ΕΤΑΙΡΙΑ ΚΡΗΤΙΚΩΝ ΙΣΤΟΡΙΚΩΝ ΜΕΛΕΤΩΝ

ΠΕΠΡΑΓΜΕΝΑ
Θ΄ ΔΙΕΘΝΟΥΣ ΚΡΗΤΟΛΟΓΙΚΟΥ ΣΥΝΕΔΡΙΟΥ

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ΗΡΑΚΛΕΙΟ 2006

BRENDAN BURKE

TEXTILE PRODUCTION AT PETRAS: THE EVIDENCE FROM HOUSE 2

Although the physical remains of wool and linen cloth on Minoan Crete are rare to nonexistent, we are fairly well informed about textile production and exchange from a variety of sources. This evidence includes artistic representations of garments in Aegean frescoes, such as the well-dressed women at Knossos; craft production residues, such as loom weights and other tools; and administrative seals, sealings, and tablets of Linear A and B that refer to the various phases of cloth production, storage, and distribution. Textiles were a major source of wealth on Crete during the second millennium B.C. and the production of textiles at Petras is well attested from archaeological and archival evidence.

The site of Petras in East Crete has revealed a great deal of textile equipment and other material dating from EM II through the LM IB periods. In this paper I focus on three aspects of cloth production at Petras, going in chronological order from the earliest to the latest. First, there is an early deposit of murex shells indicating purple dyeing at Petras contemporary with the earliest phases of the palace system elsewhere on Crete. Next, the large corpus of tools related to cloth production is discussed, including the incised and stamped loom weights. I conclude with a discussion of the material from the Neopalatial Villa, House 2, which provides some of the best evidence for concentrated textile activity at a Minoan center in eastern Crete.

Murex Purple Dye

The production of purple dyed cloth has been studied in some detail by archaeologists and is described by several ancient writers, most notably

earliest reported evidence for purple dyeing not only on Crete, but from anywhere else in the Mediterranean.[5] Other early deposits of murex shells on Crete, in quantities substantial enough to suggest dye-extraction, are from the small island of Kouphonisi, at Palaikastro, and at Kommos.[6] Pottery found at these sites suggests a date within the early MM period, that is, just after the beginning of the 2nd millennium B.C.

The deposit of Murex snail shells from the harbor site of Kommos dated to the MM I/II B is the closest contemporary material to the Petras evidence.[7] Deborah Ruscillo reports that a slab-paved stone floor was built at Kommos, in a room with drainage channels packed with Murex shells on either side running westwards toward the sea. The slab floor and the area just to the west of the room were covered with Murex remains as well, all clearly dated to the MM IB period. Ruscillo has concluded that Murex debris from purple dye production consistently dates to the early Proto-Palatial period at Kommos, suggesting that during the formative periods of Minoan palaces, purple dye production was concentrated at palatial centers. After this period there is a noticeable absence of Murex throughout the archaeological record on Crete. This is the same pattern observed at Petras – early exploitation of murex purple during the formative periods of the Old Palace.

Minoan Textile Tools

Also during the Old Palace period, we have additional evidence for cloth production at Petras, with large deposits of loom weights and some spindle whorls. These tools are most often clay weights of various shapes and sizes used to add tension to thread, and are found at many sites. Spindle whorls are usually small, fired clay objects of various shapes and weights.[8] They

weights and a very early conical stamp seal showing a standing male figure holding a staff. This stamp seal has been studied by D. Rupp.

5 See also Stieglitz 1994. What are thought to be dye residues have been analysed from a spouted vat from Sarepta showing that purple dyeing extended back into the Late Bronze Age in the Phoenician/Canaanite homeland. See McGovern and Michel 1984, 67-70.

6 For the original references to Kouphonisi and Palaikastro, see Bosanquet 1904, 317-329 and 1939-40, 60-77. For recent research at Kommos, see Ruscillo 1998, 392.

7 Ruscillo 1998, 392.

8 Τζαχίλη 1997, 105-123; Barber 1991, 51-68, 299-310.

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are attached as a weight at the bottom of a long slender rod called a spindle. Raw wool is drawn out and attached to this rod and then spun manually. Spun thread then winds itself around the narrow spindle. All weaving technologies depend upon some system of tension-spun thread.

