The Production, Circulation and Consumption of Ceramic Vessels at Early Neolithic Knossos, Crete.

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Volume II

Thesis submitted for the degree of Ph.D.

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February 2001

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APPENDIX I.

EARLY NEOLITHIC CHRONOLOGY: TOWARDS AN INTEGRATED NEOLITHIC CHRONOLOGY FOR THE SOUTHERN AEGEAN.

"Before the reconstruction of a detailed chronological framework for Mainland Greece, the Aegean and West Anatolia, it is not safe to look for close affinities between these regions" (Manteli 1993a: 159).

One could be forgiven for thinking, after a century of investigation, that there could be little to add to the issue of the chronology of Neolithic Knossos: one would expect a sequence that was both well-defined at the site and well-integrated with the chronologies of other contemporary sites in neighbouring areas of Crete, as well as on the southern Greek mainland, in the island Aegean and in western and south-western Anatolia. Regarding definition, there can be little doubt that the work of Furness and above all the excavations and studies of J. Evans have transformed the earlier and more impressionistic observations of Mackenzie and Evans into a well-defined stratigraphic and relative ceramic sequence (see Chapter 7); a sequence which, to this day, remains the basis for much of Cretan Neolithic chronology. Moreover restudy of ceramic material during the course of this doctoral research has tended to confirm the validity of this sequence and the only changes suggested below are in the form of new subdivisions within existing chronological phases. Indeed the greater temporal resolution provided by the new sub-phasing of ENI proposed here has in all cases served only to confirm the stratigraphical divisions first proposed by J. Evans, a confirmation of the excellence of this and other earlier work. It is perhaps only in terms of absolute radiocarbon dates that the Knossos sequence could be said to be lacking (see below), and even then it must be recognised that it is still one of only a handful of sequences in the southern Aegean that have radiocarbon dates.

However, regarding the integration of the Knossos sequence with those of other sites, there can be little doubt that there is much that remains to be done. Currently there exists no EN sequence from elsewhere on Crete that could be considered comparable to that of Knossos. EN material has been noted in studies of Neolithic material from Katsambas, Gerani Cave, Lera Cave, Ayios Ioannis Cave, Pelekita and Magasa[1]. However none of these sites in any way constitute a continuous sequence, with which one might further clarify the sequence at Knossos, nor are any of them fully published (see Appendix III). Instead these sites rely on the Knossos sequence for their dating. Thus for EN Crete Knossos stands isolated, an ongoing problem which has given rise to some rather fanciful theories (see Section 12.1).

Attempts towards a closer integration of the Knossos sequence with those of other sites in the southern Aegean have similarly met with little success. Based on little more than intuition and possible Anatolian comparanda for Cretan Neolithic figurines and maceheads, Sir Arthur Evans argued for the existence of an "Anatolo-Cretan Neolithic" quite different from that of the Greek mainland (A. Evans 1928; cf. also Pendlebury 1939:42); while on even less evidence than this, Mackenzie sought a Libyo-Egyptian origin (Mackenzie 1903:162-4). Childe (1937:32) praised Evans' prescience in describing Crete as an 'offshoot' of the Anatolian Neolithic and pointed to new evidence available that seemed to provide further parallels. However much of this early speculation suffers from the problem of synchronicity. Many of the parallels drawn by Childe, A. Evans and Mackenzie are now, through improvements in our understanding of regional sequences and above all radiocarbon dating, known to be millennia apart.

Largely as a result of this, relatively few stylistic parallels are noted in more recent studies, the majority of which, as both Furness and Evans openly admit (Furness 1953:108; Evans 1968:273; 1970a: 383-3), are much later in date than EN Knossos and come from regions at some considerable distance. Despite this spatial and temporal remoteness the presence of certain distinct features of the Knossos EN sequence (trumpet lugs, flap and wishbone handles, triangular 'ears' on the rim, plastic cordon decoration, pellet/knob decoration, pointillé, internally-thickened rims) among Late Neolithic East Aegean and Late Chalcolithic Western Anatolian sequences (e.g. Troad), encouraged Evans to suggest that the general character of the EN sequence "links it definitely to the East Aegean and coastal Western Anatolian tradition" (Evans 1968:273-4). Pointing to the links between the material from the Ayio Gala cave and Hacilar I, which pushes back presence in this area as far back as the Early Chalcolithic

[1] Alexiou 1956, 1957; Tzedhakis 1973; Guest-Papamanoli & Lambraki 1980; Davaras 1979,

(c.5500-5300BC), Evans argued that further evidence of still earlier occupation of Western Anatolia, contemporary with the Cretan Early Neolithic must surely await discovery (Evans 1970a:383). In this prediction, Evans has been proved correct: there is now evidence for widespread LN (6450-5800BC) occupation along the Aegean coast of Anatolia (see Appendix IV and below).

In his summary Evans considered the parallels he noted to be 'very tenuous' and concluded that Neolithic Knossos was an 'isolated community'. Since then Knossos has remained isolated or even absent from studies of Greek chronology (e.g. Weinberg 1965:301, 1970:608-618, where it is treated as an isolated case), as well as from studies of south-west Anatolian chronology (e.g. Eslick 1992) and the southern Aegean Neolithic (Sampson 1984:248). In the case of the latter, Crete is included in a comparative chronological table, however the synchronisms are based purely on what appear to be uncalibrated radiocarbon dates, which result in a dating of strata VII-II which is far too low (Sampson 1984:248; see below). In a similar way Gallis' incorporation of Crete in his chronological table (Gallis 1996) seems to have been accomplished on the basis of comparing absolute dates for the Knossos sequence to those for Greece, rather than through direct material connections between the sequences and as a result the Knossos sequence floats free from that of other regions. Furthermore some of the dates adopted for different strata at Knossos seem to have been determined more by the need to produce neat correlations: for example radiocarbon dates which put the beginnings of settlement at or before 7000BC have been ignored in favour of a date of 6800BC, which conveniently brings the Knossos Aceramic in line with that of Greece.

None of these 'tenuous' parallels provide a means of integrating different sequences with that of EN Knossos. The connections drawn by Arthur Evans, Mackenzie and Childe are for the most part very free and of limited worth, while those of Furness and Evans are vague and cautiously expressed, such as to preclude further speculation. In all of these examples, connections are sought for chronological purposes and in order to relate the 'culture' at Knossos back to its 'origins'. In none of these studies, however, is there ever any explicit consideration as to what a connection

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1982; Dawkins 1905.

might mean or how it might have come about. Close stylistic similarities may arise out of a variety of circumstances; for example, an actual exchange of ceramics between sites, the existence of a broad regional style zone, separate chronologically parallel superficially similar style zones, separate chronologically different superficially similar style zones etc. The failure to discriminate between these different possibilities also hinders detailed integration. Rather one is left with the impression that the most one could say is that the EN pottery from Knossos has an Eastern (Anatolia) rather than a Western (Greece) flavour. In the detailed discussion of comparative material in Chapter 7, an attempt was made to indicate the nature of the link and to discriminate between situations where the connection supports the identification of imports either at Knossos or in other Aegean sequences and where the link merely indicates a general similarity in form or finish. The chronological significance of some of the conclusions drawn in Chapter 7 will be presented below.

Wider integration has also been hindered by the presence of only a small number of radiocarbon dates available for Early Neolithic strata at Knossos, many of which have large standard deviations. As a result the absolute dates for the Knossos sequence remain somewhat provisional and thus comparison with the absolute dates for chronologies from the Greece and Anatolia always carries with it a proviso. In this context, it is hoped that the new series of radiocarbon samples taken during new excavations conducted by the Greek Archaeological Service (N. Efstratiou pers. comm.) will in the future provide much-needed detail and clarification and will thus allow a more confident comparison with other neighbouring chronologies. In the following discussion, the Knossos EN chronology will be discussed in terms of its stratigraphy and its relative ceramic chronology and a new sub-phasing of ENI will be proposed. This will be followed by a detailed discussion of a series of comparanda from both EN Knossos and from sites in the southern Aegean, none of which have been previously noted, which suggest the possibility of integrating the various regional sequences. It is hoped that discussion of these links will serve as an important first step in the closer integration of the EN Cretan sequence with those of its neighbours. Finally, this information will be combined with the radiocarbon dates from Knossos and from other sites to produce a chronological table relating the Knossos Neolithic sequence with site sequences in Greece, the Aegean and Anatolia (see Figure I.6).

The Aceramic and Early Neolithic Sequence at Knossos

The Aceramic and EN sequence for Knossos (and thus Crete) is conventionally defined on the basis of the sequence of deposits from sounding AC (strata X-IV) in the Central Court (see Figure I.1)

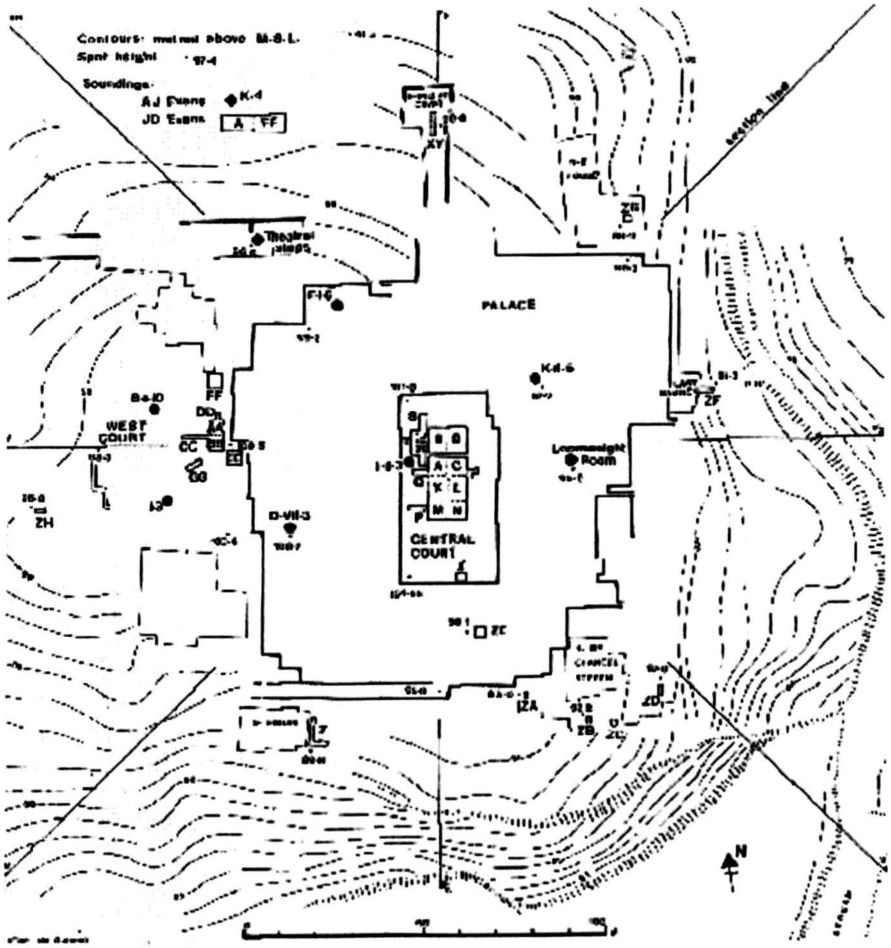

Figure I.1. Plan of the Palace Area Showing the Location of the Soundings (after Evans 1994:fig.1).

This sequence has the virtue of being the longest uninterrupted Ac/EN sequence at Knossos and has been well defined and well published (Evans 1964:140-192; 1994:2-

5). Evans divided up this stratigraphic sequence into ten strata which he was able to assign to the different ceramic phases already defined by Furness. Previously the Furness ceramic sequence had been less clearly defined on the basis of the arbitrary layers of A. Evans and Mackenzie (e.g. first metre, second metre etc.). The stratigraphic position of EN material from other soundings subsequently excavated by Evans in 1960, 1969 and 1970 was established through comparison with sounding AC. These soundings largely complement the sequence in AC, although some have produced additional information: for example sounding XY and sounding AABB have produced deeper deposits for ENII, corresponding to a series of building horizons which are absent from stratum IV (Evans 1964:166-8; Evans 1994:11-14). However, none of these soundings (Evans 1994:10), with the possible exception of sounding X (see below), have produced ceramic material as early as that of strata IX-VIII.

As a result of this, restudy of EN ceramic material for this thesis was largely confined to sounding AC. Additional information was provided by restudy of selected deposits from soundings AABB, X and XY. In the following discussion observations of changes in ceramic form and finish as well as other material changes are combined with stratigraphic information in order to produce a new subdivision of the long ENI phase. These observations will also serve as a check on Evans' stratigraphic divisions[2]. Previous studies of relative ceramic chronology for Neolithic Knossos have ignored technological change, confining their observations to form and finish. However, as noted in Chapter 7, form and finish do not seem to be the best indices of variation in the EN sequence. Rather, as has been argued, the combination of observations of changes in form and finish with fabric allows change to be viewed in much greater detail and has thus made a significant contribution to the new sub-phasing of ENI proposed here.

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[2] For more details of the EN sequence in sounding AC see Evans' detailed description (1964:140-192).

Aceramic (Ac)

Sounding AC, Stratum X (Evans 1964:140-2; 1994:2-5):

This was a thin (c. 20-40cm) deposit, which contained the remains of fires, numerous pits, several infant burials and evidence, in the form of post-holes, for a timber structure possibly to be associated with a large deposit of burnt grain. It should be stressed, however, that no remains of any substantial mudbrick or stone structures were identified. Two sherds were found embedded in the surface of this deposit and it is possible that a further three can also be assigned to the surface of stratum X (see below on stratum IX).

Following the excavation and publication of sounding AC (Evans 1964), doubts were raised regarding the transition from stratum X to stratum IX (see Weinberg 1965:301). Pointing to the parallels exhibited between ENI ceramics and west Anatolian LC pottery and to the large gap in radiocarbon dates between stratum X and IX, Weinberg argued that there was a long gap between the cessation of stratum X and the beginning of stratum IX and that stratum IX represents the resettling of the site by a later ceramic-using people[3]. Evans in turn quite rightly pointed to the absence of evidence for any stratigraphical break and to the many example of cultural continuity between the two strata (cf. axes, obsidian, stone studs, stone circlets, bone chisels bone points) (Evans 1968:275; 1970a: 381). If at that time he had been aware of sounding X (excavated 1970) Evans could also have pointed to the continuity in mudbrick building methods between Aceramic and earliest ENI and to the presence of pottery within but on the surface of the Aceramic deposits in soundings AC and X, which suggests that pottery first appeared just before the stratigraphical break which Weinberg argued marked the abandonment of the site.

The only remaining evidence of difference between stratum X and IX are:

1. Confinement of bone spatulae to stratum X (Evans 1964:236; 1968:274; 1970a:381-2). Evans notes the similarity between these three examples and examples from Hacilar VI, however these are not synchronous (Mellaart 1970b:175, fig. cxx.f-h).

[3] See Chapter 2 for a discussion of Weinberg's theories of the origins of Neolithic pottery in Greece.

2. Differential animal kill-off pattern in stratum X (Evans 1968:275; Jarman & Jarman 1968:256-62), identified by Winder (1986; 1991:46) as a real indication of difference between Aceramic and ENI in the nature of the 'extractive relationship'.
3. Absence of pottery from below the surface of the Aceramic deposit.

It should be stressed that although these seem to be real differences between Aceramic and ENI, they do not in themselves constitute arguments in favour of discontinuity.

Sounding X (South Ramp) Levels 24-19, 17ii (Evans 1971:101-2; Evans 1994:2-4):

This was a thick[4] (c.2.m) deposit, which contained traces of walls, making up four different building levels. Walls were composed of a mixture of stone (often in the form of querns), bricks or 'bricky material' and clay. This construction technique is closely comparable with that found in stratum IX, sounding AC (see below). However, since no pottery could with any certainty be assigned to the Aceramic deposit (see below) and since none was actually found during digging, it seems more likely that most of this deposit is contemporary with stratum X in sounding AC or is perhaps even earlier (Evans 1971:102).

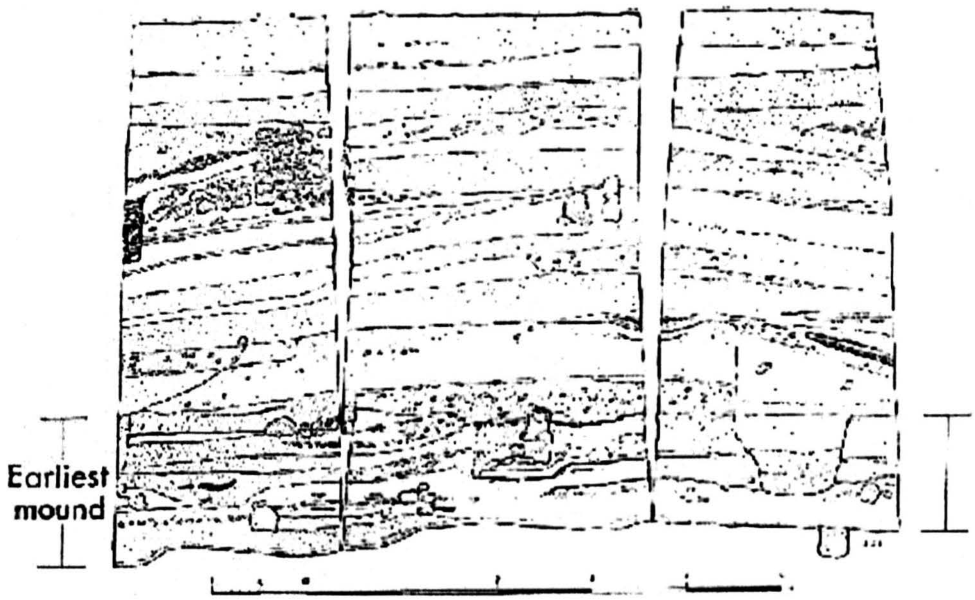

Figure I.2 Section of Sounding X (after Evans 1971:101 fig.3)

[4] One might compare also the c.1.2m of Aceramic deposit discovered in sounding ZE sealed by later Minoan material (Evans 1971:98).

The only possible ceramic material from these lowest levels comes in the form of a rather dubious group of sherds found during water-sieving of material from a single large context (level 24). Since these were all small and at least one was Minoan, Evans rejected them as contamination. This interpretation was challenged by Winder, who used their presence to undermine the identification of the lower strata as aceramic (Winder 1991:39-40). However restudy of this material confirms Evans' original interpretation: indeed many of them are in finer fabrics such as Fabrics 1e and 2c, which first appear in ENIc/ENII, no sherd is larger than c.1.5cm, with the largest being Minoan in date. Winder's other arguments against the aceramic nature of this deposit amount to very little. Firstly he argues that the presence of two baked clay figurines in these levels prevents them being truly aceramic. In this however he seems confused as to the meaning of aceramic, which is used to denote the absence of fired ceramic containers not the absence of baked clay (cf. also the presence of baked mudbrick). Indeed baked clay figurines are actually a feature of several sites of the Anatolian Aceramic Neolithic, such as Çayönü and Suberde (Joukowsky 1996:81-3, 88). Regarding his second point, it is difficult to imagine how the *general* absence of pottery from the actual internal habitation floors of Early Neolithic I houses, could explain the *complete* absence of pottery from anywhere in the lower levels of sounding X or the nearby sounding ZE.

After weathering of the section, Evans noted a distinct interface between ENI levels and the tumble of white kouskouras mortar and mudbrick which sealed the Aceramic deposit, which suggested to him that the "surface was exposed for a time before debris began to accumulate once more above it" (Evans 1971:102)[5]. This interface between the uppermost layer of Aceramic and ENI levels can clearly be seen in the published section from sounding X (see Figure I.2). This uppermost Aceramic layer was a soft dark/grey deposit, which contained v. coarse clay fragments. as well as "true red mud brick" (Evans 1970b:4; see fig. I.1). Evans states (1971:102) that the earliest pottery found in X came from the top 15cm of this final Aceramic layer. Unfortunately however, as Evans acknowledges in his excavation notes, absolute certainty is not possible because the uppermost Aceramic deposit (level 17ii in the southern half of the sounding) was not immediately recognised as being distinct from some ENI fill layers at the same level to the North (level 17 and 17i) (Evans 1970b:4). Thus this earliest material was accidentally mixed with the ENI fill material from level 17 (see below). Nevertheless, as Evans himself argued (Evans 1971:102), the absence of pottery from below the surface of the Aceramic deposit is quite clear: the only other sherds found during actual excavation being accidentally dug from the ENIb fill of pits A and B (see below), which had been dug into the Aceramic deposit (Evans 1970b:5-6). The presence of pottery within the immediate surface of the Aceramic deposit finds a parallel in sounding AC, where at least two sherds were found embedded in the surface of stratum X (see below). It thus seems possible that the top 15cm or so of the Aceramic mound in sounding X are contemporary with the transition from stratum X to stratum IX in sounding AC and thus date to the very beginning of ENIa.

Early Neolithic Ia (ENIa)

1. Sounding AC, Strata IX-VIII (Evans 1964:144-50; 1994:6-8):

Stratum IX was a deposit of variable thickness (c.0.3-1.0m), mostly of mudbrick debris, containing the earliest traces of a mudbrick and stone structure to be found in this area of the site (House E). House E was rectilinear, constructed in mudbrick and stone, and exhibited a long and complex history of occupation. Small finds were rare and pottery occurred in a low density. When examined the pottery proved to be very broken: nothing ever mended up into anything larger than a big sherd, which would seem to suggest that the deposit was very mixed and had probably been trodden down. The absence of anything like a complete vessel suggests the possibility that broken vessels were originally dumped elsewhere, presumably with other debris, and only later came to be deposited as stratum IX. One scenario, which possibly contributed to this, might be the periodic cleaning out of internal habitation floors, which were invariably found clean when excavated (Evans 1994:7, 14).

All pottery assigned to stratum IX seems to have come either from below the walls or below the lowest of several 'stamped down' floors of House E or else from

[5] Soil samples were taken to investigate this surface further, but unfortunately no results have

outside; none of these floors themselves (levels 23-24) produced any pottery (Evans 1960b:1). Only one context, AC25b, consisted purely of material which came from below House E and which was thus definitely earlier than its construction. The excavation of AC25b also encountered burials d and e, which were later assigned to stratum X (see Evans 1964:fig.7). This would seem to suggest the possibility that the three sherds from AC25b could equally have come from the top of the Aceramic deposit. When examined the three sherds from AC25b proved to be in the same two fabrics (Fabrics 2a/b, 8) and from comparable shapes (large diameter burnished deep bowls) as the two sherds from AC26, which came from the surface of stratum X (see above). Thus there may have been a surface sprinkle of pottery in the area of sounding AC prior to the construction of House E and thus prior to stratum IX proper (cf. also pottery on and just below the surface of the Aceramic deposit in sounding X).

Stratum VIII, like stratum IX, varied in thickness (c.0.2-0.9m) and mostly consisted of collapsed mudbrick mixed with habitation debris. In the western half of AC there were the scant remains of a mudbrick and stone structure (House D), with which two clay structures (ovens?) were associated. In the eastern part of the trench two deep pits (A and B) were excavated. From the excavation notebooks it is clear that Pits A and B actually first appeared below the east wall of House C (stratum VII) as a single pit filled with small stones and loose earth (C27[6]) (Evans 1959:39). From the published section it would seem that this fill corresponds to stratum VII (Evans 1964:fig.4). Only at a lower level did this single pit become two pits (A and B). From the published section of pit A and from the excavation notebook, it would appear that below the stratum VII fill there were a series of thin sterile layers alternating with stone (Evans 1959:39; 1964:fig. 4), which seem to indicate that Pit A was exposed as a shallow depression below the surface of stratum VIII for some period of time prior to the deposition of the stratum VII fill. Below these sterile layers was the main fill of pit A, which contained ash, earth, two stone figurines, sherds and a bowl (see Evans 1964:fig. 4, fig.63.15, 16, fig.39.4); it is clear from the notebook that the figurines and

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yet been published.

[6] Some or all of the material from C27, assigned by Evans to stratum VII, may also belong to Pits A and/or B. Alternatively C27 may purely be the stratum VII upper fill of the first large pit, since the label for C27 says 'Pits' and 'light brown earth/reddish with stones'.

whole vessels definitely came from these lower two pits and not from the upper fill layer (Evans 1959:39).

This detailed study of the sequence in which these pits were dug and filled supports Evans' inclusion of them in stratum VIII despite the fact that they were dug into this stratum (1964:149-50). It would appear that sometime after the deposition of stratum VIII but before stratum VII a large pit was dug into the deposit, at the bottom of which two pits (A and B) were dug. These pits were filled with an unusual deposit consisting of ash, bone, sherds as well as figurines and several whole vessels (C26). However it would appear that the main pit was not filled but remained open for some time before the deposition of what was probably a levelling fill prior to the construction of House C (stratum VII). This sequence of smaller pits dug within a larger pit, which following the filling of the lower pits remained open, strongly recalls the sequence of construction and fills reconstructed for the 'Great Pit' dug into the top of the Aceramic deposit in sounding X (see below). Furthermore both of these pit and fill sequences appear to date to some time in ENIa (see below)

From the excavation notebook for trenches A and C (Evans 1960a:18; 1960b:1) it would appear that part of House E (stratum IX) was dug as AC23 and AC22 (stratum VIII), however in the south and east sides of the published section it can be clearly seen that stratum VIII containing House D seals House E and stratum IX (Evans 1964:fig.4). The existence of a join between contexts AC22 (VIII) and AC24a (IX) as well as a near-join (two non-joining pieces of the same bowl) between AC23 (VIII) and AC24a (IX) provide some confirmation that some mixing of deposits occurred during the excavation of strata VIII and IX. However, despite this small amount of mixing, ceramic deposits in stratum VIII preserve quite a different character from those in stratum IX. Indeed despite being comparable to stratum IX in overall volume, stratum VIII produced considerably more pottery with an entirely different state of preservation. Sherds are frequently large and often profiles or even semi-complete vessels can be mended up. Thus the material in stratum VIII appears to be much less mixed and much less broken than stratum IX. This would seem to confirm that the two strata are stratigraphically distinct, thus supporting Evans' division of strata. This division is also confirmed by a number of joins between the different excavated contexts within stratum VIII[7].

The presence of a number of completed profiles and even near complete vessels within a relatively small deposit from a small area of excavated space, is unusual for EN Knossos and would seem to indicate that these layers accumulated in situ and were not brought from elsewhere. For example, many fragments of a single unique and semi-complete vessel in a blueschist fabric (Fabric 35) all appear to have come from the western half of the sounding and it seems possible that they were deposited in close proximity to each other. The frequency with which joins are found between different contexts excavated within stratum VIII would be further confirmation of the overall homogeneity of the deposit. The presence of thin layers of ash and charcoal within this deposit and a series of pits (Evans 1960a:15-17) may be a sign that it did not accumulate in a single event, but rather in stages. Taken together these suggest that following its abandonment, the area of House D (VIII) was used as a dump for broken pots and household refuse with reoccupation only occurring in the next stratum with the construction of House C (stratum VII).

Defining ENIa: Ceramic Form, Finish and Fabric in Strata IX-VIII

Early Neolithic Ia (ENIa) was first defined by Jarman and Jarman on the basis of the presence of mudbrick architecture with ENI pottery. The transition between ENIa and ENIb was placed at the stratigraphical point at which mudbrick structures cease (end of stratum VIII) and pisé and stone structures begin (beginning of stratum VII) (Jarman & Jarman 1968:241). Since this definition was not supported by evidence for ceramic change between strata IX-VIII and the rest of the ENI deposit[8], it could not serve for deposits, which lacked evidence for structures, and thus has not been subsequently used.

Restudy of the ENI ceramic material from sounding AC has cast doubt on Evans' claim of homogeneity and a new subdivision of ENI will be proposed here.

[7] Cross-joins between contexts within stratum VIII: two joins between AC23 and AC22, one between AC23 and AC22 pit d, one between AC22 and AC22 pit d and one between AC22 and C25a.
[8] Rather Evans emphasised the homogeneity of the ENI strata from beginning to end (Evans 1964:194).

Examination of ceramics from strata IX and VIII indicated the absence of quite a number of features, which are characteristic of later strata, and the presence of a small number of positively diagnostic features, which are absent from later strata. Thus the definition of ENIa largely relies on the *absence* of features characteristic of ENIb (strata VII-VI) and ENIc (stratum V). As a result it remains open to criticism on account of small sample size. In order to offset this only the absence of features in fabrics, which are well represented in all ENI strata, were considered as possible defining criteria (i.e. Fabrics 1a-i, 2a-e, 5a, 6, 8). It should be stressed that the features, which are lacking in these fabrics in strata IX-VIII, are common in these same fabrics in strata VII-VI. It should also be noted that the general absence of positive defining features of ENIa is largely a function of the lack of other large ENIa deposits, with which the incidence of other features unique to strata IX-VIII might be clarified.

In this way ENIa is characterised by the *absence* of[9]:
Funnel-necked jars: these first occur during ENIb.

Large strap handles joining the rim: these first occur in stratum VII and are found in Fabrics 2b and 5a. These should be associated with the appearance of flat-based mugs with handles joining the rim (see below).

ENIb-style Incised/Pointillé flat-based mugs: these first occur in quantity in stratum VII and are frequently decorated in incised/pointillé. These are known in Fabrics 2a/b and 5a.
- a single certain example in Fabric 5a is known from stratum VIII, however this is unlike all ENIb examples: it is undecorated, has a flared profile and has a unusual double pierced lug on the rim. No later parallels are known for either the unusual shape or the double rim lug. Unpierced double lumps on the rim of bowls in Fabric 5a are an ENIa feature (see below).
- in addition a sherd in Fabric 2a/b with incised/pointillé decoration may be from a flat-based mug. Although similar to later examples of this form of decoration this example

[9] See Chapter 7 for more details.

has a row of dots incised into the rim, a feature not found in numerous later ENIb examples. This form of pointillé decoration may prove to be a positive defining feature of ENIa.

Thus it seems most likely that although flat-based mugs may have an origin in stratum VIII, it is only in stratum VII that they gain the form and finish which characterise ENIb.

Flared Cups/Steep-Sided Bases: these are known from stratum VII-V. They are most commonly found in Fabric 1d, but are also known in Fabrics 1b and 10. It is likely that steep-sided small diameter bases comprise the lower part of the profile and if so this would indicate that flared cups also appear in Fabric 5a in strata VII-VI.

Internally-Thickened Rims on Shallow Bowls: these first appear in stratum V.

Slashed Plastic Cordons/'Rope' Decoration: Although plastic cordon decoration is known from the very earliest levels, it is only after strata IX-VIII that the practice begins of scoring or notching the plastic cordons, either with a tool or the fingernail. This practice is only found on plastic cordons in Fabrics 2a/b and 10 from stratum VII.

Incised Lattice/Incised Ladder: only found in Fabrics 2a/b and 5a from stratum VII-VI.

Barbotine Ware: This finish first appears in stratum VI and continues into ENII. It is confined to vessels in Fabrics 1d, 1e and 5a.

Painted Wares: isolated examples of painted sherds occurring in unique fabrics are known from strata VII-VI. In addition dark-on-light painted sherds are a rare and very short-lived feature of Fabrics 1d and 1e in strata V-IV.

Fabric 1d: This fabric is entirely absent from ENIa. The only example from an ENIa context is finished in a manner characteristic of ENIc and is probably intrusive.

A number of features are rare in ENIa but common in ENIb:

Incised Pointillé Decoration: only found on a handful of sherds in strata IX-VIII

Rim Pellets: these occur on a single example of a 's' profiled bowl in Fabric 6, however it is possible that this example is intrusive from stratum VII, where this form of decoration is common (see below).

ENIa can also be defined by the positive presence of:

Miniature Flared Rim Lugs in Fabric 1a: these resemble tiny flared strap handles which are found on the rim of several examples of curved or carinated bowls with offset rims in strata IX-VIII. There is one example from stratum IX and two from pits A and B (stratum VIII), one of which is complete (Evans 1964:fig.39.2). This sort of miniature handle is not found in Fabric 1a on the numerous examples of these forms in later strata.

Double Rim Lumps: there are only found on fine polished bowls in Fabric 5a in stratum VIII.

Punched Decoration: this is found just below the rim of two examples in Fabrics 8 and 9 in stratum VIII and in a V-shape on the carinated body of a straight-sided hole-mouth jar in Fabric 8.

'Wood Effect' Burnishing: a striking feature of ENIa polished vessels is the creation of a horizontal 'graining' effect, which resembles wood. This is common in strata IX-VIII in Fabrics 1a, 2a/b, 6 and 8, becoming much less common in stratum VII. It is absent from stratum VI onwards.

Triple Pellets in a Triangular Arrangement (Fabric 1a): examples of this form of decoration are confined to carinated jars with offset rim in Fabric 1a in stratum VIII.

The following are more common in ENIa, than later strata:

Straight-sided Hole-Mouth Jars: these are most common in Fabrics 8 and 9 and occur in strata IX-VIII. straight-sided hole-mouth jars become less common in ENIb and are very rare in ENIc. In general ENIa can be distinguished from ENIb by a higher frequency of incurved bowls/hole-mouth jars.

Defining ENIa: Other Material Changes

In addition to the transition from mudbrick to pisé, a number of other non-ceramic features are here proposed as being diagnostic of ENIa:

Stone circlets: these are known from strata X to VIII, but are not known from later deposits (Evans 1970a:381 fig.1.9; see examples in Evans 1964:fig. 59.1-4). Since other types of stone body ornaments continue throughout the deposit, the absence of stone circlets from levels above stratum VIII may be significant.

Unusual mortar type/pivot: Evans refers to a special type of mortar, which was confined to the 'lower strata', with all but one example coming from stratum IX. Instead of one large depression, this type had two small cup-shaped depressions in the upper surface, prompting Evans to speculate that they may have functioned as pivot stones (Evans 1964:231; fig. 53, 4-5). This type may prove ultimately to be diagnostic of Aceramic or ENIa, however the rather uneven recovery of mortars (concentrated in lower and upper Neolithic levels) necessitates caution.

Absence of Maceheads: these distinctive objects first appear in stratum VI and after then remain a feature of all remaining Neolithic strata up to and including stratum I (Evans 1964:229-231; Warren 1968:240-1).

The absence of Fabric 1d in strata IX and VIII is one of the strongest defining features of ENIa. This fabric is very common in strata VII-VI and is the single most common fabric in stratum V. The single sherd of Fabric 1d in stratum VIII is considered intrusive both on the grounds of finish (buff lightly burnished), which place it in stratum V or later, and because the same context (C25a) also produced a dark rippled sherd in Fabric 1e which also cannot date earlier than stratum V.

These examples raise the wider issue of contamination. In this it is important to distinguish between contamination, where two deposits of different date have been irretrievably mixed, and the occasional intrusive sherd, which acts merely as background noise. Restudy of ceramic material revealed no examples of the former, while examples of the latter, where individual sherds drop out of the section, are inevitable in an excavation, especially when soundings get as deep as sounding AC (c.7m). Sherds may also migrate between levels through the activity of worms or larger burrowing mammals: for example the excavation notebook for trench A mentions the presence of a 'rabbit hole' in levels later assigned to stratum VIII (Evans 1960a:16-18).

Fortunately, the most common types of ENIc and ENII shape, decoration and fabric are extremely distinctive and are easily separated from earlier material: for example three small sherds of Fabric 1e (no earlier than stratum V) were found in stratum IX, one of which was buff and unburnished suggesting a MN date; one context in stratum VIII (AC22), produced a single example (see sample 97/55) of Fabric 1b (stratum V or later) and 5 small sherds in Fabric 1e, two of which were ripple burnished (stratum V or later). Unfortunately, however, owing to the greater similarity between ENIa and ENIb ceramics, no intrusive sherds earlier than stratum V could with any certainty be identified in ENIa deposits.

2. Sounding X, Level 18 (Evans 1970b:1-11; 1971:101-2):

At some point after the abandonment of this area of the settlement at the end of the Aceramic or perhaps at the transition to ENIa, a series of pits were dug into the top of the Aceramic deposit. These pits unfortunately cut away much of the Aceramic deposit in the process complicating the stratigraphy of the earliest pottery-bearing levels (see above). Careful examination of transcripts of the excavation notebook for sounding X (Evans 1970b:1-11) reveals the sequence in which these pits were cut and filled. Examination of ceramic material from these contexts allowed dates to be tentatively applied to this stratigraphical sequence (cf. similar sequence of pits and fills of a similar date in sounding AC above).

The earliest cutting into the Aceramic deposit (through Aceramic layers 17ii, 19, 22) consists of what must have been a very large irregular shaped pit, termed the 'Great Pit' (Evans 1970b). Only the SE corner of this was excavated within sounding X, but this alone was at least 2.0m x 1.0m. Within sounding X, this pit began as a shallow cutting to the E but dipped down to the NW until it became very deep (c.1.0m) in NW corner with steep vertical sides. At the bottom of this large pit, a series of at least three smaller pits were cut; two of these (A and B) lay within sounding X, while a third (C) lay partially obscured to the NE (Evans 1970b:7-8). Pits A and B were of approximately the same diameter (c.1.0m), the deeper being pit A (c.0.9m). Pit A produced obsidian and one sherd, while pit B produced bone, obsidian, flint and a little more pottery. These pits were filled up to the level of the bottom of the 'Great Pit' (see Figure I.2; Evans 1971:fig.3). The contents of these lower pits along with the layer that sealed them make up level 18. Although similar in appearance to level 17ii (see below), level 18 was considered to be distinct (Evans 1970b:6).

Careful examination of the pottery from level 18 failed to identify any diagnostic ENIb features, although in view of the small sample size (c.50 sherds) this could not be taken as indicative of an ENIa date on its own. However, the low overall sherd density, the absence of Fabric 1d and the presence in relatively large proportions of Fabrics 5a (6 sherds), 6 (16 sherds), 14 (2 sherds), 28 (7 sherds) and 29 (1 sherd) in relation to Fabrics 1a and 2a/b (13 sherds) compare well with stratum IX (sounding AC). Thus, although it is impossible to be certain, these positive features combined with the absence of any material diagnostic of ENIb or later, make an ENIa date for these lower pits possible or even likely (see below for date of material in 'Great Pit' and above Aceramic deposit).

Early Neolithic Ib (ENIb)

1. Sounding AC, Strata VII-VI (Evans 1964:150-7; 1994:8):

The change in building methods from mudbrick and stone to pisé and *kouskouras* gave stratum VII and those that followed a distinctive composition that allowed them to be easily distinguished from strata IX-VIII. The collapse of the pisé structures results in the formation of thick bands of yellowish clay alternated with darker levels, which represent habitation debris (Evans 1964:151). Stratum VII varied in thickness (c.0.4-<1.0m) and contained the remains of at least two rooms of house (House C) along with part of a cobbled area with a possible cooking installation. Several hearths and ashy pits were excavated within the two rooms. Two different floor surfaces were excavated in House C testifying to at least two phases. In addition, the excavation notebook seems to suggest that within stratum VII some areas of paving in the western half of AC are stratigraphically later than House C (Evans 1960a:13).

Restudy of material from the lowest deposits in stratum VII, i.e. below the two floors of House C, suggests that there may have been some mixing with material from stratum VIII. Context A21 in the western half of stratum VII produced three small fragments belonging to a distinctive and unique vessel in a blueschist fabric (Fabric 35), the rest of which came from the western half of stratum VIII[10]. In addition a join was made between A21 and A21x (stratum VIII). These would seem to indicate that context A21 of stratum VII also contains some material from stratum VIII. In other contexts in stratum VII the transition to stratum VIII seems clear: for example the excavation notebook for trench A mentions a 'floor level' below A21a (stratum VI), i.e. the upper surface of AC22 (stratum VIII), which is described as "trodden down - not new earth strata" and which had a whole pot on it and a shallow hearth with ash (Evans 1960a:15).

The transition from stratum VII to VI was very clear and occurred across the whole area of AC: the alternating light yellow clay and kouskouras with dark streaks of

[10] NB the majority of the numerous fragments of this vessel can be definitely assigned to stratum VIII in trench A, i.e. in the western half of sounding AC.

stratum VII changes to a deposit of loose brown earth and ash (stratum VI), which resembles habitation refuse. Stratum VI was a thick deposit (c.0.5-1.2m) which produced no recognisable architectural remains, except for a few patches of pebble paving, two shallow burnt circular hollows and a smoothed clay 'platform'; in addition some short lines of large stones may or may not represent parts of destroyed walls (Evans 1964:155). Tumbled stone in the south-east was considered likely to have come from a collapsed building to the south and the presence of this building was held to account for the great amount of habitation debris in this stratum (Evans 1964:155).

Defining ENIb: Ceramic Form, Finish and Fabric in Strata VII-VI

ENIb is defined by the presence of a series of features in strata VII-IV, which are absent from strata IX-VIII:

Forms:

Flared Cups/Steep-Sided Small Diameter Bases: these first appear in stratum VII in Fabric 1d and are found in stratum VI in Fabrics 5a and Fabric 10 and from stratum V in Fabric 1b. Examples in Fabric 1d have pierced internal lugs; the example in Fabric 10 has fine plastic cordon decoration and a less flared rim. All have relatively small diameter. In many instances it is difficult to tell whether these functioned as cups or upturned as stands; however the presence of internal pierced lugs, sometimes projecting above the level of the rim suggests they should be oriented as tall cups. Steep-sided small diameter bases also first occur during ENIb and it seems likely that these comprise the bases of flared cups.

Funnel-necked jars: examples are known from stratum VII and stratum V and are found in Fabrics 1d, 2a/b and 5a.

Large Strap Handles joining the rim: these first appear in stratum VII and are found in Fabrics 2b, 5a and 5c. These vessels appear to be large versions of flat-based mugs (see below).

Vertical-Sided Flat-Based Mugs with or without offset rim: variations of this type first appear in quantity in stratum VII: two examples from stratum VIII differ significantly in form and finish from later ENIb examples in Fabrics 2a/b and 5a. A single example in a unique fabric, which may be related to Fabric 2a/b, comes from an ENIb context in sounding AABB: it is decorated in an unusual combination of incised/pointillé and has the upper part of a figurine projecting from the rim. Examples in Fabrics 2a/b and 5a are so similar in form and finish as to be at times indistinguishable and can only be separated on fabric. The majority of examples are decorated in incised/pointillé triangles, with other linear motifs being rare. Examples of this type vary in size, but all have some sort of handle that joins at the rim. It seems likely that the large rim straps noted above come from very large versions of this form. In support of this one might note that both larger and smaller versions are confined to the same two fabrics (Fabrics 2a/b and 5a).

Pedestalled stands: these first appear in Fabric 2a/b in stratum VI (cf. example in Fabric 2a/b from sounding X below).

Concave Bases: these first appear in stratum VI and are found in most fabrics.

Finishes:

Slashed Plastic Cordons/'Rope' Decoration: although plastic cordon decoration occurs from stratum IX, the practice of incising plastic cordon decoration begins in stratum VII in Fabrics 2a/b and 10. In Fabric 2a/b this practice is restricted to large diameter burnished vessels, while in Fabric 10 it is restricted to fine dark polished vessels and resembles a 'rope' pattern.

Plastic Cordon Decoration of fine polished vessels: in ENIa plastic cordon decoration is confined to large burnished vessels in Fabrics 1a, 2a/b, 6 and 8. This practice continues in ENIb, but is also found from stratum VII on two fine polished curved bowls with offset rims (Fabrics 2a/b and 5a).

Barbotine Decoration: this distinctive form of decoration first appears in stratum VI and is confined to Fabrics 1d and 5a. It continues through ENIc in Fabrics 1d and 5a and then into ENII in Fabrics 1e and 5a.

Rippled Decoration: the first examples of this form of decoration can now be tied to stratum VI. This contradicts the consensus view of previous studies of ceramic change, which placed the first examples of this finish in ENII (e.g. Evans 1964:fig.46). The possibility that the examples in stratum VI are intrusive was rejected on the following grounds:

(i) Study of deposits from stratum V has established that rippled decoration is already present in convincing quantities at this stage (i.e. pre-ENII).

(ii) Comparison of the stratum VI, stratum V and stratum IV rippled sherds indicates that by far the majority are in Fabric 1d or 1e, with rare examples occurring in Fabrics 5a, 12, 6, 8 and 10. The four examples from stratum VI are in Fabrics 8 and 10: if they were intrusive one would expect them to be in Fabric 1d or 1e, which are much more frequent[11].

(iii) Study of material from sounding X confirms the presence of rippled sherds in Fabric 8 with other ENIb diagnostic material (see below).

Scored Decoration: distinctive form of decoration which first occurs in stratum VI in Fabrics 2a/b and 5a (cf. also below on sounding X).

Painted Decoration: strata VII and VI produced two painted sherds, both in very rare or unique fabrics (Fabrics 32 and 34). In addition stratum VI (C24) produced a single example of dark-on-light painted decoration in Fabric 1d/e. This form of decoration in this fabric is more common in stratum V and is one of the defining characteristics of ENIc. Unless the single example is intrusive, its presence in the lower levels of stratum VI suggests that this form of decoration in Fabric 1d/e first appeared during the course of stratum VI (see below).

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[11] cf. the identification of intrusive rippled sherds in strata IX-VIII.

Applied Pellets Immediately Below Rim: This form of decoration, where rounded pellets of clay have been applied to the area below the rim, is to be distinguished from the practice of forming lumps below the rim, whose edges are smoothed into the vessel surface. The latter are well known in ENIa in Fabrics 2a/b, 6 and 8 and continue into ENIb. Although, the earliest example of the former is a single sherd (Fabric 6) in a stratum VIII context, it is possible that this deposit is mixed with material from stratum VII (see above). Thus this example *may* be later. This is admittedly speculative, but if correct means that all examples of this form of decoration come from stratum VII or later. This type of decoration is known from stratum VII in Fabric 2a/b and is common from stratum VI above all in Fabric 1d, but is also known in Fabrics 2a/b, 6 and 8. It is also found on an example in Fabric 15 in an ENIb context from sounding AABB.

Incised Lattice Decoration

Although a single example of incised lattice decoration is known from an ENIa context it is in an unknown fabric and moreover the lattice decoration is diagonal and contained within an incised diamond (see Chapter 7). ENIb lattice decoration only ever occurs in Fabric 5a, is always horizontal in orientation and never occurs as a filling within incised geometric shapes. In addition the single ENIa example occurs on a curved offset bowl, whereas all examples in ENIb, where form can be identified, are from flat-based mugs. Single 'ladder' incised decoration is also known in Fabric 2a/b and occurs on curved and carinated bowls, sometimes in a band below the rim.

Marked Increase in Incised/Pointillé Decoration: Generally speaking, although single examples of different types of incised decoration can be found in strata IX-VIII it is only after stratum VII that these types become more common. Thus four examples of incised/pointillé decoration (in Fabrics 2a/b and 6) are known from ENIa. In contrast just one context (C24) within stratum VI produced 13 examples of incised/pointillé (mostly Fabric 2a/b, but also Fabrics 5a, 6 and 11).

Absence of Internally-Thickened Rims on Shallow Bowls: these first appear in stratum V.

Absence of Shallow Carinated, Flared Carinated Bowls: these first appear in stratum V.

Fabrics:

One of the strongest defining features of ENIb is the appearance of Fabric 1d in stratum VII; indeed the presence of Fabric 1d in conjunction with the absence of Fabrics 1b and 1e could be said to define ENIb. Fabric 2a is extremely common in stratum VI and dominant in stratum V. ENIb also sees the first appearance of Fabrics 10 and Fabric 26. However these latter two are rare and their presence could not be considered diagnostic on their own.

Other Material Changes:

Maceheads: the appearance of maceheads in stratum VI can be taken as a further means of separating ENIa and ENIb deposits. These occur in a variety of shapes and sizes up to including stratum I.

Pisé, Stone and Kouskouras Architecture: the change from mudbrick to pisé architecture between strata VIII and VII is another valuable diagnostic for ENIb. One should note, however, that this transition appears to have taken place prior to the emergence of some features of ENIb in stratum VI (e.g. barbotine, rippled) and thus may have taken place prior to the full transition to ENIb in ceramic terms.

The diagnostic quality of the following material changes is more speculative:

Schist Pot Lids: these are known from stratum VII.

Burnishing Equipment: rubbers and burnishers are first found from stratum VII.

Summary of Strata VII-VI in Ceramic Terms:

The ceramic and other changes that occur during strata VII-VI need not be and indeed are unlikely to be synchronous. Indeed the definition of ENIb and ENIc inevitably suffers from the generally poor temporal resolution provided by Neolithic strata at

Knossos: strata are generally deep and are of long duration, most often accumulating gradually in the form of habitation debris. The lack of stratified floor deposits also severely restricts the clarity with which changes in ceramic, form, finish and fabric can be traced. Thus it would appear that neither stratum VII nor stratum VI provide horizons sufficiently short in duration to capture the series of ENIb-Ic changes in detail sufficient to allow a more discrete stratigraphical definition. It remains possible that some of the changes defined here as characteristic of ENIb may have emerged only during or even after stratum VII. Likewise stratum VI sees the rare appearance of some features which will help to define ENIc in stratum V, such as painted vessels in Fabric 1d, ripple decoration and, if they are not intrusive, the first examples of Fabrics 1b, 1e and 2c. That said however, other features characteristic of ENIa and ENIb and absent from ENIc occur in stratum VI, such as pierced/unpierced ears. The presence, therefore, of these features makes it possible to separate VI and V quite easily (see below for features which separate ENIb from ENIc).

2. Sounding AABB (West Court)

As noted by Evans (1971:98-101, 104-6), this sounding did not produce any traces of an Aceramic stratum. Indeed ENI deposits were only c.2.0m thick, as compared to c.3-4m from sounding AC (Evans 1971:107; 1973:136). A further contrast with sounding AC was the incidence of ENI pottery, which remained plentiful even in the lowest levels (Evans 1971:98). Only building remains of pisé type were identified and only around "half-way up the accumulation", a fact which led Evans to suggest that the lowest ENI levels represent the accumulation of refuse, "probably on the edge of the existing settlement" (Evans 1971:104).

Four ENI strata were identified by Evans (Strata L, M, N, P) (Evans 1973:133). Study of the pottery from these levels suggests that the lowest strata (M, N, P) date no earlier than ENIb, This confirms the impressions of Evans who dates them no earlier that stratum VII (Evans 1994:4). The presence of brushed ware and painted sherds in Fabric 1d dates the final ENI level (stratum L) to ENIc (see below).

3. Sounding X, Levels 13-17 (Evans 1970b:4-6):

'The Great Pit'

Above the ENIa(?) pits (A & B), but within 'the Great Pit' a series of thin deposits (c.0.5 to 0.75m in total) were excavated. The lowest layer consisted of a hard red/brown layer (level 17i), which in the NE graded into lighter soil mixed with kouskouras. Above this the next layer was soft and dark with very many large stones, similar to fill layers encountered elsewhere on the site. This layer was succeeded by and was partially mixed with level 16, which was red in colour and contained quite a large number of rounded stones (c.20cm diam.). The uppermost levels of 16 and 17 covered the entire area of the trench, filling the 'Great Pit' and burying the Aceramic deposit, both of which had remained exposed up until this point. The absence of any remains of buildings or other structures associated with habitation, as well as the nature of the deposits themselves suggests that these layers represent fill or rubbish deposits, which appear to have built up against the exposed N side of the Aceramic mound (i.e. against the S edge of the 'Great Pit') and which slope down to the North (see Figure I.2).

These lower ENI fill layers produced considerably larger quantities of pottery then the fill of pits A and B (ENIa?): the lowest level alone (level 17ii) produced over five times more pottery (276 sherds) than all the earlier ENI (ENIa?) contexts combined. Study revealed several features characteristic of ENIb:

Flat-Based Mugs: one body sherd with linear, not triangle incised/pointillé decoration (Fabric 2a/b) and one rim strap (Fabric 6).

Pedestalled stand: one sherd (Fabric 2a/b)

Slashed Plastic Cordons/'Rope': one sherd from a deep bowl with slashed cordon decoration (Fabric 2a/b); one sherd from a large diameter shallow bowl with straight sided profile with a rim decorated with short vertical incisions, plastic incised 'rope' decoration c.2cm below rim (Fabric 10).

Scored Decoration: one body sherd in Fabric 2a/b.

Ripple Decoration: one carinated body sherd with ripple decoration (Fabric 8).

Painted Decoration: one body sherd painted with lattice decoration in unique fabric (Fabric 25).

Fabric 1d: several sherds

Fabric 26: one sherd from an unpierced tubular/flared lug.

Fabric 29: one body cream burnish with incised chevron.

None of these features have parallels in strata IX and VIII. Slashed cordons/'rope' in Fabrics 2a/b and 10 are known from stratum VII. Fabric 26 likewise only appears from stratum VII. However early examples of rippled decoration, such as the example in Fabric 8, as well as wiped ware (Fabric 2a/b), unusual painted sherds in unique fabrics and pedestalled stands in Fabric 2a/b are not known before stratum VI. It is not possible to tell whether this is an indication that these features of stratum VI may date earlier or whether they are specific to stratum VI and thus allow for further subdivision of ENIb. Clearly this would require further study of ENIb deposits, which unfortunately lies outside the scope of the present study. Regardless of these issues, the ENIb date of this deposit seems to be clear.

The remaining upper half of the ENI deposit (levels 10-15) consists of thin (0.03-0.3m) dark rubbish layers, containing ash, pottery, obsidian, bone and occasional pits, often alternating with layers containing predominantly kouskouras. There was no evidence for any structures in any of these levels. In total the ENI deposit in sounding X amounts to c.1.5-2.0m of deposit. This compares unfavourably with sounding AC (c.3-4m) even though the deposits in both span the full length of ENI. This, along with the evidence for thin rubbish layers would suggest that after its abandonment at the end of the Aceramic/early ENIa this area remained on the edge of the main area of the ENIa-c settlement.

Early Neolithic Ic (ENIc)

Sounding AC, Stratum V (Evans 1964:157-64)

This was a thick stratum (0.7->1.0m) that consisted of a mixture of habitation debris and building debris. Patches of flooring and wall foundations were noted at many points, but connected remains only found in one area in the western half of AC. These remains seem to constitute sufficient evidence to reconstruct part of a dwelling, however Evans chose not to include it in his series of houses (A-E), despite the fact that this structure seems at least as well preserved as house D (see Evans 1964:fig.12). The difference in levels between many of these features indicates the presence of more than one phase and suggests that stratum V accumulated gradually over some period of time.

Only pottery from the eastern half of AC (trench C) was studied, because these deposits had not been selected. The existence of a number of cross-joins between different contexts within this stratum demonstrates the integrity of the stratum in this area. However, sherds do not mend up beyond the size of large sherds and there are no large profiles or whole vessels, suggesting that these deposits have been well mixed. Since these contexts represent a series of occupation layers not all in use at the same time, it would seem that the existence of joins between them would be an indication that these deposits had been rearranged more than once during the period in which this stratum accumulated.

Defining ENIb: Ceramic Form, Finish and Fabric in Stratum V

Flared Rim Carinated Bowls: these first appear in stratum V and continue into IV.

Shallow Carinated Bowls: these first appear in stratum V and continue into IV.

Thickening on the interior/exterior of the rims of shallow bowls: this is a rare feature of stratum V found in Fabrics 1d, 1e and 2a/b.

Brushed Decoration (Fabric 2): this type of finish first appears in stratum V and thus far has proved to be confined to this stratum. It is most common in Fabric 1d, but examples in 1e and more rarely 1b are also known.

Dark-on-Light Dribble-Painted Decoration (Fabric 1d/e): a single example of this type of finish is known from stratum VI, but many more come from stratum V. It appears in Fabrics 1d and 1e. Many are in the form of dark dribbles on light background. An example from level 7 in sounding XY from a collared jar has irregular dribbles running down from the rim.

Red Scribble Burnish Decoration: this first appears in very small quantities in stratum V and continues into ENII. It usually occurs in Fabric 1e, but isolated examples in Fabric 1b and 1d are known. Often the red scribble has a white slipped background.

Rippled Decoration (Fabric 1d): examples in Fabric 1d first occur in stratum V. This type of decoration is also found in Fabrics 5a, 6, 8 and 12.

Incised Pointillé Decoration: this is known in Fabrics 2a/b and for the first time Fabric 1b; very rare examples of this are also found in Fabric 1e (e.g. level 7, sounding XY).

Fabrics: In fabric terms ENIc is best defined as the presence of large amounts of Fabric 1b, the absence of Fabric 1a in conjunction with the very large amounts of Fabric 1d with Fabric 1e rare. There are also large amounts of Fabric 2a/b with 2c rare or absent. Other fabrics previously as common as Fabrics 1a, 1d and 3a in ENIb are now much less common (e.g. Fabrics 5a, 6, 8).

ENIc is also characterised by the disappearance of:

- Pre-Firing Piercing

- Pierced/Unpierced Ears
- Above Rim Lumps

Summary of Stratum V in Ceramic Terms:

In many respects stratum V represents a transitional phase between ENI and ENII since it contains some elements of both. This is not a new observation; for example Warren in a footnote rightly characterises stratum V as "ENI into ENII" (Warren 1968:239 n.1). It should be stressed, however, that stratum V did not simply result from a mixing of ENIb and ENII deposits, but represents a distinct phase of occupation with architecture. Furthermore it can be quite closely isolated in ceramic terms: ENIc can be separated from ENIb by the absence of a number of features characteristic of ENIb[12] and from ENII, by the dominance of Fabric 1d with Fabric 1b and with Fabric 1e rare. In contrast ENII is dominated by Fabric 1e with 1d rare (see Figures 9.3-4). Thus the relative proportions of Fabrics 1b, 1d and 1e along with the presence of Brushed ware and Dark-on-Light Painted ware in Fabric 1d allow ENIc to be isolated and moreover have proved sufficient to define this phase in stratum L in West Court sounding AABB. No further deposits have been subject to as detailed study as sounding AC[13] and so this definition of ENIc will stand or fall on the basis of further research.

Early Neolithic II (ENII)

Sounding AC, Stratum IV (Evans 1964:164-172)

Stratum IV was a thick deposit (c.1.0-1.5m) consisting of many thin habitation levels in association with hearths, small clay structures, pits and pebble pavements. No clear evidence for built structures was found, although evidence for their existence just beyond the sounding was encountered in the form of a short section of wall. Better

[12] For example the absence of pierced/unpierced triangular ears, tubular lugs.

[13] In describing the lowest level of sounding XY, which he dated ENII, Evans noted an "admixture of sherds of Early Neolithic I type" but "no real Early Neolithic I level" (Evans 1964:138). Preliminary study of this material indicates the presence of several features diagnostic of ENIc in stratum V (dribble-painted in Fabric 2a, majority of sherds in Fabric 2a or

evidence for structures was excavated in soundings XY and AABB, where three clear building levels were identified by Evans (1964:166-8; 1971:107-9; 1973:136).

The ENII ceramic phase has already been well defined by Furness and J. Evans (Furness 1953:117-20; Evans 1964:212-9). There remains little to add to their definition, beyond perhaps to point out some changes in fabric proportions: in ENII Fabric 1e dominates all others with Fabric 1d rare. Fabrics 1b and 2a/b continue in similar proportions to ENIc and Fabric 2c remains rare. There are small amounts of Fabrics 5a, 6 and 8.

Although well defined stratigraphically and in ceramic terms, Evans' separation of ENII and MN strata has been called into question (Winder 1991:42). Winder points to the overlap in radiocarbon dates between strata IV (ENII), III (MN) and III/II (MN/LN) and suggests that ENII is an "imperfectly defined "Early-Middle" Neolithic" with a time range that overlaps with that of MN, prior to LN. Winder even goes as far to hint at the possibility that there is no MN phase, as defined by Furness at Knossos. In response it should be stressed that in ceramic terms ENII and MN deposits *can* be distinguished: for example a number of MN forms, such as 'fruit stands', are absent from ENII; moreover although ripple burnish occurs in both, ENII ripple is more deeply impressed and more carefully executed and present in much smaller quantities than MN ripple and thus the two can be separated. The overlapping radiocarbon dates are a problem, however playing around with terminology, as Winder would have us do, is not the solution. Nor is it sensible to reject perfectly good ceramic evidence. Rather the problem lies in the general lack of good radiocarbon dates with short standard deviations.

1b, incised/pointillé in Fabrics 3a and 2b). Levels 10a-12 in sounding X were also studied and found also to contain a similar range of features diagnostic of ENIc.

Absolute Dates for Phases ENIa, ENIb, ENIc and ENII

Comparison of ENI-II deposits in soundings AC, X, XY and AABB produces the following table:

Ceramic Phase	Sounding AC	Sounding X	Sounding X	Sounding AABI
Aceramic	stratum X post-hole structure	levels 24-19, 17ii; 4 building levels		
Early Neolithic Ia	strata IX-VIII Houses E & D	level 18 pits		
Early Neolithic Ib	strata VII-VI House C	levels 13-17, 17i		Strata M-P
Early Neolithic Ic	stratum V buildings	levels 10a-12	levels 7-7c 1 building level	Stratum L
Early Neolithic II	stratum IV	**level 10, level 9?**	levels 2-6 **2 building level**s	Strata G-K 3 building levels

Figure I.3 ENI-II deposits in soundings AC, X, XY and AABB

Using the current set of radiocarbon dates, these phases can be given only approximate absolute dates. The most recent calibration to date of the existing Knossos radiocarbon dates is that of Manning (1999:civ). Using the date range, which lies within a 68.2% probability range, it is possible to produce the following approximate estimate of the dates of the various phases of the Cretan Neolithic:

Phase	Provisional Absolute Dates
Aceramic	>7000[14] - c.6400 BC
ENIa [IX-VIII]	c.6400 - c.5800? BC
ENIb [VII-VI]	c.5800? - c.5100 BC
ENIc [V]	c.5100 - c.4900 BC
ENII [IV]	c.4900 - c.4500 BC
MN [III]	[c.4750 - c.4400 BC]
LNI [II]	c.4400 - c.4250 BC
LNII [I]	c.4250 - c.4000 BC
FN [Phaistos]	c.4000 - c.3300 BC

Figure I.4 Absolute Dates for Neolithic Ceramic Phases at Knossos based on dates in Manning (1999:481) produced using the OxCal 2.18 calibration programme.

[14] The late eighth millennium date for the first settlement at Knossos is well known. Unfortunately people still persist in using the old uncalibrated date of 6000BC (cf. Rackham & Moody 1996:2).

It should be acknowledged that these estimates contain a good deal of guesswork. For example the lack of any dates for strata VIII and VII make it impossible to ascertain at which point, within a period between c.6100 and 5500BC, ENIa ends. The date of 5800BC is a guess, which places the transition approximately in the middle of this period (indirect support for this is suggested by integration with Anatolian and Greek sequences, see below). Also in view of the greater depth of Aceramic deposit in sounding X than in stratum X, it is suggested here that the earliest occupation of the site may precede the earliest material from stratum X, thus dating to sometime before 7000BC[15].

In addition to this there is a good deal of overlap between phases. The discrepancy between ENII, MN and the transition to LN has been discussed by Winder (1991:42). To this may be added an overlap between a date range for ENIc (stratum V) of c.5200-c.4900BC (BM-274) and one for ENIb (stratum VI) of c.5250-c.4950 (BM-273). There is at present no way of resolving these overlaps satisfactorily and one can only hope that future radiocarbon dates will clarify the issue. Here I have guessed a beginning to ENIc at around 5100 with an end point around 4900 suggested by the absolute dates for the beginning of ENII[16].

Selected EN Ceramic Material from Knossos, Crete and Other Aegean Sites

This section is necessarily selective; a more comprehensive discussion of parallels and connections has already been provided in Chapter 7 and the reader is recommended to consult that section should further detail be required.

(i) Crete

Unfortunately, in advance of new publications there is nothing to add to J. Evans' original conclusions (reported by Weinberg 1970:617) that the EN pottery of Knossos remains unique in Crete, the only certain exception being Katsambas just to the north

[15] Two dates, BM-124 (c.7200-c.6400BC) and BM-278 (c.7000-c.6600BC), suggest a date of around 7000BC for stratum X.

(see below; Chapter 7). The significance of published ceramic material from this and other sites outside Knossos, for which an EN or MN date has been claimed, is discussed below. A map of sites mentioned in the text is provided (see Figures I.5, 7.2)

West Crete:

Ayios Ioannis (LN?)

Treuil (1970:20) attributed a late ENI/ENII date to this material on the basis of the presence of wishbone handles. However, wishbone handles are now no longer considered to be diagnostic of EN (cf. Manteli & Evely 1995:pl.1(b); Manteli 1993a:47; see Chapter 7); Vagnetti, Christopoulou and Tzedakis (1989:89) now doubt the validity of Treuil's dating. Rather the majority of the Neolithic material appears to date to LN (French 1990:79).

Ellenospilia (MN? LN?)

Marinatos reported rippled ware, however this material remains unpublished (Marinatos 1928:100-1).

Gerani (EN? MN? LN FN)

According to the excavator, material from EN, MN and LN are represented (Tzedakis 1973:474-6). EN and MN levels are thin (<10cm, 8-15cm respectively) and each was sealed by a calcitic layer. While an early date for this material remains possible, it should be stressed that relatively few of the vessels published as EN (cf. Godart & Tzedakis 1992:pl.XCVIII.1; pl.XCVIX.1-2) have good parallels in the Knossos EN sequence. Furthermore Manteli doubts both the stratigraphy and the dating of this assemblage and argues that the "pottery shows closer affinities with LN Knossos and fewer with FN Phaistos (Manteli 1993a:37). However Manteli does note "the sporadic

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[16] cf. Manning (1999:civ) for ENII dates: BM-719 [c.4900-4800BC], BM-577 [c.4950-4500] and BM-279 [c.4700-4350].

Figure I.5 Neolithic Sites on Crete

occurrence of EN and MN types" (Manteli 1993a:107) and illustrates a group of profiles, which most resemble late ENI/ENII types from Knossos (cf. especially Manteli 1993b:fig.63.1, 4, 8, 9; fig.64.6, 9; fig.65.1, 6). Furthermore Manteli mentions the presence of EN style "incised square net pattern" (= incised lattice?), trumpet lugs and pronged wishbone handles as well as a the "relatively high popularity of plastic knobs" on coarseware bowls (Manteli 1993a:118, 120). The site thus remains a possible EN and MN site, although the bulk of the material must be LN-FN.

Kastelli (Chania) (MN? LN FN)

In a recent gazetteer of Neolithic sites, MN is reported from Kastelli (Papathanassopoulos 1996:207), however nothing has as yet been published to support this.

Lentaka Cave (MN? LN)

Hood (1965:112) notes the presence of 'MN rippled ware'.

