

THE POTTERY FROM NEA NIKOMEDEIA IN ITS BALKAN CONTEXT

by

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to my mother and father
στους γονείς μου Βαρβάρα και Δημήτρη

ABSTRACT

This thesis is concerned with the pottery from the Early Neolithic site of Nea Nikomedeia. First, the material is examined as a product of a Neolithic community and the technology, shapes, decoration and function of the vessels are studied. Second, the site of Nea Nikomedeia is placed in its chronological and cultural context.

The manufacturing techniques used by the Nea Nikomedeia potters, the nature of surface coatings and firing conditions, are examined. Questions concerning the location of clay sources and non-plastic inclusions, the addition of temper and refining of clay, are discussed. The simultaneous use, by the Nea Nikomedeia potters, of a variety of local clay sources seems to have been a widespread practice among the Balkan Neolithic potters.

The shapes and decoration of vessels from Nea Nikomedeia are analytically presented, and their development through time is studied. In order to gain insight into the function of vessels the minimum number of pots has been calculated, and the suitability of pots for cooking and storage, is examined. The estimated rate of annual pottery production is rather high, suggesting that pots were an important element of every-day life, and that they were used for a variety of functions.

The cultural affinities of Nea Nikomedeia, as reflected in the ceramic material (decoration, technology and shapes) and other find categories, are discussed. Review of the ceramic material from the Early Neolithic Balkan sites clearly indicates that there was a high degree of interaction and contacts among different areas of the Balkan region. At Nea Nikomedeia in particular, we find evidence for contact between two major primary

Neolithic areas, Thessaly and the Greek Neolithic to the south, and the First Temperate Neolithic (FTN) to the north, each with their developed but distinct ceramic and cultural traditions.

Finally, the question of the origin and development of the pottery in the FTN area, is discussed. Comparative study of the technology and decoration of the vessels from the FTN sites and sites of the surrounding areas, suggests that the development of ceramic production in the FTN area has to be considered to a great extent, as a local development. This conclusion is in contrast with the hypothesis that pottery and the Neolithic way of life were introduced into the Balkan area by Near-Eastern immigrants.

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CHAPTER 1

INTRODUCTION

The site of Nea Nikomedeia is a low mound situated in the alluvial plain of western Macedonia, in Greece, near the modern town of Verroia. It is the ~~most northern~~ Early Neolithic settlement excavated so far in Greece, being approximately 60 km away from the Thessalian region where a large number of sites with Early Neolithic material have been found. At mid-distance, the site of Servia is located. The nearest sites north of Nea Nikomedeia, are the settlements of Vashtëmi and Podgorie in south-east Albania, Amzabegovo and Vršnik in south Yugoslavia and the sites of Veluška-Porodin group, in Pelagonia.

The Earliest Neolithic settlements of the north Balkan Peninsula are divided into a number of regional groups, named after key localities. South Bulgarian sites are included in the Karanovo I group. Settlements in north-west Bulgaria, in the Sofia basin, belong to the Kremikovci group. The Starčevo group comprises the great majority of Yugoslavian sites except for those situated in the West Adriatic Littoral Area (west of Bosnia and Montenegro regions). The Early Neolithic Rumanian sites are known as the Criș group. Related with the Starčevo and Criș, are the Körös settlements of south-east Hungary.

The Balkan Peninsula comprises a variety of ecological zones with varying climate and vegetation. Taking into consideration these differences, the Neolithic settlements can be separated into three broad groups (Nandris 1971; 1977a, fig. 4). Sites situated north of Greece are included in the First Temperate Neolithic (FTN). The term refers to the first

fully formed Neolithic cultures which appear in a Temperate European zone, as contrasted with the Greek Neolithic which falls in the Mediterranean zone, and the sites of the West Adriatic which occupy a Wet Littoral area.

As it is to be expected, archaeological research varies from country to country, or even between different regions of the same country. There are some features however, which characterize the research in the Balkan area, as a whole.

Until the 1970's the only scope for archaeological research was the study of regional development and the collection of artifactual data. Thus, information on the subsistence of Balkan Neolithic sites was based on the data from a few Bulgarian and Greek sites (Renfrew J. 1969, 1973). It is only recently that questions relating to subsistence economy, exchange and social organization prompted the development of research excavations with far wider horizons of data recovery (e.g. at Franchthi, Achilleion, Amzabegovo, Divostin, the Iron Gates Project). The excavations at Nea Nikomedeia were amongst the earliest projects with this broader scope of investigation.

Nowadays, information is complemented by multi-oriented surveys (e.g. Bintliff 1977; Wilkie: see Archaeological Reports 1988 and 1989; Chapman and Shiel 1988). Thus a larger body of data is available now, but information is still very fragmentary (e.g. data on the economy of the Albanian sites are completely absent).

Study of artifacts is limited mainly to "elite" objects, such as decorated pottery and figurine material. As far as the tool industries are concerned, despite some early research on the origins of raw materials (Renfrew C. *et al* 1965; Nandris 1975), it is only recently that Neolithic stone and bone assemblages have been the subject of detailed analyses (Moundrea-Agrafioti 1981; Perlès 1987b; Elster 1976; 1989; Kozłowski J. and Kozłowski S. 1984; Radovanović 1981; Prinz 1987)

The study of ceramic material has maintained the traditional focus on the creation of ceramic typologies and the use of these classifications to build chronologies and reconstruct cultural processes. Owing to the paucity of absolute chronologies, and in some cases of well-defined stratigraphic sequences, the development of pottery typochronologies is the sole means employed for the relative ordering of the sites. The chronological schemes are based on the development of pottery decoration. Thus plain, undecorated, pottery although it forms the bulk of ceramic material it is usually neglected.

Studies of the technological, economic and functional aspects of Neolithic pottery are still rare. In the study of ceramic technology the emphasis is placed on identifying the range and type of materials used by the potters. On this subject, the pioneering work by Wace and Thompson (1912) on the analysis of paints of the Thessalian Middle Neolithic vessels, should be mentioned. For the Early Neolithic ceramics, raw material analyses are confined to a few, mainly Greek assemblages (e.g. Servia, Sesklo, Franchthi and Lerna).

On the reconstruction of manufacturing techniques, a subject which has received special attention is the firing of vessels: estimation of firing temperatures, examination of the prevailing atmosphere and the types of clay used by the potters. The research comprises scientific analyses (Maniatis and Tite 1981; Noll 1982; Letsch and Noll 1982; Karšulin 1955; Ellis 1984), and experimental firings (Vitelli 1984).

Functional analyses of ceramics, that is the evaluation of their role in every-day activities, are almost non-existent. The only works to which reference can be made on this subject, are those of Gardner (1979) and Vitelli (1989). Similarly, research on the intrasite distribution of pottery is very limited (Chapman 1981; Kotsakis 1983; Gimbutas 1989; Ellis 1984). This is largely owing to the scarcity of large-scale excavations.

THESIS LAYOUT

In Chapter 2, the chronological framework and cultural development of the Early Neolithic sites of the Balkan Peninsula is reviewed. The validity of the chronological/cultural schemes, which have been proposed as explanatory of the regional sequences, is examined against the stratigraphic data and the available C¹⁴ dates.

In Chapter 3, the history of the excavations and the stratigraphy of Nea Nikomedeia is presented. The size and pattern and of the settlement is compared with those from other contemporary sites, and the economy of the inhabitants is discussed in connection with the available geomorphological and environmental data. Finally, a synopsis of all find categories from Nea Nikomedeia, apart from pottery, is included.

Chapter 4 deals with the technology of the vessels from Nea Nikomedeia. In the first part of this Chapter, the manufacturing techniques used by the potters, the types of surface coatings, conditions and temperature of firing, are examined. In the second part, the fabric types used for the manufacture of vessels are presented, and questions concerning the location of clay sources, the presence of probable imports, the addition of temper and the refining of clay sources, are discussed. In every section, the results of the technological analysis of the Nea Nikomedeia vessels are compared with data available from other Neolithic sites.

In the first part of Chapter 5 the plain, undecorated, pottery from Nea Nikomedeia, which has been separated into groups according to surface treatment and vessel form, is presented. The second part of this Chapter deals with the decorated vessels (painted, impressed and pottery with applied decoration). Their decorative motifs are described, and

their shapes and fabrics are compared with those of plain vessels. Finally the development of ceramics with time is examined, by means of a comparative study of the pottery from the First and Second building periods.

Chapter 6 deals with the functional analysis of the pots from Nea Nikomedeia. Initially the annual ceramic production is estimated, on the basis of the minimum number of pots found at the site. The rate of pottery recovery, during the excavations, has been taken into consideration. Then, the suitability of vessels for cooking and storing purposes is examined. In order to investigate for any correlations between different ceramic wares and architectural features, the intrasite distribution of pottery is studied.

In Chapter 7, the nature of contacts among the Early Neolithic sites of the Balkan Peninsula is discussed. Initially, the influence of the Thessalian sites on the appearance of pottery in the FTN area is examined. The results of this analysis are compared with conclusions reached from studies of lithic assemblages, and subsistence data. Then, the appearance of impressed vessels in the Thessalian region and the nature of contacts leading to their introduction, are discussed. At the end, the cultural affinities of the Nea Nikomedeia material are examined in the light of its Balkan context.

The last Chapter includes a summary of the work included in this thesis. In Appendix A, the methodologies followed in the study of pottery in the field-work and in the study of thin-sections, are included.

CHAPTER 2

THE CHRONOLOGY AND CULTURAL SEQUENCE OF EARLY NEOLITHIC SITES IN THE BALKAN PENINSULA

2.1 Introduction

In the present Chapter the chronological framework and regional sequence of the Early Neolithic sites in the Balkan Peninsula are discussed. Although the review covers most areas of the Balkan Peninsula, the regions nearer to Nea Nikomedeia such as the Thessalian region, south-east Albania and south-west Yugoslavia are examined in more details.

2.2 Thessalian Region

Thessaly is a rich agricultural area, with few low hills separating the different plains. The Early Neolithic sites excavated in this area, are presented in fig. 2.2. The settlements, situated mainly along the river's banks, have the form of tells or magoulas. Deposits with Early Neolithic material are quite deep, regularly reaching 3-5 m of thickness.

2.2.1 Pre-pottery Phase

The period of establishment of Neolithic sites at Thessaly is represented by a Pre-pottery stratum which has been found at five sites: Argissa (Milojčić 1962), Sesklo (Theocharis 1957, 1963, 1967, 1976), Gendiki (Theocharis 1962, p.73); Achilleion (Theocharis 1962, p.71) and Soufli (Theocharis 1958, p.78-85, 1962 p.82). The thickness of deposits is usually 0.30-45 m, although they occasionally reach 1 m (Soufli Magoula).

The analysis of faunal remains from Argissa (Boessneck 1962) and the study of carbonized seeds from a number of sites (Renfrew J. 1973), show that the inhabitants of the settlements had a fully developed farming economy (see table 3.2 and table 3.3). Hence the Thessalian levels should be differentiated from the deep PPN occupations of the Near East, where one can follow the successive changes of local Mesolithic groups until the emergence of Neolithic (see Nandris 1970).

The Aceramic or Pre-pottery nature of these levels is also questioned for the following reasons. Fragments from fired clay figurines have been found at Sesklo and Soufli Magoula (Theocharis 1967, p.87), and a number of pottery sherds are reported from Soufli (Theocharis 1967, p.84, fig. 45), and Argissa (Nandris 1970, p.168). Furthermore the existence of a Pre-pottery level at Achilleion, distinguished during the 1961 excavation (Theocharis 1962, p.71), has not been confirmed by later, more extensive, research of the site (Gimbutas 1974a, 1989).

The fact that in all cases the Pre-pottery levels have been exposed in single small trenches, has enhanced these doubts. Moreover apart from the presence/absence of pottery, the Pre-pottery and Ceramic levels cannot be differentiated, since subsistence data and all find categories show a remarkable similarity (for stone industries see Perlès 1987b, 1989; for small finds see Theocharis 1967; Nandris 1970).

It should be pointed out however that in one site at least (Gendiki: Theocharis 1962, fig. 1), the Pre-pottery and Ceramic strata are separated by a sterile level. Moreover, in comparison with the large quantities of pottery found in Ceramic Neolithic occupations (e.g. at Nea Nikomedeia 600-1500 sherds are normally found in an excavation square 4 m x 4 m, and 20 cm thick), the presence of 288 sherds in the Argissa PPN levels (in a trench 8.5 m x 6 m, and 0.30-1 m thick), indicates a very limited use of pottery.

2.2.2 Ceramic levels

In all sites the PPN stratum is overlaid by levels with early monochrome pottery. A similar stratum has been found at the base of occupation sequence of Nessonis I (Theocharis 1962, p.77).

The ceramic material consists of monochrome vessels with no decoration, apart from rare applied bands and knobs (Achilleion: Gimbutas 1989, fig. 5.64). Slipped vessels are absent from all sites (Wijnen 1981), apart from Achilleion (Gimbutas 1989).

The depth of the early monochrome levels is usually small (0.30-0.50 m), except in the case of Nessonis I where it is almost 1 m. In the following levels, the ceramic material includes a number of decorated vessels. The different types of decoration employed, are painting, decoration produced by variations in firing atmosphere (black topped and mottled), applied and impressed decoration. At a number of sites, such as Otzaki (Miložić 1971), Prodromos (Chourmouziadis 1971, 1972), Nessonis II (Theocharis 1962) and Agia Anna (Chourmouziadis 1969), the occupation sequence starts with these decorated levels. In all cases decorated vessels are scarce, amounting to 5-10% of the ceramic material.

At Otzaki, Gendiki and Magoulitsa, impressed decoration appears at a later stage of development. At Prodromos, 4 impressed sherds were found at the base of the occupation sequence, but impressed pottery in measurable quantities (10% of decorated pottery) appear only at a later stage of occupation.

Taking as a criterion the appearance of impressed vessels and the disappearance of painted decoration at some sites, the strata with decorated vessels are separated into two periods: Early Neolithic II (EN II) or Protosesklo, and Early Neolithic III (EN III) or

Presesklo (Theocharis 1967, 1973; Miložčić 1955). These are considered as distinct cultural phases with an inclusive character. The separation is based mainly on the interpretation of impressed decoration as representing an intrusive, culturally divisive element (see section 7.4.2.)

The later phase (Presesklo) is separated by Miložčić (1955) into three sub-periods: Presesklo I includes monochrome vessels with a few examples decorated with spatula or finger-tip impressions; Presesklo II where impressed vessels increase in frequency and are decorated with finger pinching and nail impressions; Presesklo III where impressions are mainly made with instruments (amongst these, cardium decoration is included). Although this periodization is based on the stratigraphy of Otzaki, the scheme is considered to be applicable to all Thessalian sites (Miložčić 1955; Otto 1985).

The division of levels with decorated pottery into EN II and EN III, is not accepted by some archaeologists (Nandris 1970; Chourmouziadis 1971a). The culturally divisive character of impressed decoration is questioned on the evidence of the continuity of figurine material and other small finds (Nandris 1970). Additionally the ceramic material subjected to detailed analysis in Chapter 7 shows that even at sites where impressed decoration forms the predominant type of pottery decoration (e.g. Otzaki), the ceramic material shows a continuation in pottery technology and vessels forms (section 7.4.2).

Apart from any objections on the culturally divisive character of impressed decoration, the general application of a scheme based on the data from one site cannot be accepted because of the variation noticed among the Thessalian sites. For example, impressed decoration is absent from the south Thessalian sites (Achilleion, Pyrasos, Sesklo), in which case, the division into EN II and EN III does not have even a chronological value. At other sites such as Prodromos and Agia Anna, impressed vessels were used alongside

the other decorated vases. A similar situation is noticed at Nea Nikomedeia and Servia, two sites that can be clearly related to the Thessalian region (see section 7.5.1). Moreover the sequence of impressed motifs seen at Otzaki, is not supported by the stratigraphies of the other sites. At Gendiki impressed decoration appears after a monochrome phase as at Otzaki, but finger pinching, nail and instrument impressions were simultaneously in use. A simultaneous use of all types of impressed decoration, is noticed in the 3 m deposits of Agia Anna, and in Nessonis II.

For the reasons mentioned above, in this work the term Decorated Phase will be used for the description of the Thessalian levels stratified between the levels with early monochrome pottery (Monochrome Phase) and those with Middle Neolithic assemblages.

2.2.3 Radiocarbon dates

C¹⁴ dates are available from three sites, namely Achilleion, Sesklo and Argissa (fig. 2.3). It is only from Achilleion that a continuous series of readings from all the occupation levels, have been taken. As can be seen from figure 2.3 the Pre-pottery levels range from approximately, 6100 b.c. to 5650 b.c. The chronology for the beginning of this phase is based only on the two Argissa dates. However, the dates are in accordance with the C¹⁴ dates from the PPN levels of Franchthi, in north-east Peloponnese, and Knossos in Crete (fig. 2.4).

The Monochrome Phase ranges from 5650 b.c. to 5450 b.c. and the Decorated Phase extends up to 5200 bc. The transition from Early to Middle Neolithic, is not abrupt: A1 monochrome vessels were already present in the late Early Neolithic levels (e.g. at Sesklo, Achilleion, Prodromos), and the gradual development of the Middle Neolithic painted patterns can be followed at Achilleion, Prodromos and Pyrasos. Moreover, scraped pottery (A3d, A3e) which is common in the Middle Neolithic sites, is present in the Early

Neolithic Prodromos and Magoulitsa. Consequently, the date of 5200 b.c. can be used only as a general reference point.

2.3 Nea Nikomedeia

There are four C¹⁴ dates available from Nea Nikomedeia (Godwin and Willis 1962, p.62; Stuckenrat 1967, p.334-35).

- (1) 6230 ± 150 b.c. (Q 655; charcoal)
- (2) 5830 ± 270 b.c. (GX 679)
- (3) 5607 ± 91 b.c. (P 1202; organic carbon)
- (4) 5331 ± 74 b.c. (P 1203A; organic carbon)

Q 655 and P 1202 have been taken from the First building period deposits, P 1203A most probably belongs to the second Building period. For GX 679, there is no information available.

According to the first and second C¹⁴ dates, the beginning of the Nea Nikomedeia occupation is earlier than or contemporary with the Pre-pottery Phase of Thessaly. The site of Nea Nikomedeia can be clearly related to the Thessalian region, not only because of the proximity to the area, but due to similarities in pottery decoration, pottery technology, figurine material and other small finds (see section 7.5.1). Due to these similarities and because of the absence of other sites with a developed ceramic tradition dated as early as 5800 b.c., the early dates from Nea Nikomedeia must be considered dubious. A possible explanation for this anomalous result is that the charcoal which yielded the Q 655 date, may have been from a tree antedating the settlement.

The two Pennsylvania dates, parallel Nea Nikomedeia with the Ceramic Phase of the Thessalian region; the first (P 1202) being linked to the beginning of Monochrome Phase,

and the second (P 1203) to the Decorated Phase.

Throughout the occupation of Nea Nikomedeia, monochrome vessels and vases with painted, impressed and applied decoration were simultaneously in use. In the Thessalian sequence, this combination of wares is found at a developed stage of the Decorated Phase. Apart from the pottery decoration, vessel forms also point towards a later stage of the Thessalian Early Neolithic.

Among the Nea Nikomedeia vessels from both building periods, neck jars some of them with high collars, are quite common (9% of the ceramic material; fig. 5.4-5.6). Open, dish-like vessels (plates) are also present (fig. 5.20). Both vessel forms, show a sporadic appearance at some Thessalian sites, from the Monochrome Phase (Argissa: Milošević 1959, fig. 5, 15; Achilleion: Gimbutas 1989, fig. 5.36, 12-14), although they become more numerous towards the end of the Early Neolithic Period (Sesklo: Wijnen 1981 p.37; Achilleion: Gimbutas 1989, p.88; Oztaki: Milošević 1971, table 1; Pyrasos: Theodoridis 1959, p.45). Neck jars with high collars in particular, appear only towards the end of the Early Neolithic period.

The cultural remains from Nea Nikomedeia also show similarities with the material from the south Yugoslavian sites of Amzabegovo and Vršnik (see section 7.5.2). The early occupation levels from these sites are contemporary with the last stages of the Thessalian Decorated Phase (section 2.5.1).

Typological comparisons of the Nea Nikomedeia material suggest that the site was contemporary with the Thessalian Decorated Phase, and in particular with the late stages of the Thessalian sequence. This is in agreement with the P 1203 date (5331), whereas the P 1202 seems to be slightly too old for the material. However we cannot place absolute reliance on the Pennsylvania dates since two readings do not constitute a statistically significant sample.

2.4 Servia

Servia is situated on the right bank of the river Aliakmon, 35 km south-west of Nea Nikomedeia (fig. 2.2). The site was first excavated in 1931 by W.Heurtley (1939), and deposits dating from the Middle Neolithic and Early Bronze period were revealed. New excavations were undertaken by Riddley (Riddley and Wardle 1979). During these excavations, Early Neolithic deposits were discovered at Varithymides (Servia V) 500 m away from the Middle Neolithic occupation. A few scattered Early Neolithic sherds were found on the lower levels of the Middle Neolithic site.

The Early Neolithic ceramic material consists of monochrome and decorated vessels (painted, impressed, mottled and applied decoration). On typological comparison with the Thessalian material, the Early Neolithic occupation is dated as contemporary with the Thessalian Decorated Phase (Wijnen 1979).

There are two C^{14} dates available for the Early Neolithic material from Servia: 4955 ± 85 b.c. and 4410 ± 190 b.c. (Breunig 1987). The second date (4410 ± 190 b.c.) compared with a series of readings from the Middle Neolithic strata, ranging from 4900 b.c. to 4700 b.c. (Breunig 1987), appears inconsistently recent. In comparison with the dates from the Thessalian Early Neolithic sites the first reading (4955 ± 85) also seems slightly too recent for the material that is dating. As an explanation for the discrepancy between the archaeological material and the radiochronologies, a mixing of organic material from different strata has been proposed (Breunig 1987, p.96).

In comparison with the Nea Nikomedeia and Amzabegovo pottery, the vessels from Servia V are better fired (black cores being rare), they have a more compact surface and their clay is more fine textured. The technological superiority of the Servia pottery does

not necessarily mean that Servia is a later site than Nea Nikomedeia. For example the black core of the Nea Nikomedeia vessels could be explained as being the result of the use of a more carbonaceous clay (see Chapter 5). In the Amzabegovo vessels, black cores are largely due to the addition of organic temper in the clay.

2.5 Early FTN sites from south-east Albania and south Yugoslavia

The nearest sites north of Nea Nikomedeia, are the settlements of south-east Albania (Vashtëmi and Podgorie I), the sites of Amzabegovo and Vršnik and the Pelagonian settlements of Veluška-Porodin group, in south Yugoslavia (fig. 2.2). As in Nea Nikomedeia and Servia, the inhabitants of all these sites had, since the beginning of occupation a developed ceramic tradition which includes monochrome (coated and uncoated examples) and decorated vessels. The types of decoration employed are painting white motifs on a red surface (W/R), impressed, applied and barbotine decoration.

2.5.1 Amzabegovo and Vršnik

Amzabegovo is situated on the terraced bank of the river Svetonikolska, on the Ovče Polje depression. The site was initially excavated by P. Korošec and J. Korošec (1973). Later excavations were carried out by Yugoslav and American personnel, under M. Garašanin and M. Gimbutas, who worked independently in different sectors of the settlement. From this campaign only the American sectors have been analytically published as yet (Gimbutas 1972, 1974b, 1976). The site of Vršnik, excavated by M. Garašanin and D. Garašanin (1961), lies 8 km north of Štip on a gently sloping hillock in the valley of the Bregalnika river.

Both sites have a long occupation sequence, starting from the Early Neolithic period

and extending to the Late Neolithic Vinča culture (Amzabegovo I-IV, and Vršnik I-IV).

At Amzabegovo the deposits with W/R painted pottery are separated stratigraphically, into two superimposed levels: level Ia and Ib. In the first level, the only type of pottery decoration employed is painting (W/R). In level Ib, impressed and barbotine decorations are introduced. In painted decoration complex motifs are used, among which the "dot and line" motif and floral patterns are characteristic (Gimbutas 1976, fig. 23, 24). The W/R painted motifs from level Ia are described as being simple, but the depicted sherds (Gimbutas 1976, fig. 48) are very fragmentary and they do not allow the reconstruction of any decorative pattern. The early occupation level at Vršnik (Vršnik I and pits: Garašanin M. and Garašanin D. 1961), includes ceramic material very similar to that from Amzabegovo Ib.

The cultural remains from Amzabegovo are accompanied by a series of C¹⁴ dates. The dates listed in fig. 2.5 are those published in the monograph for Amzabegovo (Gimbutas 1976). As has been pointed out (Nandris 1977b), there are discrepancies between these C¹⁴ dates and those published in two preceding preliminary reports (Gimbutas 1972; 1975). To give only a single example, the two oldest dates (LJ 2181 and LJ 2330/31) in the 1976 publication are given as 5320 ± 140 b.c. and 5220 ± 60 b.c., whereas in the 1972 report they are published as 5390 ± 250 b.c. and 5260 ± 100 b.c. respectively. No explanation has been given for these changes.