Minoan spindle whorls have been a source of quiet consternation among archaeologists for some time. Spinning is quite labor intensive, yet can be done almost anywhere at anytime. It does not require the physical or mental application that the loom needs. It is estimated that it takes seven to eight hours to spin thread that can then be woven in one hour.[9] Because of this, one would expect to find many whorls throughout the archaeological record on Crete. This, however, is not the case. On Crete, the proportion of excavated spindle whorls to loom weights is very low in palatial contexts, including Petras, which yielded only 23 spindle whorls. The number of whorls is in no way sufficient to supply all the thread needed by the site's many looms, as indicated by the loom weights. While this number at Petras is small, it is a large number when compared to all the reported whorls from other Minoan sites.[10] And while it is of course possible that some whorls were made of perishable materials, such as wood, or that thread was spun by some other method (such as the Minoan spinning bowl, perhaps), it seems more likely that during the Old and New Palace periods, spinning occurred away from centers like Petras and was located in the surrounding countryside. Looking at the chronological distribution of whorls during the entire Bronze Age on Crete, we see that the largest numbers of reported whorls date to either before or after the Minoan palaces. For example, 32 whorls are reported from EM Myrtos Fournou Koriphi, and over 100 are known from the sub-Minoan site of Karphi.[11] This evidence suggests that during the palatial period, spinning was dispersed throughout rural areas of Crete.

On Crete, most Bronze Age weaving was done on warp-weighted, vertical looms, which allowed for patterns and greater variety of designs as compared to the horizontal ground looms of the Near East. Suspended clay loom weights gave tension to the warp threads hanging vertically at the bottom of a standing loom. There are three basic types of Minoan loom

[9] Barber 1997, 515.

[10] Carington Smith 1975, 263.

[11] Carington Smith 1975, 263-272.

weight: the cuboid, the disc and the spherical. This last type, the spherical or 'melon' shaped weight, is not present at Petras and none have been found outside of Crete, even at such Minoanized sites as Kythera or Thera. The weights seem to be found in areas with religious associations, particularly around the area of Knossos, at the Unexplored Mansion, Vathypetro and at Archanes, for example.[12] These tend to weigh more than the other loom weight types, around 150 to 250 grams, and may be related to the production of a specific kind of heavy duty cloth.

In total there were 428 clay items identified as loom weights collected at Petras from 1985 through 1996, with the majority being the cuboid and the disc shaped types. Other examples included pyramidal and cylindrical varieties. These weights were attached to a loom in various ways; they may have had bunches of the warp threads tied to them or have been attached to a thin bar by a cord that had warp threads tied to it.[13]

Some of the earliest textile equipment from Petras dates to the Old Palace period, but it is difficult to associate this material with areas of production. Many loom weights and spindle whorls were found in the rich palatial MM IB-MMIIA deposit between sectors I and III, excavated in 1995 and 1996. Nearly 60 cuboid or rectangular weights were found in this deposit, with an average weight of 174 grams, dating to the MM I-IIA period. Some of these weights, like other later ones from Petras, have marks or even stamps that suggest they were in some way connected to a centralized administration and that the production of cloth was a craft activity administered by the Minoan palaces.[14] Comparable examples from the Old Palace period include stamped disc-weights from Palaikastro,[15] one

[12] See Sakellarakis and Sapouna-Sakellaraki 1991, 87, fig. 62. Another sizeable group of melon weights comes from LM II levels of Room N in the Unexplored Mansion. Popham 1984, 24248.

[13] Carington Smith 1975, 275-279; Barber 1991, 104-105; Tzachili 1990, 380-389, fig. 9. The attachment of these weights was first illustrated in Hazzidakis 1934, 105, Pl. 30.1. The weights from Mallia, however, were identified as 'clay axe and club heads' for ritual purposes in the 1930s. Some loom weights in the Classical period also seem to have used a wooden rod inserted horizontally through the top. One of the looms on the famous aryballos in the Corinth museum illustrating the weaving contest between Arachne and Athena shows loom weights attached to horizontal bars. Two loom weights found at Nemea show this rod. See McLauchlin 1981, 79-81.

[14] Tsipopoulou 1990, 99-106.

