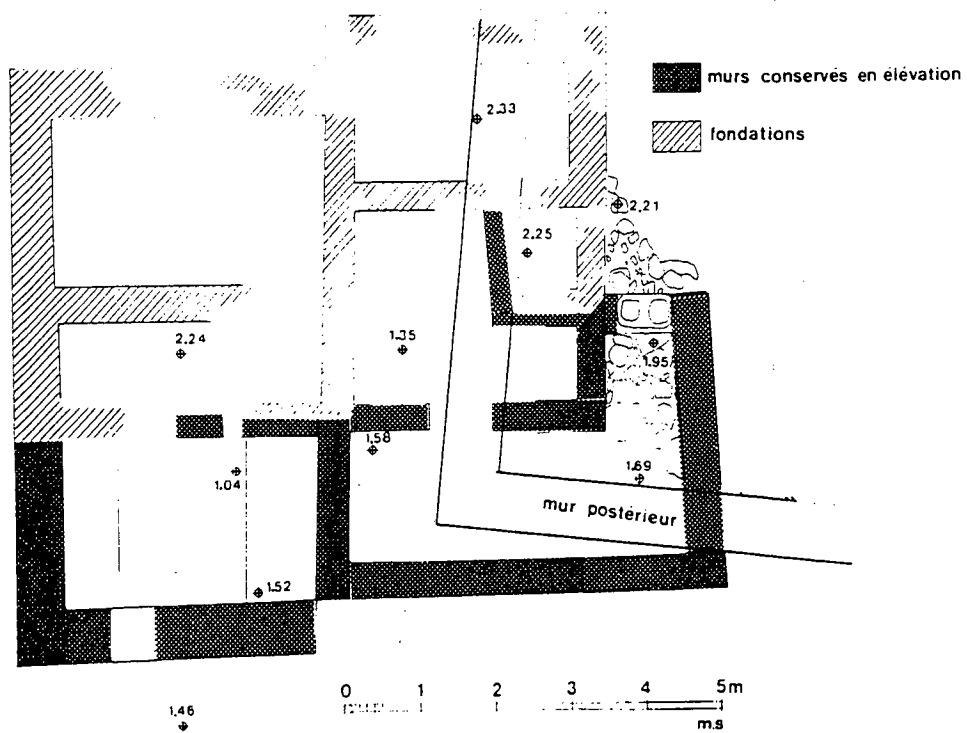


Fig. 67. Mallia. Atelier de Fondeur (Quartier Mu): plan of the foundations, scale 1:100 (Poursat 1996, fig. 25).

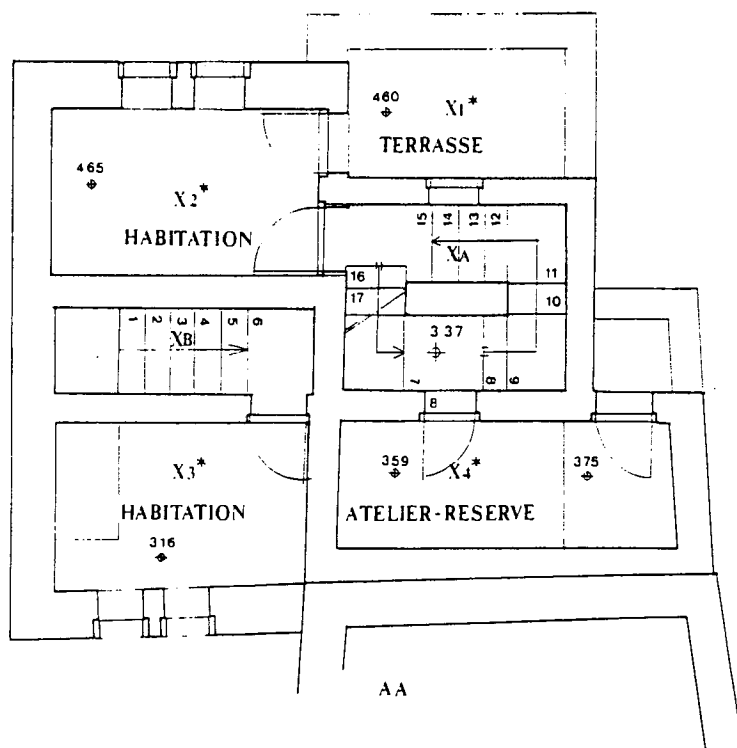


Fig. 68. Mallia. Atelier de Fondeur (Quartier Mu), plan of upper floor, scale 1:100 (Poursat 1996, fig. 27).

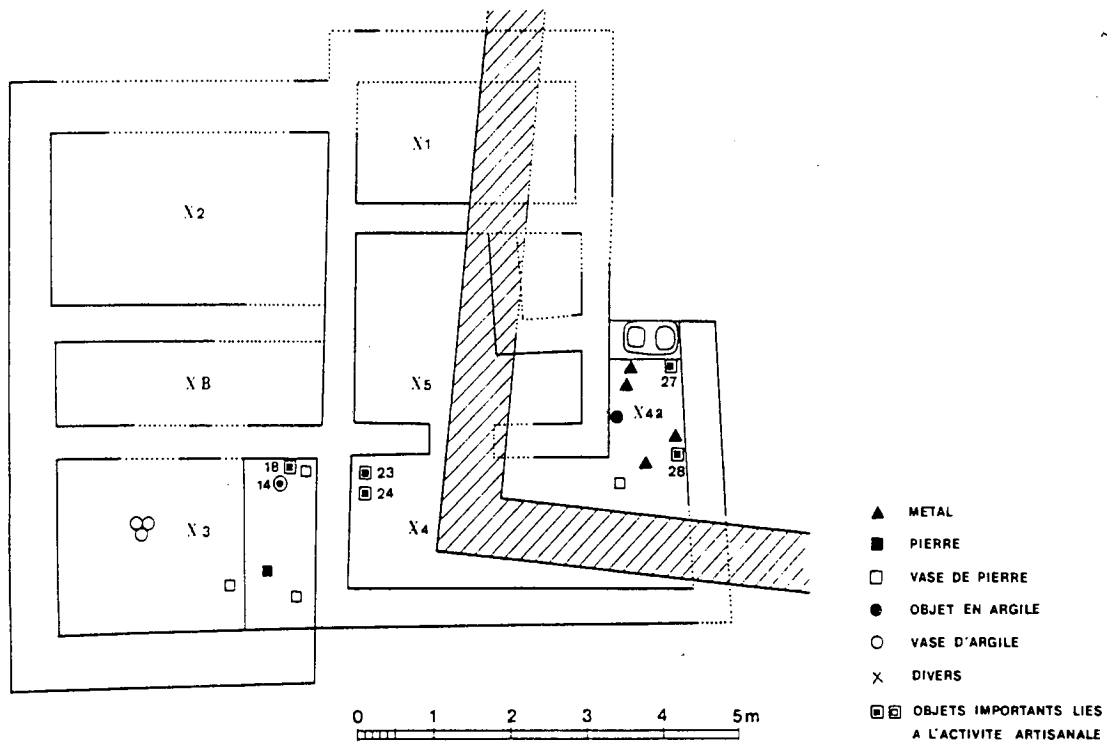


Fig. 69. Mallia. Atelier de Fondeur (Quartier Mu): plan of the distribution of artefacts on the upper floor, scale 1:100 (Poursat 1996, fig. 31).