Consequently, the usefulness of the extensive series of dates is reduced and they can only be used with caution. Taking as a whole the C¹⁴ dates from levels Ia and Ib, it can be seen that the early Amzabegovo and Vršnik were contemporary with the later stages of the Thessalian Early Neolithic, and the sites of Nea Nikomedeia and Servia.

So far, Amzabegovo and Vršnik are the earliest neolithic sites excavated in the south

Yugoslavian region. The first occupation levels of Rug Bajer (Sanev 1975), Zelenikovo (Galović 1963; Garašanin 1973) and of a number of other sites (Nandris 1968), are contemporary with the Amzabegovo II and III levels.

2.5.2 Pelagonian sites

In the south-western region of Yugoslavia, in Pelagonia, a large number of tell sites are distributed on the plain along the river Crna: Veluška, Porodin, Čuka, Tm, Optičari, Colema, Dobromiri, Karamani and Mala (fig. 2.2). Less often, settlements are situated on the terraces, above the river beds: Gradiste, Vlaku, Bela Crkva (Simoska and Sanev 1975, fig. 3).

The longest occupation sequence has been found at Veluška Tumba (Veluška I-IV, Simoska and Sanev 1975). On typological comparisons the material from Porodin (Grbić *et al* 1960) is considered as contemporary with the Veluška III and IV levels (Simoska and Sanev 1975). Occupations later than Veluška IV and Porodin, have been found at Grgur Tumba, Bara Tumba and Čuka Tumba (Simoska and Sanev 1976, p.61; Kitanonski 1977; Kitanoski, Simoska and Todorović 1978).

The available C¹⁴ dates do not support the ordering of the Porodin settlement as being contemporary with the later occupation levels from Veluška. The two readings from Porodin extend from 5300 b.c to 5050 b.c, whereas the C¹⁴ dates from the earlier Veluška levels (Veluška I and III) range from 5150 b.c. to 4800 b.c. (fig. 2.5). Although the exact chronology of the individual stages of the Veluška-Porodin group is not clear as yet, the C¹⁴ from both sites are rather constant, indicating that by 5300 b.c. to 5200 b.c. sedentary communities with a developed ceramic tradition were already present in Pelagonia.

From the settlement of Čuka, where three occupation levels have been distinguished (Čuka I, II and III: Kitanoski, Simoska and Todorovic' 1978), two C¹⁴ dates are available:

5730 \pm 160 b.c. and 5060 \pm 190 b.c. (Breunig 1987). There is no information on the stratigraphic association of the samples, but on the basis of the excavators's conclusion that " Čuka I and II belong to the Veluška-Porodin group, into which they completely fit, whereas Čuka III probably represents a continuation of the same culture" (Kitanoski, Simoska and Todorović 1978, p.32), the early date of 5730 \pm 160 b.c. must be considered dubious.

2.5.3 South-east Albanian sites

Vashtëmi and Podgorie I are situated in the plain of Korçë, in the south-east Albanian region. Vashtëmi, which has been excavated by Korkuti (1982), is located near the river Devolli, on the slopes of the Biranj-Vashtëmia mountains; Podgorie I, lies 8 km to the north.

The three occupation levels from Vashtëmi are attributed to the same cultural phase (Korkuti 1982; see also Prendi 1976). The Early Neolithic ceramic material from Podgorie I is similar to that from Vashtëmi but on the basis of the more complex motifs of the W/R painted vessels and the presence of a polychrome decoration (white and pink motifs on a red surface), which is absent from Vashtëmi, the settlement of Podgorie I is considered as being slightly later than Vashtëmi (Lera 1983; Prendi and Andrea 1981; Prendi 1982).

There are no C¹⁴ dates available for the south-east Albanian sites. The combination of the different pottery decoration types (W/R, impressed, barbotine decoration), parallels these settlements with the W/R horizon of Amzabegovo and Vršnik. This parallelism is further enhanced by the presence, at Podgorie I, of a few painted sherds decorated with the "dot and line" motif (Lera 1983, plate II,10) and floral patterns (Prendi 1976, plate I,3). Thus, the occupation of Vashtëmi and Podgorie I could be roughly dated at the last quarter of 6th millenium/ beginning of 5th.

2.6 Early FTN sites from central-north Yugoslavia (Serbia) and south-west Rumania

2.6.1 Cultural sequence

According to Srejović (1988) and Dimitrijević (1974) the cultural sequence of the first Neolithic sites in central-north Yugoslavia can be summarized as follows.

A. The period of establishment of the Neolithic is represented by deposits containing monochrome vessels, rarely decorated with applied strips or nail impressions (Monochrome Phase).

B. It is followed by a Decorated Phase, which is characterized by an increase in the occurrence of vessels with impressed decoration, and the introduction of painting (white motifs on a red surface). Barbotine decoration is rare.

C. During this stage, W/R painting is replaced by dark (brown) motifs on a red surface (D/R). Impressed and barbotine decoration become more abundant.

This relative ordering is based mainly on the stratigraphic data from Lepenski Vir (Srejović 1971, 1972), Donja Branjevina (Karmanski 1975, 1979), Drenovac (Vetnić 1972) and Divostin (MacPherron and Srejović 1971). On typological comparisons, monochrome ceramic assemblages from a number of sites such as Dobanovci (Todorović 1969; Dimitrijević 1974), Lug (Todorović 1969), Rudnik (Dimitrijević 1974), Padina (Jovanović 1968, 1969, 1983a, 1987), Stubica (Jovanović 1983b), Banja (Madas 1969; MacPherron and Srejović 1971), Velesnica (Vasić 1986) and other settlements (Srejović 1988), are included in the Monochrome Phase (Phase A). Similar assemblages are also reported from Albania (Burim: Prendi and Andrea 1981; Prendi 1990), and Pelagonia (Pešterica: Todorović; Simoska and Kitanoski 1975-77).

At Ajmana (Stalio 1986) and the Rumanian sites of Cîrcea (Nica 1976, 1977) and Gura Baciului (Vlassa 1972), the occupation sequence starts with the W/R Decorated Phase (Phase B).

This sequence (Phase A to Phase C) has been questioned by Lazarovici (Lazarovici 1976, 1979). Based on the stratigraphy of Gura Baciului where the W/R level (Gura Baciului: level I) is followed by a stratum with unpainted, monochrome and impressed pottery (Gura Baciului: level II), and on typological comparisons of the ceramic assemblages, Lazarovici argues that the stratigraphic sequence given by the excavators and Dimitrijević for Lepenski Vir, Divostin, Drenovac and Donja Branjevina is incorrect. According to Lazarovici, the Monochrome Phase (Phase A), should be dated after the W/R Decorated Phase (Phase B).

This disagreement over the relative ordering of the monochrome and W/R assemblages, is due to the general absence of well defined vertical stratigraphic sequences. Very thin deposits, usually disturbed by subsequent occupations, are a common feature of the FTN sites (MacPherron and Srejović 1971; Vasić 1986; Stalio 1986). Thus in most cases the distinction between different phases is based mainly on typological comparisons of assemblages found in individual pits, and not in superimposed levels. As a result doubts are expressed not only on the relative sequence of the Monochrome and W/R Phases, but also the existence of a Monochrome Phase at the site-type of Starčevo (Garašanin D. 1954; Garašanin M. 1971) is questioned by Ehrich (1977).

It also seems that the characteristics of the Monochrome Phase are not clearly defined. For example, according to Srejović and Letica (1978) the ceramic material from the two earlier levels of Padina B (B1 and B2), represent an amalgam of contaminations from the upper levels; Padina B3 is included in the Monochrome Phase. Jovanović (1983a, 1987), includes both Padina B2 and B3 in the Monochrome Phase. Finally, Brukner on the basis of pottery, dates the occupation of Padina B as extending from the Monochrome Phase until the later stages of the Starčevo culture (see Jovanović 1983a, 1987).

At Donja Branjevina, monochrome vessels have been found stratified below W/R strata (in Pit 9). Whether this sequence is problematic, as Lazarovici argues, cannot easily be decided on typological criteria alone. The stratigraphies of the Thessalian sites clearly show that features such as vessel shapes, types of bases, lips and rims, or even pottery decoration do not appear simultaneously in all sites and they remained in use for a long period of time. However Lazarovici is right in pointing out that in most cases the relative ordering of the sites is based on an *a priori* acceptance of the monochrome assemblages as representing the earliest occupation levels, and not on clear stratigraphic data.

Examination of the ceramic assemblages from the W/R levels of the FTN sites, (see section 7.3) suggests that these levels do not represent the first stages of the ceramic development in that area. Whether this earlier stage is represented by the monochrome strata reported from a number of sites is not clear, and remains to be confirmed by better documented assemblages.

The early stages of development of the Starčevo/Criș sites have been described by a variety of terms (see Srejović 1988; Dimitrijević 1974; Garašanin M. 1971; Miložić 1950; Lazarovici 1976). In this work the term Monochrome Phase will be used for the first monochrome levels (e.g. Dobanovci, Donja Branjevina, Lepenski Vir etc). The term W/R is used for the first levels with painted pottery, and the term D/R is collectively used here for the later stages of the Starčevo/Criș sequence.

2.6.2 Radiocarbon dates

A series of C¹⁴ dates are published referring to material from Neolithic Divostin (Hadjipheon and Srejović 1971; fig. 2.5). These dates are generally presented as belonging either to Starčevo or to Vinča occupations of the site. Apart from this gross distinction there is no further information on the samples, either regarding their stratigraphic position

or their archeological context. The Starčevo dates, range from 5150 b.c. to 4950 b.c. The monochrome strata from Banja are dated by a single reading at $5100 \pm$ b.c.; from Grivac an early reading of 5300 ± 100 b.c., is available (Macpferon and Srejšović 1971; fig. 2.5)

A number of C^{14} dates run on charcoal, are available from Padina B (Clason 1980). The series is constant, ranging from 5150 b.c. to 5115 b.c. (fig. 2.5), apart from a recent reading of 4620 ± 55 b.c. from Padina B1. Similarly the other date from Padina B1, the archaeologically earlier stratum, is more recent than the dates from the younger strata (B2 and B3). As an explanation for this discrepancy, a mixing of organic material from different strata, has been proposed (Clason 1980, p.144). Although the absolute chronology of the individual strata (Padina B1, B2 and B3) is not clear, the C^{14} dates taken as a whole are rather constant, indicating that the occupation of Padina B can be dated as being in the last two centuries of 6th millenium.

Another series of C^{14} dates from Padina, run on bone, has been published by Živanović (1979; table 2.1). Apart from a remark that the 8th millenium dates should correspond with the Mesolithic strata (Padina A: Jovanović 1983a, p.167), no other information is available for the stratigraphic association of the samples. In case that the sample BM -1143 (5788 ± 51 b.c.) comes from Padina B, the date is too old in comparison with the other series of dates mentioned above. However, due to the lack of contextual data, these dates cannot be used for any chronological comparisons.

A series of C^{14} dates (ranging from 5400 b.c. to 4600 b.c.; table 2.2) is available from Mesolithic Lepenski Vir (Srejšović 1972). These dates parallel the end of Mesolithic occupation with the last stages of Starčevo culture (by 4600 b.c., Early Vinča sites appear in the area: Chapman 1981, p.31). Although it is not difficult to imagine the persistence of collecting and hunting groups among agriculturalists, there is a discrepancy between

the dates from the Mesolithic occupation and the Neolithic strata, which include ceramic material dated at the early stages of the Starčevo sequence.

A similar problem is presented by the radiochronologies of Mesolithic Vlasac (Srejović and Letica 1978), since the dates from the earlier strata (Vlasac I) are inconsistently recent in comparison with the dates from the younger strata (Vlasac II, III). The reasoning proposed by the excavators to explain these discrepancies (contamination of the samples with ground -water), is considered as inadequate (Prinz 1987, p.23). However, on the basis of the archaeological material from Neolithic Lepenski Vir, it seems that the C¹⁴ dates of the Mesolithic strata cannot be accepted as valid.

In conclusion, the limited sample of C¹⁴ dates indicates that the early occupation levels of the sites in Serbia and south-west Rumania, could be dated around 5300 b.c. to 5100 b.c. (fig. 2.5). This can be taken only as a rough estimation, since in most cases the association between C¹⁴ dates and archaeological material is far from clear. However, this chronology (5300 b.c. to 5100 b.c.) is in accordance with the dates from Amzabegovo, a site where a similar sequence of W/R, D/R and Vinča strata, has been revealed.

2.7 Bulgarian sites

A large number of Neolithic sites are known from Bulgaria. These settlements are distinguished into two regional groups: Karanovo and Kremikovci (Georgiev 1961a, 1971; Tringham 1971; Vajsova 1966). Tell sites of the Karanovo group are distributed over a wide area of south Bulgaria, extending from the northern edge of the Rhodopes to the Stara Planina, and from the Black sea to the eastern edge of the Sofia basin (Dennell 1978, p.2). Amongst the most extensively excavated sites are the tell settlements of Karanovo (Mikov 1939, 1959 ; Georgiev 1961a) and Asmaška (Georgiev 1961b, 1963,

1965). Other well known sites are Muldava (Detev 1968) and Banjata (Detev 1950).

The sites of Kremikovci group are situated in north-west Bulgaria, in the Sofia basin. The group is named after the site of Kremikovci which was excavated by Mikov and Georgiev (Georgiev 1961a, Georgiev 1975; Petkov 1962). Other sites of the Kremikovci group are Slatina (Petkov 1961), Čavdar (Georgiev 1973), Celopeč (Petkov 1948a, 1948b) and Gradešnica (Nikolov 1974).

The ceramic material from all Bulgarian settlements includes, from the beginning of occupation, a variety of decorated wares: painted, impressed, grooved, incised and vessels with barbotine decoration. In the Karanovo group, painted decoration is executed with white paint on a red background (W/R: Karanovo I). In the next phase (Karanovo II) there is a continuation in vessel forms, but painted decoration disappears; the black or grey pottery is decorated by grooving and channelling.

Painted vessels of the Kremikovci group have W/R and D/R decoration. With time, W/R decoration disappears, whereas alongside the D/R pottery a variety of polychrome vessels (dark and red-wine on red; dark and white on red) are used (Gradešnica level B: Nikolov 1974; Celopeč level A: Petkov 1948a; Čavdar levels II and III: Georgiev 1971).

According to a series of C¹⁴ dates (table 2.3) from Asmaška and Karanovo, the W/R phase of the Karanovo group (Karanovo I) ranges from 4950 b.c. to 4700 b.c. Karanovo II extends up to 4550 b.c. The Bln-293 (5353 ± 150 b.c.) and Bln-291 (5208 ± 150 b.c.) dates from Asmaška, are dismissed by the Berlin Laboratories as being from an oak tree which antedates the first settlement (Kohl and Quitta 1966, p.32-38). There are no radiocarbon dates for the Kremikovci sites, but on the basis of typological comparisons they are generally considered as being parallel with Karanovo I and Karanovo II (Vajsova 1966, p.10-11).

2.8 Summary

The first agricultural groups in the Balkan Peninsula appear in Greece, towards the end of 7th millenium. In the Thessalian region, villages with a fully developed farming economy but with a limited use of fired clay, are dated from 6100 b.c. to 5650 b.c. Undecorated monochrome vessels appear in larger quantities around 5650 b.c. A parallel development is noticed in north-east Peloponnese at the site of Franchthi, and at Knossos in Crete (fig. 2.4).

In central Greece at Elateia (Weinberg 1962), which provides us with the only secure stratigraphy of the area, the occupation sequence starts with a monochrome ceramic level. On the basis of two C¹⁴ readings (fig. 2.4), this phase is dated in the middle of 6th millenium. At Sidari in western Greece, the Neolithic sequence starts with a monochrome level which is dated, by a single date, at 5717 ± 120 b.c. (Sordinas 1967, 1969; fig. 2.4). This date is in accordance with the radiochronology from the immediately underlying Mesolithic level (level D: 5820 ± 340 b.c.), but the large standard deviation of this date greatly reduces its value.

Decorated vessels appear in the Early Neolithic Thessalian sites around 5450 b.c., and continue until 5200 b.c. when assemblages of the Middle Neolithic period (Sesklo painted pottery, A1 monochrome vessels) appear. The transition from Early to Middle Neolithic is not abrupt and consequently the date of 5200 b.c. can be used only as a general reference point.

The Early Neolithic levels of Nea Nikomedeia and Servia are contemporary with the Thessalian Decorated Phase. In south Yugoslavia (Amzabegovo, Vršnik, Veluška-Porodin) and south-east Albania (Vashtëmi, Podgorie) the earlier Neolithic sites excavated as yet, have a fully developed farming economy and their ceramic assemblages include a variety

of decorated vessels. On the basis of a series of C¹⁴ from Amzabegovo, Veluška and Porodin the earlier Neolithic settlements of south Yugoslavia and south-east Albania are dated around 5350 b.c. and 5200 b.c.

Early monochrome levels are reported from a number of sites in Serbia (e.g. Lepenski Vir, Divostin, Donja Branjevina, Drenovac etc.). As has been seen however, the relative ordering of monochrome and W/R strata is not based on clear stratigraphic data, and the existence of an Early Monochrome Phase remains to be confirmed by better documented assemblages. On the basis of a limited sample of C¹⁴ dates, the early occupation levels of the sites in Serbia and south-west Rumania could be dated as being between 5300 b.c. and 5100 b.c. This renders them contemporary with the Thessalian Decorated Phase, and the Early Neolithic levels of Nea Nikomedeia, Servia, Amzabegovo-Vršnik, Vashtëmi-Podgorie and Veluška-Porodin group.

In north-west Greece, levels with decorated pottery have been found at Asfaka (Higgs and Vita Finzi 1966) and Sidari. At both sites the decoration consists of impressions made in the leather hard clay. The two levels are dated by single C¹⁴ dates, to 5430 ± 240 b.c. and 5390 ± 180 b.c. respectively (fig. 2.4). On the basis of pottery decoration, Asfaka and Sidari are included in the Adriatic Littoral Complex (Sordinas 1969; Batović 1966). A large number of cave and open-air sites of the Adriatic Littoral Complex, such as Crvena Stijena (Benac 1957a; Benac and Brodar 1958), Zelena Pećina (Benac 1957b), Škarin Samograd (Müller 1988), Smilčić (Batović 1966), Blaz II (Prendi and Andrea 1981; Prendi 1990), are known from the Yugoslavian and Albanian Littoral area (fig. 2.1). Radiocarbon readings have been taken from three sites only: Gundja cave (Chapman 1982), Odmut cave (Srejović 1975) and Porkovnik (Brusić 1976). According to these dates (table 2.4) the sites are dated at the end of the 6th millenium.

The sites accompanied by C¹⁴ dates are probably not the very earliest. According to the sequence presented by Yugoslav archaeologists (Benac 1987; Batović 1966; Müller 1988) these assemblages are ordered at a later stage of development (Impressed B). Assemblages from the first stage (Impressed A) have been found mainly in caves such as Crvena Stijena, Jamina Sredi (Miroslavljević 1971) and the open site of Škarin Samograd. Except for the last site, pottery is associated with the remains of wild animals and a Mesolithic chipped stone industry. This sequence (Impressed A; Impressed B) is based on typological comparisons of the archaeological material, but has not yet been confirmed stratigraphically (i.e. the two phases being found superimposed in one site).

At Škarin Samograd, the level underlying the Impressed A stratum, has produced only a very small number of sherds (35 sherds: Müller 1988). They belong to monochrome undecorated vessels, which are compared by Müller with the Thessalian monochrome assemblages (Monochrome Phase). A single occupation level with monochrome, badly fired vessels, has been found at Vlush, in south-east Albania (Prendi 1990). The material is tentatively attributed to the Adriatic Littoral Complex, on the basis of surface finds from neighbouring sites. There are no C¹⁴ dates available for the Impressed A levels. However, the radiochronologies from Sidari (level C Base, with monochrome pottery: 5717 ± 120 b.c.; level C Top, with impressed vessels: 5390 ± 180 b.c.), point to an early appearance of the Neolithic in the Adriatic area.

A number of sites have been excavated in north-west Anatolia (fig. 2.1): Yarimburgaz (Özdoğan 1986), Ilipinar (Roodenberg 1987, 1990), Fikirtepe (Bittel 1969-70) and Pednik (Harmankaya 1983; Özdoğan 1983). On the basis of typological comparisons with the material from Ilipinar, which is accompanied by a long series of C¹⁴ dates (Roodenberg 1990), the early assemblages are dated around 5150 b.c. It should be noted however, that

at Ilipinar the earliest occupation levels have not been excavated yet.

The distribution of the Neolithic sites with the earlier radiochronologies is given in figure 2.6. In the same figure the chronologies of the Anatolian Neolithic sites are given in order to set the development of the Balkan Neolithic in a wider context.

CHAPTER 3

THE SITE OF NEA NIKOMEDEIA

3.1 Introduction

The site of Nea Nikomedeia is a low tell, c. 8-9 m above present sea level, in the alluvial plain of western Macedonia, in north Greece (fig. 3.1). The mound rises to a height of about 2 m above the surrounding plain (1.30 m of occupation deposits being below the plain level), and covers an area approximately 220 m (east-west) by 110 m (north-south). The Neolithic tell lies 8 km north-east of the modern town of Verroia, and is named after the nearby village of Nea Nikomedeia.

Information presented in this chapter is based on a number of articles concerning the excavations, the archaeological material, and the environment of Nea Nikomedeia. Supplementary data, as yet unpublished, about the excavation and the stratigraphy of the site were supplied by the excavator, R. Rodden.

In the following sections, information on the present day environment of the western Macedonian plain, and on the environmental conditions during the Neolithic occupation, is given. Then the development of excavations, the stratigraphy of the site and the pattern of the Nea Nikomedeia settlement are discussed. The presentation of the subsistence data collected from the site, is followed by a synopsis of the tool industry, figurines and other small finds.

3.2 Present-day environment

The plain of western Macedonia, where Nea Nikomedeia is situated, measures 50 km east-west and 39 km north-south (fig. 3.1). It is bordered to the north by mount Paikon, in the west by mount Vermion, in the south-west by mount Pieria and in the south and southeast by Therma gulf. The alluvial plain is intersected by several rivers, mainly Axios, Aliakmon, Galikos and Loudias. Until 1930, lake Yiannitsa occupied a large area of the plain; Nea Nikomedeia was situated on its western edge. This lake was artificially drained in 1929, enabling people to settle and cultivate the previously waterlogged soils. Before the reclamation much of the alluvial plain was marsh and seasonal grazing.

Nowadays, the lowlands are open, an almost treeless steppe. Descriptions of travellers in the 18th and 19th century (see Bintliff 1976) as well as the analysis of a pollen core from Yiannitsa lake (Bottema 1974; fig. 3.3) clearly demonstrate that this open landscape is the result of recent deforestation. A far more extensive woodland, especially of *Fraxinus*, existed in the area. Bintliff dates this major deforestation between 1850-1940 A.D. (Bintliff 1976).

3.3 Environmental conditions and location of Nea Nikomedeia, during the Neolithic occupation

Since the major deforestation and the drainage of lake Yiannitsa, the plain of Macedonia has lost most of its natural features. Before these changes, caused by human intervention, the action of the rivers had already dramatically changed the landscape since the Neolithic occupation. In fact, the alluvial plain of Macedonia is a very recent creation and as late as the 5th century B.C., a part of it formed an extension of the Therma gulf.

Research on the genesis of the plain of Macedonia had started by the end of the 19th century A.D. One of the basic studies was Struck's (1908), who was the first to suggest

that Yiannitsa lake was a modern remnant of a former inlet of the Therma gulf. In figure 3.2, Bintliff's (Bintliff 1976) reconstruction of the growth of the plain of Macedonia, from the prehistoric period until the beginning of the 20th century, is presented.

After the excavations of Nea Nikomedeia, a number of specialized studies (pollen analysis, stable isotope analysis of cockles and geomorphological studies) were concerned directly with the Neolithic settlement of Nea Nikomedeia. There are two, interrelated questions on which these studies give information. The first question concerns the original location of the site, in relation to the gulf of Therma. The second concerns the environmental conditions during the Neolithic occupation.

3.3.1 Location of the site

The question of the original location of Nea Nikomedeia in relation to the Therma gulf, has been addressed by a number of studies. In a preliminary report, Rodden (1964a) based on Struck's reconstruction of the plain of Macedonia in the pre-classical period and on the extent of lake Yiannitsa before the drainage, concluded that Nea Nikomedeia was a coastal site.

In 1974, Bottema published a pollen core (fig. 3.3) from the former lake Yiannitsa, taken 7.5 km north-west of the site of Nea Nikomedeia. The base of the core, at 11-12 m below present sea level, is occupied by a white silt. The same deposit forms the subsoil of Nea Nikomedeia, at 6 m above present sea level (Bottema 1974; Bintliff 1976). C¹⁴ dates from both locations place the white silt as the last formation laid down before the Holocene (see section 2.3 and fig. 3.3). At the time when Nea Nikomedeia was settled, 2 m of estuarine to shallow saltwater sediments had been deposited above the white silt of the Yiannitsa core, whereas only humus overlay the hillock marl of Nea Nikomedeia.

Calculating the sea level contemporary with the first occupation of the site to be between 6-9 m below the present day one, Bottema (1974, p. 147; see also Bintliff 1976,

p. 245) concludes that Nea Nikomedeia was located at the edge of the Therma gulf, at 14-17 m above sea level (Bottema 1974, fig. 9). According to this conclusion, Nea Nikomedeia was situated on top of a rather high cliff.