[15] The stamped disc loom weight was found at EM II Palaikastro, House D 32, HM 4814;

of MM II date at Monastiraki,[16] stamped cuboid weights from Mallia[17] and Khamezi,[18] and a stamped spindle whorl from Khamaleuri.[19]

From Petras, a total of 146 loom weights were catalogued as the cuboid or rectangular type (See figs 1 through 5 for examples). This type of weight in the Minoan world is most often found in Protopalatial contexts concentrated in Eastern Crete, yet similar examples are reported from Neolithic Knossos.[20] These are fired clay cubes or rectangles with four holes in each corner of the cube face. The suspension holes are located along the longitudinal axes and continue through the width of the weight, showing thread wear.[21] Oddly, the punctured holes in the four corners appear symmetrical on one side, clearly set in each corner, but on the other, the holes are completely out of alignment as if they had gone astray through the middle of the weight. (See, for example, P 95/162, fig. 1). I am unable to explain this unusual feature, but it is something to examine in other loom weights on Crete. It is of course possible that these objects were not at all connected with weaving since it is difficult to reconstruct the use of the four holes in each corner. Davaras, following Coldstream and Huxley, has suggested that this type of weight is a net weight, yet the evidence for

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Eccles 1939, 49 no. 41, fig. 27. See also Warren 1970, 31. Warren dates the seal and loom weight to the EM II period, contra Dawkins 1903/4, 202.

16 The loom weight from Monastiraki was inscribed in Linear A. Nine hundred clay sealings from this provincial Protopalatial site also show early organizational features. Watrous 1994, 742-4.

17 The cuboid weight at Mallia was found in a questionable EM/MM I context. Poursat 1980, 204-205, no. 295, fig. 275.

18 For the MM I A cuboid loom weight from Khamezi, see Eccles 1939, 48. Loom weights are also reported from the ten rooms at this site. See also Davaras 1972, 283-288.

19 For the stamped spindle whorl from Khamalevri, also of MM I A date, see Vlasaki and Hallager 1995, 253, 259 and also Poursat's response to Pini in *Aegean Seals, Sealings and Administration*, *Aegaeum* 5 (ed.) T. Palaima (1990) 55. See also Aruz 1994, 211-235, especially 215-218. In addition to seal-impressed loom weights, two nodules found in the 'Room of the Olive Press' at Knossos dating to the early MM period show impressions of cloth on the rear. The date for these seals is disputed between Weingarten and Pini. The proximity of this room to the Loom Weight Basement may be significant for locating early palatial textile activity at Knossos. See Panagiotaki 1993, 29-48.

20 Hutchinson 1939-40, 47-49.

21 Carington Smith 1975, 293-296.

this remains ambiguous.[22] Some of them are, however, inscribed with signs also found on other known loom weights, including textile ideograms (e.g., Ag. Nik. 3, figs 3 and 13, and P 86/703). They appear fairly standardized in form and weight, falling into the same size range as other known loom weights.[23]

Four cuboid loom weights were surface finds from Petras in the 1950s, and were given to the Herakleion museum by Nicolas Platon. Permission to study them was given to Metaxia Tsipopoulou and they are now stored in the Agios Nikolaos Museum. I have labeled them Ag. Nik. 1-5, since there is no catalog entry for them. As mentioned above, Ag. Nik. 3 preserves a textile ideogram in the form of a rectangle, probably imitating a piece of cloth, with a diagonal mark through the rectangle. This sign occurs on the smooth face of the cube, which also has the suspension holes. The other sides of the weight are rough and show wear. The clay is light orange/buff with some mica-like inclusions. Another weight, Ag. Nik 5, is also cuboid but it has an oval shaped impression that has been quartered with the markings of a cross. It is unfortunate that we do not know the original find spot for these weights.

The second most common type of weight at Petras is the circular or discoid weight (figs 6-11). This is the most prevalent Minoan loom weight known and appears on Crete from EM II through LM III. Carington Smith states that the Minoan discoid weight is just as culturally distinctive of the Minoans as is the Double Axe or the Horns of Consecration.[24] The weights have holes in the upper half and often a slightly flattened and grooved topside. In the Old Palace at Knossos, Evans found over 400 of these discoid loom weights in the Loom Weight Basement of the East wing.