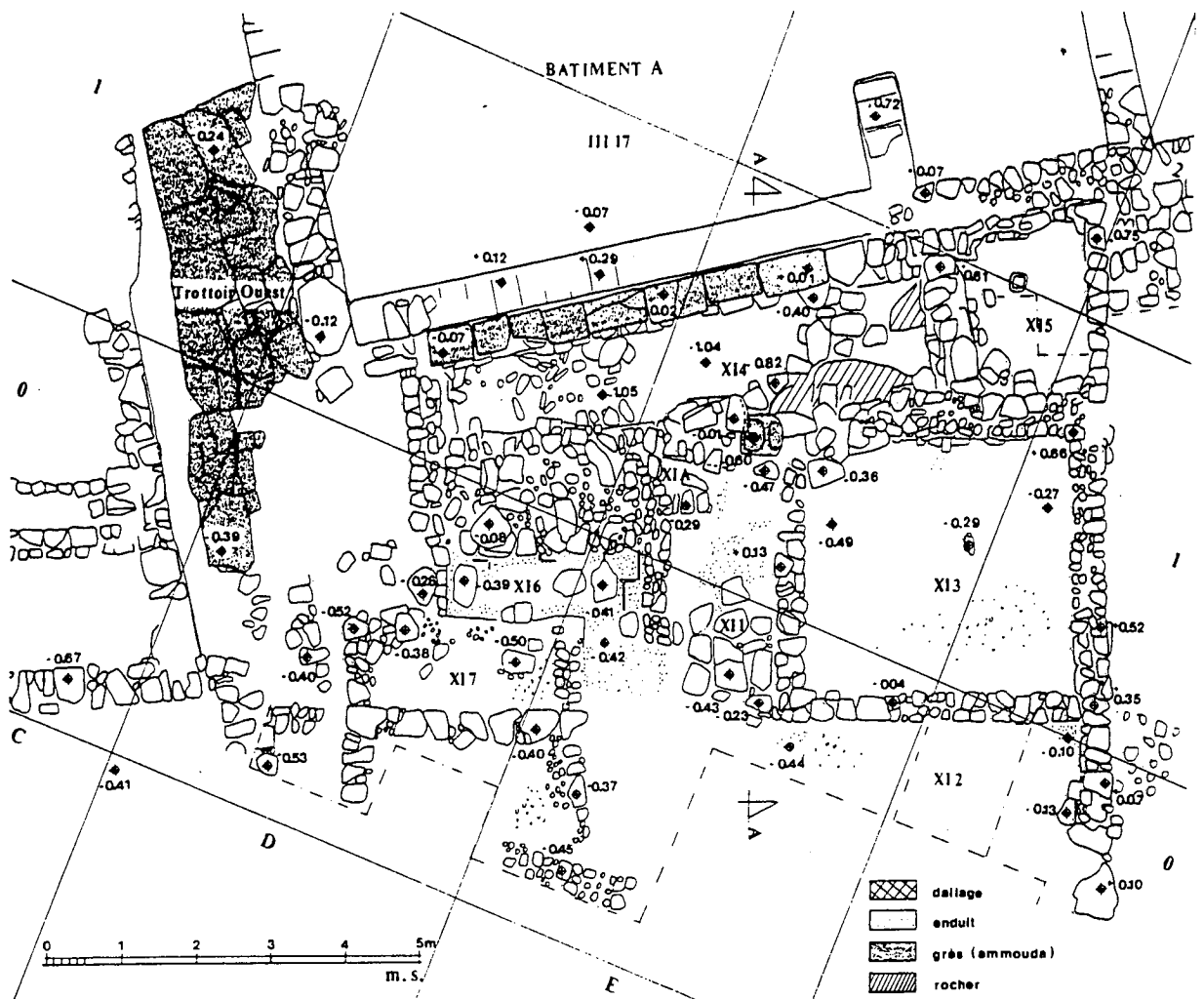


Fig. 70. Mallia. Atelier Sud (Quartier Mu): plan, scale 1:100 (Poursat 1996, fig. 34).

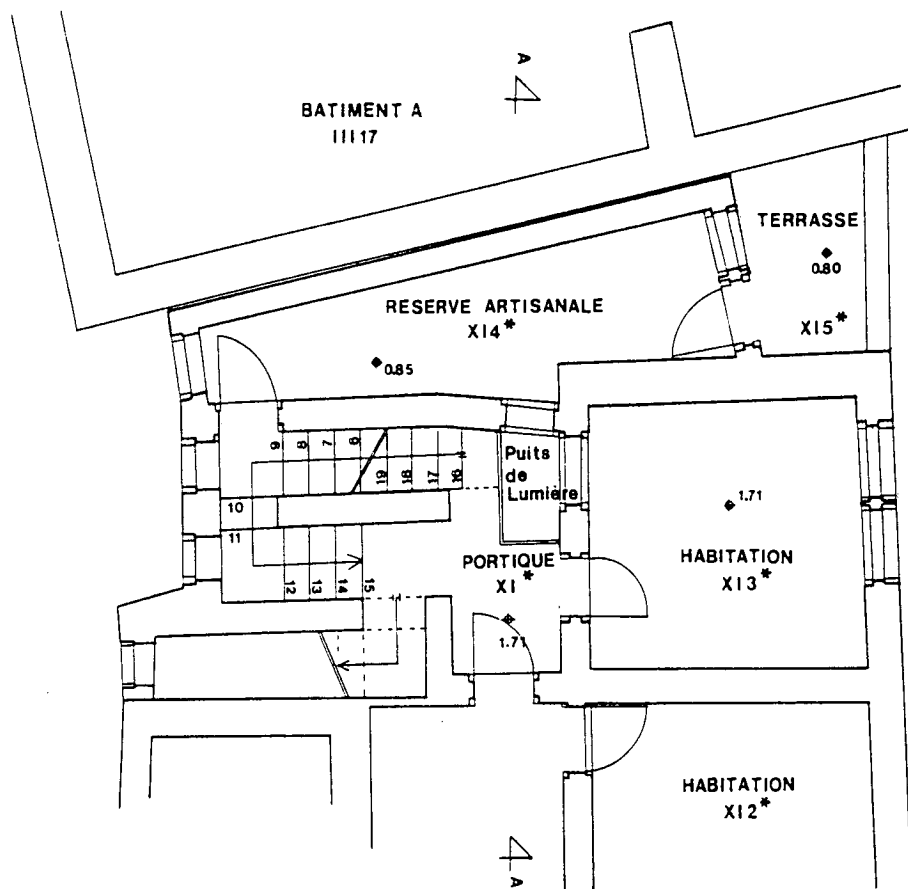


Fig. 71. Mallia. Atelier Sud (Quartier Mu): plan of upper floor, scale 1:100 (Poursat 1996, fig. 35).