Bintliff's analysis however, argues against such an abrupt gradient of the landscape. Interpolating the surface of the white silt from Nea Nikomedeia, to the level of the silt in the Yiannitsa core, which was 3-5 m under the sea, a gentle gradient is produced from the upper plain of Nea Nikomedeia to the core (Bintliff 1976, fig. 4). The point of intersection between the slope of the land and the calculated sea level during the Neolithic period, locates the Therma gulf at 5-7 km from Nea Nikomedeia, showing that the Neolithic settlement was an inland site (fig. 3.2, A).

3.3.2 Reconstruction of the environment surrounding Nea Nikomedeia

The core from lake Yiannitsa offers valuable data about the environment of Nea Nikomedeia. The level Y1a of the core was contemporary with the Early Neolithic occupation of the site. Analysis of this level shows that the area found by the first farmers was covered with deciduous forest: "To the east and north-east, the forest gave way to swamp forest, gradually passing into *Tamarix* shrub and saline meadows, and at the edge of the water to halophytic plant communities including *Salicornia*. The landscape was intersected by small fresh water streams which formed small ponds or fresh water marshes. This made a mosaic of fresh water and saline habitats; a source of rich plant and animal life" (Bottema, 1974, p.148).

These data are supplemented by the results of the stable isotope study of the cockles found in the site (Shackleton 1970). Shellfish have a salt and brackish water nature, suggesting that their environment underwent seasonal freshwater inundations. These are indications of estuarine conditions with winter high flow of large rivers.

This picture of an area with a good cover of oak woods, is completely different from

that obtained from the pollen analyses of samples from the Early Neolithic culture levels, and the subsoil of Nea Nikomedeia. According to these analyses, Nea Nikomedeia was located in a predominantly open, unwooded land (Dimbleby 1962). Moreover, study of samples of carbonized wood from the Early Neolithic layer, suggested that the area surrounding the site was most probably covered by typical vegetation of the Mediterranean Maquis (Western 1962, p.276). Bottema considers that these analyses erred on sampling and conclusions (Bottema 1974, p.148). It should also be pointed out, that Dimbleby was cautious about the suitability of his samples as the disintegrated mud-walling, which comprises the bulk of the culture levels, is of secondary origin (Dimbleby 1962, p.274).

Data on the pedology of the area, are offered by Bintliff's studies (Bintliff 1976). Based on the absence of alluvium deposit from the stratigraphy of the site, and on the fact that the rapid eustatic ocean rise phase had only recently been in operation, Bintliff concludes that a small scale alluviation was limited to the area near the deltas of rivers Aliakmon and Loudias (fig. 3.2, A). So contrary to the modern territory, which is dominated by the heavy clays and silts of the drained lake Yiannitsa, during the Neolithic occupation most of the exploitation territory was covered with Tertiary and Quaternary lacustrine marls, sands, silts and travertines.

3.4 Excavations and stratigraphy

3.4.1 The development of excavations

The settlement of Nea Nikomedeia was first noted in 1958 by Ph. Petsas, Ephor of Antiquities of the area, when a large portion of the eastern half of the mound had been removed by local builders. In 1960 R. Rodden and G. Clark visited the site, and the subsequent excavations were undertaken during the summers and autumns of 1961, 1963, and 1964. Digging was restricted mainly to "the lower site", that is in the area revealed during the quarrying operations in 1958. The 1961 excavation was directed by R. Rodden and G. Clark. During the six-week campaign, two sections, "area L" and "cutting A", were opened (Rodden 1962; fig. 3.4).

"Area L" measures 10 m by 5 m. It was opened at the edge of the mound, above the quarried area, in order to attain a complete stratigraphy of the occupation of the site. In the 1962 publication, this trench is named "cutting B" (Rodden 1962). Cutting A was opened in the lower site. It is parallel to the vertical face (10 m) of trench L, and measures 24 m east-west by 8 m north-south (fig 3.4). It consists of 4 areas (area LI, LXI, XLI, LII) which were divided into 2 m square basic units, labelled A to E north to south, and 1 to 5 west to east (fig. 3.5, A). Only parts of these areas were excavated.

In 1963 work was resumed by Rodden (Rodden 1964b). Two areas of about half an acre in total, have been excavated. The first, measuring 32 m east-west by 50 m north-south, is the main excavated area and extends over a large part of the lower site, including that not completely excavated in 1961 (fig. 3.4). Here, complete plans of the houses and part of the settlement pattern were uncovered (fig 3.6). In order to define the eastern edge of the Early Neolithic settlement, trenches TX and TY were opened towards the periphery of the mound (fig. 3.4).

In the 1963 campaign, a different grid reference system was employed. The main

excavated area, was laid out according to 4 m square units, beginning at the southern edge with A1 to A8, followed south to north by B1 to B9, up to M4 to M8 (fig. 3.5, B). Various extensions to the south ($\Omega 6$ and $\Omega 7$), and to the west (C0, C00, D0, D00, E0), as well as two horizontal baulks, complete the basic grid.

Trenches TX and TY are parallel (fig. 3.4) and they measure a total of 8 m by 48 m. Each trench was divided into twelve 4 m square units (TX1-TX12, TY1-TY12).

Despite the long extension (TX and TY), the edge of the settlement had not been reached. For this reason during the 1964 campaign, the excavations were extended further to the north-east of the mound. Three trenches, TA, TB, and TC were opened (fig. 3.4). Trench TA measures 3 m by 12 m, TB and TC measure 8 m by 24 m. The edge of the settlement was reached in trenches TB and TC.

3.4.2 Method of excavation

The settlers of Nea Nikomedeia used as building material the white clay which was dug from the subsoil of the mound. As a result, any details of structures preserved in the deposit, appeared only as faint discolourations in the clay. The following method has been used for the excavation of these deposits.

First, the disturbed plough soil was removed over large areas at a time. Reaching the undisturbed surface, proper excavation was undertaken in approximately 20 cm thick horizontal spits, with frequent scraping. With the assistance of a high overhead tripod ladder any discernible pattern of possible features could be distinguished, drawn and photographed. The features that were clearly defined were sectioned and excavated.

Bulk finds were referenced by their square and spit designations. Small finds, features and burials were located horizontally to within 10 cm accuracy. Their vertical position was recorded by spit level or by stratigraphic association with particular features.

3.4.3 Stratigraphy of the site

Area L (Upper site, non-quarried area): In area L the sterile, uncontaminated bedrock was reached at 3.30 m. The overlaying cultural fill in the first 1.20-1.30 m is characterized by horizontally bedded, light fawn-coloured deposits, flecked with charcoal. The bulk of these deposits was formed by the disintegration of Early Neolithic structures. The overlying Late Neolithic deposits were 50 cm thick. They are generally slightly darker in colour with frequent traces of burnt rubble, sometimes concentrated in lenses. At a later date, the top of the mound served as a Christian cemetery; more recently the higher deposits were disturbed by the excavation of deep bell-shaped storage pits, and by modern deep ploughing.

The Late Neolithic deposits were disturbed by the subsequent occupations of the site. The main discernible feature from this period is a massive ditch, 1.5 m deep and at least as broad, running across area L, and cutting into the underlying Early Neolithic deposits and virgin soil (Rodden 1964a). The ditch also intersects the Early Neolithic deposits of the lower site as well (fig. 3.6, excavation squares H-J).

The material from the Early Neolithic deposits from area L is similar to the material from the lower site, but a correlation between the two sites (upper and lower site) was not possible. The excavated squares of the lower site did not correspond with the area L excavations, in terms of continuous sections between the upper and the lower sites (Rodden per. comm.).

Lower site (Quarried area): The undisturbed deposits of the lower site are 20 cm to 60 cm thick. They were divided into three, 20 cm thick, spits; the upper artificial layer being spit 1, the middle spit 2, and the lower spit 3. Thicker deposits (1 m) were reached in the easternmost trench TA. The thickness of each square from the main excavation grid, is given in table 3.1.

Whereas the Early Neolithic deposits of area L refer to a single cultural phase, the excavations in the lower site have revealed the existence of two Early Neolithic building periods. The foundation trenches and wall-slots of buildings belonging to the primary settlement are overlaid by later structures, at a slightly different orientation. The two building periods seem to have followed relatively closely, because there are no marked stratigraphic breaks in the accumulation of deposit (Rodden R and Rodden J. 1964, p.564).

In the main excavation area, structures of the Second building phase are restricted in the upper spit (spit 1) and in the spit 2 of three excavation squares: B8/2, C00/2 and D00/2. As evidence of flooring is scarce, the finds from the Second building period are usually mixed with those of the First period. Material possibly from only the Second building phase has been found in squares C00/1, D00/1, C0/1, D0/1, C7/1, C10/1.

3.5 Early Neolithic settlement

3.5.1 Size of settlement

The mound of Nea Nikomedeia covers an area approximately 220 m x 110 m (2.4 hectares). During the excavations an area amounting to 8% of the mound (1934 m²), has been revealed. Almost 3/4 of this, are covered by the main excavation grid.

Architectural remains from the Early Neolithic occupation have been found in all excavated trenches and, in most cases, they continue under the body of the mound. Moreover, extensions TB and TC show that the Early Neolithic occupation extended up to the eastern edge of the mound (fig. 3.4). However, since no further soundings have been made in other areas of the site, the overall extent of the Early Neolithic occupation is not known.

Information on the size of other Neolithic settlements is very limited. Renfrew

(Renfrew C. 1972), based on a rather small sample of six Greek Neolithic sites, suggested that settlements are typically 0.4-0.8 hectares in extent. Later excavations and surveys in two of these sites (Sesklo and Dimini) indicate a far more extended occupation. At Sesklo, the connection between the Akropolis settlement (settlement A) and the lower site (settlement B), is not clear yet (Kotsakis 1984), but Theocharis (1973, p.60-66) reports a scatter of archaeological material over an area of 8-10 hectares. At Dimini, architectural remains cover an area of 3 hectares, but finds are reported over a larger radius (Chourmouziadis 1979a, p.51).

Estimation of the size of a larger sample of Neolithic sites, known from French's surveys in east Thessaly, suggests that settlements were usually less than 1 hectare in extent (Halstead 1977). A similar range is implied by the rather limited data on the size of Yugoslavian FTN sites (Chapman 1981, p.48; for Pelagonian sites see Simoska and Sanev 1976, p.10-11). In Bulgaria the site of Asmaška (Karanovo I), which was excavated completely, covers an area of 0.5 hectares, but the contemporary Karanovo settlement encompasses a larger area (2.5 hectares: Fortier 1981, p.280). Similarly, the settlements of Amzabegovo and Knossos were covering, since the Early Neolithic period, a much larger area (Amzabegovo I: 4.76 hectares: Gimbutas 1976, p.37; Early Neolithic Knossos: 2 hectares: Evans 1971, p.109-11). Moreover, large sized-settlements are common among the Vinča sites (Chapman 1981, p.43-46).

3.5.2 Pattern of settlement

In both building periods the pattern of settlement is one of detached and individual rectangular structures, which have an approximately east-west orientation (fig. 3.6). Present day houses in the near-by villages are in the same direction in order to avoid the northerly winds coming down the valley of Axios (Rodden 1972). Houses of both settlements do not seem to follow any organized pattern and clear-cut paths or alleys are

absent. Instead, structures are built at random with passages of varying width left between them. The Neolithic settlements at Sesklo (Settlement A and B: Theocharis 1973, fig. 176) follow a similar pattern, although the individual structures are more closed spaced.

A more organized communal plan is presented by the Bulgarian settlements of Asmaška, Karanovo, Gradešnica, Slatina and the site of Knossos in Crete. The closely spaced structures of these settlements are arranged in parallel rows, with definable pathways separating them. At Karanovo and Kremikovci, an intersection of two pathways has been revealed (Fortier 1981, p.336).

A common characteristic of both Early Neolithic settlements at Nea Nikomedeia is the large number of pits found inside and outside the houses. They show a variation in shape, size and depth. According to the excavator, many of them were originally dug in order to obtain clay for the construction of houses, and subsequently served as storage or rubbish pits. Some of them were used for burials.

3.5.3 First building period

Attributable to the primary building period, in the main excavation grid, are five houses. The larger, central building (fig. 3.6, squares G-C4, F7-C6) is a square structure, measuring 12 m on each side. Internally, it is divided into three parts by two rows of very large oak posts. In the burnt-rubble fill above the floor of this structure, five female and one animal figurine were found. Three of the female figurines were found close together, in square F6, lying in pieces on the floor, as if they had fallen from a table or shelf when the building caught fire (Rodden R. and Rodden J. 1964, p.604). Discovered with them were two large axes made from nephrite, each measuring 20 cm in length, two askoi, several hundred clay roundels, and several caches of unused flint blades. Each cache contained up to four hundred blades. Elsewhere in the building, two other female figurines were found.

Nearer to the centre of the mound, in the westernmost part of the excavation (fig. 3.6, E-D00, D2-C1), another large house has been found. It was 8 m wide and at least 11 m long; its full length could not be determined as it continued under the body of the mound. Outside its north wall, two ovens, three storage pits and one rubbish pit have been found. The area with these features, was delimited on north and north-west by two rows of posts meeting at a right angle (fig. 3.6, C0-C1). The size (20-30 cm in diameter) and depth of the post holes (up to 60 cm deep), indicates that this was a fairly permanent, roofed structure.

The remaining houses are smaller. Two of them are single roomed structures, measuring 8 m x 8 m. The third building (fig. 3.6, B-A6, B8-Ω7), is 6 m broad and 8 m long. This is the best preserved structure uncovered in Nea Nikomedeia, since this area was not overlaid by buildings of the Second building period. It consists of two rooms: a main central area and a narrow room along the east side. In the north end of the narrow room, a raised plaster platform with a hearth and a bin has been found. The opposite end of the house is occupied by a fenced-off porch area, where five complete pottery vessels were recovered.

In the south-west corner of the grid, a pair of walls has been revealed (fig. 3.6, A1-C2, C2-C4). The nature of this structure is not clear; one wall continues under the body of the mound, and the other ends at square C4.

3.5.4 Second building period

The central building is rebuilt after being destroyed by a fire. It has the same size as the old one, and occupies approximately the same area (fig. 3.6, F-D3, F-D6). The separation into three sections was also preserved, but the new building has a large central room and two side aisles on the north and south sides respectively.

The new houses, one and two-roomed structures, follow a slightly different orientation

than the older ones. One-roomed structures are similar in shape to those from the first settlement. A well preserved two-roomed structure was found in the north part of the main excavation grid (fig. 3.6, K4- M5, K5-J7). The two square rooms have almost the same dimensions, 8 m x 8 m, but the eastern room is less substantially constructed. This arrangement is different from the plan (one large main room and a narrow room along one side), presented by the two-roomed house of the First building period.

During the Second phase of occupation, many houses were rebuilt. As the excavator does not mention any evidence of a general rebuilding of the site during the Second phase of occupation, and as the materials and methods of construction were the same in both phases, it seems that the Second occupation of the site was more prolonged than the First phase of occupation.

3.5.5 Method of construction

In both building periods the same construction methods were used. Walls consisted of a framework of oak posts, ranging 8-30 cm in diameter, with reeds woven between them. On the inside surface they were plastered with mud mixed with chaff and on the outside with white clay. Foundation trenches both for the walls and for the roof supports were deep (35-60 cm). They were usually lined with clay-marl which was left to dry in the sun, before the walls were built.

In some houses, opposing pairs of internal buttresses have been used in order to support the roof. Such buttresses reinforced the central section of the central building (Second period), and the long walls of the large house found in the westernmost part of the excavation (fig. 3.6, E-D00, D2-C1). Floors were made of broad-leaved marsh grasses or reeds laid onto the clay sub-soil. The surface of this "matting" was mud plastered. Remains of the roofs have not been preserved. The excavator assumes that the houses had peaked and thatched roofs with overhanging eaves which carried the rainwater away from

the mud-plastered walls (Rodden 1972, photo. in p.87).

3.5.6 Burials

Graves were found outside the walls of the houses, and occasionally in the debris of buildings which had fallen into disuse (Rodden R. and Rodden J. 1964). They do not have a consistent shape, and grave goods are absent. The skeletons were found in a variety of contracted or flexed positions; in one case a pebble had been thrust beneath the jaws of one skeleton (Rodden 1972, photo. in p.90). There were only two exceptions to the custom of single burial: in the first case an adult was buried with two children; the second grave contained three children.

Study of the skeletal remains shows that a great percentage of the population suffered from hyperostosis caused, according to Angel, by malaria (Angel 1966 and 1973). Of the adults, 36% had slight hyperostosis and 32% moderate; of the children, 40% had slight, and 16% severe. Moreover, a number of people suffered from arthritis (Angel 1971). It seems that both hyperostosis and arthritis were common diseases during the Neolithic period, since examination of skeletal remains from other Neolithic settlements, has given similar results (Treuil 1983, p.349-350).

The rate of population increase at Nea Nikomedeia was about 16% per generation and as estimated from changes in the female pelvis, due to the stress, there were about five pregnancies per woman. The average longevity for men was estimated to be 31 years, and for women 30 years (Angel 1971, p. 80-82).

3.6 Economy

During the three seasons of excavations a large number of faunal and floral remains have been recovered from the Early Neolithic levels. In the 1963 campaign alone, over 2000 carbonized grains and 25000 animal bones have been collected. No sieving or flotation in water has been applied; in all seasons the remains were collected when they were observed with the naked eye. The botanical sample from the 1963 excavation has been studied by Zeist and Bottema (1971); the faunal remains are under study, by S. Payne. So far, information on the faunal remains from the site is based on the preliminary analysis of a small sample, collected during the 1961 campaign (Higgs 1962).

According to this analysis, the inhabitants of Nea Nikomedeia relied for meat mainly on domesticated animals (amounting to 96% of the animal bones; table 3.2). The sample of wild animals includes deer, hare, which is commonly represented, and probably wild goat. Bird and fish remains are not uncommon, but only a few saltwater cockles (*Cardium edule*, *Cerithium vulgare*) and freshwater mussels (*Unio crassus*), are present. The remains of one tortoise have also been found.

Among the domesticated animals, the sheep/goat group form the great majority (66% of animal bones). Cattle and pig amount to 13% and 15%, respectively. Only one radius fragment of a canid has been found. It should be stressed that the small sample of faunal remains did not offer definite proof that the bovine bones belong to domesticated cattle. As indirect evidence of their domestication, Higgs considers the fact that half of the bones indicating age belonged to immature animals (Higgs 1962, p.272-3).

The Nea Nikomedeia fauna is very similar to those of the other Early and Middle Neolithic sites of Greece, south Bulgaria and south Yugoslavia (table 3.2). In all settlements there is a great disparity between wild and domestic remains. Similarly, all samples are dominated by sheep and goat remains. A considerably different subsistence

pattern emerges from the faunal remains of Lepenski Vir III and Padina B, situated in the Iron Gates, and Biserna-obala, near Subotica. At these sites, animal protein was obtained by hunting and fishing whereas animal husbandry was of minor importance (table 3.2).

The botanical remains from Nea Nikomedeia were dispersed in the cultural debris in varying concentrations. The carbonized seeds consist mainly of emmer and naked two-row barley; einkorn wheat is present in smaller quantities (table 3.3). Lentils were found in large numbers suggesting that this pulse played an important part in the diet of the inhabitants of the site. Pea and bitter vetch were also grown. Collecting of wild fruits and seeds is attested by the presence of acorns and of fruit stones of *Cornus mas* and *Prunus cf. spinosa*.

According to Bintliff's reconstruction of the geomorphology of the region, most of Nea Nikomedeia's exploitation territory was under Tertiary and Quaternary marls, sands, silts and travertines. These fertile, well-drained soils are retentative of nitrogen and seasonal rainwater through the dry season, and they are easily cultivated with simple hand tools (Bintliff 1976, p.252).

Botanical samples from other Early and Middle Neolithic sites, show that a very similar spectrum of crops was cultivated (table 3.3). Samples from southern Bulgarian settlements, collected under controlled conditions (Dennell 1978), indicate that emmer, barley and vetch were each cultivated as separate crops (each associated with characteristic flora). At Nea Nikomedeia, relatively few seeds of vetch have been recovered, so it is not clear whether this species was grown intentionally or whether it occurred only as a weed, particularly in lentil fields (Zeist and Bottema 1971).

Dennell on the basis of the associations of cultigens, weeds and commensals present in the botanical samples, has suggested that a rotational cropping system of pulses and cereals was practised by the farmers of the south Bulgarian sites (Dennell 1978, p. 91-3,

122). A similar system has been suggested for the Thessalian sites (Halstead 1981, p.319-20), where pulses and cereals were being grown, as in Nea Nikomedeia, in similar quantities. Apart from increasing the amount of food produced per unit of land, rotation has the advantage that pulse crops enhance the nitrogen status of the soil.

3.7 Synopsis of finds, apart from pottery

3.7.1 Tools

A large number of stone and bone tools was found during the excavations at Nea Nikomedeia. So far, only a preliminary study of a small sample (47 specimens) from the 1961 excavation, has been published (Rodden 1962, p.276-80).

The chipped stone industry was based primarily on the production of blades, which amount to 4/5 of the sample. Most of them were intentionally broken into sections, and utilized as blade segments. In some instances, the notch and micro-burin technique was used (Rodden 1962, fig. 6, F7). Flake tools include few scrapers, utilized and retouched flakes (Rodden 1962, fig. 6, F15-16).

Blades usually have an irregular edge-flaking (Rodden 1962, fig. 6, F1-4), but some examples with fine denticulation along one or both edges, have been found (Rodden 1962, fig. 6, F5). A number of blade segments with oblique silica gloss across the upper corner, could most probably be interpreted as sickle-insets (Rodden 1962, fig. 6, F8-10). A few geometrical, triangular and trapeziform, arrowheads have also been found (Rodden 1962, fig. 6, F13-14). Flake tools include utilized and retouched flakes, and a few scrapers.

Chipped tools were made from locally available raw materials (flint, chert and quartz). The absence of any evidences of knapping activities within the limits of settlement, indicates that blades were worked at temporary workshops near the source and were brought to the village to be made into tools (Rodden R. and Rodden J. 1964, p.605).

Polished stone implements include small flat celts, trapezoidal in outline, and long chisels (Rodden 1962, fig. 7). The tools were made from marble or nephrite. The ground stone assemblage includes hammerstones, saddle querns and mortars. They were made from local basalt, schist, granite, sandstone and limestone.

Among the bone tools, awls were the most common type (Rodden 1962, fig. 8, B2); bevelled or chisel-ended tools, needles and spatulae are also present (Rodden 1962, fig. 8). During the 1963 excavation, four unbarbed fish hooks have been found. Almost all small tools were made from fire-hardened splinters or broken pieces of long bones, mainly of sheep or goat.

3.7.2 Figurines

In all, 113 pieces have been found, seven of which are whole figurines. The material has been studied by Nandris (1968). The great majority of the sample belong to female standing figurines; seated or reclining figures are only occasionally modelled. Male representations are rare. Additionally, few rod heads and animal figurines have been found. The three frogs, carved in nephrite (Nandris 1968; Theocharis 1973, fig. 218), are the only stone figurines found in the site. A number of vessels have human faces and silhouettes, and animal snouts modelled just below the rim (see section 5.4.3).

The female standing figures have their upper torso flat, with arms usually bent at the elbow and hands supporting small breasts (Rodden 1972, fig. in p.88). In the lower body there are slight indications of pregnancy, and the thighs are highly rounded. Facial features usually shown, are nose and eyes; a fan-shaped head dress has been noticed on a number of figurines (Nandris 1970, p.208).

3.7.3 Clay objects and objects of personal ornament

The remaining finds from Nea Nikomedeia can be grouped into two broad, sometimes overlapping, categories: small clay objects, and objects of personal ornament. Pottery, unearthed in large quantities, is presented in Chapters 4, 5 and 6.

Clay objects: In this category, loom-weights, spindle whorls, stamps and slingstones are included. Loom-weights are conical in shape and they have a suspension hole near the top. Their function was to keep in position and give tension to the warp threads of an upright warp-weighted loom. Spindle whorls are made from rounded potsherds with a hollow at the centre (fig. 5.24, 13). Impressions of matting on the bases of vessels, could give some indication of the techniques used in weaving. Of the thirty-one examples, twenty-eight were of close twine, and one of twill (Rodden R. and Rodden J. 1964, fig. 9-10). The remaining examples show reed-like strips strewn on the floor, with no evidence of interlacing.

Clay stamps-seals are common at Nea Nikomedeia. Some fifty fragments have been found, eleven of which are from the Early Neolithic levels. They exhibit a variety of geometrical designs, completely different from those seen on vessels, ranging from simple or multiple zig-zag lines and spirals to complicated interlocking meanders (Rodden 1972, fig. in page 86, d; Theocharis 1973, plate 116). It seems that these patterns have a long duration in time, since in some cases stamps from the Early and Later Neolithic strata share the same motifs.

Objects of personal ornament: In this category small finds such as beads, perforated shells and stone studs are included. Beads were made either from bone or polished marble and nephrite. They are usually hemispherical in shape, with two hourglass perforations in the upper edge (Rodden 1962, fig. 11, F6). The two complete necklaces found at the site, are made from perforated shells. One of them consists of 27 cockle shells and the other

of 16 very small, fusiform shells.