Lera Cave (MN? LN, FN)

Excavation in the cave did not produce evidence for any clear stratigraphy; all ceramic deposits appear to be mixed (Manteli 1993b:169) and dating of ceramics is purely on typological grounds. The excavators originally proposed an EN-LN date for the cave (Guest-Papamanoli & Lambraki 1980:180); the EN date was surmised on the basis of the supposed similarity of certain perforated lugs and flap handles to examples from EN Knossos (Guest-Papamanoli & Lambraki 1980:187-9). The validity of this comparison has been widely criticised: flap handles are known from LN-FN Phaistos as well as nearby LN/FN Nerokourou (Vagnetti et al. 1989:89; Vagnetti 1972-3:71). Manteli considers the ENI-LN sequence identified by the excavators to be "based on weak and general arguments" and states that "on the basis of pottery typology... the Lera assemblage finds its closest parallels in the LN and FN period (Manteli 1993a:35, 120). Only trumpet lugs could indicate EN occupation, with the presence of rippled ware possibly indicating MN/early LN (Vagnetti et al. 1989:89), otherwise the bulk of the material forms a homogeneous LN-FN assemblage (Manteli 1993a:120). The supposed parallels with EN Knossos certainly do not seem strong and none of the examples of Lera ceramics published by Davaras need be earlier than LN (Davaras 1969:pl.368.β-γ). The cave is considered only a possible EN site.

Platyvola (MN? LN)

Vagnetti 1996:37 mentions rippled ware of MN/LN character. Manteli notes LN and FN in small quantities (Manteli 1993a:36, 124-7). The site is probably LN-FN in date.

Central Crete:

Eileithyia Cave (MN? LN FN)

The majority of the material is dated to FN (Vagnetti & Belli 1978), however one rippled sherd from the cave collected by Hood in the study collection in the Stratigraphical Museum at Knossos must be either MN or early LN. Manteli notes that there are considerable amounts of FN mixed with EMI (Manteli 1993a:33). The site is probably LN-FN in date.

Kastellos (MN? LN/FN)

Pendlebury et al. (1938) report a rippled sherd, which must be MN or early LN. Manteli reports only FN (Manteli 1993a:35). The site is probably LN-FN in date.

Katsambas (ENIa? ENIb, ENIc? ENII)

Lacking the benefit of J. Evans' excavations at Knossos for comparison, this material was originally dated by the excavator to MN (Alexiou 1956, 1957). However, restudy by Manteli has indicated an EN date (Manteli 1990:438 n.1). Of the small selection of decorated sherds published (cf. Alexiou 1956:308, fig.7; 1957:373, fig.4), the majority are either ENIb (i.e. incised lattice decoration, deep incised/pointillé triangles, chevrons and linear bands) or ENIc/ENII (incised chevrons, punctuated/incised). The presence of small amounts of rippled ware would also suggest a date of ENIc or ENII for some of this material. Identification of ENIa material would require careful study of material from well-defined deposits. The site seems to have been a relatively large open settlement with occupation both on the top of a rocky outcrop and below on the edge of the Kairatos drainage (Alexiou 1956:305-8; 1957). The single published house plan is of a large rectangular multi-roomed structure, whose walls appear very regular and well-built (Alexiou 1957:fig.2) and which most closely resembles ENII houses from Knossos. The site remains unpublished, but its status as an ENI-II site is nevertheless certain.

Knossos (Ac ENIa ENIb ENIc ENII MN LNI LNII)

Mitropolis (MN LN)

Vagnetti illustrates MN/LN style rippled ware (1973:pl.I.1.6-10) and MN/LN incised wares (pl.II.1.1-16) from the site of Mitropolis near Gortyn (cf. also Vagnetti 1996:37). Manteli similarly suggests MN/LN occupation, but notes lack of architecture and stratigraphy (Manteli 1993a:37). This site is considered to be an MN to LN site.

Skaphidia Cave (MN? LN)

Pendlebury et al. (1938:17) report a rippled sherd from this cave as part of their survey of sites on the Lasithi Plateau. This was in association with incised pottery compatible with a date after ENI. Other material appears to be LN or FN. Vagnetti & Belli (1978:136) date the rippled sherd to LN. Manteli notes only an FN deposit (Manteli 1993a:38).

East Crete:

Kavousi (EN? MN? LN?)

Haggis found an assemblage of pottery, dumped near the modern village (Locus 92/17), which had originally been excavated prior to the construction of a house near the village plateia (see Haggis 1995:173-4). This excavation went down to bedrock. The assemblage was inevitably mixed and contained Neolithic as well as Bronze Age ceramics up to LMIII. Haggis considers the Neolithic material to most likely date to LN or FN. While this remains possible, an earlier date cannot be excluded for at least one of the published sherds (no. 338), which is a carinated bowl/jar fragment with a strap handle on the carination, examples of which are very numerous at EN Knossos.

Moreover, when the opportunity arose to study the fabric of this sherd in thin-section (see sample 93/69)[17], it proved to be indistinguishable from ENI examples of Fabric 12 (cf. especially 97/27) from Knossos, for which an origin in the Bay of Mirabello has already been suggested (see Chapters 6 and 7; Appendix V). This site is thus a possible EN site.

Magasa (EN? LN?)

The excavations by Dawkins at Magasa early last century (Dawkins 1905) produced a small amount of ceramic material, which has in its time been assigned to both EN and LN. On the basis of the presence of wishbone handles and other apparent links with EN Knossos, Dawkins gave this material an EN date (1905:268). However Warren (1968:239) and Vagnetti and Belli (1978:137) date this material to LN. Manteli similarly favours a LN date for the bulk of the assemblage, but notes the presence of "a few EN traits", such as plastic knob decoration (1993a:37, 107; 1993b:123; cf. also Evans 1968:275): for example the Magasa ladles with 'knobbed wishbone handle' are considered to find "exact parallels in ENI Knossos" (Manteli 1993b:122; cf. Evans 1964:fig.25.18-22). The source of much of this confusion has been the fact that no-one has actually been able to examine this material since Dawkins and must rely on the small number of sherds illustrated in the 1905 publication. This site remains a possible EN site.

Pelekita Cave (ENII? MN LN)

This cave contains a deep Neolithic deposit, consisting of nine MN to LN strata. Earlier material (EN) has also been claimed. (Davaras 1982:388). Although incised wares are reported, which may if EN suggest a date in ENII, nothing has been published yet to support these claims (Papadakis 1987:402-4). At present this cave must be considered only a possible EN site.

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[17] A petrographic study of the ceramic material collected in the Kavousi survey is currently being conducted by Dr. P.M. Day at the Department of Archaeology & Prehistory, Sheffield University.

(ii) Central and Southern Greece

In a recent review of the Neolithic of Northern Greece, Andreou, Fotiadis and Kotsakis pointed to several weakness in the chronological scheme being used (Andreou et al. 1996:558): stratigraphic support for the definition of ceramic phases is not always secure; the variability of pottery, both within sites and across regions, cannot be interpreted in exclusively chronological terms; scarcity of supporting radiocarbon dates. These criticisms would be equally applicable to other areas of the Aegean. Thus in the circumstances the absolute dates for the duration of ceramic phases and the points of transition can only be considered to be approximate. The absolute dates for different phases of the Greek Neolithic chronology are generally estimated as follows[18]:

Phase	Duration
Aceramic	c.7000-6500BC
Early Neolithic	c.6500-5800BC
Middle Neolithic	c.5800-5300BC
Late Neolithic I	c.5300-4800BC
Late Neolithic II	c.4800-4500BC
Final Neolithic	c.4500-3200BC

Figure I.6 Chronology of Neolithic Greece

(a) Possible Greek Neolithic material at Knossos:

(Stratum VIII)

- buff burnished incurved bowl (Fabric 24) with pellet a little distance below rim and oval lug: most likely EN Peloponnese;
- dark polished curved bowl with offset rim and triangle/diamond with diagonally-incised cross-hatched fill: closest parallels EN/early MN Nemea.

(Stratum VII)

- orange burnished horizontal tubular lugs with tails (Fabric 26): parallels are MN Peloponnese or EC East Aegean.

[18] See chronological tables in Andreou et al. (1996:538), Gallis (1996:28-9), Demoule & Perlès (1993:366) and Vitelli (1993:table 13). NB although the majority of these chronological schema place the beginning of Aceramic at c.6800BC the radiocarbon dates from Argissa and Franchthi, when calibrated using the most recent calibration curve (OxCal 3 calibration programme), suggest an origin around 7000BC (cf. Vitelli 1993:table 13).

- ring base (Fabric 24).

(Stratum VI)

- fine white fabric (unsampled) = parallels are MN Nea Makri/MN Peloponnese.

(Sounding X - ENIb)

- cross-hatched painted vessel (Fabric 25): closest parallels MN Peloponnese.

(b) Possible Cretan-Style Material at Greek Sites

Slashed Cordon/'Rope' Decoration

- a dark burnished sherd with fingernail incision from late EN/early MN Nemea is considered by Phelps to be 'odd' for the Peloponnese (Phelps 1975:114; fig. 9.13). However it is closely comparable to ENIb dark burnished examples in Fabric 10, which are decorated with fingernail impressions giving a 'rope' effect (cf. example from sounding X).
- body sherd with slashed cordon decoration from late EN/early MN Nemea is 'unique' for the Peloponnese (Blegen 1975:264, pl.68.4; Phelps 1975:fig. 9.14), but indistinguishable from ENIb examples in Fabric 2a/b.

Barbotine

- one example of barbotine at Nea Makri from an early LN context differs markedly from all other examples of barbotine at the site (Pantelidou Gophas 1995:pl.41.9-23; see Chapter 7). It consists of larger more carefully rounded pellets which partially overlap. In form and execution it is so close to contemporary ENIb and ENIc examples (Fabric 1d) at Knossos as to suggest the possibilities of an import.
- two examples of barbotine are known from LN Saliagos (Evans & Renfrew 1968:43, fig.43:15, 16): no.15 is very irregular but very dense and overlapping and finds close parallels in single example from Emporio VIII and in Fabric 5a in stratum IV; no.16 on a curved body sherd shows the interface between barbotine and an undecorated zone and finds an exact parallel with an example in Fabric 1e in stratum IV. These two examples are otherwise unique at Saliagos and the close contemporary parallels with ENII Knossos suggest the possibility of imports.

Plastic cordon decoration

- a single example from LN Saliagos (Evans & Renfrew 1968:fig.43.10), which consists of three near parallel cordons, closely parallels an example in stratum IV (Fabric 1e) at Knossos.

Rectangular-Sectioned Strap Handles

These first appear in the Peloponnese in the latter half of MN and mark the first appearance of strap handles in this area; they are not common and are found on collar jars, pitchers and large storage jars (Phelps 1975:158; fig.22.15, 16). Rectangular handles are a particular feature of ENIc and ENII at Knossos.

Maceheads

- two fragments of what appear to be maceheads, which come from MN/LN Kouphovouno, are very similar in dimensions and form to Cretan examples; one is in a grey limestone, the other in a yellowy marble (Renard 1989:85; pl.xx.1-2). These are the only examples known at Kouphovouno or at any sites in the Peloponnese and are broadly contemporary with Cretan (ENIb/c) examples.

Pierced Long Handle ('Spout')

- a unique 'double-spouted' bowl from Saliagos (Evans & Renfrew 1968:fig.39) finds a close parallel with a unique vessel from stratum V at Knossos in Fabric 1d or 2a/b.

Concave Base

- There is a single example of a concave base comparable to Knossian types from LN Saliagos (Evans & Renfrew 1968:fig.53.12), which is unique and thus a possible import.

Ripple Burnish

Phelps notes that rippling is found on a small number of black ware and grey ware sherds at LN sites in central and southern Greece (Phelps 1975:233-4). Although the exact form of ripple design does not find parallels at Knossos, the forms on which it occurs are reminiscent of Cretan ENIc and ENII shapes, such as vertical carinated bowls and curved bowls with offset rims. Ripple appears to be confined to Greek LN and FN deposits and although small quantities are known from Delphi, Elateia, Attica and Euboia, the main centre of distribution appears to be Corinth (Phelps 1975:234)[19].

Conclusion

When taken together these links and parallels suggest several points:

(1) They suggest that strata IX-VIII are contemporary with Greek EN and indicate a transition to stratum VII at about the same time as the transition to MN in Greece.

(2) The presence of ENIb/c style barbotine in an early LN context at Nea Makri seems to confirm what is suggested by radiocarbon dates, that ENIb ends sometime after Greek MN and ENIc begins during Greek LN[20]. This is also suggested by the increased presence of ripple burnish at Knossos in ENIc/ENII and its first appearance in LN Greek deposits.

(3) The parallels between Saliagos and Knossos V and especially IV suggest a synchronisation between Saliagos and Knossos ENIc/ENII. This agrees well with radiocarbon dates from these two sites: LN Saliagos dates to c.5100/5000 (P-1311, P-1396) and later, Knossos ENIc/ENII date c.5100-4500BC.

(iii) Links to South-West Anatolia

The problems associated with defining a sequence for south-west Anatolia are addressed in detail elsewhere (Appendix IV) and the chronological phasing followed here is the one presented in Appendix IV.

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[19] NB although at Knossos ripple decoration begins as early as ENIb, it only becomes common from ENII-LN (i.e. during the fifth millennium; cf. period of Greek LN and FN).

[20] Unfortunately Nea Makri lacks radiocarbon dates and so must be dated by comparison with other sites. Thus Pantelidou Gophas places the beginning of EN at around or before 6000BC, the beginning of MN to c.5700BC and the end of MN to c.4700BC (1995:308). However regarding this low dating for the end of MN, Phelps argues that the virtual absence of types characteristic of the late phase of LN, such as Matt-painted, Polychrome or Fine Gray, known from sites in Attica and Euboia, implies that settlement ceased at Nea Makri soon after the transition from Middle to Late Neolithic (Phelps 1998:434). This makes the low date for MN unlikely, since strata 9-12 must all belong to a very early phase in LN. This suggests that the LN levels at Nea Makri must date to the late sixth millennium (c.5300-5000?BC). Partial confirmation of this is provided by the single example of Cretan barbotine in the first LN level at Nea Makri (level 9), which suggests a synchronism with strata VI-V at Knossos (dated late sixth millennium BC).

(a) Possible Anatolian Neolithic/Chalcolithic material at Knossos:

Vertical Tubular Lugs

- these (97/36, 98/87) appear in stratum IX in Fabric 28 at Knossos and disappear in Fabric 28 during the course of stratum VII.

Unslipped, Dark-on-Orange/Brown Painted and Burnished

- a single example occurs in stratum VII in Fabric 34.

Unique Incised Designs

- one example in Fabric 27 (98/83) from stratum VII.
- one example in Fabric 28 (98/96) from an ENIb context.

(b) Possible Cretan-Style Material at Anatolian Sites

Plug-Attached Strap Handles

This form of handle join firsts appear in MC and are more common at LC sites in the Elmali Plain (Eslick 1992:78). It seems to be associated with the first appearance of strap handles in Anatolia, which also are first found from MC. Although the frequency with which plug-attached handles occur in south-west Anatolia marks them out as local products, it is striking that the timing of their appearance parallels plug-attached handles at Knossos (ENIc) and furthermore this technique in south-west Anatolia is closely associated with the first appearance of strap handles, which on Crete have a much more ancient ancestry. These parallels therefore suggest some sort of link or influence between these regions.

Conclusion

(1) The confinement of vertical tubular lugs to strata IX-VII and their disappearance during stratum VII suggests that the transition from Anatolian LN to EC took place either during the transition from stratum VII to VII or perhaps during the course of stratum VII. This is also suggested by the occurrence of a single painted sherd in stratum VII, which in Anatolia may date to the LN/EC transition or to EC. These

appear to confirm what is also suggested by Greek parallels that the transition from ENIa to ENIb should approximately be placed at c.5800BC.

(2) If the connection between ENIc/ENII Knossian plug-attached strap handles and the MC/LC appearance of both strap handles and plug attachment is meaningful, then this would suggest a synchronism between ENIc/ENII and MC/LC.

(iv) Links to the East Aegean

(a) Possible East Aegean Neolithic/Chalcolithic material at Knossos:

- a sherd with red and white painted decoration on orange burnish in Fabric 32 (stratum VI) whose closest parallels are from Ayio Gala (lower cave).
- unique sherd incised with rows of dashes (Stratum V), which has an exact parallel in Emporio VIII.

(b) Cretan-Style Material at Sites in the East Aegean

Incised/Pointillé

The rare (7/40 incised) examples of incised pointillé from the Ayio Gala Lower Cave must date no later than Anatolian EC, making them contemporary with Cretan ENIb. In design and execution these seven sherds are indistinguishable from Cretan incised pointillé: they consist of diagonal bands filled with deep carefully incised and regularly arranged dots, although some appear to be wider than bands and may be triangles. Several of these are filled with a white paste (see Hood 1981:pl.7(c).42-3).

- out of around 70 incised sherds in the Ayio Gala Upper Cave, 12 have pointillé (Hood 1981:60-1). Unfortunately those that most resemble Cretan types have no secure stratigraphic position within this context.
- one sherd combines several Cretan features: a high carinated bowl with offset rim, decorated with incised pointillé on the exterior and vertical ripples inside the rim (Hood 1981:fig.33.202). Another six of the 12 pointillé sherds may belong to this vessel (Hood 1981:60).
- one sherd is well burnished and decorated in a carefully incised/pointillé design featuring incised bands in a chevron arrangement (Hood 1981:61, fig.42.286):

numerous parallels exist at Knossos for both design and execution (e.g. Pendlebury 1939:fig.1 bottom far left).

- several other bowls are illustrated which lack decoration but have sharply offset rims (Hood 1981:fig.33.197-204), which are more easily paralleled at Knossos than amongst mainland Anatolian assemblages (see Chapter 7).
- only one or two small sherds have incised/pointillé decoration at Emporio levels X-VIII. These are mostly confined to X-IX and are rare or absent thereafter (Hood 1981:232).

Incised Cordons

- a well-burnished deep jar from the Ayio Gala Lower Cave (Hood 1981:pl.7(d).24, fig.7.24) has a cordon with regular neat incision, which closely resembles examples of incised 'rope' decoration in Fabric 10 at Knossos. This sherd also has incised/pointillé decoration. The co-occurrence of two features considered diagnostic of Cretan ENIb in a deposit broadly contemporary with ENIb makes this a very likely import from Crete.
- from the Ayio Gala Upper Cave comes an example of slashed cordon decoration, which Hood considers 'unique' and a probable import (Hood 1981:61, fig.42.308).

Single Applied Pellet

- one body sherd with single applied pellet from Emporio (X-VIII) (Hood 1981:pl.42.430) closely resembles examples in Fabric 1d from stratum VI at Knossos (ENIb).

Barbotine

- single 'unique' example from Emporio (VIII) is considered an import (Hood 1981:299, pl.41(d).421). Hood notes closest parallels with 'denser barbotine' at Saliagos (also probable Cretan imports, see above) and in stratum ENII Knossos (Evans 1964:214 pl.47(3):6; Furness 1953:115 pl.30, a:10, 11). The ENII parallels from Knossos are in Fabric 5a and are identical to the example from Emporio VIII.

Incised Decoration (Without Pointillé)

- in Emporio VIII incision becomes the most common form of decoration (c.600 examples Hood 1981:295). In terms of execution and design these examples are strikingly close to ENIc and ENII incised vessels on Crete (see Hood 1981:fig.111.4, 6-16; fig.112.17-20, 25-33).

Red/Light Brown Scribble Burnished Ware

Beginning in Emporio VIII this is common in VII-VI (Hood 1981:305). Hood describes it as a light brown burnished ware and compares MN Greek Urfirnis (1981:305-7), however Urfirnis parallels are too early. Moreover illustrated examples show a scribble burnish that is almost indistinguishable from red scribble burnished ware found in small quantities in Knossos V and in much larger quantities in IV (ENII). This parallel has the virtue of being both close and seemingly synchronous. In addition the range of forms is very similar to that found in red scribble burnished ware at Knossos: curved jars with 'S' profile and 'necked' jars, long loop handles (Hood 1981:pl.43.a, b). Hood (1981:304) notes that it is used mostly for jugs, but there also a few bowls and jars. The fabric, as described by Hood, seems to be different from Fabric 1e.

Conclusions

The chronological significance of these links between Knossos, Ayio Gala and Emporio largely depends on the absolute and relative dates for the various phases at Ayio Gala and Emporio.

(i) Ayio Gala Lower Cave:

Hood dates this deposit to the Anatolian LN on the basis of comparanda with Hacilar IX-VI, namely vertical tubular lugs (Hood 1981). However the unique red-on-white sherd (no.49) would seem to relate to Hacilar painted wares (Hood 1981:24), which suggests that at least part of this deposit is late LN/EC (Eslick 1980:12; Mellaart 1970b:fig 156:b). An EC date is also suggested by the possible Cretan imports (incised/pointillé, slashed cordon, see above), which at Knossos would all date to ENIb

(Stratum VII-VI). The continued presence of tubular lugs (predominantly horizontal) in the lower levels of the Upper Cave, suggests that at least on Chios this form continues into EC (Hood 1981:34). It thus seems probable that the bulk of this deposit dates to Anatolian late LN/EC (contemporary with Cretan ENIa/b and Greek EN/MN)

(ii) Ayio Gala Upper Cave (lower): Early Chalcolithic/Middle Chalcolithic

Using a variety of criteria Hood argues for links between Ayio Gala Lower Cave and Emporio X-VIII (1981:36-7). Some of these criteria, such as horned handles, suggest links with MC material as defined by Eslick (1980; 1992; see Appendix IV). Others, however, such as the increased presence of horizontal tubular lugs and the occurrence of relief decoration, suggest links with EC material in the Lower Cave. Thus this very mixed deposit may contain EC and MC material. This date agrees well with the few sherds (incised/pointillé, slashed cordon), unfortunately without context, which link the Upper Cave to Cretan ENIb and possibly ENIc.

(iii) Ayio Gala Upper Cave (upper): mixed

This deposit is also very mixed. Hood argues for links between the upper part of the Upper Cave deposit and LC Beycesultan (Hood 1981:79). He also notes "many points of comparison with Emporio VII-VI" as well as some VI-IV (Hood 1981:74-6), which also date to the beginning of LC (see below).

(iv) Emporio X-IX: Middle Chalcolithic

Eslick, in her definition of Anatolian MC (see Appendix IV) draws attention to the close parallels between pottery at MC sites in the Elmali Plain (Kizilbel, Lower Bagbasi), Saliagos and Emporio X-IX (incurved shapes, high-sided pans, piercings below the rim, strap handles with knobs placed on bowl rims or sides of jars, incision) (1980:10-12). Since Kumtepe IB rolled rim bowls in level VII at Emporio date this level to LC (see below) Eslick argues that Emporio X-IX must date before LC (Eslick 1980:11; cf. Evans & Renfrew 1968:fig.45.4; pl.xxx.a).

(v) Emporio VIII: Middle Chalcolithic/early Late Chalcolithic

In a later work Eslick draws parallels, such as knobbed strap handles, between MC Kizilbel and Emporio X-VIII (see Eslick 1992:69-70 for list). If so this would suggest that Emporio VIII is at least partly MC. However Eslick also links Emporio VIII with the Anatolian LC (Eslick 1992:70). A number of shared features suggest links between Emporio VIII and Knossos IV (and possibly V):

Red Scribble Burnished Ware: small amounts of red scribble burnished ware are present in both Emporio VIII and Knossos V, becoming more common in Knossos IV. As noted above the examples at Emporio are so close as to be indistinguishable from the Knossos examples in both finish and forms represented.

Incised Ware: both Emporio VIII and Knossos IV see a large increase in incised decoration and both deposits share striking parallels in designs (see Hood 1981:fig.111.4, 6-16; fig.112.17-20, 25-33).

Barbotine Ware: single example of this ware in Emporio VIII finds its Aegean closest parallel in examples in Fabric 5a in Knossos IV.

Incised Rows of Dashes: Emporio VIII has a single example of this decoration, which is considered an import. It is indistinguishable in form and finish and similar in fabric to a similarly unique sherd in Knossos V.

When taken together these synchronisms suggest that

(1) EC Ayio Gala is contemporary with strata VII-VI at Knossos, thus confirming the mid sixth millennium date for ENIb.

(2) Emporio VIII spans part of Knossos V (ENIc) and part of Knossos IV (ENII).

And so when all evidence is taken together it suggests a transition between MC and LC around c.5000/4900BC. Indirect support for this is provided by the links between Saliagos, Knossos IV and Emporio VII-VI. The presence of similar white-on-dark decorated pottery at Saliagos, which is radiocarbon dated to the late sixth/early fifth millennia, and in Emporio VII-VI (Evans 1970c:395), suggests that Emporio VII may data around the same time. This supports a dating of Emporio X-VIII to the late sixth millennium BC. Support for an early fifth millennium date for Anatolian LC, is provided by Joukowsky who notes the presence at early LC Aphrodisias of light on dark painted pottery and some linear white-painted designs which find very close parallels at Saliagos (Joukowsky 1986:432-3).

Summary and Conclusions

The numerous links noted above between Crete, Greece, Anatolia and the East Aegean compliment each other extremely well and provide the basis for the establishment of a secure relative chronology linking Knossos with sequences from neighbouring sites and regions. These synchronsims can be tabulated as follows (see Figure I.6):

Approx Dates	Cre	Knossos	Greece/ Cyclade		East Aegean	SW Anatoli		Pan-Aegean Features
>7000	Ac?	**Sounding X** level 24	Mesolithic	Franchthi Mesolithic		EN	Aceramic Hacilar I-VII	aceramic
c.7000 - c.6500	Ac	X	Ac	Franchthi **Mesolithic**/ Aceramic		EN	Beldibi B? cf. Çatal Höyük XII	aceramic?
c.6500 - c.6400	Ac/ ENIa	X (surface) Sounding X 17ii (surface)	Ac/EN	Franchthi Intermed.		EN	Kuruçay 13	first pottery
c.6400 - c.5800	ENIa	IX-VIII	EN	Franchthi EN	Ayio Gala Lower Cave	LN	Hacilar IX-VI Kuruçay	first pottery
c.5800 - c.5300	ENIb	VII-VI	MN	Franchthi MN Nea Makri MN	Ayio Gala Lower Cave Upper Cave	EC	Hacilar VI-I Kuruçay	painted pottery in Greece and Anatolia
c.5300 - c.5100	ENIb	VI (continued)	LNI	Nea Makri level 9 Saliagos	Ayio Gala Upper Cave Emporio X-IX	MC	Elmali Kizibel/ Lower Bagbasi	first increase in maritime contacts/ island colonisation
c.5100 - c.4900	ENIc	V	LNI	Saliagos	Emporio VIII	MC/LC transition	Lower Bagbasi/ Bagbasi	maritime contacts/ island colonisation
c.4900 - c.4500	ENII/ MN	IV-III	LNI	Saliagos	Emborio VIII - VII	LC	**Aphrodisias VIII** Bagbasi	maritime contacts/ island colonisation l-on-d painted ware
c.4500 - c.4000	LN	II-I	LNII/FN			LC		
c.4000 - c.3300	FN	?	FN			LC		

Figure I.7 Integrated Relative and Absolute Chronology for the Neolithic Southern Aegean

Through the careful integration of Cretan, Greek, East Aegean and Anatolian chronologies it becomes possible to say more about the nature of the relationships between these regions during the earlier Neolithic (sixth-late fifth millennium BC). It is striking that the first adoption of pottery occurs at approximately the same time on both sides of the Aegean (c.6500BC). Although this pottery exhibits some regional differences, there also strong similarities in the types of form and finish represented. Also noteworthy is the parallel appearance of painted pottery in Greece (late EN/MN) and Anatolia (late LN/EC) (c.5800-5300BC). However perhaps the most obvious signs of pan-Aegean contacts first emerge late in the sixth millennium with a whole series of sites displaying closer links: cf. ENIc/ENII Knossos with Saliagos (Washburn 1983:141-8) and Emporio VIII-VII, Saliagos with Emporio X-VI and MC/LC sites in south-west Anatolia and also the spread of light-on-dark painted wares throughout the Cyclades and East Aegean/Aegean-Anatolia littoral. Also Eslick has emphasised (1980; 1992) that from MC south-west Anatolia changes in orientation away from the east and towards the Aegean. It is no accident that the first signs of increased contacts (c.5300BC) probably coincide with the establishment of many permanent settlements in the Cyclades and other Aegean islands.

Recognition of the timing of this increase in contacts beginning in Anatolian MC/ Greek LNI and continuing into LC/LNI-II provides a new perspective on the ceramic links first noted by Evans between Knossos and Greek LN east Aegean and LC western Anatolian sequences (Evans 1968:273-4). Almost all of the 'Cretan' features noted by Evans in these later assemblages, that is flared strap ('trumpet lugs'), flap and wishbone handles, triangular 'ears' on the rim, plastic cordon decoration, pellet/knob decoration and incised/pointillé decoration have been demonstrated in Chapter 7 to be purely Cretan features during the preceding seventh and sixth millennia BC (i.e. Greek EN-MN, Anatolian LN-EC). Evans saw these links as possibly saying something about the origin of the earliest settlers of Crete. However, what seems more likely is that these connections say much more about a probable Cretan origin for some of the first LC settlers of the islands of the south-east/east Aegean.

The changing nature of inter-regional contacts during the earlier Neolithic will be discussed in more detail in the context of EN Knossos in Chapter 12. Here it suffices to emphasise that there is nothing here to suggest that *any* region of the Aegean was ever truly isolated during the earlier Neolithic (*contra* Cherry 1985:27-8), rather the movement of probable imports as well as the identification of other material similarities suggest that there was always some sort of regular small-scale interaction as well as perhaps more infrequent longer-distance movements around and across the

Aegean. In this way the contemporary appearance of material similarities in different regions cannot in reality be used to demonstrate waves of advance or the unidirectional trafficking of individuals, innovations and ideas, rather movement was multidirectional criss-crossing the southern Aegean, with all sides (Greece, Crete, east Aegean/south-west Anatolia) having the potential to influence developments in neighbouring regions (see Chapter 12).

APPENDIX II

EARLY NEOLITHIC KNOSSOS: THE GROWTH OF A SETTLEMENT?

In 1971 John Evans published an important study, which, by comparing dated phases of occupation from old and new soundings around the Kephala hill, attempted to document the growth of the Neolithic settlement at Knossos from Aceramic to Late Neolithic (Evans 1971). In addition, Evans and the site architect, Col. A.B. de Quincey, collected together the absolute depths when bedrock was reached in these soundings to make a reconstruction of the original geography of the hill prior to settlement. The picture Evans produced was one of steady growth in size over the duration of the Neolithic, a pattern of growth felt to be in accordance with "the fundamental conservatism and isolation of the community" (Evans 1971:114).

While it is not the intention here to question the methodology behind this reconstruction (see Whitelaw 1992:226-8), it will be argued that Evans' characterisation of EN growth as a "steady and apparently uninterrupted" (Evans 1971:116) must now be recast. Problems with this characterisation have already been noted (Broodbank 1992:44): Using Evans' figures Broodbank plotted changes in site size against a period chronology based on calibrated radiocarbon dates, producing a graph (see Figure II.1), which seemed to indicate that overall growth was not gradual, but actually uneven. For Aceramic and EN, however, Broodbank argued that growth must have been quick steady in order that the small founder population of Knossos might quickly reach a point where it was demographically self-sufficient; this threshold was considered to be a point where population reached the low hundreds (Broodbank 1992:47). Broodbank's graph suggests that Knossos reached the necessary figure for demographic self-sufficiency at some point during ENI. However, it should be stressed that these figures represent the maximum area and hence population for the *end* of each phase. They *do not* indicate how quickly demographic viability was actually reached during the millennium and a half of ENI. Broodbank's curve suggests that growth was gradual and regular; however it is equally possible that growth was uneven and that the settlement either grew in quick bursts or remained small until late in ENI.

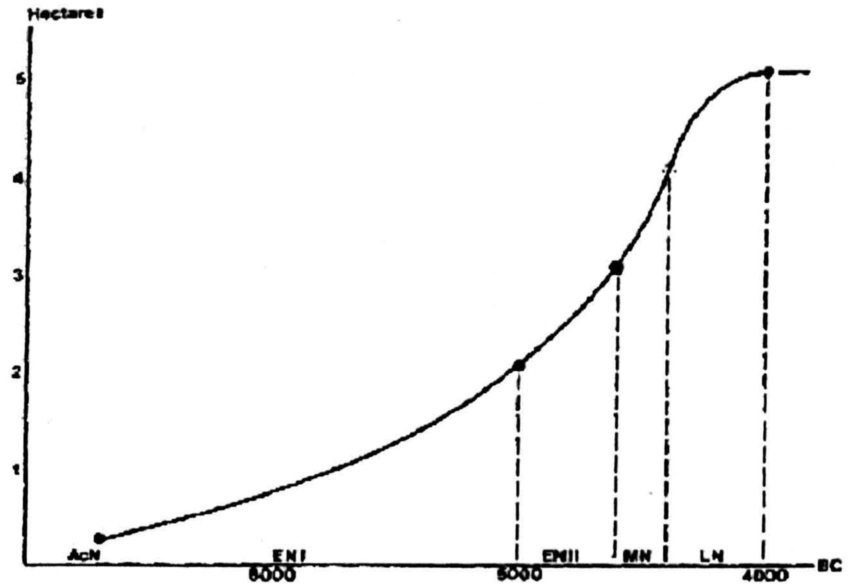

Figure II.1 Graph of Growth of Neolithic Knossos (after Broodbank 1992).

In view of the refinements to EN relative chronology proposed in Appendix I, a new picture of EN site development will be presented here, which traces changes in settlement size and location during ENIa, ENIb, ENIc and ENII. Restrictions of time confined detailed study of ceramic material to only the most important soundings[1], namely soundings AC (Central Court), AABB (West Court) and X (South Ramp) (see Figure I.1).

Changes in Settlement Size and Location (Aceramic - ENII)

Aceramic: further study (see Appendix I) has largely confirmed the picture outlined by Evans (1971:99-103). Settlement appears to have been confined to the top of an oval knoll, situated at the confluence of the Vlychia and the Kairatos. This settlement was long-lived (c. four building phases) and small (c.0.25ha or 50m x 50m) (Evans 1971:103). To the north of the main area of settlement on the lower slopes of the knoll (i.e. sounding AC, stratum X) were work areas, rubbish dumps (pits), fires and several infant burials but no evidence for permanent mudbrick and stone structures (Evans 1971:103; Appendix I).

ENIa: the definition of an earlier phase within ENI has given greater resolution to the early history of the ENI settlement. Rather than a gradual expansion of the initial Aceramic settlement, several features suggest that late in the Aceramic, or perhaps very early in ENIa the settlement on the knoll was permanently abandoned with occupation shifting onto the saddle to the North:

(i) In sounding X Evans noted a distinct interface between later ENI and Aceramic deposits, which indicate that the Aceramic deposit had been exposed for some time *prior* to the ENI activity which buried it.

(ii) My recent study of ENI ceramic material from sounding X suggests a date for these ENI deposits *in the latter half of ENI*, i.e. after the end of ENIa, (after c.5800BC). A post ENIa date is also suggested by the absence of mudbrick debris.

(iii) While ENIa levels in the Central Court sounding AC contain mudbrick and stone structures, ENI levels from sounding X contain *little evidence for structures* either in the area of the trench or in areas adjacent in the form of building tumble. Rather these thin ENI deposits are either pits or resemble rubbish deposits, such as might be found on the edge of a settlement (cf. Appendix I).

This change in site location is striking, certainly the normal procedure during the Aceramic seems to have been to build a new house upon the ruins of the old in a manner which emphasises continuity of occupation. The reasons for this abandonment are unclear, but it may signify changes in ownership of the site or a desire to break with the past. Not that abandonment necessarily meant obliteration: it seems clear that the top of the Aceramic mound remained exposed for the full length of ENIa and perhaps for a significant amount of ENIb, a period of at least 500 years. Indeed it may have remained free of structures until at least the end of ENII. Certainly the summit of the Aceramic mound (max. c.99m a.s.l.) would have overlooked the ENI settlement (max. c.96m a.s.l.) until late in its development: cf. sounding X where even late ENI levels

[1] The restudy and reinterpretation of material from soundings AC, AABB and X benefited immeasurably from transcripts of the relevant excavation notebooks kindly made available by John Evans (Evans 1959, 1960a, 1960b, 1970b).

dip down, sometimes sharply, to the NE following the natural contours of hill (Evans 1970b:3-4).

The continued presence of the earliest settlement may mean that it retained a significance long after its original abandonment. It is perhaps against this possibility of special significance that the unusually large 'Great Pit' and its associated smaller pits, dug into the Aceramic mound, should be interpreted. These pits may possibly represent some sort of ritual activity perhaps to be connected with some of the perhaps ceremonial aspects of house abandonment, such as the clearing/cleaning of occupation floors and the possible 'votive pottery pits' in the top of the destruction levels of houses, which may have been closure/foundation deposits (Evans 1968:268; 1964:48; 1994:7, 14).

Like its predecessor, the ENIa settlement was small: the absence of ENIa levels from sounding AABB (West Court) as well as from any deposits from North of the Central Court suggest that occupation was confined to the lower northern slopes of the knoll. Evans estimates that the maximum area occupied during the mudbrick period of ENI (i.e. ENIa) cannot have been much more than 0.5ha (Evans 1971:103). Since this figure also includes the area of the Aceramic settlement, of which some if not all seems now not to have been occupied at this time, Evans' original estimate should be revised down to perhaps c. 0.25-0.3ha.

ENIb: Evans estimates that the maximum possible area occupied by the later ENI (i.e. ENIb-c) settlement was c.2ha. It seems likely however that the ENIb settlement did not actually ever reach this size. Evans includes in this estimate the ENI deposits from soundings AABB (West Court) and X. However, the area of sounding X seems to have been on the edge of the ENI settlement (cf. Appendix I), likewise the area of AABB, which was only settled towards the end of ENI: cf. the absence of built structures, sequence of thin layers of mixed refuse, much lower densities of sherd material in comparison with sounding AC (Evans 1971:104-6). Preliminary study of the lowest ENIc levels in sounding XY to the north, suggests that this area was also unoccupied during ENIb. Unfortunately further precision would require the re-study of all ENI deposits from the site, a task beyond the scope of the present study. At present it seems likely that the actual maximum area of ENIb occupation probably did not exceed c.1.0-1.5ha.

ENIc: definition of the full extent of the settlement during this phase requires further study of late ENI/ENII deposits. However, preliminary study of soundings XY and AABB suggest that that during ENIc the settlement may have undergone a period of rapid growth, perhaps doubling in size. In sounding XY, Evans excavated three ENII building levels, the lowest of which rested directly on bedrock and contained an admixture of ENI pottery, without there being a real ENI level (1964:138; 1994:11). Preliminary study of this material (level 7) indicates that this is not an admixture of ENI material but a real ENIc level. This would suggest that the ENIc settlement might have extended at least as far to the north as the later ENII settlement. Moreover the absence of underlying rubbish deposits, a common feature of deposits close to the limits of settlement, may indicate that this expansion was well beyond the limits if the previous ENIb settlement. ENIc is also represented as a distinct phase below ENII in soundings AABB[2] and AC. In the latter, wall foundations and faint traces of structures were also found (Evans 1964:157). Although requiring further investigation, it would seem that the ENIc settlement could have stretched some considerable distance to the north and probably at least as far west as the edge of the West Court[3]. This would indicate a settlement at least the size of c.2.5ha.

ENII: there is little to add to Evans' discussion of the extent of the ENII settlement (Evans 1971:107-9), except perhaps to emphasise that in none of his tests did Evans reach beyond the northern or western limits of the ENII settlement, the eastern and southern limits being naturally defined by the slope of the mound and the courses of the Vlychia and Kairatos. Thus the real northern and western limits of the ENII settlement remain unknown and require further soundings. The absence of any mention of ENII in connection with excavations into the LN below Middle Minoan houses south of the

[2] Unfortunately information about the presence or absence of architecture in ENIc levels in AABB was not available to this study.

Royal Road, may suggest a possible limit, but no details of whether bedrock was reached are given (Evans 1971:114). And so, although Evans argues that it was not until MN that the settlement underwent a 'significant acceleration in the rate of change' (Evans 1971:109), this cannot actually be *demonstrated* and an equally significant expansion may have occurred during ENII and possibly as early as ENIc. Certainly the ENII settlement must have been at least as big as 3ha and may well have been much bigger. One should note however that ENII and MN strata were almost entirely absent from sounding X (Evans 1971:102), either through later LN activity[4] or alternatively because this area of the site continued to be free of permanent structures. Nevertheless the failure to identify the northern and western limits of the ENII settlement offsets this and makes c.3.0ha or more a reasonable minimum estimate.

Summary and Conclusions

These new estimates of changes in site growth during the Early Neolithic are collected together in table 1. An approximate minimum (area x 100) and maximum (area x 200) population sizes per phase have been estimated using the same multipliers used by Broodbank (1992:43). Halstead used similar multipliers (e.g. 1989:70), although he favoured a maximum of x300, which may be rather high since it exceeds recent estimates of population density for later early urban centres on Crete (c.240/hectare, Whitelaw 2000).

[3] NB in sounding ZH, situated near the ramp running west from the West Court, Evans found ENII but unfortunately did not have time to investigate further (Evans 1971:98-99). Since bedrock was not reached, the limits of the ENIc settlement remain unknown.
[4] Evans has suggested (Evans 1994:18) that much of the area below the future Central Court of the palace at Knossos was levelled during LN; this would include presumably include the area of sounding X and may help to account for the paucity of ENII and MN material.

Phase	Maximum Area (ha.)	Minimum Population (area in hectares x100)	Maximum Population (area in hectares x200)
Aceramic	c.0.25	25	50
ENIa	c.0.25-0.3	25-30	50-60
ENIb	c.1.0-1.5	100-150	200-300
ENIc	c.2.5	250	500
ENII	c.3.0+	300+	600+

Figure II.2 Changes in Estimated Site Size and Population Size at Knossos (ENI-II)

The most obvious problem with this method is that it assumes that large gaps in settlement were fairly infrequent (see Evans 1971:116) and that an area with occupation of one date was also occupied during subsequent phases (Whitelaw 1992:226). Although this may have generally been true, the probable abandonment of the area of the Aceramic settlement constitutes a serious exception. In addition, as the discussion of stratigraphy in Appendix I makes clear, smaller gaps in the settlement were probably fairly common (Evans 1994:10): most ENI Houses tend to go through phases of abandonment which may be quite long, where they may act as rubbish dumps (e.g. House D). Also larger areas may be more permanently abandoned, with the movement of site centre to another area of the site: in the case of the Aceramic and ENIa settlements this did *not* entail an increase in site size. These examples suggest that these estimated EN settlement and population sizes should be treated as absolute maxima.

On the basis of Figure II.2, it would seem that contrary to the pattern of growth suggested by Broodbank (see Figure I.1) the population of Knossos during its first millennium of occupation (i.e. from c.7000BC to c.6000BC), did not expand rapidly expanding to reach a demographically viable population figure (*contra* Broodbank & Strasser 1991:240), but actually grew much more slowly, reaching a maximum population of around 60 or so (cf. Cherry's (1985:24) 'founder population' of 12 families). Thus these figures *do not* represent a short-term founder group, which rapidly expanded to reach demographic self-sufficiency, but rather represent the *maximum* population at the site over the period of around a millennium. Halstead has suggested that typical early farming settlements in Greece ranged in size from c.0.5-1.0 hectares, around 50-300 inhabitants (Halstead 1989:70). If so, then in comparison

Aceramic-ENIa Knossos was very small indeed. Unfortunately, however, in the absence of available site-size data for other contemporary settlements on Crete, one cannot be sure whether Knossos was small or average in Cretan terms. What is clear, however, is that Knossos could not have been demographically self-sufficient for much of its early existence, a fact which pays indirect testimony to the existence of other (undiscovered) settlements with which Knossos must have been in contact.

APPENDIX III

CRETAN GEOLOGY

III.1 The Pre-Neogene Geology of Crete

The Pre-Neogene rocks of Crete comprise a series of nappes. Geological study has resulted in the division of these nappes into a number of main tectonic units, which are described below. These units are separable because they evidence different depositional environments and histories prior to their emplacement together during the Tertiary formation of Crete (see Figure III.1).

Upper Nappes	Asteroussia & Ophiolite Nappes	highest
Upper Nappes	Vatos, Arvi, Miamou, Spili, Preveli Units[1]	
Upper Nappes	Pindos Nappe	
Upper Nappes	Tripolitza Nappe	
Lower Nappes	Phyllite-Quartzite Series	
Lower Nappes	Trypali Unit (Omalos)	
Lower Nappes	Plattenkalk Series	lowest

Figure III.1 The Main Cretan Pre-Neogene Tectonic Units in Stratigraphical Order

(1) Plattenkalk Series

Plattenkalk outcrops can be correlated laterally, but these exhibit different sedimentation histories in different parts of Crete: this group is repeatedly influenced by input of continental material throughout, implying a depositional environment close to a land mass (Soujon et al. 1998; but cf. Hall et al. 1996). Widespread occurrence of lithistide silicosponges both laterally and vertically throughout Mesozoic to Tertiary members of the group indicates shallow to intermediate water depths as well as continental influences (Soujon et al. 1998). Rhythmicity in some of the sedimentary sequences is interpreted as showing changes in sea-level, but in general the depositional area of Plattenkalk group was structured and slowly subsiding (Soujon et al. 1998), as indicated by Early Jurassic coarse carbonate breccias passing up into calciturbidites and then into basinal conditions of a bedded chert-limestone sequence (Hall et al. 1996).

[1] These units have recently been grouped together as 'tectonic melange' on the basis of their internal structure and mode of occurrence (Fassoulas 2000:19).

Basinal conditions probably prevailed for much of Mesozoic with carbonate deposition throughout and occasional disturbances recorded by slumped chert horizons and channelled calcisiltites (Hall et al. 1996).

The Plattenkalk is composed of neretic and pelagic, (mainly carbonate) rocks (see Fassoulas 2000:14). At its base there are Permian schists and clastic sediments. Resting unconformably over these are neretic dolomites and cherty limestones. During the Norian a distinctive stromatolithic dolomite was deposited, indicating inter-tidal sedimentation on continental crust (Hall et al. 1996). Above these rocks are the Gigilos beds (e.g. Omalos area) which contain schists, clastic sediments and dolomites. Finally, from the Middle Jurassic the platy limestone/marble occurs, which gave this unit its name. In some areas (e.g. Nida) this is covered by Oligocene 'meta-flysch' deposits, which contain sericite and calcite schists/phyllites (Soujon et al. 1998:45). In general metamorphic grade and deformation are sufficiently mild to preserve primary sedimentary structures (Lister & Durkin 1985:24).

(2) Trypali Unit

Just above the Plattenkalk in West Crete lies the Trypali Unit. The geotectonic significance of this unit still remains a matter of debate. For a variety of reasons[2] Hall et al. (1996) consider it separate from the Phyllite-Quartzite Series and the Plattenkalk; however Bonneau does not consider it to be a separate unit, but rather a tectonic melange in the thrust-zone between the Phyllite-Quartzite and Tripolitza Nappes[3] (1996:520). The Trypali Unit consists largely of recrystallised coarse carbonate breccias, limestones and dolomites of Triassic to Lower Jurassic age.

[2] i.e. the considerable tectonic thickness of rocks (2-300m+), the fossil evidence of date, the variety of carbonate types as clasts, the obvious sedimentary features in many of the breccia exposures and the absence of assumed large-scale inversion of the Plattenkalk series (Hall et al. 1996).

[3] Bonneau argues that it is identical to the lowest part of the Tripolitza sequence, both in lithology and fossil content; other outcrops south-east of Rethymnon are considered to be recrystallized Tripolitza limestones (Bonneau 1996).

(3) Phyllite-Quartzite Series

The Phyllite-Quartzite series consists of continental to shallow marine siliciclastics and impure carbonates. Despite a strong supply of clastic material (pyroclastic, volcanic and minor intrusive igneous rocks), deposition occurred in a fully marine environment from the Upper Carboniferous to the end of the Lower Triassic, a shallow marine environment in the Upper Triassic and a saliniferous facies/littoral facies at the Triassic/Lias transition. The Phyllite-Quartzite series was probably deposited upon continental crust (Hall et al. 1996:509) and may be related to the low grade Tyros unit of the Peloponnese (Bonneau 1996:520).

All members of the Phyllite-Quartzite series have been deformed and metamorphosed during the Tertiary orogenesis under high pressure/low temperature conditions (Hall et al. 1996). The grade of metamorphism varies from very low grade zeolite/greenschist in East Crete (300°C, 8Kb) to blueschist facies in West Crete (400°C, 10Kb) (Theye et al. 1992). During exhumation (Middle-Late Miocene) a retrograde, low greenschist metamorphism affected the Phyllite-Quartzite series leading to the overprinting of the previous metamorphosed structures by low grade greenschist facies metamorphism (Theye et al. 1992; Fassoulas et al. 1998). The Phyllite-Quartzite series consists of two parts (see Fassoulas 2000:14-18): the upper comprises pelites, phyllites, schists, quartzites, limestones and altered volcanics; the lower contains dolomites and quartzites, locally (West Crete) intercalated with evaporites (gypsum) and metabasalts (Greiling 1982:291). Petrological studies of the Phyllite-Quartzite series in West Crete revealed the metamorphic minerals glaucophane, lawsonite, pumpellyite, aragonite and albite in metabasalts and quartz, muscovite, paragonite, chloritoid and lawsonite in metapelites (Greiling 1982:291). Schists in the area of Platanos (south coast) contain carpholite and chloritoid crystals (Fassoulas 2000:66).

In central Crete the Phyllite-Quartzite series crops out as isolated intensely strained boudinaged bodies between high pressure metamorphosed Plattenkalk and rocks of the upper nappes, with a thickness ranging from a few metres to around 100; this contrasts with West Crete where it is about 1500m thick (Fassoulas et al. 1998:89). In central Crete the Phyllite-Quartzite series was strongly affected by the retrograde greenschist metamorphism which occurred during exhumation. This resulted in two characteristic types of quartz microstructure (Fassoulas et al. 1998:91):

(1) Large quartz grains floating in a mass of smaller recrystallised grains (found in quartzites and phyllites);

(2) Large flattened quartz grains surrounded by phyllosilicate minerals (white mica, chlorite) in association with fine-grained recrystallised quartz (mainly phyllites).

(4) Tripolitza Series

At its base the Tripolitza Series consists of Middle to Upper Triassic dolomites, shales, schists, limestones and clastic sediments (Ravdoucha beds). Above this lies a neretic carbonate series, over which lie Upper Eocene flysch sediments. This is the facies equivalent of the 'classical Triassic to Upper Eocene carbonate platform sequence of continental Greece', which is found also on Kasos, Karpathos, Rhodes and Astypaleia (Bonneau 1996:520-1). There is no information about metamorphic grade, but rocks near Sellia show temperatures of 300-400°C from the *Upper Triassic* (Bonneau 1996:520). Tripolitza limestones are intensely karstified and accommodate most of the aquifers of the island.

(5) Pindos Nappe

This is a sequence of pelagic sedimentary rocks (Late Triassic-Jurassic) and comprises cherts, radiolarites, limestones, calciturbidites and calc-breccias, siltstones; these pass up into turbidite sandstones and shales with intercalated carbonate conglomerate units. (Hall et al. 1996; Fassoulas 2000:19). Bonneau has correlated these with the Olonos-Pindos sequence of mainland Greece and with the Pindos nappe of the Dodecanese (especially Rhodes, Prophitis Ilias Nappe); On Crete characteristic sections occur in the Kedros, Samitos and

Assiderotas mountains and in the Mangassa sequence of East Crete (Bonneau 1996:521). South of Apesokari (Mesara) deformed siltstones, sandstones, limestones and slates occur (Fassoulas 2000:48).

(6) Tectonic Melange (Vatos, Arvi, Miamou, Spili, Preveli Units)

The Vatos, Arvi and Miamou Units consist of very low-grade metamorphosed sediments, which comprise a variety of rocks: pillow lavas, pelagic shales, metamorphic rocks, serpentinites, limestones and turbidite sandstones (Hall et al. 1996:506). Bonneau also notes the presence of coarse breccias containing neritic limestone blocks as well as abundant clasts of granite, metamorphic rocks and serpentinite (Lentas and Prinia sections) (Bonneau 1996:521). Mineral assemblages are perhaps referable to sub-sea-floor metamorphism (Bonneau 1996). The Spili unit consists of crystalline, baroisite-bearing and sheared serpentinites, related to an old ophiolitic nappe (Fassoulas 2000:19). The Preveli Unit consists of schists, marbles and high-pressure/low-temperature rocks, including blueschists containing large blue amphiboles (Kilias et al. 1993; Fassoulas 2000:53-4). The Cycladic Blueschist sequence occupies a position equivalent to that of the Pindos nappe (Bonneau 1996:522).

(7) Asteroussia/Ophiolite Nappes

These are high-grade metamorphic rocks and ultramafic rocks with some subordinate microgabbros (Hall et al 1996:506). The Asteroussia nappe comprises Late Cretaceous high-temperature/low-pressure metamorphosed rocks, mainly amphibolites, marbles, quartzites, gneisses, garnet-bearing mica-schists, with deformed and undeformed granitic rocks (Bonneau 1996:522-3; Fassoulas 2000:20). Minerals characteristic of the Asteroussia nappe are sillimanite, andalusite, cordierite, hornblende, garnet and biotite. The Asteroussia nappe is a continental unit which also occurs in the Cyclades and Anatolia. Within Crete it ranges in depth from 600m (Asteroussia) to 4-5m (Anogia) (Bonneau 1996:522). It would appear to have been severely attenuated during Oligocene emplacement in the nappe pile: the Neogene rocks of East Crete, where no outcrops of the Asteroussia Nappe are known, contain abundant gneissic pebbles, which are referable to this nappe, thus indicating its former extent (Bonneau 1996:523). Around Kalo Khorio on the Mirabello Bay (East Crete) there is a distinctive outcrop of acid intrusives (granite, syenite, diorite), which finds little or no parallel on Crete (Becker 1975:251; Fassoulas 2000:85).

The Ophiloite nappe is comprised of ophiolitic remnants thrust onto the Asteroussia nappe, probably during the main Upper Eocene-Oligocene Hellenic phase (Bonneau 1996:523). These are badly preserved and are mainly composed of serpentinite, but also include an ophiolitic suite (e.g. Gonies, Mount Ida), which includes mainly serpentinites and gabbros. The Gonies serpentintes vary in colour from light green to red, brown and black and are found together with chlorite and thin veins of asbestos (Becker 1975:243). Several large deposits of serpentinite occur along the north coast of Crete between Gazi and Phodele (north of Ida). Serpentinite, chlorite and other ultrabasic rocks also occur in the Zaros-Kamares area to the south of Ida (Becker 1975:244, 249). There is a small outcrop of the ophiolite series near Galeni and Roukani to the south of Iouktas. The ophiolite nappe also occurs in Rhodes.

III.2 The Neogene and Post-Neogene Geology of Crete

The post-Alpine rocks of Crete occur as Neogene and Quaternary sediments and rest unconformably on the upper and lower nappes (see above). Through use of biostratigraphic and chronostratigraphic data it is possible to reconstruct their sedimentary history (see Meulenkamp 1971; Meulenkamp 1985; Meulenkamp et al. 1977; Dermitzakis et al. 1995; Fassoulas 2000:20-2).

(1) Prina Group

These are the oldest Neogene sediments and consist of dark limestone breccias and brecci-conglomerates of continental facies, usually embedded in a well-cemented calcareous matrix. These are clastic deposits of Middle Miocene age (Seravallian-Tortonian) (Dermitzakis et al. 1995:200), which accumulated in graben-like depressions, prior to submergence (see Meulenkamp 1985: fig 15.2A). Submergence began first in the Middle Miocene in the Ierapetra area (Meulenkamp 1971:9). A good example of this group occurs west of Tylissos in the Mylopotamos graben in central Crete (Fassoulas 2000:20).

(2) Tefeli Group

These are sediments, which were deposited during the Late Miocene (Late Serravalian-Earliest Tortonian), when Crete and adjacent areas had been transformed into a mosaic of small-sized horsts and grabens (Meulenkamp 1985:310; fig15.2B). This paleogeographic revolution occurred probably within one million years and was responsible for shaping the general configuration of modern Crete. This group is comprised of conglomerates, sands and clays reflecting deposition in fresh-water, brackish and marine environments (i.e. marly limestones, evaporites). Sediments of the Tefeli group occur in central Crete and around Chania.

(3) Vrysses Group

During the late Tortonian-early Messinian the land became a shallow sea with islands and shoals; in tectonically 'quieter' areas biogenic sedimentation played an important role, but this gradually decreased (Meulenkamp 1971:6). In general this period saw an increase in marine sedimentation resulting in the deposition of bioclastic, often reefal algal-coral limestones with associated alternations of laminated shallow marine marls. Sometimes there occur intercalations of gypsum. The earliest marine sediments in Rethymnon area are early-middle Tortonian (Meulenkamp et al 1977). Rocks of the Vrysses group rest on rocks of the Tefeli group or unconformably on basement rocks (e.g. north of Tylissos; near Vrysses, Chania).

(4) Hellenikon Group

The early Messinian was a period of high tectonic instability with the 'independent' movement of separate blocks: for example subsidence in Khania occurred probably at same time of the rejuvenation of relief in the south-west Herakleion area; elsewhere, in the north Herakleion area, Rethymnon and Siteia there was a post-early Messinian period of uplift and erosion not followed by renewed subsidence. This resulted in an intricate pattern of fluviatile, brackish and shallow marine sediments, which resulted in the sedimentation of gypsiferous deposits (Meulenkamp 1971:9; Meulenkamp 1985:310). Rocks of this group consist of coarse, non-marine conglomerates, fluvio lacustrine and lagoonal sediments with gypsum.

(5) Finikia Group

During the early-middle Pliocene there was a period of marine transgression, which was much wider in extension than others which occurred during the Late Neogene. Possibly only the highest parts of Crete, such as the Lefka Ori and Psiloritis, remained above sea-level (Meulenkamp 1971:9). This transgression was the result of a 'conspicuous rise of sea-level'. Sedimentary evidence of the Early Pliocene flooding can be found all over the island, but in central and eastern Crete the lowermost Pliocene sediments are generally found as components in breccia-type conglomerates (marl breccias), which unconformably overlie lower Messinian carbonates (Meulenkamp 1985:310). In West Crete Upper Messinian clastics are conformably overlain by marly limestones of Trubi type (Early Pliocene) (Meulenkamp 1985:310). In general this group consists of marine sediments, comprising marl breccias at the base with open marine, white marls, clays and locally intercalations of brown beds and diatomites (Fassoulas 2000:21-2). Good examples of these beds occur near Herakleion and west of Chania.

During this period (later early Pliocene?-Late Pliocene) strong differential vertical movements occurred in some parts of Crete, which resulted in the uplift and erosion of the lowermost Pliocene beds. This produced a general tilting of blocks to the north, which continued for the Pliocene and into the Pleistocene/Holocene (Meulenkamp 1985:310). Usually the youngest marine sediments found along the north coast form part of shallowing sequences of

Middle Pliocene age (Meulenkamp 1985:310). This uplift of Crete coincided with subsidence of adjacent areas, such as Kythira. These movements lifted up the Herakleion area, thus separating it from the Mesara basin, with which it had hitherto shared a common sedimentary history.

(6) Agia Galini Group

The erosion of the uplifted Herakleion basin's sediment supplied the Mesara with coarse (red) non-marine conglomerates and sands, which constitute the youngest Pliocene formation on Crete (Meulenkamp 1985).

(7) Quaternary

Quaternary sediments include marine shallow water sediments and terraces and alluvial and fluvial deposits. Sedimentation was local and mainly continental; marine sedimentation was restricted to some places along the coast and to terrace deposits (Meulenkamp 1971:9). These deposits occur mainly on the north and south coasts of Crete (Fassoulas 2000:22).

III.3 The Geology of the Herakleion Basin

During the Miocene the Herakleion Basin extended to the south as far as the Asteroussia Mountains forming a continuous neotectonic graben with the Mesara (see Papanikolaou & Nomikou 1998:231; Figure III.2). There is a general dip to the north as shown by the orientation of the hydrographic systems, the general dip of the geological strata, especially Pliocene and the distribution of planation surfaces, especially the northward plunge beyond the north coast to the east and west of Herakleion. Mount Iouktas was produced by the uplift of Pre-Neogene rocks within Neogene sediments of the basin and is bounded on its east and west flanks by north-south trending tectonic faults. Iouktas consists of Tripolitza series rocks with Phyllite-Quartzite series rocks at its base. The formation of the Iouktas horst probably took place after the deposition of thick Middle Miocene sediments during the Late Miocene-Quaternary because of

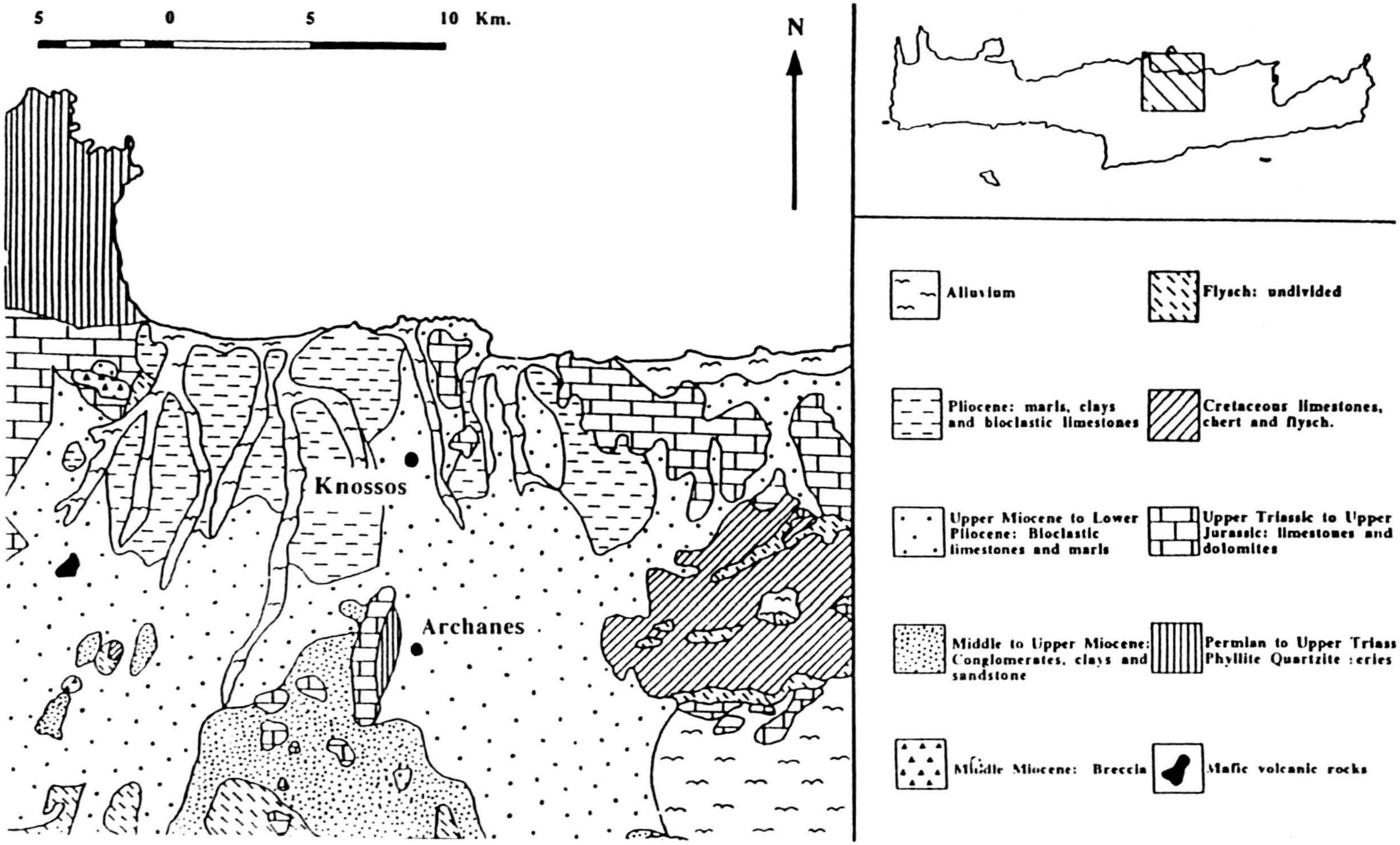

Figure III.2 Geological Map of North-Central Crete

absence of sedimentation (Papanikolaou & Nomikou 1998:235). The Iouktas horst divides the basin into two sub-basins, with the eastern half showing maximum subsidence. At the western and eastern margins there has been pronounced uplift[4]. These large scale vertical neotectonic movements were caused by the activity of numerous faults, which have been divided into seven main neotectonic units (see Papanikolaou & Nomikou 1998:233-5). In the western sub-basin, at c.100-300m. the Neogene sediments (c.1000m thick) overlie the Ophiolite Nappe.

The lowest marine deposits (early Tortonian) correspond to the Tefeli group and exhibit a generally similar sedimentation history to the Rethymnon area (Meulenkamp 1971:8). Quite a complex Late Miocene-Early Pliocene history of sedimentation is indicated which included two periods of erosion:

(i) Subaerial erosion: after deposition gypsum conglomerates and relative uplift produce a rugged topography of gypsum conglomerates, Upper Miocene carbonates and Pre-Neogene rocks. This was flooded by the Pliocene marine transgression and white calcareous muds accumulated over almost entire area.

(ii) Shortly after, strong vertical movements along existing fracture systems rejuvenated relief. This led to the removal of the lowermost Pliocene marls from rising blocks and their redeposition with elements of older pre-Neogene strata and rocks in deeper parts of the sub-basin.

The Neogene sequence of the south-west part of the Herakleion basin has been studied, resulting in the following stratigraphic sequence (Meulenkamp et al. 1977:143-6).

(1) Ambezoulos Formation (Tortonian)

This corresponds to the Tefeli group and consists of irregular alternations of conglomerates sands and clays deposited in fluvio-lacustrine, brackish and shallow marine environments

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[4] The highest rates of uplift occur in the western half of the Herakleion basin: cf. the presence of rocks of the Plattenkalk series at high altitudes (c.1400m).

(2) Varvara Formation (Messinian)

This corresponds to the Vrysses group and consists primarily of bioclastic limestones or laminated-homogenous marl sequences in graben-like depressions. In some places there are evaporites. The uppermost layer (c.50m) near Psalidha-Ploutis reflects an abrupt return to terrigenous-clastic supply and consists of sands, clays and siltstones with irregular gypsum bodies. This layer may correspond to the Hellenikon group. These sands, siltstones and clays show rapid repeated alternations of barren horizons (monotypic or oligotypic, especially *Cyprideis*) and beds with rich and diversified associations of ostracods and foraminifera, which contain *Globorotalia conomiozea*. Some coarse beds contain mollusc fragments; delicate pelecypode shells in some of clayey intervals. These features of the Ploutis member are best explained by deposition in an environment subject to repeated and large fluctuations in marine ingression, as might be the case in embayments separated from the open sea.