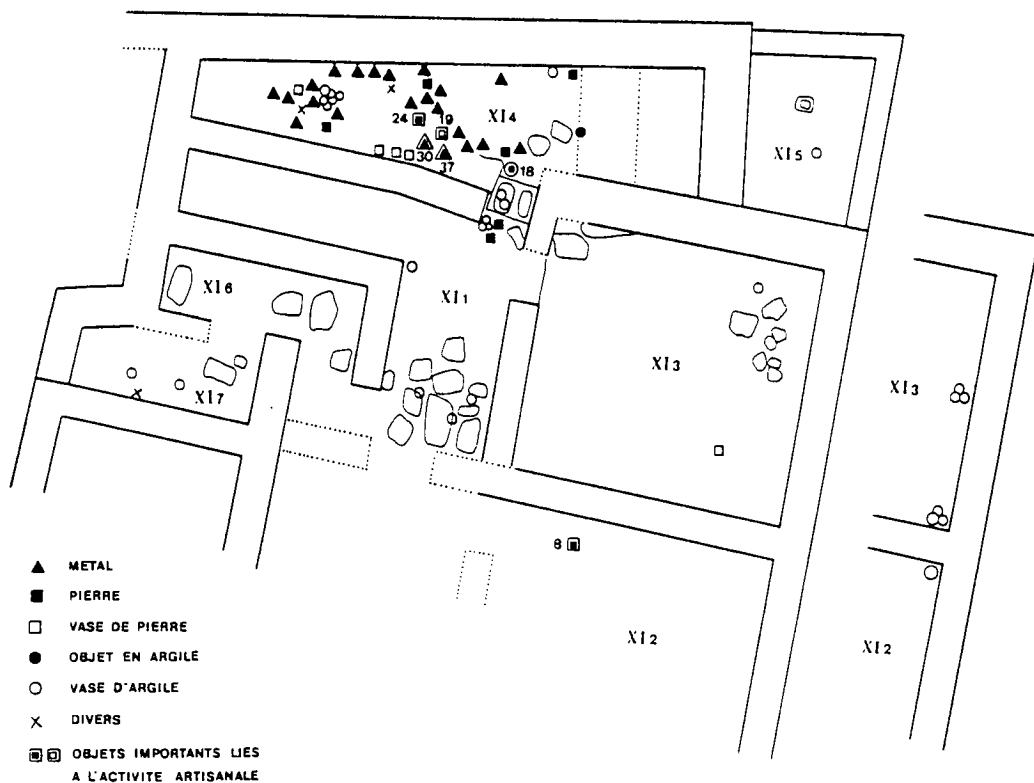


Fig. 72. Mallia. Atelier Sud (Quartier Mu): plan of the distribution of artefacts on the upper floor (shown on the left) and the lower floor (on the right), scale 1:100 (after Poursat 1996, fig. 37).

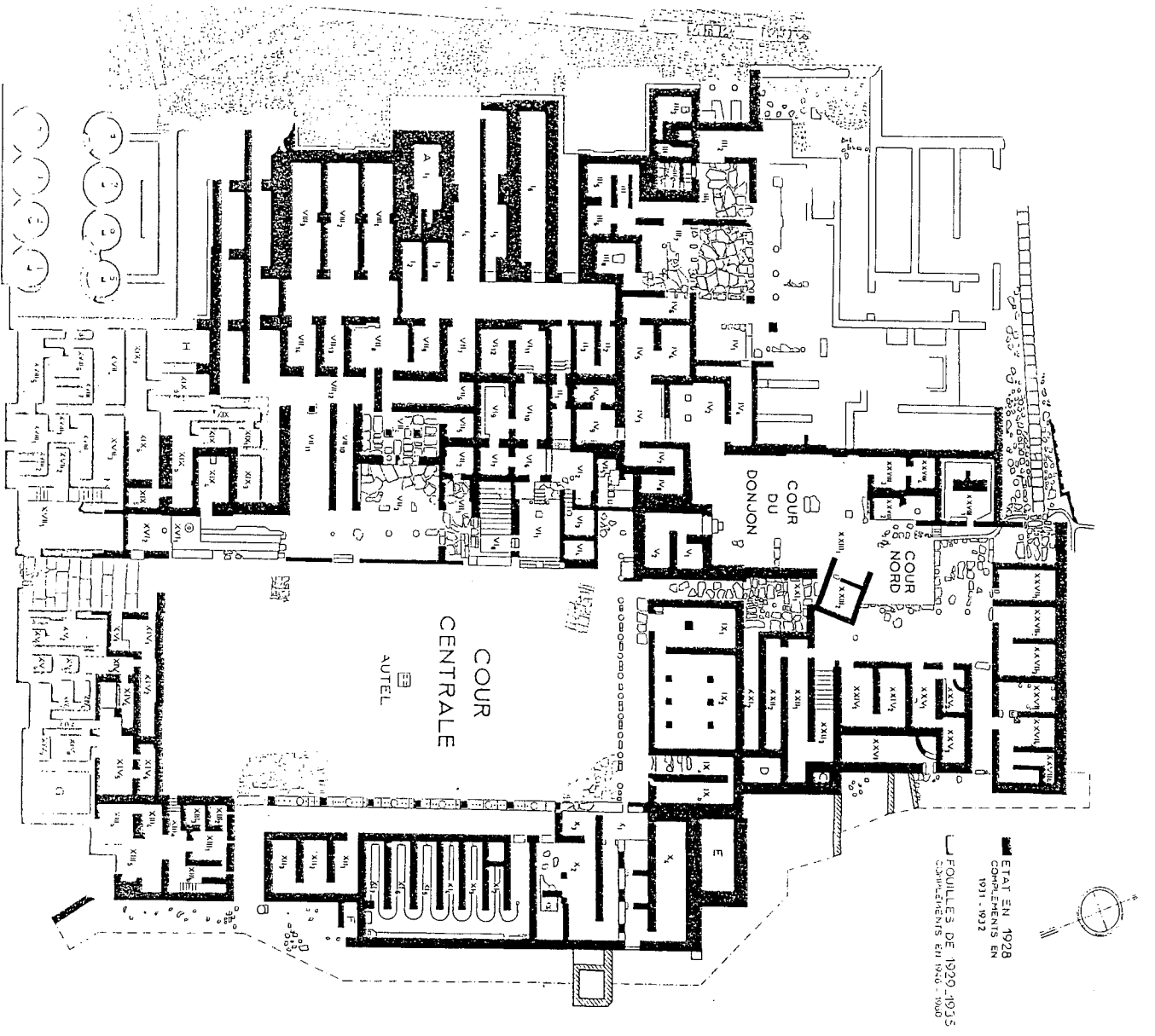


Fig. 73. Mallia. Plan of the New Palace (Chapouthier and Demargne 1962, plan 1).