A large number of stone studs, made from marble or nephrite, has been found at Nea Nikomedeia (Rodden 1962, fig. 11). All specimens are polished and show a high level of technical competence. Stone, and less often clay studs, show a wide spatial distribution. Examples are known from Near Eastern sites (Jarmo, Hassuna, Amuq, Hacilar), Greek and some FTN settlements (Nandris 1970, fig. 2). In Greece, they are restricted mainly to the Thessalian region, where they are present since the Pre-pottery levels (Theocharis 1967, plate XI,XII; Wijnen 1981, fig. 14). The excellent workmanship of the studs, their material and the time involved in their manufacture, imply that they were objects of high value. On the basis of information from Neolithic figurines, studs are considered as personal ornaments (i.e. head-dress decoration and ear-plugs: Rodden 1962, p.285; lip-plugs: Nandris 1970, p.198).

CHAPTER 4

TECHNOLOGY OF NEA NIKOMEDEIA VESSELS

Analysis and Comparison with other Neolithic Ceramic

Materials

4.1 Introduction

Information on the technology of the Nea Nikomedeia vessels was obtained by three methods: macroscopic examination, microscopic analysis, and a refiring test.

Macroscopic examination: During macroscopic examination the fabrics used for the manufacture of the vessels were separated into different groups on the basis of colour and hardness of clay, the amount, type and size of non-plastic inclusions. Sherds were carefully examined for any marks left from the manufacturing techniques and for information on the method of attachment of lugs and bases. Cross sections and surfaces of vessels were examined in order to ascertain the firing conditions. The method followed in the macroscopic analysis, is described in Appendix A.

Microscopic examination: A number of sherds were selected for further analysis, at the Institute of Archaeology. The following analyses were undertaken: petrographic study of fifty four thin sections (table 4.1) and analysis of four thin sections with the scanning electron microscope (table 4.2).

The aim behind the petrographic examination was to confirm information on the technology of vessels obtained by macroscopic examination, and to relate to provenance studies (see section 4.6.2). The procedure followed in the examination of thin sections,

is described in Appendix A.

Thin sections were taken from all fabric groups distinguished by macroscopic examination. They were examined with a polarizing microscope, and their major categories of non-plastic inclusions were identified. Much information on clay preparation was obtained by examining the size and contour of non-plastic inclusions. The presence and nature of surface coatings was investigated.

By using a detailed geological map of the area, the author was able to compare the non-plastic inclusions present in the clays, with the local rock outcrops. This comparison gave information on the availability of the non-plastic inclusions in the surrounding area.

The composition of red-brown slipped sherds was the main objective for the scanning electron microscope analysis. A number of sherds was refired (table 4.3), under oxidizing conditions, at 800° C for 40 minutes. The refiring test was carried out in order to establish whether the pink coating was applied before or after firing. Brown and red-brown sherds were also refired, for checking their reaction in firing under oxidizing conditions.

This Chapter can be separated into two broad parts. The first part is concerned with the description of manufacturing techniques, surface coatings and firing of the vessels. The second part starts with the presentation of the fabrics used for the manufacture of the vessels. Then questions concerning the origin of the non-plastic inclusions, addition of temper and refining of the clay, are discussed. In every section, a comparative description of technological aspects from other Greek, and FTN sites is included.

4.2 Manufacture of vessels

The vessels from Nea Nikomedeia were carefully finished, hence marks of the primary manufacturing techniques were usually obliterated by subsequent treatment. From the large sample studied, only an extremely small number of sherds have such marks. Apart from two miniature vessels which were fired without being scraped, marks of primary manufacturing techniques are restricted to the interior surface of the vessels. Sherds with fresh breaks can give information on the manufacturing techniques used, and on the method of attachment of later additions such as bases and lugs.

Macroscopic examination has shown that two primary manufacturing techniques were used: coiling and pinching.

4.2.1 Coiling

The majority of coiling marks are found on rim sherds (20 sherds); only one base and one body sherd with lug are included in the sample. In all cases two or three superimposed coils, 10-20 mm wide, can be clearly seen on the interior surface of the sherd (photo. 4.1).

Coils were thoroughly connected to one another, i.e. no traces of division between the coils were visible. This is attested by the rarity of sherds with horizontal fracture along the smooth junction of coils. In all, only two such sherds have been found. Such breaks show a smooth central surface with tails protruding on either side of the clay. These tails are the result of scraping the vessel and smearing the clay (Vitelli 1984, p.119).

Coil building may be detected in thin sections, the most obvious signs being join voids resulting from inadequate bonding (Woods 1982b, photo 22). Orientation of inclusions may also be indicative of the manufacturing techniques (Woods 1984). Despite the careful examination of the thin sections, coil joins were not present, nor was the orientation of inclusions diagnostic.

4.2.2 Pinching

Evidence that pinching was used as primary manufacturing technique, comes from two miniature beige, unslipped vessels. Both vessels were left unscrapped, so that their surfaces are marked with adjacent grooves (photo. 4.2). In one of them, impressions of finger nails are visible on the interior wall. Since the pots were not properly finished, they were less adapted to stand the firing. One of them was cracked vertically into two parts; one exterior and one interior.

Despite the fact that these miniature vessels were the only examples with pinching marks it seems probable that pinching, a simple and fast manufacturing technique, was more widely used. The paucity of sherds with manufacturing traces, can be explained by the fact that pinching marks are more easily obliterated than those left by coiling (Shepard 1956, p.184).

Ethnographic research has shown that pinching is a widespread method, used for the manufacture of whole pots or for the modelling of the lower part of larger vessels; the upper part being made by coiling (Rye 1981, p.70). It seems that a similar process was used by the Nea Nikomedeia potters. This is suggested from the fact that coiling marks were found only in one base sherd, in contrast with the 20 rim sherds which had such marks.

Technological analysis of the pottery from other sites has shown that, both coiling and pinching were known, and were mainly used in combination, for the manufacture of the Neolithic vessels. Among the sites where the combination technique was used for vessel manufacture are Early Neolithic Sesclo (Wijnen 1981), Middle Neolithic Sesclo (Kotsakis 1981), Middle Neolithic Lerna and Franchthi (Vitelli 1974). Coil built vessels are reported from Amzabegovo (Gardner 1976) and from many Karanovo-Kremikovci sites (Fortier

1981). During examination of the Early Neolithic material from Servia and Vršnik, sherds with coil marks have been found, by the present author.

4.2.3 Mat impressions

A number of the Nea Nikomedeia bases have mat impressions on their exterior surface. These impressions could have been made when the finished vessels were left to dry on mats. Alternatively, such mats could have been used for supporting and rotating the vases, in order to facilitate their building (Vitelli 1984, p.119; Rye 1981, p.63). This is because when a pot becomes too large to be shaped in the potter's hands, it has to be set on a surface. Porous surfaces, such as mats, are preferable because when a pot is rotated against a hard plane, its bottom is weakened by friction and may crack or bend. Similar mat impressions have been found at a number of sites: Early Neolithic Servia (Wijnen 1979), Amzabegovo I & II (Gimbutas 1976, fig. 64), in sites from the Veluška-Porodin complex (Simoska & Sanev 1976, fig. 59 and fig. 58), at Sitagroi (Renfrew 1973, fig. 122).

4.2.4 Scraping

After the primary building had finished, the pots were scraped. Scraping marks are present in only a few sherds. These are series of parallel lines, sometimes forming adjacent groups with different orientation. Despite the rarity of these marks, scraping is recognized by the quality of contour and the uniform thickness of the vessels walls. Pots were scraped when they were still plastic: grit drag-marks, formed by dragging grains with a scraping tool on a hard clay surface, are absent. Scraping can be done with smooth-edged tools such as bone and wood, hard-edged tools such as pieces of flint or other rocks, or with a toothed or serrated device such as shell or pot-sherd (Rice 1987). Some of the scraping marks, seen on the Nea Nikomedeia vessels, look as though they

were made with a comb-like tool, probably shell or fragment of another pot.

Ethnographic research has shown that the paddle and anvil technique is sometimes employed to complete the union of coils. This technique produces overlapping or closely spaced depressions, left by the anvil, on the interior of the pot (Rye 1981, fig. 70). Such marks were not present in the Nea Nikomedeia vessels and it seems that this technique was not used by the potters, unless the characteristic depressions were obliterated by subsequent scraping.

4.2.5 Application of bases and lugs

The majority of Nea Nikomedeia vases have ring or flat bases; only few of them are round bottomed (fig. 5.21-5.23). After the vessel was built, a round base was modelled by scraping the excess clay and smoothing the surface. Some flat and a few ring bases were modelled in a similar way.

Most often however, for the manufacture of ring and flat bases, a disk or a coil was added to the bottom of the vessel. These additions are visible in many broken sherds (photo 4.3). The coil was restricted to a number of well made and easily distinguished ring bases, whereas the disk was encountered in both flat and ring bases. Actually, it is this disk which is modelled in order to make a ring or flat base. The fact that the disk is thicker than the bottom of the vessel, suggests that it was added partly for modelling the base, and partly for strengthening it in order to sustain the weight of the vessel. All three methods described above (smoothing, addition of coil or disk), were encountered even in the earlier pots from Thessaly (Wijnen 1981) and Peloponnese (Phelps 1975).

Lugs were applied as rounded thick bulbs of clay which were pressed on to the surface of the vessel. Additional wet clay was smeared on to cover and seal the joint. The bulb was then pierced. In all pots, lugs were made from the same fabric used for the manufacture of the whole pot.

For the larger lugs, extra precaution was taken to secure them safely on to the body. An oblong plug was added to the bottom surface of the lug, which went through the wall of the vase (photo. 4.4). In all, five such examples have been found. This method of lug attachment was not widely used in other Neolithic sites. The only known example, is a handle found in Elateia (in the stratum with early painted pottery: Weinberg 1962, p.175). Such "thrust handles" are known from the Early Bronze Age in Greece and Anatolia (Weinberg 1962, p.175).

Lugs were added after the vessels have been scraped. This is attested from the pots in which lugs have broken off the body, at the point of attachment. In such pots, the surface below the lug, is well smoothed. Bases were also added at a similar stage (after scraping).

After the addition of lugs and bases, the unslipped pots were burnished so as to acquire the characteristic compact and smooth surface. They were burnished when the surface was still yielding but not too plastic. This is apparent from the fact that the medium and large sized inclusions are usually levelled on the surface, being visible only in the fresh breaks. Troughs, made from the burnishing tool, are rarely visible.

4.3 Surface coating

Two different surface coatings were used by the Nea Nikomedeia potters: red-brown slip and pink coating. Their characteristics are described below.

4.3.1 Red-brown slip

The red-brown slip adheres well with the body since flaking or peeling is almost absent. Generally it has a sufficient covering power to conceal the body, but vessels with a thin slip (wash), are also present. Slipped surfaces are carefully finished as no runs are visible, and the margin line of the slip, on the interior surface of closed pots, is more or

less regular. Fine grooves produced when the slip is applied by wiping, are absent. So the slip was applied either by dipping or pouring. Since dipping allows more control over coverage (Rye 1981, p.41), it seems that this was the most widespread method, with pouring limited to the larger vases. After the application, the slip was burnished.

In all thin sections of red-brown slipped sherds, the slip appears as a straight, fine grained line, of uniform thickness in a single sherd (photo. 4.5). It has a distinctive difference in colour from the underlying body and there is a clear demarcation between body and surface. The slip of painted sherds has a similar appearance under the microscope.

Variation in colour: Red-brown slipped vessels show a great variation in colour, from one pot to the other. Colours range from red through red-brown, to brown; the lighter shades being more common. The Munsell Soil Colour Chart notations are given in table 4.4. These differences in colour could be the result of using different slips, or the result of firing the vessels under varying conditions. Thus, the brown colour of a slip can be attributed either to manganese, which acquires a brown colour when fired, or to iron oxides fired in a non oxidizing atmosphere (Shepard 1956, p.39).

In order to clarify this, three thin sections were examined with the SEM. Two of the sections belong to red coloured sherds, the third comes from a brown pot. The results of the analysis are presented in tables 4.5-4.7. As can be seen, red and brown slips have the same composition, and the amount of manganese is negligible in all cases.

To verify the above, brown and red slipped sherds were refired in oxidizing conditions for 40 minutes at 800° C. After the refiring, all sherds had a clear red colour, and it was impossible to distinguish the previously brown sherds. It seems safe then to conclude, that brown and red sherds were coated with similar slips; the difference in colour being the

result of firing. Since there is a great variation in shades from one pot to the other, it seems that these differences were the result of varying conditions from one firing to the other, rather than being intentional attempts by the potters to produce light red or darker vessels.

The slipped surface of each vessel is fairly uniform and consistent in colour, although some darker or lighter spots, due to firing clouds, are present. A few sherds (1% of red-slipped sample) however, show greater variation in colour. The exterior surface of each sherd appears red, light brown, dark brown and black at places. The interior surface has either the same mottled appearance, or its slip has one of the exterior shades.

It is difficult to determine if this variation was intentional. The different coloured patches are mixed and they do not follow any decorative pattern. It should be noticed however that such variations, on a single vessel, are absent among the other wares (i.e. pink coated, painted, impressed and uncoated vessels).

This group of sherds should be differentiated from the characteristic "variegated" or "buntpolierte" vessels, which are commonly found in the Thessalian sites (Chourmouziadis 1971a, fig. 26d and fig. 25b). These vessels have triangular, tongue-like and other decorative motifs, which have been made by covering parts of their surface during firing. The mottled vessels from Nea Nikomedeia appear buff and monotonous, when compared with these Thessalian examples.

A final remark should be made about the red-brown mottled vessels. These, in the 1962 report (Rodden 1962, p.284), were referred to as "brown, self coloured, burnished ware" (group E in Rodden's classification). During the fieldwork it was not easy to distinguish, by macroscopic examination alone, whether these vessels were slipped or not. Their surface was covered in large parts by firing clouds. For this reason, a number of

thin sections were examined with the polarizing microscope. All examined sections were slipped.

Preparation of slip: Analysis of the three thin sections with the SEM has shown that slips have a significant clay content (table 4.5-4.7), in contrast with the small amount of iron oxide. The clay matrix of one sherd, made from fabric B-1 (see section 4.5.3), was also examined (table 4.8). The amount of iron oxides present in the matrix, is comparable with that found in the slip (9% in the slip; 8.2% in the clay matrix). This suggests that the slip was made from a ferruginous clay, similar but more fine-grained than that used for the manufacture of the pot. Fabric B-1, when fired, acquires colours ranging from brown-beige to red-brown. Since no colouring material has been added to the slip, the difference in colour between slip and clay matrix can be explained as resulting from the fine particle size of clay minerals and other inclusions in the slip. Moreover, the iron oxides present in the slip, were better oxidized during firing, and acquired clearer colours.

No other clay matrix was examined under the SEM. However, petrographic analysis has shown that all clays used for the manufacture of Nea Nikomedeia vessels, are highly ferruginous. It is probable then, that it was a general practice for the slip to be made from clays used for the manufacture of the vessels, without the addition of colourings. Use of a slip which does not contain added colorant is not uncommon (Shepard 1956, p.67).

Red-brown slips contain mica grains. Their amount however, is not constant in all vessels. Almost 80% of the studied sherds have slips with a few mica grains. The remaining sherds are coated with a mica dusted slip which has a glittering appearance.

There are two alternative explanations for the presence of plentiful mica in the micaceous slip. Either ground mica was added to the slip, or mica occurred naturally in

the raw material used for slip. Taking into account the suggestion, that slip was made from the same clays used for the manufacture of vessels, one would expect the clay used for the manufacture of pots with the micaceous slip, to be richer in mica. Comparative study of thin sections of sherds with micaceous and non-micaceous slip, has shown no differences in the amount of mica present in the clay matrix (n.b. this study is based on an estimation of the inclusions present in the matrix, and not on a point count analysis). Thus, the addition of ground mica seems to be the most probable explanation. Judging even from broken sherds, the addition of plentiful mica had a highly decorative effect.

4.3.2 Pink coating

In all thin sections of pink coated sherds, the pink coating appears as a thin irregular line of non-uniform thickness (photo. 4.6 and photo 4.7). The coating consists of rounded and subrounded dark red particles of varying size, connected with a "fluid", fine grained paste, most probably clay. Apart from the rounded particles and the clay, the coating looks free from other inclusions. There is not a distinct demarcation between body and surface. Instead, the red particles are pressed into the matrix, making grooves in it.

According to the ceramic literature, slip is a suspension of fine clay particles in water, with or without the addition of colouring material (Shepard 1956, p.67; Rye 1981, p.41). Seen under the microscope, slip appears as a line of uniform thickness, with no obvious particles of the colouring material, but with a clear demarcation line between surface and clay matrix (Woods 1982b, p.16, photo. 28). Although the red-brown slip compares well with this description, it is clear that the pink coating cannot be identified as a slip. In fact, the features of the pink layer, as seen under the microscope, distinguish it as a mineral coating (pigment) made from crushed colorant and clay (Woods 1982b, photo. 30).

Macroscopically the pink coating is difficult to distinguish from a slip. It adheres well

to the body, and it is not crusty. Only the following features can differentiate pink coated and red-brown slipped vessels. First, few large (up to 1 mm across) particles of colorant are visible with the naked eye in most of the pink coated sherds. Second, in vessels which have lost part of their burnishing lustre, the pink coating appears powdery and rough. It is only occasionally that colour comes off when the hand is rubbed on the surface of these vessels. It should be stressed though, that it is under microscopic examination that the pink coating is clearly distinguished from a slip.

Identification of colorant: Compared with the Munsell Soil Colour Chart, the colour of pink coated sherds ranges from 7.5R 5/6-5/4, to 10R 5/6-5/4 (see table 4.4). This "cherry-red" colour is usually connected with haematite (red iron oxide: Fe_2O_3). One thin section of a pink coated sherd has been examined with the SEM. As can be seen from table 4.9, haematite has been detected, amounting to 20%, but the high percentage of clay (Si_1O_2 , Al_2O_3) amounting to 71%, shows that pure haematite has not been used for the pink coating. Instead, it seems that a ferruginous shale (dark brown inclusions in the matrix of photo 4.6) which is a common inclusion in fabrics C and D (see sections 4.5.5 and 4.5.6), has been used as colorant.

Method of application: Most pigments are mixtures of colorants, fine clay, water and a binder (Shepard 1956, p.71). Clays slow the settling of particles in the mixture and enhance the flow and adhesion of pigment. The binder is an organic medium which improves spreading quality and binds the paint. The use of a binder is a common practice, but not universal with pre-wheel potters.

Pigments can be applied either before or after firing. The pink coating of Nea Nikomedeia vessels has been applied before firing. This can be recognized from the thin sections, where the particles of colorant are pressed, by burnishing, into the clay matrix

making grooves in it. This it would have been impossible on a hard fired surface. Moreover, refiring of two sherds under oxidizing conditions, for 40 minutes at 800° C, did not alter their appearance. As the pink coating was applied before firing, the presence of a binder cannot be detected because, if present, it is burned out during the firing.

After applying the pigment, the ground colorant will remain soft and powdery unless it is burnished before firing, or sintered during firing (Shepard 1956, p.32). Sintering in iron oxides occurs at temperatures between 920° C and 950° C. Pink coated vessels from Nea Nikomedeia, were fired at temperature lower than 800° C (see section 4.4). Therefore, the permanence of pink coating can be attributed to burnishing. The quality of burnishing lustre of the pink coated sherds, varies from high to poor.

In a recent study of "haematite-coating" in Late Bronze/Early Iron Age vessels from South England (Middleton 1987), two methods were used for the application of coating in modern replicas. First, a thick slurry of crushed haematite was burnished into the leather hard surface. Second, crushed haematite was applied as a dry powder to the wet clay surface followed by burnishing at the leather hard stage. Both methods produced coatings which microscopically are similar to the Nea Nikomedeia pink coating (Woods 1982b, photo. 30; see also Rigby *et al* 1989, fig. 5 and fig. 7) .

Use of mineral coatings Apart from the graphite-painted pottery, other vessels with mineral coatings are the so called Crusted Ware, reported from the Late- Final Neolithic period. The term Crusted Ware is applied to all forms of decoration employing a thick red or white crusty pigment which adheres badly to the vessel (Phelps 1975, p.310). It is generally considered as a post-firing decoration, and the red coating has been identified as haematite or as iron rich (Jones 1986, table 9.6a).

The pink coated ware from Nea Nikomedeia is not comparable with the Crusted Ware.

The pink coating has been applied before firing, it adheres well to the body and it is not crusty. Moreover, it covers the whole surface of the vessels, whereas in Crusted ware the pigment is used for decorative patterns.

A coating technique similar to that used by the Nea Nikomedeia potters, has not been reported from any other Neolithic site of the Balkan area. Gardner (1978) reports that haematite has been identified, by chemical analysis, in the slip of Early Neolithic vessels from Achilleion. The surface of such vessels is described as being powdery and the colour as fugitive. A number of these sherds were examined, macroscopically, by the present author. None of them had the powdery/rough surface of the Nea Nikomedeia pink coated sherds, and haematite particles were not visible with the naked eye. Thus the macroscopic analysis suggested that the Achilleion potters were using a clay slip which contained very fine particles of haematite, rather than coating the vessels with a crushed mineral pigment.

In Lakavica (near Štip in south Yugoslavia), an animal figurine has been found which shows typological and stylistic similarities with figurines from Nea Nikomedeia (Nandris 1968). It is covered with a pink paint, which macroscopically is very similar with the pink coating from Nea Nikomedeia. Similarly, Red-Pink coated vessels and Red on Red painted pots from Early Neolithic Serbia, appear under macroscopic examination, as being very similar to the Nea Nikomedeia pink coated vessels. A microscopic examination of the paint from Serbia, would have been very interesting in order to establish whether these examples were coated by the same technique used by the Nea Nikomedeia potters (n.b. the Lakavica figurine has been soaked in PVA since then: Nandris pers. comm.).

4.4 Firing

It seems that the Nea Nikomedeia pots were fired in open bonfires. This is recognized by the appearance of the pottery, which has all the signs of a bonfire, uneven in temperature and atmosphere: i.e. firing clouds, and a range of surface colours, both among different pots, or even on a single vessel.

Apart from the appearance of the pottery itself, open bonfire firing is implied by the absence of any kiln structures. Remains of bonfires when preserved, may be indistinguishable from remains of fires lit for heating or cooking, unless they are accompanied by a large amount of ceramic wasters. Vitelli (1974, p. 2 and p.29) reports that after an experimental firing, only a slight grey ash stain remained. After two years, nothing remained at all.

At Achelleion large-sized circular hearths situated in courtyards, are reported as had been used for the firing of pottery, on a communal basis (Gimbutas 1989). Such hearths have been found in almost every excavated level (apart from phase I and IIa). It should be noticed however, that firing wasters are reported only for the hearth in phase IIIb (Gimbutas 1989, fig. 4.25b and 4.29). At Nea Nikomedeia a large number of firing remains and hearths have been found, which apart from cooking and heating, could have been used for firing vessels. It is also possible that some of the pits, which contain ashes and black earth, had served a similar purpose.

The atmosphere during the firing usually supported incomplete oxidation. The majority of the fresh breaks in pots show a dark core between two light coloured layers. The relative proportions of core and surface layers vary, sometimes within one vessel. In most cases however, the light coloured margins are very thin (1-2 mm). In monochrome, impressed and pottery with applied decoration, completely oxidized cores are rare. In

painted vessels however, oxidized cores are more common, and firing clouds are almost absent.

Estimation of temperature: Temperatures attained by bonfire firing generally range between 650° C-900° C, but higher temperatures may occasionally be reached (Rice 1981; Woods 1982a).

A rough estimation of the maximum temperature at which the vessels from Nea Nikomedeia were fired, can be obtained from the clays containing calcium carbonate grains. Calcium carbonate when heated at temperatures between 700° C and 850° C, begins to decompose into CO₂ and CaO. Pottery with calcitic inclusions, fired above 700° C, is subject to disintegration, due to the hydration of CaO. Calcium hydroxide, which has a larger volume, exerts pressure on the fabric and causes a cone-shaped piece to spall from the wall leaving a white grain at the apex (lime spalling: Rye 1981, p.114).

Among the clays used by the Nea Nikomedeia potters, fabric A and C are rich in calcitic inclusions; their size varying from fine to coarse (see sections 4.5.2 and 4.5.5). Both fabrics were commonly used: 72% of the plain vessels were made from them. Lime spalling however, is absent, even in the pots containing large calcitic inclusions. It should be pointed out, that after refiring at 800° C, lime spalling was noticed in all sherds (3 sherds) made from fabric A and C. Therefore, it can be suggested that the vessels from Nea Nikomedeia were fired at temperatures not exceeding 750° C-800° C. This temperature range can be taken only as a rough estimation, since firing is a complicated process and the final result is affected by many factors: temperature, duration of firing, atmosphere of firing, type of clay, pre-drying of pots etc.

Turning for comparison, to the pottery from other Greek and FTN sites, it can be seen that the estimated temperatures range from 750° C to 1050° C; 750° C-850° C being the

consensus (Jones 1986, table 9.6b).

The relatively low firing temperatures are in accordance with the scarce evidence for kiln structures in the archaeological record. One kiln is reported from Late Neolithic Olynthos, in Chalkidiki (Mylonas 1929). The identification of this structure as kiln however, is questioned on chronological and technological grounds (Vitelli 1974; Jones 1986, p.777).