(3) Pliocene

No Pliocene beds are found on top of the Varvara formation in the Psalidha-Ploutis area, but nearby white fossiliferous Pliocene marls are in sharp contact with the underlying Varvara formation.

A similar sequence obtains in the northern part of the Herakleion basin:

(1) Lower Varvara Formation

This resembles that from south-west and corresponds to the Vrysses group. Primary gypsum occurrences are concentrated in a strip next to Iouktas (e.g. Gypsades Hill, Knossos).

(2) Laminated gypsum is unconformably overlain by 40-50m of gypsum conglomerates, which may contain older Neogene rocks. This would correspond to the Hellenikon group.

(3) 'Marl breccia'

This comprises a poorly-sorted mixture of components of older Neogene strata, pre-Neogene rocks and in some places marly limestones floating in a marly matrix. These marly limestones are lowermost Pliocene in date and correspond to rocks of the Finikia group. In all places this breccia is in sharp erosional contact with bioclastic limestones and/or laminated-homogenous marl sequences or gypsum conglomerates (Varvara Formation). West of Mount Iouktas marl breccias are deposited along and between culminations of gypsum conglomerates, which suggests that these culminations must have been formed prior to the deposition of Pliocene mass-flow deposits.

(4) White marly limestones (Lower Pliocene)

These are composed of marl breccias, which are succeeded upwards by, and partly interfinger with, white marly limestones and marls, which locally (west of Iouktas) are found immediately above gypsum conglomerate culminations.

(5) Grey silty clays

There is a change from calcareous mud to clastic sedimentation in the later Early Pliocene. This change should be connected with a major tectonic phase that affected whole island. In the east and south parts of the Herakleion basin this is seen in a rapid transition from open marine marls to coarse non-marine conglomerates.

III.4 The Geology of Knossos and Environs

The majority of the immediate area around Knossos (<5km) is comprised of Neogene limestones (often bioclastic), marls and clays (see Figure III.2; Creutzberg 1977). The main geological formation is of Pliocene age and consists of soft white marl, locally known as *kouskouras* (Roberts 1979:232). Related deposits of gypsum comprise the hill of Gypsades to the south (Roberts 1979:232). These Pliocene sediments are laid down uncomformably on

Cretaceous limestone, which is now exposed on Ailias and also further south on Mount Iouktas (Roberts 1979:232). This kouskouras weathers to form a light brown *rendzina*, very suitable for fruit crops; while on hard Cretaceous limestone *terra rossa* soils have developed, although often these are removed by erosion on steeper slopes, such as on Ailias (Roberts 1979:233-4).

The coarser EBA and MBA pottery of the Knossos area, when subjected to petrographic analysis, proved to be dominated by low grade schists and phyllites as well as a variety of igneous dyke rocks, which appear to be more or less altered (Riley 1983:289; Day 1988:504-6; Wilson & Day 1994:54; 1999:37-9). The phyllites and schists would appear to originate in low grade metamorphic deposits, which probably link to the Phyllite-Quartzite series of Crete. The closest source for these would appear to be the eastern side of Iouktas, which lies approximately 5km to the south of Knossos (Creutzberg 1977). More distant sources lie at the eastern and western edges of the Herakleion basin. In addition phyllite-quartzite rocks have been noted in flysch deposits to the north-east of Iouktas (Day 1988:504, n.3; Wilson & Day 1994:54; 1999:38). The igneous and altered igneous rocks (dolerite, altered basalt, serpentinite) have been taken to have an origin within the ophiolite series of Central Crete (Wilson & Day 1999:37). Rocks of the ophiolite series outcrops near Galeni and Roukani to the south of mount Iouktas and further west in the foothills of mount Ida (Creutzberg 1977). It may be significant that both Bronze Age ceramics and modern roof tiles from the site of Kanli Kastelli, which lies in the region of Galeni and Roukani, frequently contain altered igneous rocks (Day 1988:505). The Galeni source does not, however, appear to contain serpentinite and the closest source for this would appear to be at the western edge of the Herakleion basin (Gonies) (Riley 1983:289-90).

APPENDIX IV.

THE NEOLITHIC AND CHALCOLITHIC SEQUENCE IN SOUTH-WESTERN ANATOLIA

There are a host of problems involved in attempting to relate the Cretan Neolithic sequence to that of South-western Anatolia. First and foremost is the problem of establishing a coherent sequence for different sites in this large and, for the Neolithic and Chalcolithic, relatively under-explored region:

> "Our knowledge of the Neolithic and Chalcolithic periods of south-western Anatolia is... derived from only a few, widely scattered sites and is still incomplete. It is based mainly on pottery, as there is little other evidence available. We do have a basic sequence for the south-west and, in general terms, it is no doubt correct, although its validity for any one part of the area has yet to be shown. Not one complete local sequence, verified by stratigraphy, has been produced, nor is there information available to construct one" (Eslick 1992:xvii).

A basic Neolithic sequence for south-western Anatolia can be reconstructed using a series of excavated site sequences (see Figure IV.1).

Early Neolithic[1] (EN) (c.7000?-6400BC)

Secure EN deposits are extremely rare in Southwest Anatolia. The earliest ceramic phase at Kuruçay (level 13) is unparalleled in the LN material excavated at Hacilar by Mellaart, although some recent soundings at Hacilar recovered similar pottery pressed into the surface of red plastered floors, a type of floor which previously had only been found in the latest aceramic layers (I-II) (Duru 1994:103; Mellaart 1970a:4). The absence of pottery from the latest aceramic layers excavated at Hacilar by Mellaart, would seem to indicate that these new layers date after level I, while Duru argues that level 13 ceramic technology is much simpler and must be earlier than Hacilar IX (Duru 1994:103, 114-5). Thus this type of pottery first appeared after Aceramic Hacilar I, but before LN Hacilar IX, at a time when red plastered floors were still in use. Duru would like to date this material to around 7100-6900BC (see footnote 3), however this earliest material does not find parallels in the early material from Çatal

[1] Both Eslick and Duru describe an Early Neolithic ceramic phase for the south-west, however radiocarbon dates from Kuruçay appear to indicate that this phase should not be dated earlier

Höyük (Duru 1994) and radiocarbon dates would place level 13 closer to the middle of the seventh millennium BC, which together suggest a late EN date.

Ceramic Phases	Site Sequence	Absolute Dates[2]
Aceramic	Hacilar I-VII	= eighth millennium BC
Early Neolithic	Beldibi B Kuruçay 13	= c.7000?BC[3] = mid seventh millennium[4]
Late Neolithic	Hacilar IX-VI Kuruçay 12-11	= c.6400 - 6000BC = c.6200 - 5800BC
Early Chalcolithic	Hacilar V-I Kuruçay 10-7	= c.6000 - 5500BC = c.5800 - 5600/5500BC[5]
'Middle Chalcolithic'	Elmali Kizilbel/ Lower Bagbasi Emporio X-VIII	= c.5500? - 5000?BC
Late Chalcolithic	Bagbasi Aphrodisias VIIIB-VII Emporio VIII-VI Beycesultan XL-XX Kuruçay 6a-3	= c.5000 - 4500BC = c.5000 - 4500BC = c.5000 - 4500BC = c.4500 - 3500BC = c.3700 - 3200BC

Figure IV.1 Ceramic phases, site sequences and absolute Dates for South-western Anatolian Neolithic and Chalcolithic (Based on data from Eslick 1980, Eslick 1992:xvii-xviii, Duru 1994:103-5, 114-5, Duru 1996:143-4)

The only other EN pottery in the south-west is that from the Beldibi Cave (level B), which was found in association with a 'Mesolithic' tool industry (Bostanci

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than the mid seventh millennium. This places it contemporary with the first half of the Late Neolithic as defined in Joukowsky (1996:32).

[2] All radiocarbon dates, apart from those for Kuruçay, were calibrated using the OxCal 3 calibration programme. Kuruçay dates are from Duru (1994:114-5). Note also that absolute dates for the 'Middle Chalcolithic' rely on synchronisms with Aegean sequences outside Anatolia which have radiocarbon dates.

[3] There are, unfortunately, no radiocarbon dates from Beldibi. The ceramics from level B were considered by Mellaart to be comparable to those found in the earliest levels at Çatal Höyük (Yakar 1991:123). This synchronism is accepted here.

[4] Although the radiocarbon dates for Kuruçay 13 overlap with those for Hacilar IX, Duru argues that the Kuruçay 13 ceramics have no parallels in Hacilar IX, despite the proximity of the sites (Duru 1994:114). Rather, their closest parallels are in pottery excavated by Duru at Hacilar, which was found pressed into 'aceramic' red plaster floors and is thus likely to be earlier than that Hacilar IX. He thus prefers to ignore the radiocarbon dates and to date Kuruçay 13 to the period 7100-6900BC. However, since on their own the radiocarbon dates for levels 13 to 11 otherwise present a coherent series, they are preferred here.

[5] Duru's absolute dating of Kuruçay 7 is based on a comparative synchronism with Hacilar I (Duru 1994:114). He considers Kuruçay 7 to end before Hacilar I, however he uses an uncalibrated rather than a calibrated date for Hacilar I. Here his argument for dating the end of level 7 slightly earlier than Hacilar I has been retained, but a calibrated date for Hacilar I has been used.

1959). This pottery was compared by Mellaart to the earliest pottery from Catal Höyük (Yakar 1991:123), which makes an early EN date likely (cf. also Eslick 1992:xvii-xviii).

Late Neolithic (LN) (6400-5800BC)

As first noted by Mellaart (1970a:146), LN monochrome wares, similar to those from Hacilar VI have a wide distribution. This homogeneity has also been stressed by Eslick, who notes that LN pottery, similar pottery to that from Hacilar and the Elmali Plain, has been found over a wide area from Karain near the south coast, throughout the Tefenni, Burdur and Dinar areas (1992:81). This leads her to hypothesise that during this phase villages kept up regular contacts with their neighbours (1992:82).

Hacilar

Hacilar (IX-VI) provides the defining LN sequence for the Southwest (Mellaart 1970). This sequence is now complemented by that recently excavated at Kuruçay Höyük, where the close similarities between level 11 and pottery from Hacilar IX-VI have allowed a close synchronisation (Duru 1994).

Erbaba

At Erbaba, to the east of Hacilar, the pottery of the upper Neolithic levels is also red or brown monochrome, in a fabric dominated by gastropod shells; shapes are holemouth jars with straight rims, flat bases and crescentic ledge handles or lugs (Eslick 1992:81-2; Yakar 1991:149).

Elmali Plain

The earliest pottery from the Elmali Plain, to the south-west of Hacilar, is Late Neolithic and similar to that of Hacilar IX-VI (see Eslick (1992:81) for details). The fabric is tempered and black cores (cf. 'sandwich effect') are said to be common. Vessels are coil-built with handles applied flat against the wall of the vessel. This pottery is characterised by the "extensive use of red slips and tubular lugs" (Eslick

1992:81). Hole-mouth jars have straight rather than curved upper walls. Flared rim bowls are also common, e.g. at Gökpinar and Akçay (Eslick 1992:67-8).

Aphrodisias

Late Neolithic pottery from level VIIIC (Pekmez trench) at Aphrodisias is entirely monochrome, the majority being red (34%) and slipped (59%); vertical and flaring rim bowls were very common, large handles dominate over loop handles; flat bases account for 38% of the assemblage (Yakar 1991:177). This small assemblage exhibits close parallels with that of Hacilar IX-VI (Joukowsky 1986:431).

Aegean Coast/West-Central Anatolia

The first LN sites in this area were noted by French in a survey along the rivers Gediz and Büyük Menderes. Sites such as Ulucak (Kemalpasa), which lies not far from the Bay of Izmir, and Morali (Akhisar) have produced pottery with similar forms and finishes to that from Hacilar IX-VI (French 1965:18-20). Surveys by Meriç have added a further ten Neolithic sites along the floodplain of the Gediz river, along a natural route from the Aegean coast to the Burdur district of Central Anatolia (Meriç 1993:144). A number of sites are also known from the Aegean coast: Coskuntepe, and Edremit in the North, Bornova, Uluçek Höyük and Liman Tepe[6] in the Bay of Izmir, Ayio Gala Cave on Chios (lower cave), as well as from further south around Ephesus[7] (Çukurici Höyük, Arvalya Höyük) and around Miletus[8] (Killikitepe, near Yeniköy) (Meriç 1993 1997; Eslick 1992:81; Hood 1981:14-24, pl.4-5; Büyükkolanci 1997; Niemeier, Niemeier, Greaves & Raymond 1997; Tuncel 1997). Indeed when these surveys are combined it becomes clear that Central-West Anatolia was "as densely inhabited in the Late Neolithic Period as the region of Hacilar" (Meriç 1997).

Neolithic pottery from West-Central Anatolia, like that from the Southwest, is very homogeneous: all sherds are burnished on both surfaces and most are slipped with

[6] Unstratified LN material has been noted in recent excavations at Liman Tepe (Sahoglu pers. comm.). In addition LN ceramics, comparable to Hacilar VI, are known from Barlaros and Aratepe (Tuncel 1997).
[7] see Büyükkolanci 1997; Meriç 1997.
[8] For Killikitepe see W. Voigtländer 'Frühe Funde von Killikitepe bei Milet', in Istanbler Mitteilungen 33 (1983) 5-39; for near Yeniköy see Niemeier et al. 1997.

the colour varying from buff and orange to reddish brown (Meriç 1993:145). Generally 'grit' or organic temper are used, sometimes, as in sherds from Tepeköy, together (Meriç 1993:145). Most pottery from sites along the Gediz and Büyük Menderes has a red slipped and burnished finish with black or grey surfaces rare; fabrics are micaceous, organic tempered with around 75% exhibiting a black core 'sandwiched' between red (French 1965:18; Meriç 1993:146). LN pottery from Ayio Gala (lower cave) is predominantly in micaceous fabrics[9] (both gold and silver mica), with little evidence for organic temper and surfaces are predominantly red burnished, although some mottling occurs (Hood 1981:14).

Shapes are bowls or jars and are often thin-walled with 'S' curved profiles; a large number of vessels have vertically-placed tubular lugs, flattened rims and raised bases (French 1965:19; Meriç 1993:145, fig. 3.1-4; Tuncel 1997). There are also some rectangular vessels with short feet, one of which has deeply incised decoration[10] (Meriç 1993:145, fig. 3.5). Particularly characteristic is the presence at all sites of pierced vertical tubular lugs. Most shapes, including the 'S' profile bowls and tubular lugs have parallels in Hacilar IX-VI, however raised bases appear to be characteristic only of this region (French 1965:19; Meriç 1993:145-6). The rectangular vessels are known from only three sites in Western Anatolia (Coskuntepe, Höyücek II and Çaltidere); such vessels are more common in the Marmara region than around Hacilar (Meriç 1993:145). Both French and Meriç argue that the points of similarity and difference between these sites and Hacilar do not suggest that connections between Hacilar and the west coast were close (French 1965:19). However Meriç still sees the links to Hacilar as closer than links to pottery from sites of the 'Fikirtepe culture' to the north and agrees with others who have argued that the 'Hacilar culture' has a coastal expansion further north from this region (Meriç 1993:145).

[9] cf. predominantly micaceous fabrics at LN sites in the nearby Izmir region (Tuncel pers. comm.).
[10] Incision itself is rare in the West-Central region (1 sherd). It may, however, have been more common further south: in a recent rescue excavation near Miletus a number of incised Late Neolithic(?) sherds were recovered (see Niemeier et al. 1997).

Early Chalcolithic (EC) (c.5800-5500BC)

In contrast to the homogeneity of LN ceramics, painted pottery, characteristic (20%) of the EC assemblage at Hacilar (IV-II) has a much narrower distribution and is known from only a handful of sites, one of which being Kuruçay (Mellaart 1970a:146; Duru 1994). Mellaart suggests that during EC most SW Anatolian sites continued to make monochrome wares like those also known at Hacilar in EC levels, whereas only a few 'centres', such as Hacilar, produced painted pottery, which may then have been 'exported' to other sites (Mellaart 1970a:146). However, pottery of the last EC level at Hacilar (level I) once again has a wide distribution, covering the greater part of the south-west and has been found as far west as the Ayio Gala cave on Chios (Mellaart 1970a:147). Here one might also note the few sherds of red-on-white painted pottery from Kos (Aspri Petra) and Rhodes (Kalythies), for which an EC date has been suggested (Joukowsky 1996:114-40; Broodbank 1999:33).

Eslick (1992:82) also notes a weakening in the former LN ceramic homogeneity at EC sites in the Elmali Plain and points to an increase in local features. Some sites in the Dinar region and others on the Elmali and Korkuteli plains, have produced a few sherds of painted pottery which share some similarities with Hacilar I pottery; however in each case there are also differences in shape and finish. Many of the EC and MC brown orange wares from sites on the Elmali Plain are decorated with a "brush-applied streaky slip, most often coloured scarlet ranging to brown, and burnished" and at Akçay were found together with local variations of painted and incised wares (Joukowsky 1996:134). Eslick notes that sites in the Tefenni and Bucak areas have monochrome wares, which *can* be paralleled amongst monochrome wares at Hacilar, however these sites lack any of the corresponding Hacilar painted pottery. Thus, as Eslick rightly points out, this general absence of painted pottery in the south-west outside Hacilar rather undermines the suitability of terming material from this area Early Chalcolithic based on the presence of painted pottery (Eslick 1992:68).

As noted above, the general absence of tubular lugs from EC or later assemblages makes them one of the main diagnostic features for LN sites (cf. absence at EC Kuruçay, Hacilar and sites in the Elmali Plain). However, there is growing evidence to suggest that tubular lugs may continue at least some sites along the Anatolian-Aegean coast and on islands of the East Aegean. In the Ayio Gala lower cave horizontal tubular lugs are in the minority, however in lower levels of the upper cave, they are in the majority, occurring in a red-burnished ware (Hood 1981:34). The material from the lower deposit of the upper cave is generally dated to EC, thus indicating that horizontal tubular lugs are a feature of EC at this site. The small amounts of horizontal lugs in the lower cave join other small amounts of EC material and Cretan ENIb material (see Chapter 7, Appendix I) in suggesting that this deposit, although largely dating to LN, also contains some EC material. Red-burnished horizontal lugs have also been found at the site of Barakli, south of Izmir. These are survey material and thus without stratigraphic position, but it has been suggested that these are EC in date (Meriç 1997). If so then this would confirm that in the central east Aegean and coastal west-central Anatolia *horizontally-pierced* tubular lugs are an EC feature. It is also worth noting that this makes them broadly contemporary with the similar MN Peloponnesian practice of using horizontally-pierced tubular lugs.

Recently French has noted (1997) that the site of Galhisar, a rock shelter which lies between the Menderes and Çesme regions, has an EC sequence which may be compared to Hacilar I and thus this site might begin to fill the gap between Miletus and Antalya. However, this leaves the majority of EC (pre-Hacilar I) still poorly defined outside Hacilar. Indeed it is far from clear exactly where in this period certain key ceramic assemblages belong. It is thus perhaps here that the absence of a well-dated and well-stratified excavated sequence spanning the EN, 'MC' and LN phases is most keenly felt (cf. Duru 1996:141-2).

'Middle Chalcolithic' (MN) (5500?BC-5000BC)

After Hacilar I (EC) and before Beycesultan XL (LC) there is a gap, which is both ceramic stylistic and temporal. This cannot be simply a product of regionalism since there is LC Beycesultan-style pottery in the immediate area of Hacilar (e.g. Kuruçay) (Eslick 1980:5-8; Duru 1996:142-3). Absolute dates for the end of the EC (5500BC) and for sites of the LC (fifth-fourth millennium BC) suggest a long gap.

However Duru has suggested that the early LC levels at Kuruçay should be pushed back to as early as the mid fifth millennium BC (Duru 1996:144; cf. also Joukowsky 1986:431-2, 471-3).

Eslick (1980) has attempted to define a 'Middle Chalcolithic' phase using material from two sites in the Elmali Plain (Kizilbel & Lower Bagbasi). The pottery itself (see Eslick 1980:8-9) has a course 'grit-tempered' fabric, which also contains some organic material, and which usually has a black core. Vessels are coil-built and given a well-smoothed surface finish whose colour varies from red to black. Thick flat bases are common; handles are usually strap and applied flat to a scored area of the vessel. Hole mouth pots and flattened rims predominate. Decoration is rare: single knobs on strap handles, rare incision and some red-painted sherds.

Although the Kizilbel material is unstratified, the Lower Bagbasi assemblage comes from a layer stratified below material closely related to Beycesultan LC 2-3, thus providing a lower limit (LC) to pottery from the Kizilbel and Lower Bagbasi Group (Eslick 1980:8-9). Eslick considers that diagnostic LN and EC from neighbouring sites and the well-defined LC material from excavated sites of Karaburun, Boztepe and Bagbasi provide upper and lower limits for this group. Citing the prevalence of hole-mouth shapes, flat-rimmed curved bowls as well as the flat application of handles (contrast LC plug-attachment), Eslick, considers this material to be closer to the Late Neolithic/Early Chalcolithic than to Late Chalcolithic (Eslick 1980:9-10; 1992:69).

This definition of a Middle Chalcolithic phase has been criticised because the material upon which it is based retains a certain ambiguity (see Duru 1996:143). However, the stratigraphic position of the Kizilbel/Lower Bagbasi sequence is fixed before the beginning of LC and moreover the character of this sequence is only ambiguous when viewed purely in Anatolian terms. Unlike previous Anatolian ceramic phases the closest parallels for this material are *not* with sites further east such as Hacilar (cf. absence of comparable strap handles), but with assemblages further west, from islands of the Aegean, above all levels X-IX at Emporio (incurved shapes, high-sided pans, piercings below the rim, strap handles with knobs placed on bowl rims or sides of jars, incision) (Eslick 1980:10-12). Since Kumtepe IB rolled rim bowls in level

VII at Emporio date this level to LC and the pattern burnishing of level VIII, comparable to that of Besikatepe, dates to early in LC, Eslick argues that Emporio X-IX must date before LC (Eslick 1980:11). Although lacking radiocarbon dates Emporio X-IX and VIII can be dated through parallels with Aegean assemblages which have absolute dates (see Appendix I on Saliagos, Knossos). These suggest a date for Emporio X-IX in the last quarter of the sixth millennium and for Emporio VIII in the first half of the fifth millennium. This agrees well with the date range of the EC-LC gap. These synchronisms therefore suggest an end for MC and a beginning for LC around 5000BC.

APPENDIX V

PETROGRAPHIC DESCRIPTIONS

(1a) Calcareous, Rare Quartz, Fine-Grained Sparite.

Samples: 97/4, 97/7, 97/22, 97/49, 97/51, 97/62, 97107, 97/118, 98/1

Microstructure
Very few to rare macro to meso planar voids, very few to rare mega to meso vughs. Voids and inclusions generally exhibit local long-axis parallel orientation; the angle of this orientation may vary from parallel to perpendicular to vessel margins, even within a single section (e.g. 97/22). Darkened areas around some voids may indicate the incomplete combustion of organics within the clay body. Some voids in samples 97/49, 97/107 and 97/118 have a calcite lining. Inclusions are close or single-spaced.

Groundmass
The fabric is homogenous: colour varies from yellow/orange to brown (PPL, x40) and yellow/orange to yellow/brown (XP, x40). The micromass varies in optical activity from low (e.g. 97/118) to high (e.g. 97/107). B-fabric is medium to thick crystallitic/porostriated (e.g. 97/107).

Inclusions
$c:f:v_{10\mu m}$ c.25:70:5
Coarse fraction = 2.5mm to 0.2mm.
Fine fraction = 0.2mm or less.

Coarse Fraction:
Predominant to dominant : **sparite**, a-sa, equant to elongate. Grain size varies from 0.05 to 0.35, mode = 0.1mm. Size = 2.5mm to 0.2mm
Rare to absent: **monocrystalline calcite**, a-sa, equant. Probably derives from limestone (sparite). Size = 0.9 to 0.2mm
Rare (97/107) to absent: **fossilised shell frags.** , sa-sr, elongate. Size = 1.5 to 0.25mm
Rare to very rare: **micrite with iron concentrations**, sr-r, equant; sometimes contains isolated clasts of quartz (max. 0.15mm) or foraminifera. Size = 0.85mm to 0.2mm
Very rare (97/49) to absent: **ostracods**. Size = 0.25mm.
Very rare (97/107) to absent: **plagioclase feldspar**, r, elongate. Size = 0.3 to 0.2mm.
Rare (97/7, 97/62) to absent: **monocrystalline quartz**, sa-r, equant. Size = 0.4 to 0.2mm.
Very rare to absent: **polycrystalline quartz**, sa-r , equant; sometimes sutured contacts. Size = 0.5 to 0.2mm.
Very rare (97/49) to absent: **biotite schist**, sa-r, equant. Size = 0.5 to 0.2mm.
Very rare to absent: **chert**, r, equant to elongate. Size = 0.65 to 0.2mm.

Very rare to absent: **opaques**, r, equant; sometimes contain tiny (0.02mm) quartz or plagioclase. Size = 0.5mm to 0.2mm

Fine Fraction:
Predominant to dominant: **monocrystalline calcite**.
Common: **ostracods, foraminifera**.
Very few to very rare: **quartz**.
Very few to very rare: **iron oxide**.
Rare to absent: **epidote**.
Rare to absent: **clinozoisite**
Very rare: **mica**
Very rare to absent: **chert**
Very rare to absent: **plagioclase feldspar**.
Very rare (97/49) to absent: **biotite schist**
Very rare to absent: **brown chert**.

Textural Concentration Features (TCF)
Rare to very rare: **clay pellets**, r, merging to clear boundaries, equant to elongate, usually diffuse to merging; colour varies from yellow/orange (PPL, XP) (x40) to red (PPL, XP) (x40). Size = 1.1mm to 0.1mm, mode = 0.25mm. These clay pellets appear to have two different compositions:
(1) yellow to brown (XP) (x40), which are almost entirely free of inclusions except for some calcite and very rare to absent fine quartz, mica, plagioclase feldspar (see 97/22). These clay pellets lack foraminifera and epidote.
(2) yellow to brown (XP) (x40), containing ostracods, foraminifera, epidote, very rare quartz, alkali and plagioclase feldspar, calcite, opaques (see 97/49, 97/107).
Very rare to absent: **clay striation,** oriented parallel to vessel margins; contains calcite, rare quartz. Colour is yellow (PPL, XP) (x40). Size = 3.5mm long, 0.2-0.1mm thick.
Very rare to absent: **red streaks**, very thin, Size = 0.25mm long.

Amorphous Concentration Features (ACF)
Very few to very rare: **unburnt/partially burnt organics**. N.B. all samples contain examples of unburnt organic material.

Comments
This fabric is characterised by a buff-firing, calcareous clay, which is dominated by large limestone (sparite) non-plastics and which also contains monocrystalline calcite, ostracods and foraminifera, micrite with iron concentrations and rare quartz, mica, chert and biotite schist. The presence of clay pellets of two different types may suggest that this fabric is a mix of two different calcareous clays (see also Fabric 1b): one containing ostracods and epidote and one which is almost entirely clay, but which in view of the very rare presence of mica and quartz might also be the source of the very rare rounded biotite schists which occur in some samples (e.g. 97/49). Neither of these, however, contain the larger rounded quartz grains found in some samples (e.g. 97/62, 97/118) and the most likely origin for these is as clasts within the rounded micrite with iron concentrations, which are a feature of Fabrics 1a-i. The rare occurrence of thin red streaks (e.g. 97/22) may be explained as resulting from iron migration; this iron is most likely

to originate from the alteration of micrite with iron concentrations (see below on Fabric 1c). The third component of this fabric is sparite, which does not appear in either type of clay pellet, is angular and poorly sorted. In view of these features it seems likely that sparite was added to the clay mix as temper.

The closest fabrics to this are Fabrics 1b and 1c (see below), which differ only texturally from Fabric 1a. Fabric 1a also shares similarities in groundmass with Fabrics 1d (calcareous, biomicrite), 1e (calcareous, coarse sparite, well-formed monocrystalline calcite) and 1f (calcareous, crushed coarse-grained sparite). These fabrics are also tempered with forms of calcite. What distinguishes Fabric 1a from all others is the dominant presence of fine-grained sparite. Although sparite is a feature of Fabrics 1d, 1e and especially 1f and 2a, it is never as frequent as the sparite in Fabric 1a (or Fabrics 1b, 1c) and moreover it usually more coarse-grained. Fine-grained sparite is also a dominant feature of Fabric 7, however this fabric has a quite different groundmass (doleritic rocks). Fabrics 1a (and Fabrics 1b and 1c) also differ from Fabrics 1d, 1e and 1i due to the complete absence of grog (see below on Fabrics 1d, 1e and 1i).

Consideration of void, inclusion and b-fabric orientation in conjunction with study using a lambda plate allowed the identification of coil-building in sample 97/107. The evidence for forming in other samples is less clear, although nothing was observed which would be inconsistent with the use of coil building. Some samples exhibit slip layers, which appear to be calcareous (e.g. 97/107). Other slip layers appear to be non-calcareous (cf. 97/7, 97/22, 97/51, 97/62, 98/1); this has been confirmed using SEM (see Chapter 8). These non-calcareous slips correspond to the presence of dark brown polished surfaces and suggests that these slips were deliberately used to create a dark finish on an otherwise generally buff-firing fabric. Others lack evidence for slip layers, but have areas near their surface which exhibit slightly different optical activity (e.g. 97/49, 97/118): these seems to be consistent with compaction due to burnishing. This is consistent with macroscopic study of the surfaces of such samples.

The micromass of samples in Fabric 1a exhibits considerable variability in optical activity, varying from low (e.g. 97/118) to high (e.g. 97/107) and colour, from brown-yellow (97/49, 98/1) to yellow. This variation suggests that vessels were fired to a variety of temperatures and were exposed to an atmosphere which varied between oxidising and reducing. All samples contain some traces of unburnt organic material (e.g. 97/4, 97/7, 97/22, 98/1, etc.). The presence of unburnt and partially burnt organic material might be an indication that the overall duration of firing was short (see Chapter 5). All these features taken together would not be inconsistent with fast firing in an open environment (pit, bonfire) (see Chapter 10).

Examples of Fabric 1a become rare to absent from stratum V-IV (cf. 97/107, 97/118; see also Fabric 1c). Macroscopic study of fabric indicates that during this period Fabric 1b is most common, while Fabric 1a or Fabric 1c (coarser versions of Fabric 1b) seem to occur most often in thicker-walled buff burnished samples (cf. also 97/118 and in Fabric 1c 97/119, 97/120).

Fabric 1a contains no features which are sufficiently distinctive to allow a confident assessment of provenance. All elements are consistent with a sedimentary environment consisting of calcareous marls and limestone, examples of which can be found all around Crete, including Knossos. In view, however, of the high frequency with which this fabric occurs at Knossos and its compatibility with the local geological environment (limestone, marls; see Appendix III), it seems most likely that this fabric is local to Knossos.

(1b) Calcareous, Rare Quartz, Crushed Fine-Grained Sparite.

Samples: 97/53, 97/55, 97/81, 97/83, 97/116, 97/117, 97/130, 97/135, 97/136, 98/71, 98/97

Microstructure
Very few to rare macro to meso planar voids, very few to rare mega to meso vughs. Voids and inclusions generally exhibit local long-axis parallel orientation; the angle of this orientation may vary from parallel to perpendicular to vessel margins, even within the same section (e.g. 97/130). Darkened areas around some voids may indicate the incomplete combustion of organics within the clay body (cf. 97/81, 97/130). Some voids have calcite linings (e.g. 97/116, 97/117, 97/136). Inclusions are close or single spaced.

Groundmass
The fabric is homogenous. Colour varies from yellow or orange to yellow-brown or orange-red (PPL, XP) (x40). The micromass varies in optical activity from low to high. B-fabric is medium to thin crystallitic/porostriated.

Inclusions
c:f:$v_{10\mu m}$ c.30:67:3
Coarse fraction = 3.75mm to 0.25mm.
Fine fraction = 0.25mm or less.

Coarse Fraction:
Frequent to absent: **sparite**, a-sa, equant to elongate. Grain size varies from 0.05 to 0.35, mode = 0.1mm. Size = 1.0mm to 0.25mm, mode = 0.5mm.
Rare to very rare: **monocrystalline calcite (sparite)**, a-sa, equant. Size = 0.45 to 0.25mm.
Rare (97/130) to absent: **shell frags.**, a-sa, elongate. Size = 0.8mm.
Very rare (97/117) to absent: **ostracods**. Size = 0.25mm.
Few to rare: **micrite with iron concentrations**, sr, equant; fine grained with occasional coarser grained areas which resemble very fine sparite; often contains isolated quartz, feldspar, foraminifera, opaques; often large in size (e.g. 3.25mm (97/135), 2.75mm (97/117)). One example (0.8mm) in sample 97/53 contains grains of monocrystalline calcite, foraminifera and monocrystalline quartz. Size = 3.25 to 0.25mm.
Rare to absent: **monocrystalline quartz**, sr-r, equant. Size = 0.5mm to 0.25mm.
Rare to absent: **polycrystalline quartz**, sr-r, equant to elongate; sometimes sutured contacts, sometimes in association with mica (e.g. 98/71). Size = 0.45 to 0.25mm.
Rare (e.g. 98/71) to absent: **biotite schist**, sr-r, equant to elongate. Size = 0.4o to 0.25mm.
Very rare (97/55) to absent: fine-grained **chert**, sr-r, equant. Size = 0.35mm to 0.25mm.

Very rare (97/53) to absent: **iron oxide**, sr, elongate, contains quartz, mica, micrite. Size = 0.5mm

Fine Fraction:
Predominant to dominant: **fine-grained monocrystalline calcite (sparite)**.
Few to rare: **foraminifera, ostracods.**
Very few to rare: **monocrystalline quartz**.
Very rare: **polycrystalline quartz**, sometimes contains mica.
Very few to very rare: **opaques**, iron oxide(?).
Rare: **epidote**.
Rare to absent: **clinozoisite**
Rare to very rare: **chert**; sometimes contains larger clasts of quartz and feldspar.
Very rare: **plagioclase feldspar, alkali feldspar**.
Rare (e.g. 97/130): **mica**.

Textural Concentration Features (Tcf)
Very few to very rare: **clay pellets**, r, equant to elongate, usually clear to merging. Size = 3.75mm to 0.1mm. These clay pellets seems to have two distinct compositions:
(1) yellow/orange (PPL, XP) (x40) to dark brown (PPL, XP) (x40); contain rare fine quartz, alkali and plagioclase feldspar, calcite, mica, opaques, shell, epidote (cf. 97/117, 97/130).
(2) yellow/orange (PPL, XP) (x40) to brown (PPL, XP) (x40); very fine, rich in ostracods, with rare calcite and very rare to absent fine quartz; example in 97/136 contains rounded altered volcanic (cf. 97/136).

Clay layer, (c.0.5mm to 0.9mm) on exterior surface of sample 97/130, merging boundaries with rest of sample, contains monocrystalline calcite, rare quartz, yellow-brown in colour, probably same composition as body. Distinguishable by different texture and parallel orientation of b-fabric and planar voids (cf. also 97/53, 97/81, 97/130). Sample 97/130 also has a non-calcareous slip layer running over this clay layer. In sample 97/83 the added layer is red, quartz-rich and seemingly non-calcareous; this layer also has a slip layer running over it.

Amorphous Concentration Features (Acf)
Very few to very rare: **unburnt/partially burnt organics**.
Rare (e.g. 97/117) to absent: **thin red streaks**; these red streaks are most likely to have resulted from the migration of iron during firing (see 97/65 Fabric 1c).

Comment
As with Fabric 1a this fabric is characterised by a buff-firing, calcareous clay groundmass, which contains ostracods and foraminifera, micrite with iron concentrations and rare quartz, mica, chert and more rarely biotite schist. Fabric 1b, like Fabric 1a, also appears to result from the mixing of a calcareous clay rich in ostracods and a fine clay, which contains of rare mica and quartz. The lattter might also be the source of the quartz-biotite schist (see above on Fabric 1a). The rare occurrence of thin red streaks (e.g. 97/117) may be explained as resulting from the migration of iron during firing from the iron-rich micrite (see below on Fabric 1c, 97/65). The third component of this fabric is sparite, which does not

appear in either type of clay pellet, is angular and poorly sorted. In view of these features it seems likely that sparite was added to the clay mix as temper. This clay groundmass is dominated by crushed calcite temper, which seems to derive from a fine-grained sparite, identical to that found in Fabric 1a. In this way Fabrics 1a, 1b and 1c differ only in terms of texture, average size of large non-plastics and packing. Fabric 1b may be characterised thus as a finer version of Fabric 1a. Fabric 1b first appears in quantity late in ENIb (stratum VI/V) and continues into ENII and is used for burnished (e.g. 98/71) or polished vessels (e.g. 97/117). Although a single stratigraphically earlier example of this fabric is known from stratum VIII (97/55), this more closely resembles later examples and comes from a context which contains other intrusive sherds.

Fabric 1b also has a very similar groundmass to Fabrics 1d-i; in addition to high degree of visual similarity, groundmasses in Fabrics 1a-i all contain epidote. Also a clay pellet in 97/136 contains a rounded altered volcanic rock fragment which links to similarly rare examples of rounded altered volcanic rocks in Fabric 1d (e.g. 97/84). However, Fabrics 1d-i differ significantly in the form of the dominant limestone present and/or in the presence of other large non-plastics absent from Fabrics 1a-c (grog, siltstones). In texture and packing Fabric 1b shares some similarity with Fabric 1e (crushed euhedral calcite), 1f (crushed coarse-grained sparite) and 2c (crushed sparite), these however differ in the form or size of the crushed calcite.

Consideration of void, inclusion and b-fabric orientation in conjunction with study using a lambda plate allowed the identification of coil-building in samples 97/130 and 98/97. The evidence for forming in other samples is less clear, although nothing was observed which would be inconsistent with the use of coil building. Several samples suggest that there was a secondary forming stage, which involved the addition of a thin clay layer to the surface of the vessel, which probably served to create a very smooth surface prior to polishing, since all samples, which evidence this added layer are polished. Added layers in samples 97/53, 97/81 and 97/130 resemble Fabric 1b in composition, while the layer in sample 97/83 might derive from a different clay, which is more red-firing and quartz-rich.

In many cases slip layers can be seen running over these added layers (97/83, 97/130). Some samples exhibit slip layers, which appear to be calcareous (e.g. 97/117). Other slip layers appear to be non-calcareous (cf. 97/83, 97/116, 97/130); this has been confirmed using SEM (see Chapter 8). These non-calcareous slips correspond to the presence of dark brown polished surfaces and suggests that these slips were deliberately used to create a dark finish on an otherwise generally buff-firing fabric. Other samples lack evidence for slip layers, but have areas near their surface which exhibit slightly different optical activity (e.g. 97/117, 98/71): these seems to be consistent with compaction due to burnishing (98/71) or polishing. This is consistent with macroscopic study of the surfaces of these samples.

Samples in Fabric 1b vary in optical activity from low (97/53, 97/116) to high (98/71, 98/97). Colour varies considerably from yellow or yellow-orange through red to brown. In several samples there is partially or unburnt organic material. All of these features are consistent with firing in an open environment, where temperature and atmosphere can vary more severely and where firing times are usually very short. As with Fabric 1a, 1b provides no clear indication as to the location of the source of its raw materials. In view of its high frequency during stratum V-IV, its close relationship with Fabric 1a and its compatibility with the local geology, it seems most likely that Fabric 1b is local to Knossos.

(1c) Calcareous, Rare Quartz, Coarsely/Finely Crushed Fine-Grained Sparite

Samples: 97/65, 97/103, 97/119, 97/120

Comment
This fabric falls within the range of mineralogical and technological variation described above for Fabrics 1a and 1b (see on Fabrics 1a and 1b). Sample 97/65 is particularly noteworthy in the context of the thin red streaks noted above as a rare feature of some samples in Fabrics 1a-b: in sample 97/65 a micritic clot can be seen in close association with thin red striations, which suggests that these striations result from the migration of iron from iron concentrations in the micrite. Fabric 1c differs from Fabric 1a in having large quantities of crushed fine-grained sparite and from Fabric 1b in containing a small number of larger sparite inclusions. In this way Fabric 1c links groups 1a and 1b. Macroscopic study of fabric suggests that the large majority of sherds, which can be assigned to Fabrics 1a-c, fall discretely into Fabrics 1a and 1b. Fabric 1c thus represents those few samples which overlap between these two fabrics. Fabric 1c demonstrates a continuum of variability between Fabrics 1a and 1b and further emphasises that Fabrics 1a, 1b and 1c were produced from the same set of raw materials using slightly different techniques of paste preparation.

(1d) Calcareous, Rare Quartz, Biomicrite/Micrite +/- Grog

Samples: 97/84, 97/105, 97/109, 97/111, 97/115, 98/51, 98/53, 98/54, 98/70, 98/85, 98/98. .

Microstructure
Few to very rare mega to meso planar voids, very few to very rare mega to meso vughs. Some voids contain a calcite lining or are completely in-filled with calcite (e.g. 97/111). Many voids are surrounded by darker patches, some contain opaque, possibly organic, material. Assessment of the orientation of voids and inclusions is difficult because inclusions and voids are predominantly equant; however, when inclusions and voids are more elongated, local long-axis parallel orientation can often be observed (e.g. 97/105, 97/109); the angle of this orientation varies from parallel to perpendicular to vessel margins. Inclusions are close to single-spaced.

Groundmass
Within single samples the groundmass is generally homogenous, however there is variation between samples. In some samples the groundmass is very fine and contains very few ostracods or foraminifera (e.g. 97/105, 98/54), others are richer in either ostracods (e.g. 97/84, 97/109, 97/111, 98/51, 98/53) or fine

quartz (e.g. 98/85) or biotite schist (97/105). It is therefore the distinctive large non plastics (bioclastic limestone), which serve best to define this group (see comment below). Colour varies from yellow (PPL, XP) (x40) to dark brown (PPL, XP) (x40). The micromass varies in optical activity from low (e.g. 97/105, 98/98) to high (e.g. 98/54). B-fabric is medium to thick granostriated/porostriated.

Inclusions

$c{:}f{:}v_{10\mu m}$ c.25:73:2 to 30:64:6
Coarse fraction = 3.5mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction

Dominant to common: **bioclastic limestone** (biomicrite and oomicrite), a-sr, equant to elongate; contains shell frags, ooliths, foraminifera (e.g. 98/54); bioclastic zones sometimes in association with areas which have a purely micritic or sparite structure (fine to medium-grained) (e.g. 97/111); sometimes contain chert (97/115), radiolaria(?) infilled with chalcedonic quartz (e.g. 97/111, 98/53). Size = 3.5 to 0.2mm., mode = c.0.6mm.

Rare (98/85) to absent: **micrite with iron-rich concentrations**, r, equant to elongate; sometimes contains discrete r quartz, calcite, foraminifera (cf. 97/105, 98/53), opaques, epidote; varies in colour from light to dark brown (XP) (x40). Size = 3.5 to 0.2mm.

Rare to absent: **foraminifera/shell frags.**; Size = 0.8mm to 0.2mm (cf. 97/115, 98/85).

Very rare to absent: **monocrystalline calcite**, sa, equant to elongate. Size = 0.4mm to 0.2mm.

Very few (97/105) to absent: **biotite schist**, sa-r, equant to elongate. Size = 1.25 to 0.2mm.

Rare to absent: **polycrystalline quartz**, sa-r, equant to elongate; often with sutured contacts; one example in 97/115 contains a radiolarian(?) infilled with chalcedonic quartz. Size = 1.0 to 0.2mm.

Rare to very rare: **monocrystalline quartz**, sa-r, equant. Size = 0.9 to 0.2mm., mode = c.0.2mm.

Very rare (97/115) to absent: **radiolarian test(?)**, equant; infilled with chalcedonic quartz. Size = 0.8mm.

Rare to absent: **chert**, a-r, equant; one example in sample 98/98 also contains mica (cf. also 97/115); sometimes contains large clasts of quartz (e.g. 98/53). Size = 1.1mm. to 0.2mm.

Rare to absent: **coarse siltstone/fine sandstone**, sa-sr, elongate; grains are well-sorted, unimodal, equant to elongate, sa-sr, no preferred orientation, size varies from 0.05 to 0.3mm, mode = 0.1mm; mostly quartz, feldspar, with some chert, mica, opaques and more rarely calcite (98/85); fabric is usually grain-supported with point-contacts; matrix, where visible, is orange-red (XP) (x40). Size = 1.3mm to 0.6mm (cf. 97/115, 98/85, 98/98).

Rare to very rare: **opaques**, sr, equant to elongate; sometimes contain isolated tiny quartz. Size = 1.1mm. to 0.2mm.

Very rare (97/84) to absent: **altered volcanic rock fragment**, r, equant; contains plagioclase laths in an opaque/glassy matrix. Size = 0.7mm.

Very rare to absent: **epidote**, r, equant. Size = 0.25mm to 0.2mm
Very rare (97/105) to absent: **alkali feldspar**, r, equant. Size = 0.3mm.

Fine Fraction
Frequent: **micrite**.
Common to few: **foraminifera, ostracods**.
Few to rare: **calcite**.
Few to rare: **quartz**.
Rare: **opaques**.
Rare: **chert**.
Rare: **biotite mica**.
Rare to absent: **plagioclase/alkali feldspar**.
Very rare to absent: **epidote**.
Very rare to absent: **clinozoisite**.
Very rare to absent: **radiolarian test(?)** infilled with chalcedonic quartz.

Textural Concentration Features (Tcf)
Rare to absent: **clay pellets**, r, equant, clear to merging boundaries, colour varies in XP (x40) from yellow-orange to dark brown; some pellets contain fine clay, very rare very fine quartz, mica, others are richer in ostracods. Size = 1.5 to 0.1mm., mode = c.2mm.

Very few (97/109) to absent: **grog**, **a-sa**, equant to elongate, sharp to merging boundaries. High to neutral optical density. Burnished surfaces are visible in sample 97/109. Fabric is yellow to brown in colour (XP) (x40). Examples in 97/109 contain fine quartz, biomicrite and calcite. Fabric resembles Fabric 1d. Size = 0.9 to 0.2mm.

Rare to absent: **clay layer**, (0.75mm to 0.2mm), visible on exterior surface of samples 97/111, 98/98 as differentially oriented b-fabric. Same composition as body. Possibly formed from extensive smoothing and compaction of clay body during burnishing.

Amorphous Concentration Features
Very few to very rare: **burnt/partially burnt organics**, sr-r, equant to elongate. Size = 0.6 to 0.1mm.

Comment
This fabric is characterised by a calcareous clay groundmass, which contains rare quartz, epidote and sometimes ostracods. This groundmass is generally homogenous within single samples, but may vary between samples: in some cases the groundmass is very fine and contains very few ostracods or foraminifera (e.g. 97/105, 98/54), others are richer in either ostracods (e.g. 97/84, 97/109, 97/111, 98/51, 98/53) or fine quartz (e.g. 98/85) or biotite schist (97/105). Those groundmasses which are richer in ostracods and contain rare rounded quartz and epidote closely resemble the groundmass in Fabrics 1a-c, others which lack ostracods closely resemble the non-fossiliferous clay component of Fabrics 1a-c. Fabrics 1a-c and Fabric 1d also both contain rare rounded quartz and micrite with

iron concentrations. However, in general the groundmasses of Fabric 1d contain more chert, more sedimentary rocks and more altered volcanics than those of Fabrics 1a-c. One may also point to differences in form and finish between vessels in these fabrics (see Chapter 7). Nevertheless the significance of these links is confirmed by a join between two coils, one in Fabric 1b and one in Fabric 1d within a single sherd (Fabric 3). What distinguishes Fabric 1d from all others is therefore not so much its groundmass, but its distinctive large non plastics (bioclastic limestone). Similar forms of bioclastic limestone occur in Fabrics 1e (97/50, 97/122), Fabrics 1g (97/133) and 1h (97/122), and 2b. However these groups are distinguished from Fabric 1d variously by the presence of large quantities of crushed euhedral calcite (Fabric 1e), euhedral calcite and coarse-grained sparite (Fabric 1g), sandstone (Fabric 1h) or by a different clay groundmass (Fabric 2b, red, fine quartz rich). These differences should not however be allowed to obscure the clear connections which also exist between Fabrics 1d-1i. For example the rare to absent siltstones in Fabric 1d link it to the rare siltstones/sandstones in Fabrics 1h (97/122) and 1i (98/68). Likewise the presence of grog in some samples of Fabric 1d (e.g. 97/109) links it to grog-tempered Fabrics 1i and 2e.

An unusual texture in sample 97/105, composed of swirls and streaks in brown and yellow may indicate that the groundmass of Fabric 1d was, at least on some occasions created by the mixing of two clays. However, the variability observed in groundmass would seem to suggest that there was some variability in this mixing process and perhaps that clay mixes were not always used.

Consideration of void, inclusion and b-fabric orientation in conjunction with study using a lambda plate did not identify clear examples of coil joins, however such structural discontinuities that were observed would be consistent with coil forming. The regular presence of large planar voids may indicate that cracking, due either to poorly joined coils or to shrinkage was relatively common. Vessels in Fabric 1d seem to have received a variety of surface treatments: a non-calcareous slip layer is visible in sample 97/111, while a differentially birefringent surface layer in sample 98/98 is suggestive of compaction of an unslipped surface due to burnishing. As with Fabrics 1a-c the use of a non-calcareous slip layer coincides with the creation of dark (red-dark brown) polished surfaces. In this way Fabric 1d is linked by a shared finishing technique to Fabrics 1a-c and 1e-f.

Samples exhibit different degrees of optical activity from high (e.g. 97/109) to low (e.g. 98/98). Colour (XP, x40) also varies from yellow (e.g. 98/70) to dark brown (e.g. 98/53). This would seem to suggest that vessels in Fabric 1d were fired to a variety of temperatures and were exposed to an atmosphere which varied between oxidising and reducing. The frequent presence of burnt, partially burnt and complete organics may indicate that the overall duration of firing was short. Although none of these features alone indicate the type of environment the occurrence together would not be inconsistent with fast-firing in an open environment.

Fabric 1d, like related Fabrics 1a-c, 1e-i contains no features which are sufficiently distinctive to allow a confident assessment of provenance. However, all elements are consistent with a sedimentary environment consisting of calcareous marls and limestone, examples of which can be found all around Crete, including Knossos. In view, however, of the high frequency with which this fabric occurs at Knossos (especially stratum V) and its compatibility with the local geological environment (bioclastic limestone, marl; see Appendix III), it seems most likely that this fabric is local to Knossos.

(1e) Calcareous, Rare Quartz, Crushed Euhedral Calcite, Biomicrite.

Samples: 97/50, 97/121, 97/126, 97/127, 97/132, 98/79, 98/82, 98/86, 98/95

Microstructure
Very few to very rare mega to meso planar voids, very few to rare mega to meso vughs. Voids generally exhibit local long-axis parallel orientation with inclusions, however this relationship may be at any angle with the vessel margins and different local arrangements may exist within a single section (e.g. 97/126). Some voids are surrounded by darker patches, some contain opaque, possibly organic material. Inclusions are close to single-spaced.

Groundmass
Generally homogenous within single samples, but may vary between samples from samples which contain only rare quartz (98/82) to those which are rich in quartz (98/79). Colour varies from yellow-orange or orange (PPL) (x40) and yellow-brown (XP) to dark brown in (PPL, XP) (x40); sometimes some colour variation between core and margins ('sandwich effect') (e.g. 98/82). Optical activity varies from low (e.g. 97/132) to high (e.g. 97/126). B-fabric is thin to medium granostriated/ porostriated.

Inclusions
$c{:}f{:}v_{10\mu m}$ c.20:76:4 to 30:64:6
Coarse fraction = 4.5mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Predominant to very few: **monocrystalline euhedral calcite**, a-sa, equant to elongate, well-sorted. Size = 1.75mm. to 0.2mm., mode = c. 0.2mm.
Few to very rare: **coarse grained polycrystalline calcite (sparite)**, a-sa, equant. Grain-size varies from 0.05mm to 1.6mm., mode = 0.2mm. Grains are often elongate. Size = 2.3 to 0.2mm, mode = c.0.4mm.
Few (97/50) to absent (97/132): **biomicrite**, sa-sr, equant to elongate; contains traces of foraminifera and larger shell frags. One example in sample 97/126 contains an oolith (0.15mm). Some samples (e.g. 97/127, 98/82) suggest that biomicrite may be associated with coarse-grained sparite. Size = 1.8mm to 0.2mm
Rare (98/82) to absent: **micrite with iron concentrations**, r, equant to elongate; sometimes contains isolated r quartz, epidote. Size = 4.0mm to 0.4mm
Very few to rare: **ostracods**. Size = 0.4 to 0.2mm.
Very few (98/79) to absent: **monocrystalline quartz**, sr, equant. Size = 1.4mm to 0.2mm., mode = 0.2mm.
Rare to absent: **polycrystalline quartz**, sa-sr, equant to elongate. Size = 0.6 to 0.2mm, mode = 0.2mm.
Rare (97/127) to absent: **chert**, r, equant. Size = 0.5 to 0.2mm.

Very rare to absent: **plagioclase feldspar**, sr, elongate. Size = 0.5 to 0.2mm (e.g. 97/127, 98/79).
Very few to very rare: **opaques**, sr, equant to elongate. Size = 1.9mm. to 0.2mm.
Very rare (97/50) to absent: **biotite schist**, sr, elongate. Size = 0.2mm.

Fine fraction
Predominant to dominant: **monocrystalline calcite**.
Few: **polycrystalline calcite**.
Very few to absent: **biomicrite/micrite**.
Common (98/79) to few: **monocrystalline quartz**.
Very few: **polycrystalline quartz**.
Few to rare: **foraminifera, ostracods**.
Few (98/79) to rare: **plagioclase feldspar**.
Very few to very rare: **opaques**.
Very rare: **chert**.
Rare to absent: **clinozoisite** (97/127).
Very rare to absent: **epidote**.

Textural Concentration Features (Tcf)
Rare to absent: **clay pellets**, r, equant to elongate, diffuse to merging boundaries, coloured yellow-orange to dark brown in XP (x40). Size = 4.5 to 0.05mm, mode = c.0.2mm.
Clay pellets seem to have two compositions:
(1) fine clay with foraminifera and rare rounded quartz, epidote and biotite schist (e.g. 97/50);
(2) fine clay without foraminifera or quartz.
Rare (98/95) to absent: **grog**, a-sa, equant to elongate, clear boundaries; colour (PPL, XP x40) is brown to dark brown; contain fine quartz, calcite (mono-, polycrystalline). Size = 1.1 to 0.2mm.

Amorphous Concentration Features (Acf)
Rare to very rare: **burnt/partially burnt/unburnt organics**, r, equant to elongate. Several samples (e.g. 97/126, 97/127) contain examples of unburnt/partially burnt organic material.

Comment
This fabric is characterised by a calcareous clay groundmass, usually very low in quartz, with opaques (iron oxide?), chert and biotite schist rare to absent. As with Fabric 1d this groundmass exhibits some variability between samples. Most are poor in quartz and lack chert and feldspar, but 98/79 is rich in quartz and feldspar. This group is therefore best distinguished by its crushed euhedral calcite temper. This calcite seems to have originated as a very coarse sparite (cf. examples in 98/86) and during processing has fractured along cleavage lines to produce much smaller often elongated calcite grains. This fabric shares a similar range of similarities with Fabrics 1a-d and 1f-i as have been outlined elsewhere: i.e. similar groundmass, micrite with iron concentrations, epidote, foraminifera, rare rounded quartz. Fabric 1e has particularly close links with Fabric 1d (similar biomicrite, rare rounded biotite schists, grog).

The presence of two types of clay pellet suggests that on at least some occasions the groundmass of Fabric 1e was created by mixing two similar calcareous clays, one fine containing few inclusions, the other containing foraminifera and rare rounded quartz. To this was added a crushed calcite temper. Grain-size seems to vary between samples from coarse (e.g. 98/86) to very fine (97/132): in general there seems to be a tendency for thicker walled vessels to be built in a coarser version of the fabric and thinner walled vessels in a finer form (cf. Fabric 5a). The coarse texture of 98/86 and the presence of crushed euhedral calcite and coarse sparite links this sample to Fabric 1f and particularly to Fabric 1g (97/133). Sample 98/79 exhibits a very clear coil join, while other observed structural discontinuities would be consistent with coil forming. As with Fabrics 1a-d, non-calcareous slips seem to have been applied (e.g. 97/50, 97/127, 98/95) and these closely correspond to dark surfaces (red, brown, dark brown). It is worth noting also that all examples of Fabric 1e date either to late in ENI (stratum VI or V) or ENII (stratum IV); during ENII Fabric 1e is very frequent (see Chapter 9). In addition biomicrite is much more frequent in the earliest examples of Fabric 1e (e.g. 97/50, 97/121). See variously on Fabric 1a and Fabric 1d concerning the likely local provenance of Fabric 1e.

(1f) Calcareous, Rare Quartz, Crushed Coarse-Grained Sparite

Samples: 97/125, 97/131, 97/134, 98/76, 98/81

Microstructure
Very few to rare macro to meso planar voids, very few to rare macro to meso vughs. Some of the voids have calcite linings (e.g. 97/131). Voids generally exhibit local long-axis parallel orientation with inclusions, however this relationship may be at any angle with the vessel margins and different local arrangements may exist within a single section (e.g. 97/131). Some voids are surrounded by darker patches, some contain opaque, possibly organic material. Inclusions are close to single-spaced.

Groundmass
Fabric is generally homogenous, although one sample (i.e. 98/76) is richer in fine quartz and chert; colour varies from yellow or yellow-orange (PPL, XP) (x40) to dark orange (PPL, XP) (x40); sometimes some colour variation between core and margins - the 'sandwich effect' (e.g. 97/134). Optical activity is generally low (e.g. 98/81). B-fabric is thin to medium granostriated/porostriated.

Inclusions
$c{:}f{:}v_{10\mu m}$ c.30:65:5
Coarse/fine fraction = 1.7mm. to 0.05mm.

Coarse/Fine Fraction
Predominant to dominant: **monocrystalline calcite (sparite)**, a-sa, equant to elongate, well-sorted. Size = 0.7mm. to 0.2mm., mode = c. 0.2mm.

Very few to very rare: **coarse-grained sparite,** a-sa, equant. Grain-size varies from 0.05mm to 0.7mm., mode = 0.2mm. Grains are often elongate. Size = 1.6 to 0.2mm.
Rare: **micrite with iron concentrations**, r, equant to elongate. Size = 1.15mm to 0.1mm
Rare: **ostracods**. Size = 0.25 to 0.1mm.
Rare to very rare: **monocrystalline quartz**, sr, equant. Size = 0.5mm to 0.05mm
Rare to very rare: **polycrystalline quartz**, sr, equant to elongate. Size = 0.5 to 0.1mm.
Rare to absent: **chert**, r, equant. Size = 0.4 to 0.2mm.
Rare to very rare: **opaques**, sr, equant to elongate; sometimes contain isolated r quartz, feldspar, amphibole, mica (cf. 98/81). Size = 1.7mm. to 0.05mm.
Very rare: **plagioclase/alkali feldspar**, sr, equant to elongate. Size = 0.5 to 0.1mm.
Very rare (98/76) to absent: **altered igneous rock frag.**, r, equant. Fine grained, contains tiny plagioclase laths, in a fine green (serpentinised?) matrix. Size = 0.75mm.
Very rare to absent: **epidote**. Size = 0.1mm.

Textural Concentration Features (Tcf)
Very few to very rare: **clay pellets,** r, equant to elongate, size = 1.6 to 0.05mm, diffuse to merging boundaries, coloured yellow-orange to dark brown in XP (x40); contains grains of monocrystalline quartz and calcite.

Amorphous Concentration Features (Acf)
Rare to very rare: **burnt/partially burnt/unburnt organics**, r, equant to elongate. Many samples contain examples of unburnt/partially burnt organic.

Comment
This fabric is characterised by a calcareous clay groundmass, which is usually low in quartz and contains ostracods and to which a crushed coarse-grained sparite temper has been added. Close similarities in groundmass between Fabric 1f and Fabrics 1-e can be noted (rare rounded quartz, foraminifera, micrite with iron concentrations, epidote), which have been discussed at length for Fabric 1d. Therefore the most distinctive feature of this fabric is the form of the crushed sparite temper, which appears to derive from a coarser-grained sparite than Fabrics 1a-c. A similar coarse-grained sparite appears in Fabric 1g (97/133) and Fabric 1e (98/86), which suggests that these groups may be particularly closely linked. A similar crushed coarse-grained sparite temper is also a feature of Fabric 2c, but this occurs in a different clay groundmass (red, fine quartz rich, rare siltstone). Vessels in fabric 1f seem to have been subject to a similar range of finishing techniques as Fabrics 1a-e with samples variously evidencing compaction due to burnishing (98/76) or the use of non-calcareous slips to create dark (red, brown) polished surfaces (97/125, 97/131, 97/134).

(1g) Calcareous, Rare Quartz, Euhedral Calcite, Coarse-Grained Sparite, Biomicrite

Sample: 97/133

Comment
This single sample effectively demonstrates the links between Fabrics 1d, 1e and 1f. It has a groundmass which appears calcareous, containing rounded quartz, epidote, chert, but no foraminifera. In composition it therefore resembles clay pellets in Fabrics 1a-c and 1d which lack foraminifera. This groundmass is dominated by a variety of large calcareous non-plastics, which vary in form (coarse-grained sparite, iron-rich micrite, biomicrite, monocrystalline euhedral calcite) and which variously link this sample to Fabrics 1d-f. In texture and packing, the closest parallel for 97/133 is 98/86 in Fabric 1e.

(1h) Calcareous, Rare Quartz, Biomicrite, Sandstone

Sample: 97/122

Comment
This sample is identical to examples of Fabric 1d, except for the presence of large sandstone rock fragments. Coarse siltstone/fine sandstone is a rare component of Fabrics 1d and 1i, however in sample 97/122 they are frequent and large (size = 2.6mm to 0.25mm): subangular to subrounded, elongate; grains are well-sorted, unimodal, equant to elongate, sa-sr, no preferred orientation; mostly quartz, feldspar, with some chert, mica, opaques and more rarely calcite (cf.98/85); fabric is usually grain-supported with point-contacts; matrix, where visible, is orange-red (XP) (x40).

(1i) Calcareous, Rare Quartz, Grog, Sparite/Micrite

Samples: 97/40, 98/68, 98/69, 98/75

Microstructure
Very few to rare mega to meso planar voids, very few to rare macro to meso vughs. Inclusions are close to single-spaced.

Groundmass
Fabric is generally homogenous; colour varies from yellow or yellow-orange (PPL, XP) (x40) to dark brown (PPL, XP) (x40). Optical activity is generally high (e.g. 98/68, 98/69). B-fabric is thin to medium granostriated/porostriated.

Inclusions
$c:f:v_{10\mu m}$ c.25:70:5
Coarse fraction = 2.75mm. to 0.2mm.
Fine fraction = 0.2mm or less.

Coarse Fraction

Frequent to common: **limestone (micrite, sparite)**, sa-sr, equant to elongate. Varies in form from a fine sparite to a micrite. Some examples show micrite in association with sparite (e.g. 98/68); occasionally bioclastic (e.g. 98/68). Size = 1.8mm to 0.2mm.

Very rare (97/40, 98/68) to absent: **shell fragments**, sa, elongate. Size = 1.1mm to 0.8mm.

Very rare (97/40) to absent: **ostracod**. Size = 0.8mm.

Rare to absent: **micrite with iron concentrations**, r, equant to elongate. Size = 3.2mm to 0.2mm.

Rare to very rare: **monocrystalline quartz**, sr-r, equant. Size = 0.25 to 0.2mm.

Rare to absent: **polycrystalline quartz**, sr-r, equant to elongate. Size = 1.5 to 0.2mm.

Very rare to absent: **chert**, sr-r, equant. Size = 0.35 to 0.2mm.

Very rare to absent: **coarse siltstone/fine sandstone**, sa-sr, elongate; grains are well-sorted, unimodal, equant to elongate, sa-sr, no preferred orientation, grain size = 0.05 to 0.3mm: mostly quartz, feldspar, with some mica; fabric is usually grain-supported with point-contacts; matrix, where visible, is orange-red (XP) (x40). Size = 0.8mm.

Very rare (97/40, 98/69, 98/75): **phyllite**, r, elongate; contains mica, quartz. Size = 0.6 to 0.2mm.

Fine Fraction

Frequent: **micrite/sparite**.

Common to few: **foraminifera, ostracods**.

Few to rare: **calcite**.

Few to rare: **quartz**.

Rare: **opaques**.

Rare: **chert**.

Very rare to absent: **epidote**.

Very rare to absent: **biotite schist**.

Textural Concentration Features (Tcf)

Frequent to common: **grog**, a-sa, equant to elongate, sharp to merging boundaries. High to neutral optical density. Burnished surfaces visible in some samples (e.g. 98/69). Size = 2.75 to 0.15mm. At least two different types of grog can be distinguished:

(1) Colour dark brown to brown (PPL, XP x40), rich in fine quartz, biotite mica, alkali feldspar, chert, altered volcanics (e.g. 98/69), epidote. One example in 98/69 contains no limestone and has a visible burnished surface; others also contain limestone (sparite, micrite). These latter resemble Fabrics 2a and 2b in both groundmass and large non plastics. (cf. 97/40, 98/68, 98/69, 98/75).

(2) Colour orange brown to dark brown (PPL, XP x40), rare large rounded quartz, micrite (sometimes bioclastic), sparite; (cf. 97/40, 98/68, 98/69, 98/75). This resembles Fabrics 1a-d.

Rare: **clay pellets** and **clay streaks** (e.g. 98/68, 98/69): colour is yellow to orange (PPL, XP x40); examples in 98/69 lack foraminifera and quartz. One very large swirl in 98/68 is rich in foraminifera. Size = 4.5 to 0.15mm.

Comment
This fabric is characterised by a groundmass similar to that found in Fabrics 1-h, which hosts limestone non-plastics and frequent grog. Evidence for clay mixing in 98/68 and 98/69 once again (cf. Fabrics 1a-c, 1d) suggests that the groundmass was created by mixing two clays, one of which is rich in ostracods and foraminifera. The closest links are with Fabrics 1d and 1h (sandstone, bioclastic limestone, biotite schist). Sample 98/75 has traces of a non-calcareous slip and this, as with other examples in Fabrics 1a-f coincides with a dark (brown) surface. All samples of Fabric 1i date to late in ENI (strata VI-V); a single example from a context in stratum VIII (97/40), which contains other intrusive material, finds its closest parallels in finish and form with examples in stratum V.