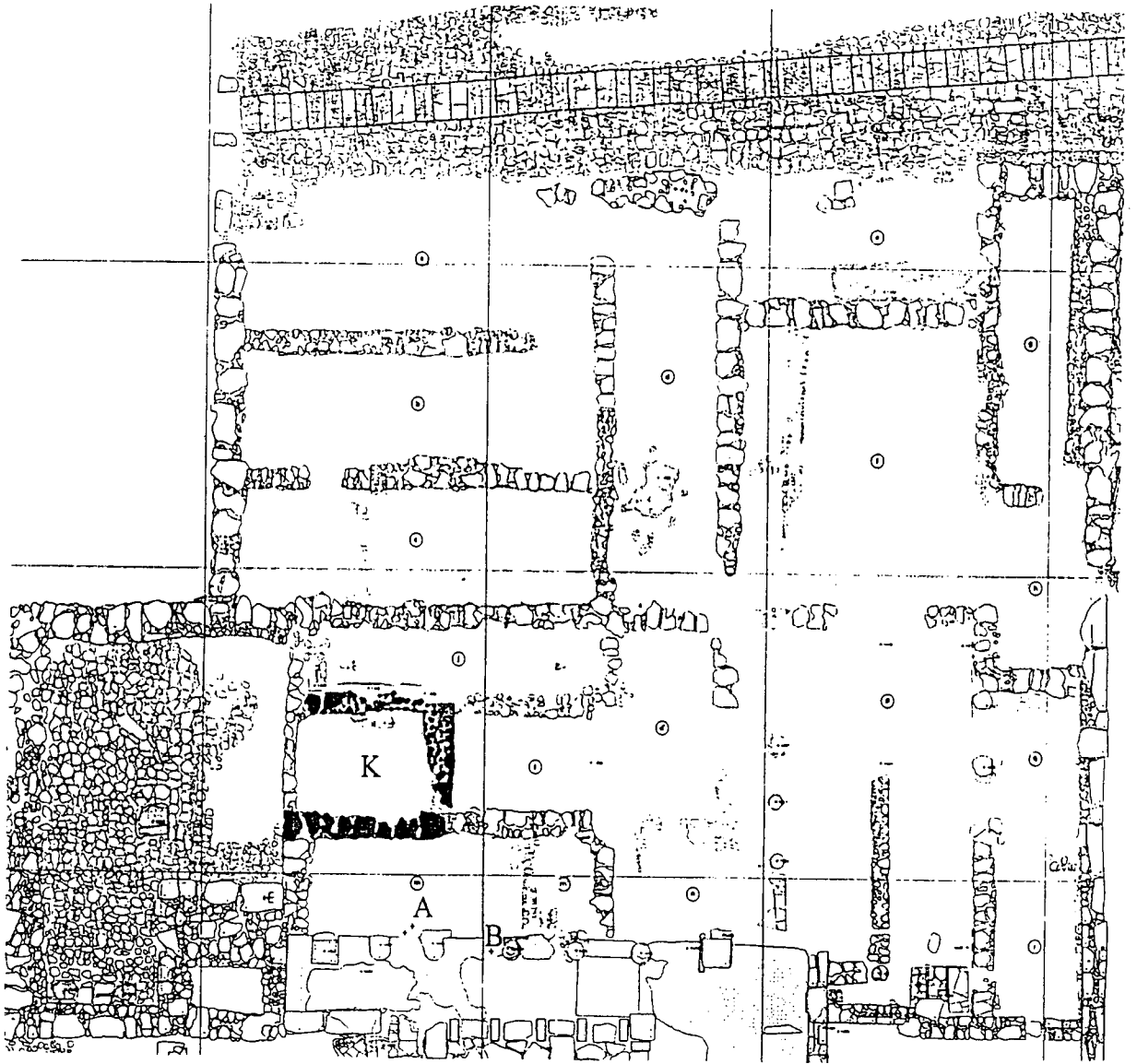


Fig. 74. Mallia. Plan of the northwest quarter of the palace. *A* indicates the findspot of the moulds, *B* indicates the location of the burnt spot; *K* indicates the location of the probable workshop (after Pelon 1987, fig. 1).

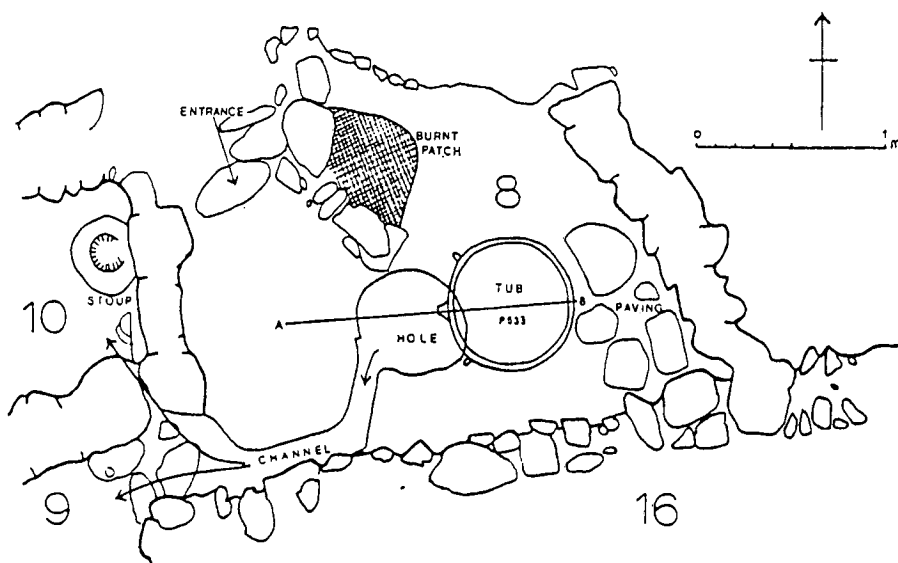


Fig. 76. Myrtos. Area 8 (area of the tub, hole and channel) (Warren 1972a, fig. 15).