Another example of a pottery-firing site, is reported from Late Neolithic Dimini (Chourmouziadis 1979b). This is a low, circular structure (1.15 m diameter), built with clay, thick tiles and flat schist fragments. The structure preserves its original height (30 cm), so it is clear that it was not a domed oven but a fire pit. The excavator suggests that this pit has been used by a specialized workshop, since inside and outside the pit (in a radius of 3- 4 m) abundant sherds with stylistic similarities have been found.

In contrast with the negative evidence for kiln structures from Greek Neolithic sites, kilns have been found in other Balkan countries. The earliest examples so far, are dated to the last stages of the Starčevo culture (Starčevo IV). Four kilns have been found at Cîrcea (Nica 1978). They consist of a single fuel chamber with an opening, served by a lateral fuel chamber (Ellis 1984, fig. 48). One kiln had two adjoining firing chambers, both served by the same fuel chamber. Similar simple, kiln structures have been found at a number of Late Neolithic sites (Vinča, Turdas, Dudești, Boian Cultures: see Ellis 1984).

4.5 Petrographic examination

4.5.1 Introduction

A sample of fifty-four thin sections from monochrome and impressed pottery, has been examined (table 4.1). In order to give a coherent picture of the pottery from Nea Nikomedeia, a summary of the petrographic examination, by Hodges, of the painted vessels will be included at the end. Most of the thin sections of the painted vessels were available at the Institute of Archaeology, so that microscopic comparisons with sections of monochrome and impressed pottery were possible.

One of the aims of carrying out the petrographic analysis, was to confirm information obtained by macroscopic examination. It has been proven, that a macroscopic analysis using general features such as colour, hardness of clay, size, amount and colour of non-plastic inclusions and their reaction with dilute hydrochloric acid, can be a reliable method for a general separation of different fabric categories. Based on these features, the fabrics were separated, macroscopically, into five different types (fabric A-E).

With only one exception, petrographic analysis confirmed this separation. The exception concerns fabric B. Twenty thin sections, which according to macroscopic examination were considered to be made from fabric B, were examined with the polarizing microscope. From these, fifteen were clearly made from the same fabric. The remaining five however, had to be separated as a different fabric type. In the following description, the first group is called fabric B-1 and the second fabric B-2. The relative frequency of the different fabric types, used for the manufacture of Nea Nikomedeia vessels, has been calculated from data obtained from the macroscopic analysis. Therefore in all subsequent comparative analyses (Chapter 5, 6 and 7), fabrics B-1 and B-2 are not distinguished as different, but they are considered as a single group (fabric type B).

Size variation of non-plastic inclusions: The procedure followed in the examination of the thin sections is described in Appendix A. In order to facilitate the reading of the fabrics description, the size degradation of the non-plastic inclusions will be given here: very fine inclusions are <0.125 mm; fine >0.125 mm and <0.3 mm; medium >0.3 mm and <0.5 mm; coarse >0.5 mm and <1 mm; very coarse >1 mm.

Before we proceed with the description of the different fabric types, a remark concerning the size of the non-plastic inclusions should be made. Every fabric type contains a variety of classes of non-plastic inclusions. Thin sections belonging to the same fabric group, contain the same variety of inclusions, in comparable amounts. Moreover, in thin sections of the same fabric type, every class of inclusions shows a uniformity in shape and contour. However a variation on the size of the inclusions has been noticed among thin sections of the same fabric type. Some thin sections contain inclusions showing a great variation of particle size, ranging from very fine to coarse, whereas in others most of the inclusions are smaller than 0.3 mm. Based on this feature, thin sections can be separated into two categories: fine textured and medium-coarse textured.

It should be stressed that within these categories, a variation in the size of inclusions is still noticeable. For example amongst the fine textured sections of fabric type A, the following variations have been observed: (1) the majority of inclusions are very fine, few fine inclusions are present; (2) the majority of inclusions are very fine, few fine and few medium are present; (3) many inclusions are very fine, many are fine, some are medium. Equally among the medium-coarse textured sections of the same fabric type (fabric A), there are examples with few coarse inclusions, in others the coarse inclusions are more numerous, or some very coarse grains are present.

Apart from fabric A, the same variation was noticed in fabric B-1 and fabric E. The

same variation in the size of inclusions was noticed in fabric C, but the fine textured sherds contained more medium sized grains, than those of the other fabrics. All thin sections from fabric B-2 and fabric D are medium-coarse textured.

During macroscopic examination, sherds were distinguished, according to the size and frequency of their larger non-plastic inclusions, into fine, medium and coarse textured groups. Thus, there is a slight discrepancy between the microscopic analysis, where only two groups were distinguished, and the macroscopic examination. Although macroscopic analysis is not a very detailed and precise technique, it can be applied on a large number of sherds and gives information on general trends in the sample. The results of the macroscopic analysis, on the quality of paste, will be incorporated in the description of the different pottery wares and vessel forms (Chapter 5, 6 and 7).

4.5.2 Fabric A

This is the most common fabric type, being used for the manufacture of 60% of the plain vessels (fig. 5.40). It is characterized by a soft (2.5-3 Moh's scale), calcareous beige-grey matrix. Non-plastic inclusions amount to 25%-30% of the matrix.

Subrounded quartzite and limestone, and subangular to subrounded calcite fragments, constitute the major inclusions (photo. 4.8). A few molluscan fragments are also present. Among the quartzite fragments, examples with a little mica (mainly muscovite) and iron mineral inclusions, are quite common; occasionally, hornblende is present as well. Quite often, quartzite inclusions are surrounded by a calcitic rim. Inclusions with an overgrowth of calcite are rare. All inclusions mentioned so far, apart from shell fragments, are usually of low sphericity, and show a variation in particle size ranging from very fine to very coarse. Shelly molluscan inclusions are usually of medium size.

Subangular quartz fragments of low sphericity, are abundant; the majority measures

less than 0.50 mm. Rounded iron mineral inclusions, of high sphericity, are frequent (<0.05 mm). They often appear in association with quartz and mica inclusions.

Some subrounded to rounded serpentine and greywacke fragments are scattered throughout the matrix (photo 4.9: one serpentine fragment can be seen on the left section of the of the field; one greywacke fragment on the right). They measure up to 1 mm across, but generally are less than 0.05 mm. Greywacke fragments consist of abundant polycrystalline quartz, a little mica and a few iron mineral inclusions. Occasionally, feldspar inclusions, mainly microcline, are also present. The matrix between the inclusions is not clearly visible (200 X).

Rounded schist and subangular to subrounded slate fragments, are present as minor inclusions. Schist fragments, brown and yellow in colour, are heavily stained by iron minerals (photo 4.12: the yellow inclusion on the center of the field). They have a high content of mica inclusions, parallel to the foliation. Due to the very fine size of the individual grains, no other minerals could be distinguished (200 X), apart from few quartz and feldspars. Slate fragments consist of numerous tiny quartz grains and some iron mineral inclusions oriented parallel with the laminated structure.

Of the finer inclusions, mica fragments (mainly biotite) are quite common. Plagioclase and microcline feldspar, and pyroxene inclusions, are present in minor amounts. In a few thin sections, occasional grog-like inclusions are visible.

4.5.3 Fabric B-1

Fabric B-1 (and B-2) has been used for the manufacture of 20% of the Nea Nikomedeia plain vessels (fig. 5.40). It is a hard fabric (4.5-5.5 in Moh's scale), characterized by a red-brown, compact matrix. Inclusions amount to 25%-30% of the matrix. Subangular to subrounded feldspar and quartz fragments, of low sphericity,

constitute the major inclusions (photo 4.5). They can measure up to 1 mm, but usually are less than 0.5 mm across. Among the felspar inclusions, plagioclase predominates, but some microcline grains are present as well. Fine grained quartzite inclusions (fine to medium), are common.

Rounded to subrounded fragments of andesite (0.125-2 mm), often surrounded with a ferruginous rim, are common (photo 4.10: the two large inclusions in the centre of the field). They consist of angular and subangular quartz and plagioclase felspar, angular and subrounded biotite and hornblende; the inclusions are set in a very fine grained feldspathic groundmass.

Rounded iron mineral inclusions of high sphericity (0.125-0.5 mm), are frequent. They often appear in association with quartz, felspar and abundant mica inclusions.

The finer inclusions consist of abundant mica (mainly biotite), less abundant hornblende, and relatively rare pyroxene grains. Occasionally, medium-sized biotite (lath-like) fragments are present.

4.5.4 Fabric B-2

This fabric type is characterized by a hard (4.5-5.5 in Moh's scale), red-brown clay matrix. Inclusions amount to 25%-30% of the matrix. Subangular to subrounded quartzite fragments of low sphericity, predominate (photo 4.11). They range in size from fine to very coarse. Among the quartzite fragments, examples with very few mica and iron mineral inclusions, are present. Subangular quartz fragments are the second most common inclusion (usually <0.05 mm across). Some plagioclase and microcline feldspars are present. Rounded iron mineral inclusions, in close association with quartz, mica and felspar fragments, are scattered throughout the matrix (photo. 4.11: on the left corner of the field). In some cases, a clear halo effect is noticeable.

The smaller inclusions comprise pyroxene, hornblende, muscovite and biotite. Occasionally, large biotite lath-like fragments are also present.

4.5.5 Fabric C

Fabric C has been used for the manufacture of 12% of the Nea Nikomedeia plain vessels (fig. 5.40). It is characterized by a soft (2.5 in Moh's scale), beige-red clay matrix. Inclusions amount to 25% of the matrix. The fabric contains abundant subrounded limestone and subangular to subrounded quartzite and quartz fragments (photo 4.6). Calcite is virtually absent, and one shell fragment was found only in one thin section. Among the quartzite fragments, examples with little mica and iron mineral inclusions, are present. Quartzite and limestone inclusions show a great variation in size, ranging between 0.125 and 2 mm; quartz fragments are usually smaller than 0.05 mm.

Rounded shale, schist and subangular to subrounded greywacke fragments, are also present. Their frequency is not constant in all thin sections. In nine out of the fifteen sections, only a few fragments are present. The remaining thin sections, contain abundant fragments of these rock types. Despite these differences shale fragments are the most common, in all cases.

Shale fragments are heavily stained with iron minerals (dark brown in colour), and they contain a large amount of mica inclusions (dark coloured inclusions in phot. 4.6). Greywacke fragments consist of numerous quartz and biotite inclusions and relatively infrequent calcite and plagioclase inclusions (photo. 4.13 inclusion in the left corner of the field). They are yellow and brown in colour, and they have a characteristic streaking appearance, due to a ferruginous cement between the individual inclusions. They are different from those described in fabric A: they contain monocrystalline quartz grains, instead of polycrystalline ones. Moreover greywacke fragments from fabric A do not

contain calcite inclusions, they lack the streaking appearance and the matrix between the individual inclusions is not as clearly visible as in the greywacke fragments of fabric C. Schist fragments are similar to those described in fabric A (large inclusion in the middle of the field in photo. 4.12).

Rounded iron mineral inclusions are frequently found, sometimes in association with subangular quartz and mica inclusions. The smaller inclusions consist of abundant mica grains and a few feldspars.

4.5.6 Fabric D

Fabric D has been used for the manufacture of 3% of the Nea Nikomedeia plain vessels (fig. 5.40). It is characterized by a hard (5.5 in Moh's scale) red clay matrix. Inclusions amount to 20% of the matrix.

Rounded schist, and subrounded quartzite fragments, sometimes accompanied by a few mica and iron mineral grains, constitute the major inclusions (photo 4.13). Subangular to subrounded quartz inclusions, are also abundant. Subangular to subrounded greywacke fragments are common. A few rounded shale fragments are scattered throughout the matrix. Rounded sandstone fragments, resembling the greywacke, are present as minor inclusions in some of the thin sections. Schist, greywacke and shale fragments are similar, in appearance and composition, to those described in fabric C.

All inclusions apart from quartz, show a great variation in size ranging from fine to very coarse. Quartz fragments are usually less than 0.05 mm.

Some rounded iron mineral inclusions (<0.5 mm), sometimes in close association with quartz grains, are present in Fabric C. Of the smaller inclusions, mica grains (mainly muscovite) are abundant. A few fine-sized feldspars are also present.

4.5.7 Fabric E

Fabric E has been used for the manufacture of 4% of the Nea Nikomedeia plain vessels. It is characterized by a soft (2.5-3 in Moh's scale), grey-cream matrix. Inclusions amount to 25%-30% of the matrix.

Rounded serpentine and subrounded quartzite fragments, are the major inclusions. Subangular quartz (<0.05 mm) grains are common (photo. 4.14). Serpentine and quartzite fragments range in size from fine to coarse. Among the quartzite fragments, examples with a little mica, iron minerals and rare hornblende inclusions, are found. Some subrounded greywacke and few schist fragments, similar in appearance and composition to those described in fabric A, are present.

Among the smaller inclusions, fine mica fragments (mainly biotite) are abundant. Some pyroxene and a few feldspars are scattered throughout the matrix. One of the thin sections contained a few subrounded calcite inclusions.

4.5.8 Petrographic analysis of Painted Pottery

In all, 66 thin sections were studied by Hodges and his analysis is included in Biernoff's thesis (Biernoff 1969, Appendix A). The material was separated into three groups: Group A to C. In this work they will be referred to as Groups 1 to 3, in order to avoid confusion with the fabric types described above. A few of the thin sections of painted pottery could not be included in any of these groups (Hodges 1969), and they were reported as non-conformers.

Group 1 (42 thin sections): This resembles fabric type A, the fine textured category. Included in this group are all sections of the Standard Ware (see section 5.4.2), ten sections of the Porcelain Ware (section 5.4.2) and four sections of the White on Red Ware (section 5.4.2).

Group 2 (7 thin sections): This fabric type has not been encountered among the monochrome, impressed and pottery with applied decoration. It is extremely fine textured, and appears to be almost without inclusions. In a highest magnification (200 X), quartz, quartzite, mica, few limestone and pyroxene inclusions are visible. A few shell fragments were present in some of the sections. All thin sections from Group 2, belong to the Porcelain Ware.

Group 3 (8 thin sections): This fabric type has not been encountered among the plain, impressed and pottery with applied decoration (fig. 5.40, 5.42). The predominant inclusions are quartzite; quartz and limestone inclusions are also common. A few feldspar, pyroxene and mica inclusions are present. The inclusions range in size from very fine to medium. From the eight thin sections of Group 3, seven belong to the White on Red Ware and one to the Porcelain Ware.

From the eight thin sections considered as non- conformers, four were available at the Institute of Archaeology. From these, two were identified, by the present author, as belonging to the medium-coarse textured fabric A, one to fabric B-1 and one to fabric D.

4.6 Discussion on the results of petrographic analysis

4.6.1 Diversity of fabrics

Petrographic analysis has shown that a variety of fabrics were used by the Nea Nikomedeia potters. In all, eight different fabrics were distinguished. Clays with high and low calcareous content were used, the former being more common.

This picture, is in accordance with the situation encountered in most Greek Neolithic sites. At Servia, chemical analysis has shown that there is at least as much variation in composition among the Early Neolithic coarse wares, as there is among the remainder of the Early Neolithic material (Jones 1986). Analysis of the pottery from Franchthi

(Early-Final Neolithic: Jones 1986), Corycian cave (Late Neolithic: Courtois and Dimou 1981) and Kitsos cave (Middle-Final Neolithic: Courtois 1981) has produced similar results. Similarly in Crete a variety of clays, with low and high calcareous content, were used by the Neolithic potters without selection principle (Noll 1982).

Exceptions exist, as for example at Vassilika (Sikalidis *et al* 1983) where the pottery was made only from two different clay fabrics.

4.6.2 Source location of non plastic inclusions and clay

It should be pointed out, that despite the variety of fabrics used at Nea Nikomedeia, 62% of the plain pottery and 90% of the painted were made from the same fabric (fabric A). Macroscopic examination suggests that fabric A was also used for the manufacture of stamps, altars and the majority of figurines. This preference implies that this clay source was near the settlement, and /or that it was the most commonly encountered over a wide area. It is also probable that this clay was more workable.

Location of the clay sources, requires a detailed geological survey of the area. Considering the dramatic changes of the landscape surrounding Nea Nikomedeia, due to extensive alluvium accumulation (see section 3.3), it was thought that a survey of the surface clay sources was highly unlikely to give any results of relevance to the conditions at that time. Similar attempts at other Neolithic sites, with more stable geomorphology, are rather disappointing. With few exceptions (Vassilika: Sikalidis *et al* 1983; Sesclo: Overweel 1981), the collected clays did not compare with the archaeological material.

By using a detailed geological map of the area, the non-plastic inclusions present in the clays, were compared with the local rock outcrops. All inclusions present in the fabrics, are consistent with the prevailing geology of the area which comprises of igneous, metamorphic and sedimentary outcrops. From the geological map (fig. 4.1), it can be seen

that within a minimum distance of 7 km from the site, there are abundant calcareous deposits, outcrops of serpentine, igneous rocks (andesite and trachyte), red and yellow schists, calcareous conglomerates and sandstones. Similar types of minerals and rocks were found in all thin sections of fabrics used by the Nea Nikomedeia potters. It should be stressed that in order to confirm the similarity of the minerals and rocks present in the vessels's fabrics with those available locally, future petrological research of the local rock fragments has to be carried out. For the present, all that can be said with certainty is that in the archaeological material there are no inclusions inconsistent with the local geology.

Fabric B-1 is the weathering product of andesite (I. Freestone, pers. comm.), since it contains inclusions of andesite, abundant feldspar and quartz grains, numerous fine mica, hornblende and pyroxene inclusions. Moreover, the absence of calcareous inclusions, serpentine, schist and greywacke particles, imply that this clay source was deposited near the parental rock. At a distance of 7 km north-west of the site, there are outcrops of trachyte and andesite. Therefore, one may speculate that fabric B-1 was collected near this area.

Of special interest is the fact that two different fabrics, not encountered among the plain pottery, were used for the manufacture of Porcelain and White on Red painted Ware. Both pottery groups are rare, amounting each to 4% of painted pottery (see section 5.4.2). Moreover, White on Red pottery show similarities with the painted pottery from the FTN sites (see section 7.5.2).

It has been stated above, that all non-plastic inclusions are compatible with the local geology. The low frequency of these wares though, and their different fabric raises the question of imports. However, the following arguments are against this explanation. Firstly, Porcelain and White on Red Wares were also made from fabrics common in plain,

impressed and pottery with applied decoration. Secondly, painted sherds made from the uncommon fabrics (Group 2 and 3) were present in First and Second building periods, and were evenly distributed in the settlement (see section 6.4, fig. 6.12). Thirdly, the archaeological material from other Greek and FTN sites does not as yet offer examples with exactly the same decorative patterns.

The use of fabric Group 2 for the manufacture of Porcelain Ware could have a technological explanation. Porcelain vessels have a careful finish and a superior quality of burnishing. It could be suggested that potters from Nea Nikomedeia selected a fine textured clay exclusively for the manufacture of this superior quality ware. The difficulty of working with such a clay, should be stressed. Many fine textured clays are too plastic for manufacturing vessels and they tend to crack during firing and drying (Rye 1981, p.31).

4.6.3 Addition of non-plastic inclusions

Inclusions found in a fabric, may be naturally present in the parent clay utilized, or they may be added by the potters as filler or temper. Addition of temper could facilitate the building and firing of vessels (Rye 1981, p.31). Moreover, different types of temper are better suited for the varying functions of pots (see section 6.3.1). A few types of inclusions such as grog and abundant plant fragments, are generally considered as deliberate additions. For the other categories of non plastic inclusions it is difficult to determine, due to the complexity of the geology, whether they were naturally present in the clay or added. On this basis, three characteristics can be used to determine their origin: size, contour and amount of inclusions. Deliberately added inclusions tend to be of uniform size and are usually large, they generally have angular contour and their proportion can vary from one pot to the next.

As has been seen in sections 4.5.2-4.5.7, all inclusions of Nea Nikomedeia fabrics are subrounded to rounded, and they show a great variation in particle size. Moreover, different types of inclusions are present in similar amounts in all thin sections of the same fabric. The only exception concerns the schist fragments present in fabric C, whose amount is not constant in all sections. However, since schist fragments are subrounded in contour and they show a great variation in particle size, they cannot easily be considered as deliberate additions. Shell fragments present in fabric A, cannot be regarded as temper either, because they are always present in small amounts. In most cases where shell is added as temper, it is present in relatively large quantities (20%-30% Rice 1987, 410). The occasional grog fragments found in fabric A, show that the addition of this temper type was limited.

During macroscopic examination of the material, charred plant inclusions were noticed in all fabrics. Such examples were limited, not exceeding 1-2% of the sample. This percentage was similar in all pottery groups: slipped, coated, uncoated, impressed and pottery with applied decoration. Also, fabrics with vegetable matter were not restricted to any particular vessel form or to coarse textured fabrics. The amount of plant fragments is usually small, but some heavily tempered sherds, are present as well.

During microscopic examination of the thin sections, charred plant fragments were noticed in three of them (1 from fabric A-1 and 2 from fabric B-1). Two of the sections contain a few plant fragments, whereas the third was full of elongated voids and vesicles (photo: 4.15). In painted pottery, no plant inclusions were found (Hodges 1969).

Thus, examination of thin sections of all fabric types indicates that tempering was very limited among the Nea Nikomedeia potters. Although this result should be verified by more detailed textural analysis (i.e. point count of particle size distribution, and calculation

of average grain size), it seems unlikely that such analysis will alter this conclusion.

4.6.4 Refining of clay

Despite the fact that tempering was very limited, some of the fabrics show variation in the size of their inclusions. Since the larger inclusions were not added, it seems that their absence from the fine textured categories, is the result of a clay refining process. Ethnographic research shows that for the removal of the coarser particles present in the clay, two methods are usually used (Rye 1981, p.37): sieving and settling. For settling, the clay is mixed with water to a sufficiently thin consistency to permit the coarser particles to settle to the bottom of the pit. By taking the clay from different levels of the pit (upper or lower), fine or medium-coarse textured vessels can be made from the same clay.

It seems that sieving was not used by the Nea Nikomedeia potters. Clays refined by sieving contain inclusions which have a uniform size. This is not the case with the Nea Nikomedeia vessels since, as has been seen in section 4.5.1, a clear distinction into fine, medium and coarse textured sherds is difficult to make. Such a situation could be explained by a settling procedure, which allows the broad separation into fine and medium/coarse textured batches of clay, but some mixing should be expected. The very fine textured clay, at the top of the pit, could have been used for slipping the pots.

The only thin sections which contain inclusions of a rather uniform size, are those of the Porcelain Ware (group 2). In this case however, it is difficult to distinguish if this is the result of a refining procedure, or whether the potters were using a naturally fine textured clay source.

CHAPTER 5

PLAIN AND DECORATED POTTERY FROM NEA NIKOMEDEIA

5.1 Introduction

The ceramic assemblage of Nea Nikomedeia includes decorated (painted, impressed and vessels with applied motifs) and plain monochrome vessels. Part of the decorated pottery has been studied by Biernoff (1969) and Nandris (1968). Plain, impressed and vessels with simple applied motifs, are subjects of the present work. Plain vessels form the majority of pottery amounting to 96% of the ceramics found at Nea Nikomedeia.

For the classification of the plain pottery the following attributes were used: composition of paste (fabric type), surface treatment and shape. Each attribute is considered to be equally important. Using one attribute at a time the pottery was divided into three main classes; smaller sub sets were subsequently distinguished within each class.

For example the criterion for surface treatment was the presence of surface coating. Pottery was initially divided into coated and uncoated vessels, and on the basis of surface colour each set was divided into smaller groups. Similarly, the other two classes were divided into smaller, subsets.

The description of the different fabric types used for the manufacture of the Nea Nikomedeia vessels has already been given in Chapter 4. In the first part of this chapter (Part One), plain pottery is presented according to surface treatment and vessel form.

Impressed pottery and vessels with simple applied motifs have been studied with the same methodology used for the plain pottery. They are presented in the second part (Part Two) of this chapter. In order to give a coherent picture of the decorated pottery from Nea Nikomedeia, a summary description of painted pottery and face vessels is also included.

PLAIN POTTERY

5.2 Surface treatment

On the basis of surface treatment, plain vessels can be separated into two groups: vessels with a surface coating, and vessels without a surface coating.

5.2.1 Vessels with surface coating

These vessels amount to 73% of the plain pottery (fig. 5.1). In open vessels both the interior and exterior surfaces have the same treatment. In closed pots the interior surface is uncoated: the exterior surface coating stops either at the rim, or it continues on the interior surface for a few centimetres below the rim. As has been seen in Chapter 4, two different surface coatings were used by the Nea Nikomedeia potters. These comprised a red-brown slip made from very fine textured clay and a pink coating made from crushed shale, which was burnished on to the vessel's surface. The range of surface colours of red-brown slipped and pink coated vessels is given in table 4.4.

Red-brown slipped ware: Red-brown vessels form the commonest category of the plain pottery amounting to 46% of the sample (fig. 5.1). The pots are slipped in shades varying from red through red-brown to brown, with lighter shades being more common.