(2a) Low/Non Calcareous, Fine Quartz-Rich, Chert, Sparite

Samples: 97/24, 97/37, 97/64, 97/85, 98/2, 98/5, 98/24, 98/34, 98/37, 98/42, 98/50

Microstructure
Rare to very rare mega to meso vughs, rare to absent mega to meso planar voids.

Some larger voids are surrounded by darker patches, some contain opaque, possibly organic material (e.g. 98/34, 98/37). Assessment of orientation of voids and inclusions is difficult because inclusions and voids are predominantly equant; however, when inclusions and voids are more elongated, local long-axis parallel orientation can be observed (e.g. 98/2, 98/34); the angle of this orientation varies from parallel to perpendicular to vessel margins. Inclusions are close to single-spaced.

Groundmass
Fabric is homogenous. Colour varies from orange or orange-red (PPL, XP) (x40) to dark brown (PPL, XP) (x40). Sample 98/37 has a dark core. The micromass varies in optical activity from low (e.g. 98/42) to high (e.g. 98/2). B-fabric is medium to thick granostriated/porostriated (e.g. 98/2).

Inclusions
$c:f:v_{10\mu m}$ c.25:70:5 to 30:65:5
Coarse fraction = 2.4mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Dominant to frequent: **sparite**, a-sa, equant to elongate. Grain size varies from 0.05 to 0.4mm, mode = 0.1mm. Sometimes interstices between individual grains within a sparite cluster are blurred and individual grains do not exhibit separate

extinction, but rather have a similar form and texture to micrite (cf. 97/85, 98/2, 98/24). This is found particularly (e.g. 98/24) in association with a darker brown clay matrix (PPL, XP x40) and may be connected with secondary calcite formation (see comments below). Sometimes contains discrete clasts of quartz (e.g. 98/2). Size = 2.4 (98/24) to 0.2mm.
Rare to absent: **micrite**, r, equant to elongate; sometimes contains iron concentrations (e.g. 98/50); sometimes contains rare discrete clasts mostly of quartz (e.g. 98/37); sometimes bioclastic. Size = 0.9 to 0.2mm.
Very rare (97/85, 98/50) to absent: **shell fragments**, sa-r, elongate. Size = 0.4mm.
Rare (98/37) to absent: **monocrystalline calcite**, a-sa, equant; resembles sparite in form. Size = 0.4mm to 0.2mm.
Very rare (97/64, 98/42) to absent: **foraminifera**. Size = 0.25 to 0.2mm.
Very few (98/2) to very rare: **monocrystalline quartz**, sr-r, equant. Size 1.4 (97/64) to 0.2mm.
Rare to absent: **polycrystalline quartz**, sr-r, equant. Size = 0.5 to 0.2mm.
Very few (97/64) to very rare: **chert**, sa-r, equant; varies from fine to medium-grained, but predominantly fine. Sometimes (e.g. 98/37) larger clasts of quartz and plagioclase are set in a chert-rich matrix. Size = 0.7 to 0.2mm, mode = 0.2mm.
Rare (97/24, 98/37) to absent: **coarse siltstone/fine sandstone**, r, equant to elongate. Grain-size varies from 0.3mm to 0.05mm; contains clasts of monocrystalline quartz, polycrystalline quartz/chert, feldspar, biotite mica; usually grain-supported; well sorted; matrix is usually orange (PPL, XP x40). Size = 0.8mm to 0.2mm
Very rare (98/5) to absent: **fine siltstone**, sa-sr, equant; occasional clasts of quartz, biotite mica (c. 0.02), matrix supported. Size = 0.7mm.
Rare (97/64, 98/42) to absent: **quartz-biotite schist**, r, equant to elongate. Size = 0.6 to 0.2mm.
Very rare (98/2) to absent: **alkali feldspar**, sa-sr, equant. Size = 0.3 to 0.2mm
Very rare (97/37) to absent: **plagioclase feldspar**, sa, elongate. Size = 0.3 to 0.2mm.
Very rare (98/2) to absent: **igneous rock fragment**, sr, equant to elongate; contains quartz with sutured contacts in association with plagioclase feldspar laths and some alkali feldspar and rare biotite. Size = 0.8mm.
Very rare to absent: **opaques (iron oxide?)**. Size = 0.25 to 0.2mm.

Fine Fraction
Frequent to common: **monocrystalline/polycrystalline quartz**.
Frequent (98/24) to very few: **monocrystalline calcite (sparite)**.
Common: **chert**.
Rare: **alkali feldspar**.
Rare: **plagioclase feldspar**.
Rare: **biotite mica**.
Rare to very rare: **quartz-biotite schist/phyllite**.
Rare to very rare: **epidote**.
Very rare: **foraminifera**
Very rare: **opaques**.

Textural Concentration Features (Tcf)
Rare (98/5) to very rare: **clay pellets**, sr-r, equant, high sphericity, merging (98/24) to clear boundaries; contain fine rounded quartz (monocrystalline, polycrystalline), chert, feldspar (plagioclase, alkali), biotite mica, epidote, quartz-biotite schist (cf. 97/24, 97/37, 98/5, 98/24). Colour varies from red (PPL, XP) (x40) to dark brown (PPL, XP) (x40). Size = 1.3 to 0.1mm.
Rare to absent: **clay layer**; in sample 98/42 a clay layer is visible on exterior edge (PPL) as a slightly darker area (c. 0.2mm to 0.4mm thick) and (XP) as a b-fabric parallel in orientation to vessel margins; this area is texturally distinctive being generally composed of non-plastics at the lower end of the size range (<0.6mm) and is of similar composition to the fine fraction of Fabric 2a (cf. also 97/85, 98/34). This clay layer always corresponds to the use of non-calcareous slips (see comments below).

Amorphous Concentration Feature (Acf)
Rare to very rare: **burnt/partially burnt organics**; all samples contain examples of voids with traces of burning around them; some samples also contain traces of unburnt/partially burnt organic (cf. 98/24, 98/37).

Comment
This fabric is characterised by a groundmass which seems to be low or non-calcareous rich in fine quartz and also containing chert, coarse siltstone/fine sandstone, feldspar (plagioclase, alkali), biotite mica. Dominated by sparite, which appears to have been added as temper, this groundmass appears to be generally consistent between samples. Clay pellets contain most components of he groundmass (i.e. contain fine rounded quartz (monocrystalline, polycrystalline), chert, feldspar (plagioclase, alkali), biotite mica, epidote, quartz-biotite schist), however they do not appear to be the source of the rare foraminifera and these may derive from another clay similar to that identified in Fabric 2b (see below). The groundmass of Fabric 2a is very close to that of 2b-e (although poorer in foraminifera) and therefore the most distinctive feature of this group is the presence of sparite. The sparite varies considerably in grain-size from very fine (0.05mm) to coarse (0.4mm). The presence of sparite and micrite together in Fabric 2b (e.g. 97/2) sometimes within a single inclusion (97/66) suggests the possibility that Fabrics 2a and 2b may actually grade into one another; a close link is also suggested by the presence of biomicrite (98/50), quartz-biotite schist, coarse siltstone/fine sandstone and fine siltstone in Fabrics 2a and 2b. Further support for a close link is provided by macroscopic study of fabric and form, which failed to distinguish between Fabrics 2a and 2b and which demonstrated that identical forms of deep incised/pointillé decoration are common to both groups. The presence of sparite in Fabric 2a also links it to Fabric 2c; indeed the differences between these two groups are largely textural. The generally coarse-grained sparite in Fabrics 2a, 2b and 2c also links in to the similarly coarse-grained sparite in Fabrics 1f-g.

No clear coil joins could be identified in Fabric 2a, however structural discontinuities would be consistent with coil forming. Samples exhibit a variety of surface finishes: most samples appear to have been simply burnished, with some of these exhibiting compaction due to burnishing (e.g. 98/5); others appear to have a thin clay layer (0.2-0.4mm) of similar composition to the body, although with few to none limestone inclusions. This thin layer lies over the large non-plastics apparently smoothing the vessel surface, prior to the application of a non-calcareous slip. All samples finished in this way are polished rather than burnished (e.g. 97/85, 98/2, 98/34, 98/42). Sample 98/37 contains a long void where a clay strip (cordon) has been poorly joined to the body of the vessel.

The variety in the degree of optical activity and the colour range suggests that samples of Fabric 2a had been exposed to a variety of temperatures and atmospheres (oxidising/reducing). In several samples calcitic inclusions exhibit only a relict primary grain texture (sparite): the interstices between individual grains within a sparite cluster are blurred and grains do not exhibit extinction, but rather have a similar texture to micrite. This is particularly found (e.g. 98/24) in association with a darker brown clay matrix (PPL, XP x40), which is itself suggestive of more strongly reducing atmosphere. The presence of micritic clots would seem to indicate the alteration of calcite during firing. If so this would suggest that in these examples vessels may have been fired over c.800°C (see also Chapter 8). All samples had traces of either burnt, partially burnt or even unburnt organic material. All of these above features would be consistent with firing of short duration in an open environment.

Fabric 2a unfortunately contains no features which are distinctive of specific provenance; however it remains broadly consistent with the local geology around Knossos (limestone, bioclastic limestone): cf. bioclastic limestone (98/50) with bioclastic limestone in Fabrics 2b, 1d-h (see Appendix III). Support for local provenance is also provided by consideration of the high frequency with which Fabric 2a occurs at Knossos (see Chapter 9) and by the technological/mineralogical similarities shared with Fabric 2b (see below) and Fabrics 1a-i, for which a local provenance has also been suggested.

(2b) Low/Non Calcareous, Fine Quartz-Rich, Chert, Micrite/Biomicrite

Samples: 97/2, 97/3, 97/5, 97/44, 97/54, 97/63, 97/66, 97/82, 97/104, 97/106, 97/110, 98/3, 98/6, 98/36, 98/38, 98/49, 98/56, 98/77, 98/84.

Microstructure
Very few to very rare mega to meso vughs, very few to absent mega to meso planar voids. Occasionally voids have calcite linings (e.g. 97/66, 98/6). Some larger voids are surrounded by darker patches, some contain opaque, possibly organic material (e.g. 98/84). Assessment of orientation of voids and inclusions is difficult because inclusions and voids are predominantly equant; however, when inclusions and voids are more elongated, local long-axis parallel orientation can be observed (e.g. 97/110, 98/50, 98/77); the angle of this orientation varies from parallel to perpendicular to vessel margins. Inclusions are close to single-spaced.

Groundmass
Fabric is generally homogenous within individual samples, but exhibits some variety between samples from those rich in fine quartz (e.g. 98/36) to those poorer in quartz (e.g. 98/56). Colour varies from yellow-orange or orange-red (PPL, XP) (x40) to dark brown (PPL, XP) (x40). Sample 98/84 has a dark core.

The micromass varies in optical activity from medium (e.g. 97/63, 98/77) to high (e.g. 97/54, 98/36). B-fabric is medium to thick granostriated/porostriated (e.g. 98/36, 98/49).

Inclusions

$c:f:v_{10\mu m}$ c.25:70:5 to 30:65:5
Coarse fraction = 3.35mm. to 0.2mm.
Fine fraction = 0.2mm or less.

Coarse Fraction

Dominant to few: **micrite/biomicrite**, sa-sr, equant to elongate; sometimes micrite is bioclastic (e.g. 97/66, 98/6, 98/84) or in association with fossilised shell frags (e.g. 97/44, 97/104, 98/36, 98/49, 98/50). Micrite varies in form from very fine to coarse and appears to grade into sparite (see below); in several instances this grading is visible within a single inclusion (e.g. 97/66). Size = 2.4mm. to 0.2mm.

Frequent (98/56) to rare: **sparite**, a-sa, equant to elongate; sparite varies from a coarse micrite/fine sparite (c.0.05mm) to a medium-grained sparite (c. 0.4mm) and thus seems to grade into micrite (see above); several sparite inclusions in 97/63 exhibit a recrystallised ring and, although texturally sparitic, do not exhibit extinction (cf. 98/2). These features are suggestive of secondary calcite formation (see comments below). Size = 1.8 to 0.2mm.

Common (97/104) to absent: **shell fragments**, a-sa, elongate. Size = 2.0 to 0.2mm.

Rare (98/49, 98/77) to absent: **foraminifera**. Size = 0.3 to 0.2mm.

Rare to very rare: **micrite with iron concentrations**, r, equant to elongate; sometimes contains discrete clasts of fine quartz (e.g. 97/3, 98/56, 97/66), chert (98/77), feldspar (98/36); one example in 98/56 in association with sparite. Size = 3.35 to 0.2mm.

Very few (98/77) to very rare (97/54): **monocrystalline quartz**, sr-r, equant. Size = 1.4 (97/64) to 0.2mm

Rare to absent: **polycrystalline quartz**, sr-r, equant; sometimes sutured contacts. Size = 1.5mm to 0.2mm.

Rare to very rare: **chert**, sa-r, equant; varies from fine to medium-grained, but predominantly fine. Sometimes (e.g. 97/5, 97/66) larger clasts of quartz and plagioclase are set in a chert-rich matrix; one example in 97/2 contains radiolarian test(?) infilled with chalcedonic quartz. Size = 1.4 to 0.2mm, mode = 0.2mm.

Very rare (97/82, 98/3, 98/77) to absent: **quartz-biotite schist**, sr-r, equant. Size = 0.7 to 0.2mm

Very few (97/3) to absent: **fine siltstone**, sa-sr, equant to elongate; occasional clasts of quartz, more rarely calcite, mica (c. 0.02), matrix supported. Size = 1.0mm to 0.2mm.

Rare (97/63, 97/106) to absent: **coarse siltstone/fine sandstone**, r, equant to elongate. Grain-size varies from 0.3mm to 0.05mm. Contains clasts of monocrystalline quartz, polycrystalline quartz, chert, feldspar, biotite mica; grain-supported, well sorted. Size = 0.6mm to 0.2mm.

Rare (98/77) to absent: **calcareous siltstone**, sr-r, equant to elongate; contains quartz, feldspar, biotite mica and epidote. These resemble micrite with iron concentrations and it is possible that the two grade into each other. Size = 2.1 to 0.2mm.

Rare (98/3) to absent: **dioritic rock fragments**, r, equant; one example in 98/77 contains large biotite mica in a finer mosaic of biotite and amphibole (diorite?); one example in 98/3 rich in fine plagioclase in association with biotite and amphibole (diorite?); one example in 98/3 contains plagioclase with some alkali feldspar (diorite?); one example in 97/110 contains plagioclase, biotite, some alkali feldspar (diorite?). Size = 0.7 to 0.4mm

Very rare (97/110) to absent: **altered volcanic rock fragment**, r, elongate; contains plagioclase laths, biotite. Size = 0.5mm.

Very rare (97/66) to absent: **altered rock fragment**. Size = 1.2mm.

Very rare (98/56) to absent: **radiolarian test(?)**, sa-sr, equant; infilled with chalcedonic quartz. Size = 0.35mm.

Very rare to absent: **plagioclase feldspar**, sa, elongate. Size = 0.4 (98/36) to 0.2mm.

Very rare to absent: **alkali feldspar**, sa, equant. Size = 0.2mm

Rare to very rare: **opaques**, sa-r, equant. Sometimes contain grains of quartz, mica (97/5), calcite (98/49). Size = 0.7 to 0.2mm.

Fine Fraction

Dominant to common (98/56): **monocrystalline/polycrystalline quartz**.

Common to few: **calcite/micrite**.

Very few (98/49) to very rare: **foraminifera**

Common to few: **chert**.

Rare to very rare: **alkali feldspar**

Rare to very rare: **plagioclase feldspar**.

Rare to very rare: **biotite mica**

Rare to absent: **igneous rock frags**. (e.g. 98/36)

Rare to very rare: **quartz-biotite schist/phyllite**.

Rare to very rare: **epidote**.

Very rare to absent: **clinozoisite** (e.g. 98/77, 97/110)

Very rare: **opaques**.

Textural Concentration Features (Tcf)

Rare (98/49) to very rare: **clay pellets**, sr-r, equant, high sphericity, merging to clear boundaries. Size = 1.3 to 0.1mm. Two types are apparent with the first most frequent:

(1) colour orange-red (XP) to dark brown (PPL) (XP) (x40), containing fine quartz, larger rounded quartz, feldspar, chert, biotite mica (e.g. 98/77)

(2) colour yellow (PPL, XP x40), rich in foraminifera, also containing rare large rounded quartz, epidote, calcite (e.g. 97/66).

Rare (97/66, 98/56) to absent: **grog**, a-sa, equant to elongate, sharp to clear boundaries; contain quartz, mica, feldspar, calcite, rounded altered igneous rock frag.; colour varies from brown to dark brown (PPL, XP) (x40).(cf. 97/66, 97/82, 97/104, 98/56). Size = 1.0 to 0.15mm.

Amorphous Concentration Feature (Acf)
Rare to very rare: **burnt/partially burnt organics**. N.B. samples 97/5, 97/63, 98/84 contain several examples of unburnt/partially burnt organic.

Comment
This fabric is characterised by a low to non-calcareous groundmass (see Chapter 8 for confirmation), rich in fine quartz, but also variously containing larger rounded quartz, chert, foraminifera, biotite mica, feldspar, siltstone, sandstone, quartz-biotite schist and dioritic igneous rocks. This groundmass is dominated by limestone (sparite, micrite, biomicrite), which has been added as temper. Most samples contain a mixture of sparite and micrite (e.g. 97/63), although some are predominantly micrite or biomicrite (e.g. 98/84). Often limestone inclusions exhibit rings or exhibit the relict primary form of sparite but do not go in and out of extinction (e.g. 97/2, 98/6). The frequent presence of these micritic clots suggests that the form of calcite inclusions in Fabric 2b may have been frequently altered during firing. This is perhaps clearest in sample 98/84, where carbonate inclusions grade from those in one portion of the section which exhibit a clear unaltered bioclastic form to those on the other side of the section which resemble micrite: this grading through the sherd would seem to reflect changes in the form of calcite occurring after the formation of the vessel, probably during the firing process. If so then this may mean that some of the frequent micrite inclusions in Fabric 2b may have originally been bioclastic or sparitic prior to secondary calcite alteration during firing. Recognition of this phenomenon increases the likelihood that Fabrics 2a and 2b may grade into each other to form a large group characterised mainly by the presence of coarse-grained sparite and/or biomicrite.

Groundmass is homogenous within single samples, but exhibits some variation between samples, from those which are quartz rich (e.g. 97/2) to those which are relatively quartz poor (e.g. 98/56) or those which are more yellow-orange firing and rich in foraminifera and larger rounded quartz (e.g. 98/49) to those which are not (e.g. 97/2). Some of this variability in groundmass may be due to clay mixing since clay pellets of two different compositions were observed: one red firing and rich in fine quartz, chert, mica, feldspar; one yellow firing rich in foraminifera, larger rounded quartz, calcite, epidote. This latter clay would seem to be the source of the foraminifera and for the few samples which fire with a slightly more yellow colour (e.g. 98/49). See also clay-mixing in Fabric 2d. A similar type of clay mix - between a calcareous fossiliferous clay and a non-calcareous quartz-rich clay - can also be seen in Fabric 37. In this way subtle inhomgeneities in groundmass may result from the mixing of two clays in different proportions.

Fabric 2a shares a similar groundmass with Fabrics 2a, 2c, 2d and 2e and therefore its most distinctive feature is the large limestone non-plastics. However, the presence of sparite in Fabric 2b in conjunction with other close similarities may indicate that groups 2a and 2b grade into another; moreover Fabric 2d (98/74) is closely linked to Fabric 2b by the presence of smaller quantities of similar calcareous siltstones in 98/77 and by similar texture in 97/104: these again suggest that Fabric 2d may grade into Fabric 2b. Fabric 2e (grog) is closely linked to Fabric 2b by the presence of grog in 97/66. Fabric 2b also shares a similar groundmass with Fabric 15 (organic tempered). Fabric 2b has similar limestone inclusions to Fabric 4 (micrite), but these are in a groundmass which is poor in quartz. Fabric 2b also has similar limestone inclusions (micrite, biomicrite) as Fabric 2d. The presence in Fabric 2b of micrite with iron concentrations also provides a general link with Fabrics 1a-i.

Consideration of void, inclusion and b-fabric orientation allowed the identification of coil-joins in sample 97/66. Other structural discontinuities in other samples would be consistent with coil-forming. Most samples seem to have been burnished or polished without the use of added slips; instead samples generally exhibit compaction due to burnishing (e.g. 98/38) or polishing (98/3). However, a non-calcareous slip layer was noted in sample 97/54. Samples exhibit a range in optical activity from medium (e.g. 97/63, 98/77) to high (e.g. 97/54, 98/36) and a range in colour from orange yellow to dark brown. This would suggest that vessels were fired to a variety of temperatures and were exposed to an atmosphere which varied between oxidising and reducing. Evidence for secondary calcite formation would seem to suggest that vessels in Fabric 2b were often fired over c.800°C and were generally more highly fired than vessels in Fabrics 1a-i. Burnt, partially burnt and unburnt organic material was frequently observed in samples of Fabric 2b. All of these above features would be consistent with fast firing within an open environment.

As with Fabric 2a, Fabric 2b unfortunately contains no features which are distinctive of specific provenance; however it remains broadly consistent with the local geology around Knossos (bioclastic limestone): cf. bioclastic limestone (98/84) with bioclastic limestone in Fabrics 1d-h (see Appendix III). Support for a broadly local provenance is also provided by consideration of the high frequency with which Fabric 2b occurs at Knossos (see Chapter 9) and by the technological/mineralogical similarities shared with Fabric 2a (see below) and Fabrics 1a-i, for which a local provenance has also been suggested.

(2c) Low/Non Calcareous, Fine Quartz, Chert, Crushed Coarse-Grained Sparite

Samples: 97/42, 97/58, 98/58, 98/72

Microstructure
Rare to very rare mega to meso vughs, very few to rare macro to meso planar voids. Sometimes voids are in-filled with calcite (e.g. 97/42). Some voids are surrounded by darker patches, some contain opaque material (e.g. 98/58). Inclusions are generally close-spaced.

Groundmass
Fabric is generally homogenous. Colour varies from orange to dark brown (PPL, XP) (x40). The micromass varies in optical activity from low (98/72) to high (97/58). B-fabric is medium and granostriated/porostriated.

Inclusions
$c{:}f{:}v_{10\mu m}$ c.25:70:5 to 30:65:5
Coarse fraction = 2.3mm. to 0.1mm.
Fine fraction = 0.1mm. or less.

Coarse Fraction
Dominant: **monocrystalline calcite (sparite)**, a-sa, equant to elongate. The form of the grains suggested that they derive from a sparitic limestone; this would seem to be confirmed by the presence of sparite (see below). Size = 0.45 to 0.1mm.
Few to rare: **sparite**, a-sa, equant to elongate. Size = 1.9 to 0.2mm.
Very rare (97/58) to absent: **shell fragment**, sr, equant. Size = 0.9mm.
Rare to very rare: **monocrystalline quartz**, r, equant. sometimes ophitic, containing mica (e.g. 98/58, 98/72). Size = 1.0mm to 0.1mm
Very few to very rare: **polycrystalline quartz**, sr, equant to elongate. sometimes in association with mica. Size = 0.6 to 0.2mm
Rare to very rare: **chert**, r, equant to elongate. Size = 0.8 to 0.1mm
Very few (98/58) to absent: **quartz-biotite schist**, r equant to elongate; also contains opaques. Size = 2.0 to 0.2mm.
Rare to absent: **coarse siltstone/fine sandstone**, r, equant to elongate; contains grains (c.0.05mm to 0.2mm) of monocrystalline/polycrystalline quartz, mica, feldspar (plagioclase, alkali), quartz-biotite schist. Size = 0.8mm to 0.35mm.
Very rare to absent: **amphibole**, sr, elongate. Size = 0.35mm.
Very rare to absent: **plagioclase**, r, elongate. Size = 0.25mm to 0.1mm
Very rare to absent: **alkali feldspar**, r, equant to elongate. Size = 0.2mm to 0.1mm.
Rare to very rare: **opaques**, sr, equant; some contain isolated mica grains. Size = 0.4mm to 0.1mm.

Fine Fraction
Frequent to common: **monocrystalline calcite**.
Common: **fine monocrystalline quartz**.
Very few to rare: **biotite mica**.
Rare: **plagioclase feldspar**.
Rare: **alkali feldspar**.
Very rare: **chert**.
Very rare: **epidote**.
Rare to very rare: **opaques**.

Textural Concentration Features (Tcf)
Very few to absent: **clay pellets**, sr-r, equant, diffuse boundaries; contain very few inclusions: rare fine quartz (max. size 0.05mm), biotite mica, some feldspar, chert; colour varies from orange or orange-red to dark brown (PPL) (x40) and orange-red to very dark brown (XP) (e.g. 97/42, 98/72). Size = 2.3 to 0.1mm.

Amorphous Concentration Features (Acf)
Rare to absent: **burnt/partially burnt organics**; samples 97/58 and 98/58 contain examples of unburnt/partially burnt organic.

Comment
This fabric is characterised by a groundmass which is red firing (non-low calcareous), rich in fine quartz and also containing biotite, chert, siltstone/sandstone and quartz-biotite schist. This groundmass is dominated by a

crushed coarse-grained sparite temper. The groundmass is very close to that found in Fabric 2a-b (quartz-rich, biotite, quartz-biotite schist, siltstone/sandstone). It differs from Fabric 2b in its lack of foraminifera. Generally the groundmass is homogenous between samples, although sample 98/58 contains much more quartz-biotite schist than other samples. Study of clay pellets suggest the use of a fine non-calcareous clay containing fine quartz and biotite mica. The source for the larger rounded schist and siltstone/sandstone remains unclear: these may also derive from the same clay as the clay pellets or from another clay. Certain similarities in texture and limestone non-plastics may be noted with Fabrics 1b and 1f, which also contain crushed sparite; closest is Fabric 1f which is also a coarse-grained sparite, however neither Fabric 1b or 1f has a groundmass comparable to Fabric 2c.

The similarities in groundmass and limestone non-plastics between Fabrics 2a and 2c suggest that Fabric 2c is likely to be a technological variant of Fabric 2a. Fabric 2c first appears in stratum VI and continues into stratum IV (NB sample 97/58 is from a context in stratum VIII which contains other intrusive material) (see Chapter 9). The surface of samples 98/58 and 98/72 have differently oriented birefringence which suggests that compaction of the surface took place as a result of polishing. Differences in colour and optical activity suggest that vessels were exposed to a variety of temperatures and atmospheres (oxidising to reducing). Partial alteration to the structure of sparite grains in sample 97/42 are suggestive of secondary calcite formation (micritic clots). This sample also has calcite infilling of voids, which could conceivably by allochthonous in origin, however several considerations would seem to suggest that it is only partially allochthonous: firstly as already noted there are micritic clots suggestive of calcite alteration during firing; secondly 97/42 has a very dark brown clay matrix suggestive of exposure to a reducing atmosphere (over-fired?); thirdly if the calcite infilling resulted from the percolation of calcite bearing groundwater then one would expect to see its random occurrence in all fabrics; however calcitic infilling of voids is almost never found in other well-sampled fabrics at Knossos (see Fabrics 5a, 6 and 8), which notably lack a calcareous components (clays, inclusions) even though they shared the same burial environment as Fabric 2c (and Fabrics 1a-i, 2a-e). Thus the calcite infilling in the voids of sample 97/42 is more likely to originate within the sherd itself. In this way consideration of secondary calcite formation in sample 97/42 would suggest that sample 97/42 was fired to over c.800°C. For provenance see on Fabrics 2a and 2b.

(2d) Low/Non Calcareous, Fine Quartz, Biomicrite, Calcareous Sandstone

Sample: 98/74

Comment

This fabric has a groundmass very similar to that of Fabric 2b. Links with Fabric 2b are also suggested by the presence of siltstone/sandstone and calcareous sandstone (cf. Fabric 2b 98/77) and bioclastic material (shell) (cf. Fabric 2b, 97/106). In this way Fabric 2d is only distinguished from Fabric 2b by the presence of much larger quantities of sedimentary material. A large clay pellet in

98/74 is yellow-firing (calcareous?) and contains calcite (sparite), and rare rounded quartz and biotite. This would suggest that the groundmass of Fabric 2d resulted from a mix of a quartz-poor calcareous clay with a non-calcareous quartz rich clay. A similar mix was suggested for Fabric 2b.

(2e) Low/Non Calcareous, Fine Quartz-Rich, Biomicrite, Grog

Sample: 97/46

Microstructure
Very rare meso planar voids, very few macro to meso vughs. Some voids contain opaque material. Voids exhibit no preferred orientation. Voids and non-plastic inclusions are close to single-spaced.

Groundmass
Colour is yellow/brown (PPL, XP) (x40). Micromass is slightly optically active.

Inclusions
$c:f:v_{10\mu m}$ c.30:65:5
Coarse fraction = 1.5mm. to 0.2mm.
Fine fraction = 0.2mm or less

Coarse Fraction
Dominant: **micrite/biomicrite**, sa-r, equant to elongate; mostly micrite; sometimes contains or is in association with coarse-grained sparite (c.0.05 - 0.1mm). Size = 1.5 to 0.2mm.
Rare: **monocrystalline quartz**, r, equant to elongate. Size = 0.65mm to 0.2mm.
Rare: **polycrystalline quartz**, r, equant to elongate; sometimes with sutured contacts; sometimes in association with mica. Size = 0.9mm to 0.2mm.
Rare: **chert**, r, equant to elongate. Size = 0.4mm to 0.2mm.
Rare: **quartz-biotite schist**, r, elongate. Size = 1.35mm to 0.4mm
Very rare: **siltstone**, r, elongate; contains quartz and mica. Size = 0.4mm
Very rare: **plagioclase feldspar**, r, elongate. Size = 0.2mm
Very rare: **alkali feldspar**, r, elongate. Size = 0.2mm
Very rare: **opaques**, r, equant. Size = 0.25 to 0.2mm.

Fine Fraction
Dominant: **monocrystalline quartz**.
Frequent: **biomicrite/micrite**.
Few: **foraminifera**.
Very few: **plagioclase/alkali feldspar**.
Very few: **chert**.
Very few: **biotite mica**.
Rare: **monocrystalline calcite**.
Rare: **opaques**.
Very rare: **epidote**.

Textural Concentration Features (Tcf)
Common: **grog**, s-sr, equant to elongate; sharp to diffuse boundaries. Size = 1.4 to 0.1mm. Two fabrics identifiable:
(1) Colour varies from red to dark brown (XP) (x40); rich in fine quartz, with mica, chert, feldspar and opaques; some contain large (0.4mm) limestone (micrite); one example has a burnished surface.
(2) Colour varies from yellow to brown (XP) (x40); rare fine quartz, with calcite, micrite; one example contains large sparite (0.9mm) non-plastic.

Very few: **clay pellets**, r, equant to elongate; sharp to diffuse boundaries. Size = 0.8 to 0.1mm. Two compositions identifiable:
(1) brown (PPL) (x40) and dark brown (XP); contains fine quartz, mica, opaques
(2) yellow-orange (PPL, XP) (x40); rare quartz, calcite.

Amorphous Concentration Features (Acf)
Rare: **burnt/partially burnt organics**, sr-r, equant.

Comment
This fabric is characterised by a groundmass rich in fine quartz and foraminifera, containing chert, biotite, quartz-biotite schist, micrite. This groundmass is dominated by a biomicrite and grog temper and it is these features which distinguish Fabric 2e. The groundmass of Fabric 2e is very close to that of Fabric 2b; indeed that of sample 98/49 (Fabric 2b) and sample 97/46 are indistinguishable. Comparison of clay pellets suggests that this groundmass was produced by mixing a calcareous clay rich in foraminifera and containing rare rounded quartz with a non-calcareous quartz-rich clay containing chert, biotite and quartz-biotite schist. This sort of mix was also suggested for Fabrics 2b and 37. For provenance see on Fabric 2b.

(3) Fabric 1b + Fabric 1d

Sample: 97/140

Comment
Sample 97/140 contains a join between a coil in Fabric 1b and a coil in Fabric 1d. It therefore adds to the other links between these two groups (see on Fabrics 1a-c, 1d-f). The join between the two coils occurs at the point of carination: this would be an obvious point at which to pause in forming not only because it allowed the lower part of the vessel to dry and thus gain structural strength prior to the next stage of forming, but also because it facilitated the abrupt change of direction in forming necessitated by the carination. Clear clay layers can be seen forming the outer and inner surfaces of 97/140. These are in Fabric 1b, even when they overlie Fabric 1d and suggest that the final creation of the surface took place using an added clay layer (in Fabric 1b) after the formation of the section of the vessel which was formed using Fabric 1d.

(4) Low/Non Calcareous, Rounded Quartz and Chert, Micrite

Samples: 97/25, 98/25, 98/73

Microstructure
Very few to rare mega to meso planar voids, rare mega to meso vughs. Some voids are surrounded by darker patches, some contain opaque material (e.g. 98/25). Voids and inclusions exhibit local long-axis parallel orientation (e.g. 98/73); the angle of this orientation may vary. Voids and non-plastic inclusions are close to single-spaced.

Groundmass
Fabric is homogenous. Colour varies from yellow-orange or orange (PPL, XP) (x40) to dark brown (PPL, XP) (x40). Micromass varies in optical activity from medium (97/25) to low (98/73).

Inclusions
$c:f:v_{10\mu m}$ c.25:70:5 to 30:65:5
Coarse fraction = 2.6mm. to 0.1mm.
Fine fraction = 0.1mm or less

Coarse Fraction
Dominant: **micrite**, a-sr, equant to elongate; sometimes with iron concentrations; sometimes contains discrete clasts of rounded quartz, epidote, siltstone/sandstone, feldspar (e.g. 98/73); some examples are more coarse and approach a very fine sparite; very rarely bioclastic (e.g. 98/73). Size = 2.6 to 0.1mm.
Very few to very rare: **fine-grained sparite**, a-sa, equant to elongate. Size = 2.6 to 0.1mm.
Few: **monocrystalline quartz**, r, equant. Size = 0.4 to 0.1mm.
Rare: **polycrystalline quartz**, r, equant. Size = 0.4mm to 0.1mm.
Rare: **chert**, r, equant to elongate. Size = 0.5mm to 0.1mm.
Rare: **alkali feldspar**, r, equant. Size = 0.4 to 0.1mm.
Rare: **plagioclase feldspar**, r, equant. Size = 0.25 to 0.1mm.
Rare to very rare: **quartz-biotite schist**, r, equant. Size = 0.3 to 0.4mm.
Very rare: **biotite mica**, sr, elongate. Size = 0.15 to 0.1mm.
Very rare: **epidote**, r, equant to elongate. Size = 0.15 to 0.1mm.
Very rare: **opaques**, r, equant. Size = 0.25 to 0.1mm.

Fine Fraction
Frequent: **calcite/micrite**.
Very few to rare: **quartz**.
Rare: **biotite mica**.
Rare: **chert**.
Rare: **opaques**.
Very rare: **epidote**.

Amorphous Concentration Features (Acf)
Rare (98/25) to absent: **burnt/partially burnt organics**.

Comment
This fabric is characterised by a groundmass rich in rounded quartz, chert and quartz-biotite schist, which is dominated by micrite temper. The colour of groundmass varies from yellow-orange to orange, which suggests a low calcareous or non calcareous clay (see Chapter 8 for confirmation). The quartz, chert and schist component of Fabric 4 exhibits a narrow size range (0.4 to 0.1mm) and is well sorted. This material could possibly derive from the clay used or have been added as sand; however, the presence of rounded grains of quartz, chert and sandstone/siltstone within the added micrite inclusions (see 98/73) would seem to suggest that this sandy material derived from the micrite temper. The presence of micrite, often with iron concentrations and sometimes containing discrete clasts of quartz links Fabric 4 generally with Fabrics 1a-i and Fabric 2b. However, in none of the fabrics is this sort of micrite as common as in Fabric 4; moreover the groundmass of Fabric 4 is unlike the groundmasses of Fabrics 1a-i and 2a-e (no ostracods, foraminifera). The samples of Fabric 4 also comprise a very good macroscopic group since they have all been covered in a white slip prior to burnishing (see Chapter 8). Fabric 4 unfortunately contains no material diagnostic of a specific origin, although there is nothing inconsistent with a local provenance.

(5a) Low Calcareous, Fine Quartz, Biotite/Muscovite, Micrite/Calcimudstone

Samples: 97/9, 97/15, 97/23, 97/29, 97/48, 97/52, 97/87, 97/93, 97/95, 97/98, 97/99, 97/112, 97/113, 97/114, 97/123, 97/128, 97/129, 98/39, 98/41, 98/52, 98/63

Microstructure
Few to very rare mega to meso planar voids, very few to very rare mega to meso vughs. Very rarely (e.g. 97/15) these voids are calcite-filled or have a calcite lining. Voids generally exhibit local long-axis parallel orientation with inclusions, however this relationship may be at any angle with the vessel margins and different local arrangements may exist within a single section. In 97/9 the orientation of voids and inclusions curves round roughly following the curve of the rim and vessel margins. Voids and inclusions are close to single-spaced.

Groundmass
Groundmass is generally homogenous within single samples but may vary between samples: some samples are rich in quartz, mica (muscovite, biotite) and schist (e.g. 97/52) others are not (e.g. 97/99). Colour varies from orange in PPL (x40) and orange-red (XP) to very dark-brown/black (PPL, XP) (x40). Sample 97/9 has a dark-brown to black (PPL) (x40) core and a dark red outer (PPL) (x40). The size and frequency of non-plastics and voids also varies. Likewise the micromass varies in optical activity from very low to medium (97/29, 97/114,

97/123, 98/41, 98/63) to high (97/23). The b-fabric, where visible, tends to be thin and locally granostriated/porostriated (e.g. 97/114, 98/63).

Inclusions

c:f:$v_{10\mu m}$ c.20:77:3 to 30:64:6
Coarse fraction = 3.0mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction

Predominant (97/123) to frequent: **micrite/calcimudstone**, sa-sr, equant to elongate, well-sorted, unimodal. The micrite sometimes has a bedding structure so that it appears to grade into a calcimudstone; often contains foraminifera and other bioclastic material; also contains concentrations of calcite (rounded micrite, sparite), radiolarians(?) infilled with chalcedonic quartz (e.g. 97/52) and more rarely small (c.0.05mm) grains of monocrystalline quartz and mica. Sometimes when mica is more frequent and parallel extinction can therefore be measured, it appears that the calcimudstone may be very slightly metamorphosed (e.g. 97/48). Size = 3.0mm. to 0.2mm., mode = 0.5mm.
Very few (97/9) to very rare: **monocrystalline quartz**, sa-sr, equant, moderately sorted. Size = 1.1mm (97/9) to 0.2mm.
Very few (97/9) to very rare: **polycrystalline quartz**, equant to elongate, well-sorted, sa-r; sometimes resembles a coarse chert. Size = 2.0 (97/9) to 0.2mm.
Very few (97/9) to absent (97/15): **chert**, sa-r, equant to elongate; medium to coarse-grained; sometimes in association with clasts of alkali and plagioclase feldspar (cf. 97/9). Size = 1.1 to 0.2mm, mode = 0.4mm.
Few (97/52) to very rare: **quartz-mica schist**, sa-r, equant to elongate; contains quartz, biotite, muscovite and opaque material; low grade metamorphism. Size = 2.0mm to 0.2mm, mode = 0.4mm.
Rare (97/52) to absent: **muscovite**, a, laths. Size = 0.5 to 0.2mm.
Very rare to absent: **siltstone/pelite**, sr, equant. Generally contains sa-sr quartz/meta-quartz, calcite and mica; retains structure of siltstone. Size = 1.5mm to 0.3mm. (97/15, 97/29, 97/87, 97/99).
Rare (97/98) to absent: **sparite**, sa-sr, equant to elongate. Size = 1.5mm to 0.2mm.
Very rare to absent: **monocrystalline calcite**, a, equant. Size = 0.7mm to 0.2mm.
Rare (97/98) to absent: **micrite with iron concentrations**, r, equant to elongate; sometimes contains discrete clasts of quartz. Size = 2.0 to 0.2mm.
Rare (97/9) to absent: **plagioclase** and **alkali feldspar**, sa-sr, equant to elongate. These are most common as single grains but occasionally are found associated together. Alkali feldspars sometimes enclose mica laths. Size = 0.8mm to 0.2mm
Very rare: **iron oxide**, sa-sr, equant to elongate, size = 0.9 to 0.2mm.

Fine Fraction

Dominant to few (97/99): **monocrystalline quartz**.
Common to few: **polycrystalline quartz**.
Common to few: **muscovite/biotite**.
Very few to very rare: **micrite/calcite**.
Very few to rare: **chert**.

Rare: **iron oxide**.
Very rare to absent: **epidote**.
Very rare to absent: **quartz-mica schist**.
Very rare to absent: **plagioclase feldspar**.
Very rare to absent: **alkali feldspar**.
Rare to very rare: **foraminifera**.

Textural Concentration Features
Few (97/123) to very rare: **clay pellets**, sr-r, usually equant with high sphericity, sharp to clear boundaries. Colour varies from orange-red (PPL) (x40) and red (XP) to dark brown in PPL (x40) and black (XP) (cf. 98/63). Size = 2.5 to 0.2mm., mode = 0.3mm. Two types are identifiable:
(1) fine clay containing rare fine quartz and biotite (e.g. 98/39);
(2) quartz-rich, also containing biotite, chert and quartz-mica schist fragments (e.g. 97/93, 97/113, 98/41).

Amorphous Concentration Features
Very few (98/63) to very rare: **burnt/partially burnt organics**; sample 98/63 contains several examples of elongate unburnt/partially burnt organic (largest 0.7mm) in planar voids.

Comment
This fabric is characterised by a groundmass which is usually rich in quartz and also contains biotite, muscovite, chert and quartz-mica schist fragments. Groundmass is homogenous within samples but varies between samples from those which are rich in quartz, mica and schist (e.g. 97/52) to those where quartz, mica and schist are more rare (e.g. 97/99). All of these samples are however linked by the dominant presence of a distinctive bioclastic micrite/calcimudstone temper. Study of clay pellets strongly suggests the use of two clays: a fine red clay containing only rare fine quartz and mica and a coarser red clay rich in quartz and mica and containing also chert and quartz-mica schist. This latter clay therefore seems to be the most likely source of the sometimes large rounded quartz-mica schist grains. The mixing of two clays in different proportions would help to explain the differences in groundmass noted above. Fabric 5a is distinctive and shares few similarities with other fabrics. The presence of micrite with iron concentrations links it generally to Fabrics 1a-i, 2b and 4. However, it differs in all other respects from these groups (groundmass, large non-plastics). Fabric 5b has similar large limestone inclusions to Fabric 5a, however it has a groundmass which is richer in foraminifera.

There is some indication that thicker walled burnished vessels have non-plastic inclusions at the upper end of the size range (e.g. 97/9, 97/87, 97/112, 97/123, 98/39), while thinner walled polished vessels have inclusions at the lower end. However there are several borderline cases (e.g. 97/52, 97/93, 98/52), which demonstrate that this is only a tendency and *not* a clear distinction. No clear examples of coil-joins could be identified, but structural discontinuities observed in a number of samples would be consistent with coil forming. Areas of differential birefringence near the surfaces of some samples suggest that surfaces were compacted during polishing (e.g. 97/23, 97/114 98/63); on some (i.e. 97/93, 97/95, 97/128) there is also a layer which appears too thin (0.01-0.02mm) to be a slip and may be a thin layer of fine clay created by the process of burnishing or polishing; in one example there appears to be a non-calcareous slip layer (97/48), however this layer also contains quartz and may therefore not so much a slip as a more plastic version of the body. Some vessels were also incised: the incision in 97/99 appears to have been done with a tool with square-shaped tip, while the scoring in 97/98 was done with a tool with curved tip. The variety in the degree of optical activity and the colour range suggests that vessels were fired to a variety of temperatures and were exposed to a variety of atmospheres (oxidising to reducing). In many samples there are traces of burnt, partially burnt and even unburnt organic material. These features would be consistent with fast firing in an open environment.

The raw materials present in this fabric (biotite, muscovite and quartz-mica schist) originate in low grade metamorphic deposits whose source cannot be within the immediate area of Knossos (c.0-5km) (see Appendix III). Instead these would seem to link to rocks of the Phyllite-Quartzite series, the nearest outcrops of which are to the east or west of the Herakleion basin or possibly around Iouktas (see Appendix III). The frequently bioclastic micrite/calcimudstone temper would be compatible with a source somewhere in north-central Crete. The presence of micrite with iron concentrations may suggest a source within the same general area as Fabrics 1a-i, 2a-e and 4. A source within the general area (>5km) of Knossos is also suggested by the high frequency with which this fabric consistently occurs at Knossos (see Chapter 9). In addition the clay component rich in quartz and containing quartz-mica schist may have parallels in an EMIIB cooking pot fabric at Knossos (i.e. Group 4, Wilson & Day 1999:38-9, 50-2).

(5b) Low/ Non Calcareous, Fine Quartz, Foraminifera, Micrite/Calcimudstone

Sample: 98/9

Microstructure
Very rare meso planar voids, very few mega to meso vughs. Some voids contain opaque, possibly organic material. Inclusions exhibit local long-axis parallel orientation; the angle of this orientation varies from parallel to perpendicular to vessel margins, forming what appears to be a curve. Inclusions are close to single-spaced.

Groundmass
Colour is yellow to orange-yellow (PPL, XP) (x40). The micromass is very mildly optically active.

Inclusions
c:f:$v_{10\mu m}$ c.30:65:5
Coarse fraction = 2.2mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Dominant: **bioclastic micrite limestone**, sa, equant to elongate; fine-grained, show bedding structures; occasionally contain tiny rounded isolated clasts of calcite, quartz, opaques. Size = 2.2mm to 0.2mm.
Few: **foraminifera/large shell frags.**. Size = 0.9 to 0.2mm
Very rare: **sparite**, sr, equant to elongate; also contains shell fragment. Size = 1.8mm.
Rare: **micrite with iron concentrations**, sr, equant; some contain quartz. Size = 1.75 to 0.2mm.
Rare: **monocrystalline calcite**, r, equant to elongate. Size = 0.4 to 0.2mm
Rare: **chert**, r, elongate. Size = 0.4mm
Rare: **opaques**, sa-r, equant to elongate; sometimes contain fine quartz. Size = 0.45 to 0.25mm.
Very rare: **plagioclase**, r, elongate. Size = 0.4mm

Fine Fraction
Frequent: **micrite/calcite**
Frequent: **monocrystalline quartz**
Few: **foraminifera**
Very few: **mica**
Very few: **chert**
Rare: **opaques**
Very rare: **plagioclase**

Textural Concentration Features (Tcf)
Rare: **clay pellets**, r, equant, high sphericity; colour is red to red brown (XP) (x40); clear boundaries. Size = 0.5 to 0.1mm. Two types are identifiable:
(1) red, quartz-rich, also contains biotite mica, quartz-mica schist, opaques;
(2) red, rich in foraminifera, also contains rare quartz.

Comment
This fabric is characterised by a groundmass rich in quartz and foraminifera, also containing mica, chert and micrite with iron concentrations. This groundmass is dominated by micrite limestone which link this fabric to Fabric 5a. However the groundmass of 5b differs from 5a in the frequent presence of foraminifera. Study of clay pellets suggests that these derive from one component of a mix of two clays: one rich in quartz, containing mica and quartz-mica schist (similar to one of the clay components of Fabric 5a) and one containing little quartz and mica, but rich in foraminifera. In view of the connections noted with Fabric 5a it is likely that Fabric 5b and 5a share the same provenance.

(5c) Low/Non Calcareous, Calcareous Sandstone/Siltstone

Sample: 98/57

Microstructure
Very few mega to meso vughs, rare meso planar voids. Some voids are surrounded by darker patches. Inclusions and voids exhibit local long-axis parallel

orientation; the angle of this orientation varies from parallel to perpendicular to vessel margins. Inclusions are close to single-spaced.

Groundmass
Colour is brown (PPL) (x40) and brown-red (XP). The micromass is strongly optically active. B-fabric is medium to thick granostriated/porostriated.

Inclusions
c:f:$v_{10\mu m}$ c.27:68:5
Coarse fraction = 2.0 mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Dominant: **calcareous siltstones**, a-sr, equant to elongate; well-sorted; grain size is 0.05mm or less; consists of rounded quartz, mica, calcite, opaques; high sphericity; matrix-supported; mica shows varying orientation. Size = 2.0 to 0.2mm, mode = 0.7mm.
Rare: **monocrystalline quartz**, sr-r, equant to elongate. Size = 0.4 to 0.2mm
Very rare: **polycrystalline quartz**, sr, equant. Size = 0.2mm
Very rare: **quartz-biotite schist**, sr, equant. Size = 0.2mm.
Very rare: **opaque**, r, equant; contains quartz, mica. Size = 0.25mm to 0.2mm

Fine Fraction
Dominant: **monocrystalline quartz**.
Very few: **chert**.
Few: **calcareous siltstone**.
Few: **mica**.
Rare: **opaques**.
Very rare: **alkali/plagioclase feldspar**.
Very rare: **epidote**.

Amorphous Concentration Features (Acf)
Rare: **burnt/unburnt burnt organics**; several voids contain organic material.

Comment
This fabric is characterised by a red-firing clay groundmass, rich in fine quartz with mica and chert and dominated by calcareous siltstones. The groundmass is not unlike that of Fabric 5a (quartz rich, micaceous, quartz-biotite schist); no parallels however are possible for the large calcareous siltstone non-plastics, which appear to have been added as temper.

(6) Non-Calcareous, Quartz-Rich, Altered Volcanics, Siltstone/Sandstone, Dolerite

Samples: 97/8, 97/13, 97/21, 97/45, 97/67, 97/68, 97/74, 97/80, 97/96, 97/97, 98/12, 98/13, 98/14, 98/15, 98/16, 98/18, 98/23, 98/31, 98/61, 98/64, 98/100

Microstructure
Very few to rare macro to meso vughs and very few to very rare macro to meso planar voids. Voids are single to double-spaced. In many samples (e.g. 97/9, 97/45, 97/96, 98/16, 98/31, 98/68, 98/100) planar voids are locally oriented parallel to each other and vary from parallel to c.45° to vessel margins. The angle may vary between different areas of the same sample. In some samples (e.g. 97/9, 97/45, 97/68, 97/96, 98/16, 98/18, 98/100) the larger non-plastics exhibit a crude orientation parallel to the planar voids. Inclusions are close to single-spaced.

Groundmass
Groundmass is generally homogenous within single samples, but may vary between samples from one rich in schist (e.g. 97/68) with no igneous rocks, to one with igneous rocks (e.g. 97/8, 98/18); others are richer in sandstone (e.g. 97/13) or siltstone/pelite (e.g. 97/74, 97/80). Usually there is colour variation between cores and margins (e.g. 97/8, 97/13, 97/45, 98/14, 98/23, 98/61, 98/64). Generally colour varies from orange margins in PPL (x40) and orange-red in XP to dark brown cores in both PPL (x40) and XP. However samples 97/21 and 97/97 are entirely dark brown in PPL (x40) and dark brown to black in XP. Colour variation is particularly striking in sample 98/61, where in XP a dark brown core is 'sandwiched' between an orange-red outer. The micromass varies in optical activity from low to high (97/68, 98/13, 98/15, 98/18, 98/31). Thin to medium parallel striated b-fabric present in samples 98/16, 98/18, 98/31; thin to medium porostriated b-fabric in samples 97/8, 97/13, 97/67, 97/68, 97/96, 98/13, 98/64, 98/100.

Inclusions
c:f:$v_{10\mu m}$ c.25:72:3 to 30:64:6
Coarse fraction = 3.0mm to 0.2mm
Fine fraction = 0.2mm or less

Coarse Fraction
Frequent to very few: **altered volcanic rock fragments**, a-sa, equant to elongate; generally composed of plagioclase feldspar laths within a devitrified groundmass; often these are altered (chloritised e.g. 98/12; serpentinised e.g. 98/18) sometimes to biotite (e.g. 98/64). Probably originally a basalt. May sometimes contain calcite in the interstices (e.g. 98/12); in sample 97/68 there is a large (2.75mm) altered calcite-rich rock fragment; more rarely texture is porphyritic with discrete rounded altered volcanic phenocrysts set within a mica-rich matrix (e.g. 98/31). Size = 2.75 to 0.2mm.
Very few (97/8, 98/18) to absent: **igneous rock fragments (dolerite)**, sa-r, equant to elongate; usually rounded; contain clinopyroxene with laths of plagioclase, sometimes with an ophitic texture, also contains biotite, amphibole and rarely clinozoisite (97/67): resembles dolerite (e.g. 97/96) or basalt. Some of these also appear to be chloritised/serpentinised (e.g. 98/13, 98/23). Size = 3.0 to 0.2mm.
Rare to absent: **serpentinite**, sa-sr, equant to elongate; (cf. 97/45, 98/12, 98/18, 98/64). Size = 1.5 to 1.0mm.
Few (97/13, 97/96) to absent (98/12): **sandstone**, sa-sr, high sphericity; mostly fine-medium sandstone, some grade into siltstone; fairly well sorted; contains

predominantly quartz, some feldspar and occasional mica, chert and opaques; grain-supported with little matrix; grains are generally sa-sr, equant (some elongated) with low sphericity. More rarely (e.g. 97/96) sandstone has been partially metamorphosed to form biotite laths which are aligned to form a schistocity. Size = 2.35 to 0.2mm.

Few (97/74, 98/61) to absent (98/12): **siltstone/pelite**, sr-r, equant to elongate; contains quartz and biotite; varies from red-brown matrix-supported bedded structure to a grain-supported well-sorted structure; example in 97/45 shows interface between these two structures; some appear to be siltstones (e.g. 97/45), but more usually partially metamorphosed to form biotite laths which show parallel alignment (pelite). Size = 2.75 to 0.2mm.

Few (97/68) to very rare: **quartz-biotite/muscovite schist**, a-r, equant to elongate; sometimes also contain opaques. Size = 1.6 to 0.2mm.

Very few: **monocrystalline quartz**, sa-r, equant. Size = 0.9mm to 0.2mm.

Very few to rare: **polycrystalline quartz**, a-r, equant to elongate. Size = 1.6 to 0.2mm.

Rare (97/68) to very rare: **biotite mica**, sr-r, elongate. Size = 1.25 to 0.2mm.

Very few (97/8) to very rare: **chert**, sr, equant to elongate; some contain calcite or mica (97/96); sometimes has a muddy brown appearance (brown chert) (e.g. 98/16); one example contains radiolarians(?) infilled with chalcedonic quartz (98/16). Size = 3.0mm to 0.2mm

Very few (98/100) to absent: **micrite**, sr-r, equant to elongate; sometimes with iron concentrations; sometimes contains discrete clasts of quartz or plagioclase feldspar. Size = 1.75 mm to 0.2mm.

Very rare to absent: **epidote**, r. Size = 0.25 to 0.2mm.

Very rare (97/8, 97/74, 97/80) to absent: **foraminifera**. Size = 0.2mm.

Rare to very rare: **plagioclase feldspar**, sa. Size = 0.7 to 0.2mm.

Rare to very rare: **alkali feldspar**, sr-r; usually associated with mc/pc quartz or plagioclase, sometimes poikilitic enclosing laths of mica (98/13). Size = 0.5 to 0.2mm.

Very rare (98/13) to absent: **pyroxene**, sa. Size = 0.75 to 0.2mm.

Very rare (97/8) to absent: **olivine**, r. Size = 0.25mm.

Very rare (97/8, 97/96) to absent: **amphibole**, sa. Size = 0.3 to 0.2mm.

Very rare (97/13) to absent: **chlorite pseudomorph**, equant, sr. Size = 0.3mm.

Very rare (e.g. 98/12, 98/31) to absent: **opaques**, usually containing quartz grains. Size = 0.75mm to 0.2mm.

Very rare (98/61) to absent: **radiolarian test(?)**; infilled with chalcedonic quartz. Size = 0.55mm.

Fine Fraction

Dominant: **monocrystalline quartz**.

Common: **polycrystalline quartz**.

Common to few: **biotite**.

Very few to rare: **plagioclase/alkali feldspar**.

Very few to rare: **chert**.

Rare **epidote**.

Rare **opaques**.

Rare to absent: **micrite**.

Rare: **igneous rock fragments**.
Very rare to absent: **pyroxene**.
Very rare to absent: **olivine**.
Very rare to absent: **amphibole**.
Very rare (98/13) to absent: **foraminifera**.

Textural Concentration Features (Tcf)
Rare to absent: **clay pellets**, sr-r, equant; diffuse to clear boundaries; low to medium optical density. Size = 2.2mm to 0.1mm. Two main types are identifiable:
(1) orange to brown (XP x40), fine quartz, pyroxene, biotite, feldspar, containing igneous rock fragments (plagioclase, alkali feldspar, clinopyroxene, biotite = dolerite or basalt?) (e.g. 97/8, 97/45, 97/67, 98/16); igneous rock fragments are sometimes rounded (e.g. 97/8, 97/67); also contains some calcite (e.g. 97/8);
(2) orange-red to dark brown (PPL, XP x40), contains quartz, biotite, r quartz-mica schist, r pelite, brown chert (e.g. 97/96, 98/13).

Amorphous Concentration Features (Acf)
Rare to very rare: **burnt/partially burnt organics**; sample 98/31 contains voids in shape of organics; 97/67 has a single macro channel with smudged edges; 98/12 contains unburnt organic material (0.3mm). Size = 0.5 to 0.2m.

Comment
This fabric is characterised by a groundmass which is red-firing (non-calcareous?), rich in quartz, chert and mica and variously containing igneous rock fragments (dolerite), sandstone, siltstone/pelite, sandstone. This groundmass is dominated by altered volcanic rock fragments which, to judge by their angularity and size distribution were added as temper. The groundmass is generally homogenous within single samples, but may vary between samples from one rich in schist (e.g. 97/68) with no igneous rocks, to one with igneous rocks (e.g. 97/8, 98/18); others are richer in sandstone (e.g. 97/13) or siltstone/pelite (e.g. 97/74, 97/80). Study of clay pellets suggests that two clays were mixed: one orange-red (non-calcareous?) containing fine quartz, pyroxene, biotite, feldspar and dolerite and more rarely calcite; the other red (non-calcareous?) containing quartz, biotite, rounded quartz-mica schist, rounded pelite, brown chert. The mixing of these two clays in varying proportions would help to account for the variability observed in groundmass. Fabric 6 is distinctive and shares no obvious similarities with any other fabric. One might have expected to observe a relationship with Fabric 10 (serpentinite), however the groundmass of Fabric 10 is quite different (mafic rocks) from that of Fabric 6 (dolerite, sandstone, siltstone/pelite). The closest fabric to Fabric 6 is Fabric 7 which shares similar dolerites (cf. 98/12 (Fabric 6) to 97/14 (Fabric 7)); however Fabric 7 lacks altered volcanic rocks and is instead dominated by fine-grained sparite.

No clear examples of coil building were noted. Several samples have areas of differential birefringence near their surfaces, which suggest that compaction due to burnishing or polishing has taken place (e.g. 98/31, 97/80, 97/13, 98/13); some samples have a very thin (0.01 to 0.02mm) layer, which looks like a non-calcareous slip layer (e.g. 98/16, 98/18). It remains possible, however, that this layer is a natural result of intensive burnishing or polishing.

The variation in colour both within and between samples suggests that during firing vessels were exposed to a range of atmospheres (oxidising/reducing). Samples exhibit a range of optical activity from low to high. In most samples there are traces of burnt or partially burnt organic material. All of these features are consistent with fast firing in an open environment.

The raw materials present in this fabric (altered volcanic rocks, dolerite, quartz-mica schist, siltstone/pelite, sandstone) originate in deposits whose source cannot be within the immediate area of Knossos (c.0-5km) (see Appendix III). The quartz-mica schist and siltstone/pelite would seem to link to rocks of the Phyllite-Quartzite series, the nearest outcrops of which are to the east or west of the Herakleion basin or possibly around Iouktas (see Appendix III). The distinctive altered volcanic and doleritic inclusions may have an origin within the ophiolite series of Central Crete, the nearest outcrops of which are in the foothills of mount Ida or near Galeni and Roukani to the south of mount Iouktas (see Appendix III). The generally high frequency with which Fabric 6 occurs at Knossos (see Chapter 9) may suggest that its source is not too distant from Knossos. A broadly local north-central Cretan provenance is suggested by similarities between Fabric 6 and an EMIIB cooking pot fabric from Knossos (i.e. Group 3, Wilson & Day 1999:48-50).

(7) Non-Calcareous, Fine Quartz, Dolerite, Fine-Grained Sparite

Samples: 97/6, 97/14, 97/17, 97/26

Microstructure
Rare to very rare macro to meso vughs and rare to very rare meso planar voids. Some voids are surrounded by darker brown patches, others contain opaque material (e. 97/17). Inclusions are close to single-spaced.

Groundmass
Fabric is homogenous. Colour is orange-red to brown (PPL, XP x40). The micromass is optically active. B-fabric is thin porostriated granostriated.

Inclusions
$c{:}f{:}v_{10\mu m}$ c.25:70:5
Coarse fraction = 2.0mm to 0.2mm
Fine fraction = 0.2mm or less

Coarse Fraction
Dominant to frequent: **fine-grained sparite**, a-sa, equant to elongate; grain-size c.0.05 to 0.4mm, mode 0.1mm) in sample 97/6 some sparite has been altered (see below on secondary calcite alteration). Size = 1.9 to 0.2mm.
Few to rare: **igneous rock fragments (dolerite)**, sa-r, equant to elongate; usually rounded; contain laths of plagioclase with biotite, amphibole, clinopyroxene; sometimes with an ophitic; resembles dolerite. Some of these also appear to be chloritised/serpentinised (e.g. 97/26). Size = 1.4 to 0.2mm.
Few to rare: **altered volcanic rock fragments**, a-sa, equant to elongate; generally composed of plagioclase feldspar laths within a devitrified groundmass;

often these are altered (chloritised e.g. 97/26). Probably originally a basalt. Size = 1.4 to 0.2mm.
Rare to very rare: **monocrystalline quartz**, sa-sr, equant. Size = 0.6 to 0.2mm.
Rare to very: **polycrystalline quartz**, r, equant to elongate. Size = 1.7 to 0.2mm.
Rare: **chert**, sa-sr, equant to elongate. Size = 2.0 to 0.2mm
Very rare (97/6): **sandstone/siltstone**, r, equant; contains predominantly quartz, some mica, chert and opaques; grain-supported with little matrix; grains are generally sa-sr, equant (some elongated) with low sphericity. Size = 0.9 to 0.2mm.
Very rare (97/6): **quartz-biotite schist**, sr, elongate. Size = 0.7mm.
Very rare (97/6): **monocrystalline calcite**, sa, equant to elongate. Size = 0.6 to 0.2mm.
Very rare (97/17) to absent: **opaques**, r, equant. Size = 0.2mm.

Fine Fraction
Frequent: **quartz**.
Common to rare: **calcite**.
Rare: **chert**.
Rare: **plagioclase feldspar**.
Rare: **alkali feldspar**.
Rare: **biotite**.
Rare: **epidote**.
Rare: **igneous rock fragments**.
Very rare: **opaques**.

Textural Concentration Features (Tcf)
Very rare to absent: **clay pellets**, sr-r, equant; diffuse to clear boundaries; low to medium optical density; orange-red (XP x40), contain quartz, pyroxene, biotite, rounded igneous rock fragment. Size = 0.3mm to 0.1mm.

Amorphous Concentration Features (Acf)
Rare to absent: **burnt/partially burnt organics**; in sample 97/17 void has shape of organic and still contains some opaque material.

Comment
This fabric is characterised by a groundmass which is red-firing (non-calcareous), rich in quartz and also contains altered volcanic rocks, dolerite and sandstone. This clay groundmass is dominated by a coarse fine-grained sparite temper. The fabric is homogenous with little variation in groundmass or large non-plastics between samples. The groundmass is very similar to the dolerite-rich clay component of Fabric 6. Fabric 7 however has very little quartz-mica schist and siltstone pelite, characteristic of the other clay component of Fabric 6. The absence of this material may suggest that Fabric 7 is formed from only one of the clay components of Fabric 6. Study of clay pellets would also support this. The sparite closely resembles that found in Fabrics 1a-c. Some of the sparite in 97/6 has been altered to form micritic clots, which retain only a relict primary sparite structure. This suggests that some alteration of calcite occurred during firing,

which may in turn indicate that this vessel was exposed to temperatures exceeding c.800°C. See on Fabric 6 for likely provenance.

(8) Non-Calcareous, Quartz-Rich, Siltstone/Pelite, Micrite

Samples: 97/1, 97/19, 97/20, 97/31, 97/35, 97/47, 97/69, 97/70, 97/75, 97/94, 98/8, 98/11, 98/19, 98/28, 98/30, 98/45, 98/46, 98/55, 98/59, 98/60, 98/66, 98/93

Microstructure

Very few to rare macro to meso vughs and few (98/11) to rare mega (98/46) to meso planar voids. Voids are single to double-spaced and are generally oriented parallel to the long-axis of the large non-plastic inclusions. Voids usually remain free from calcification; a rare exception being 98/28. Inclusions are close to single-spaced and generally exhibit local long-axis parallel orientation varying between parallel to vessel margin (e.g. 97/1, 97/31, 97/47, 97/75, etc.) to almost perpendicular to vessel margin (e.g. 97/20, 98/66, 97/75). Sometimes inclusions are oriented in a curve (e.g. 98/66).

Groundmass

Groundmass is generally homogenous within single samples but may vary between samples: some samples are rich in sparite (e.g. 98/27), others are not (e.g. 98/59); some are rich in quartz (e.g. 97/70) others are not so rich (e.g. 98/19). Colour also varies from red-orange (PPL) (x40) and orange-red (XP) to dark brown (PPL) (x40) and very dark brown/black (XP). Several samples (e.g. 97/1, 97/69, 98/28) show strong colour differentiation either between core and outer or between interior and exterior. The micromass varies in optical activity from low (e.g. 97/1) to high (e.g. 98/19, 98/93). B-fabric is generally medium to thick porostriated/granostriated.

Inclusions

$c{:}f{:}v_{10\mu m}$ c.25:72:3 to 30:63:7
Coarse fraction = 6.30mm to 0.25mm.
Fine fraction = 0.25mm or less.