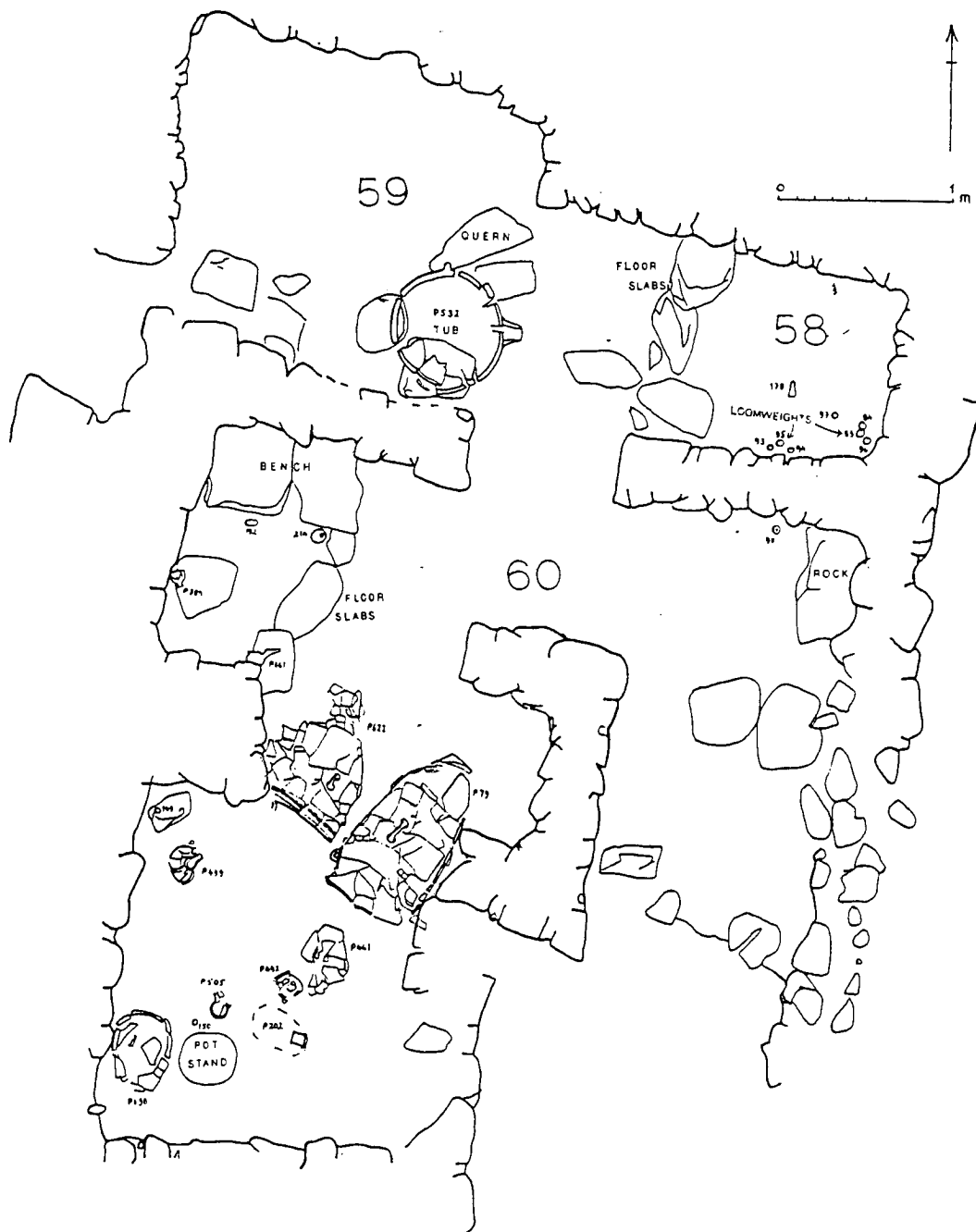


Fig. 77. Myrtos. Rooms 58, 59 and 60 (Warren 1972a, fig. 21).

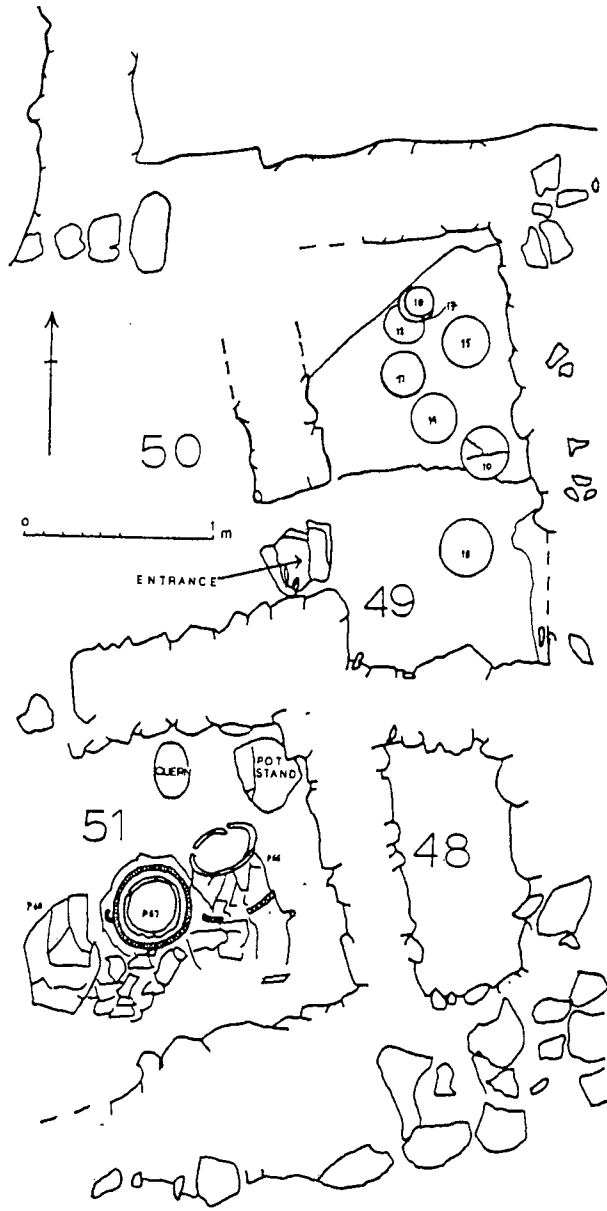


Fig. 78. Myrtos. 'Pottery workshop', Cell 48, Rooms 48-51 (Warren 1972a, fig. 14).