For the manufacture of red-brown slipped vessels all types of fabric were used, but in different proportions: 49% of the vessels were made from fabric A, 36% from fabric B, 5% from fabric C, 4% from fabric D and 5% from fabric E (fig. 5.40). It should be noted that fabric B was mainly used for the manufacture of red-brown slipped vessels: 57% of the pots made from this fabric, have a red-brown slip. As far as the quality of the paste is concerned, red-brown slipped vessels from all the plain pottery groups have the highest percentage of fine textured sherds at 69%, with 29% medium and 6% coarse textured (fig. 5.41).

All vessels were burnished. The quality of burnish ranges from moderate to good. Some of the fine textured sherds were heavily burnished.

Pink coated ware: Vessels with a pink coating amount to 27% of the plain pottery (fig. 5.1). For the manufacture of pink coated vessels all fabric-types were used. Their relative frequency was as follows: 55% of the sherds were made from fabric A, 5% from fabric B, 33% from fabric C, 5% from fabric D and 2% from fabric E (fig. 5.40). It should be pointed out that fabric C was mainly used for the manufacture of pink coated vessels since 73% of the pots made from this fabric, have a pink coating. The quality of paste varies with 55% of the sherds being fine textured, 40% medium and 5% being coarse textured (fig. 5.41).

All vessels were burnished. It seems however that the pink coating does not hold the burnishing lustre as well as the red-brown slip. In many cases only parts of the burnishing lustre are preserved.

5.2.2 Uncoated monochrome vessels

Uncoated monochrome vessels amount to 27% of the plain pottery (fig. 5.1). The exterior and interior surface of open vessels as well as the exterior surface of closed pots are carefully smoothed. The interior surface of closed pots is roughly smoothed, apart from a strip below the rim which is more carefully finished. Most vessels are burnished. The quality of the lustre varies from moderate to poor and is inferior to that on coated pots.

The great majority of uncoated vessels have a light beige colour. The remaining sherds are red-brown coloured. The Munsell Soil colour chart notations for beige and red-brown sherds are given on table 4.4. Separation of uncoated vessels into beige and red-brown groups is based on the colour of the fabric-types used for their manufacture.

Beige uncoated vessels: Beige vessels amount to 24% of the plain pottery. Their surfaces have a clear light colour except for some reduced grey patches. The vessels are mainly made from fabric A at 88% of the sample, with 3% of fabric B, 3% of fabric C and 5% of fabric E (fig. 5.40). Well levigated pastes were regularly used. As can be seen from fig. 5.41, fine and medium textured vessels amount to 48% and 40% respectively. However, by comparison with the coated vessels, there is an increase in the proportion of coarse textured sherds (at 12% and 5% respectively).

Red-brown uncoated vessels: Only 3% of the plain pottery belongs to this category. Vessels are made from fabric D and fabric B at 66% and 34% of the sample respectively (fig. 5.40). Fabric D when fired, attains colours varying between red, red-brown, light brown and dark brown. Fabric B when fired under oxidizing conditions has a beige colour, but when fired in a reducing atmosphere attains a light brown colour. The proportion of fine and medium textured vessels is substantial at 50% and 30% respectively (fig. 5.41), but the proportion of coarse textured examples is larger than in any other ware, at 20%.

5.3 Analysis of shapes of plain pottery

5.3.1 Methodology

The vessels were divided into three structural classes.

(A) Closed Vessels: These are vessels with a rim angle larger than 90°. They have converging walls which are carried beyond the point of greatest diameter. Rim angle, which is defined as the angle between the rim line and the upper wall of the vessel, measures the slope of the upper wall.

(B) Open Vessels: These are vessels with a rim angle equal or smaller than 90°. Their

walls vary from spreading to vertical, and stop at the point of greatest diameter.

(C) **Neck jars:** These are vessels with an inflection or corner point above the major diameter (Shepard 1956, p.93).

Each of these classes were divided into a number of subcategories. Closed vessels were divided into slightly closed bowls, whose rim angle ranges from 91° to 114°, and into hole-mouthed jars where rim angle is larger than 115°. A third division is into askoid vessels which have an asymmetrical form, intermediate to slightly closed pots and neck jars.

Open vessels were divided into three subcategories of bowls; firstly, those whose rim angle ranges from 85° to 90°, secondly to those with rim angle from 60° to 84° and thirdly to bowls with rim angle smaller than 60°.

Neck jars were divided on the basis of the height of their neck, into jars with medium and high collar. The height of medium collars varies between 2.5 cm and 4.5 cm; high collars are taller than 4.5 cm.

Although the dividing line between the different subcategories is to some extent arbitrary, the study of the Nea Nikomedeia pottery has shown that vessels from different subcategories have different shapes. The span of rim angles in each vessel form is quite large (15° to 20°) in order to compensate for variations which are to be expected in a hand-made pottery.

Rim diameter and the ratio of rim diameter to total height are the two parameters used in this work to describe the size of the vessels. The ratio of rim diameter to total height, is estimated only from whole or reconstructable vessels. Reconstructable vessels are rim fragments which preserve at least two thirds of the original height.

In the present work, pots with a diameter equal or smaller than 10/10 of their height

are characterized as deep, those with a ratio between 20/10 and 10/10 as medium, and those with a diameter greater than 20/10 of the height, shallow. This ratio seems to have a chronological value, since studies of Early Neolithic material from Peloponnese (Phelps 1976) and Central Greece (Weinberg 1962) indicate that deep pots are more characteristic of the later stages of this period.

There are three types of bases (ring, flat and rounded) and two main types of handles (string-hole and unpierced lug). These types are analytically presented in sections 5.3.10 and 5.3.9 respectively.

The Nea Nikomedeia vessels have direct rims. In a few cases slightly everted rims appear but they always follow the direction of the upper walls, which are concave (fig. 5.17, 5, 8). Lips vary in shape. They can be rounded, thinned either at the interior or on both sides, thickened at the interior or they are flat. The relative frequency of the different lip-types found in each vessel form, is given in table 5.1. Rounded lips are the most common lip-type, whereas thickened or flat rims are rare. It should be pointed out however, that in many cases a single rim sherd has more than one lip-type.

Before describing the different vessel forms, it should be noted that lids are absent among the pottery fragments. A few (1-4 examples) round-oval sherds formed from broken vessels, are present in every excavation square. Their greatest diameter ranges from 4 cm to 6cm and only scarcely reaches 9 cm (fig. 5.24, 13-14). As the Nea Nikomedeia vessels (excluding miniatures) have rim diameters larger than 6 cm (fig. 5.26-5.31), it is clear that the round-oval sherds were not used as lids. It has therefore to be assumed then that for the protection of the contents of pots other objects such as larger pottery fragments, stones, cloth or mats were used.

The use of the round-oval sherds is not clear as they do not have any obvious wear damage. They should be differentiated from similar shaped items which have a perforation hole at the centre, and which were most probably used as spindle-whorls (fig. 5.24, 13).

5.3.2 Neck jars

Neck jars amount to 9% (255 examples) of plain pottery (fig. 5.45). The sample includes three reconstructable vessels. They are deep pots and their form resembles to an ellipsoid which has the greatest diameter horizontal (fig. 5.5, 4). One of the pots has four vertically pierced lugs placed below the greatest circumference (fig. 5.5, 4). The rim diameter of neck jars ranges from 5 cm to 29 cm with the most common group being between 9 cm and 17 cm (fig. 5.25).

Height and shape of neck, as well as the way neck is joined to the body, are the two criteria usually used for subdividing neck jars (Milojčić 1971; Phelps 1975). Almost 70% of the sherds (178 examples) included in the sample of neck jars have their collars intact and attached to the vessel walls. These were separated according to the height of their collars, into medium and high neck jars. The collars and upper walls are usually connected with a smooth curve. There are only two examples with an angular join (fig. 5.5, 1). Internally thickened angular joins which are so characteristic of the Early Neolithic Thessalian neck jars (Milojčić 1971, fig. 3, 6,7,8 and fig. 5; Gimbutas 1989, fig. 5.46, 4) are not present.

The remaining sherds are broken and it is often impossible to attribute them to either of the two subcategories. As the data are fragmentary, the exact percentages of the occurrence of each subcategory cannot be considered as representative. For this reason only general estimates of their frequency will be given.

Medium-collars: The height of collar ranges from 2.5 cm to 4.5 cm. Shorter necks have not been identified among the sherds which have their collars intact. They can be separated into two groups: A1 and A2.

A1: Vessels included in this group have internally thickened cylindrical necks. The

beginning of neck is mainly marked by a thickening of the wall and not by a clear angle or curve (fig. 5.4, 1-3). Necks are usually 0.3 cm to 0.5 cm thicker than the upper walls of the pots. These pots are intermediate in shape to the hole-mouthed jars and the neck jars. They are less common than the vessels belonging to the A2 subcategory.

A2: These are vessels with a definite neck (fig. 5.4, 4; fig. 5.5). Their collars are either concave or conical with the latter being more rare. Two examples of conical necks have an angular articulation with the body, while all concave necks are smoothly connected with the upper walls.

High collars: The height of collar ranges from 5 cm to 10 cm. More common are vessels with necks between 5 cm and 7 cm tall. The collars can be concave, conical or cylindrical with concave examples being the more frequent (fig. 5.5). In all, vessels with high necks are less numerous than those with medium necks.

Among the 255 rim sherds included in the sample of neck jars, there are 27 broken examples which could be from either high collared neck jars, or small open vessels with flaring walls (fig. 5.6, 7-8). Indeed their shape is that of a cone with flaring walls but they are broken in such a way that it is impossible to distinguish in which type of vessel belong.

If they are open vessels their profile is very similar to that of Late Neolithic cups. Their fabrics and surface coatings however are not different from those of Early Neolithic pots. Macroscopic examination of the fabrics of the Late Neolithic painted and monochrome pottery indicates that they are different in colour, sorting and firing, from those used in the Early Neolithic Period. Three similar sherds are reported from the Early Neolithic Otzaki Magoula. They are classified as neck jars (Milojčić 1971: Rim-form II, 3) and are described as having "high rims of non-typical shape". It is therefore considered

that these 27 sherds are open vessels or neck jars from the Early Neolithic levels, and not intrusions from later strata.

3.5.3 Hole-mouthed jars (Closed pots with rim angle larger than 115°)

Hole-mouthed jars are rare amounting to 3% (85 examples) of the plain pottery (fig. 5.45). Their rim angles range from 115° to 140° with the most common group ranging from 115° to 125°.

Four whole vessels have been recovered. Their contour is similar to that of neck jars (fig. 5.7 and 5.8). The transition from the lower to the upper part is rather abrupt. Their upper walls can be straight, slightly concave or convex. String-hole lugs are present in two whole vessels (fig. 5.8, 5-6). In one case, the lugs are set vertically far below the greatest circumference. In the other vase, they are set horizontally above mid-height.

Rim diameters range from 10 cm to 32 cm with the most common group being between 13 cm and 24 cm (fig. 5.26). Basal diameters measure between 3.5 cm and 11 cm.

5.3.4 Askoid vessels

Askoid vessels have an asymmetrical shape resembling the leather containers used for carrying liquids, from which they take their name. Their upper part has a form intermediate to that of neck jars and slightly closed vessels, as one side converges and the other forms a short neck (fig. 5.9).

During the excavations at Nea Nikomedeia three whole vessels have been found, two of them in the central building (F6/1 excavation square) and the third in K7/1 square. A broken miniature vessel has also been found in square A6/1 (fig. 5.9, 3). Two of the pots have oval bases (fig. 5.9, 1), while the other two are supported by round bases.

Despite the relatively large sample of whole vessels, during the study of pottery no rim

or base fragment have been found which could be clearly attributed to this vessel category. This is due to the fact that unless a very large part of the vessel is preserved, the fragment cannot be distinguished from a slightly closed pot or a neck jar. A number of oval bases have been found (see section 5.3.10), but as these bases are not restricted to askoid vessels they cannot be considered as a definite evidence for the presence of askoi.

Askoid vessels are rarely found in Early Neolithic sites. The only examples come from Peloponnese (Nemea: Blegen 1975 plate 63; Akrata: Phelps 1975). In contrast with the Nea Nikomedeia vessels which are uncoated, the examples from these sites have painted decoration. Moreover, their shape is less asymmetrical and they usually have a strap-handle.

5.3.5 Slightly closed vessels (Closed vessels with rim angle from 91° to 114°)

Slightly closed vessels constitute the commonest vessel form as 33% (935 sherds) of the studied sample has this shape (fig. 5.45). Among them, seven whole vessels and sixty-nine reconstructable pots, are included. Two of the whole vessels are miniatures (fig. 5.10, 1).

The rim angle of slightly closed vessels ranges from 91° to 114°. The greatest concentration of values is towards the lower limit: pots with rim angle varying between 91° and 110° amount to 28% of the total sample of monochrome pottery. Vases with rim angle between 111° and 114° amount only to 5%. As hole-mouthed jars (rim angle larger than 115°) constitute only 3% of the sample, sherds with a rim angle larger than 111° could have been included in the same category. However, vessels with rim angles up to 114° have similar shapes. Changes in form occur in pots with a rim angle greater than 115°.

Slightly closed vessels usually have a spherical lower part which reaches the greatest diameter by mid-height (fig. 5.11). The inclining upper walls continue straight or slightly concave up to the rim. In a few sherds (9%) the upper walls are convex. It seems that lugs are common accessories to this shape, since there are seven examples with string-hole lugs set just below the greatest diameter (fig. 5.10, 6 and fig. 5.11, 3).

If whole and reconstructable vessels are considered as a representative sample of the slightly closed pots, then deep forms (fig. 5.10, 6-7; fig. 5.12, 4; fig. 5.13, 2) seem to be quite common, amounting to 42% of the sample. Apart from being more elongated, deep vessels are similar in shape to the medium ones.

Rim diameters range from 8 cm to 35 cm with the most common group being between 12 cm and 24 cm (fig. 5.27). Basal diameters measure between 3.5 cm and 11 cm.

5.3.6 Open vessels with rim angle from 85° to 90°

Despite the fact that the span of rim angle is restricted, this vessel category is very common amounting to 25% of the monochrome pottery (708 rim sherds), (fig. 5.45). The sample includes four whole vessels and eighty-three reconstructable sherds.

The basic shape consists of straight upper walls and a spherical bottom (fig 5.15, 2). Less often the lower part is oval (fig. 5.15, 4). The transition from the lower to upper body is usually gradual and smooth. In some examples however, the join of the two sections is marked by an abrupt bend in the wall (fig. 5.14, 1-3). Such examples are more common among the shallow vessels. Another variation of the basic shape is seen in a few vessels which have their upper walls concave (fig. 5.14, 5). Two whole painted vessels offer a more complete example of this shape (fig. 5.34, 3).

Vessels with medium depth predominate the sample of reconstructable pots at 67%. Deep vessels (fig. 5.15, 4) are slightly more common than the shallow ones (fig. 5.14,

3-4) with proportions of 18% and 14% respectively. Sting-hole lugs have been found in only two vessels (fig. 5.15, 3). In both cases they are set around the greatest diameter.

Rim diameters range from 6 cm to 30 cm, the most common group being between 10 cm and 20 cm (fig. 5.28). Basal diameters range from 3 cm to 8 cm.

5.3.7 Open vessels with rim angle from 60° to 84°

This is a common vessel form amounting to 23% of the monochrome pottery (680 sherds), (fig. 5.45). The rim angle ranges from 84° to 60° but the greatest concentration of values occurs towards the upper limit: only 30% of the sample have rim angles smaller than 70°. The sample includes 120 reconstructable sherds and one whole vessel.

Vessels show a variety of shapes. Forms resembling sections of sphere, ovaloid, ellipsoid and cone have all been found. Rounded forms are more common and only 9% of the vessels are conical. Despite the low frequency of the conical forms, the single whole vessel has a conical shape. It is a large pot supported by a flat angular base (fig. 5.17, 3).

Among the round vessels, ovaloid bowls are the most frequent (fig. 5. 16, 1, 3, 5-8). A few of them have concave upper walls (fig. 5.16, 5-8). Ellipsoid forms are usually confined to shallow vessels (fig. 5,18).

Lugs are absent from the monochrome and decorated sherds of this vessel form. Nevertheless, their use should not be completely discounted, at least for the deep and medium vessels. Medium and shallow vessels predominate the sample with 58% and 40% respectively. Deep vases are rare, at 2%.

The rim diameter ranges from 8 cm to 30 cm with the most common group being between 10 cm and 26 cm (fig. 5.29).

5.3.8 Open vessels with rim angle smaller than 60°

This is a fairly uncommon vessel category amounting to 6% (170 sherds) of the plain pottery (fig. 5.45). The rim angle ranges from 59° to 30° with the most common group being between 55° and 40°. A large number of reconstructable sherds has been recovered (130), but only one whole vessel. The large number of reconstructable sherds is explained by the fact that as the great majority of vessels are shallow (89% of the sample), their original height can be estimated even from smaller fragments.

Apart from a few (12) conical examples (fig. 5.19, 2, 5, 10), all sherds have a round profile. Their shape resembles to a shallow section of an ellipsoid (fig 5.19, 1, 3-4, 6-9). A number of them have concave walls (fig. 5.20, 1-2, 4-6). Since there is not a single vessel with lugs and most of the pots are shallow, it seems that this vessel form did not have lugs as accessories.

The rim diameters range from 6 cm to 32 cm with the most common group being between 12 cm and 22 cm (fig. 5.30).

5.3.9 Handles

Handles are present on a number of whole or reconstructable plain vessels. Most often however, lugs are broken off the vessel where they were attached. The great majority of handles are simple string-hole lugs. Unpierced, knob-like and ledge lugs (pellets) were only occasionally used. Strap handles are absent.

There is no evidence for a restricted use of lugs on coarse textured vessels. Instead, they are commonly found on fine and medium textured pots. String-hole and knob lugs are used on both coated and uncoated vessels. In fact, the relative frequencies of coated/uncoated string-hole lugs are the same as those of coated/uncoated vessels. Red-brown slipped lugs amount to 44%, pink coated to 27%, beige unslipped to 29% and

red-brown unslipped to 2%. All examples of ledge lugs (4 sherds) come from coated pots.

Sting-hole lugs: Depending on the size of the vessel, lugs range from tiny pellet-handles to large ones. The majority of them are of medium size. Most lugs have circular or oval sections, but a few examples with a conical section are also present.

Among the fifteen examples of whole/reconstructable vessels with lugs, only two open pots are included. This suggests that lugs were mainly attached to closed vessels. In fourteen of the reconstructable examples, four equally spaced lugs were set around the greatest circumference. In one vessel, only two lugs were used. Lugs were either vertically or horizontally pierced. The studied sample of monochrome pottery included 339 sting-hole lugs and 1227 base sherds. From these it can be estimated that lugs were attached to 25%-30% of the Nea Nikomedeia vessels.

Unpierced lugs: In this group knob-like and ledge lugs (pellets) are included. These are rare features of the Nea Nikomedeia vessels. From the main excavation area (main grid) only thirty six sherds with single knobs or pellets have been found (fig.5.24, 8-10).

Most of them are small and as they are applied to thick walled vessels it seems that they were decorative rather than utilitarian. In Nea Nikomedeia, groups of knobs or knobs associated with raised strips are common motifs of the applied decoration (section 5.4.3; fig.5.37). Similar examples have also been found at other Neolithic sites (Milojčić 1971, fig. XII, 7; Weinberg 1962, plate 52, d and plate 53, c, 5; Gimbutas 1989, fig. 5.65, 12-14).

Thus, from the sample of thirty six sherds only five knobs and four pellets are thick enough to have been used as lugs. From these, four knobs have a circular section and the fifth is triangular. Pellets are 2 cm to 6 cm long, and they have an almost conical section.

Specialized handles: In this category four strangely shaped handles are included (fig. 5.24, 11-12). They consist of a thick core which has the shape of a section of cone. This is covered by an external layer, whose top surface has an oblong slot which exposes the central core (fig. 5.24, 12). Two slots are cut along the centre of the two side surfaces.

In two of the handles the surface layer is pink coated while the third example is red-brown slipped. In all cases, the coloured layer stands out against the uncoated core. One of the examples is attached to a rim sherd showing that the handle was set just below the rim (fig. 5.24, 11). Handles similar to those described above are not reported from any other Neolithic site of the Balkan area.

5.3.10 Bases

Nea Nikomedeia vessels usually have low ring and flat bases. Round bottomed examples are rare and only a few pedestal bases have been found.

Ring base: Ring bases amount to 47% of the sample of base sherds. The height of ring ranges from 0.5 cm to 1 cm and only rarely reaches 2 cm (fig. 5.21). The concavity of the bottom is usually pronounced apart from some examples which look like flat bases with a slightly concave centre (fig. 5.21, 2, 6, 8).

Flat base: 45% of the vessels have a low flat base. Two varieties of this type can be distinguished. In the first, vessels are supported by a low foot whose height ranges from 0.5 cm to 4 cm (fig. 5.22, 1-5). Seen only from the exterior (not a cross section), it cannot be distinguished from a ring base. In the second variety, the transition from base to body is marked by a slight concavity on the profile of the vessel (fig. 5.22, 6-10). This variety is slightly more common than the first one.

Rounded base: True round bottomed vases are almost absent (fig. 5.23). Most of the examples incorporated in this group, are rather flat bottomed vessels with a round

transition from the base to body. This type of base was encountered in 8% of the vases.

Ring, flat and rounded bases are found in all vessel forms. The base thickness ranges from 9 mm to 30 mm. It has been noticed that flat bases are usually thicker than the ring bases, whereas rounded bases are comparatively thin, having the same thickness as the body walls. The majority of bases are almost circular, but a few oval and rectangular examples are also present (10 oval and 7 rectangular bases; fig. 5.9).

The diameter of circular bases ranges from 3 cm to 14 cm, the most common group being between 4 cm and 10 cm (fig. 5.33). The longest diameter of oval bases measures between 6.5 cm to 14 cm. All rectangular examples are broken, but it seems that they are longer than 5-6 cm.

Simple short bases such as those described above, are the common feature of all Neolithic sites of the Balkan region. Rare oval bases have been found in the Thessalian sites (Theocharis 1967, plate XXIV, B; Milošević 1971, fig. XIV, 1-4), Serbia (Wijnen 1979, p.193) and Vršnik (Garašanin 1982, p.90). It should be noticed however that vessels from the FTN sites often have elaborate bases with a wavy contour, quartefoil and cruciform shape. Such examples are common in Amzabegovo (Gimbutas 1976, fig. 18; Garašanin 1971, fig. 4 and fig. 5), Cîrcea (Nica 1977 fig. 7) and the Bulgarian sites (i.e. Asmaška, Muldava: Fortier 1981, fig. 75; fig. 85; fig. 88). Rare examples have also been found at Podgorie (Lera 1983, plate I, 6). Such bases are absent from Nea Nikomedeia, Serbia and the Thessalian sites.

Pedestal bases: Pedestal bases are a rare feature of the Nea Nikomedeia vessels. Only fifteen examples have been found during the excavations. These include two miniature "egg cups" which are the only cases where both the conical base and the supported vessel are preserved (Rodden 1962, fig. 9, P2).

The remaining pedestals are broken off the vessels. The majority of them (11 examples) have a compact cylindrical stems which opens to a conical foot at the base (fig. 5.23, 4-6). There are only two whole pedestals and their heights are 6 cm and 8 cm respectively. One of the broken bases reaches 8 cm, suggesting that taller bases were used as well. Basal diameters range from 5 cm to 8 cm, with 5 cm and 6 cm being the most common.

Present are also two short, carelessly made examples. Their heights are 2.5 cm and 4 cm respectively. They look as though a round lump of clay has been pressed at the sides; a round opening at the base has been made by pressing in the thumb. Their basal diameters are 3 cm and 4.5 cm.

On the basis of the miniature "egg-cups", and by comparison with examples from other sites, it seems that the pedestals supported open, carefully made vessels. The miniature vessels and two of the larger examples are unslipped. All the other pedestals are red-brown slipped.

Pedestal bases similar to those from Nea Nikomedeia have been found at Early Neolithic Otzaki (Milojčić 1971, fig. 15, 10-12) and Soufli Magoula (Gallis 1982, fig. 2, 13) in Thessaly. At both sites, as in Nea Nikomedeia, such examples are rare.

A few of the Nea Nikomedeia pedestal bases have been found in spits that contained some Late Neolithic sherds. But as these bases do not differ in shape, fabric and surface treatment from the Early Neolithic examples, they are included in this study.

5.3.11 Legs

A small number of clay legs (10 examples) have been found during the excavations at Nea Nikomedeia. They usually are cylindrical in form, sometimes tapering towards the base (fig. 5.24, 1-6). Their height ranges from 2 cm to 5 cm and their larger diameter

measures between 2 cm and 4 cm. Although none of the legs are attached to a pottery fragment, it seems more probable that they were supports for polypod vases or small "altars", rather than being parts of figurines. Figurines from Nea Nikomedeia have plump legs which are modelled together with the buttocks (Nandris 1968). Moreover, figurines are usually unslipped, whereas most of the legs included in the sample have a surface coating. Red- brown slipped and pink coated examples are present, with the later being more rare.

One miniature vase on four legs (two legs are missing, fig. 5.24, 7), shows that polypod pots were in use at Nea Nikomedeia and that the legs described above, could have been used in a similar way. It is probable however that some of them could have been used as supports of small "altars". At Achilleion, throughout the Neolithic occupation of the site, small legs similar to those from Nea Nikomedeia were used for supports of small triangular or rectangular "altars" (Gimbutas 1989, fig. 7.63- fig. 7.67). Similar "altars" have been found at Prodromos (Theocharis 1973, fig 12; fig. 214).