Coarse Fraction

Dominant to frequent: **siltstone/pelite** (partially metamorphosed siltstone), sa-r, equant to elongate. Generally rock fragments display parallel extinction but within an intact well-sorted sedimentary structure varying from siltstone to a fine sandstone with a matrix-supported texture. Usually individual clasts of quartz, mica, calcite, feldspar, generally exhibiting high sphericity, are set within a clay-rich matrix with long-axis orientation parallel to the bedding lines. Sometimes clay-rich beds alternate with bands of chert (e.g. 98/30). More often these beds are interspersed with areas grading into a **fine sandstone/psammite** (e.g. 98/60), which are grain-supported and rich in larger (0.05mm to 0.25mm) clasts of quartz (both monocrystalline and polycrystalline metamorphosed quartz), biotite mica, chert, feldspar and rarely calcite (e.g. 97/20, 98/66, 97/75, 98/30); sometimes these areas appear to be metamorphosed (e.g. 98/8). Siltstone/pelite beds are also regularly interspersed with areas rich in calcite (sparite) (e.g. 98/66) and more rarely with chert (e.g. 98/30). Size = 6.30 to 0.25mm.

Rare (97/35) to absent: **fine sandstone**, sr, elongate; grain-supported, contains quartz, plagioclase, biotite. Size = 1.3 to 0.4mm.

Very few to absent: **calcareous siltstone**, sa, equant to elongate; contains predominantly a-r clasts of quartz, biotite and calcite in a calcareous matrix; varies in texture from grain-supported (e.g. 98/55) to matrix-supported (e.g. 98/30, 98/66). Sometimes found in association with siltstone/pelite and may therefore derive from the same source as the siltstone/pelite rocks discussed above. Size = 3.75mm (98/55) to 0.25mm

Few (98/27) to absent: **sparite**, sr, equant to elongate; usually fine-grained (c.0.05mm); sometimes sparite is very coarse-grained (c.0.2-0.3mm), more angular and resembles calcitic areas within the siltstone/pelite non-plastics; sometimes this more angular and coarse-grained sparite is in association with a siliceous matrix (e.g. 98/60) not unlike that of the siltstone/pelite non-plastics. This coarser sparite may therefore derive from this source. Size = 2.4 to 0.25mm.

Rare to very rare: **monocrystalline calcite**, a-sa, equant to elongate. Size = 0.6 to 0.25mm.

Rare to very rare: **micrite with iron concentrations**, r; often contains rounded clasts of quartz, more rarely chert, plagioclase, foraminifera. Size = 5.6 to 0.25 mm.

Very rare to absent: **foraminifera**. Size = 0.4 to 0.25mm.

Rare to absent: **biomicrite**, sa-sr, equant to elongate (cf. 97/20, 98/28). Size = 0.6 to 0.25mm.

Rare: **monocrystalline quartz**, sa-r, equant to elongate. Size = 1.25 to 0.25mm.

Rare: **polycrystalline quartz**, a-r. sometimes with sutured contacts (e.g. 98/60, 98/66). Size = 1.25 to 0.25mm.

Rare to very rare: **chert**, sa-r: usually fine-grained but also in association with close-spaced clasts (0.35 to 0.01mm) of quartz, alkali and plagioclase feldspar (e.g. 98/66, 97/20, 97/75). Chert is occasionally found within fragments of siltstone/pelite (see above) (e.g. 98/30). Size = 1.5mm to 0.25mm.

Very rare to absent: **quartz-biotite schist**, r, equant to elongate; example in 97/20 exhibits crenulation cleavage (see 97/20, 97/55, 97/70, 97/94, 98/11). Size = 1.0 to 0.4mm.

Very rare (98/60) to absent: **igneous** rock fragments, sr-r. These vary in texture and composition. Sample 98/60 contains a fragment of a medium to fine-grained rock, containing plagioclase feldspar and pyroxene (dolerite?). One example in 97/75 contains laths of plagioclase (0.3mm to 0.05) in a yellow (biotite-rich) matrix (diorite?). An example in 98/46 contains plagioclase laths, alkali feldspar, quartz (diorite?). Size = 0.85mm to 0.25mm.

Very rare to absent: **plagioclase/alkali feldspar**, sa-sr. Size = 1.1 to 0.25mm.

Very rare to absent: **chlorite pseudomorph**, r. Size = 1.35mm to 0.25mm.

Fine Fraction

Dominant to frequent: **quartz**.

Few to rare: **calcite**.

Few to rare: **biotite**.

Rare: **siltstone/pelite rock fragments**.

Rare: **chert**.
Rare: **plagioclase**.
Very rare: **alkali feldspar**.
Rare: **opaques**.
Rare to absent: **epidote**.
Rare to absent: **quartz-biotite schist**.
Very rare to absent: **igneous rock frags**.
Very rare to absent: **pyroxene**
Very rare (98/46, 98/60) to absent: **foraminifera**.

Textural Concentration Features (Tcf)
Few to very rare: clay pellets, high sphericity, r, with clear to diffuse boundaries. Colour varies from yellow-brown or orange (PPL, XP) (x40) to very dark brown (PPL, XP) (x40). Size = 2.6mm (97/69) to 0.1mm. Two types are identifiable:
(1) Brown to very dark brown, rich in a-sa monocrystalline and polycrystalline quartz and biotite mica; contain also plagioclase, r chert, r quartz-biotite schist (see 97/69, 97/70, 98/27).
(2) Yellow/orange-brown, fine clay rare inclusions; rare discrete fine r quartz, biotite, opaques; example in 98/46 also contains biomicrite and appears to be calcareous (see 97/20, 98/19, 98/46, 98/27).

Amorphous Concentration Features (Acf)
Very few to rare: **partially burnt organics/darkened areas around voids**. Sometimes traces of opaque (organic?) material are preserved (e.g. 97/75, 98/28, 98/93) sometimes without any trace of burning (e.g. 98/46).

Comment
This fabric is characterised by a groundmass which is usually rich in quartz and also contains biotite, micrite, sparite, rare chert, quartz-biotite schist, r igneous rock fragments. This groundmass is homogenous within individual samples but varies between samples from those which are rich in quartz and biotite (e.g. 97/35, 97/70, 97/75) to those where quartz and biotite are more rare (e.g. 98/19, 98/28). All of these samples are linked by the large siltstone/pelite non plastic inclusions which dominate the groundmass and help to define the group. Consideration of size, distribution and angularity indicates that these siltstone/pelite inclusions were added as temper. Study of clay pellets strongly suggests the mixing of two clays (cf. 97/20, 98/27, 98/55): a red-firing clay rich in angular quartz, also containing biotite, chert, quartz-biotite schist, and a fine yellow/orange firing clay, which contains few inclusions, usually very fine discrete rounded clasts of quartz, some fine biotite, opaques and biomicrite. The latter clay is the likely source for the majority of the calcareous component of Fabric 8 (biomicrite, sparite, micrite with iron concentrations, foraminifera), although the angular coarse-grained sparite and the large individual calcite grains probably derive from the calcareous component of the siltstone/pelite temper. The mixing of these two clays, perhaps in varying proportions would help to explain the differences in groundmass noted above.

The siltstone/pelite in Fabric 8 shares some similarities with the siltstone/pelite in Fabric 26 although the pelite in these frequently contains opaque areas which are oriented the bedding plane. Moreover the groundmass of

Fabric 26 is different: much finer quartz, more metamorphic rock fragments, more opaques and no calcareous component. Closer similarities exist with Fabric 9, which in general differs from Fabric 8 only in terms of texture and packing. Fabric 9 is therefore considered a technological variant of Fabric 8. Fabric 21 contains siltstone/pelite similar in composition and texture to Fabric 8, however the groundmass is different: generally larger more angular quartz, large shell and bioclastic limestone fragments.

Consideration of orientation of voids, inclusions and b-fabric and use of a lambda plate allowed the identification of probable coil-joins in 97/20, 97/94 and 98/66. Non-calcareous slip layers were noted on the exterior surfaces of 98/30, 98/46, 98/59 and 98/60. All of these samples come from polished vessels suggesting the use of slips may have been used only when a surface was to be polished. At the surfaces of other samples areas of differential birefringence in several cases are suggestive of compaction due to burnishing (e.g. 97/19, 98/93, 98/59 [interior surface]). The wide variety in optical activity of samples of Fabric 8 suggests that these may have been fired to a variety of temperatures. Likewise variation in the colour of the groundmass from orange-red to very dark brown suggests variability in firing atmosphere (oxidising-reducing). A small number of samples show a steep gradient between oxidised exteriors and strongly reduced interiors. The presence of unburnt/partially burnt organics in combination with these other features would be compatible with fast firing in an open environment.

The majority of the components of Fabric 8 are inconsistent with a provenance within the immediate area of Knossos (<5km). The low-grade metamorphic component (siltstone/pelite rock fragments) would be consistent with an origin within the greenschist facies of the Phyllite-Quartzite Series of central-east Crete. Closest sources would be the north-western edge of the Herakleion Basin or possibly Iouktas (see Appendix III). The quartz-biotite schist fragments within the quartz-rich clay component may also derive from this source. However the other, quartz-poor and possibly calcareous clay component could be compatible with a source within the immediate area of Knossos as well as elsewhere in north-central Crete: the presence of bioclastic limestone, micrite with iron concentrations and foraminifera provide a link between this clay component of Fabric 8 and Fabrics 1a-i.

(9) Non-Calcareous, Quartz, Pelite/Phyllite

Sample: 97/34

Microstructure
Rare macro to meso planar voids, few to rare mega to meso vughs. Some voids contain opaque, possibly organic material. Voids and inclusions exhibit local long-axis orientation generally parallel to the vessel margins. Inclusions are close-spaced.

Groundmass
Colour is orange-red (PPL, XP) (x40). The micromass is optically active. B-fabric is thin to thick granostriated/porostriated.

Inclusions
c:f:$v_{10\mu m}$ c.30:65:5
Coarse fraction = 3.0mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Dominant: **pelite/phyllite rock fragments**, a-sa, equant to elongate; usually retains bedding structure of a siltstone, but rich in fine mica which exhibit parallel orientation; matrix-supported, well-sorted; contains mica, quartz (mostly monocrystalline, although polycrystalline quartz also occurs), calcite, opaques; sometimes in association with areas rich in quartz, mica; grain-supported. Size = 3.0 to 0.2mm.
Very rare: **micrite with iron concentrations**, r, equant; contains isolated grains of quartz, mica. Size = 0.5 to 0.2mm.
Rare: **coarse-grained sparite**, sa-r, equant to elongate; grain-size varies from c.0.05 to 0.35mm. Size = 1.2 to 0.2mm
Very rare: **monocrystalline quartz**, r, equant to elongate. Size = 0.25 to 0.2mm.
Very rare: **polycrystalline quartz**, r, equant to elongate. Size = 0.3 to 0.2mm.
Very rare: **chert**, r, equant to elongate; sometimes contains larger clasts of quartz. Size = 0.3mm to 0.2mm

Fine Fraction
Dominant to frequent: **monocrystalline quartz**.
Common: **pelite/phyllite**.
Few: **polycrystalline quartz**.
Rare: **calcite**.
Rare: **biotite**.
Rare: **opaques**
Very rare: **chert**.
Very rare: **quartz-biotite schist fragments**.
Very rare: **epidote**.
Very rare: **amphibole**.
Very rare: **plagioclase feldspar**.

Textural Concentration Features (Tcf)
Very few to rare: **clay pellets**, r, equant; sharp to diffuse boundaries. Size = 1.6 to 0.1mm, mode = 0.2mm. Two possible types are identifiable:
(1) Brown (XP, x40), a-sa quartz, biotite, chert;
(2) Orange/brown (XP, x40), fine clay very rare small r quartz, biotite.

Amorphous Concentration Features (Acf)
Rare to very rare: **burnt/partially burnt organic material**.

Comment
The fabric is characterised by a orange-red firing clay groundmass, which contains quartz, biotite, rare chert, plagioclase and epidote. This groundmass is dominated by large pelite/phyllite rock fragments, which were added as temper. In both its groundmass and large non-plastics Fabric 9 closely resembles Fabric 8,

the main difference between the two being largely in texture and packing: in 97/35 the large non-plastics are very well packed. Like Fabric 8, Fabric 9 may have resulted from the mixing of two clays, however this is not certain. It is considered likely that Fabrics 8 and 9 are closely related and that Fabric 9 is a technological variant of Fabric 8. For provenance see Fabric 8.

(10) Non-Calcareous, Quartz-Rich, Serpentinite, Siltstone/Sandstone, Mafic Rocks

Samples: 97/56, 97/71, 97/108, 98/40, 98/47, 98/48

Microstructure
Very few to rare macro to meso planar voids, rare mega to meso vughs, very rare (98/48) to absent channels. Some voids are surrounded by darker patches (e.g. 97/71, 98/48), some contain opaque, possibly organic material (e.g. 98/48). Voids and inclusions exhibit local long-axis parallel orientation; the angle of this orientation varies from parallel to perpendicular to vessel margins sometimes across a single sample (e.g. 97/71). Inclusions are close to single-spaced.

Groundmass
Fabric is generally homogenous within individual samples but may vary between samples: some samples are rich in mafic rocks (e.g. 97/108) others contain very few (e.g. 97/56). Colour varies from orange-red to brown (PPL, XP) (x40). The micromass varies in optical activity from low (e.g. 97/108) to high (e.g. 98/40). B-fabric is thin to medium granostriated/porostriated (e.g. 98/47).

Inclusions
$c{:}f{:}v_{10\mu m}$ c.25:70:5 to 30:65:5
Coarse fraction = 4.0mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Dominant to frequent: **serpentinite**, a-sr, equant to elongate; often in association with biotite mica, more rarely intercalated with calcite. Size = 4.0mm to 0.2mm.
Very few (98/48) to absent: **chlorite pseudomorphs**, r, equant; one large example in 98/48 appears to be partially serpentinised. Size = 2.25mm to 0.2mm.
Rare to absent (97/56): **phyllite**, r, equant to elongate; quartz, mica, opaques; some examples retain structure of a siltstone (= pelite). Size = 1.0 to 0.2mm.
Rare: **coarse siltstone/fine sandstone**, r, equant to elongate; contains quartz (monocrystalline, polycrystalline), chert, mica, amphibole, opaques; grain-size varies from 0.02 to 0.4mm; usually well-sorted, grain-supported. Size = 1.0 to 0.2mm.
Few (97/108) to very rare (97/71): **igneous (mafic) rock frags.**, r, elongate; examples in 97/108 contain biotite, amphibole, pyroxene, quartz, feldspar and opaques; sometimes in association with larger (c.0.6mm) amphibole grains; one example in 97/71 is rich in biotite with some plagioclase in association with larger (0.2mm) alkali feldspar grains; some examples in 97/102 rich in pyroxene or plagioclase. Size = 1.25 to 0.2mm.

Rare to very rare: **calcite**, sa, equant to elongate; often in association with biotite mica or serpentinite. Size = 2.65mm to 0.2mm
Very few to rare: **biotite**, sr, elongate; usually lathlike. Size = 1.25 to 0.2mm.
Rare: **monocrystalline quartz**, sr-r, equant to elongate. Size = 0.7 to 0.2mm.
Rare: **polycrystalline quartz**, r, equant; often resembles meta-quartz. Size = 1.0 to 0.2mm.
Very rare: **quartz-biotite schist**, r, equant to elongate. Size = 1.1 to 0.2mm.
Rare to very rare: **chert**, r, equant. Size = 1.25mm to 0.2mm.
Rare: **opaques**, r, equant to elongate. Size = 0.8 to 0.2mm.
Rare (97/108) to absent: **amphibole**, sr, elongate. Size = 0.7mm.
Very rare (98/47) to absent: **pyroxene**, sr, elongate. Size = 0.75mm to 0.2mm.
Very rare: **plagioclase feldspar**, sa-sr, elongate. Size = 0.4 to 0.2mm.

Fine Fraction
Dominant to frequent: **quartz**.
Common to rare: **serpentinite**.
Few to rare: **opaques**.
Few to rare: **biotite**.
Very few: **chert**.
Rare to absent: **phyllite**.
Rare: **siltstone/sandstone**.
Rare: **igneous (mafic) rocks**.
Rare: **plagioclase**.
Rare: **alkali feldspar**.
Rare: **amphibole**.
Rare: **pyroxene**.

Textural Concentration Features (Tcf)
Rare: **clay pellets**, r, equant to elongate; colour varies from orange-red to dark brown (PPL, XP) (x40); contain fine quartz, mica, opaques, amphibole, r siltstone rock frags, r phyllite. Size = 1.2 to 0.1mm.

Amorphous Concentration Features (Acf)
Rare to absent (97/56, 98/40): **burnt/unburnt organics**; several samples contain voids surrounded by darkened patches (traces of burning of organic material), some of these voids (channels) preserve the shape of the organic material (e.g. 98/47, 98/48).

Comment
This fabric is characterised by a red-firing clay groundmass, rich in fine quartz, which also contains biotite, opaques, chert, siltstone/sandstone and mafic rocks. This groundmass is dominated by serpentinite, which consideration of size, angularity and distribution would was added as temper. Fabric 10 exhibits some variability in its groundmass between samples rich in mafic rocks (e.g. 97/108) and samples poor in mafic rocks (e.g. 97/56). In addition some samples contain more serpentinite than others (cf. 97/56 and 97/71 with 98/48. Fabric 10 is distinctive and shares only superficial similarities with other fabrics. Fabric 6 contains altered igneous rocks, but has a groundmass that contains more chert

and lacks mafic rocks. A section cut through the incised decoration on sample 97/108 would suggest the use of a blunt rounded tool. Colour would suggest that vessels in Fabric 10 were fired in a predominantly mixed oxidising-reducing atmosphere. The variation in optical activity exhibited between samples would suggest that vessels were exposed to a variety of firing temperatures. The presence of burnt or unburnt organic material may hint at the possibility that firing was short. Fabric 10 is characterised by a number of components (serpentinite, mafic rocks), which are inconsistent with an origin within the immediate area of Knossos (<5km). The serpentinite and mafic rocks would seem to link to rocks of the Ophiolite series, the nearest outcrops of which are to the south of Iouktas and to the west in the area of Tylissos.

(11) Non-Calcareous, Quartz-Rich, Fine-Grained Phyllite

Samples: 97/16, 97/18, 97/78, 97/102, 98/7, 98/17, 98/62, 98/67

Microstructure
Rare to very rare macro to meso planar voids, very few to rare mega to meso vughs. Some voids are surrounded by darker patches (e.g. 98/17), some contain opaque, possibly organic material (e.g. 97/16). Generally voids and inclusions exhibit local long-axis parallel orientation; the angle of this orientation varies from parallel (e.g. 97/16, 97/18) to perpendicular (e.g. 98/17) to vessel margins, sometimes across a single sample (e.g. 98/17) resulting in a structural discontinuity; in sample 97/78 the long-axis orientation of voids and inclusions follows a curve. Inclusions are close to single-spaced.

Groundmass
Colour varies from orange-red (PPL, XP) (x40) to brown (PPL, XP) (x40). The micromass varies in optical activity from medium (e.g. 98/17) to high (e.g. 97/16). B-fabric is thin to thick granostriated/porostriated.

Inclusions
$c:f:v_{10\mu m}$ c.25:70:5
Coarse fraction = 3.0mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Dominant to frequent: **quartz-biotite phyllite**, a-sa, equant to elongate; very fine-grained, contains quartz and biotite; sometimes in association with calcite (e.g. 97/18, 98/17) or chlorite (e.g. 97/16); sometimes in association with altered igneous rock frags. (see below). Size = 3.0 to 0.2mm.
Rare to absent: **biotite**, a-sa, elongate, lathlike. Size = 0.8mm to 0.2mm
Rare (97/18, 98/17) to absent: **altered igneous rock frags**, sa-sr, equant to elongate; fine-grained rock, rich in fine plagioclase; example in 97/18 altered to a green colour (XP) (x40) (chloritised?); example in 98/17 in association with calcite; examples in 98/17 in association with fine-grained phyllite. Size = 0.85mm to 0.7mm

Rare (97/102) to absent: **serpentinite**, sr, equant to elongate. Size = 0.5 to 0.2mm.
Very rare (97/18) to absent: **monocrystalline/polycrystalline calcite**, a-sa, equant to elongate. Size = 0.6 to 0.2mm.
Few (98/7) to very rare: **chert**, a-r, equant to elongate; one example in 97/102 contains larger clasts of plagioclase. Size = 0.8mm to 0.2mm.
Very few: **polycrystalline quartz**, a-sa, elongate; sometimes resembles meta-quartz, sometimes in association with mica. Size = 0.9 to 0.2mm
Rare: **monocrystalline quartz**, sr, equant to elongate. Size = 0.4 to 0.2mm
Common (97/102) to rare: **chlorite pseudomorphs**, r equant to elongate. Size = 2.25 to 0.2mm.
Very few (98/62) to absent: **micrite with iron concentrations**, r, equant; sometimes contains discrete clasts of quartz. Size = 0.7 to 0.2mm.
Few to rare: **coarse siltstone/fine sandstone**, sr-r, equant; grain-supported, well-sorted, contains sa-sr quartz, feldspar, biotite, chert, phyllite, calcite (max. grain-size varies from 0.1 to 0.35mm). Size = 2.6 to 0.6mm.
Rare: **plagioclase feldspar**, sr-r, equant. Size = 0.4 to 0.2mm.
Very rare to absent: **clinozoisite**, sr, equant. Size = 0.35mm to 0.2mm.
Very rare to absent: **foraminifera**.
Very few to rare: **opaques**, sa-sr, equant to elongate. Size = 1.1 to 0.2mm.

Fine Fraction
Dominant: **monocrystalline quartz**.
Common: **biotite**.
Very few to rare: **polycrystalline quartz**.
Very few to rare: **phyllite**.
Very few: **chert**.
Very few to rare: **chlorite pseudomorphs**.
Very few to rare: **plagioclase**.
Very few to rare: **calcite**.
Rare: **opaques**.
Rare: **clinozoisite**.
Very rare: **foraminifera**.

Textural Concentration Features (Tcf)
Rare: **clay pellets**, clear to diffuse boundaries, colour is varies from red-orange to dark brown (XP) (x100), contain quartz, mica, opaques, calcite, clinozoisite, rounded phyllite. Size = 0.6mm to 0.1mm.

Amorphous Concentration Feature (Acf)
Rare to absent: **burnt/partially burnt organics**.

Comment
This fabric is characterised by a red-firing, quartz-rich clay groundmass, rich in biotite, which also contains rounded chlorite pseudomorphs, phyllite and siltstone/sandstone rocks. This groundmass is dominated by phyllite, which consideration of size, angularity and distribution would suggest was added as temper. The combination of phyllite in a quartz-rich micaceous groundmass

generally serves to distinguish Fabric 11 from all others. Fabric 10 also contains chlorite pseudomorphs and phyllite, similar to that found in Fabric 11, albeit in smaller quantities. There are closer similarities with some of the finer phyllite in Fabric 14, although in general the low grade metamorphics in Fabric 14 resemble schists. The similarities, which Fabric 11 shares with Fabric 14 are not sufficiently close as to argue for a common provenance, although they might indicate a common geological origin (Phyllite-Quartzite series). The low grade metamorphic rocks in Fabric 11 make it incompatible with a provenance within the immediate area of Knossos (<5km). The closest compatible sources are at the eastern and western edges of the Herakleion basin or to the south of Knossos in the areas of Iouktas.

(12) Non-Calcareous, Feldspars, Quartz, Biotite, Altered Igneous Rocks, Phyllite

Samples: 97/27, 97/41, 97/137, 97/138

Microstructure
Very few macro to meso planar voids, rare macro to meso vughs. Some voids have calcite linings (e.g. 97/27, 97/137, 97/138). Some voids are surrounded by darker patches, others contain opaque, possibly organic material (e.g. 97/41). Assessment of orientation of voids and inclusions is difficult because inclusions and voids are predominantly equant; however, when inclusions and voids are more elongated, local long-axis parallel orientation can be observed; the angle of this orientation varies from parallel to almost perpendicular to vessel margins; both extremes may be observed within a single sample (e.g. 97/41). Inclusions are close to single-spaced.

Groundmass
The fabric is generally homogeneous, however 97/41 differs slightly: larger non-plastics, absence of calcite. Colour varies from red-orange (PPL, XP) (x40) to very dark brown (PPL, XP) (x40). The micromass varies in optical activity from low (e.g. 97/138) to high (e.g. 97/41). B-fabric is thin to medium granostriated/porostriated.

Inclusions
c:f:$v_{10\mu m}$ c.30:65:5
Coarse fraction = 1.5mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction:
Dominant: **feldspars**, a-sa, equant to elongate; both alkali and plagioclase; often have a cloudy appearance due to saussuritisation. Size = 0.75mm to 0.2mm.
Common: **monocrystalline/polycrystalline quartz**, a-sa, equant to elongate; sometimes in association with biotite. Size = 1.25 to 0.2mm.
Few: **intermediate igneous rock (granodiorite)**, a-sa, equant; holocrystalline granular texture; contains alkali and plagioclase feldspar with some quartz, biotite

and amphibole; one example in 97/27 rich in lath-like biotite. Size = 1.4 to 0.3mm.

Very few to rare: **fine-grained basic igneous rock frags.**, sr-r, elongate; highly altered; mostly plagioclase, biotite. Size = 0.75mm to 0.3mm.

Very few to rare: **chert**, sr-r, equant to elongate; sometimes contains larger clasts of quartz; sometimes contains biotite, opaques. Size = 0.9 to 0.2mm.

Few to rare: **siltstone/fine sandstone**, sr-r, equant to elongate; contains quartz, feldspar, mica, chert, opaques; grain-size varies between 0.05 and 0.2mm; well-sorted, grain-supported. Size = 1.4 to 0.2mm.

Rare: **biotite mica**, sa, elongate. Size = 0.35 to 0.2mm.

Rare to very rare: **amphibole**, sa, equant to elongate. Size = 0.25 to 0.2mm.

Rare to absent: **phyllite**, r, equant; quartz-mica. Size = 0.6 to 0.2mm.

Very rare to absent: **opaques**, r, equant. Size = 0.3 to 0.2mm.

Rare to absent: **calcite**, sa-sr, equant to elongate. Size = 0.5 to 0.2mm.

Rare to absent: **micrite**, r, equant to elongate; contains isolated clasts of quartz and feldspar. Size = 1.0 to 0.2mm.

Fine Fraction:

Dominant: **plagioclase and alkali feldspar**.

Frequent: **quartz**.

Few: **biotite**.

Very few to rare: **amphibole**.

Rare: **chert**.

Rare: **altered igneous rocks**.

Rare: **phyllite**.

Rare: **opaques**.

Very rare to absent: **calcite/micrite**.

Textural Concentration Features (Tcf)

Rare to very rare: **clay pellets**, sr-r, equant to elongate, diffuse to merging. Size = 0.5 to 0.2mm. Two types may possibly identified:

(1) Red to dark brown (PPL, XP) (x40); contain fine grain-size (0.05-0.1mm) quartz, polycrystalline quartz, biotite, chert (e.g. 97/27, 97/41).

(2) Fine yellow/brown clay, opaques, rare biotite; an example in 97/137 contains calcite (e.g. 97/137, 97/138)

Amorphous Concentration Feature (Acf)

Rare to very rare: **burnt/partially burnt organics**.

Comment

This fabric is characterised by a red-firing groundmass containing feldspar (plagioclase and alkali), quartz, biotite, amphibole, chert, calcite/micrite with rounded altered igneous rocks. This groundmass is dominated by large grains of feldspar, quartz and granodioritic rock fragments. The groundmass is homogenous for samples 97/27, 98/137 and 98/138, however 97/41 has a slightly different texture and lacks calcite/micrite. Study of clay pellets suggests the possibility of the mixing of two clays: one red-firing containing quartz, biotite and chert, the other yellow/brown firing, containing calcite and opaques, but which otherwise was poor in inclusions (rare biotite). If so then the latter clay may be the origin of the calcareous component of Fabric 12, while the former clay could be the source of the phyllite and siltstone. Because of the small quantity and size of clay pellets available for comparison it is impossible to certain about this identification of mixing, however if correct it would suggest that the dominant granodiorite rock fragments did not derive from either clay and were therefore probably added as temper.

No slip layers were identified, however several samples (i.e. 97/27, 97/138) exhibited differentially oriented birefringence at the surface, which may suggest compaction due to burnishing. The presence of voids with calcite linings also proved to be a general feature of this fabric. The only sample which lacks such linings is 97/41. Since this is also the only sample to lack evidence for a calcareous component, then this may suggest that in general the secondary deposition of calcite has only a partially allochthonous origin, with a source in the original calcareous component of Fabric 12.

The various components of Fabric 12 are inconsistent with an origin in the area of Knossos. The presence of granodiorite rock fragments and altered basic igneous rocks in Fabric 12 compares closely to EM and later fabrics for which an origin has been established in the Isthmus of Ierapetra, East Crete. The granodiorite rocks in this area may belong stratigraphically to the upper tectonic melange or Asteroussia nappes, however similar rocks do not appear elsewhere on Crete (Fassoulas 2000:85; see Appendix III). Thus although granitic rocks in general occur elsewhere on Crete, most notably on the southern edge of the Mesara, the combination of granodiorite with phyllite and altered basic rocks in Fabric 12 is diagnostic of a source in the Isthmus. Moreover, comparison of examples of Fabric 12 with Neolithic material from the site of Kavousi, situated on the northern coast of the Isthmus (Bay of Mirabello), suggested that the two were so close as to be indistinguishable (cf. Kavousi 93/69). This would serve to support a provenance for Fabric 12 in the Mirabello Bay area of East Crete.

(13) Non-Calcareous(?), Fine Quartz, Chlorite, Calcite, Phyllite

Samples: 97/12, 98/4

Microstructure
Very few to rare macro to meso planar voids, rare macro to meso vughs. Some voids are surrounded by darker patches, some contain opaque, possibly organic material. Voids and inclusions exhibit local long-axis parallel orientation; the angle of this orientation varies from parallel to perpendicular to vessel margins; in sample 97/12 the long-axis orientation of voids and inclusions follows a curve. Inclusions are close to single-spaced.

Groundmass
Colour varies from red-orange to brown (PPL, XP) (x40). The micromass is highly optically active. B-fabric is thin to thick granostriated/porostriated.

Inclusions
c:f:$v_{10\mu m}$ c.20:75:5

Coarse fraction = 2.6mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Dominant: **chlorite**, a-sa, equant to elongate; sometimes in association with polycrystalline calcite. Size = 2.0 to 0.2mm
Very few to rare: **monocrystalline/polycrystalline calcite**, a-sa, equant to elongate; some examples consist of large (max. size = 0.5mm) calcite grains. Size = 1.1 to 0.2mm
Very few to rare: **phyllite**, r, elongate; very fine-grained, opaques. Size = 1.0mm to 0.2mm.
Rare to very rare: **monocrystalline quartz**, sr, equant. Size = 0.3 to 0.2mm.
Very rare to absent: **plagioclase feldspar**, sr-r, equant to elongate. Size = 0.25 to 0.2mm.
Rare to absent: **chert**, r, equant to elongate. Size = 0.3 to 0.2mm
Very rare to absent: **polycrystalline quartz**, r, equant. Size = 0.25mm
Very rare to absent: **opaques**, r, elongate. Size = 0.5mm

Fine Fraction
Dominant: **monocrystalline quartz**
Very few: **chlorite**
Very few: **calcite**
Rare: **opaques**
Rare: **mica**
Rare: **polycrystalline quartz**
Rare: **phyllite**
Very rare: **epidote**

Textural Concentration Features (Tcf)
Few to very few: **clay pellets**, r, equant; sharp to clear/diffuse boundaries; colour varies from red to very dark brown (XP) (x40); contains fine quartz, rare larger quartz, mica, opaques, clay pellets, r igneous rock frag (alkali feldspar, some mica), calcite. Size = 2.6 to 0.1mm.

Amorphous Concentration Feature (Acf)
Rare to very rare: **burnt/partially burnt organics**.

Comment
This fabric is characterised by a red-firing (non-calcareous?) clay groundmass rich in fine quartz with some mica, containing rounded phyllite. This groundmass is dominated by large chlorite and calcite non-plastics. Study of these large non-plastics would seem to indicate that the chlorite and the calcite are the intercalated component of a single rock and that this rock was added as temper. Comparison of groundmass and clay pellets does not indicate mixing. Consideration of void, inclusion and b-fabric orientation in conjunction with study using a lambda plate allowed the identification of a coil-join in sample 97/12. No evidence for the use of slips was observed, but both samples exhibit areas of differential birefringence at the surface, which is suggestive of

compaction due to burnishing. The high optical activity of both samples suggests that they were low-fired.

Fabric 13 is distinctive and has no close parallels amongst other EN fabrics. Chlorite is also found in Fabric 10, however while the chlorite in fabric 13 is dominant and angular and probably added as temper, that in fabric 10 is rare and rounded. Nevertheless some geological link may exist between these fabrics, since the chlorite would in general be compatible with a serpentiferous geology. The closest potential source for the chlorite in Fabric 13 would be to the west of Herakleion in the area of Tylissos.

(14) Non-Calcareous, Quartz-Rich, Biotite, Quartz-Biotite Phyllite/Schist

Samples: 97/10, 97/28, 97/32, 98/65, 98/94

Microstructure
Rare to very rare meso to micro planar voids, rare to very rare macro to meso vughs. Sample 98/94 contains a void with a calcite lining. Some voids are surrounded by darker patches, some contain opaque, possibly organic material (e.g. 98/65). Voids and inclusions exhibit local long-axis parallel orientation; the angle of this orientation varies from parallel to perpendicular to vessel margins (e.g. 98/65, 98/94). Inclusions are close to single-spaced.

Groundmass
Fabric is generally homogeneous, although 97/32 has a slightly different texture (finer) from other examples. Colour varies from orange-red or red (PPL, XP) (x40) to dark brown (PPL, XP) (x40). Sample 98/94 is predominantly dark brown with red margins. The micromass varies in optical activity from medium (e.g. 97/32) to high (e.g. 97/10). B-fabric is thin to medium granostriated/porostriated.

Inclusions
$c{:}f{:}v_{10\mu m}$ c.28:70:2
Coarse fraction = 2.25mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Dominant: **quartz-biotite phyllite-schist,** a-sr, equant to elongate; predominantly lath-like biotite mica and quartz; sometimes biotite shows crenulation cleavage (e.g. 97/10, 97/32); sometimes also contain opaque material (e.g. 98/65, 98/94). Size = 2.0 to 0.2mm.
Few to very few: **polycrystalline quartz**, a-r, equant to elongate; usually grain-size is c.0.05 to 0.1mm, but occasionally larger grains occur (c.0.6mm); often meta-quartz, sometimes sutured contacts (e.g. 97/10, 97/28). Size = 2.25 to 0.2mm.
Very few to rare: **monocrystalline quartz**, sa-sr, equant to elongate. Size = 1.5mm to 0.2mm.
Rare: **opaques**, sr-r, equant to elongate; some examples resemble biotite in form (=black mica?). Size = 1.25 to 0.2mm.

Rare to very rare: **chert**, a-sr, equant to elongate. Size = 0.5mm to 0.2mm.
Rare (97/32) to absent: **siltstone**, sr-r, elongate; contains quartz, mica; matrix-supported (max. grain size c. 0.05mm). Size = 1.25mm.
Rare (97/32) to absent: **chlorite**, r ,equant. Size = 0.6mm
Rare (97/28) to absent: **plagioclase feldspar**, sa-sr, equant to elongate. Size = 0.7 to 0.2mm

Fine Fraction
Dominant: **quartz**.
Frequent: **mica**.
Common: **phyllite**.
Rare: **opaques**.
Rare: **chert**.

Textural Concentration Features (Tcf)
Rare to very rare: **clay pellets**, sr-r, equant to elongate; colour is orange-red to dark brown (XP) (x40); sharp to clear boundaries; rich in a-sa quartz, also contain biotite, quartz-biotite phyllite. Size = 1.1mm to 0.1mm

Amorphous Concentration Features (Acf)
Rare to very rare: **burnt/partially burnt organics**.

Comment
This fabric is characterised by a red-firing groundmass, which contains quartz, biotite, opaques and rounded phyllite. This groundmass is dominated by angular quartz-biotite phyllite-schist rock fragments. Consideration of size, angularity, distribution as well as comparison with clay pellets suggests that the large quartz-biotite phyllite rock fragments were added as temper. Texture and packing varies between samples from the very coarse (e.g. 97/28) to the fine (97/32). Samples 97/10, 97/32 and 98/65 appear to have thin fine non-calcareous clay layers at their surface, however it is not clear whether these are the natural result of the burnishing process or result from the application of a slip. Other samples (e.g. 97/28, 98/94) exhibit areas of differential birefringence at their surfaces which may indicate compaction due to burnishing. The incidence of clay (slip?) layers appears to be confined to polished vessels, while those which exhibit possible signs of compaction are all burnished. Colour and optical activity suggests that samples were relatively low fired in an atmosphere which could vary from oxidising to reducing.

Fabric 14 shares some similarities with other fabrics. The closest to the quartz-biotite schist in Fabric 14 is the quartz-biotite schist in some samples (e.g. 97/52) of Fabric 5a and the phyllite in Fabric 11. Such similarities are not so great as to suggest a close relationship between these fabrics. Closer links are possible with an EM fabric from Knossos: cf. EMII Cooking Pot Ware, Red Wares (i.e. Group 4, Wilson & Day 1999:38-9, 50-2). The raw materials in Fabric 14 are not compatible with a source in the immediate area (<5km) of Knossos. They would seem to originate in low grade metamorphic deposits, such as those which characterise the Phyllite-Quartzite series, the nearest outcrops of which are to the east or west of the Herakleion basin or possibly around Iouktas (see Appendix III).

(15) Low/Non Calcareous, Fine Quartz, Organics, Foraminifera

Samples: 97/57, 97/88

Microstructure
Common macro to meso vughs., the majority of which are smooth-sided and elongate, sometimes curved, often tapering to a point (burnt out organics). Many in sample 97/88 contain opaque material. Voids and inclusions exhibit local long-axis parallel orientation; the angle of this orientation varies in relation to vessel margins in different areas of a single section; often this orientation forms a curve; in sample 97/88 voids and inclusions curve round in a circle. Inclusions are close to single-spaced.

Groundmass
Fabric is homogeneous: colour varies from orange-red in PPL (x40) and red (XP) to dark brown (PPL) (x40) and brown (XP). The micromass is optically active. B-fabric is medium and granostriated/porostriated.

Inclusions
$c{:}f{:}v_{10\mu m}$ c.25:70:5
Coarse/fine fraction = 2.25mm. or less.

Coarse/Fine Fraction
Common: **marl**, r, equant; resembles micrite in form; sometimes contains clasts of quartz or more rarely shell frags. and foraminifera; sometimes has iron concentrations. Size = 1.0mm to 0.02mm.
Rare: **foraminifera**.
Few: **monocrystalline quartz**, sr-r, equant. Size = 0.5mm to 0.02mm, mode = 0.05mm
Very few to very rare: **chert**, r, equant; sometimes contains mica (cf. mica-rich example in 97/88) and larger clasts of mc/pc quartz. Size = 0.7 to 2mm.
Very rare to absent: **polycrystalline quartz**, sa-r. Size = 0.35mm
Rare: **biotite**, r, lathlike. Size = 0.1 to 0.02mm.
Very rare: **plagioclase feldspar**, r, elongate. Size = 0.35 to 0.1mm
Very rare: **alkali feldspar**, r, equant. Size = 0.2 to 0.1mm
Very rare to absent: **altered igneous rocks**, r. equant to elongate; one in 97/88 is v. fine-grained, contains quartz, feldspar, mica. Size = 0.75mm & 0.4mm.
Very rare: **epidote**, r, equant. mode = 0.1mm
Very rare (97/57) to absent: **sandstone frag.**, r, equant; contains quartz (max. size 0.3mm). Size = 0.3mm
Very few to very rare: **opaques**, r, equant. Size = 0.05 to 0.1mm

Textural Concentration Features (Tcf)
Rare: **clay pellets**, r, equant, merging boundaries; contain quartz, some biotite, chert, feldspar, opaques; colour varies from orange-red in PPL (x40) and red (XP) to dark brown (PPL) (x40) and brown (XP). Size = 2.25mm to 0.2mm

Amorphous Concentration Features (Acf)
Very few (97/88) to rare: **unburnt** and **partially unburnt** organic material.

Comment
This fabric is characterised by red-firing groundmass, which contains quartz, some biotite, chert, foraminifera and marl and rare altered igneous and sandstone rock fragments. This groundmass is dominated by the traces of organic tempering material (chaff?): burnt out voids preserving form of organics as well as partially burnt and unburnt organic material. Comparison of groundmass and clay pellets suggests that a red-firing clay containing quartz and some biotite and chert was mixed with a bioclastic calcareous component (foraminifera, marl). Variation in colour and optical activity suggest that samples of fabric 15 were low-fired in a mixed oxidising-reducing atmosphere.

The fabric is highly distinctive: only one other organic-tempered fabric was identified in the EN assemblage at Knossos (see Fabric 27); however this is otherwise entirely different in technology (grog and organics) and composition (calcareous, low in quartz). The groundmass of Fabric 15 shares many similarities with that of Fabrics 2a-e: the same red-firing, quartz-rich, groundmass, which also contains some biotite, chert, microfossils and more rarely rounded sandstone and altered igneous rock fragments. The presence of micrite with iron concentrations would also link Fabric 15 more generally to Fabrics 1a-i and 2a-e. Such similarities suggest a close connection between these fabrics and it is quite likely that Fabric 15 is a technological variant of Fabric 2.

(16) Non-Calcareous, Quartz-Rich, Crushed Euhedral Calcite

Samples: 97/91, 97/100

Microstructure
Very few to rare meso planar voids, very few to rare macro to meso vughs. Small planar voids are often in-filled with calcite (e.g. 97/91). Voids generally exhibit local long-axis parallel orientation with inclusions, however this relationship may be at any angle with the vessel margins and different local arrangements may exist within a single section (e.g. 97/91). Some voids contain opaque, possibly organic material. Inclusions are close to single-spaced.

Groundmass
Homogenous in colour, texture, inclusion size and packing. Colour is orange-red (PPL) (x40) and red-brown (XP). Groundmass is mildly optically active. B-fabric is thin porostriated.

Inclusions
c:f:$v_{10\mu m}$ c.30:65:5
Coarse fraction = 1.6mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Dominant to frequent: **monocrystalline euhedral calcite**, a, equant to elongate. Size = 1.2 to 0.2mm, mode = c.0.5mm
Rare: **polycrystalline euhedral calcite (coarse-grained sparite)**, a, elongate; calcite grains are well-formed, generally large (c.0.6mm) and elongate. Size = 1.6mm to 0.6mm.
Frequent to rare: **monocrystalline quartz**, a-r, equant to elongate. Size = 0.6 to 0.2mm.
Rare to absent: **polycrystalline quartz**, sa-r. equant to elongate. Size = 1.0 to 0.2mm.
Rare to absent: **quartz-biotite schist**, sa-sr, equant to elongate. Size = 1.0 to 0.2mm.
Very few to very rare: **chert**, r, equant to elongate; sometimes contains larger clasts of quartz. Size = 0.9 to 0.2mm
Very rare: **opaques**, r, equant. Size = 0.3 to 0.2mm

Fine Fraction
Dominant: **monocrystalline quartz**.
Few to very few: **monocrystalline calcite**.
Very few: **chert**.
Rare: **biotite**.
Rare: **opaques**.
Rare: **epidote**.

Textural Concentration Features (Tcf)
Rare to absent: **clay pellets**, r, equant to elongate; colour varies from red (PPL, XP) (x40) to dark brown (PPL, XP) (x40); sharp to clear boundaries; contain a-sa quartz, biotite, opaques, quartz-biotite schist. Size = 0.85 to 0.15mm

Amorphous Concentration Features (Acf)
Rare: **burnt/unburnt organics**, r, equant.

Comment
This fabric is characterised by a red-firing (non-calcareous?) groundmass, which is rich in quartz and also contains chert, rare biotite and quartz-biotite schist. This groundmass is dominated by angular euhedral calcite. Consideration of size and angularity as well as comparison with clay pellets suggests that the calcite was added as temper. Comparison of clay pellets and groundmass indicates that the groundmass is significantly richer in quartz than the clay pellets; moreover the quartz in the clay pellets is invariably small and angular or subangular, while the quartz of the groundmass varies considerably in size and angularity from angular to rounded. The differences between clay pellets and groundmass therefore largely concerns the additional presence in the groundmass of rounded quartz grains. These have no obvious origin and may have been also added as temper in the form of sand. Sample 97/91 has what appears to be a non-calcareous slip layer.

Fabric 16 is distinctive with no clear links to other fabrics. The euhedral calcite resembles that found in Fabric 1e, but there is otherwise nothing to link these groups. Unfortunately Fabric 16 contains no material indicative of a specific provenance, although it would be compatible with a provenance in north-central Crete.

(17) Non Calcareous(?), Quartz-Rich, Calcareous Siltstone

Samples: 98/77, 98/99

Microstructure
Rare mega to meso vughs, rare meso planar voids. Inclusions are close to single-spaced.

Groundmass
Fabric is generally homogeneous. Colour varies from red to dark brown (PPL, XP) (x40). Groundmass is mildly optically active.

Inclusions
c:f:$v_{10\mu m}$ c.30:65:5
Coarse fraction = 2.0mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Dominant: **calcareous siltstone**, a-sa, equant to elongate; some examples (e.g. 98/99) resemble a calcimudstone with rare discrete clasts of fine quartz and opaques, others (e.g. 97/77) contain larger clasts of quartz, plagioclase, calcite, opaques, shell fragments and foraminifera in calcareous matrix (matrix-supported). Size = 2.0 to 0.2mm.
Rare: **micrite with iron concentrations**, r, equant to elongate; sometimes contains discrete clasts of quartz.
Very rare to absent: **monocrystalline calcite**, sr, equant. Size = 0.4mm.
Rare: **monocrystalline quartz**, sr, equant. Size = 0.25 to 0.2mm.
Rare: **polycrystalline quartz**, sr, equant to elongate. Size = 1.4 to 0.2mm.
Rare to very rare: **chert**, sr, equant. Size = 0.3 to 0.2mm.
Rare to absent: **phyllite**, r, elongate; also in association with biotite. Size = 0.7mm.

Fine Fraction
Dominant: **quartz**.
Common: **biotite**, lathlike.
Very few to rare: **epidote**.
Very few: **micrite/calcareous siltstone**
Rare: **quartz-biotite phyllite**.
Very few: **chert**.
Very rare: **plagioclase**.
Very rare: **foraminifera**.
Very rare: **opaques**.

Comment
This fabric is characterised by a red-firing groundmass, which is very rich in quartz and which also contains chert, biotite, quartz-biotite phyllite. This groundmass is dominated by large calcareous siltstone non-plastics. Some of the calcareous siltstones in 98/99 are similar in form and composition to calcimudstones in Fabric 5a. Fabric 17 otherwise has a quite different groundmass from Fabric 5a, very rich in quartz, no clay pellets, phyllite. The presence of micrite with iron concentrations links Fabric 17 in general to Fabrics 1a-i, etc. Fabric 17 contains nothing indicative of a specific provenance, although it would be compatible with a broad origin in north-central Crete.

(18) Low Calcareous, Fine Quartz, Micrite, Biomicrite, Shell, Sand

Samples: 97/11, 97/89, 97/90

Microstructure
Few to rare macro to meso planar voids, rare mega to meso vughs. Some larger voids are surrounded by darker patches, some contain opaque, possibly organic material (e.g. 97/11, 97/89). Some voids (e.g. 97/90) contain remains of calcitic material at margins. Generally voids and inclusions exhibit local long-axis parallel orientation; the angle of this orientation varies from parallel (e.g. 97/89) to almost perpendicular (e.g. 97/11) to vessel margins. Inclusions are close to single-spaced.

Groundmass
Generally homogenous, however the groundmass of 97/90 is poor in fine quartz. Colour varies from orange (PPL, XP) (x40) to red-orange (PPL) (x40) and orange-brown (XP) (x40). Micromass varies in optical activity from low to high (e.g. 97/11).

Inclusions
c:f:$v_{10\mu m}$ c. 25:70:5
Coarse fraction = 2.75mm. to 0.1mm.
Fine fraction = 0.1mm. or less.

Coarse Fraction
Dominant to frequent: **micrite/biomicrite**, r, equant to elongate; some well-rounded grains appear to be oooids or peloids; micrite contains foraminifera and discrete clasts of quartz, chert, quartz-biotite schist; sometimes contains iron concentrations. Size = 1.6 to 0.1mm.
Frequent: **sand**, r, equant to elongate, low to high sphericity; appears water worn; predominantly quartz (monocrystalline, polycrystalline), but also contains siltstone/sandstone (grain-supported, quartz, biotite, plagioclase), chert, quartz-biotite schist, igneous (doleritic?) rock. Size = 0.7 to 0.1mm.
Very few: **shell fragments**. Size = 1.25 to 0.25mm.
Very few: **foraminifera**. Size = 0.45 to 0.1mm.
Rare to absent: **fine-grained sparite**, sa-sr. Size = 2.7 to 0.1mm.
Rare to very rare: **opaques**, r, equant to elongate. Size = 0.8 to 0.1mm.

Very rare to absent: **epidote**, r, equant. Size = 0.2mm

Fine Fraction
Dominant to frequent: **monocrystalline quartz**.
Few: **polycrystalline quartz**.
Few: **calcite/micrite**.
Very few: **foraminifera**.
Rare: **biotite**.
Rare: **chert**.
Rare: **plagioclase feldspar**.
Rare: **opaques**.
Very rare: **epidote**.

Textural Concentration Features
Rare to very rare: **clay pellets**, sr-r, equant to elongate, clear boundaries, colour is orange to brown in XP (x40); contain fine monocrystalline quartz, biotite. Size = 0.5 to 0.1mm.

Amorphous Concentration Features (Acf)
Few: **unburnt organics/burnt organics**, r equant to elongate; always found in voids.

Comment
This fabric is characterised by orange to orange-brown firing groundmass, which contains fine quartz and rounded grains of quartz, chert, siltstone and phyllite. This groundmass is dominated by predominantly bioclastic calcareous non-plastics. Comparison of groundmass, large non-plastics and clay pellets would suggest that the main clay component was a red-firing clay rich in fine quartz. The predominantly quartz sand would appear then to be a second component, leaving the fossiliferous limestone as a third. This calcareous material could derive from a second clay or alternatively could have been added as temper with the sand. Fabric 18 is distinctive and lacks close parallels amongst other EN fabrics at Knossos. It contains no material distinctive of a specific origin, although it would nevertheless be compatible with an origin in north-central Crete.

(19) Calcareous, Quartz-Rich, Microfossils, Pelite/Phyllite

Samples: 97/30, 97/72, 97/92

Microstructure
Very rare to absent meso planar voids, very few to rare mega to meso vughs, very rare to absent channels. Some voids are surrounded by darker patches, some contain opaque, possibly organic material (e.g. 97/30). Voids and inclusions exhibit local long-axis parallel orientation; the angle of this orientation varies from parallel to perpendicular to vessel margins. Inclusions are close to single-spaced.

Groundmass
Generally homogenous throughout the section. Colour varies from yellow to yellow-brown (PPL, XP) (x40). The micromass is optically active.

Inclusions
c:f:$v_{10\mu m}$ c.25:70:5 to c.30:65:5
Coarse fraction = 3.5 to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Dominant: **pelite/phyllite**, a-sr, equant to elongate; grading from calcareous phyllites/meta-siltstones (e.g. 97/30) into mica-rich phyllites (e.g. 97/72); contain quartz, mica, often rich in calcite (sparite and micrite); well to moderately sorted; usually retain sedimentary bedding structure, but mica exhibits parallel extinction. Size = 2.75 to 0.2mm.
Few to very few: **micrite with iron concentrations**, sr-r, equant; well-sorted; sometimes contains isolated clasts of quartz, foraminifera . Size = 1.1 to 0.2mm.
Very few to rare: **foraminifera and ostracods**; sample 97/72 contains doughnut-shaped calcareous microstructure. Size = 0.65 to 0.2mm.
Rare to very rare: **monocrystalline/polycrystalline calcite (coarse-grained sparite),** sa, elongate; max. single grain-size = 0.85mm. Size = 1.4 to 0.2mm.
Rare to very rare: **monocrystalline quartz**, sa-r, equant to elongate. Size = 0.4 to 0.2mm.
Very rare to absent: **polycrystalline quartz**, sa, equant, size = 0.3 to 0.2mm.
Very rare: **chert**, r, equant. Size = 0.35 to 0.2mm.
Rare to absent: **alkali feldspar,** sr-r, equant; sometimes in association with plagioclase feldspar (e.g. 97/30). Size = 0.3 to 0.2mm.
Very rare to absent: **plagioclase feldspar**, a, elongate. Size = 0.5 to 0.2mm.
Very rare (97/72) to absent: **chlorite pseudomorph(?)**, sr, equant; yellow (XP) (x40) intersecting laths. Size = 0.2mm.
Very rare (97/30, 97/92) to absent: **clinozoisite rock fragments,** sr, equant, granular, subhedral clinozoisite. Size = 0.25 to 0.2mm.
Rare (97/72) to absent: **igneous rock (volcanic?)**, r, equant; contains plagioclase laths and some mica in isotropic groundmass. Size = 0.6 to 0.2mm.

Fine fraction
Frequent: **quartz**.
Frequent: **micrite**.
Common to few: **foraminifera**.
Few to rare: **monocrystalline calcite**.
Few to very few: **phyllite frags**.
Very few to rare: **chert**.
Rare to very rare: **plagioclase feldspar**.
Rare to very rare: **biotite**.
Rare: **epidote**.
Rare to very rare: **clinozoisite**.
Rare to very rare: **epidote**.
Very rare (97/72) to absent: **igneous rock**.

Rare: **opaques**.

Textural Concentration Features (Tcf)
Rare to very rare: **clay pellets**, sr-r, equant to elongate; clear boundaries; red to dark brown (XP) (x40) (non-calcareous?); contain predominantly sa-sr, equant quartz, but also chert, biotite, feldspar, clinozoisite, polycrystalline quartz, r quartz-biotite phyllite (cf. 97/30, 97/92). Size = 3.5 to 0.1mm.

Rare (97/92) to absent: **clay streaks**, clear boundaries, colour is red (XP) (x40); predominantly quartz, chert, feldspar, biotite, igneous rock frags. Length = 3.25mm.

Amorphous Concentration Feature (Acf)
Rare to very rare: **burnt/partially burnt organics**.

Comment
This fabric is characterised by a yellow-brown, calcareous(?), clay groundmass which is rich in quartz, foraminifera, ostracods and micrite, and which also contains rounded phyllite and rarely igneous rock fragments. This groundmass is dominated by pelite/phyllite rock fragments, whose size, distribution and angularity would suggest were added as temper. Comparison of groundmass and tcfs (clay pellets, clay streak) strongly suggests the mixing of two clays: all tcfs are red-brown, rich in quartz, chert and rounded phyllite and, importantly, contain no calcareous material. Therefore the source for the foraminifera, ostracods and micrite must lie elsewhere (a calcareous marl?). There are traces of a non-calcareous slip layer in 97/30. The degree of optical activity suggests that vessels were generally low-fired.

Fabric 19 is distinctive and shares little more than superficial similarities with other fabrics. At a very general level the siltstone-pelites may be compared to pelite/phyllites in fabrics 8, 9, 20 and 21, while the calcareous component rich in micrite and microfossils closely resembles the calcareous component in Fabric 23 and sample 97/38 (non-ceramic clay lump - see description below). The pelite-phyllite temper and red clay rich in quartz and phyllite would appear to be mineralogically related. The pelite-phyllites would link to the Phyllite-Quartzite series, the close sources of which are to the east and west of Herakleion or possibly Iouktas. The provenance of this fabric remains open, although it seems unlikely that it was produced within the immediate environs of Knossos (<5km).

(20) Calcareous, Rare Quartz, Siltstone/Pelite/Phyllite

Sample: 98/33

Microstructure
Rare macro to meso planar voids, very few mega to meso vughs. Several contain opaque, possibly organic material. Voids and inclusions exhibit local long-axis orientation varying in orientation to vessel margins. Inclusions are close to single-spaced.

Groundmass
Colour is yellow-orange (PPL, XP) (x40). The micromass is highly optically active. B-fabric is thin to thick granostriated/porostriated.

Inclusions
c:f:$v_{10\mu m}$ c.25:70:5
Coarse fraction = 3.1mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Dominant: **siltstone/pelite/phyllite**, a-sr, equant to elongate; consists of beds of fine-grained matrix-supported, metamorphosed fine siltstone (=phyllite), rich in mica with very fine quartz, which alternate with coarser, grain-supported coarse siltstone (max. grain-size c. 0.05mm). The latter predominantly contain mica, quartz, calcite with some opaques; in many cases the micas exhibit parallel orientation suggesting metamorphism; sometimes the phyllite is in association with calcite, which often resembles meta-calcite. Size = 3.1 to 0.2mm.
Few: **monocrystalline/polycrystalline calcite**, a-sa, equant to elongate; resembles a coarse-grained sparite (grain-size varies from c.0.02 to 0.5mm). Size = 1.0mm to 0.2mm
Few: **micrite**, sr-r, equant to elongate. Size = 1.7 to 0.2mm
Very few **opaques**, sa-r, equant to elongate; sometimes contain fine quartz. Size = 0.7 to 0.2mm.
Rare: **monocrystalline quartz**, r, equant to elongate. Size = 0.5 to 0.2mm.

Fine Fraction
Frequent: **quartz**.
Frequent: **calcite**.
Very few: **chert**.
Very few: **opaques**.
Very rare: **plagioclase feldspar**.
Rare: **biotite**.
Very rare: **epidote**.
Very rare: **igneous rock frag**.

Textural Concentration Features (Tcf)
Very few: **clay pellets**, high sphericity, r, with clear to diffuse boundaries; colour varies from yellow to red-brown (PPL, XP) (x40); contain almost no inclusions: some very fine quartz, calcite, very rare mica. Size = 0.7mm to 0.1mm.

Amorphous Concentration Features (Acf)
Very few to rare: **partially burnt organics**.

Comment
This fabric is characterised by a yellow-firing (calcareous ?) clay groundmass, which contains rare quartz, calcite and opaques. This groundmass is dominated siltstone/pelite rock fragments, whose size, angularity and distribution would suggest were added as temper. Comparison with clay pellets suggests that the

main clay component was fine and relatively free from large non-plastics. The fabric is distinctive: at a very general level the siltstone-pelites may be compared to pelite/phyllites in Fabrics 8, 9, 19 and 21, while the fine calcareous clay component may be compared to Fabrics 1a-i. The colour and high optical activity suggest that sample 98/33 was low-fired in a predominantly oxidising atmosphere. Provenance remains open: the presence of low grade metamorphic (pelite-phyllite) rock fragments would link to rocks of the Phyllite-Quartzite series.

(21) Non-Calcareous, Quartz-Rich, Bioclastic Limestone/Marl, Chert, Phyllite, Biotite

Samples: 97/33, 98/20, 98/35

Microstructure
Rare meso planar voids, very few to rare mega to meso vughs. Some voids contain opaque, possibly organic, material (e.g. 97/33). Assessment of orientation of voids and inclusions is difficult because inclusions and voids are predominantly equant; however, when inclusions and voids are more elongated, local long-axis parallel orientation can be observed (e.g. 97/33); the angle of this orientation varies from parallel to perpendicular to vessel margins. Inclusions are close to single-spaced.

Groundmass

Colour is brown to dark brown (PPL, XP) (x40). The micromass exhibits low to no optical activity.

Inclusions
c:f:$v_{10\mu m}$ c.30:65:5
Coarse fraction = 3.75mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Frequent to common: **bioclastic limestone/marl**, sr-r, equant to elongate; varies from micrite to sparite; some shell fragments are very large (e.g. c.3.75mm 97/33) others resemble foraminifera; large shell fragment in association with area of clay which is yellow/brown with rare quartz. Size = 3.75 to 0.2mm.
Frequent (98/20) to rare: **siltstone/pelite**, r, equant to elongate; usually retains the form of a siltstone (parallel bedding structure), but biotite and matrix frequently exhibit parallel extinction. Size = 3.15mm to 0.2mm.
Rare to very rare: **foraminifera**. Size = 0.3 to 0.2mm.
Rare (98/35): **sparite**, sa, elongate; varies in grain-size (c.0.4-0.1mm); examples in 97/33 and 98/35 exhibit only a relict primary structure. Size = 2.1 to 0.2mm.
Very rare to absent: **monocrystalline calcite**, r, equant to elongate. Size = 0.8 to 0.2mm.
Rare: **chert**, r, equant to elongate. Size = 0.4 to 0.2mm.
Rare: **polycrystalline quartz**, r, equant to elongate. Size = 0.3 to 0.2mm.

Rare: **monocrystalline quartz**, sr-r, equant to elongate. Size = 0.8 to 0.2mm
Very rare to absent: **igneous rock fragments**, r, equant to elongate; fine-grained, contain alkali and plagioclase feldspar with some quartz. Size = 0.9mm to 0.4mm
Rare to very rare: **opaques**, sr-r, equant. Size = 0.3 to 0.2mm.

Fine Fraction
Dominant: **monocrystalline quartz**.
Common: **chert**.
Few: **micrite**.
Few to rare: **phyllite**.
Few: **biotite**.
Few: **plagioclase feldspar**.
Few to very few: **alkali feldspar**.
Rare: **epidote**.
Rare: **calcite**.
Rare: **igneous rock fragments**.
Rare: **opaques**.
Very rare: **foraminifera**.

Textural Concentration Features (Tcf)
Rare to very rare: **clay pellets**, sr-r, equant, high sphericity, merging boundaries; contain sr monocrystalline quartz; colour is brown (PPL, XP) (x100). Size = 0.9 to 0.1mm.

Amorphous Concentration Feature (Acf)
Rare to very rare: **unburnt/partially burnt organics**; sample 97/33 contains a very large example of unburnt organic material (c.2.0mm).

Comment
This fabric is characterised by a groundmass rich in quartz and also containing chert, phyllite, opaques and biotite. This groundmass also contains a significant calcareous component in the form of shell fragments, foraminifera, micrite and sparite. The origin of the calcareous component is unclear. The area of yellow (calcareous?), quartz-poor clay adhering to the large shell fragment in 97/33 may indicate that the clay component originated in a calcareous marl which could have been added to a non-calcareous quartz rich clay. The calcite frequently exhibits traces of secondary calcite alteration (micritic clots, relict primary structures). In view of the low optical activity of the samples these features together may indicate a high firing temperature. There is a clear non-calcareous slip layer in 97/20.

Fabric 21 is most easily defined by its quartz-rich groundmass and its large fossiliferous limestone non-plastics. The presence of low-grade metamorphic rocks (pelite) links it to Fabrics 8, 9, 19 and 20 as well as more generally to rocks of the Phyllite-Quartzite of north-central Crete. Provenance remains open, although it would be consistent with a Cretan origin.

(22) Non-Calcareous(?), Fine Quartz, Marl, Sandstone, Phyllite, Igneous Rocks

Sample: 97/124

Microstructure
Very few to very rare mega to meso planar voids, rare macro to meso vughs. Some voids have calcite linings, some voids are surrounded by darker patches. Assessment of orientation of voids and inclusions is difficult because inclusions and voids are predominantly equant; however, when inclusions and voids are more elongated, local long-axis parallel orientation can be observed generally parallel to vessel margins. Inclusions are close to single-spaced.

Groundmass
Colour varies from orange (PPL, XP) (x40) to brown (PPL, XP) (x40). The micromass varies is highly optically active. B-fabric is thin to thick granostriated/porostriated.

Inclusions
c:f:$v_{10\mu m}$ c.25:70:5
Coarse fraction = 2.1mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Frequent: **micrite**, r, equant to elongate; sometimes with iron concentrations; occasionally micrite is coarser in texture and resembles a very fine sparite; sometimes contains isolated clasts of quartz, chert, foraminifera/shell fragments. Size = 2.1 to 0.2mm.
Very few: **foraminifera/shell fragments**. Size = 1.7 to 0.2mm.
Very few: **quartz-biotite phyllite**, sr-r, equant to elongate. Size = 1.1 to 0.2mm.
Very few: **siltstone/sandstone rock frags.**, r, equant to elongate; varies in grain-size from fine matrix-supported siltstone to medium grain-supported sandstone; contains quartz, chert, biotite, calcite, feldspar, altered igneous rock frags. Size = 1.25 to 0.3mm.
Rare to very rare: **quartz**, r. equant to elongate. Size = 0.9 to 0.2mm
Rare to very rare: **chert**, r, equant to elongate. Size = 0.7 to 0.2mm.
Rare to very rare: **igneous rock frags.**, r, equant to elongate; several examples are rich in amphibole with some quartz and biotite. Size = 1.3 to 0.4mm.
Very rare: **opaques**, r, equant to elongate; sometimes contains isolated quartz. Size = 0.4 to 0.2mm.

Fine Fraction
Dominant to frequent: **quartz**.
Frequent: **calcite**.
Few: **foraminifera**.
Rare to very rare: **chert**.
Rare to absent: **amphibole**.
Rare: **biotite**.

Few: **opaques**.
Rare: **epidote**.

Textural Concentration Features (Tcf)
Rare: **clay pellets**, r, equant to elongate; yellow-brown (XP) (x40); calcite-rich, fine quartz, foraminifera. Size = 1.0 to 0.1mm.

Amorphous Concentration Feature (Acf)
Rare to very rare: **burnt organics**.

Comment
This fabric is characterised by yellow/brown-firing clay groundmass, which contains fine quartz, micrite, biotite, siltstone/sandstone, rounded phyllite and igneous rock fragments. Fabric 22 is distinctive and cannot easily be related to other fabrics. The presence of micrite with iron concentrations may indicate a general link to Fabrics 1a-i, 2a-e, 6 and 8. Provenance remains open.

(23) Calcareous(?),Quartz, Micrite, Foraminifera

Sample: 97/60, 97/61

Microstructure
Very few to very rare mega to meso planar voids, rare macro to meso vughs. Some voids contain opaque, possibly organic material, others are surrounded by darkened areas. Some voids and inclusions exhibit local long-axis orientation parallel to vessel margins (e.g. 97/60). Inclusions are close to single-spaced.

Groundmass
Colour is yellow/brown to dark brown (PPL, XP) (x40). The micromass is optically active.

Inclusions
c:f:$v_{10\mu m}$ c.30:65:5
Coarse fraction = 0.8 to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Frequent: **micrite**, sa-sr, equant to elongate; sometimes contains iron concentrations; sometimes contains discrete clasts of quartz, foraminifera; sometimes grades into a fine sparite (e.g. 97/60). Size = 0.8 to 0.2mm.
Rare: **polycrystalline calcite (sparite)**, a, elongate. Size = 0.65 to 0.1mm.
Very few: **monocrystalline quartz**, sr-r, equant to elongate. Size = 0.8 to 0.2mm.
Rare: **chert**, sr-r, equant to elongate. Size = 0.65 to 0.2mm.
Rare: **polycrystalline quartz**, sr-r, equant to elongate. Size = 0.4 to 0.2mm.
Very few to rare: **foraminifera**. Size = 0.2mm.
Rare to very rare: **opaques**, r, equant; contain fine quartz and mica. Size = 0.5 to 0.25mm.