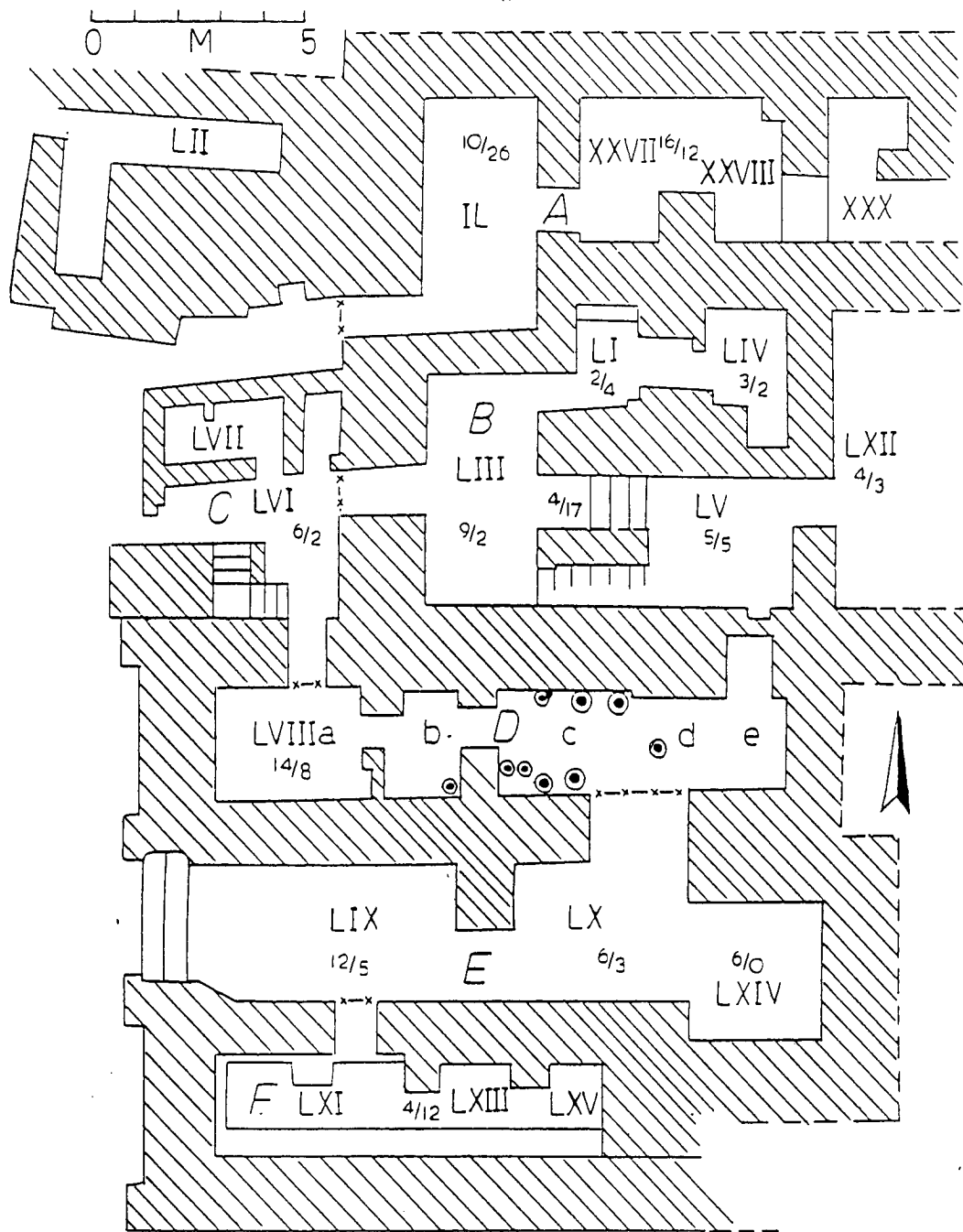


Fig. 79. Phaistos. Plan of the Old Palace. Letters A-F indicate architectural units, roman numerals indicate room numbers (Branigan 1987, fig. 1).

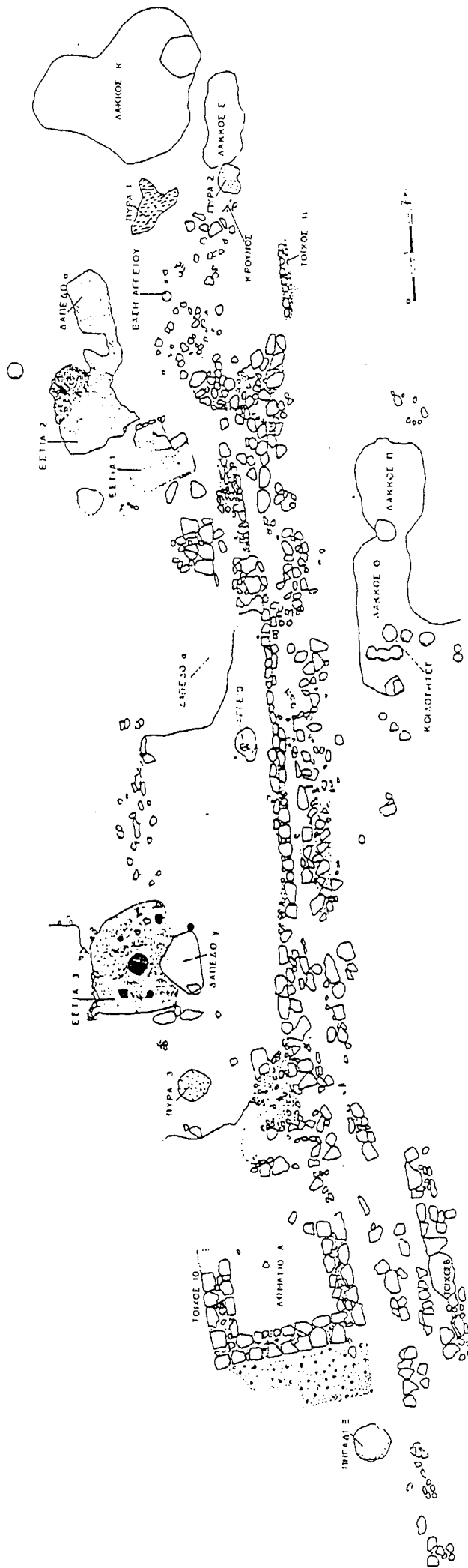


Fig. 80. (Rethymnon) Hamalevri. Bolanis: working area with stone-paved path, hearths and fireplaces (Andreadaki-Vlasaki 1997, plate XIV).