At least 60 examples of these discs have been found at Petras, many of them from the Neopalatial period. The weights are fairly standardized, with an average weight of about 130 grams, comparable to those from the Loom Weight Basement at Knossos.[25] Wear marks on the discoid loom weights show that the one and two holed weights were attached by straps to something, rather than having the warp threads directly attached to the

[22] Davaras 1977, 493; Coldstream and Huxley 1972, 216-218.

[23] A great many of these stamped weights are on display in the Hagios Nikolaos Museum.

[24] Carington Smith 1975, 275.

[25] Barber 1991, 104.

weights. The grooves found on the upper edges of the loom weights were most likely from poles to which the weights were attached (see profiles in figs 6-11 which show the grooves). As I have discussed elsewhere, the disc-shaped loom weight was shown on steatite seal stones found at Minoan palaces and informs us on the use of the discoid weights for Minoan weaving (fig. 12).[26]

At least 25 of these prism-shaped seal stones from different sites on Crete, although none from Petras, show a motif that almost certainly indicates weaving, and by extension I would suggest, the administration of cloth production. Evans first suggested that the image on these seals showed vessels attached to poles for transport.[27] As in much of Minoan archaeology, scholars have followed Evans' early identification and classified these seals along with other vessel motifs.[28] There are prism seals that show vessels with lips, handles and rims clearly delineated by the glyptic artist, but these prismatic seals show something completely different from suspended globular vessels. I believe that they are the one or two-holed Minoan disc loom weights attached to the bottom of a warp-weighted loom, indicating weaving.

The round objects on the seals suspended from poles are very similar to the disc shaped weights known from many excavations on Crete and in the Aegean, including weights from Petras (cf. fig. 6 with fig. 12). This method of suspension would give equal tension to all the warp threads, and could account for the variability in their measured weights, reducing the need for large numbers. On the seals we also see tassels or fringes running upward, perpendicular to the bar and the weights, which are probably the warp threads of the loom. As a tool of early administration, the seals indicate centralized control of textile production from the very beginning of the Minoan palatial period, ca 1900 BC, that must have contributed to the rise of complexity on Crete.

[26] Burke 1997, 413-424.

[27] Evans 1909, 131-32 figs 69a, 70b, 71a.

[28] Yule, 166-167. Younger 1995, 336, 'Vertical Supports with Globular Attachments'. This rod could function as both a shed and a spacing bar as illustrated in Hoffmann 1964, fig. 2, d and k.

House 2

The remaining part of this paper maps the artifactual evidence for cloth production within its architectural contexts at House 2, located on a lower terrace southeast of the palace area at Petras (fig. 14). The rather elaborate cut slab pavements, coursed ashlar masonry, pier and door partitions, colored plaster and foundation deposit found at House 2 suggest a structure with ties to the Minoan palatial koiné; as Tsipopoulou has recently demonstrated, it should be thought of as a Minoan villa, of a type comparable to others in eastern Crete.[29] An analysis of the extensive evidence for cloth production within this setting provides a unique opportunity to study centralized cloth production in the Minoan world during the Neopalatial period.

House 2 was excavated in 1989 and 1990 and has three architectural phases. The Old Palaces on Crete are destroyed sometime in the MM II period, and the succeeding phase of rebuilding that marks the New Palace period on Crete is exemplified by the construction of House 2. The earliest date for construction is at about the same time as House I nearby, in the MM III period. Towards the end of the Neopalatial period on Crete, palaces and other sites show evidence for a decline in trade and agricultural productivity, perhaps partly attributable to the eruption of Akrotiri and a series of earthquakes in LM I A.[30] House 2 was expanded during this period but then destroyed by an earthquake during the LM IA period. The house is then reused during LM IB, and it is to this last phase that much of the textile equipment dates, as indicated by the finds of very fine Minoan pottery, along with such items as clay molds for pottery attachments and a Neopalatial rhyton.

House 2 at Petras shows some of the best evidence for cloth production at a major center in eastern Crete, including tools, installations, and inscriptions associated with an active textile industry. In three areas of the house there were dye vats and water channels (areas A, B, and N) and a large number of tripod vessels placed on hearths. We also have several rock cut

[29] See Tsipopoulou and Papacostopoulou 1997.