It seems that polypod vessels were absent from the Thessalian sites since not a single vessel is reported from the region. It should be noted however that a few legs, similar to those from Nea Nikomedeia, have been found at Otzaki (Milojčić 1971, fig. X, 28). Similar broken off legs have also been found at Servia (Wijnen 1979, p.194) and Vashtëmi (Korkuti 1982, plate III, 1-10).

Polypod vessels are present in the FTN sites: examples have been found at Vršnik (Garašanin 1982, p.90), Porodin (Grbić *et al* 1960, plate XXI 2, 4, 5) and Drenovac (Vetnić 1972, fig. 1, 12). A miniature vessel similar to that from Nea Nikomedeia has been found at Amzabegovo (Gimbutas 1976, fig. 23, 1).

DECORATED POTTERY

5.4.1 Introduction

Decorated pottery amounts to 4% of the ceramic material. It can be separated into pottery with painted, impressed and applied motifs. Painted pottery is considerably more common, forming 88% of the decorated vessels (fig. 5.2). Impressed pottery and pottery with applied decoration amount to 9% and 3% respectively (fig. 5.2). All three decorative types were simultaneously in use.

Painted pottery has been studied by Biernoff and Washburn. In his Ph.D thesis, Biernoff presents the shapes, fabrics and decorative patterns of the pottery (Biernoff 1969). Washburn's study concerns the organization of the decorative motifs depicted on the painted vessels (Washburn 1983, 1984).

In the pottery with applied decoration the decorative patterns range from complicated modelling of human faces, silhouettes and animal snouts to simple linear motifs. All face vessels have been studied by Nandris (1968). Apart from the description of the decoration, information on the shapes, fabrics and spatial distribution is also included.

Impressed pottery and vessels with simple applied motifs are subjects of this work and have been studied with the same methodology used for the plain pottery. In order to give a coherent picture of the decorated pottery from Nea Nikomedeia, a summary description of the painted pottery and the face vessels is included. This description is partially based on the works mentioned above.

5.4.2 Painted pottery

Painted sherds amount to 88% of the decorated pottery. On the basis of the colour of the decoration, two groups of painted pottery were distinguished. One group includes sherds with red patterns set on a white background (R/W: photo. 5.1). Sherds of the second group have white patterns on a red surface (W/R: photo. 5.2). R/W vessels form the great majority as they amount to 96% of the painted pottery (fig. 5.2).

Red on White painted pottery: According to the quality of finish, two varieties within this group were distinguished: the Standard R/W Ware and the R/W Porcelain Ware (Rodden 1962; Biernoff 1969). Standard Ware is considerably more common. It amounts to 92% of the painted pottery whereas only 4% belongs to the Porcelain Ware (fig. 5.2). The remaining 4% of the painted pottery belongs to the W/R Ware.

In the Standard R/W Ware the exterior surface is usually covered by a cream-beige slip, but in a few cases red patterns are applied directly to the light coloured fabric surface. The interior surface, which is not painted, is covered with the reddish slip. The surfaces are usually burnished. It seems that the red paint retains its gloss better than the white, which now has a matt finish (Biernoff 1969). Both fine and medium textured sherds are included in this ware.

Porcelain Ware is differentiated by both its superior quality of burnish (porcelain-like finish) and the superior quality of the fabric used for the manufacture of a number of the vessels. As has been seen in Chapter 4, seven out of the eighteen thin sections of Porcelain Ware, belonged to a very fine textured fabric group (section 4.5.8). Porcelain vessels are painted only on the exterior surface but, in contrast with the Standard Ware, both their exterior and interior surfaces are covered with a cream coloured slip.

White on Red painted Ware: Vessels in this group have both their exterior and interior surfaces covered with a red slip. Decoration is restricted to the exterior surface where the designs are painted with a white paint.

Decoration: Solid and linear elements were both used for the decoration of the painted sherds. Solid elements include triangles, squares and bands. Linear elements include straight, zig-zag and wavy lines and simple curved lines. The syntax of the Nea Nikomedeia decoration is difficult to reconstruct as the majority of sherds are fragmented. Washburn (1984) has reconstructed eight patterns (Classes A-H) which all come from the Standard R/W Ware. In the other two categories (Porcelain Ware and White on Red Ware), only fragmentary combinations of motifs could be recognized. It is clear however, that differences in the selection and combination of motifs is evident among the three painted Wares (see also Biernoff 1969). In all cases however motifs cover the entire design field between the pot rim and base.

Standard Ware: This ware is unified by the bold, simple character of the decorative motifs. Eight types of pattern were reconstructed comprising: two triangles (simple and double) placed back to back (fig. 5.34, 1-2), a series of isosceles triangles pendant from the rim line (fig. 5.34, 3), two rows of interlocking isosceles triangles (fig. 5.34, 4), interlocking diamonds (fig. 5.34, 5) and step designs (fig. 5.34, 7). Linear elements which are less common than the solid ones, include series of vertical zig-zags extending from the rim to base (fig. 5.34, 6), series of wavy lines extending vertically or diagonally from the rim to base (fig. 5.34, 8) and occasionally square-cornered elements associated with wavy lines.

Porcelain Ware: Linear and curvilinear elements seem to be more common in this ware. They include curved units, perhaps spirals (fig. 5.35, 1), thin lines around the rim,

thin lines crossed at right and acute angles associated with square and triangular designs (fig. 5.35, 3-4) and thin parallel lines in series frequently bent at right angles.

White on Red: Instead of being negative copies of the Red on White pottery, White on Red sherds have a different character. Both linear and solid elements were commonly used in the decoration. They include diagonal parallel lines from the rim to base and groups of short wavy parallel lines (fig. 5.35, 11-12). Combinations of both straight and curved lines (fig. 5.35; fig. 5.10), and triangles with solid bands are also present (fig. 5.35, 6-7).

5.4.3 Applied decoration

In this section, pottery is presented according to the subject of the decoration. Vessels with human faces, animal snouts and human silhouettes are described one at a time. Vases with simple linear motifs, although sometimes related to the face vessels, are presented separately.

Face vessels: Ten sherds with representations of human faces, three with animal snouts and two with human silhouettes have been found (Nandris 1968). Most of them are very fragmented so that only parts of the decoration are shown.

In vessels with human faces the modelling starts a few centimetres below the rim and the facial features regularly shown are eyes, nose and ear (Nandris 1968, fig.3, fig. 4, fig. 25; Theodoridis 1973, fig. 279-220). The mouth was only occasionally modelled and in one sherd arms were added. At least three of the examples are representations of male faces since a beard has been added. It should be pointed out that male representations are absent among the anthropomorphic figurines from Nea Nikomedeia.

Two of the zoomorphic vessels have a snout modelled just below an everted rim (Nandris 1968, fig. 28). The third example has a prominent nose, a marked bump on the

forehead and eyebrows which are curving out over the eyes.

One of the sherds with human silhouettes carries a representation of a female figure; its upper part is missing (Nandris 1968, fig. 26). The pubic triangle and the navel are incised, whereas the legs are applied strips which are bent outwards at an angle. On the other sherd, the head and upper part of a torso are represented (Nandris fig. 26). The arms are zig-zag strips.

In all face vessels the features were separately applied on the vessel and then were smoothed off into the surface. Traces of paint were present only in one vessel, in the form of white encrustation filling the eyes, but it is possible that this practice was more widely practised. Surface coating is common among the face vessels. There are four red-brown slipped and two pink coated examples. All have traces of medium to poor burnishing.

Faces were sometimes modelled on small, thin walled vessels (e.g. with a wall thickness of 2.5 mm), but the majority of them belong to medium-large, thick walled vessels. The height of one such vessel was calculated to be at least 40 cm.

Vessels with simple applied decoration: Vessels with simple applied decoration were rather scarce. During the excavations of the main grid, only a small number of sherds (85) has been found. They are decorated with simple linear and solid elements. Linear elements include straight or curved raised bands, right or acute angled lines and more rarely, zig-zags (fig. 5.36). Solid elements include simple blobs and pellets (fig. 5.37).

The syntax of the decoration is difficult to reconstruct since all the examples are fragmented. By comparison with the sherds with human silhouettes discussed above, it seems probable that some of the angled bands and zig-zags were parts of a similar decoration (fig. 5.36, 1,7). Combinations of linear and solid elements are suggested by two sherds, which have a blob set below a straight band (fig. 5.37, 5-6). Groups of blobs form

another decorative pattern: on a number of sherds (5), two or three blobs are placed one next to the other (fig. 5.37, 2-4). Moreover, sherds with single blobs and pellets are commonly found (fig. 5.35, 1,7).

Decorative elements were usually placed somewhere on the belly of the vessels. This is suggested from the fact that among the 85 sherds, there are only seven rim sherds and four concave sherds coming from near the rim line. The remaining examples belong to body sherds. From the rim sherds it can be seen that linear motifs were usually set horizontally a few centimetres below the rim line (fig. 5.37, 7). In one case however, a raised band starts at the lip and continues vertically along the collar of a neck jar (fig. 5.36, 2).

Red-brown slipped and pink coated examples are common among the vessels with simple applied decoration, amounting to 34% and 22%, of the pottery (fig. 5.43). They are usually burnished and the quality of burnishing ranges from poor to medium, but only traces of the burnishing are usually visible. Uncoated vessels are always smoothed but only a few of them have traces of burnishing.

5.4.4 Impressed decoration

Vessels with impressed decoration amount to 9% of the decorated pottery (fig. 5.2). Decoration is restricted to the exterior surface of the vessels. It consists of impressions of finger-tips and finger-nails and also of impressions made either by finger-pinching or with an instrument. Each vessel usually carries one type of decoration, but some sherds with a combination of two decoration types have also been found.

Decoration was executed when the clay was still soft or leather hard. A number of vessels have a surface coating on their exterior, impressed surface. In fact, 8% of impressed sherds are red-brown slipped and 5% have a pink coating (fig. 5.43). All

examples have a low relief, so that the coating covers adequately the impressions. Depending on the vessel's contour (open/closed), the interior surface can be coated and burnished, smoothed and slightly burnished or only smoothed. It should be pointed out that only medium and poorly burnished surfaces are encountered among the impressed sherds.

Syntax of decoration: Although most of the sherds are fragmented, enough information is still available to reconstruct the syntax of the decoration. The most common practice, which is encountered in all types of impressed decoration, is for the surface of the vessel to be subdivided into three zones: the belly of the vessel which is covered with impressions and two horizontal zones around the rim and foot which are left undecorated. By slightly burnishing the smoothed zones, the decorated belly stands out against a slightly darker surrounding area.

The smooth zone below the rim can be considered as a rule since it is present in 90% of the rim sherds. It ranges from 1.5 cm to 10 cm with the most common group being between 2 cm and 4 cm (fig. 5.38, 2-9). An undecorated zone measuring up to 4 cm, is found in half of the base sherds. In the other sherds, the impressions continue up to the base and in a few cases continue even below the base. Moreover, two sherds should be mentioned which are decorated only below the base (fig. 5.39).

An undecorated zone was sometimes left at the belly of the vessel as well. On a small number of sherds (3 examples) finger-pinched impressions surround an undecorated area. It is probable that this zone was restricted to this type of decoration which produces the most rough and densely decorated surfaces, and it is against such a background that an interplay of smooth and rough areas would have a more decorative effect.

Pottery decorated with finger-tip impressions: This is a rather rare type of decoration since it is encountered in only 5% of the impressed vessels. The decoration consists of shallow circular or slightly oval impressions made when the finger-tips are pressed on the soft clay (photo. 5.3). In a few cases the impression of the nail is also visible. Impressions are arranged slightly apart in parallel vertical and horizontal rows. In all cases the decoration is very carefully executed and the exterior surface is rather smooth. Vessels with a surface coating are common and almost half of them are red-brown slipped or have a pink coating.

Pottery decorated with finger pinching: This is the most common type of decoration and it is found in 71% of the impressed pottery. The impressions were made with the thumb and fore-finger which are pressed together so that the clay was squeezed into bulges (photo 5.5 and photo 5.4, sherd in the lower left corner; fig. 5.38, 1-5). Often one finger was pressed into the clay and then slightly moved to one side. Thus, a small depression with a bulge at its side was made (photo. 5.6). It is probable that some of these impressions were made with instruments.

All vessels have a surface covered with dense horizontal and vertical rows of impressions. Some pieces were carefully decorated with the rows of finger-pinchings being nearly horizontal or vertical (photo. 5.4); other pieces were decorated with less care (photo. 5.5). The size of impressions vary considerably; there are sherds with very small depressions and a coffee-bean-like relief and others with a very rough relief. In a few cases the finger-pinchings are very small and appear to be made by a child. Similar impressions however can be produced by instruments. Vessels with a surface coating amount to 13% of this group.

Pottery decorated with finger-nail impressions: Sherds decorated with finger-nail impressions amount to 18% of the impressed pottery. They can be separated into two groups. The first group includes sherds decorated with repeated impressions of single finger-nails (fig. 5.38, 6-7; photo. 5.7). On a number of sherds impressions were made with the finger-nail and with part of the tip of the finger as well. Thus, these impressions are wider and have an oblong shape. Sherds decorated with single finger-nail impressions amount to 13% of the impressed pottery. Impressions are usually carefully set in horizontal and vertical rows, but sometimes they are scattered without any order.

In the second group, the nails of both the thumb and fore-finger were pressed into the clay (fig. 5.38, 6; photo 5.4, the two sherds on the right). The pattern is similar to that made by finger pinching, but since the nails are not pressed together, the sherds look smoother and lighter than the densely decorated finger-pinched examples. A few sherds have an intermediate decoration, as one finger and one nail are pressed into the clay (fig. 5.38, 5). Decorating the vessels with double nails was not common and only 5% of the impressed pottery belongs to this group. In all sherds the impressions are carefully executed. There are two pieces with very small impressions which were made either by a child or with an instrument.

Finger-nail impressions (single or double) are sometimes difficult to be distinguished from impressions made with an instrument which has a straight edge. The latter, are usually straight and longer, but a differentiation is not always possible.

Vessels with a surface coating amount to 33% of the vessels with double impressions and to 19% of those with single nail impressions.

Pottery decorated with the help of an instrument: Sherds decorated with instrument impressions amount to 6% of the impressed pottery. The decoration ranges from simple scratches to circular, oblong, triangular and short straight impressions. The instruments used for the decoration were probably bones, edged stones, reeds or dried plants. Sherds with a surface coating amount to 11% of the sample.

Sherds decorated with scratches amount to 4% of the impressed pottery. This decoration is characterized by a poor selection of short straight parallel lines, angled lines, crossed lines and zig-zags. The scratches are scattered on the vessel's surface without following any pattern. On one sherd for example, a few crossed lines appear 1 cm below the rim and below them, short straight lines are sparsely distributed (fig. 5.38, 10-11).

The remaining sherds are very few (9 examples). From these, three examples are decorated with circular impressions, one with semi-circular and two with oblong impressions (fig. 5.38, 9). All examples were carefully decorated, having their impressions set in vertical and horizontal rows. In two cases, circular impressions were made with an instrument which had long parallel scratches on the exterior surface, probably a bone or reed. From the remaining sherds, two were probably decorated with small triangular impressions, but their form is not clearly distinguishable. Last, one sherd with oblong impressions combined with angled lines has been found.

Finally, two bases with impressed decoration should be described. Their decoration is confined to areas which are not usually visible as the impressions are set on the exterior surface of the base. Both examples are broken and almost half of the decoration is missing. However it is clear that the decoration was not extended to the vessel's body (fig. 5.39). The designs are made up of very small impressions, the size of a pin-head.

In the first base the decoration consists of a central floral motif surrounded by one

circular and two arch-shaped designs. Three thin girdles are set on the edge of the surface (fig. 5.39, 1). The bold motifs are made from numerous impressions, while the thin girdles comprise a single row of impressions. The designs are carelessly executed. The decorative pattern of the second base is more simple. It consists of a number of straight lines radiating from a central point (fig. 5.39, 2). All the lines are made up of a single row of impressions.

Both bases are short and flat, and their diameter is 7 cm and 5 cm respectively. The impressed surfaces are smoothed, but the exterior walls of the vases are coated with a red-brown slip.

5.5 Comparative study of plain and decorated pottery

5.5.1 Comparison of fabric types and quality of paste

The fabrics used for the manufacture of painted pottery have been presented in Chapter 4. It was seen in section 4.5.8, that although the majority of painted vessels were made from the same fabrics used for the plain pots (mainly fabric A), two different fabrics (Group B and C), were used exclusively for the manufacture of painted vessels.

Impressed pottery and pottery with applied decoration were made from the same fabrics used for the manufacture of plain vessels. Their relative frequencies are given in figure 5.42.

From figure 5.42 it can be seen that a considerably larger amount of impressed and pottery with applied decoration were made from fabrics D and E. Indeed, 21% of the impressed and 27% of the pottery with applied decoration was made from fabric D. This fabric was used only in 3% of the plain vessels. Similarly, 16% of the impressed and 19% of the applied vessels were made from fabric E, which was used for only 4% of the plain

pottery. In impressed pottery, fabrics D and E were used at the expense of fabrics B and C. In the pottery with applied decoration, it is fabric A which is less frequent.

In both impressed and applied pottery, the increase in the frequency of fabric D is accompanied by a rise in the number of red-brown unslipped vessels (fig. 5.43). Such examples amount to 15% of the impressed and 26% of pottery with applied decoration, whereas red-brown unslipped vessels comprise only 3% of the plain pottery. A similar correlation between fabric types and decoration has been noticed at Prodomos (Chourmouziadis 1971a).

When comparing the quality of the paste of plain and pottery with applied decoration (fig. 5.44), it can be seen that the latter contains a considerably larger proportion of coarse sherds (42%) as opposed to only 6% of the plain vessels. In contrast, impressed decoration has not been used widely on coarse textured sherds as 52% of the sherds are fine textured, 26% are medium and 22% coarse (fig. 5.44). These proportions are similar to those obtained from the plain unslipped sherds (fig. 5.41).

5.5.2 Comparison of shapes of plain and decorated vessels

From the drawings of the painted vessels presented by Washburn (1984), the relative frequency of each vessel form has been estimated (fig. 5.45). In the same figure (fig. 5.45) the relative frequency of the shapes of impressed and plain vessels is presented. For the vessels with applied decoration, percentages could not be estimated since the sample of rim sherds is very small, consisting of four rim sherds with face vessels, and seven sherds with simple linear motifs. The remaining examples belong to body sherds.

Comparing these figures it can be seen that the decorated and plain vessels have a comparable repertory of shapes, but some differences do exist. In the case of the painted pottery, the differences concern the relative frequencies of neck and hole-mouthed jars.

Hole-mouthed jars are slightly more numerous, being twice as frequent in painted pottery than in plain. Neck-jars in contrast, are virtually absent amongst the painted vessels (only one example).

In the case of impressed pottery, an increase of the slightly closed vessels (rim angle from 91° - 114°) and dish-like pots (rim angle smaller than 60°) can be seen. These shapes were favoured at the expense of neck and hole-mouthed jars, which are absent. A decrease in the number of open vessels with straight walls (rim angle from 85° to 90°) is also noticed. The absence of neck jars among the impressed pots (and probably also among the painted) could be explained by the fact that the decoration was not extended up to their collars. Whole neck jars from other sites (e.g. examples from Porodin at Bitola Museum) show that impressed decoration was restricted to the body of the jars.

The few rim sherds with applied decoration belong almost exclusively to neck jars and open vessels (rim angle from 60° to 84°) with concave upper walls. Five out of the seven rim sherds with simple linear motifs and one face vessel belong to neck jars with high concave collars. The remaining face vessels (3 sherds) and one sherd with linear motifs are from open pots (rim angle from 80° to 60°). There is only one example of a slightly closed vessel. Neck jars and open vessels with concave walls must have been common among the pots with applied decoration, since many body sherds from near the rim-line show a pronounced concavity (fig. 5.37, 4-6). This indicates that in the case of vessels with applied decoration there is a correlation between vessel form and decoration.

Apart from the differences in the amount of some vessel forms, painted and impressed vessels have similar contours with those of the plain pottery. Their upper walls are usually straight, but slightly concave or convex examples are also present. Their lower parts are round or oval. However a difference in the size of the vessels is noticeable. In painted

vessels the rim diameters range from 12 cm to 23 cm, the most common group being between 13 cm and 21 cm (fig. 5.31). These figures show that painted vessels are of medium size as both small (rim diameter up to 6 cm) and large (rim diameter up to 32 cm) examples are absent. Such vessels, although rare, are present in the plain pottery.

Similarly it seems that impressions were not applied to small vessels, since examples with rim diameters smaller than 12 cm are absent among the impressed pots. Their rim diameters range from 12 cm to 32 cm, the most common group being between 18 cm and 30 cm (fig. 5.32).

Among the painted vessels, lugs are present in only one hole mouthed jar (fig. 5.35, 2). Also, none of the impressed sherds have lugs or bear scars made from the attachment of lugs. It would therefore seem that lugs were restricted to plain vessels. However, it should be pointed out that the majority of lugs are broken off the vessels. In case that lugs were not decorated (painted or impressed), it is impossible to distinguish whether the broken off lugs belong to plain or decorated vessels.

Painted pots are usually supported by short ring bases but one flat bottomed example has also be found. Their diameters range from 4 cm to 6 cm. Impressed vessels are supported by ring and flat bases; few round bottomed examples have also been found. Their diameters range from 6 to 10 cm. One sherd with diameter around 16 cm is probably from an oval base. A similar oval example has been found among the painted vessels (Biernoff 1969).

5.6 Intra-site development

Excavations at Nea Nikomedeia have revealed that during the Early Neolithic occupation there were two building phases. Study of the painted pottery (Biernoff 1969) concluded that there is no difference between the two phases, both in the types of decoration (R/W, W/R) and in the decorative motifs.

Study of the plain pottery shows that the same fabric types, coated/uncoated ware and vessel forms were in use in both building periods. This uniformity of ceramic material, suggests that Nea Nikomedeia was occupied by the same community during the two building periods.

However, it might be expected that the ceramic material from the two phases could show differences in the relative frequencies of the fabrics, shapes and surface treatment. These differences would reflect altered preferences among the inhabitants of the two phases due to changes in the economy, function of vessels, availability of raw material, and/or the state of technological development. In order to check whether any such differences were discernible, the plain pottery from the two periods has been comparatively studied.

The studied sample of the rim sherds of plain pottery consists of 1703 sherds from the First building period, 214 sherds from the Second period and 916 sherds from spits with mixed material from both periods. The sample from the Second building period is small because unmixed material from this period has been found only in seven spits. The relative frequencies of vessel forms, coated/uncoated ware and fabric types has been calculated for each period.

The relative frequencies of neck jars, open and closed vessels from the First and Second building periods, are given in figure 5.46. In the same figure the values of the

relative frequencies for the spits with mixed material are included. From figure 5.46 it can be seen that the proportion of the three structural classes is similar for the two building periods.

The examination of the relative frequency of the different vessel forms present in the two periods has given similar results (fig. 5.47). Moreover, variations in the profile (e.g. concave/convex/straight walls) of the vessels from the two periods are not observable. The amount of deep, medium and shallow vessels seems to remain constant. Note however that only a small number of whole/reconstructable vessels has been found in spits with material from the Second period.

The percentage of red-brown slipped, pink coated, beige and red-brown uncoated vessels, as well as the relative frequency of the fabric types present in each period are given in figure 5.48 and 5.49 respectively. From figure 5.48 it can be seen that the ratio of coated and uncoated vessels remains constant. Moreover, the fabrics used for the manufacture of vessels are the same in both periods, and they increase in frequency from fabric E to fabric A (fig. 5.49). Only one difference is noticed in the amount of fabric B, which seems to have been used more frequently during the Second phase of occupation.

The frequency of fine, medium and coarse textured vessels does not change from one period to the other. Moreover, macroscopic examination of the vessels shows that there is no difference in the firing of the vessels.

The relative frequency of the different types of impressed decoration present in the First and Second building periods is given in figure 5.50. It can be seen that all decorative types were in use throughout the occupation of the site, and that they have the same order of frequency (finger pinchings are the most common, then single nails, double nails, and instruments). According to figure 5.50 there are some differences between the First and

Second periods in the relative amounts of finger pinchings and nail impressions. It should be pointed out however that the sample of impressed sherds from the Second period is small (26 sherds).

Conclusion: It is clear from the above analysis that the pottery from the First and Second building periods shows a striking uniformity. The relative frequencies of shapes, surface treatment and fabric types do not show any differences that could be related to an economic, functional or technological change. During the Second period of occupation there is a slight increase in the use of fabric B, but it is not accompanied by any other technological development. On the contrary, the Nea Nikomedeia potters show a persistence to their potting tradition.

Study of the Early monochrome pottery from Sesklo (Wijnen 1981) concludes that the amount of fine and medium textured vessels increases with time at the expense of those with a coarse texture. This was accompanied by an increase in the amount of open vessels and an improvement in the firing of the pots. At Early Neolithic Achilleion, in the strata with decorated pottery (Achilleion Ib-II: Gimbutas 1989), a development in the repertory of vessels is noticed as high necked jars and vessels with S-profile, appear at a later stage. Moreover, an improvement in slipping, firing and levigating the paste of the vessels is apparent, with time. A similar technological improvement is noted between Anzabegovo Ia and Ib (Gardner 1976). This is accompanied by the introduction of a new type of pottery decoration (impressed).