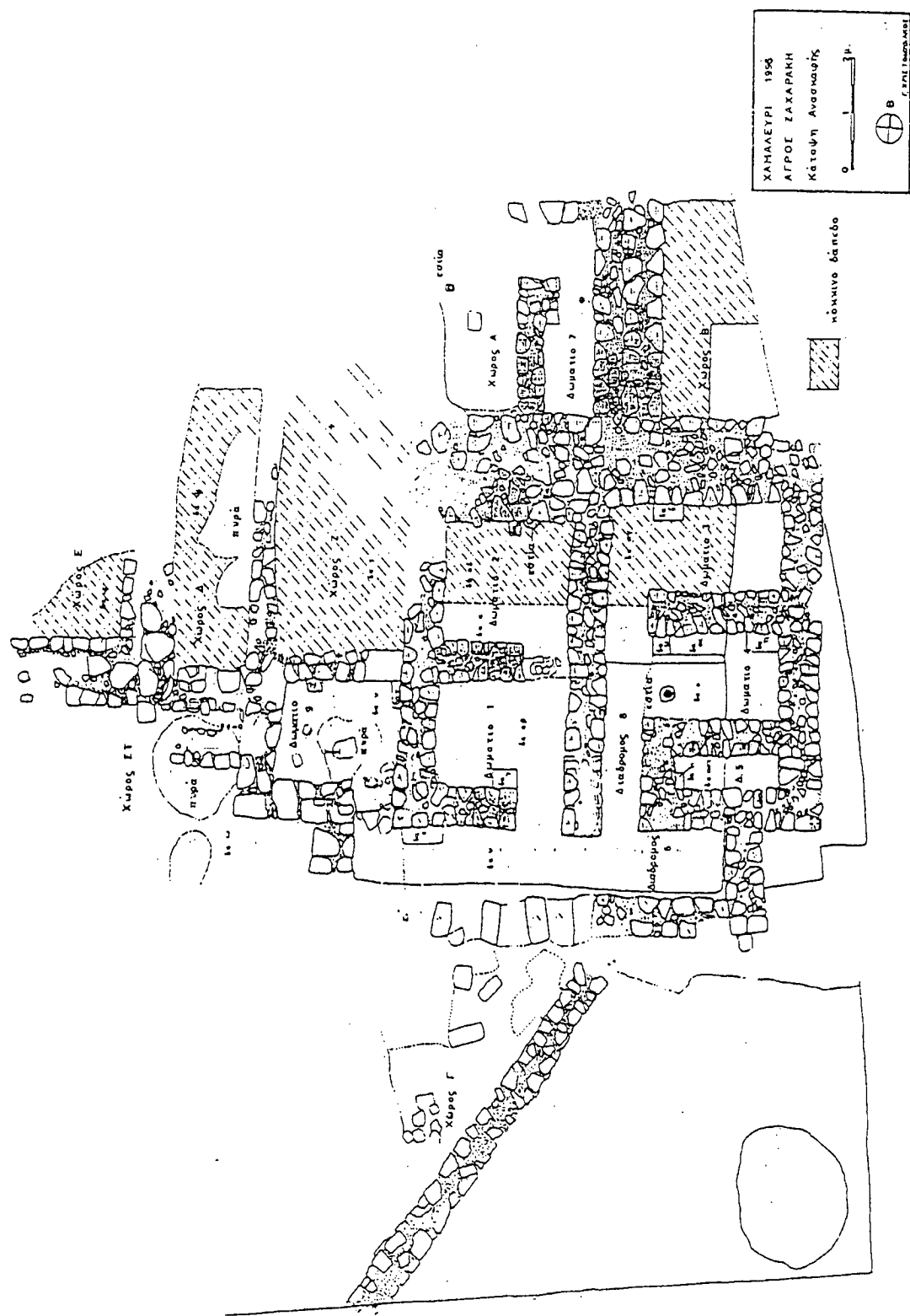


Fig. 81. (Rethymnon) Hamalevri. Tzambakas building (Andreadaki-Vlasaki 1997, plate XIV).

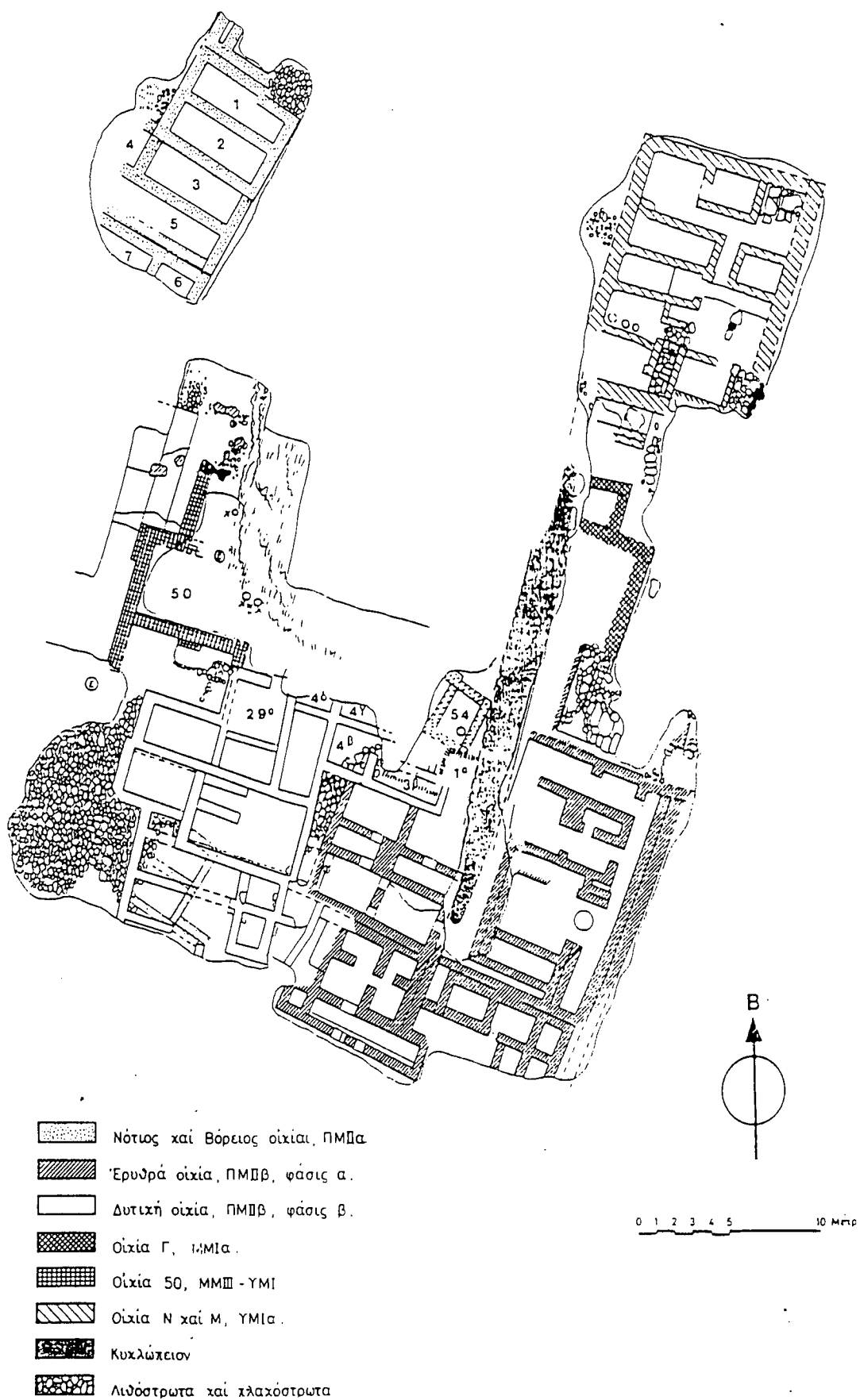
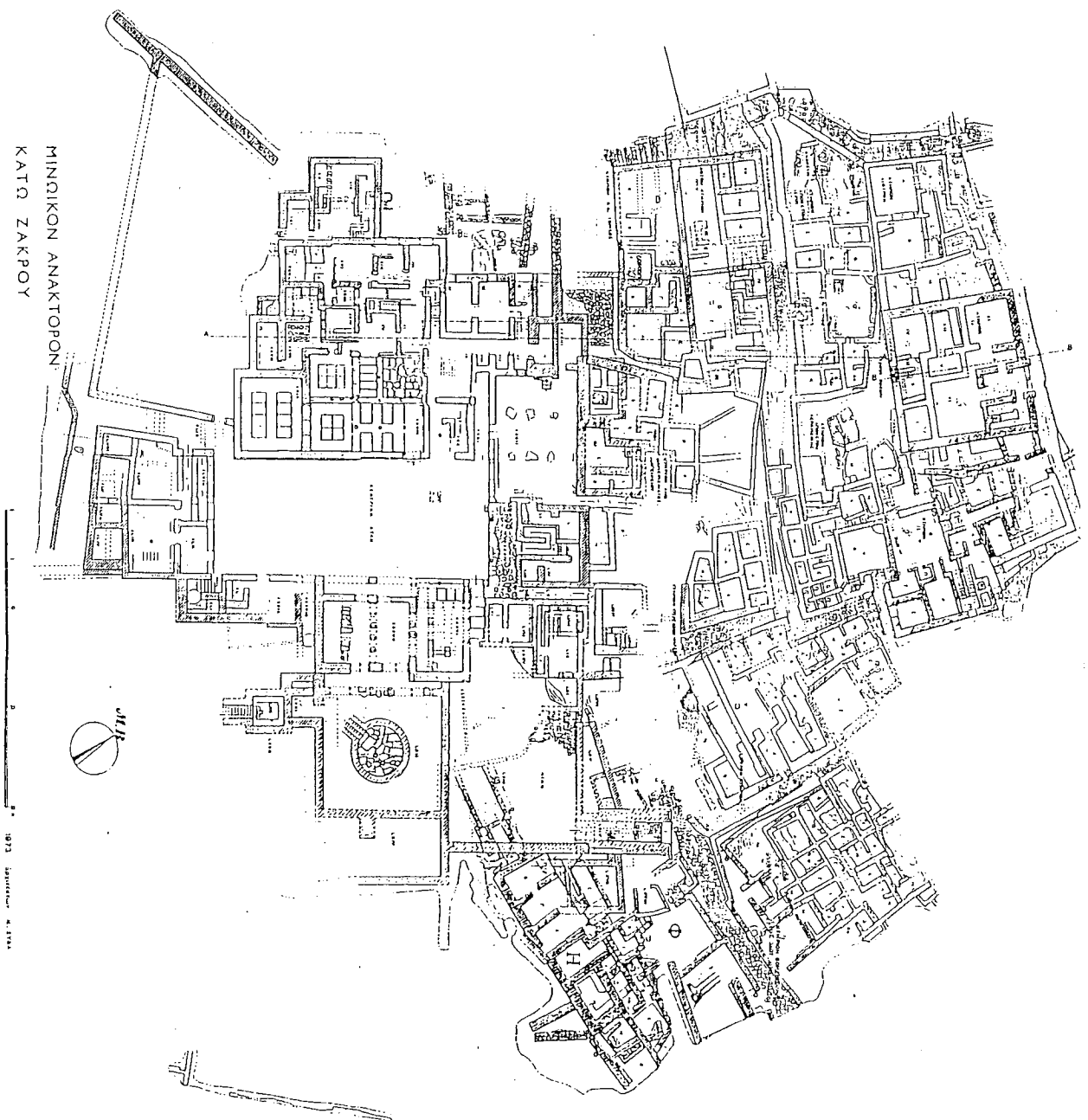