Fine Fraction
Frequent: **micrite/calcite.**
Frequent: **quartz.**
Few: **chert.**
Few: **polycrystalline quartz.**
Rare: **foraminifera.**
Rare: **plagioclase feldspar.**
Rare: **alkali feldspar.**
Rare: **biotite.**
Rare: **opaques.**
Very rare: **epidote.**

Textural Concentration Features (Tcf)
Rare to very rare: **clay pellets**, merging boundaries. Size = 0.8 to 0.1mm. Two types are possible:
(1) yellow/brown (XP, x40), rich in foraminifera and biotite;
(2) brown to dark brown (XP, x100); contains large rounded quartz, biotite.

Amorphous Concentration Features (Acf)
Very few to rare: **burnt/partially burnt/unburnt organics**, sr-r, equant to elongate; always found in voids.

Comment
This fabric is characterised by a groundmass rich in large rounded quartz, which also contains micrite, microfossils and biotite. Study of clay pellets suggests the possibility of clay mixing: the micrite and microfossils would appear to derive from a yellow firing (calcareous?) clay (marl?) which contains biotite but lacks large rounded quartz; the large rounded quartz would appear to derive from a brown-firing clay which also contains biotite. The fossiliferous components shares some similarity to the fossiliferous component of Fabrics 19 and 22 as well as to sample 97/38. Consideration of the orientation of voids, inclusions and b-fabric allowed the identification of a coil join in 97/60. There appears to be a non-calcareous (slip?) layer in 97/60. Colour suggests that both samples were fired in a predominantly reducing atmosphere. The frequent presence of unburnt organic material in 97/61 may suggest that the overall duration of firing was short. Provenance remains open, although Fabric 23 would be compatible with a provenance within the immediate area of Knossos.

(24) Low-Calcareous(?), Micrite, Phyllite, Opaques

Samples: 97/39, 98/29, 98/43, 98/44

Microstructure
Few to rare mega to meso vughs, rare macro to meso planar voids. Occasionally voids have calcite linings (e.g. 98/44). Some voids are surrounded by darker patches, many contain opaque, possibly organic material (e.g. 98/44). Assessment of orientation of voids and inclusions is difficult because inclusions and voids are

predominantly equant; however, when inclusions and voids are more elongated, local long-axis parallel orientation can be observed (e.g. 98/29, 98/44); the angle of this orientation varies from parallel to perpendicular to vessel margins. Inclusions are close to single-spaced.

Groundmass
Colour varies from orange (PPL, XP) (x40) to brown (PPL, XP) (x40). The micromass is optically active.

Inclusions
c:f:$v_{10\mu m}$ c.25:70:5
Coarse fraction = 2.5mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Dominant: **micrite with iron concentrations**, sr-r, equant to elongate; usually contains isolated sr-r clasts of quartz, calcite, opaques, more rarely fine lath-like biotite, chert, alkali feldspar; rarely bioclastic (e.g. 98/43, 98/44); size of clasts varies from 0.3 to <0.05mm. Sometimes contain a-sa argillaceous rock frags., red to brown in colour (XP) (x40), 0.9 to 0.1mm in size, which resemble siltstone and contain quartz, calcite and some biotite (e.g. 97/39, 98/44). Sometimes contain larger sa-sr clasts of sparite, (0.6 to 0.1mm in size). Size = 2.5mm to 0.2mm, mode = c.0.6mm.
Rare to absent: **siltstone**, sa, equant; contains calcite and quartz (cf. above micrite). Size = 0.55mm to 0.2mm.
Few to absent: **calcareous siltstone/fine sandstone**, a-sa, equant to elongate; grain-size = 0.3 to 0.05mm, mode = 0.12mm, matrix-supported but point contacts; contains sa-r quartz, calcite, chert, phyllite rock frags., polycrystalline quartz and mica in a calcareous matrix (see above micrite). Size = 2.2 to 0.5mm.
Rare to absent: **sparite**, sa-sr, equant to elongate; grain-size c. 0.15 to 0.05mm (cf. above micrite). Size = 1.0 to 0.2mm.
Rare to absent: **calcite**, sa, equant to elongate. Size = 0.45 to 0.2mm.
Very few to absent: **chert**, sa-r, equant to elongate. Size = 0.6 to 0.2mm.
Few to absent: **phyllite rock frags.**, r, elongate; contain quartz, biotite (cf. above calcareous siltstone). Size = 1.7 to 0.3mm.
Very few: **monocrystalline quartz**, r, equant to elongate. Size = 1.75mm to 0.2mm, mode = c.0.3mm.
Rare: **polycrystalline quartz**, r, equant. Size = 0.35 to 0.2mm.
Rare: **alkali feldspar**, r, elongate. Size = 0.5 to 0.2mm.
Rare: **igneous rock frags.**, r, equant to elongate; contain plagioclase with alkali feldspar and some quartz. Size = 0.4 to 0.2mm.
Rare to absent: **opaques (iron oxide?)**, r, equant to elongate. Size = 0.7 to 0.2mm.
Very rare to absent: **pyroxene**, r, equant. Size = 0.25mm.

Fine Fraction
Dominant: **micrite**.
Frequent to common: **monocrystalline quartz**.

Few: **chert**.
Few: **alkali feldspar**.
Few: **polycrystalline quartz**.
Few to rare: **calcite**.
Rare: **epidote**.
Rare: **mica**.
Rare: **opaques**.
Rare: **quartz-biotite phyllite**.
Very rare: **igneous rocks**.
Very rare to absent: **pyroxene**.
Rare to absent: **foraminifera**.
Very rare: **plagioclase feldspar**.

Textural Concentration Features (Tcf)
Very few to rare: **clay pellets**, r, equant; red (PPL, XP) (x40) to dark brown (PPL, XP); contains fine quartz, alkali feldspar, epidote. Size = 0.5 to 0.1mm, mode = 0.15mm.

Amorphous Concentration Features (Acf)
Few: **unburnt organics/burnt organics**, r equant to elongate; always found in voids.

Comment
This fabric is characterised by an orange-firing (low calcareous?) clay groundmass, which contains fine quartz, chert, feldspar, phyllite and opaques. This groundmass is dominated by micrite/calcareous siltstone, which may have been added as temper. The presence of micrite with iron concentrations would appear to link Fabric 24 to Fabrics 1a-i, 2a-e and 8. However the micrite in Fabric 24 also occasionally contains a silty component which does not find good parallels. In addition the phyllite has no close comparanda in these fabrics (cf. Fabric 8), although parallels could be found in Fabrics 11 and 14. Provenance therefore remains open, although Fabric 24 would in general be compatible with an origin in north-central Crete.

(25) Non-Calcareous, Fine Quartz, White Mica, Phyllite/Coarse Siltstone

Sample: 98/92

Microstructure
Rare macro to meso vughs, very rare meso planar voids, very rare macro channels. Some voids are surrounded by darker patches, some contain opaque, possibly organic material. Voids and inclusions exhibit local long-axis parallel orientation; the angle of this orientation may vary from parallel to perpendicular to vessel margins. Inclusions are close to single-spaced.

Groundmass
Colour is brown (PPL, XP) (x40). Where visible the micromass is optically active.

Inclusions
c:f:$v_{10\mu m}$ c.25:70:5
Coarse fraction = 2.5mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Dominant: **phyllite/coarse siltstone**, a-sr, equant to elongate; phyllite is predominantly quartz and biotite; phyllite sometimes found in association with coarse siltstone (grain-supported; max. grain-size c.0.05mm). Size = 1.4 to 0.2mm.
Very rare: **white mica**, sr, lath-like. Size = 0.5mm
Rare: **polycrystalline quartz**, sr-r, equant to elongate. Size = 0.3 to 0.2mm.
Very rare: **alkali feldspar**, r, equant to elongate. Size = 0.25 to 0.2mm.

Fine Fraction
Dominant: **quartz**.
Frequent: **white mica**.
Common: **phyllite**.
Rare: **calcite**.
Very rare: **opaques**.

Textural Concentration Features (Tcf
Very few: **clay pellets**, r, equant to elongate; merging to clear boundaries; dark brown in colour (XP) (x40); quartz-rich, white mica. Size = 0.75 to 0.1mm.
Rare: **clay streak**, clear, yellow in colour (PPL, XP) (x40); contains clay pellets, very rare quartz. Length = c. 2.5mm.

Amorphous Concentration Features (Acf)
Rare: **burnt/partially burnt organics**.

Comment
This fabric is characterised by a groundmass, rich in quartz and white mica, which is dominated by large phyllite and siltstone non-plastics, which may have been added as temper. Comparison between clay groundmass and textural concentration features (clay pellets, clay streak) suggests the possibility that two clays were mixed: i.e. a non-calcareous, micaceous, quartz-rich clay and a calcareous clay rare in quartz. There is a possible calcareous slip layer on the exterior surface of sample 98/92. This overlies a thicker area, which exhibits differentially-oriented birefringence which may indicate compaction due to burnishing. Fabric 25 shares no close parallels with other fabrics. There is nothing diagnostic of specific provenance.

(26) Non-Calcareous, Fine Quartz, Siltstone/Pelite, Metamorphics, Opaques

Samples: 97/73, 97/76, 98/91

Microstructure
Very few to rare mega to meso vughs, very few to rare macro to meso planar voids. Occasionally voids have calcite linings (e.g. 97/76). Some voids are surrounded by darker patches, some contain opaque, possibly organic material (e.g. 98/91). Voids and inclusions exhibit local long-axis parallel orientation; the angle of this orientation varies from parallel to perpendicular to vessel margins. Inclusions are close to single-spaced.

Groundmass
Colour varies from orange-red (PPL, XP) (x40) to very dark brown (PPL, XP) (x40). The micromass varies in optical activity from low (e.g. 98/91) to medium (e.g. 97/141). B-fabric is thin to medium granostriated/porostriated.

Inclusions
$c{:}f{:}v_{10\mu m}$ c.25:75:5
Coarse fraction = 3.2mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Dominant: **siltstone/pelite**, a-r, equant to elongate; generally matrix supported; contains quartz, biotite, feldspar, opaques, rare calcite; biotite often shows parallel extinction; pronounced dark bedding lines; sometimes grain-supported and larger grain-size (fine sandstone). Size = 3.2 to 0.2mm.
Very few to rare: **quartz-biotite schist**, r, equant to elongate. Size = 1.0 to 0.2mm.
Rare to very rare: **monocrystalline quartz**, sr, equant to elongate. Size = 0.9mm to 0.2mm.
Rare: **polycrystalline quartz**, sr-r, equant to elongate. Size = 0.6mm to 0.2mm.
Rare to very rare: **chert**, sr-r, equant to elongate; contains mica. Size = 0.55 to 0.2mm.
Rare: **opaques**, sa, equant to elongate. Size = 1.0 to 0.2mm

Fine Fraction
Frequent: **quartz**.
Common: **biotite**.
Few: **phyllite**.
Very few: **opaques**.
Rare: **chert**.
Very rare: **plagioclase feldspar**.
Very rare: **alkali feldspar**.

Textural Concentration Features (Tcf)
Rare: **clay pellets**, r, clear to merging; colour is orange-red to dark brown (XP) (x40); contain fine quartz, mica, opaques, r phyllite. Size = 0.9 to 0.1mm

Amorphous Concentration Feature (Acf)
Rare: **burnt/partially burnt organics**

Comment
This fabric is characterised by a red-firing (non-calcareous ?) clay groundmass, which contains fine quartz, biotite, opaques and rounded phyllite rock fragments. This groundmass is dominated by siltstone/pelite rock fragments, which consideration of size, angularity and distribution would suggest were added as temper. There is a thick non-calcareous slip layer in 97/73, which in composition resembles the body (fine quartz, biotite). The siltstone/pelite in Fabric 26 shares some similarities with the siltstone/pelite in Fabric 8, although there is no parallel in the siltstone/pelite in Fabric 8 for the distinctive dark opaque bedding structures. The groundmasses of the two fabrics are also distinct: that of Fabric 26 is richer in metamorphic rock fragments and opaques and contains only fine quartz. Fabric 26 also lacks the calcareous component of Fabric 8. Provenance remains open.

(27) Calcareous, Rare Quartz, Grog, Organics, Rounded Phyllite

Sample: 98/26, 98/83

Microstructure
Very few (98/26) to absent macro to meso channels, very few (98/83) to rare mega to meso vughs, rare macro to meso planar voids. In sample 98/26 many channels surrounded by slightly darkened areas. Voids and inclusions exhibit local long-axis parallel orientation; the angle of this orientation varies from parallel to perpendicular to vessel margins, forming a curve in several areas. Inclusions are close to single-spaced.

Groundmass
Colour varies from yellow (PPL, XP) (x40) in sample 98/26 to dark brown (PPL, XP) (x40) in sample 98/83. The micromass is very mildly optically active.

Inclusions
$c{:}f{:}v_{10\mu m}$ c.25:68:7
Coarse fraction = 1.8mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Dominant: **grog** (see below).
Very few: **micrite**, r, equant to elongate; sometimes contains isolated quartz grains; sometimes with iron concentrations. Size = 1.3 to 0.2mm.
Rare to absent: **quartz-biotite phyllite**, sr, equant to elongate; contains quartz, mica. Size = 0.4 to 0.2mm.
Rare: **monocrystalline quartz**, r, equant to elongate. Size = 0.35mm to 0.2mm.
Rare to very rare: **polycrystalline quartz**, r, elongate; sometimes in association with banded mica. Size = 0.65 to 0.2mm.

Rare to very rare: **chert**, sr, equant to elongate. Size = 0.3 to 0.2mm.
Rare: **opaques**, r, elongate. Size = 0.65 to 0.3mm.
Very rare to absent: **plagioclase feldspar**, r, equant. Size = 0.25mm.

Fine Fraction
Dominant: **calcite/micrite**
Frequent: **quartz**
Few: **foraminifera/shell frags.**
Rare: **phyllite frags.**
Rare: **chert**
Rare: **opaques**
Rare: **amphibole**
Rare: **mica**

Textural Concentration Features (Tcf)
Dominant: **grog**, a-sa, equant to elongate; sharp to merging boundaries. Size = 1.8 to 0.2mm. Three basic types are identifiable:
(1) yellow to dark brown (XP) (x40), calcareous, rare fine quartz, r micrite, r elongate chert, amphibole/quartz rock frags., opaques, epidote, biotite, grog, rounded voids (organics?); varying degrees of optical activity.
(2) dark brown (XP) (x40), non-calcareous, quartz rich (monocrystalline and polycrystalline), rare biotite.
(3) orange-brown (XP) (x40), rich in lath-like biotite, quartz, some calcite; large sa-r siltstone? rock frag., some quartz in association with lath-like biotite, rare foraminifera.
Rare: **clay pellets**, diffuse boundaries, orange (XP) (x40), contain fine calcite, biotite, some quartz. Size = 0.4 to 0.1mm.

Amorphous Concentration Features (Acf)
Few: **burnt organics**. Very many channel voids have darkened areas around them which may be connected with the burning out of organic material.

Comment
This fabric is characterised by a yellow-firing (calcareous?) clay groundmass, low in quartz, with rare rounded phyllites and chert. This groundmass is dominated by grog temper. In sample 98/26 organic material has also been added, probably also as temper. The fabric is distinctive with no close parallels amongst the other fabrics. Although the clay is calcareous and resembles calcareous clays in Fabrics 1a-i, the presence of rounded phyllite rock fragments mark it out as different and moreover suggest that Fabric 27 is inconsistent with a provenance within the immediate area (<5km) of Knossos. Provenance remains open.

(28) Non-Calcareous, Large Quartz, Grog, Quartz-Biotite Phyllite/Schist

Samples: 97/36, 97/79, 98/21, 98/22, 98/87, 98/89, 98/96

Microstructure
Very few to rare macro to meso planar voids, rare mega to meso vughs. Very rarely (i.e. 97/36) voids contain very small amounts of opaque, probably organic, material. Voids and inclusions generally exhibit local long-axis parallel orientation usually parallel to vessel margins. Inclusions are close to single-spaced.

Groundmass
Colour varies from orange (PPL, XP) (x40) to brown (PPL, XP) (x40) to black (97/79). The micromass varies in optical activity from low (e.g. 98/96) to high (e.g. 97/36). B-fabric is medium to thin granostriated/porostriated.

Inclusions
$c{:}f{:}v_{10\mu m}$ c.25:70:5
Coarse fraction = 1.7 mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Dominant to frequent: **grog** (see below)
Very few to rare: **monocrystalline quartz**, sa-sr, equant to elongate. Size = 1.1 to 0.2mm
Rare: **polycrystalline quartz/meta-quartz**, sa-sr, equant to elongate; often resembles meta-quartz (e.g. 98/21). Size = 0.95 to 0.2mm
Rare: **quartz-biotite phyllite/schist**, r, equant; also contains opaques. Size = 0.7 to 0.2mm.
Rare: **chert**, sa, elongate; sometimes contains larger grains of quartz (e.g. 98/21); sometimes contains calcite (e.g. 98/87). Size = 0.75mm to 0.2mm.
Very rare: **plagioclase feldspar**, sr, elongate. Size = 0.25mm
Very rare: **radiolarian test(?)**, sr, equant; infilled with chalcedonic quartz. Size = 0.25mm.
Rare to absent: **micrite**, r, elongate; contains isolated quartz. Size = 0.95mm to 0.2mm.
Very rare to absent: **opaques**, r, equant; sometimes contain isolated fine quartz. Size = 0.45 to 0.2mm.

Fine Fraction
Dominant: **quartz**.
Few: **chert**.
Few to rare: **biotite**.
Very few to rare: **plagioclase feldspar**.
Rare: **opaques**.
Rare to absent: **micrite**.

Textural Concentration Features (Tcf)
Dominant to frequent: **grog**, a-sa, equant to elongate, sharp to diffuse boundaries. Size = 1.7 to 0.2mm. Four fabrics can be identified:
(1) orange to dark brown (XP) (x40), large sr-r quartz, chert, polycrystalline quartz, rare micrite, biotite. This resembles groundmass of Fabric 28.
(2) dark brown (XP) (x40), rich in fine quartz, some micrite, biotite, chert, grog.
(3) yellow/brown to dark brown (XP) (x40), rich in fine calcite/micrite, some fine quartz, rare biotite, grog? (see large example in 98/96).
(4) brown (XP) (x40), fine quartz, large rounded phyllite.
Very few to rare: **clay pellets**, sr-r, equant to elongate, diffuse to merging boundaries, colour is orange (XP) (x40), contain quartz, opaques, biotite. Size = 0.7 to 0.1mm.
Rare to absent: **clay layer**, on exterior surface of 97/36, 98/87 and 98/89, red in colour (XP) (x40), clear to sharp boundaries, differentially oriented b-fabric; varies in thickness from 0.1mm to 0.85mm.; rich in fine quartz, biotite, chert, opaques, sparite. Possibly different clay from Fabric 28.

Amorphous Concentration Features (Acf)
Very rare (97/36) to absent: **opaque, possibly organic material**, consists of thin (c.0.05) elongate strands in planar voids. However, there are no darkened areas around the voids.

Comment
This fabric is characterised by an orange to brown firing clay groundmass, which contains large quartz grains, chert, some quartz-biotite schist. This groundmass is dominated by grog temper. The fabric is distinctive: the closest fabric is Fabric 29, which is richer in fine quartz. In comparison to the majority of fabrics from Knossos, Fabric 28 contains very little organic material. A number of samples have coarse non-calcareous slip layers (e.g. 97/36, 98/87 and 98/89), which are always in association with features added to the original surface of the vessel, either tubular lugs (97/36, 98/87) or plastic decoration (98/89). These slip layers contain fine quartz and biotite, but lack larger quartz. They therefore may derive from a different clay from the body. Provenance remains open.

(29) Low/Non Calcareous, Fine Quartz, Grog, Limestone, Phyllite

Sample: 97/86

Microstructure
Very few macro to meso planar voids, rare mega to meso vughs. Voids and inclusions generally exhibit local long-axis parallel orientation. Inclusions are close to single-spaced.

Groundmass
Colour varies from orange to brown (PPL, XP) (x40). The micromass is highly optically active. B-fabric is medium to thin granostriated/porostriated.

Inclusions
c:f:$v_{10\mu m}$ c.25:70:5
Coarse fraction = 2.15 mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Dominant: **grog** (see below).
Few: **micrite**, r, equant to elongate; sometimes contains isolated quartz. Size = 1.3 to 0.2mm.
Very few: **polycrystalline quartz**, sr-r, equant to elongate; sometimes resembles meta-quartz. Size = 0.5 to 0.2mm.
Very few: **quartz-biotite phyllite**. Size = 0.6 to 0.2mm.
Rare: **monocrystalline quartz**, r, equant to elongate. Size = 0.3 to 0.2mm.
Rare: **opaques**, r, equant to elongate. Size = 0.5 to 0.2mm.
Very rare: **chert**, r, equant. Size = 0.25mm.

Fine Fraction
Dominant: **quartz**.
Common: **calcite/micrite**.
Few: **biotite**.
Few: **chert**.
Rare: **opaques**.
Very rare: **epidote**.
Very rare: **alkali/plagioclase feldspar**.

Textural Concentration Features (Tcf)
Dominant: **grog**, a-sa, equant to elongate, sharp to diffuse boundaries. Size = 2.15 to 0.2mm. A number of fabrics are identifiable:
(1) yellow (XP) (x100), calcareous?, some rounded quartz, some biotite, sparite/micrite, (max. c.0.5mm), rare rounded phyllite, small rounded highly spherical brown clay pellets.
(2) orange-red (XP) (x100), non calcareous?, large quartz.
(3) dark brown (XP) (x100), non-calcareous?, rich in fine quartz, biotite, chert, calcite, rounded phyllite rock frags., dark tcfs (clay pellets?).
(4) dark brown (XP) (x100), non-calcareous?, rich in meta-quartz, rich in biotite, some meta-calcite, opaques, rare large pyroxene (schist?).
(5) red (XP) (x100), rich in mica, some quartz, meta-quartz and metamorphic rock frags. (quartz-mica phyllite/schist).

Amorphous Concentration Features (Acf)
Very rare: **unburnt organic material**.

Comment
This fabric is characterised by a clay groundmass, rich in fine quartz and which also contains biotite, chert and quartz-biotite phyllite. This groundmass is dominated by grog temper. The fabric may be compared to fabrics 27 and 28, which also contain metamorphic rock fragments and grog. There is a possible non-calcareous slip layer in 97/86, which has been cut through by an angular tool

(cf. combed/grooved surface of 97/86). Fabric 29 contains nothing distinctive of a specific source and provenance therefore remains open.

(30) Low/Non Calcareous, Fine Quartz, Biotite, Siltstone/Pelite

Sample: 98/90

Microstructure
Few mega to meso vughs, rare mega to meso planar voids. Voids and inclusions approximately oriented parallel to vessel margins. Inclusions are close to single-spaced.

Groundmass
Groundmass almost entirely obscured due to isotropic nature of fabric.

Inclusions
c:f:$v_{10\mu m}$ c.25:65:10
Coarse fraction = 2.1mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
NB very obscured.
Dominant: **siltstone/pelite**, sa-r, equant to elongate; contains quartz and biotite. Size = 2.0 to 0.2mm.
Rare: **monocrystalline quartz**, r, equant to elongate. Size = 0.65 to 0.2mm.
Rare: **altered igneous rock frags.**, sr, equant; one example consists of clasts of alkali feldspar in a glassy matrix. Size = 1.0 to 0.2mm.
Rare: **chert**, a-sa, elongate. Size = 0.75mm to 0.2mm.
Very rare: **micrite**, r, equant. Size = 0.25mm to 0.2mm.

Fine Fraction
NB almost entirely obscured.
Frequent: **quartz**.
Common?: **biotite**.
Few: **chert**.

Textural Concentration Features (Tcf)
Rare: **clay pellets**, r, equant to elongate; contains quartz, mica, grog. Size = 2.1mm to 0.2mm

Amorphous Concentration Features (Acf)
None identifiable.

Comment
This fabric is characterised by clay groundmass rich in biotite and quartz, which also contains altered igneous rocks. This is dominated by large siltstone/pelite non-plastics, which seem to have been added as temper. The isotropic nature of

this sample may indicate that it is high-fired. There is little distinctive of a specific source and provenance therefore remains open.

(31) Non-Calcareous, Siltstones, Biotite

Samples: 97/101

Microstructure
Very few macro to meso vughs, rare meso planar voids. Some voids are surrounded by darker patches, some contain opaque, possibly organic material. Voids and inclusions exhibit local long-axis orientation parallel to vessel margins. Inclusions are close to single-spaced.

Groundmass
Colour varies from brown to orange-red at margins (PPL, XP) (x40). Where visible the micromass is optically active.

Inclusions
$c:f:v_{10\mu m}$ c.25:70:5
Coarse fraction = 1.9mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Dominant: **siltstone**, sr-r, equant to elongate; matrix-supported; contain rare isolated quartz, mica, calcite (grain-size 0.1 to 0.01mm) and very rare foraminifera (c.0.25mm); sometimes matrix appears to be calcareous (e.g. 97/101); sometimes in association with coarser grain-supported siltstone (grain-size 0.1 to 0.01mm), which contains predominantly quartz, calcite, banded mica, chert in a non-calcareous/calcareous matrix. Size = 1.9 to 0.2mm.
Rare: **coarse siltstone/calcareous siltstone**, r, equant to elongate; grain-supported, contain quartz, calcite, banded mica, chert. Size = 1.0 to 0.5mm.
Few: **biotite**, sa-sr, lath-like. Size = 0.7mm to 0.2mm.
Rare: **igneous or metamorphic (?) rock fragments**, sr-r, equant to elongate; contain lath-like biotite, quartz and feldspar. Size = 0.7mm to 0.2mm.
Rare: **polycrystalline quartz**, sr-r, equant to elongate. Size = 0.6 to 0.2mm.
Rare: **monocrystalline quartz**, sr-r, equant to elongate. Size = 0.5 to 0.2mm.
Very rare: **plagioclase**, r, equant to elongate. Size = 0.25 to 0.2mm.
Very rare: **calcite/micrite**, r, equant. Size = 0.25 to 0.2mm.
Very rare: **foraminifera**. Size = 0.2mm.

Fine Fraction
Frequent: **quartz**.
Frequent: **biotite**.
Few: **siltstone**.
Rare: **plagioclase**.
Rare: **calcite/micrite**.
Rare: **opaques**.

Textural Concentration Features (Tcf)
Very rare: **clay pellets**, r, equant to elongate; merging boundaries; dark brown in colour (XP) (x40); contain quartz, mica. Size = 0.2 to 0.1mm.

Amorphous Concentration Features (Acf)
Rare: **burnt/partially burnt organics**.

Comment
This fabric is characterised by clay groundmass rich in lath-like biotite mica and also containing quartz, igneous or metamorphic rock fragments and foraminifera. This groundmass is dominated by large siltstone non-plastics, which appear to have been added as temper. Sample 97/101 has a non-calcareous slip layer. Fabric 31 is distinctive and shares no similarities with other fabrics. Clays sufficiently rich in biotite mica to produce Fabric 31 are rare on Crete (cf. area of the Isthmus of Ierapetra). Provenance therefore remains open.

(32) Non-Calcareous, Quartz-Epidote Phyllite/Schist

Sample: 98/78

Microstructure
Rare mega to meso vughs, very rare to absent meso planar voids. Some voids contain opaque, possibly organic material. Voids and inclusions exhibit local long-axis parallel orientation; the angle of this orientation varies from parallel to almost perpendicular to vessel margins across a single sample. Inclusions are close to single-spaced.

Groundmass
Colour is orange-red (PPL, XP) (x40). The micromass is optically active. B-fabric is thin to medium granostriated/porostriated.

Inclusions
$c{:}f{:}v_{10\mu m}$ c.20:75:5
Coarse fraction = 1.7mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Dominant: **quartz-epidote phyllite/schist**, a-sr, equant to elongate; also contains some biotite (grain size varies from c.0.05 to c.0.6mm). Size = 1.7 to 0.2mm.
Rare: **polycrystalline quartz (meta-quartz)**, a, equant to elongate. Size = 0.75 to 0.2mm.
Rare: **white mica**, a, lath-like. Size = 0.4 to 0.2mm.
Rare: **epidote**, sr, elongate. Size = 0.25mm.
Rare: **alkali feldspar**, sa-sr, elongate. Size = 0.4mm.

Fine Fraction
Dominant: **quartz**

Few: **epidote**
Very few: **biotite.**
Rare: **white mica.**
Very few: **phyllite.**
Rare: **opaques.**
Rare: **plagioclase.**
Rare: **alkali feldspar.**

Textural Concentration Features (Tcf)
Very rare to absent: **clay pellets**, r, equant; colour is orange to red (XP) (x40); clear to diffuse boundaries; contain isolated fine quartz and mica. Size = 0.15 to 0.1mm.

Amorphous Concentration Features (Acf)
Very rare: **unburnt organics.**

Comment
This fabric is characterised by a red-firing (non-calcareous?), clay groundmass, containing quartz and white mica. This is dominated by quartz-epidote phyllite/schist rock fragments. Consideration of size, angularity and distribution would indicate that these were added as temper. The fabric is distinctive and shares no similarities with any other fabric. Provenance remains open, but cannot be within the immediate area (<5km) of Knossos.

(33) Non-Calcareous, Quartz-Rich, Amphibolite, Altered Igneous, Phyllite

Sample: 97/59

Microstructure
Rare macro to meso vughs, very rare macro channel. Some larger voids are surrounded by darker patches, some contain opaque, possibly organic material. Voids and inclusions exhibit local long-axis parallel orientation, parallel to vessel margins. Inclusions are close to single-spaced.

Groundmass
Colour varies from very dark brown/black to red at margins (PPL, XP) (x40): both samples are almost entirely very dark brown/black. Where visible the micromass is optically active.

Inclusions
c:f:$v_{10\mu m}$ c.25:70:5
Coarse fraction = 1.1mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Frequent: **amphibolite**, sa-r, equant to elongate; predominantly amphibole, some biotite, opaques, feldspar, quartz. Size = 1.0 to 0.2mm.

Few: **altered igneous rocks**, sr-r, equant to elongate; usually little internal structure can be seen, however one example rich in biotite with some pyroxene, another example contains plagioclase laths with mica and pyroxene (altered basalt?). Size = 1.1 to 0.2mm.
Very few: **quartz-biotite phyllite**, r, equant. Size = 0.5 to 0.2mm.
Rare: **amphibole**, a-sr, equant to elongate. Size = 0.7 to 0.2mm.
Rare: **biotite**, sa-sr, lath-like. Size = 0.25 to 0.2mm.
Rare: **monocrystalline quartz**, r, equant to elongate. Size = 0.5 to 0.2mm.
Rare: **polycrystalline quartz**, sa-r, equant to elongate; sometimes sutured contacts. Size = 0.6 to 0.2mm.
Very rare: **plagioclase feldspar**, sr-r, equant to elongate. Size = 0.25 to 0.2mm.
Rare: **chert**, sr, equant to elongate. Size = 0.4 to 0.2mm.
Very rare: **radiolarian test(?)**, infilled with chalcedonic quartz.
Rare: **chlorite pseudomorph**, r, equant. Size = 0.6mm.
Very rare: **micrite**, r, elongate. Size = 0.4 to 0.2mm.
Rare: **opaques**, r, equant to elongate. Size = 0.4 to 0.2mm.

Fine Fraction
Dominant: **quartz**.
Common: **biotite**.
Few: **plagioclase feldspar**.
Very few: **pyroxene**.
Rare: **igneous rocks**.
Rare: **altered igneous rocks**.
Very few: **amphibole**
Rare: **phyllite**.
Rare to very rare: **chert**.
Rare to very rare: **opaques**.
Very rare: **micrite**.

Textural Concentration Features (Tcf)
Very few to rare: **clay pellets**, sr-r, equant to elongate; colour dark brown/black (PPL) (x40); merging boundaries; contains fine quartz, biotite, pyroxene, calcite, r altered igneous rock frags, chert. Size = 1.2 to 0.1mm

Amorphous Concentration Features (Acf)
Rare: **burnt/partially burnt organics**.

Comment
This fabric is characterised by a red-firing (non-calcareous?) groundmass, which contains quartz, biotite, amphibole, phyllite and altered igneous rocks. This is dominated by amphibolite rock fragments. Angularity, grain-size and comparison with clay pellets fail to indicate obvious tempering. Fabric 33 is distinctive and shares no similarities with any other fabric. Provenance remains open.

(34) Non-Calcareous, Quartz-Rich, Dolerite, Altered Igneous, Phyllite/Schist

Samples: 98/80, 98/88

Microstructure
Rare meso planar voids, very few mega to meso vughs. Some voids contain opaque material. Voids and inclusions exhibit local long-axis parallel orientation; the angle of this orientation varies from parallel to perpendicular to vessel margins, sometimes across a single sample (e.g. 98/80). Inclusions are close to single-spaced.

Groundmass
Colour varies from very dark brown/black to red at margins (PPL, XP) (x40): both samples are almost entirely very dark brown/black. Where visible the micromass is optically active.

Inclusions
$c{:}f{:}v_{10\mu m}$ c.25:70:5
Coarse fraction = 2.0mm. to 0.2mm.
Fine fraction = 0.2mm. or less.

Coarse Fraction
Dominant to frequent: **dolerite**, a-sr, equant to elongate; fine-grained; contains laths of plagioclase and biotite, with phenocrysts of pyroxene in an opaque matrix; some examples appear altered (e.g. 98/88). Size = 2.05 to 0.25mm.
Very few to rare: **altered igneous (basaltic?) rock frags.**, r, equant to elongate; usually show little texture; one example in 98/88 contains plagioclase laths in a flow structure.. Size = 1.1mm to 0.2mm.
Common: **siltstone/pelite**, sa-r, equant to elongate; varies from meta-siltstone/phyllite to a well-sorted very fine sandstone/meta-sandstone (max. grain size 0.1mm); contain quartz, mica, opaques; retain bedding structure of a siltstone, but micas in parallel orientation; sometimes pronounced dark bedding lines. Size = 2.0 to 0.2mm.
Very few to rare: **quartz-biotite phyllite/schist**, r, equant to elongate. Size = 1.6 to 0.2mm.
Rare: **monocrystalline quartz**, r, equant to elongate. Size = 0.5 to 0.2mm.
Very few to rare: **polycrystalline quartz**, sa-r, equant to elongate; sometimes sutured contacts. Size = 1.1 to 0.2mm.
Rare: **plagioclase feldspar**, sr-r, equant to elongate. Size = 1.2 to 0.2mm.
Rare: **biotite**, sa-sr, elongate. Size = 0.25 to 0.2mm.
Rare: **opaques**, r, equant to elongate. Size = 0.3 to 0.2mm.
Rare: to absent: **chert**, sa-sr, equant to elongate. Size = 1.2 to 0.2mm.
Very rare to absent: **micrite**, r, equant to elongate. Size = 0.25mm.

Fine Fraction
Dominant: **quartz**.
Common: **biotite**.

Few: **plagioclase feldspar**.
Very few: **pyroxene**.
Very few: **igneous/altered igneous rocks**.
Rare: **phyllite/schist**.
Rare to very rare: **chert**.
Rare to very rare: **opaques**.
Very rare: **micrite**.

Textural Concentration Features (Tcf)
Very few to rare: **clay pellets**, sr-r, equant to elongate; colour dark brown/black (PPL) (x40); merging boundaries; contains fine quartz, mica, r meta-siltstone, r phyllite, r altered igneous rock frags, chert. Size = 1.2 to 0.1mm.

Amorphous Concentration Features (Acf)
Very rare to absent: **burnt/partially burnt organics**.

Comment
This fabric is characterised by a groundmass, rich in quartz and biotite and also containing quartz-biotite schist and siltstone/pelite. This groundmass is dominated by large igneous (dolerite) and altered igneous non-plastics. Consideration of angularity, size and comparison with clay pellets suggests that the latter was added as temper. Fabric 34 is distinctive: the presence of dolerites and altered igneous rocks encourages comparison with Fabric 6, however Fabric 34 also contain more metamorphic rocks of a different texture to Fabric 6 (quartz-biotite phyllite/schist). Provenance remains open.

(35) Non-Calcareous, Quartz and Biotite-Rich, Blueschist

Samples: 97/43, 98/10

Microstructure
Rare macro to meso planar voids, very few to rare mega to meso vughs. One void in 98/10 is surrounded by a darker area and contains some opaque, possibly organic material. Voids and inclusions exhibit local long-axis parallel orientation; the angle of this orientation varies from parallel to perpendicular to vessel margins, sometimes across a single sample (e.g. 97/43) leading to structural discontinuities where zones of different orientation meet; also the long-axis orientation of voids and inclusions sometimes follows a curve (e.g. 97/43). Inclusions are close to single-spaced.

Groundmass
Colour varies across the section, usually from red-orange at margins, to red-brown to brown in the core (PPL, XP) (x40). The micromass is highly optically active. B-fabric is thin to thick granostriated/porostriated.

Inclusions
$c{:}f{:}v_{10\mu m}$ c.30:65:5
Coarse fraction = 6.2mm. to 0.2mm.

Fine fraction = 0.2mm. or less.

Coarse Fraction
Dominant: **glaucophane schist (blueschist)**, a-sa, equant to elongate; contains fine grains (c.0.05 - 0.15mm.) of quartz, mica, amphibole, pyroxene, glaucophane and opaques, often in association with porphyroblasts (max. size c.1.25mm.) of glaucophane, pyroxene, mica, plagioclase. Size = 2.75mm to 0.2mm.
Few: **monocrystalline glaucophane**, a-sa, equant to elongate, size = 1.25mm. to 0.2mm.
Very few to rare: **monocrystalline quartz**, sr, equant to elongate. Size = 0.5mm to 0.2mm
Rare: **polycrystalline quartz**, sa-sr, equant to elongate; sometimes resembles meta-quartz; sometimes sutured contacts; often in association with mica. Size = 2.5 to 1.0mm.
Very few to rare: **opaques**, sr-r, equant to elongate; sometimes contain fine quartz and mica. Size = 0.5mm to 0.2mm.

Fine Fraction
Dominant: **quartz**.
Frequent: **biotite**.
Few: **glaucophane**.
Few: **opaques**.
Rare: **chert**.
Rare: **amphibole**.
Rare: **pyroxene**.

Textural Concentration Features (Tcf)
Few to very few: **clay pellets**, r, equant to elongate; clear to diffuse boundaries; colour is red to dark brown (XP) (x40); rich in fine quartz and biotite, some opaques, with sr-r metamorphic rock fragments containing quartz and biotite. Size = 6.2mm to 0.1mm.

Amorphous Concentration Features (Acf)
Very rare (97/43) to absent: **burnt/partially burnt organic**.

Comment
This fabric is characterised by a red-firing (non-calcareous?) clay groundmass, which is rich in quartz and biotite and also contains rounded quartz-biotite schist rock fragments. This groundmass is dominated by large glaucophane schist (blueschist) non-plastics. Consideration of angularity, grain-size and comparison with clay pellets suggests that the latter was added as temper. There is a possible non-calcareous slip layer in 98/10. Fabric 35 is distinctive and shares no similarities with any other fabric. Although blueschists do occur on Crete (e.g. Preveli, West Crete), they are far more common in the Cyclades and also occur in coastal Anatolia (e.g. Knidian peninsula). Provenance remains open.

Untempered Clay Lump: Calcareous, Quartz-rich, Foraminifera, Micrite

Sample: 97/38

Microstructure
Rare meso planar voids, very few macro to meso vughs. Local long-axis orientation of planar voids. Inclusions are close to single-spaced.

Groundmass
Colour varies from yellow (PPL, XP) (x40) to orange (PPL, XP) (x40). Micromass is very mildly optically active.

Inclusions
c:f:$v_{10\mu m}$ c.26:70:4
Coarse/fine fraction = 1.75mm. to 0.05mm.

Coarse/Fine Fraction
Frequent: **micrite**, r, equant; sometimes contain isolated clasts of quartz, foraminifera, calcite. Size = 1.75 to 0.05mm.
Common: **monocrystalline quartz**, sa-r, equant to elongate. Size = 0.4 to 0.05mm.
Few: **foraminifera**. Size = 0.35mm to 0.05mm.
Rare: **quartz-biotite schist**, r, equant to elongate. Size = 0.25 to 0.1mm.
Very few: **biotite**. Size = 0.1 to 0.05mm.
Rare: **opaques (iron oxide?)**, r, equant. Size = 0.7 to 0.05mm.
Rare: **chert**, r, equant. Size = 0.2mm to 0.05mm.
Rare: **plagioclase feldspar**, r, elongate. Size = 0.25mm .

Textural Concentration Feature Tcf)
clay pellets, r, equant to elongate; clear boundaries; colour is brown (PPL, XP) (x40), contains fine quartz and biotite. Size = 0.35 to 0.05mm.
clay streak: presence of a ptygmatic texture (suggestive of the folding together of two different clays) and clay striations within sample. These are red (PPL, XP) (x40), rich in quartz, with chert, feldspar, biotite, rounded volcanic rock frags. (rich in plagioclase). Grain size varies from 0.25 to 0.05mm.

Amorphous Concentration Features (Acf)
None visible; no sooted areas around voids.

Comment
This sample is characterised by a yellow-firing (calcareous?) groundmass, which contains quartz, foraminifera and micrite. Study of tcfs suggests the mixing of two clays: yellow firing (calcareous?) clay, rich in microfossils and micrite; a red firing (non-calcareous?) clay, rich in quartz with biotite, feldspar and rounded altered igneous rock frags. The former clay could be compared to clays used to produce Fabrics 1a-i, while the latter resembles the red quartz-rich clay component of Fabrics 2a-e. Sample 97/38 lacks obvious evidence for an added temper and here it is worth noting that the sample comes from an amorphous clay lump and not from a finished ceramic vessel.

APPENDIX VI

A REVISED TYPOLOGY OF EARLY NEOLITHIC CERAMIC FORMS

In the following series of tables the existing Furness-Evans shape typology is presented alongside a new typology of shape. This comparison is intended to demonstrate the extent to which forms may vary within the existing typology. For further discussion of this see Section 7.3. The new proposed typology will form the basis of all discussion of form in this thesis (see Chapter 7 and Appendix VII).

Coarse Burnished EN

Furness-Evans Typology	Range of Forms (Furness) [1]	Range of Forms (Evans) [2]	New Typology
Type 1: open bowls w. rounded profile			curved bowl
			deep curved bowl
			shallow curved bowl
			shallow straight-sided bowl
Type 1A: open bowls w. beaded/ offset rim (Evans 1964:198)			deep curved bowl with beaded rim

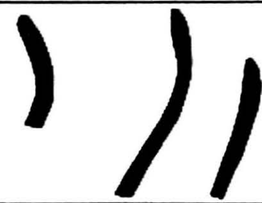
[1] Forms taken from Furness 1953: figs. 4-8.
[2] Forms taken from Evans 1964: figs. 22-32.

Furness-Evans Typology	Range of Forms (Furness)	Range of Forms (Evans)	New Typology
Type 2: open bowls w. straight/ splayed sides			straight-sided bowl
			flared bowl
			flared carinated bowl
			carinated bowl

Furness-Evans Typology	Range of Forms (Furness)	Range of Forms (Evans)	New Typology
Type 3: carinated bowls			deep curved bowl with offset rim
			curved bowl w. offset rim
			carinated bowl
			carinated bowl with flared offset rim

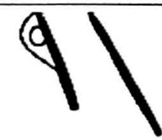
Furness-Evans Typology	Range of Forms (Furness)	Range of Forms (Evans)	New Typology
Type 4: carinated bowls with offset rim			high carinated bowl with offset rim
			curved bowl with flared offset rim
Type 5: bowls with incurved rim			incurved bowl

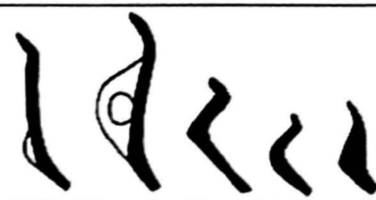
Furness-Evans Typology	Range of Forms (Furness)	Range of Forms (Evans)	New Typology
Type 6: deep jars			incurved bowl
			incurved bowl
			curved jar with offset rim

Furness-Evans Typology	Range of Forms (Furness)	Range of Forms (Evans)	New Typology
Type 7: narrow-necked jars			's' profile bowls/jars
Type 8: funnel-necked jars			jar with flared offset rim
			's' profile bowls/jars

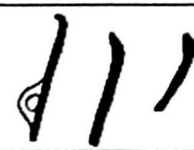
Fine Burnished

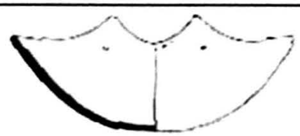
Furness-Evans Typology	Range of Forms (Furness)	Range of Forms (Evans)	New Typology
Type 1: open bowls w. rounded profile			curved bowls
			shallow curved bowls
Type 1A: open bowls w. offset rim			straight-sided bowls with offset rim
			curved/carinated bowls with tiny offset rim

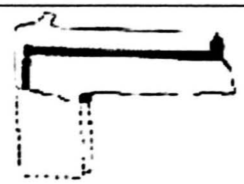
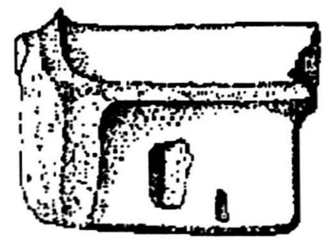
Furness-Evans Typology	Range of Forms (Furness)	Range of Forms (Evans)	New Typology
Type 2: open bowls w. straight/splayed profile			flared bowls
			shallow straight-sided bowls
			straight-sided bowls
			straight-sided bowls with offset rim
			flared carinated bowls

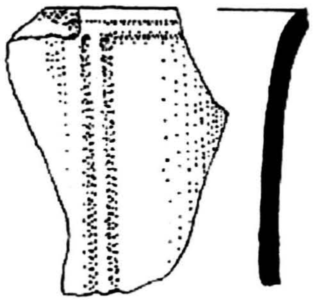
Furness-Evans Typology	Range of Forms (Furness)	Range of Forms (Evans)	New Typology
Type 3A: simple carinated bowls			carinated bowls
Type 3B: profiled carinated bowls			high carinated bowls with offset rim
			weakly carinated bowl with offset rim
			flared carinated bowls (see above)
Type 4A: carinated bowls with offset rim			high carinated bowls with offset rim (see above)
			carinated bowls with offset rim

Furness-Evans Typology	Range of Forms (Furness)	Range of Forms (Evans)	New Typology
Type 4B: bowls with offset rim			curved bowls with offset rim
			straight-sided bowls with offset rim
			curved jars with offset rim
Type 5: bowls with incurved rim			incurved bowls

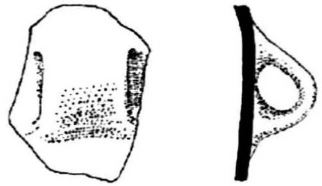
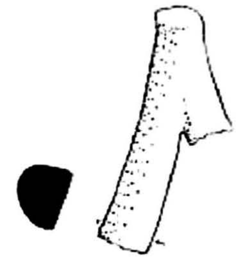
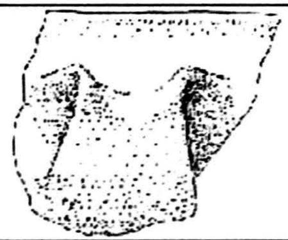
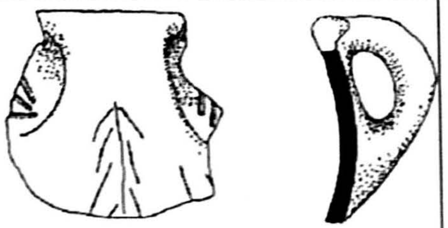
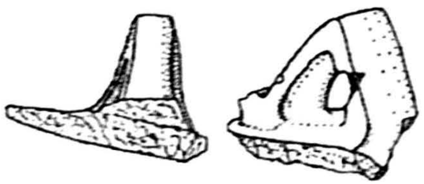
Furness-Evans Typology	Range of Forms (Furness)	Range of Forms (Evans)	New Typology
Type 6: deep narrow-mouthed bowls/jars			incurved bowls
			straight-sided incurved bowl/jar
			straight-sided incurved bowl/jar with offset rim
Type 7: narrow-necked jars			's' profile bowl/jar
			collared jar

Furness-Evans Typology	Range of Forms (Furness)	Range of Forms (Evans)	New Typology
Type 8: funnel-necked jars	no fine equivalent noted by Furness		collared jar
			curved jar with offset rim (see above)
Flat-based dishes or mugs: (Evans 1964:198, 200)			flat-based mug
			flat-based mug with offset rim
Oval Dishes with pairs of ears: (Furness 1953: fig. 9.13; Evans 1964:200; fig. 39.4)			curved bowl (see above)

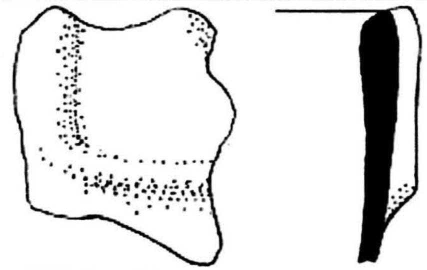
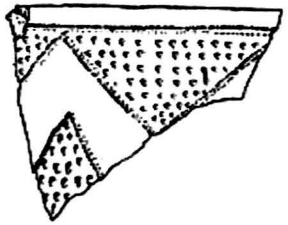
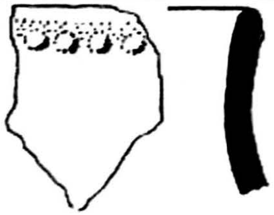
Furness-Evans Typology	Range of Forms (Furness)	Range of Forms (Evans)	New Typology
Shallow Rectangular Vessels: (Evans1964:200-1; fig. 27.26)			rectangular trays
Pedastalled Bowls: (Evans 1964:201; fig, 24.17, fig. 27.14)		 	pedestalled stand/ shallow bowl
'Legged Receptacles': (Furness 1953: fig. 13b.10; Evans 1964: fig. 31.3-5)			house model(?)

Furness-Evans Typology	Range of Forms (Furness)	Range of Forms (Evans)	New Typology
		 	flared cup
Flat base			flat base
			steep-sided base
Concave base			concave base

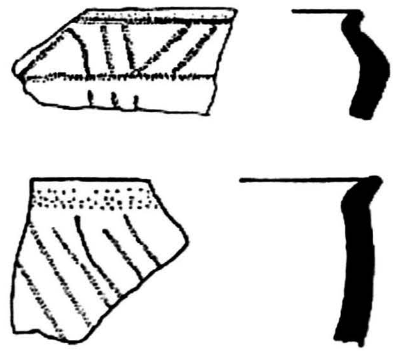
Main Handle Types

Strap handle		Wishbone	
Flared strap		Tubular lug	
Rim Strap			
Squared handle			

Main ENI Decoration Types

Plastic cordon		Barbotine	
Incised Pointillé		Incised Lattice	
Pellet (rim)		Incised 'Ladder'	
Pellet (body)		Incised Cordon/'Rope'	

Main ENII Decoration Types

Incised Diagonals or Chevrons		'Branch'	
'Barbed Wire'		Barbotine	

APPENDIX VII

FORM AND FINISH PER FABRIC

In the following series of tables the incidence of specific features of form and finish are presented for each fabric and for each ceramic phase (i.e. ENIa, ENIb, ENIc, ENII; see Appendix I). When a fabric is not listed this means either that it was not identified in contexts belonging to that phase or that such sherds that were identified were not diagnostic of a specific form or finish.

	1a C	1a F	1b /c	1d	1e	1f	2a /b	2c	4	5a C	5a F	5b	5c	6	7	8	9
no offset rim																	
deep curved	•	•									•			•		•	•
curved	•	•					•				•			•		•	
shallow (curved)		•									•					•	
shallow (straight)	•	•					•							•			
incurved bowl /hole-mouth jar	•	•					•				•			•	•	•	
hole-mouth jar (straight-sided)									•	•	•		•			•	•
carinated							•										
flared										•	•			•		•	
's' profile	•	•					•			•				•			
flat-based mug							•				•						
palette							•										
with offset rim																	
deep curved							•										
curved	•	•					•				•			•		•	
carinated		•															
shallow (curved)							•				•						
curved jar	•	•									•						
carinated jar		•					•										
collared jar							•			•	•			•			
flared offset rim																	
strap	•	•					•		•	•	•		•	•		•	•
flared strap							•							•		•	
false flared strap														•			
rim strap																	
squared strap																	
wishbone	•	•					•							•		•	
tubular rim loop (vertical)											•				•		
tubular loop (horizontal)							•							•		•	
tubular lug																	
oval pierced lug																	
flat base	•	•					•				•			•		•	•
rounded base																	

ENIa Forms Per Fabric

	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
no offset rim															
deep curved															
curved		•			•										
shallow curved)															
shallow (straight)															
incurved bowl /hole-mouth jar												•			•
hole-mouth jar (straight-sided)												•			
carinated															
flared					•										
's' profile															
flat-based mug															
palette															
with offset rim															
deep curved															
curved															
shallow (curved)			•												
curved jar															
carinated jar															
collared jar		•													
carinated															
curved high offset															
flared rim jar															
flared offset rim															
strap									•						•
flared strap	•														
false flared strap			•												
rim strap															
squared strap		•													
wishbone				•											
tubular rim loop (vertical)															
tubular loop (horizontal)												•			
tubular lug															
oval pierced lug															•
flat base										•	•	•			•
rounded base															

ENIa Forms Per Fabric (Continued)

	25	26	27	28	29	30	31	32	33	34	35	36
no offset rim												
deep curved												
curved					•							
shallow curved)												
shallow (straight)												
incurved bowl /hole-mouth jar					•							
hole-mouth jar (straight-sided)												
carinated												
flared												
's' profile												
flat-based mug												
palette												
with offset rim												
deep curved												
curved												
shallow (curved)												
curved jar												
carinated jar												
collared jar												
carinated												
curved high offset												
flared rim jar												
flared offset rim											•	
strap											•	
flared strap												
false flared strap												
rim strap												
squared strap				•								
wishbone												
tubular rim loop (vertical)												
tubular loop (horizontal)												
tubular lug				•								
oval pierced lug												
flat base												
rounded base											•	

ENIa Forms Per Fabric (Continued)

	1a C	1a F	1b /c	1d	1e	1f	2a /b	2c	4	5a C	5a F	5b	5c	6	7
no offset rim															
deep curved	•						•			•		•		•	
curved	•						•			•	•			•	
shallow (curved)		•					•				•			•	
shallow (straight)		•												•	
incurved bowl /hole-mouth jar	•	•					•			•	•			•	
hole-mouth jar (straight-sided)	•	•							•		•				
carinated							•				•				
flared							•				•		•	•	
's' profile	•	•								•	•			•	
flat-based mug							•				•			•	
straight-sided bowl	•	•									•			•	
flared cup				•											
tray							•							•	
pedestal							•								
with offset rim															
deep curved		•					•							•	
curved	•	•					•			•	•			•	
shallow (curved)											•				
curved jar	•	•			•						•			•	
carinated jar							•								
collared jar										•	•			•	
carinated		•					•							•	
high carinated															
flared rim jar											•			•	
flared offset rim															
strap	•	•		•			•		•	•	•	•	•	•	
flared strap	•	•								•	•			•	
false flared strap	•						•				•			•	
rim strap							•			•	•		•	•	
mini rim strap							•								
squared handle							•								
wishbone	•			•			•				•			•	
tubular rim loop (vertical)															
tubular loop (horizontal)											•			•	
tubular lug															
oval pierced lug															
flat base	•	•		•			•			•	•			•	
rounded base				•			•		•						

ENIb Forms Per Fabric

	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
no offset rim															
deep curved	●		●					●				●			
curved	●								●						
shallow (curved)	●														
shallow (straight)															
incurved bowl /hole-mouth jar											●				
hole-mouth jar (straight-sided)	●													●	
carinated											●			●	
flared	●	●													
's' profile			●												
flat-based mug	●														
straight-sided bowl											●			●	
flared cup			●												
tray															
pedestal				●											
with offset rim															
deep curved									●						
curved	●		●		●										
shallow (curved)															
curved jar	●														
carinated jar															
collared jar															
carinated															
high carinated														●	
flared rim jar															
flared offset rim															
strap	●	●				●	●				●	●		●	
flared strap															
false flared strap															
rim strap															
mini rim strap															
squared handle									●						
wishbone	●	●			●									●	
tubular rim loop (vertical)															
tubular loop (horizontal)															
tubular lug															
oval pierced lug															
flat base	●										●			●	
rounded base															
ring base															

ENIb Forms Per Fabric (Continued)

	23	24	25	26	27	28	29	30	31	32	33	34	35
no offset rim													
deep curved													
curved									•		•		
shallow (curved)													
shallow (straight)													
incurved bowl /hole-mouth jar		•											
hole-mouth jar (straight-sided)													
carinated													
flared													
's' profile													
flat-based mug	•												
straight-sided bowl													
flared cup													
tray													
pedestal													
with offset rim													
deep curved													
curved													
shallow (curved)													
curved jar													
carinated jar													
collared jar													
carinated													
high carinated													
flared rim jar													
flared offset rim													
strap													
flared strap													
false flared strap													
rim strap													
mini rim strap													
squared handle						•							
wishbone													
tubular rim loop (vertical)													
tubular loop (horizontal)													
tubular lug				•		•							
oval pierced lug													
flat base		•											
rounded base													
ring base		•											

ENIb Forms Per Fabric (Continued)

	1b C	1b F	1d C	1d F	1e C	1e F	1e B/S	1f C	1f F	2a/b C	2a/b F	2c	4	5a C	5a F
no offset rim															
deep curved	•		•	•					•	•					•
curved		•		•	•	•			•		•		•		•
curved with thickened rim									•		•				
straight-sided		•					•						•		•
shallow (curved)				•	•										•
shallow (straight)	•		•			•			•	•	•				
incurved bowl /hole-mouth jar		•		•	•					•	•				
hole-mouth jar (straight-sided)															
vertical carinated		•							•						•
vertical curved carinated		•													
carinated shallow									•						
flared		•		•	•				•		•				•
's' profile	•			•									•		
flat-based mug									•		•				
flared cup		•		•											•
with offset rim															
deep curved			•	•					•		•				
curved		•		•	•	•		•	•	•	•				•
shallow									•		•				
curved jar										•					
carinated jar															
collared jar	•	•	•	•	•	•		•	•	•	•			•	
carinated				•	•	•				•			•		•
high carinated		•							•						
flared rim jar											•				
funnel-necked jar															•
flared offset rim															
strap	•		•	•	•		•	•		•	•		•		
flared strap			•				•			•	•		•	•	•
false flared strap		•													
rim strap							•				•				
mini rim strap															
squared handle									•	•					
wishbone		•		•		•			•						•
loop handle															
mini fold-over handle															
tubular lug															
oval pierced lug															
flat base	•	•	•	•			•		•	•	•		•		
rounded base													•		
steep-sided				•							•				

ENIc Forms Per Fabric

	6	8 C	8 F	9	10	11	12	18	34
no offset rim									
deep curved	•	•	•						
curved		•	•						•
curved with thickened rim									
straight-sided	•								
shallow (curved)	•		•						
shallow (straight)									
incurved bowl /hole-mouth jar	•	•	•						
hole-mouth jar (straight-sided)	•								
vertical carinated	•								
vertical curved							•		
carinated									
carinated shallow									
flared	•	•	•						
's' profile									
flat-based mug									
flared cup									
with offset rim									
deep curved									
curved	•		•						
shallow									
curved jar	•								
carinated jar							•		
collared jar	•	•	•						
carinated	•								
high carinated									
flared rim jar									
funnel-necked jar									
flared offset rim									•
strap	•	•	•					•	
flared strap	•		•						
false flared strap									
rim strap									
mini rim strap									
squared handle	•								
wishbone	•		•						
loop handle									
mini fold-over handle			•						
tubular lug									
oval pierced lug									
flat base	•		•						
rounded base									
steep-sided						•			

ENIc Forms Per Fabric (Continued)

	1b C	1b F	1d C	1d F	1e C	1e F	1e B/S	1f C	1f F	1f B/S	2a/b C	2a/b F	4
no offset rim													
deep curved			•		•	•		•			•		•
curved	•	•		•		•	•	•	•	•		•	•
curved with thickened rim					•	•			•				
straight-sided		•			•		•		•	•			
shallow (curved)													
shallow (straight)	•	•		•		•			•			•	
incurved bowl /hole-mouth jar					•	•						•	
hole-mouth jar (straight-sided)					•		•						
vertical carinated		•				•	•		•	•		•	
vertical curved carinated						•			•				
carinated shallow				•		•			•				
flared	•	•		•		•	•		•	•	•	•	
's' profile													
flat-based mug													
flared cup													
house model						•			•				
spoon/scoop		•				•							
with offset rim													
deep curved		•		•					•			•	
curved	•	•			•	•	•		•	•		•	•
shallow						•							
curved jar		•		•	•	•	•				•	•	
carinated jar									•				
collared jar	•					•	•	•	•				
carinated									•			•	
high carinated		•				•	•		•				
funnel-necked jar									•				
strap	•	•	•	•	•	•	•	•	•	•	•	•	•
flared strap							•						
false flared strap						•			•				
rim strap	•	•		•		•			•				
mini rim strap													
squared handle						•			•			•	
horizontal strap						•							
wishbone		•		•		•			•			•	
loop handle									•				
tubular lug													
flat base	•	•			•	•			•		•		
concave base	•	•	•	•	•	•	•		•			•	
rounded base						•							•
steep-sided									•			•	
pedestal						•	•						

ENII Forms Per Fabric

	5a C	5a F	6	8	9	10	11	12	13	14	15	16	18	22
no offset rim														
deep curved	•		•											
curved	•	•	•	•										
curved with thickened rim														
straight-sided		•	•	•										
shallow (curved)											•			
shallow (straight)														
incurved bowl /hole-mouth jar			•			•								
hole-mouth jar (straight-sided)				•										
vertical carinated				•		•		•			•			
vertical curved carinated														
carinated shallow		•		•										
flared		•	•	•				•						•
's' profile														
flat-based mug														
flared cup														
house model														
spoon/scoop														
with offset rim														
deep curved		•	•											
curved		•		•				•						
shallow		•												
curved jar		•		•										
carinated jar														
collared jar				•										
carinated														
high carinated		•		•										
funnel-necked jar		•												
strap	•	•	•	•				•						•
flared strap														
false flared strap														
rim strap		•												
mini rim strap														
squared handle				•										
horizontal strap				•										
wishbone		•		•										
loop handle														•
horizontal tub. lug		•												
flat base		•		•										
concave base		•	•	•									•	
rounded base														
steep-sided		•		•										
pedestal								•						

ENII Forms Per Fabric (Continued)

	1a C	1a F	1b /c	1d	1e	1f	2a /b	2c	4	5a	5b	5c	6	7	8	9
U/V cordon:																
curved/deep bowl	•						•						•		•	
incurved bowl	•															
lump (↑ rim):																
curved/deep bowl	•															
incurved bowl	•						•			•				•	•	
lump (↓ rim):																
curved/deep bowl	•						•						•			•
pierced ears:																
curved bowl							•								•	
flat-based mug										•						
pellet (↓ rim):																
's' profile jar							•									
pellets (body):																
single							•									
Θ carinated [o] jar		•														
mini false strap:																
curved [o] bowl													•			
rim of curved [o] bowl		•														
unpierced tub lug																
incised/ pointillé:							•									
fb [o] mug							•			•						
curved [o] bowl							•									
lattice in triangle																
lattice																
'ladder'																
incised offset rim															•	
oblique/V punched:																
straight-sided hole-mouth jar															•	•
wiped/combed							•									
scribble burnish							•						•		•	
piercing (pre-firing):																
shallow (ss)		•														
flared															•	
high carinated [o]															•	

ENIa Decoration Per Fabric

	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
U/V cordon:															
curved/deep bowl															
incurved bowl															
lump (↑ rim):															
curved/deep bowl															
incurved bowl															
lump (↓ rim):															
curved/deep bowl															
pierced ears:															
curved bowl															
flat-based mug															
pellet (↓ rim):															
's' profile jar															
pellets (body):															
single															
Θ carinated [o] jar															
mini false strap:															
curved [o] bowl			•												
rim of curved [o] bowl															
unpierced tub lug															
incised/pointillé:															
flat-based [o] mug															
curved [o] bowl															
lattice in triangle															
lattice															
'ladder'															
incised offset rim															
oblique/V punched:															
straight-sided hole-mouth jar															
wiped/combed															
scribble burnish															
piercing (pre-firing)															

ENIa Decoration Per Fabric (Continued)

	25	26	27	28	29	30	31	32	33	34	35	unsampled
U/V cordon:												
curved/deep bowl												
incurved bowl												
lump (↑ rim):												
curved/deep bowl												
incurved bowl												
lump (↓ rim):												
curved/deep bowl												
pierced ears:												
curved bowl												
flat-based mug												
pellet (↓ rim):												
's' profile jar												
pellets (body):												
single												
Θ carinated [o] jar												
mini false strap:												
curved [o] bowl												
rim of curved [o] bowl												
unpierced tub lug				•								
incised/pointillé:												
flat-based [o] mug												
curved [o] bowl												
lattice in triangle												•
lattice												
'ladder'												
incised offset rim												
oblique/V punched:												
straight-sided hole-mouth jar												
wiped/combed					•							
scribble burnish												
piercing (pre-firing)												

ENIa Decoration Per Fabric (Continued)

	1a C	1a F	1b/c	1d	1e	1f	2a/ b	2c	4	5a	5b	5c	6	7	8	9
U/V cordon																
curved/deep bowl	•			•			•						•		•	•
incurved bowl																
flared															•	•
curved [o] bowl							•			•					•	
flared cup																
slashed cordon/rope:																
curved/deep curved							•									
lump (↑ rim):																
curved/deep bowl	•			•			•						•		•	
incurved bowl	•						•									
flared bowl															•	
lump (below rim)																
[un]pierced ear																
curved bowl							•			•			•			
flat-based mug																
pellet (↓ rim):																
's' profile jar																
curved/deep curved	•														•	•
incurved	•						•						•			
collared jar				•			•								•	
curved [o] bowl							•			•					•	
pellets (body):																
single							•			•						
row				•			•									
barbotine				•						•						
mini false strap:																
curved [o] bowl										•						
rim of curved [o] bowl																
unpierced tub lug																
ripple decoration:																
curved [o] bowl																
carinated [o]															•	

ENIb Decoration Per Fabric

	1a C	1a F	1b /c	1d	1e	1f	2a /b	2c	4	5a	5b	5c	6	7	8	9
incised/pointillé:							•			•			•			
flat-based [o] mug							•						•			
flared										•						
pedestal bowl							•									
rim strap							•									
dotted													•			
lattice																
flat-based mug										•						
'ladder'																
curved							•									
flat-based mug							•			•			•			
incised offset rim															•	
unique incised decoration																
oblique/V																
punched:																
straight-sided hole-mouth jar																
curved [o] bowl															•	
combed																
wiped/scored							•						•			
scribble burnish																
d-on-l painted:																
crosshatching																
oblique																
dribble				•												
dots					•											
red & white paint																
piercing (pre-fire)																
flared cup				•												

ENIb Decoration Per Fabric (Continued)

	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Plastic Decoration															
U/V cordon									•						
curved/deep bowl															
flared cup		•													
slashed cordon/ 'rope':															
curved/deep curved	•														
's' profile	•														
lump (↑ rim)															
lump (↓ rim):															
deep curved						•				•					
[un]pierced ear															
pellet (↓ rim):															
's' profile jar															
curved/deep curved						•									
incurved															•
pellets (body)															
barbotine															
mini false strap															
unpierced tub lug															
ripple decoration		•													
incised/pointillé															
pedestal bowl		•													
flat-based [o] mug														•	
grooved/pointillé					•										
dotted															
lattice in triangle															
lattice															
'ladder'															
incised offset rim							•								
unique incised decoration															
oblique/V punched															
combed															
wiped/scored															
scribble burnish															
d-on-l painted:															
crosshatching															
oblique															
dribble								•							
red & white paint															
piercing (pre-fire)															

ENIb Decoration Per Fabric (Continued)

	25	26	27	28	29	30	31	32	33	34	35
Plastic Decoration											
U/V cordon											
curved/deep bowl											
flared cup											
slashed cordon/ 'rope':											
curved/deep curved											
's' profile											
lump (↑ rim)											
lump (↓ rim):											
deep curved											
[un]pierced ear											
pellet (↓ rim):											
's' profile jar				•							
curved/deep curved											
incurved											
pellets (body)											
barbotine											
mini false strap											
unpierced tub lug											
ripple decoration											
incised/pointillé											
pedestal bowl											
flat-based [o] mug											
grooved/pointillé											
dotted											
lattice in triangle											
lattice											
'ladder'											
incised offset rim											
unique incised decoration			•	•							
oblique/V punched											
combed					•						
wiped/scored											
scribble burnish											
d-on-l painted:											
crosshatching	•										
oblique										•	
dribble											
red & white paint								•			
piercing (pre-fire)											

ENIb Decoration Per Fabric (Continued)

	1b C	1b F	1d C	1d F	1e C	1e F	1f C	1f F	2a/b C	2a/b F	2c	4	5a C	5a F	6	8 F	34
U/V cordon																	
curved/deep bowl			•						•	•					•		
slashed cordon/rope																	
curved/deep														•			
lump (↑ rim)																	
lump (↓ rim)																	
[un]pierced ear																	
pellet (↓ rim)																	
collared jar			•														
pellets (body)																	
single		•											•	•			
row																	
double on high carinated bowl								•		•						•	
barbotine			•														
mini false strap																	
curved [o] bowl		•															
rim of curved [o] bowl																	
unpierced tubular lug																	
ripple																	
curved [o] bowl						•											
carinated [o]				•										•			
carinated															•		
body				•													
incised/ pointillé:																	
flat-based [o] mug								•		•				•			
curved [o] bowl																	
flared															•		
rim strap																	
body		•	•					•		•				•			

ENIc Decoration Per Fabric

	1b C	1b F	1d C	1d F	1e C	1e F	1f C	1f F	2a/b C	2a/b F	2c	4	5a C	5a F	6	8 F	34
dotted																	
lattice																	
flat-based mug														•			
'ladder'																	
curved										•							
curved [o]		•															
flat-based mug										•							
incised offset rim						•											
vertical notch								•									
high carin. [o]																	
notched rim																	•
incised diagonals																	
vertical carinated								•									
curved [o]								•									
'barbed wire'						•		•								•	
deep bowl [o]			•														
vertical carinated [o] w. rim strap						•		•									
high carin. [o]								•									
V punched																	
combed																	
wiped							•		•								
scribble		•	•		•											•	
burnish																	
deep bowl					•												
carinated [o]					•												
flared strap					•												
brushed				•		•											
vertical carinated [o] w. rim strap						•											
d-on-l painted																	
crosshatching																	
oblique/linear																	
dribble				•													
brushed/painted dots			•	•													

ENIc Decoration Per Fabric (Continued)

	1b C	1b F	1d C	1d F	1e C	1e F	1f C	1f F	2a/b C	2a/b F	4	5a C	5a F	6 F	8 C	8 F	12 F	?
U/V cordon																		
curved/deep				•	•	•	•			•								
slashed																		
cordon																		
curved/deep													•					
lump (↑ rim)																		
lump (↓ rim)																		
[un]pierced																		
ear																		
pellet (↓ rim)																		
curved/deep															•			
pellets (body)																		
single	•																	
double on high carinated bowl						•		•										
barbotine					•								•					
curved [o] bowl								•										
ripple								•								•		
curved [o] bowl								•									•	
carinated [o]								•					•					
carinated																•		
's' profile						•										•		
(flat-topped)																		
flared														•				
wishbone								•										
incised/					•	•								•				
pointillé																		
f-based [o] mug						•				•								
lattice																		
'ladder'																•		
incised				•	•	•		•		•			•			•		
diagonals																		
vertical								•		•								
carinated																		
curved/carin.				•		•		•		•								
[o] (rim strap)																		
'barbed wire'						•	•	•		•								
deep bowl [o]																		
curved/carin.						•		•										
[o] (rim strap)																		
incurved						•				•								
V punched																		
curved [o] bowl																•		
scribble burn.	•					•		•		•	•							
brushed						•		•										
d-on-l painted																		
oblique/linear																		•
dribble																		
brushed/paint						•												
dots						•												

ENII Decoration Per Fabric

APPENDIX VIII

SELECTED SAMPLES

All samples selected for further analysis by thin section petrography are listed below in Figure VIII.1. Illustrations of those samples that preserve specific features of form or finish can be found after Figure VIII.1 or in Plates 30-71.