[30] Significant deposits of LM IA pottery do not continue into LM IB at Knossos and Phaestos. New excavations at Galatas, Petras, and Kommos show evidence for destruction and abandonment of buildings during LM IA. Rehak and Younger 1998, 101.

basins or depressions carved into the natural bedrock at Petras, and these areas may also be dyeing installations. There was also a double mortar in room E that could have been used to grind dyes. More analysis including residual studies is necessary before any further conclusions are drawn.

This Neopalatial Villa shows evidence for weaving with two major concentrations of loom weights. One group was found in the main square of House 2, room (E), and probably came from a standing loom located on the second floor. This compares well with House 1, where there was a loom on the upper floor of room Lamda. On the eastern side of House 2, in areas Alpha and Beta, the second concentration of loom weights was found on a floor cut in the bedrock and with bedrock mortars.

One cuboid weight found in House 2 had a textile ideogram similar to the sign on Ag. Nik. 3 found in the 1950s.[31] This sign is also identical to marks on two conical cups from Petras. The ideogram in form resembles a cloth sign with the usual rectangle depicting a textile on a vertical warp weighted loom, but it also has an internal, diagonal mark. The interior sign is not a known Linear A or B syllable and it lacks the usual tassels or fringes found on other textiles signs, yet its reoccurrence at Petras on loom weights suggests that it is a cloth ideogram.

In Room E, immediately in front of a cupboard, a sherd with two painted signs of Linear A, AB57, JA, and AB41, SI was found read by Hallager as]JA-SI[.[32] See fig. 14 for the find spot. This rare example of painted Linear A is probably part of an imported jug or stirrup jar and dates to the final use of the area in LM IB. Room E is a rather large room in the center of the building and the find spot of the Linear A sherd is in the northwest corner of the room. A clay nodulus with Linear A was also found in House 2, in the storage magazine labeled Room K, indicated on fig. 14.[33] The baked nodulus has three signs on it, one of which is the sign for oil (A302, OLE). The other two signs are A307 (a 'transaction' sign), a number 1 and A707 (a fractional sign). As noted by Tsipopoulou and Hallager, since olive oil pithoi were also found in this room, there is a direct connection between the inscribed documents and the contents of this storeroom.

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[31] Tsipopoulou 1995, 941-942, 971, sx. 4, pin. 39.

[32] Tsipopoulou and Hallager 1996, 36-37, figs 6, 14. As Hallager notes, painted Linear A signs on ceramic are rather rare on Crete.

[33] Ibid, 38-39, figs 8, 15.

Conclusion and Summary

While there is nothing at Petras quite comparable to the wall frescoes showing elaborate costumes of well-dressed Minoans, such as we find at Hagia Triada or Knossos, we do have good evidence for an active cloth industry in House 2 that can be associated with the palace. I would not say that the activities in evidence at Petras are unique, but I do think that they are significant. Archaeologists are now beginning to pay more attention to craft production and economic activities associated with the Minoan palaces, as exemplified by the finds from House 2, rather than just concentrating on various Minoan architectural elements or ceramic motifs. This preliminary investigation into cloth production shows that smaller items have a greater significance and can improve our understanding of Minoan craft production and economy when analyzed in some detail.

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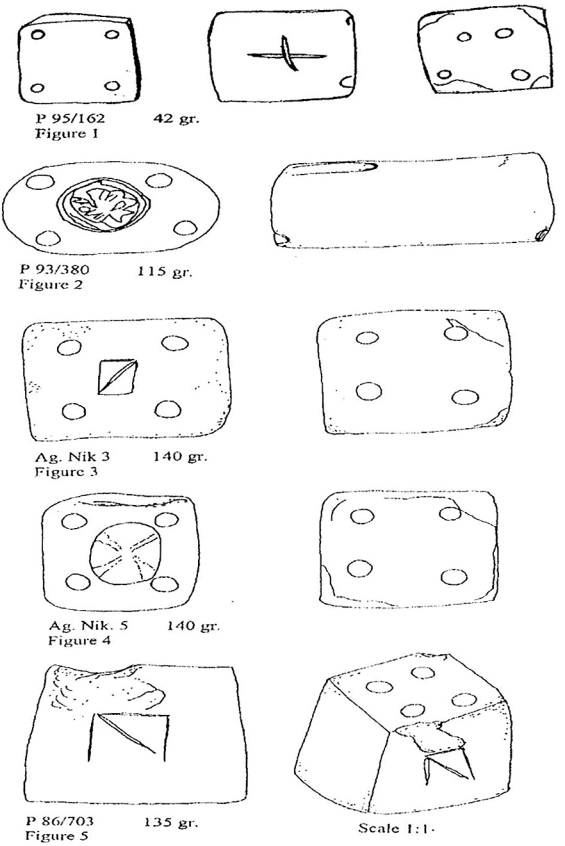

Fig. 1-5. Cuboid Loom weights from Petras.