Fig. 82. Vasiliki. Plan of the site (after Zois 1976, Map III).



MINIKION ANAKTOPON
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Fig. 83. Zakro. Plan of the site; Φ shows Area Phi, and H shows Room H (after N. Platon 1971a).

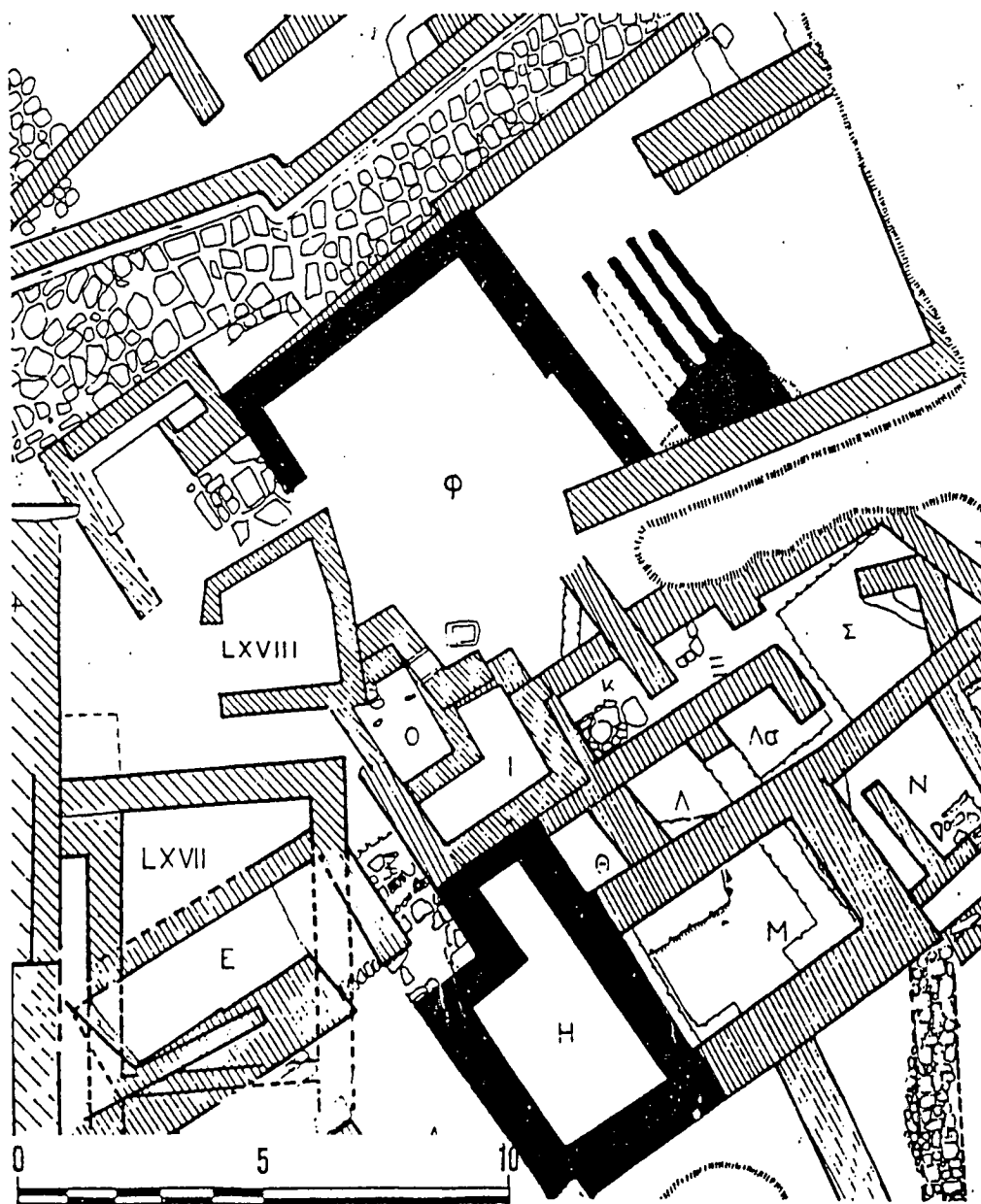


Fig. 84. Zakro. Space Phi and Room H (L. Platon 1988, fig. 18).