Sample No.	Fabric	Finish	Context	Comments	Illustration
97/1	8	B	ENIA	body	-
97/2	2b	B	ENIA	body	-
97/3	2b	B	ENIA	body	-
97/4	1a	P	ENIA	body w. strap handle	VIII.2
97/5	2b	B	ENIA	straight-sided shallow bowl	VIII.14
97/6	7	P	ENIA	body	-
97/7	1a	P	ENIA	carinated bowl w. offset rim	VIII.8
97/8	6	B	ENIA	handle	-
97/9	5a	B	ENIA	straight-sided hole-mouth jar	VIII.17
97/10	14	P	ENIA	body	-
97/11	18	B	ENIA	body	-
97/12	13	B	ENIA	body	-
97/13	6	B	ENIA	body	-
97/14	7	P	ENIA	incurved bowl w. rim lump	VIII.20
97/15	5a	P	ENIA	flared	VIII.17
97/16	11	P	ENIA	thin body sherd	-
97/17	7	P	ENIA	incurved bowl	VIII.20
97/18	11	B	ENIA	flat-base	VIII.24
97/19	8	B	ENIA	body	-
97/20	8	B/P	ENIA	's' profile	VIII.21
97/21	6	P	ENIA	carinated bowl w. offset	-
97/22	1a	P	ENIA	carinated bowl w. offset rim	VIII.2
97/23	5a	P	ENIA	incurved bowl	VIII.16
97/24	2a	B	ENIA	body	-
97/25	4	B	ENIA	round base burnt interior	-
97/26	7	B	ENIA	body	-
97/27	12	P	ENIA	curved bowl w. offset	Plate 34
97/28	14	B	ENIA	curved bowl	VIII.25
97/29	5a	P	ENIA	body	-
97/30	19	P	ENIA	body	-
97/31	8	B	ENIA	body	-
97/32	14	P	ENIA	body	-
97/33	21	B	ENIA	flat-base	Plate 65
97/34	9	B	ENIA	strap handle	VIII.23
97/35	8	B	ENIA	body	-
97/36	28	B	ENIA	tubular lug	Plate 67
97/37	2a	B	ENIA	body	-
97/38	-	-	ENIA	clay lump	-
97/39	24	B	ENIA	miniature bowl	VIII.16

Figure VIII.1 List of Selected Samples

Sample No.	Fabric	Finish	Context	Comments	Illustration
97/40	1i	B	ENIA	straight-sided bowl	VIII.10
97/41	12	B	ENIA	round base	-
97/42	2c	B	ENIA?	deep bowl	VIII.15
97/43	35	B	ENIA	body	-
97/44	2b	P	ENIA	body	-
97/45	6	B	ENIA	rounded base	-
97/46	2e	B	ENIA	flat-base	VIII.15
97/47	8	B	ENIA	body	-
97/48	5a	P	ENIA?	body	-
97/49	1a	B	ENIA?	carinated	VIII.2
97/50	1e	P	ENIA?	body	-
97/51	1a	P	ENIA	curved bowl with offset rim	VIII.2
97/52	5a		ENIA	body	-
97/53	1b	P	ENIA?	wishbone	VIII.4
97/54	2b	I	ENIA	deep bowl w. offset rim	VIII.12
97/55	1b	P	ENIA	bowl	VIII.4
97/56	10	B	ENIA	body?	-
97/57	15	B	ENIA	deep bowl	Plate 45
97/58	2c	P	ENIA	body.	-
97/59	33	P	ENIA	body	-
97/60	23	IP	ENIA?	flat-based mug	Plate 59
97/61	23	P	ENIA	carinated	Plate 59
97/62	1a	P	ENIB	shallow bowl	VIII.2
97/63	2b	P	ENIB	shallow bowl	VIII.14
97/64	2a	B/W	ENIB	deep bowl	VIII.11
97/65	1c	P	ENIB	deep bowl	VIII.3
97/66	2b	B	ENIB	carinated	VIII.14
97/67	6	B/W	ENIB	curved bowl w. offset rim	VIII.19
97/68	6	B	ENIB	body	Plate 63
97/69	8	B	ENIB	body	-
97/70	8	B	ENIB	rounded base burnt.	Plate 47
97/71	10	SC/R	ENIB	's' profile	VIII.22; Plate 64
97/72	19	B	ENIB	body	-
97/73	26	B	ENIB	body	-
97/74	6	B	ENIB	body	-
97/75	8	B/W	ENIB	body	-
97/76	26	B	ENIB	horiz. tubular lug	Plate 66
97/77	17	B	ENIB	body	-
97/78	11	B	ENIB	pedestalled stand/bowl.	VIII.24
97/79	28	B	ENIB	body	-
97/80	6	B	ENIB	body	-
97/81	1b	P	ENIB?	straight-sided bowl	VIII.3
97/82	2b	B	ENIB	handle	-
97/83	1b	P	ENIB	curved bowl w. offset rim	VIII.4
97/84	1d	B	ENIB	deep bowl	VIII.5
97/85	2a	P	ENIB	deep bowl w. offset rim.	VIII.12
97/86	29	C	ENIB	bowl	Plate 66
97/87	5a	B	ENIB	flat-base	VIII.16
97/88	15	B	ENIB	deep bowl	Plate 45
97/89	18	B	ENIB	body	-
97/90	18	B	ENIB	carinated bowl	-

Figure VIII.1 List of Selected Samples (Continued)

Sample No.	Fabric	Finish	Context	Comments	Illustration
97/91	16	P	ENIB	curved bowl	VIII.25
97/92	19	B	ENIB	body	-
97/93	5a	P	ENIB	curved	VIII.17
97/94	8	B	ENIB	flat base	VIII.21
97/95	5a	P	ENIB	curved bowl w. offset rim	VIII.16
97/96	6	B	ENIB	straight-sided hole-mouth jar	VIII.18
97/97	6	B	ENIB	body	-
97/98	5a	W	ENIB	straight-sided bowl	VIII.17
97/99	5a	IL	ENIB	flat-based mug	VIII.18
97/100	16	B	ENIB	deep bowl w. offset rim	VIII.25
97/101	31	P	ENIB	bowl!	VIII.26
97/102	11	R	ENIB	curved bowl w. offset rim	VIII.24
97/103	1c	P	ENIB	carin. bowl w. mini offset	VIII.3
97/104	2b	B	ENIB	flat-base.	VIII.13
97/105	1d	B	ENIC	deep bowl	VIII.5
97/106	2b	B	ENIC	collared rim.	VIII.14
97/107	1a	P	ENIC	bowl	VIII.2
97/108	10	IP	ENIC	carinated	Plate 64
97/109	1d	P	ENIC	deep bowl	VIII.5
97/110	2b	B	ENIC	's' profile	VIII.14
97/111	1d	P	ENIC	bowl	VIII.5
97/112	5a	B	ENIC	strap	VIII.16
97/113	5a	P	ENIC	curved bowl	VIII.16
97/114	5a	P	ENIC	flared	VIII.17
97/115	1d	B	ENIC	handle	-
97/116	1b	P	ENIC	shallow bowl	VIII.3
97/117	1b	P	ENIC	curved bowl w. offset rim	VIII.4
97/118	1a	B	ENIC	strap handle	VIII.2
97/119	1c	B	ENIC	incurved/'s' profile	VIII.4
97/120	1c	B	ENIC	deep bowl	VIII.4
97/121	1e	painted	ENIC?	deep bowl	VIII.6
97/122	1h	B	ENIC	body.	VIII.10
97/123	5a	B	ENIC	bowl	VIII.17
97/124	22	B	ENIC	bowl	VIII.26
97/125	1f	P	ENIC	bowl	VIII.7
97/126	1e	P	ENIC	bowl	VIII.6
97/127	1e	P	ENIC	flat-base	VIII.6
97/128	5a	P	ENIC	strap handle	VIII.16
97/129	5a	P	ENIC	carinated bowl 3b	VIII.17
97/130	1b	P	ENIC	bowl; darker b	VIII.3
97/131	1f	P	ENIC	high carinated	VIII.7
97/132	1e	I	ENIC	bowl	VIII.6
97/133	1g	B	ENIC	strap handle	VIII.10
97/134	1f	P	ENIC	carinated	VIII.7
97/135	1b	I	ENIC	body	VIII.4
97/136	1b	P	ENIC	body	-
97/137	12	B	ENII	body	-
97/138	12	B	ENII	body	-
97/139	22	B	ENII	body	-
97/140	3	P	ENII	body	VIII.10

Figure VIII.1 List of Selected Samples (Continued)

Sample No.	Fabric	Finish	Context	Comments	Illustration
98/1	1a	P	ENIA	curved bowl	VIII.2
98/2	2a	SB	ENIA	incurved	VIII.11
98/3	2b	P	ENIA	deep curved w. offset rim	VIII.13
98/4	13	P	ENIA	wishbone	VIII.25; Plate 53
98/5	2a	B/SB	ENIA	incurved bowl	VIII.11
98/6	2b	B	ENIa	large strap handle	VIII.15
98/7	14	P	ENIA	collared jar w. flared strap	VIII.24
98/8	8	PB	ENIA	body	-
98/9	5b	B	ENIA	body	VIII.20
98/10	35	B	ENIA	flared rim bowl	Plate 71
98/11	8	B	ENIa	deep bowl	VIII.21
98/12	6	B	ENIA	curved bowl	VIII.19
98/13	6	B	ENIA	body	-
98/14	6	B	ENIa	incurved jar	VIII.19
98/15	6	P	ENIA	deep bowl	VIII.18
98/16	6	P	ENIA	curved bowl w. offset rim	Plate 63
98/17	11	P	ENIA	squared strap	VIII.24
98/18	6	P	ENIA	collared jar	VIII.19
98/19	8	B	ENIA	straight-sided hole-mouth jar	VIII.21
98/20	21	B	ENIA	horizontal loop handle	Plate 29
98/21	28	B	ENIA	body	-
98/22	28	B	ENIB	unpierced tubular lug	Plate 67
98/23	6	SB	ENIA	strap handle	Plate 63
98/24	2a	P	ENIB	deep bowl w. offset rim	VIII.12
98/25	4	B	ENIB	body	-
98/26	27	B	ENIB	body	-
98/27	8	B	ENIB	deep bowl	VIII.21
98/28	8	B	ENIB	curved bowl, pierced ear	VIII.22
98/29	24	B	ENIB	large strap handle	Plate 68
98/30	8	P	ENIB	curved bowl w. offset rim	VIII.23
98/31	6	SB	ENIBa	body	-
98/32		SB	ENIBa	body	-
98/33	20	B	ENIBa	flat-base	Plate 69
98/34	2a	B	ENIB	collared rim	VIII.12
98/35	21	B	ENIBa	jar w.offset rim high carin.;	Plate 29
98/36	2b	B	ENIB	strap handle	VIII.13
98/37	2a	B	ENIB	curved bowl	VIII.8
98/38	2b	B	ENIB	deep bowl; rim strap	VIII.13
98/39	5a	B	ENIB	deep bowl; rim strap	VIII.16
98/40	10	P	ENIB	flared strap handle shallow carinated bowl	Plate 64
98/41	5a	P	ENIB	body plastic dec.	VIII.16
98/42	2a	IP	ENIB	deep bowl w. offset rim	VIII.8
98/43	24	B	ENIB	pierced oval lug	Plate 68
98/44	24	B	ENIB	incurved bowl w. lump	Plate 68
98/45	8	SB	ENIB	body	-
98/46	8	P	ENIB	collared jar	VIII.23
98/47	10	P	ENIB	flared strap handle	Plate 64
98/48	10	P	ENIB	curved bowl w. offset rim	Plate 64
98/49	2b	IP	ENIB	deep bowl w. offset rim	VIII.13
98/50	2a	IP	ENIB	deep bowl w. offset rim	VIII.12

Figure VIII.1 List of Selected Samples (Continued)

Sample No.	Fabric	Finish	Context	Comments	Illustration
98/51	1d	B	ENIB	flared cup w. pierced rim	VIII.5
98/52	5a	B	ENIB	body; barbotine	-
98/53	1d	B	ENIB	body; single line of knobs	-
98/54	1d	B	ENIB	body; barbotine	VIII.5
98/55	8	B	ENIB	straight-sided hole mouth jar	VIII.21
98/56	2b	S	ENIB	body	-
98/57	5c	B	ENIB	flared bowl; rim strap	VIII.20
98/58	2c	P	ENIB	wishbone	VIII.15
98/59	8	B	ENIB	's' profile; pellets below rim	VIII.22
98/60	8	P	ENIB	curved bowl w. offset rim	VIII.23
98/61	6	B	ENIB	deep bowl; below rim pellets	VIII.18
98/62	11	P	ENIB	flared cup plastic decoration	VIII.22
98/63	5a	P	ENIB	wishbone	VIII.16
98/64	6		ENIB	deep bowl	VIII.18
98/65	14	P	ENIB	grooved incised body	VIII.25
98/66	8	P	ENIB	body w. flared strap	VIII.23
98/67	11	B	ENIB	strap handle	-
98/68	1i	B	ENIB	rounded base	VIII.10
98/69	1i	B	ENIB	strap	VIII.10
98/70	1d	B	ENIB	drilled body	-
98/71		B	ENIB	strap	VIII.4
98/72	2c	P	ENIB	body	-
98/73	4	B	ENIB	strap handle	-
98/74	2d	P	ENIC	rim	-
98/75	1i	P	ENIC	curved offset rim	VIII.10
98/76	1f	PB	ENIC	body	-
98/77	2b	B	ENIC	incurved bowl	VIII.14
98/78	32	Painted	ENIB	body; red and white lines	Plate 70
98/79	1e	Painted	ENIB	curved jar w. offset rim black dots	Plate 70
98/80	34	B	ENIC	flared rim jar	VIII.26
98/81	1f	I	ENII	curved bowl w. offset rim	VIII.7
98/82	1e	B	ENII	straight-sided bowl	VIII.8
98/83	27	I	ENIb	body	-
98/84	2b	IP	ENIB	incised strap handle	VIII.13
98/85	1d	P	ENIB	body	-
98/86	1e	I	ENIB/C	collared jar	VIII.6
98/87	28	B	ENIB	pierced horiz. tubular lug	Plate 67
98/88	34	painted	ENIB	straight-sided bowl	VIII.26
98/89	28	B	ENIB	's' profile;. joining lumps	Plate 67
98/90	30	B	ENIB	body	Plate 69
98/91	26	B	ENIB	unpierced horiz. lug	Plate 66
98/92	25	painted	ENIB	d-on-d lattice painted; body	-
98/93	8	R	ENIB	body	VIII.21
98/94	14	W	ENIA?	bowl	VIII.25
98/95	1e	B	ENII	house model	VIII.9
98/96	28	I	ENIB	narrow cup	Plate 67
98/97	1a	B	ENIB	body	-
98/98	1d	Painted	ENIC	body; l-on-d dribble	VIII.5
98/99	17	Painted	ENIB/C	body; d-on-d dribble	VIII.25
98/100	6	B	ENII	dark rough sb	VIII.19

Figure VIII.1 List of Selected Samples (Continued)

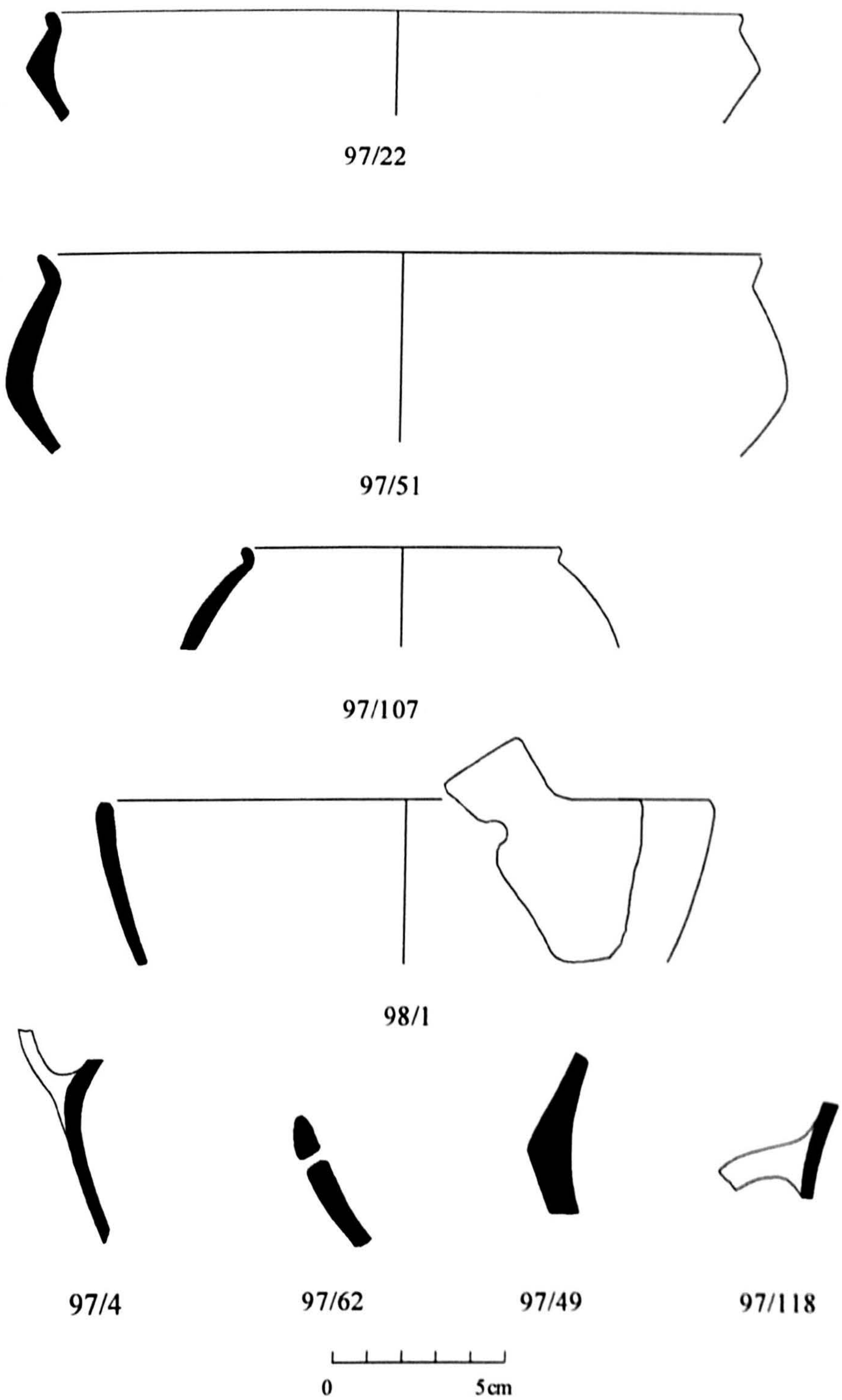
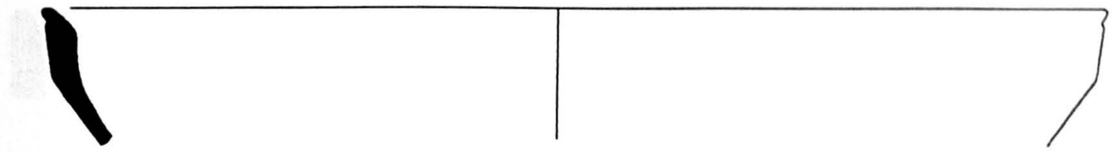
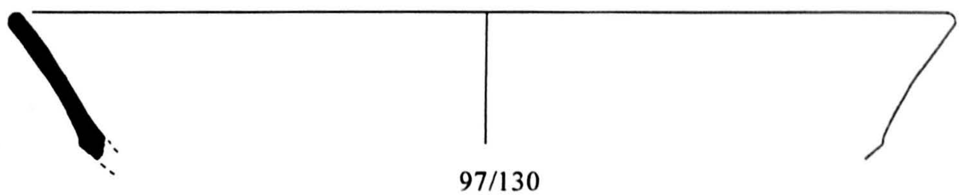


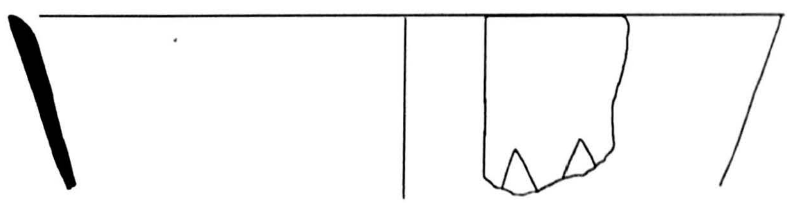
Figure VIII.2. Fabric 1a



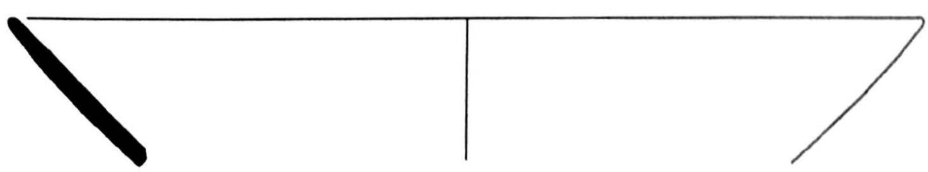
97/103



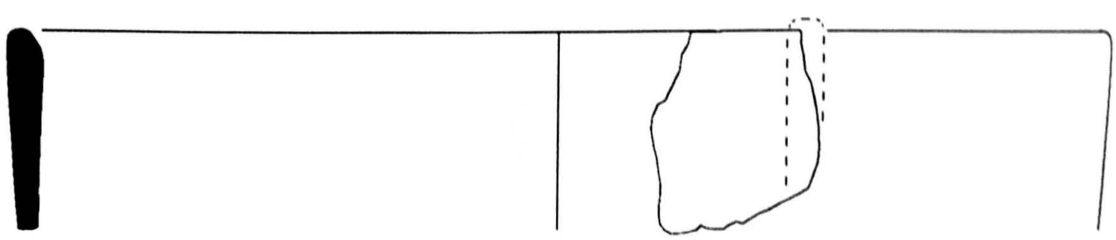
97/130



97/81



97/116



97/65

Figure VIII.3. Fabrics 1b/c

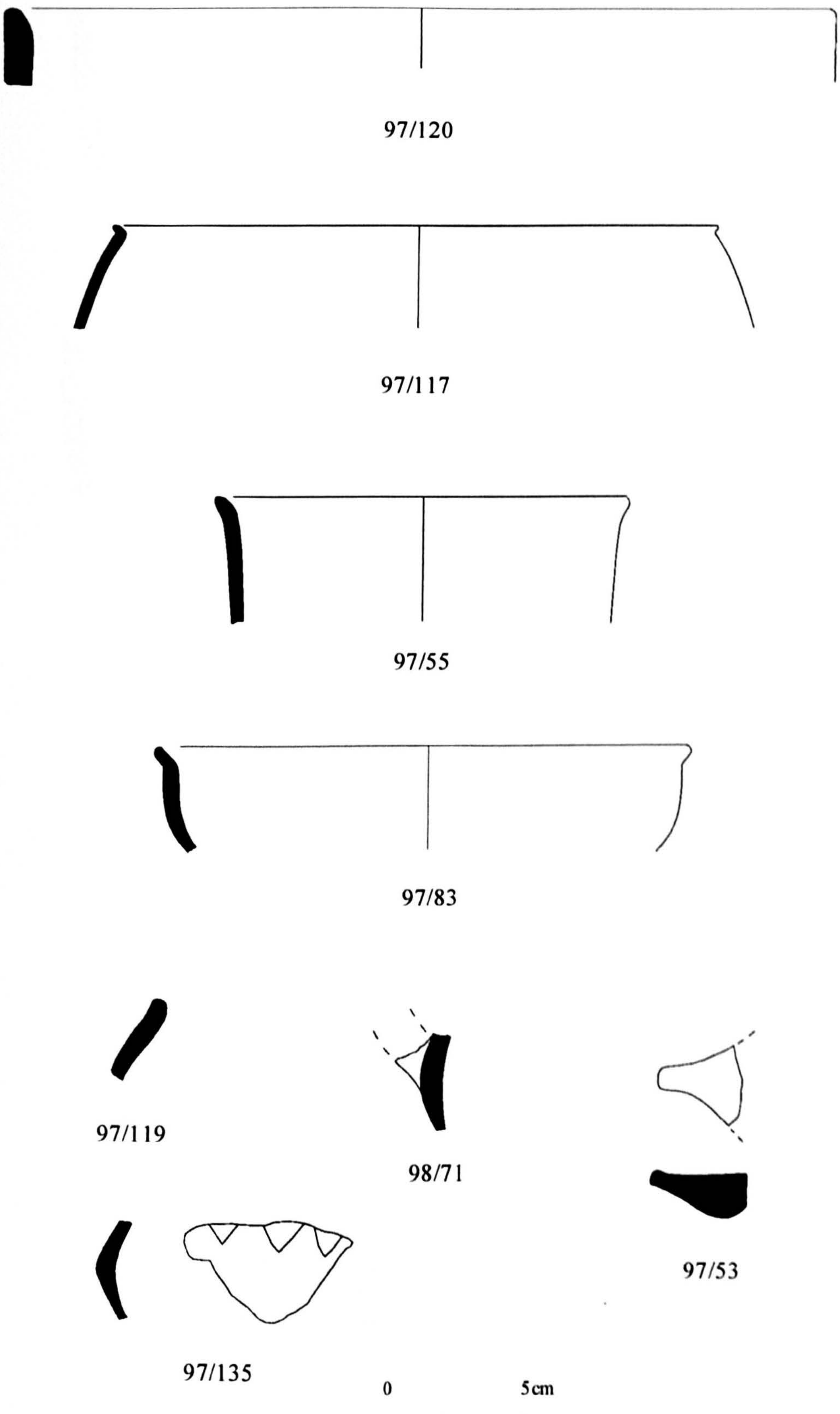


Figure VIII.4. Fabrics 1b/c

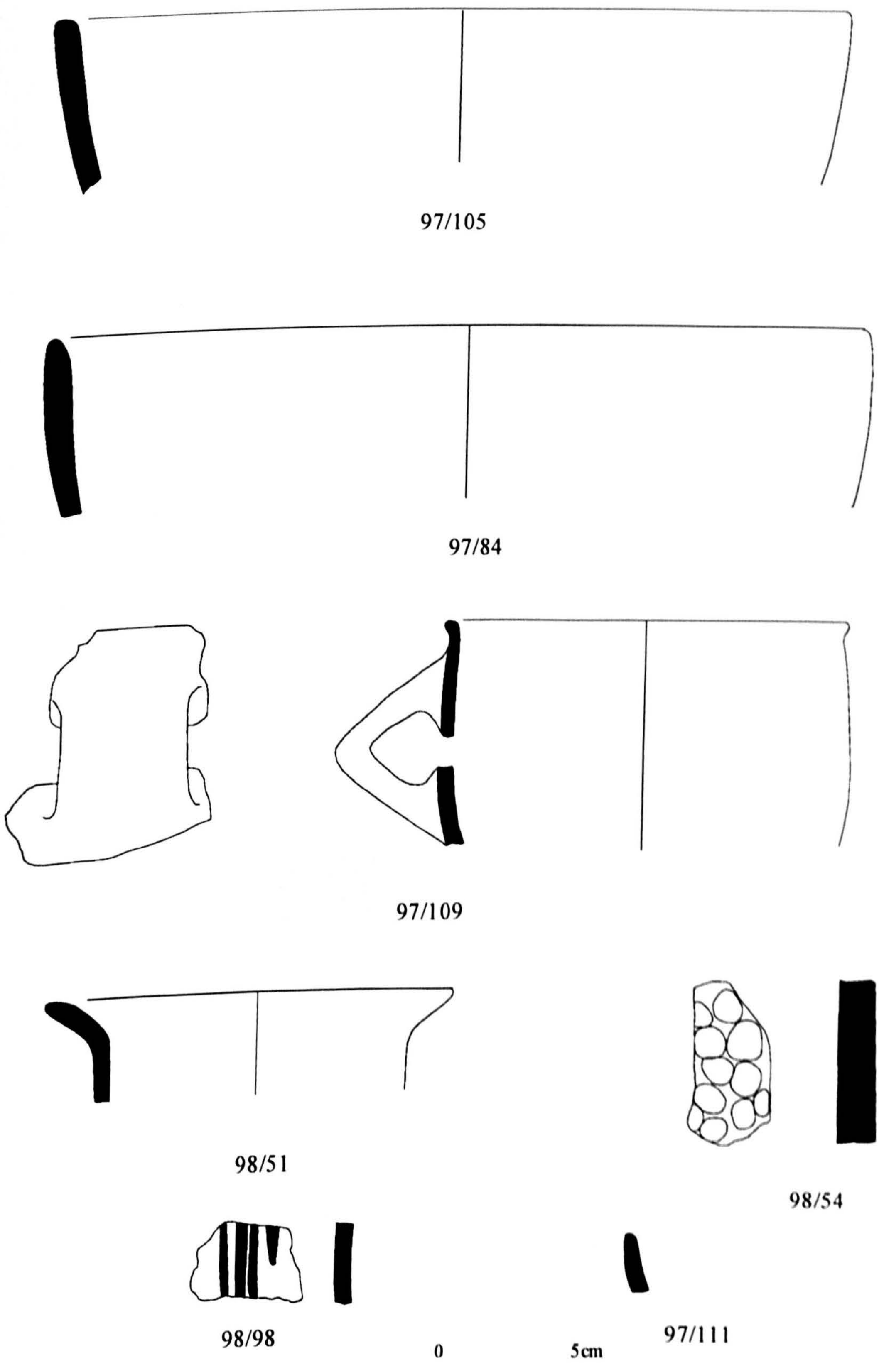
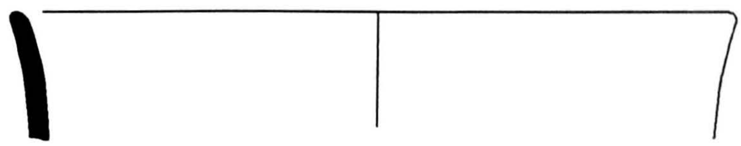
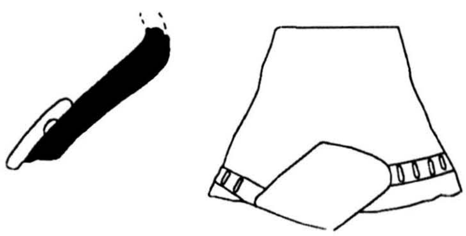


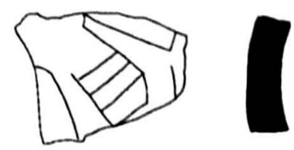
Figure VIII.5. Fabric 1d



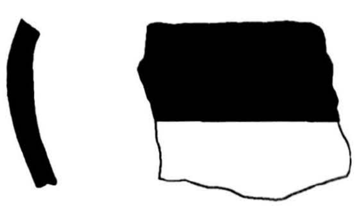
97/126



98/86



97/132

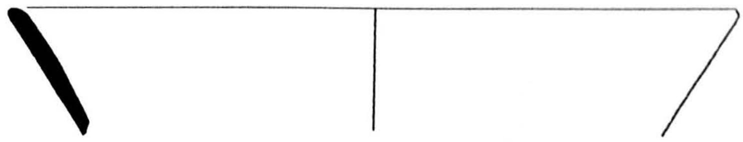


97/121

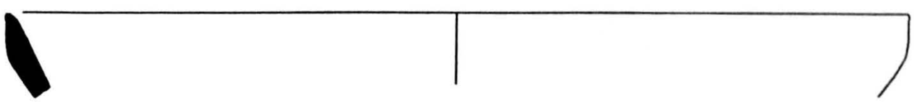
97/127

0 5cm

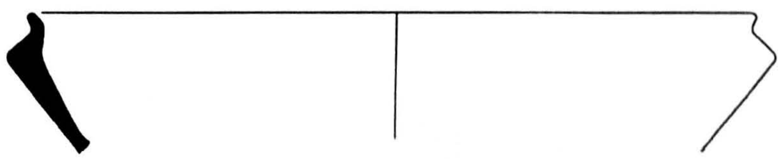
Figure VIII.6. Fabric 1e



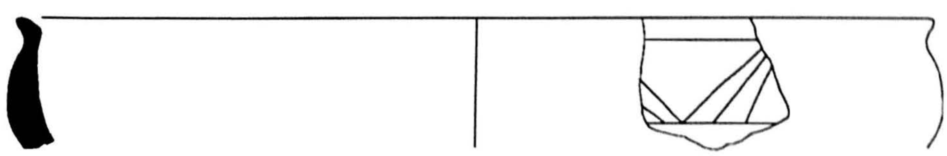
97/125



97/134



97/131



98/81

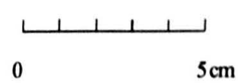
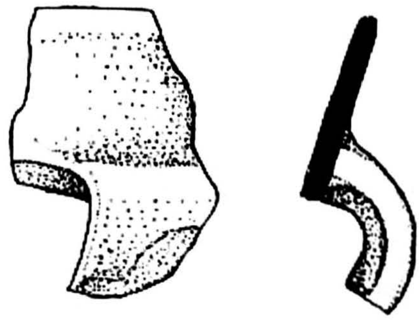
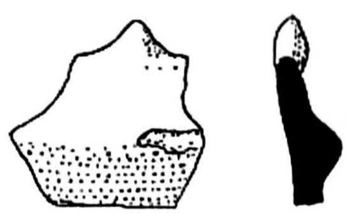


Figure VIII.7. Fabric 1f



Fabric 1e: sample 98/82 – not to scale
(Evans 1964: fig. 31.20

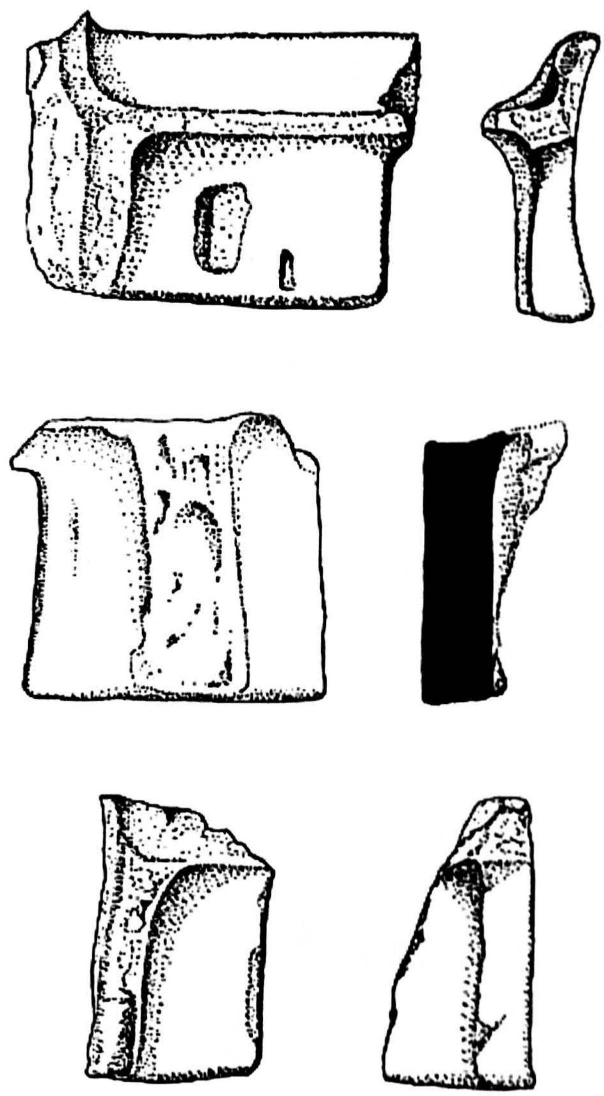
Fabric 1a: sample 97/7; – not to scale
(Evans 1964: fig. 23.32



Fabric 2a; sample 98/37; not to scale
(Evans 1964: fig. 26.3)

Fabric 2a; sample 98/42; not to scale
(Evans 1964: fig. 27.10)

Figure VIII.8. Fabrics 1a and 2a



Fragments of a House Model (ENII)
Fabric 1d; sample 98/95; not to scale
(Evans 1964: 31.3-5)

Figure VIII.9. Fabric 1e

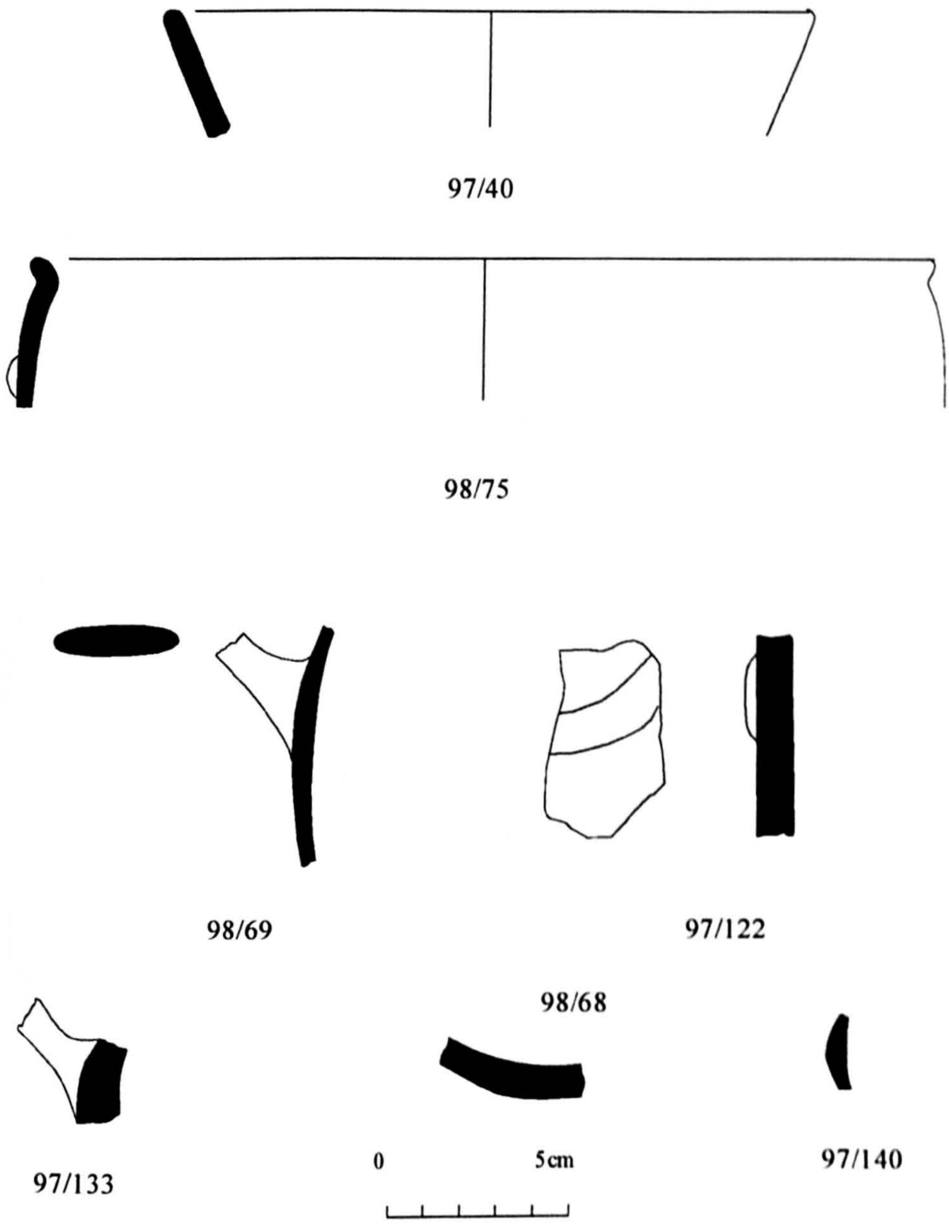
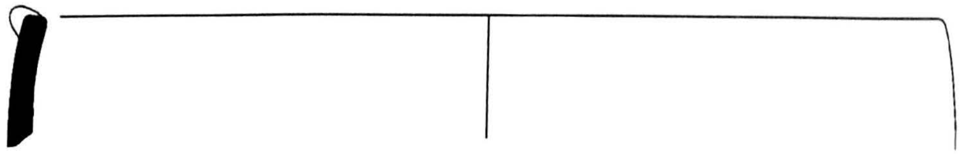
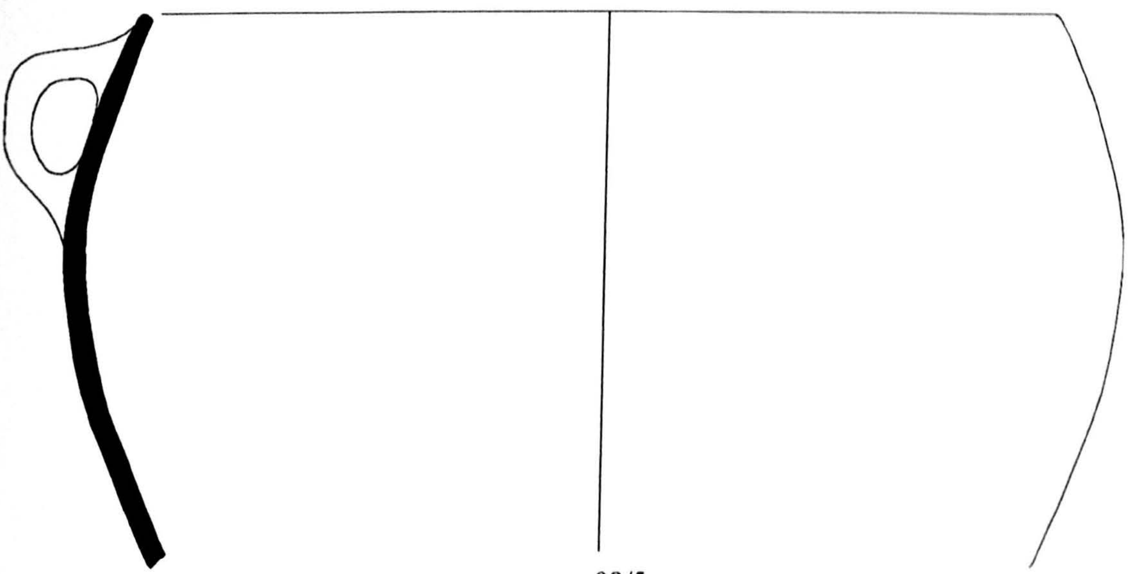


Figure VIII.10. Fabrics 1g, 1h, 1i, 3

98/2



97/64



98/5

0 5cm

Figure VIII.11. Fabric 2a

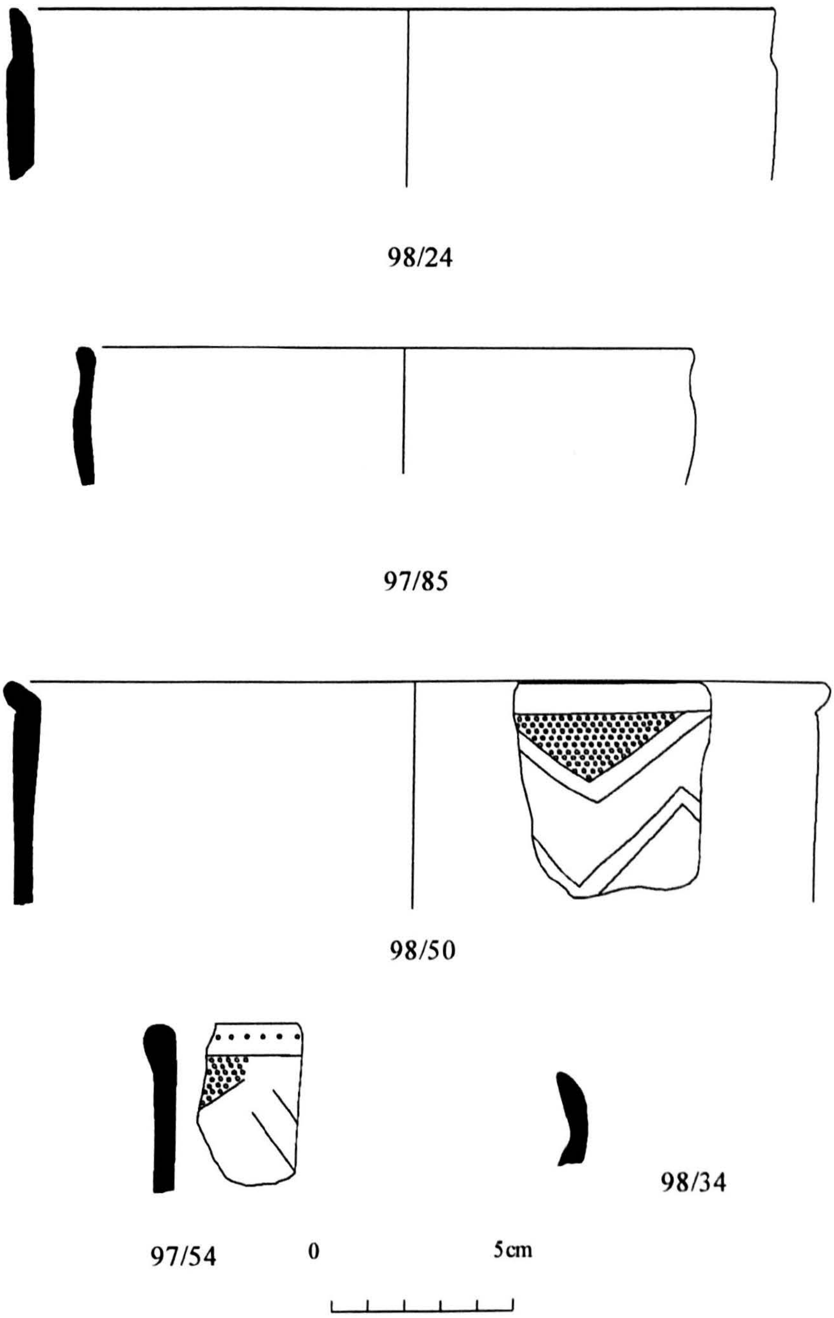


Figure VIII.12. Fabric 2a

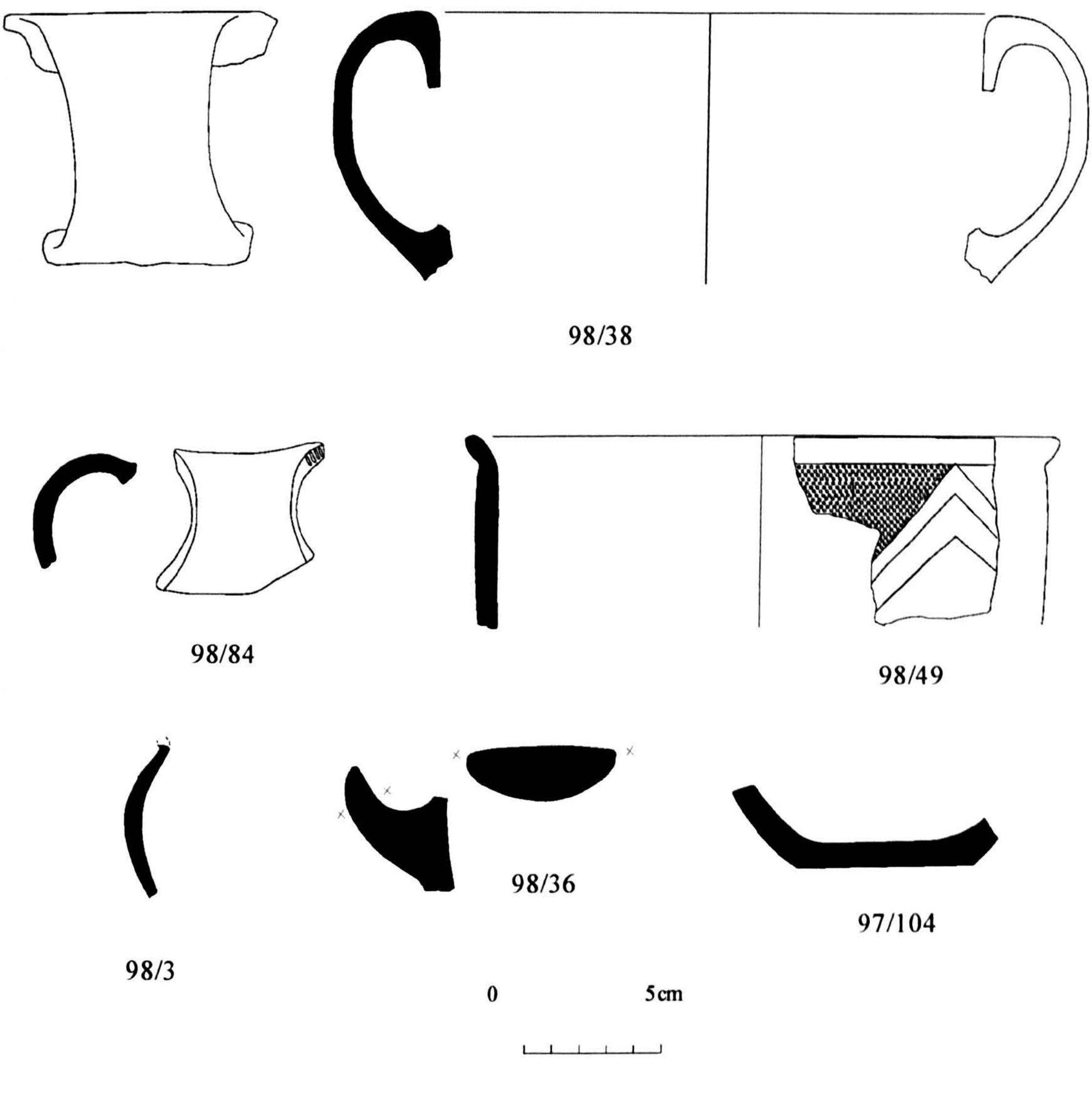


Figure VIII.13. Fabric 2b

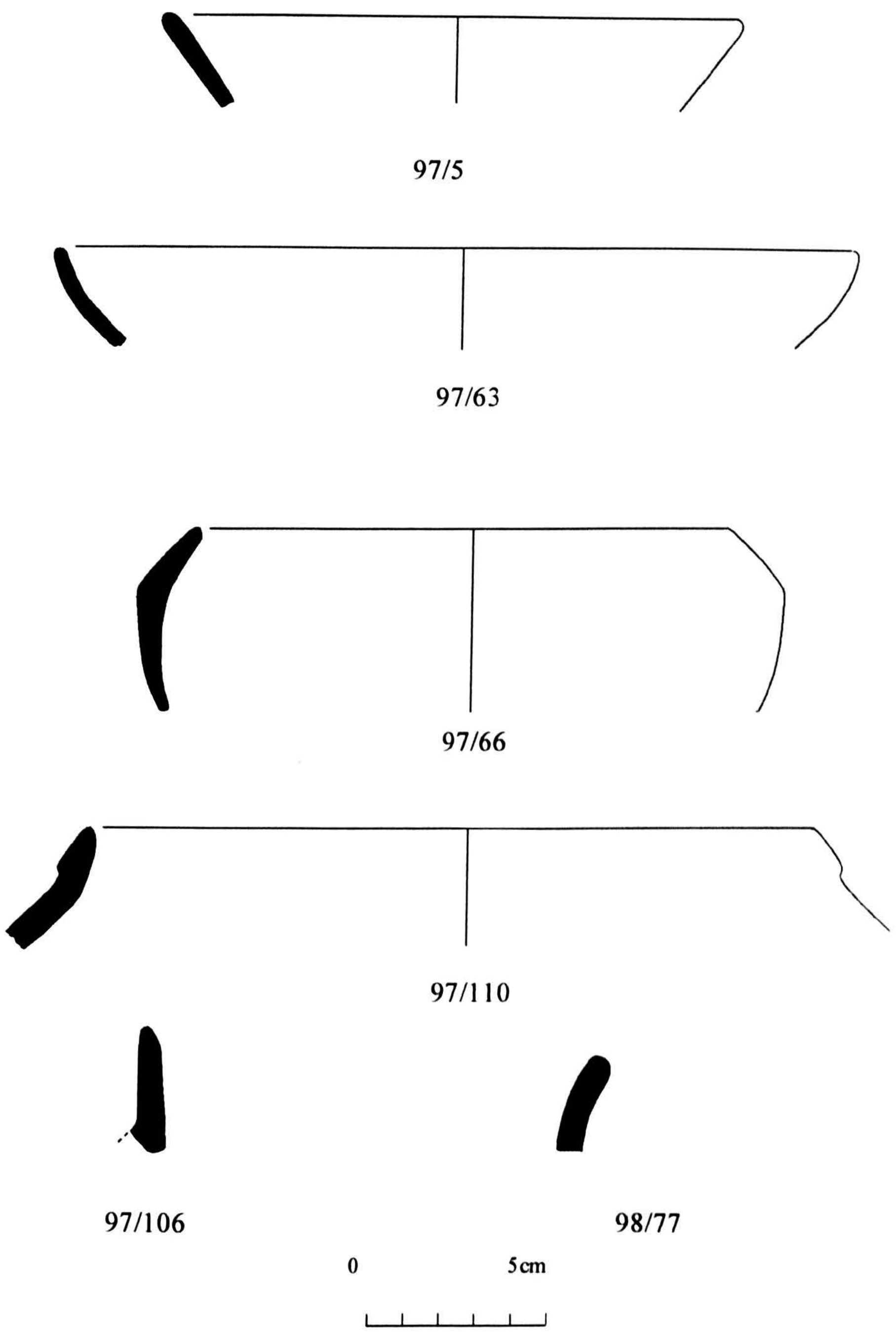
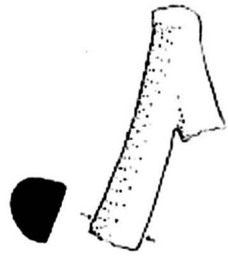
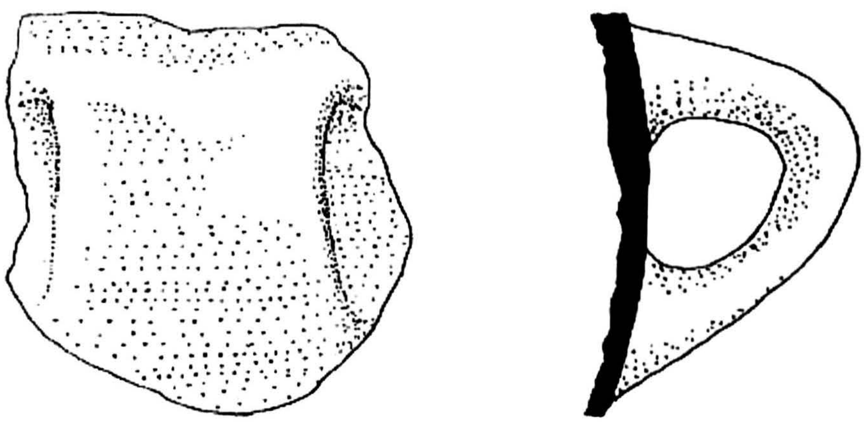


Figure VIII.14. Fabric 2b



Fabric 2c; sample 98/58; not to scale
(Evans 1964: fig. 25.20)



Fabric 2b; sample 98/6; not to scale
(Evans 1964: fig. 24.19)

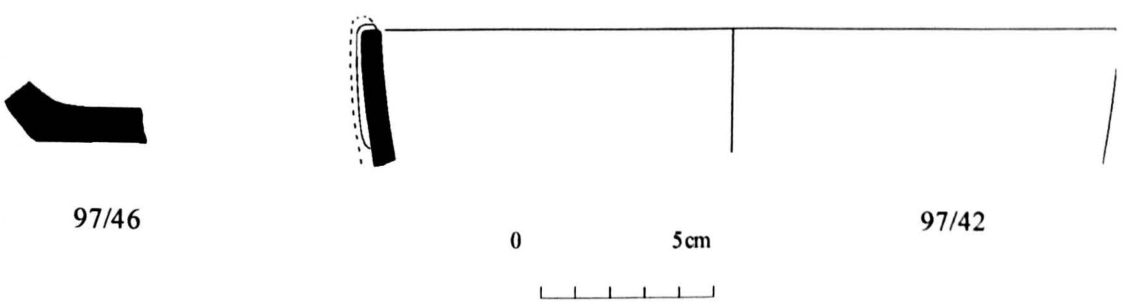
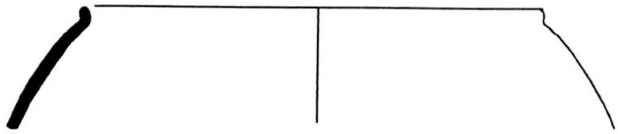
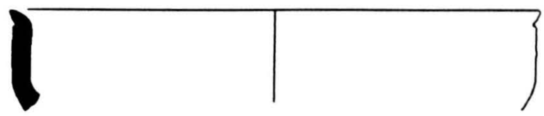


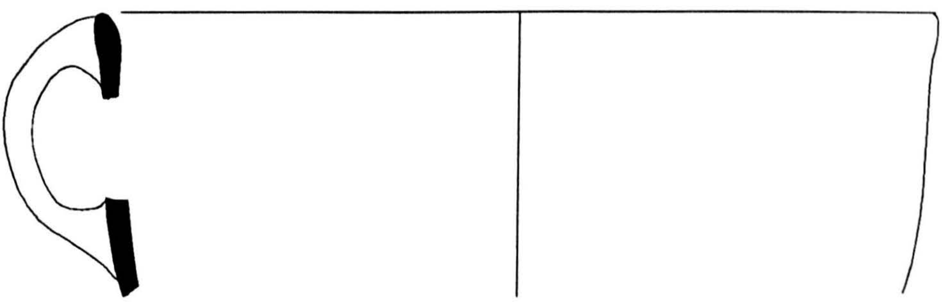
Figure VIII.15. Fabrics 1c and 1e



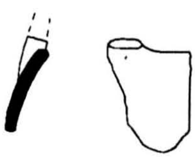
97/128



97/95



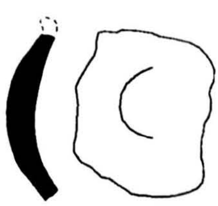
98/39



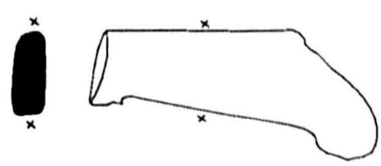
97/23

97/113

97/112



98/41



98/63

97/39
Fabric 24

97/87

0 5cm

Figure VIII.16. Fabric 5a

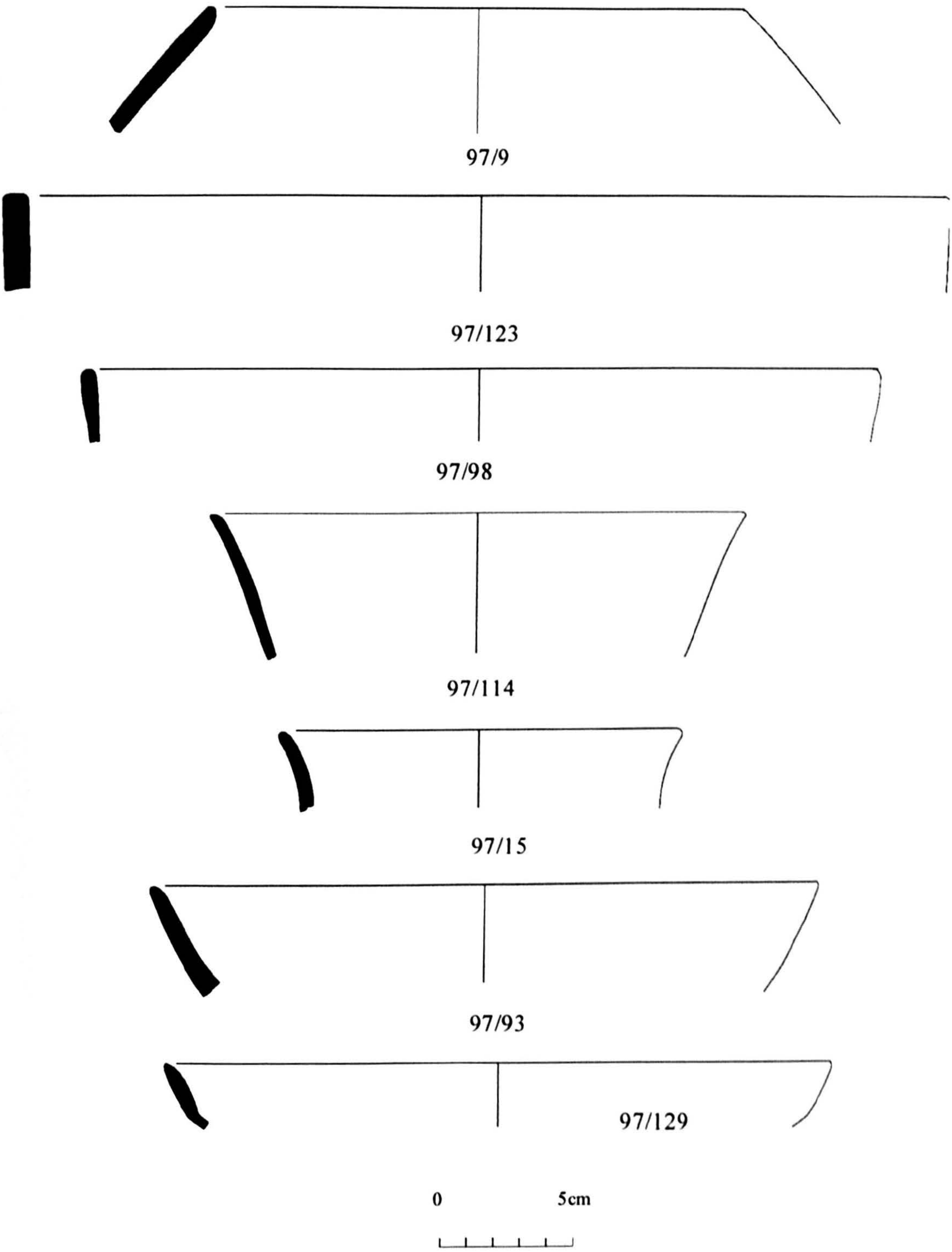
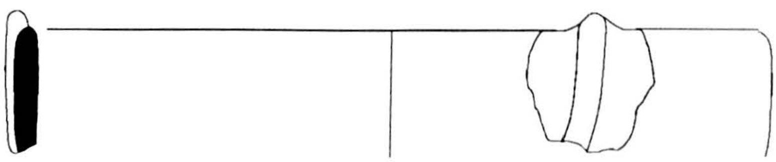
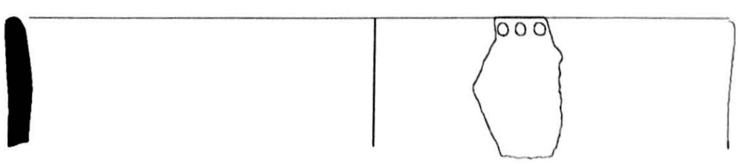