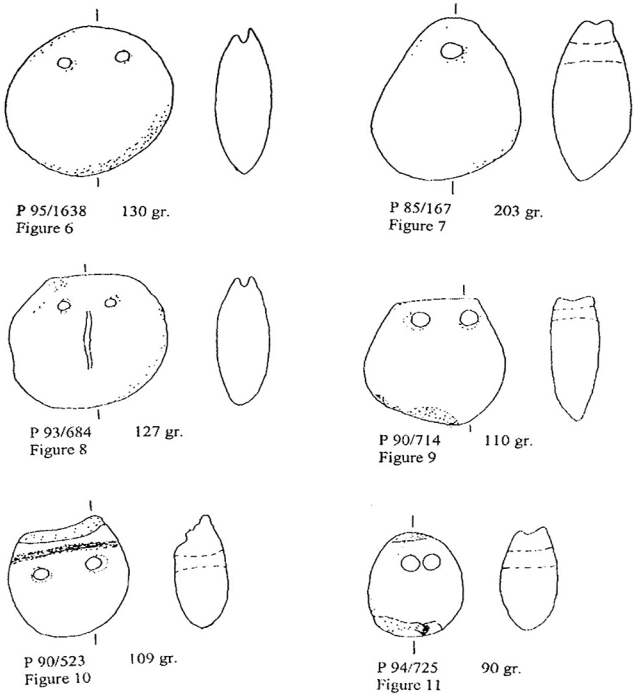

Fig. 6-11. Discoid Loom weights from Petras. Scale 1:2.

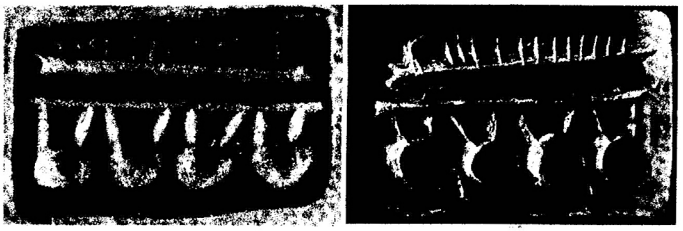

Fig. 12. Minoan seal stone. Chance find from Mallia CMS No. 151. Herakleion museum inventory.

Fig. 13. Cuboid loom weights with stamp and inscribed designs. Top - P93/380; bottom left - Ag. Nik. 5; bottom right - Ag. Nik. 3.

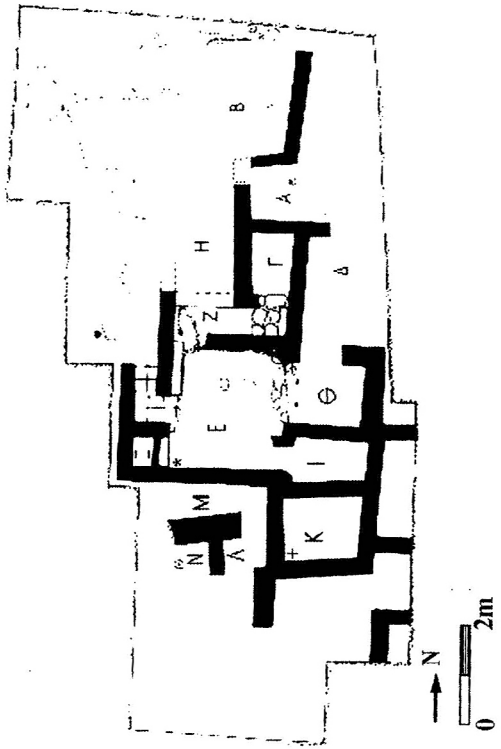

Fig. 14. Petras House 2. *Sherd with two painted Linear A signs]ja-si[
+ Linear A nodulus with oil ideogram and transaction sign.