Figure VIII.17. Fabric 5a

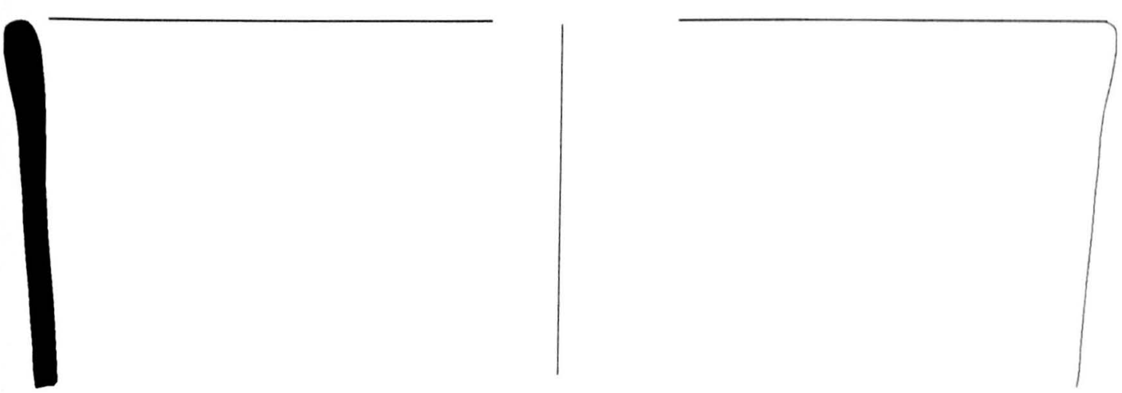
Fabric 5a; sample 97/99; not to scale
(Evans 1964: fig.28.11)



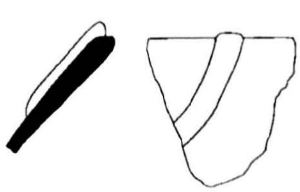
98/15



98/61



98/64



97/96

0 5cm

Figure VIII.18. Fabrics 5a and 6

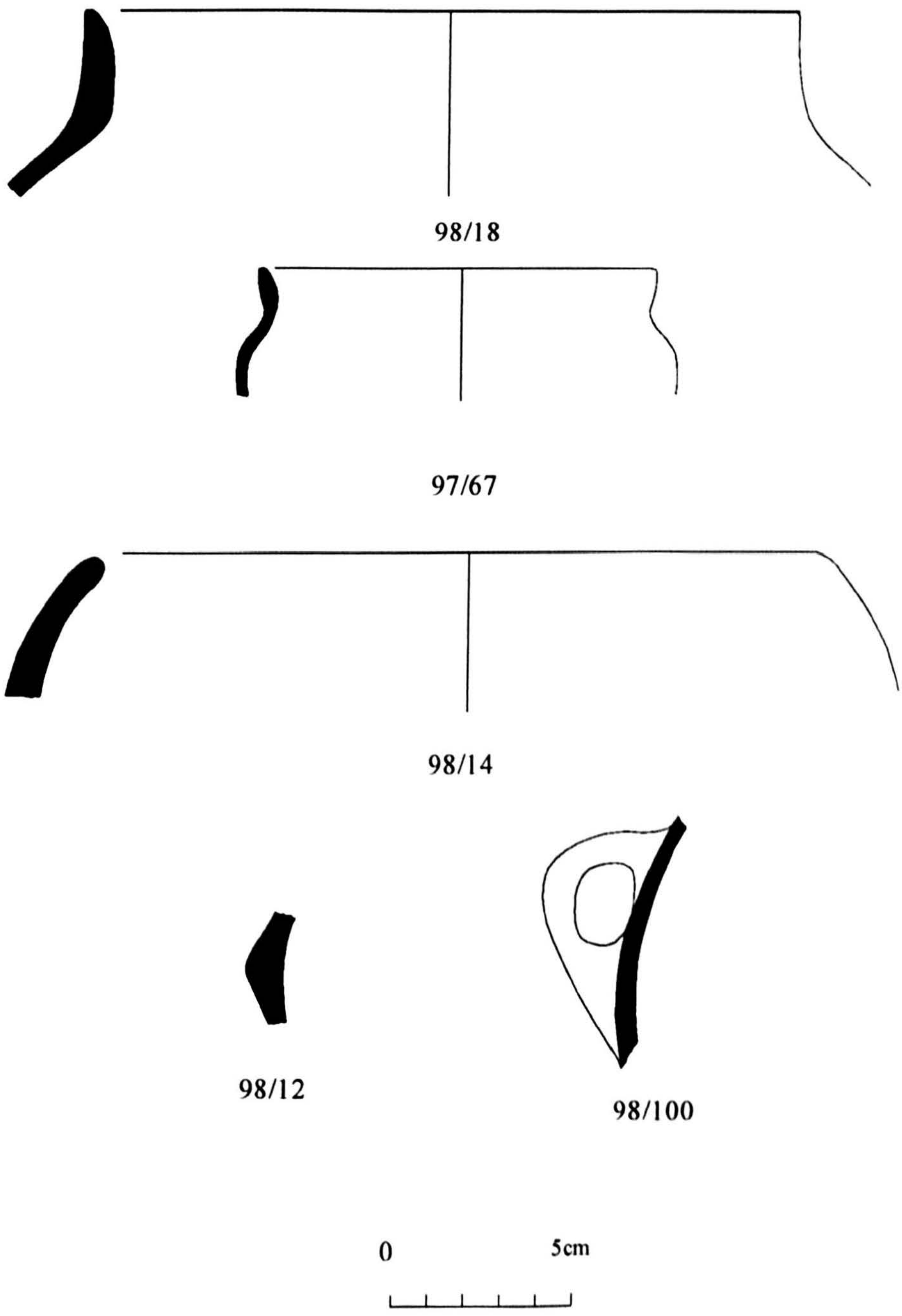


Figure VIII.19. Fabric 6

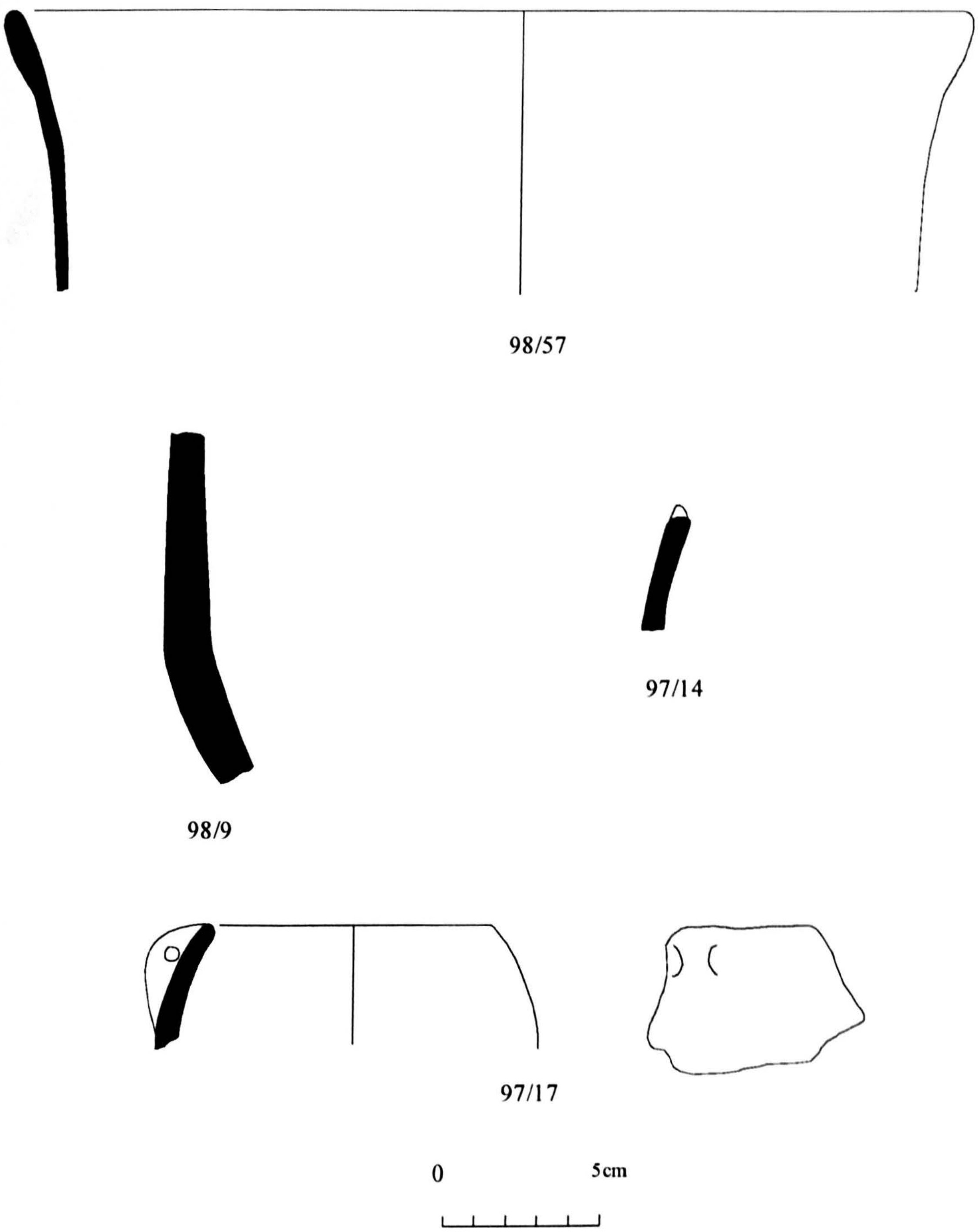
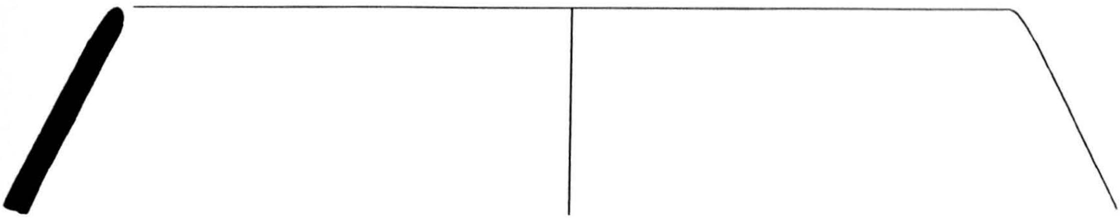
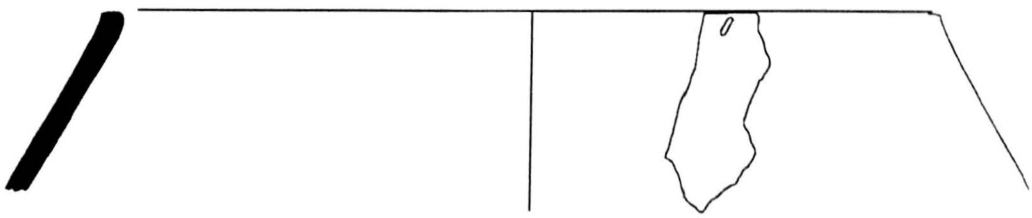


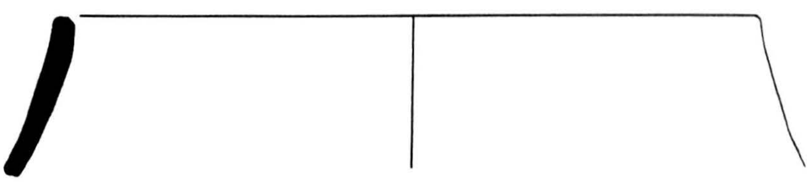
Figure VIII.20. Fabrics 5b, 5c and 7



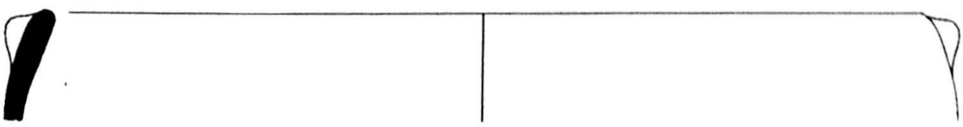
98/55



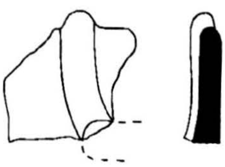
98/19



97/20



98/27



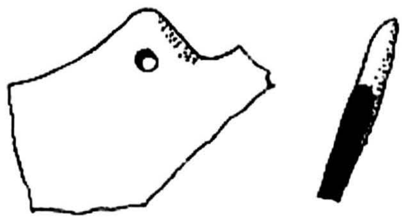
98/11

97/94

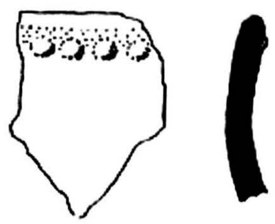
98/93

0 5cm

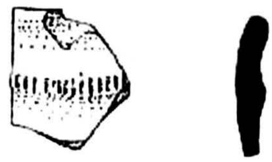
Figure VIII.21. Fabric 8



Fabric 8; sample 98/28; not to scale
(Evans 1964: fig.26.6)



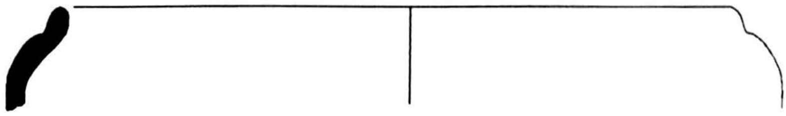
Fabric 8; sample 98/59; not to scale
(Evans 1964: fig. 26.17)



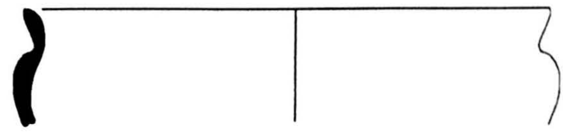
Fabric 10; sample 97/71; not to scale
(Evans 1964: fig.28.16)

Fabric 11; sample 98/62; not to scale
(Evans 1964: fig.28.18)

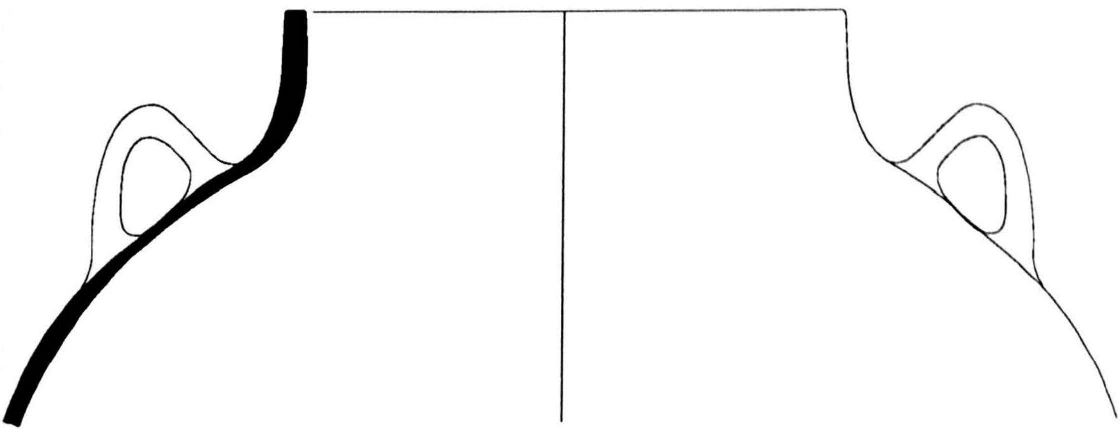
Figure VIII.22. Fabrics 8, 10, 11



98/60



98/30



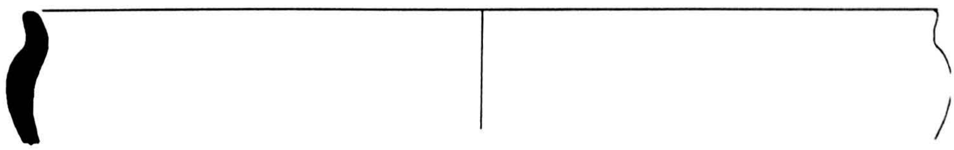
98/46

98/66

97/34

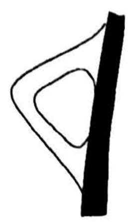
0 5cm

Figure VIII.23. Fabrics 8 and 9



97/102

98/7



98/17

97/78

97/18

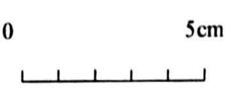


Figure VIII.24. Fabric 11

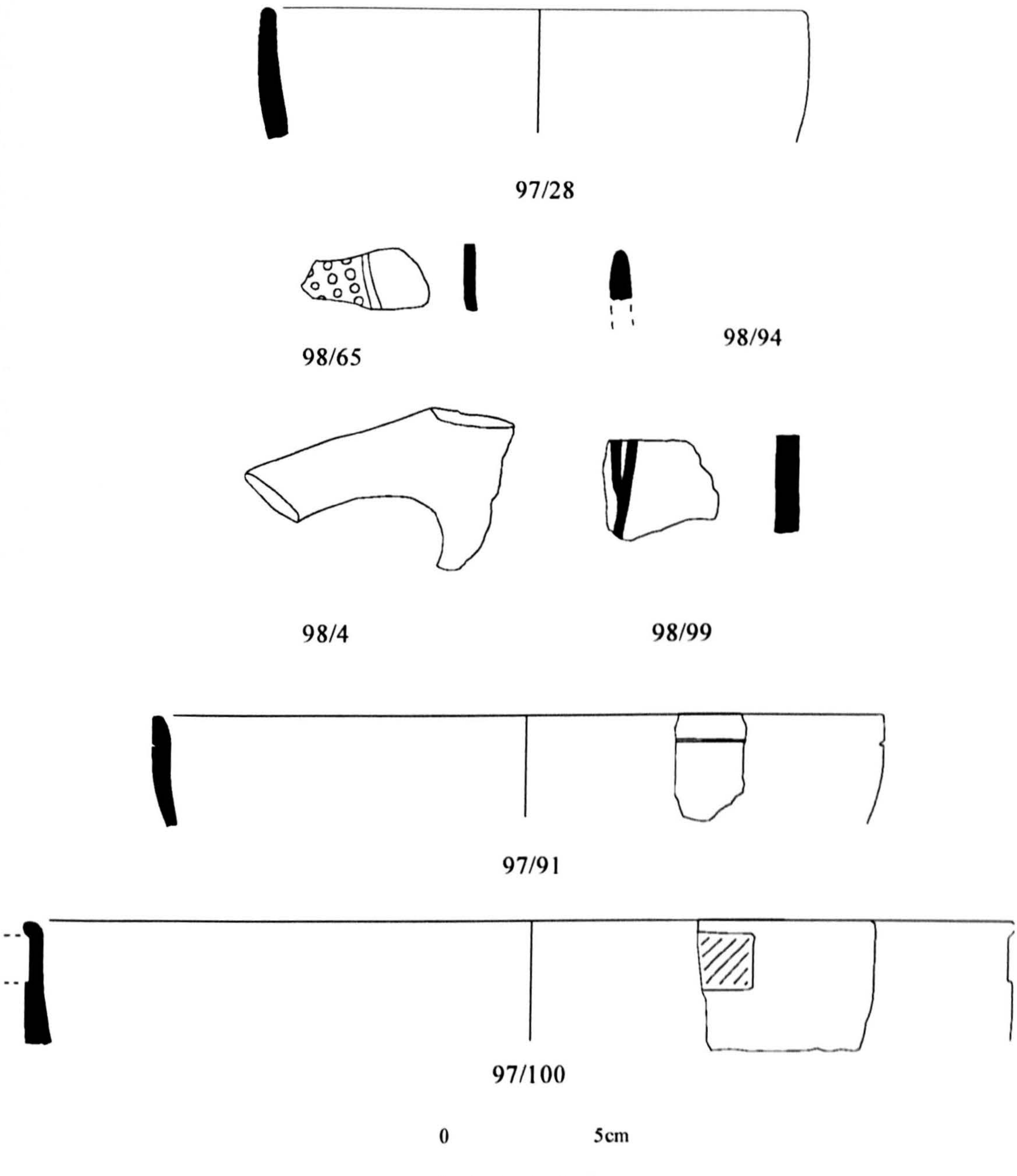
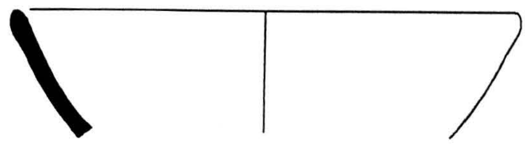
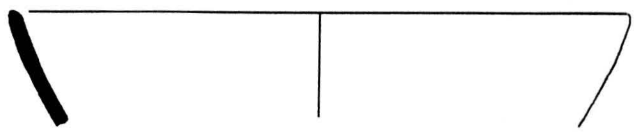


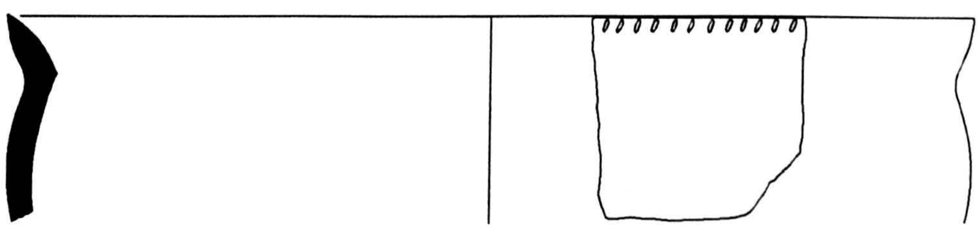
Figure VIII.25. Fabrics 13, 14, 16, 17



97/124



97/101



98/80

98/88

97/59

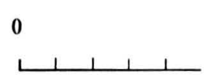


Figure VIII.26. Fabrics 23, 31, 33, 34

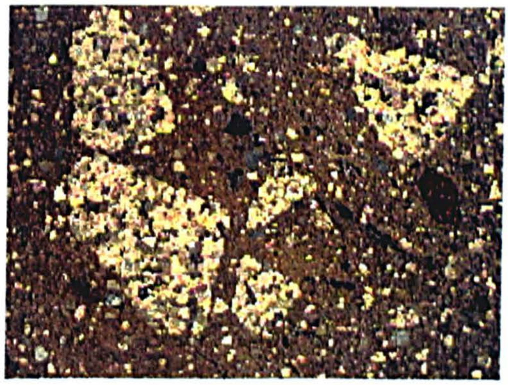


Plate 1. Fabric 1a
(Width of Image = 4.0mm)

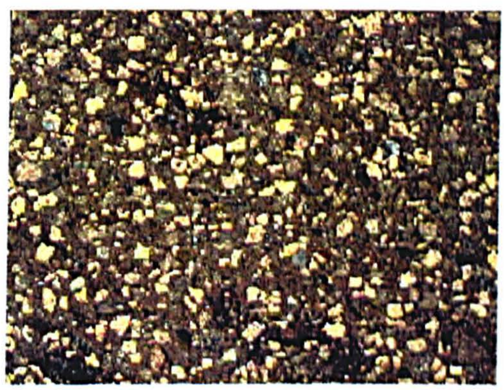


Plate 2. Fabric 1b
(Width of Image = 4.0mm)

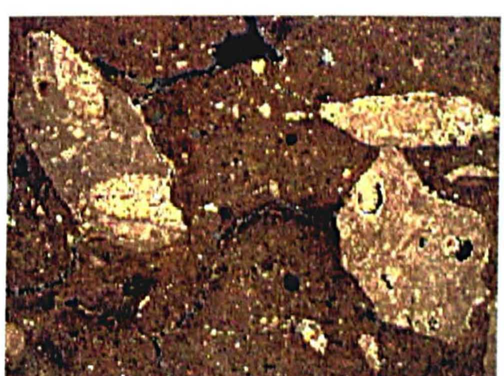


Plate 3. Fabric 1d
(Width of Image = 4.0mm)

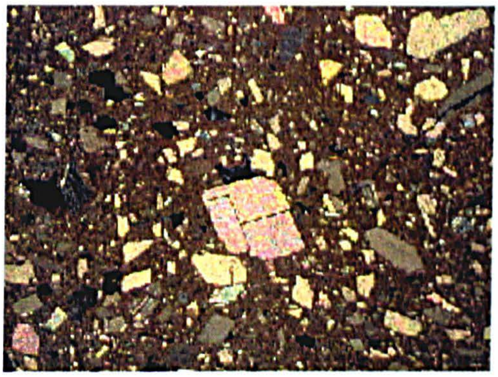


Plate 4. Fabric 1e
(Width of Image = 4.0mm)

Plate 5. Fabric 1f
(Width of Image = 4.0mm)

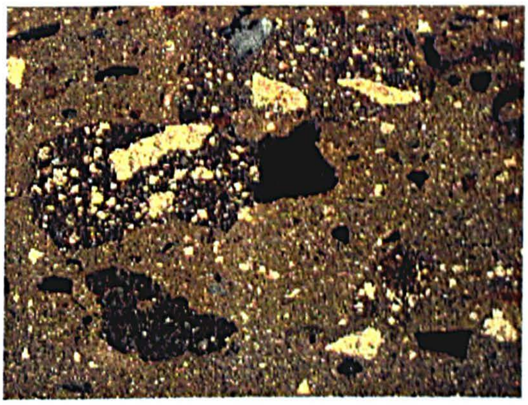


Plate 6. Fabric 1i
(Width of Image = 4.0mm)

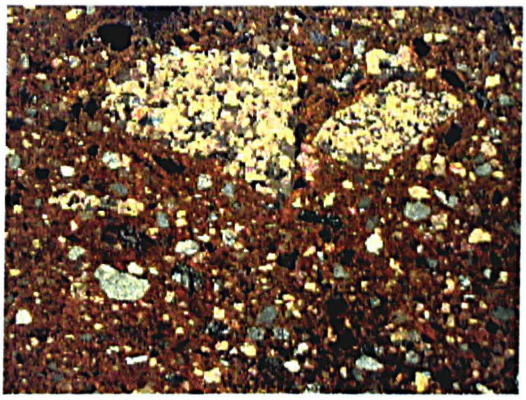


Plate 7. Fabric 2a
(Width of Image = 4.0mm)

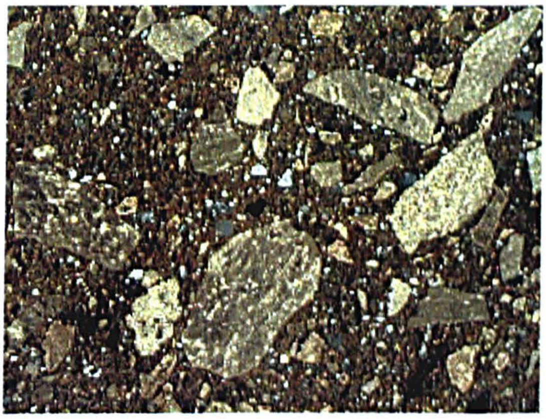


Plate 8. Fabric 2b
(Width of Image = 4.0mm)

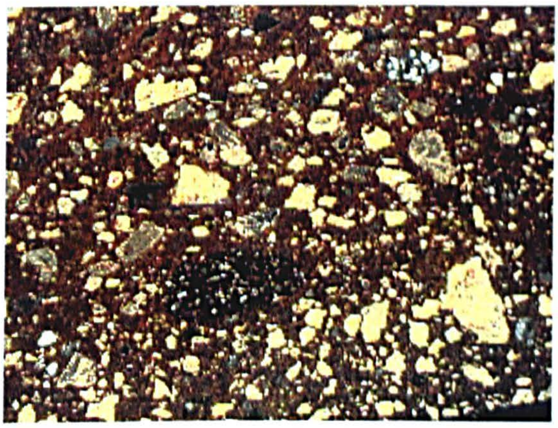


Plate 9. Fabric 2c
(Width of Image = 4.0mm)

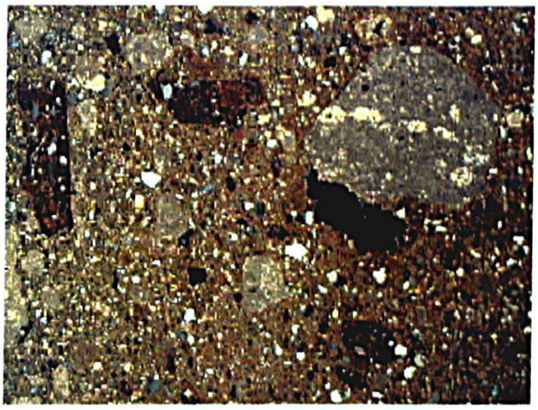


Plate 10. Fabric 2e
(Width of Image = 4.0mm)

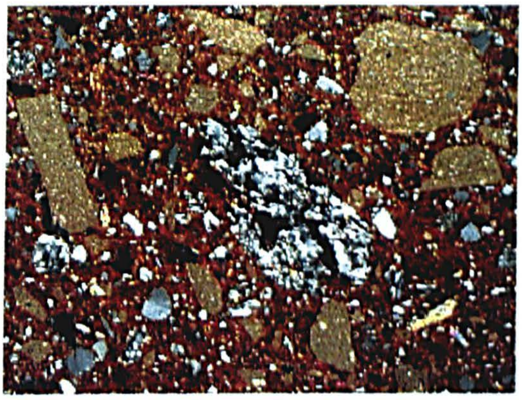


Plate 11. Fabric 5a
(Width of Image = 4.0mm)

Plate 12. Fabric 7
(Width of Image = 4.0mm)

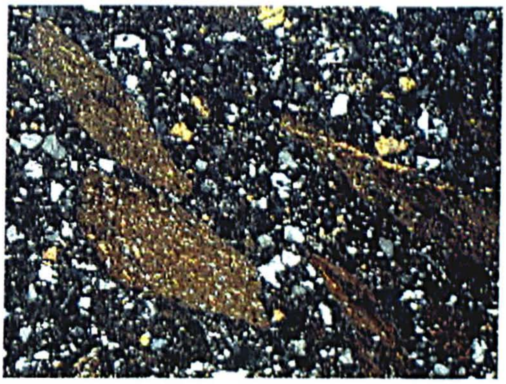


Plate 13. Fabric 8
(Width of Image = 4.0mm)

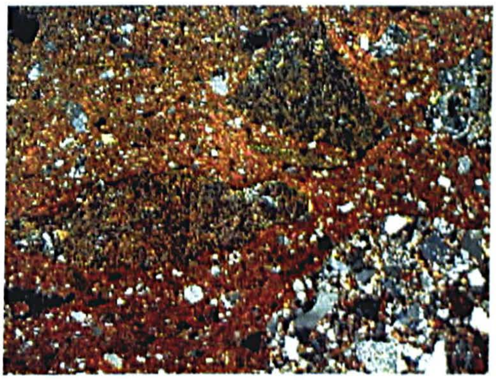


Plate 14. Fabric 6
(Width of Image = 4.0mm)

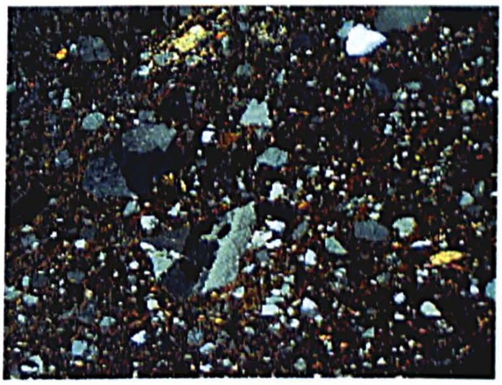


Plate 15. Fabric 12
(Width of Image = 4.0mm)

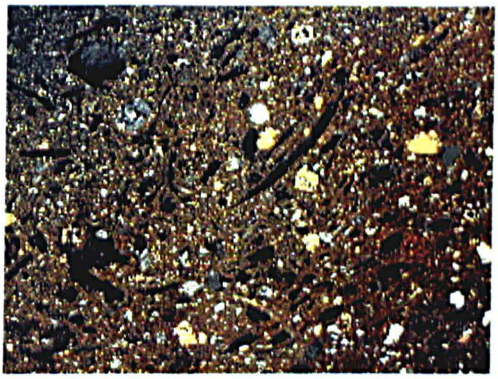


Plate 16. Fabric 15
(Width of Image = 4.0mm)

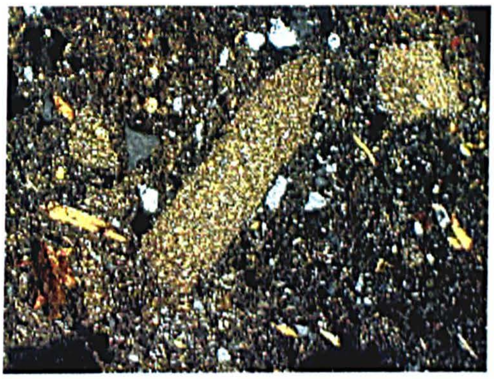


Plate 17. Fabric 31
(Width of Image = 4.0mm)

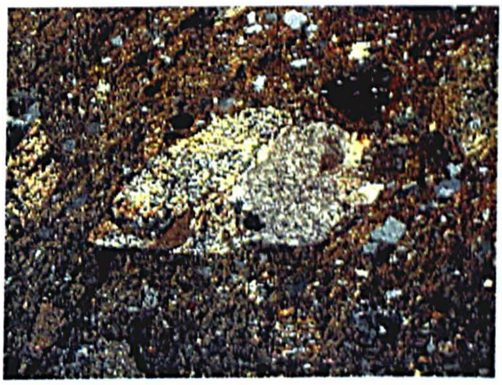


Plate 18. Fabric 35
(Width of Image = 4.0mm)

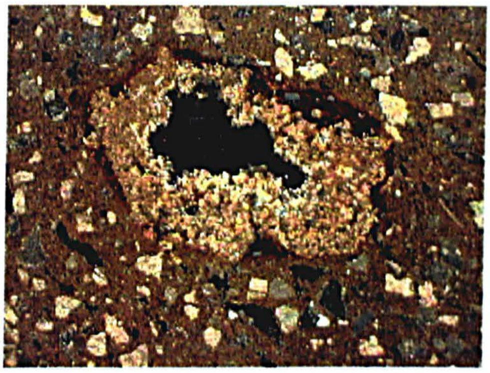


Plate 19. Fabric 1c. Micritic Clot with Red Ring (Iron Migration)
(Width of Image = 2.5mm)

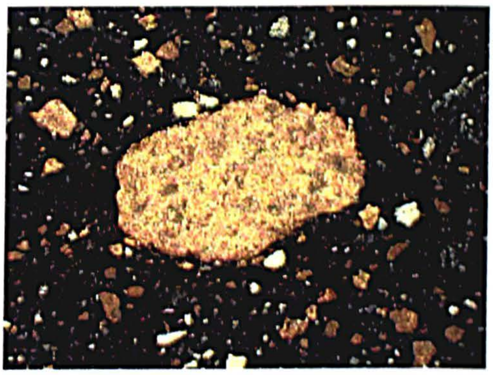


Plate 20. Fabric 2a. Micritic Clot Exhibiting Relict Primary Texture (Sparite)
(Width of Image = 2.5mm)

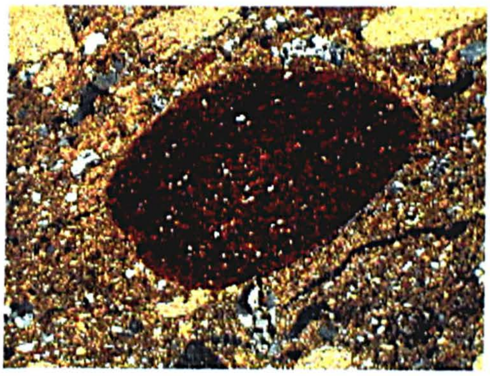


**Plate 21. Fabric 5a Fine Clay Component of Clay Mix
(Width of Image = 2.5mm)**

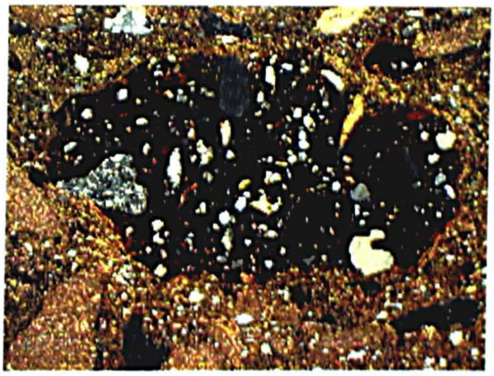


**Plate 22. Fabric 5a Coarse Clay Component of Clay Mix Containing Chert
(Width of Image = 2.5mm)**

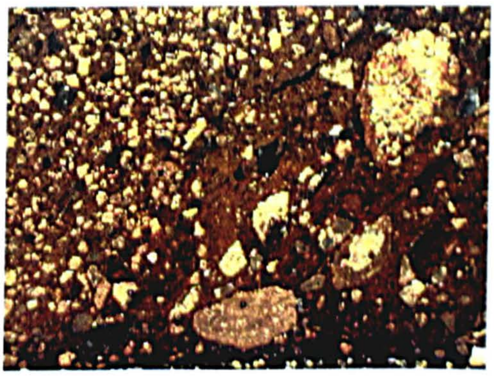


**Plate 23. Fabric 3 (97/140) Showing a Join Between Coils in Fabric 1b and 1d
(Width of Image = 4.0mm)**

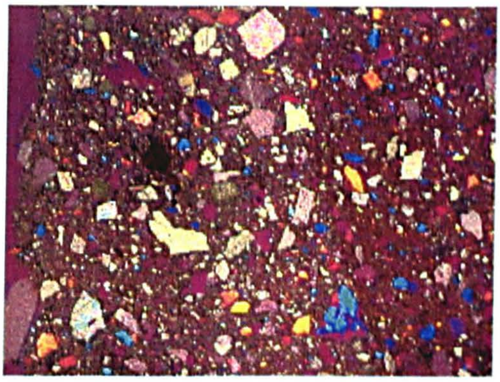


Plate 24. Fabric 1e (97/79) Coil Join Viewed with Lambda Plate (Width of Image = 4.0mm)

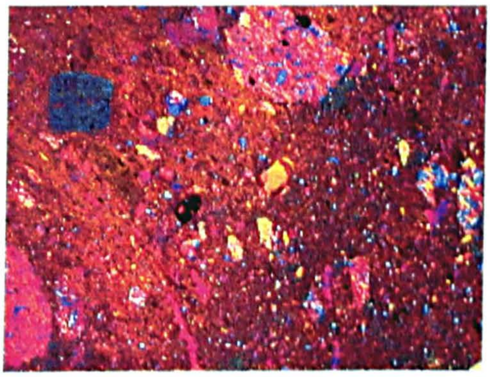


Plate 25. Fabric 13 (97/12) Coil Join Viewed with Lambda Plate (Width of Image = 4.0mm)

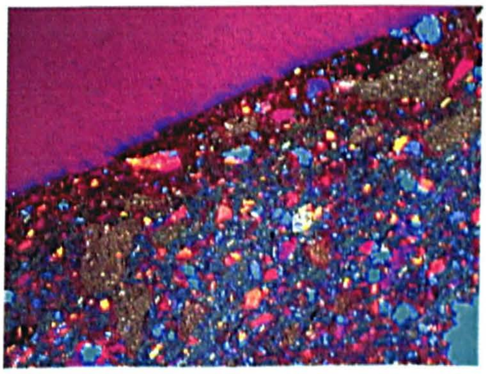


Plate 26. Fabric 5a (98/63) Compacted Surface Layer Viewed with Lambda Plate (Width of Image = 2.5mm)

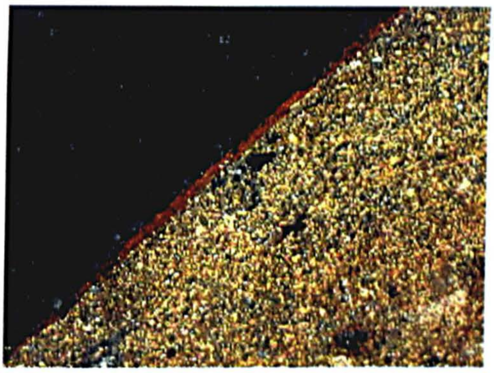


Plate 27. Fabric 1d (97/111). Non-Calcareous Slip Layer
(Width of Image = 2.5mm)

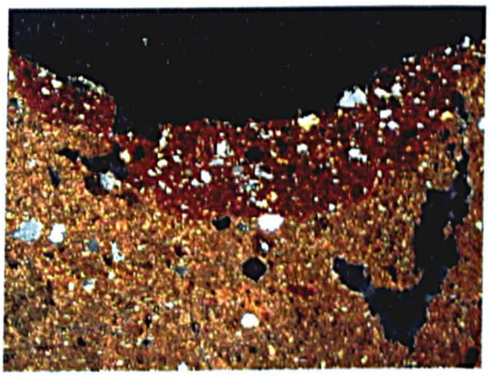


Plate 28. Fabric 28. Clay Layer
(Width of Image = 4.0mm)

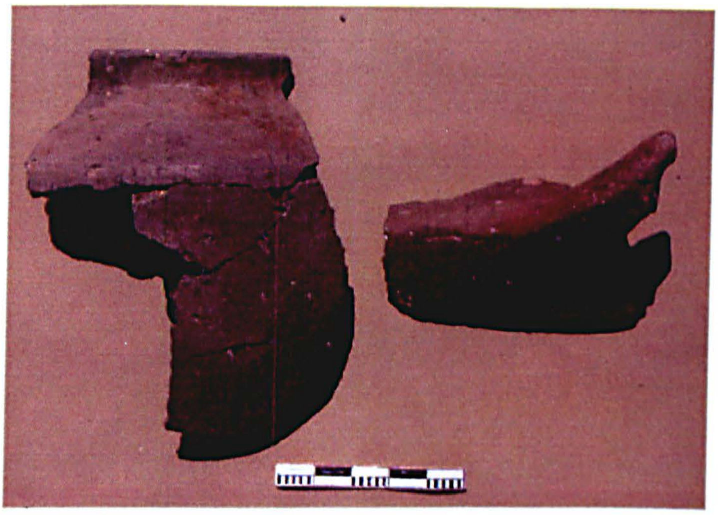


Plate 29. Burnished Decoration
Fabric 21: Sample 9735 (Left); Sample 97/20 (Right)

Plate 30. Polished Decoration
Fabric 1a

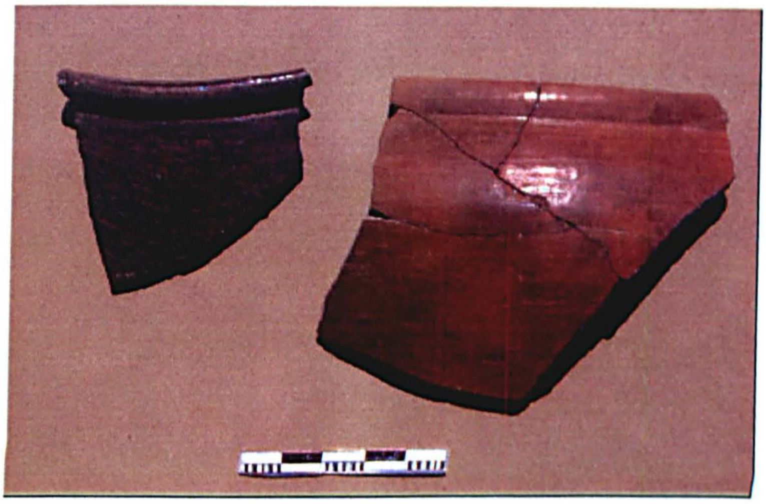


Plate 31. Slipped and Polished Decoration (ENIa) in Fabric 1a: Non-Calcareous Slip (Left); Calcareous Slip (Right)

Plate 32. Fabric 5a Dark Polished Bowls and Jars

Plate 33. Dark Polished Straight-Sided Bowls in Fabrics 6 (Left), 5a (Centre) and 2a (Right)

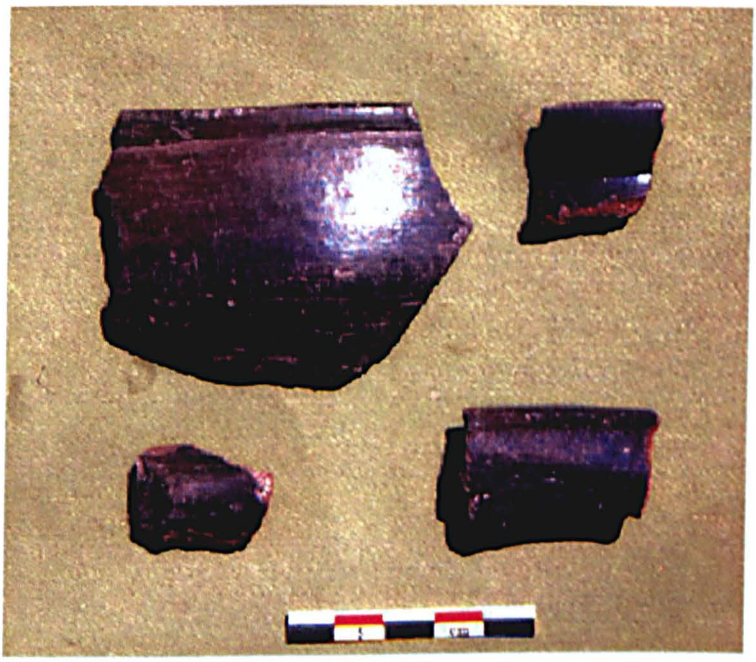
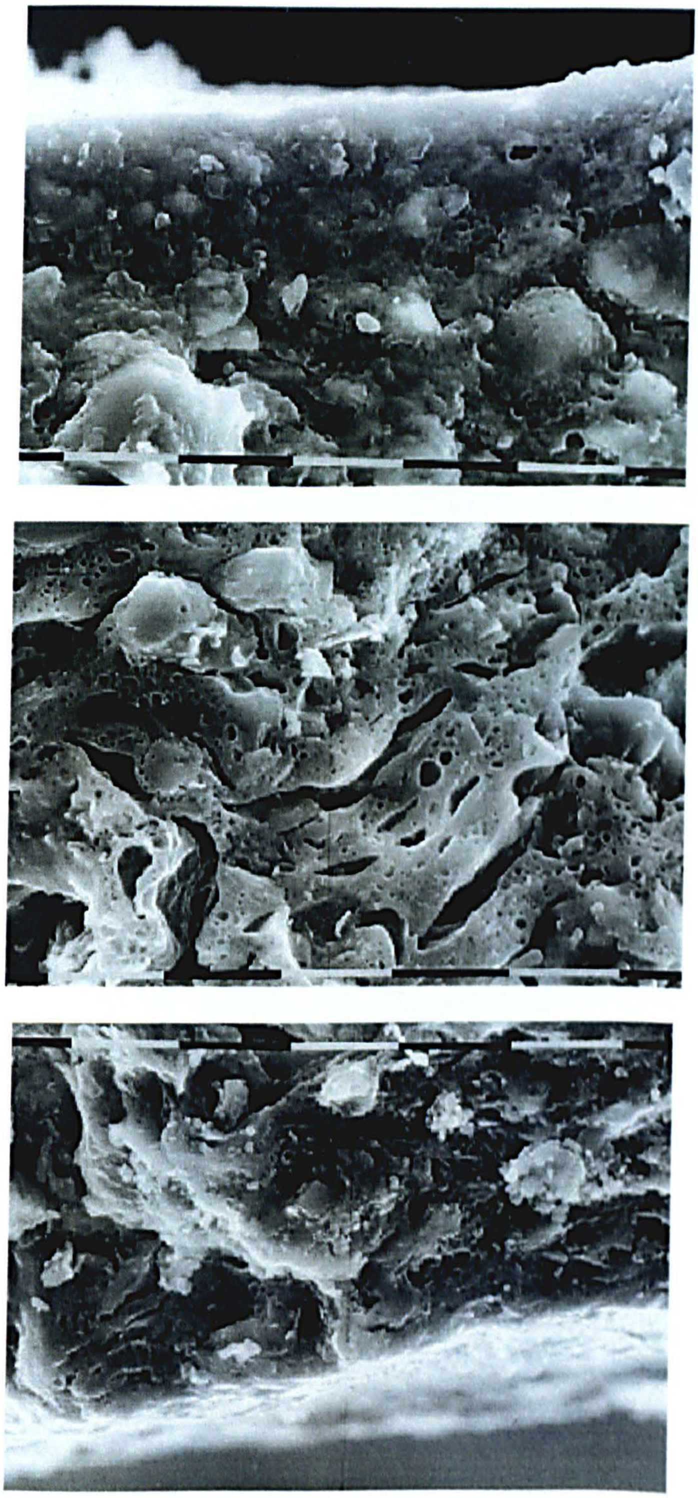


Plate 34. Dark Polished Bowls and Wishbone Handle in Fabric 12 (Mirabello Bay)



Plates 35-7. Non Homogenous Firing in Sample 97/121 (Fabric 1e)
Upper: V Exterior; Middle: V/TV Core; Lower: TV Interior Slip
Bar = 10μm

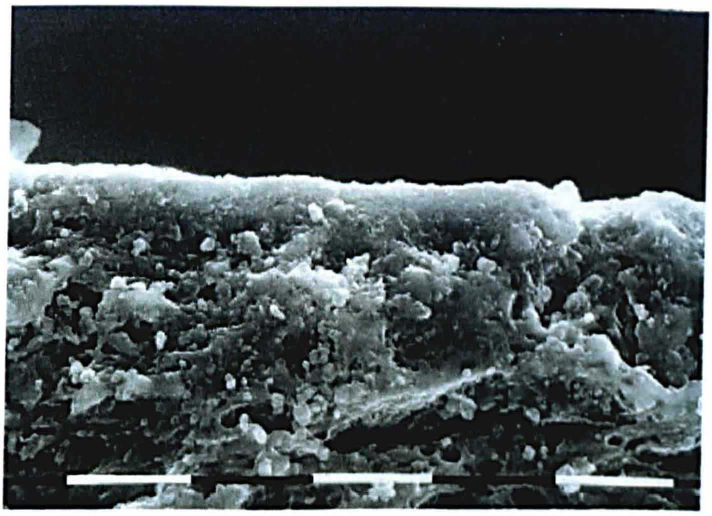


Plate 38. Compacted Surface Layer in Sample 97/84 (Fabric 1d)
Bar = 10μm

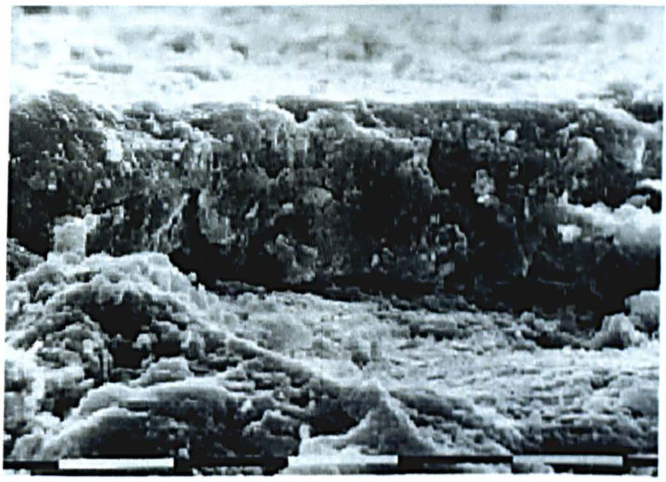


Plate 39. Vitrified (Illitic) Slip Layer (Fabric 8)
Bar = 10μm

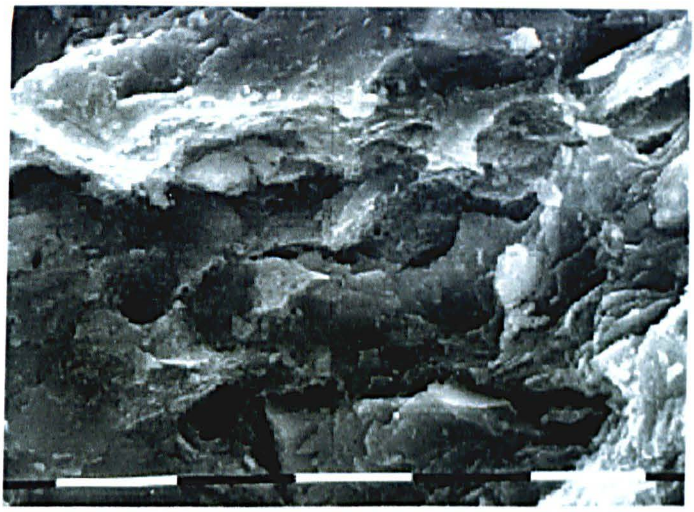


Plate 40. Fabric 5a NV Body (Sample 97/23)
Bar = 10μm

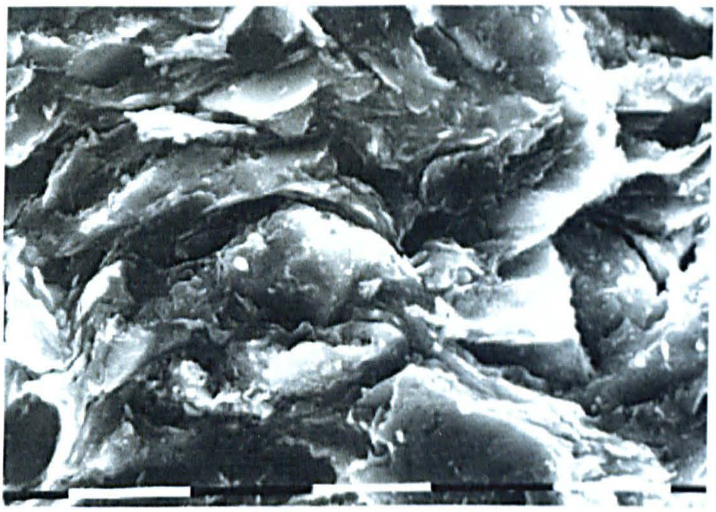


Plate 41. Fabric 5a IV/V Body (sample 97/114)
Bar = 10μm

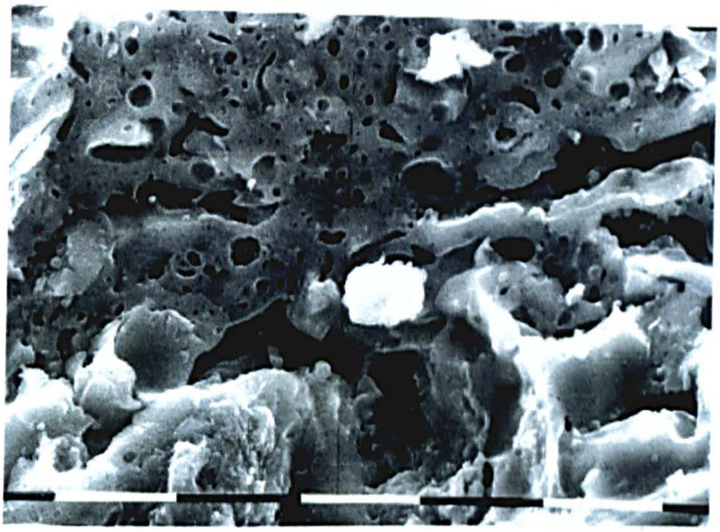


Plate 42. Fabric 5a: VC+/TV Body with Fine Bloating Pores (Sample 97/9)
Bar = 10μm

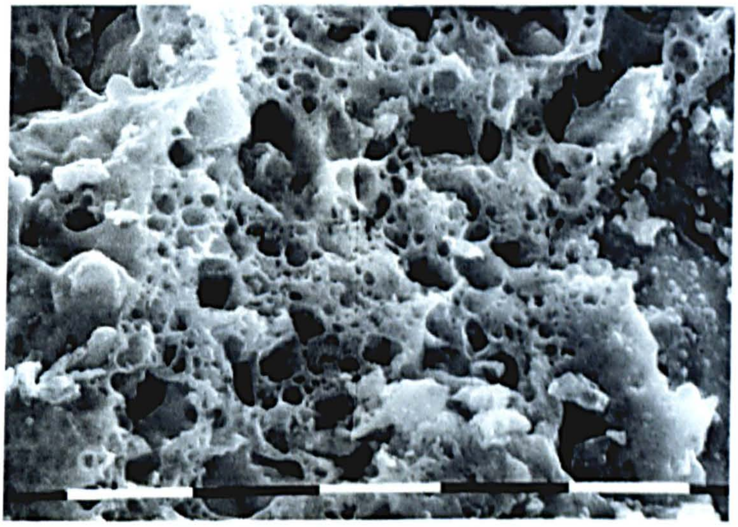


Plate 43. Fabric 5a: TV Body with Fine Bloating Pores (Sample 97/9)
Bar = 10μm

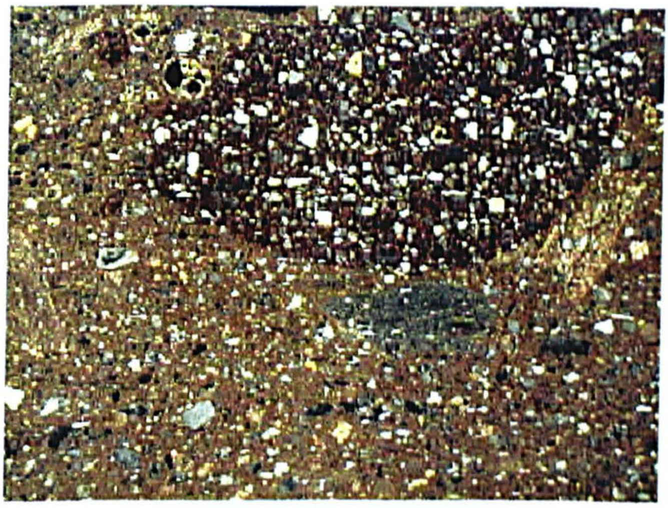


Plate 44. Clay Mixing in Fabric 19 (Sample 97/92)
NB Red Quartz-rich Clay Pellet (no foraminifera)
in Calcareous Groundmass Rich in Foraminifera
Width of Image = 2.5mm

Plate 45. Deep Bowls in Fabric 15

Plate 46. Deep Bowl (Fabric 6)
NB Regular Sequence of Horizontal Fracture Lines

Plate 47. Coil-Built Rounded Base (Fabric 8)

Plate 48. Coil Joins (ENII) in Fabric 1b

Plate 49. Experimental Forming ENII Style Pinched Up Coil Join

Plate 50. Experimental Forming. Adding The Final Coil/Offset Rim

Plate 51. ENII Plug-Attached Handle (Fabric 1b)

Plate 52. Pebbles Probably Worn by Burnishing (ENI-II)

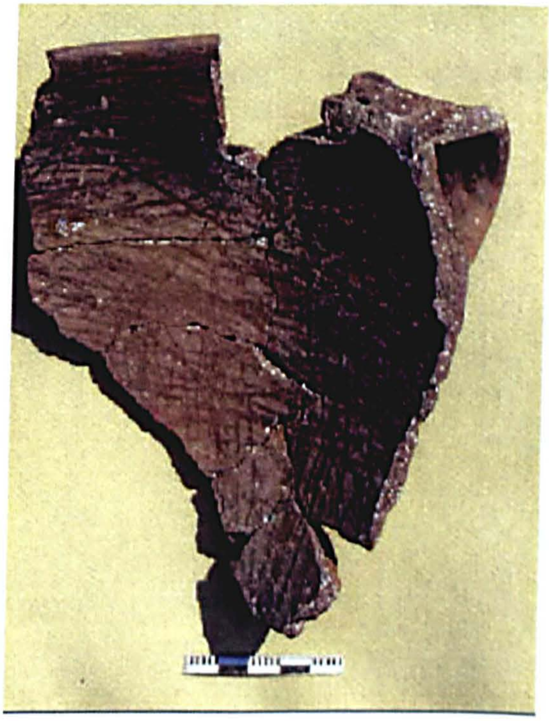


Plate 53. Scribble Burnished Interior (Fabric 2a) (ENIa)

Plate 54. White Slipped Vessels in Fabric 4
NB Burnt Interior

Plate 55. Dribble Painted Sherds in Fabrics 1d (Left, Centre) and 18 (Right)

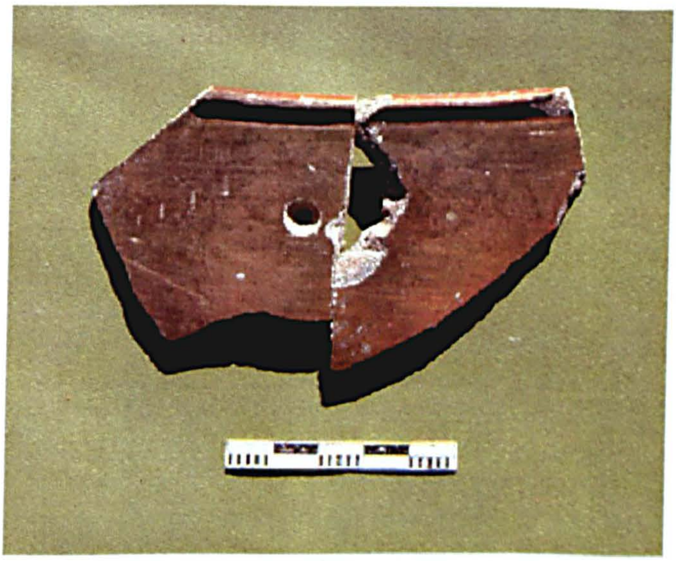


Plate 56. Mend Holes (ENII)

Plate 57. ENIb Collared Jar (Fabric 5a)

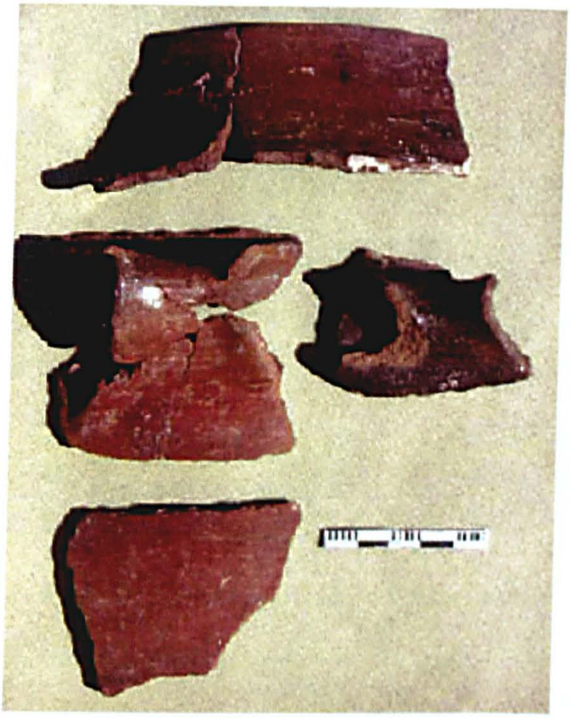


Plate 58. ENIb Collared Jar (Fabric 6)

Plate 59. Fabric 23 Samples 97/60 (Left) and 97/61 (Right)

Plate 60. Fabric 2a/b 'Wood Grain Effect' Horizontal Burnishing

**Plate 61. House Model (Unpublished) (Fabric 1f)
Sounding AABB**

Plate 62. Stone Bowl (ENIc)

Plate 63. Fabric 6
Samples 97/68 (centre left), 98/16 (centre right), 98/23 (upper right)

Plate 64. Fabric 10
Samples 98/40 (upper right), 98/48 (upper right),
97/71 (lower right), 97/108 (lower centre), 98/47 (lower right)

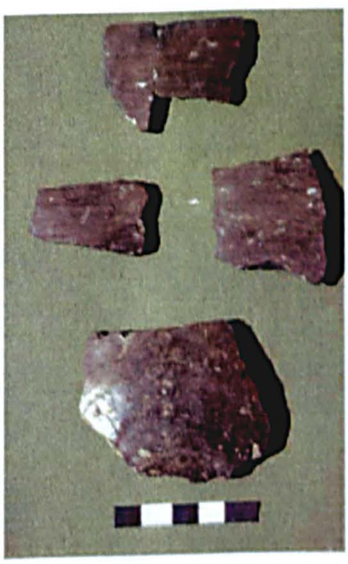


Plate 65 Fabric 21
Sample 97/33

Plate 66. Fabrics 26, 27 and 29.
Samples 97/86 (upper right), 97/76 (upper left),
98/26 (lower left), 98/91 (lower right)

Plate 67. Fabric 28.
Samples 98/89 (upper left), 98/96 (upper centre), 98/22 (upper right)
97/36 (centre left), 98/87 (centre)

Plate 68. Fabric 24
Samples 98/44 (upper left), 98/43 (upper right), 98/29 (lower)

Plate 69. Fabrics 20 and 30
Sample 98/90 (left) and 98/33 (right)

Plate 70. Painted Sherds in Fabrics 1e and 32
Samples 98/79 (left) and 98/78 (right)

Plate 71. Fabric 35
Sample 98/10