Therefore it seems reasonable to conclude that, at Nea Nikomedeia after the destruction of the First settlement, the rebuilding of the site followed rather shortly. Moreover, the uniformity of the ceramic material suggests that the site was not occupied for a long period of time.

CHAPTER 6

FUNCTIONAL ANALYSIS OF VESSELS

6.1 Introduction

In recent years, a considerable amount of archaeological research has been oriented towards the functional analyses of ceramics. Such studies are based on information obtained from two intercorrelated approaches: ethnoarchaeological research and technological investigation of experimental pottery.

The ethnography of pottery has a greater literature than any other material culture analysis. Studies generally give information on the number of pots in individual households, on their form and stated use. A review of the literature can be found in Kramer 1979 and Rice 1987. In more recent works, information on vessel life expectancy and recycling of ceramics, is included (e.g. Foster 1960; David and Henning 1972; Stanislawski 1977; DeBoer 1974; DeBoer and Lathrap 1979; Longacre 1985).

Technological investigation provides information on the contribution of different materials (types of fabric and non-plastic inclusions) and techniques, to vessel suitability for particular functions. Such studies have developed mainly after the 1970's. A review of the research into the mechanical and thermal properties of ceramics can be found in Bronitsky (1986).

Functional analyses of Early Neolithic ceramics from the Balkans have been published in two works. The first concerns the material from Early and Middle Neolithic Franchthi

(Vitelli 1989). This study, concludes that pottery manufacture was very infrequent during the Early Neolithic period, with an average production of 12-13 pots per year. From the estimated number of vessels, Vitelli concludes that the inhabitants of Early Neolithic Franchthi did not have enough vessels for seed or harvest storage. Furthermore, evidence for the use of ceramics for cooking could be found only in the Middle Neolithic material. In the second publication, Gardner (1978) examining the pottery fabrics from Amzabegovo, Achilleion and Sitagroi, concludes that vessels were not used near the fire. Instead, according to Gardner, vessels were used for storing, or as display dishes.

6.2 Estimation of the number of pots from Nea Nikomedeia

A rough sense of the scale of local pottery production is a basic prerequisite, for studying the function of vessels. In Nea Nikomedeia, as in every other Neolithic site of the Balkans, an impressive number of pottery sherds has been found.

The estimation of vessel equivalents may be accomplished by several methods (Millet 1979; Orton 1980). The method used for estimating the minimum number of pots from Nea Nikomedeia was determined by the available data. The total surface area of the recovered ceramic material (rim, base, lug and body sherds), from the main excavation grid, was calculated by Rodden (see Appendix A) to be equal to 1343400 cm². For the calculation of the average surface area of the Nea Nikomedeia pot, the following method was used by the present author.

Initially, the surface area of a slightly closed pot, was calculated. The measured vessel was chosen so because its ratio of rim diameter/height was equal to the estimated average ratio for this particular vessel form (see table 6.1). As has been explained in Chapter 5, the average ratio of rim diameter/height, was calculated from a number of whole and

reconstructable pots. For the calculation of the surface area of the slightly closed vessel, the pot was divided into a number of conical segments, of 1 cm height (fig. 6.1). The surface area of each segment was calculated from the following expression:

$$S = \pi * (R_a + R_b) * h$$

where R_a , R_b are the radii, and h is the height (1 cm) of the conical segment. The surface area of the base was added to the total.

From the histogram of rim diameters for the slightly closed forms (fig. 5.27), the surface area of each studied example, was estimated. Thus, the average surface area for the slightly closed vessel category was found. The basic assumption for this generalization, is that the ratio of rim diameter/height is constant. This means that by changing the rim diameter of the pot, all other dimensions (i.e. R_a , R_b , R_c ..., and h) would change proportionally.

The same method was used to calculate the average surface area of all other vessel forms. From table 6.1, the average surface area of the Nea Nikomedeia pot, was calculated to be equal to 1063 cm². Dividing the total surface area (1343400 cm²) of the recovered ceramic material from the main grid, by the average surface area of the Nea Nikomedeia pot (1063 cm²), the minimum number of vessels was found to be equal to 1264.

The underlying assumption of these estimations is that the number of sherds into which a vessel breaks is random, and independent of the size of the pot. In reality, larger vessels will break in a larger number of sherds. This will bias the distribution of rim diameters towards the larger values. Consequently, the estimated average area of the Nea Nikomedeia pot (1063 cm²), might be larger than the actual value. In this case, the minimum number of pots will be larger than 1264.

6.2.1 Recovery rate

Using the method described above, it was calculated that among the 1264 vessels, 7 impressed and 2 W/R pots, are included. During the study of impressed pottery, sherds belonging to at least 36 different vessels have been distinguished. That is, the sherds could be separated into 36 groups which differed either in fabric type, or decorative motifs or in vessel form. Similarly the W/R sherds could be attributed to 9 vessels at least.

This, suggests that the rate of recovery of ceramic material at Nea Nikomedeia, is around 20%. Taking into consideration that only 2/3 of the surface of impressed vessels and 1/2 of the surface of W/R pots was decorated, a value of 30% to 40% for the recovery rate of the ceramic material, must be more representative.

From the discussion above, it can be estimated that the number of vessels that entered the archaeological deposit of the main excavation grid at Nea Nikomedeia, ranges from 4200 to 3160.

6.2.2 Rate of production

In order to obtain a rough sense of the scale of local pottery production per year, an estimate of the time in which these deposits were formed, is needed. Taking into consideration that two building phases were distinguished by the excavator, the site should have been occupied for 50 years at least.

An upper limit for the duration of occupation, is more difficult to estimate. The recorded ceramic material used in this study, comes from the main excavation grid, where the thickness of deposits ranges from 60 cm to 20 cm. An indication of the length of occupation, could be obtained by comparing the depth of these deposits, with those of the contemporary Thessalian sites.

Although a direct relation between depth of stratigraphy and length of occupation does

not exist, an indication for the rate of the accumulation of deposit can be obtained.

As can be seen from table 6.2, the occupation deposit accumulated during the Decorated Phase in Thessaly ranges from 1.60 m to 4.20 m. On the basis of C¹⁴ dates, this period lasted for 250-300 radiocarbon years. Taking the lowest value (1.60 m), a period of 100 years would be suggested for the Nea Nikomedeia debris. Consequently, the occupation deposit from the main excavated grid most probably had been accumulated over a period of 50 to 150 years. It has to be pointed out, that these figures apply only to the deposits of the main excavation grid.

From the estimated number of years of occupation and the calculated number of pots, we arrive at an estimated annual production of 21 to 84 pots per year, for all the houses of the main excavation grid.

The annual production of vessels which has been calculated for an area covering 0.1 hectare, suggests that pots were produced frequently in Nea Nikomedeia, in contrast with Franchthi (12-13 pots per year for the whole site). This difference in pottery production, between the two Early Neolithic sites, could indicate different economic activities.

The fact that ceramic containers played an important role in the activities of the Nea Nikomedeia inhabitants, is also reflected by the variation in shape and size of the vessels. Pots range in shape from open dish-like bowls, to hole-mouthed jars. In size there is a continuous range from the miniature vessels, 4-6 cm in height, to the large neck jars which reach up to 60 cm in height. This suggests that vessels had a variety of functions. The functions of ceramic containers can be separated into three broad categories: processing of food, storage and transfer or transport (Rice 1987, p.208).

6.3 Function of vessels

6.3.1 Cooking vessels

Vessels used for cooking must have a good resistance to thermal shock in order to withstand repeated heating and cooling without fracturing (Rye 1981, p.26). Two factors are usually controlled by the potters: the shape of vessels, and the types of fabric used for the manufacture of pots. As far as the vessel's shape is concerned, angular pots are usually not used for cooking, because they have many points of stress which might initiate fracture when exposed to sudden changes of temperature. Instead, the majority of cooking vessels have rounded contours (Woods 1985).

The composition of the fabric may also be relevant. The use of different clays and tempers for different vessel forms or function classes of pottery, is widely known from the ethnographic research (Rice 1987, p.226). This is also attested by analyses of experimental ceramics (Rye 1976, 1981; Braun 1982, 1983; Bronitsky 1983; Steponaitis 1984). Pottery which contain inclusions in the pot fabric which have low coefficient of thermal expansion or one similar to that of the fired clay, should prove most resistant to the effects of thermal shock. Such inclusions are calcite, feldspars and grog (Rye 1981, p.31-36). Furthermore, large amounts of non-plastic inclusions, preferably coarse, will increase the porosity of the fabric. Porous fabrics maximize thermal shock resistance, because they allow the pot to expand and contract during the heating and cooling phases.

The non-plastic inclusions could be either added by the potters, or they could be naturally included in the original clay which has been used for the manufacture of pots. As was discussed in Chapter 4 (section 4.6.4) the Nea Nikomedeia potters were most probably using material from the original clay beds after a refining process.

If the Nea Nikomedeia potters were aware of the effects of the pottery fabric's

composition on the performance of vessels used for different tasks, a correlation between fabric types and vessel forms would be expected. In order to investigate this, the relative frequency of every fabric type, used in each vessel form, as well as the proportion of fine, medium and coarse textured paste encountered in each vessel form, have been calculated. They are presented in figures 6.2 and 6.3.

From figure 6.2, it can be seen that all fabrics were used for the manufacture of each vessel form. Moreover the relative frequency of each fabric type is similar in all vessel forms. Only two slight variations are noticed. In neck jars the use of fabric B is increased at the expense of fabric A. A slight increase of fabric B is also noticed in the open pots with rim angle less than 60°. In the case of neck jars, the increase of fabric B could be attributed to the rise of red-brown slipped pots (fig. 6.4, and 6.5). As was seen in Chapter 5 (section 5.2.1., and 5.5.1), there is a correlation between surface treatment and types of fabric.

Figure 6.3 shows that the relative frequency of coarse, medium and fine textured paste, is the same in each vessel form.

Therefore, the Nea Nikomedeia pots do not show any correlation between types of fabric or quality of paste, and vessel form. However the above conclusion does not exclude the use of pots for cooking. Fabrics A, B and C, are well suited for the manufacture of cooking vessels. Fabrics A and C, which have been used for the manufacture of 60% and 12% of the ceramic material, are rich in calcite and limestone inclusions (section 4.5.2, and 4.5.5). Fabric B (used for 18% of the vessels) contains abundant felspar and volcanic inclusions (section 4.5.3 and 4.5.4). Moreover, all types of fabric are rather porous.

The Nea Nikomedeia pots have rounded contours, a design which tends to eliminate

points of high stress. Round bases are not a common feature, amounting to 8% of the base sherds. Flat based vessels were more common, amounting to 25% of the sample. Although round bottomed bases might have a better thermal shock resistance, the archaeological record shows that flat based vessels have also been used for cooking (Woods 1986).

Ethnographic research shows that cooking vessels can have a variety of shapes, depending on the type of cooking (Linton 1944; Henrickson and McDonald 1983; Ericson *et al* 1972; Smith 1985). For boiling, slightly open or slightly closed vessels are regularly used. These forms are common in Nea Nikomedeia (fig. 5.45).

Another characteristic which can be used for the identification of cooking pots, is the detection of sooting and burning on the exterior surface of the vessels. The location of soot can indicate how the vessel has been used (Rice 1987, p.235). If the soot occurs primarily on the sides of a vessel, from the base up to or near the maximum diameter, the vessel was probably set in the fire. Vessels with soot on the base and sides were most probably suspended over the fire.

Among the whole pots found in Nea Nikomedeia, one askoid vessel (photo 6.1) has the larger part of the exterior surface covered with soot, apart from a lighter area near the base. This lighter area may be due to the exposure in hot oxidizing flames. Among the base sherds, there are examples with black patches on the exterior surface. Since most of the sherds are rather small, it is difficult to distinguish whether these black patches are the result of repeated exposure to fire, or are due to the original firing of the pots. It is worth mentioning however that black patches were noticed in 31% of the beige uncoated bases, in contrast to 12% of the red-brown slipped and 7% of the pink coated bases.

From the above discussion it can be concluded that definite proof of the existence of cooking pots made from a particular fabric type and/or with a specific shape, is not

evidenced in the Nea Nikomedeia material. However such a differentiation might require a long tradition in pottery manufacture and pottery use. The site of Nea Nikomedeia is dated at the early stages of ceramic production in the Balkan area. Moreover the majority of fabrics used by the Nea Nikomedeia potters were able to withstand the firing stress, and a whole vessel with sooting marks has been found.

The above discussion is based on the assumption that the inhabitants of Nea Nikomedeia were using clay cooking pots (boiling vessels in particular). From the study of faunal and floral remains it is known that meat and perhaps other animal products, such as milk, were consumed. Cultivated grains and legumes and probably a wide variety of gathered wild edible plants, fruits, nuts and seeds played an important role in their diet. It is not known though, whether roasting, boiling or baking was a preferred form of cooking. An indirect indication for the use of boiling containers, of some sort, is offered by the botanical sample.

Bitter vetch seeds have been found, in Nea Nikomedeia and other Neolithic sites (table 3.3), together with human food remains (Zeist and Bottema 1971). Thus, although today bitter vetch is used for animal fodder it seems that in Neolithic period man himself consumed these seeds. Bitter vetch is poisonous for man and some animals, but the poisonous substance can be removed by boiling the seeds and pouring off the water (Zeist and Bottema 1971).

Wild bitter vetch was also present in Mesolithic sites (e.g. Franchthi: Hansen and Renfrew 1978). Whether the Neolithic inhabitants had adapted their Mesolithic cooking traditions to the new technology (ceramic containers), it is difficult to say. As Vitelli argues (Vitelli 1989), taste is something that changes very slowly. Although in Nea Nikomedeia there are indications of the use of vessels near the fire, it is difficult to conclude how widespread this practise was.

6.3.2 Storage vessels

Ceramic containers, if used for storing foodstuffs, offer better protection against rodents, than do containers made from perishable material (baskets, leather or wooden containers). The safe storage of the next season's seed grain in particular, would have been essential to the early farmers. In Nea Nikomedeia, a number of large vessels have been found, which most probably were used for the long term storage of foodstuffs.

The largest vessels belong to the hole-mouthed and neck jar categories. They are deep vessels with rim diameters reaching up to 32 cm (fig. 5.26). Their height ranges between 40 cm to 60 cm. Moreover large vessels belonging to the slightly closed and slightly open bowls as well as the medium sized neck and hole-mouthed jars, could also have been used for storage. Large sized vessel have also been found in other Early Neolithic sites (Achilleion: Gimbutas 1989; Franchthi: Vitelli 1989).

Halstead (1981) reviewing the faunal and floral remains from Greek Neolithic sites, concludes that their inhabitants were largely dependant, for their diet, on grains and pulses. He estimates that the combined annual consumption of cereals and pulses may have been something like 200 kg per head. Using Narrol's (1962) formula:

$$\text{number of persons} = \text{total floor space of all houses in m}^2 / 10$$

it can be estimated that 30-50 people were living in the houses revealed in the main excavation grid (figure 3.6). For the storage of their annual crop production, a storage volume of 7500-12500 litres would have been needed. A conversion rate of 1.25 litres per 1 kg. of pulses and grain seeds has been used. This rate has been estimated by measuring the volume occupied by 1 kg. of barley, wheat, peas and lentils (see table 6.3)

In order to calculate the average volume of the Nea Nikomedeia vessels the same method used for the calculation of the average surface area has been employed. The

volume of each conical segment was calculated from the following expression:

$$V = \pi * (R_a^2 + R_a * R_b + R_b^2) * h / 3 \quad (\text{see Ericson and Stickel 1973})$$

where R_a , R_b are the radii, and h is the height (1 cm) of the conical segment. The average volume was found to be 6107 cm³, suggesting a total volume of 19000-25000 litres.

Only a part of the calculated volume however, would have been used for storage. Furthermore the figure of 19000-25000 litres has been estimated from all the vessels used over a period of 50-150 years. This means that only a small fraction of the total volume, was available at a time. Thus, it is obvious that the storage capacity of the Nea Nikomedeia pots was not enough for the annual crop production.

For the storage of seeds kept for sowing the next year, a much smaller volume capacity is needed. According to Halstead (1981, p.317) 10% or even less of the annual crop production was kept for sowing. This would correspond to a volume of 750-1250 litres. The large vessels of Nea Nikomedeia, range in volume from 36-85 litres. Only 15 to 20 such vessels would have been enough, for the inhabitants of the main grid, to store the grains kept for sowing. According to ethnographic research (Foster 1960; DeBoer 1985; Kramer 1979), large vessels have a long use life, since they are rarely moved. Consequently the storage of seeds kept for sowing, was within the ceramic production at Nea Nikomedeia, which amounts to 21-85 vessels per year.

6.4 Spatial distribution of pottery

In Nea Nikomedeia a large part of the Neolithic settlement has been excavated. Plans of a number of houses have been revealed in the main excavation grid, which covers an area of 0.1 hectare. This is a rare case, since in most Neolithic sites of the Balkans, only small trenches are opened.

Examining the intrasite distribution of pottery, variation in the amount of different wares might be detectable. Such differences might be more pronounced in the case of decorated vessels. It should be pointed out that despite the large surface area revealed at Nea Nikomedeia, only a very rough study of the spatial distribution of pottery can be attempted. This is owing to the fact that during the excavations, pottery from each excavation square was recorded as a whole without being separated into that found inside or outside a house-wall.

The number of sherds recovered in each excavation square of spit 1 and spit 2, is given in figures 6.6 and 6.7 respectively. Spit 2 contains material which belongs to the First building period, whereas spit 1 includes mixed material, from the First and Second building periods (see section 3.4.3). For the visual presentation of the quantity of pottery, a grey scale has been used.

Figure 6.7 (spit 2) shows that the highest concentration of pottery is in the excavation squares A1, A2 and B1, B2. This area is mainly related to a pair of walls extending from A1-C2 and C2 -C3. A high concentration of ceramic material is noticed also in squares D6, C5 and C6. Square D6 belongs to the central building (G-C4, F7-C6), whereas only part of the pottery from C5 and C6 can be attributed to this structure. In squares D6 and C5, a large number of figurines has also been found (see section 3.3.3). In the remaining part of the central building, a considerably smaller quantity of pottery has been found.

As regards the small number of sherds present in the south-east house (B-A6, B8-Ω7), it should be noticed that five whole vessels have been recovered in squares A6 and B6. These squares correspond to the fenced-off porch area of the house.

In spit 1 (fig. 6.6) a high concentration of pottery is noticed in the excavation squares C6, C7 and B7, as well as in F4, C2 and A5. Of these, B7, C2 and F4 are associated with

house-walls, whereas the remaining squares are outside houses. The presence of a large number of sherds in the latter squares (C6, C7, A5) is in contrast with the distribution of pottery in spit 2, where high concentrations of pottery are associated with house-walls. The exact amount of pottery present within each house cannot be estimated, since the relevant information was not recorded during the excavation.

In figures 6.8 and 6.9, the numbers of decorated sherds present in each excavation square from spit 1 and spit 2, are presented. It can be seen that decorated wares follow a pattern similar to that of plain pottery. In spit 2 the highest concentration of decorated sherds is found in A1, A2, C1, C2, B1 and B2, that is, in the area associated with a pair of walls, where a large amount of plain pottery has also been recovered. Many decorated sherds have been found in the same area, of spit 1.

Similarly, the larger quantities of decorated pottery in squares C5, C6, D6 of spit 2, is in accordance with the abundance of plain pottery recovered in the same squares. In the remaining area of the central building, few decorated sherds have been found.

Apart from the large amount of decorated sherds found in the south-west structure (A1-C2, C2-C3), decorated pottery has a reasonably even distribution over the main excavation grid.

The number of impressed sherds found in spit 1 and 2, is given in figures 6.10 and 6.11, respectively. In figure 6.12 the distribution of W/R painted sherds, is presented. Since W/R painted sherds are rare, finds from spit 1 and spit 2 are presented together. Impressed pottery follows the same pattern seen in figures 6.8 and 6.9, where all the types of decorated pottery are presented. W/R sherds are not limited to any particular area of the main grid. As can be seen from figure 6.12 in most cases W/R sherds are found inside houses. There is one exception however, with regard to the south-east house (B -A6, B8 -Ω7), where W/R pottery is absent.

In every studied excavation square, plain sherds made from all five different fabric types were present. In all cases, the relative frequency of each fabric type was similar with the average values given in fig. 5.42. This uniformity in the spatial distribution of fabric types, indicates that specific clay beds were known to and used by all the inhabitants of the main grid.

In conclusion it can be seen that the excavation squares in which plain and decorated pottery is more abundant, are mainly associated with houses. This might indicate that these were storage and/or food preparation areas. It is worth mentioning that among the five whole vessels found in the porch area of the south-east house (B-A6, B8-Ω7), a miniature "egg cup" as well as a storage vessel (60 cm in height), are included. This suggests that areas with a high concentration of pottery, had a variety of functions.

As far as the central building is concerned, the excavator taking into consideration its size and contents (figurine material, caches of unused blades, large axes and askoid vessels), suggested that the structure served a ritual purpose (Rodden 1964b, 1972). Examination of the pottery distribution shows that the amount of W/R, R/W painted, impressed and plain pottery present in the central building is similar with that found in other houses of the settlement. In fact, all types of pottery decoration are found in similar amounts all over the excavation grid; the only exception being the absence of W/R pottery from the south-east house.

It is worth mentioning also that the plain and decorated pottery found in the central building is similar in surface treatment, shape and types of fabric, to the pottery found in the other structures. Rodden pays special attention to the presence of two askoid vessels in the central building. Askoid vessels however, have been found in two other excavation squares (A/1 and K7/1). Moreover, as has been pointed out in Chapter 5 (section 5.3.4)

the rarity of this vessel form could probably be attributed to the fact that askoi, due to their asymmetrical form, cannot be identified unless a very large part of the vessel is preserved. This lack of differentiation between the ceramic material found in the central structure and the material from houses connected with living/domestic activities, does not support the interpretation that this building was a structure used purely for ritual purposes.

Study of the distribution of "religious" objects (e.g. figurines, anthropomorphic and zoomorphic vessels, house models, altars) present in Vinča settlements, shows that these items are usually associated with house assemblages (Chapman 1981, p.66). This association suggests a fusion of domestic and religious activities. The data from the Earlier Neolithic settlements seems to be in accordance with this conclusion. The centre of House V (7 m X 7 m) at Muldava (Detev 1968), is occupied by a raised clay platform, where one zoomorphic vessel and a number of three-legged tables were standing. The northern half of the house was most probably used for storage, since 50 vessels and 4 clay basins were found. The south part of the house was used for domestic activities (weaving, food preparation).

At Achilleion, a large number of figurines and altars has been found in the Early and Middle Neolithic strata (Gimbutas 1989). In all cases, the items are associated with working, domestic activity areas (food preparation, tool making, weaving). Moreover, the frequency with which such objects are found (in almost every excavation square), does not support the hypothesis of a communal ritual centre.

CHAPTER 7

DEVELOPMENT AND CONTACTS IN THE EARLY NEOLITHIC BALKAN PENINSULA

7.1 Introduction

Nea Nikomedeia and the other sites examined in this thesis, represent the early stages of the Neolithic period in Europe. The explanatory theories proposed for the beginning of farming in Europe range from the diffusionist model, according to which the introduction of farming is a result of a colonization process from the Near East (Childe 1929, 1958; Clark 1965; Ammerman and Cavalli-Sforza 1971), to the proposal of an independant development by the local Mesolithic inhabitants (Dennel 1978; Barker 1985).

The first part of this chapter is concerned with the appearance of farming in the Balkan Peninsula. Initially, the subsistence strategies and lithic assemblages from sites with superimposed Mesolithic and Neolithic strata are reviewed, after this there is a discussion on the information they offer for the processes leading to the appearance of farming.

Subsequently, the information provided by the ceramic material, is examined using the case study of the FTN area. Pottery technology and decoration are examined in order to assess the degree of external influence on the local population, and to locate the Neolithic communities with which the local groups came into contact. The conclusions reached by this analysis, are compared with the available data for the appearance of ceramics in Thessaly and Crvena Stijena.

The second part of this Chapter is concerned with the appearance of impressed pottery in the Thessalian region. In order to assess the nature of contacts between the Thessalian sites and the northern Balkan settlements, the ceramic material is examined. The results of this analysis are compared with conclusions reached from the study of figurine material.

In the final part of this Chapter, the cultural affinities of Nea Nikomedeia are examined.

7.2 Appearance of farming in the Balkan Peninsula

In the Balkan Peninsula only a few sites with superimposed Mesolithic and Neolithic strata have been excavated (fig. 7.1). In Greece two sites are known, Franchthi cave and the open air site of Sidari (Sordinas 1967, 1969, 1970). Mesolithic occupation levels have been found in two other cave sites, Zaimis and Ulbricht (Markovits 1928, 1932-33). Subsistence data were collected only from Franchthi, whereas from the last two sites only a very summary description of the lithic industry is available.

Similar sites are absent from Bulgaria, south Yugoslavia and Albania. In the Adriatic Littoral area, Mesolithic and Neolithic levels have been excavated at Odmuť cave (Srejšović 1974; Marković 1974), whereas in the cave of Crvena Stijena the Mesolithic strata (Crvena Stijena IVa, IVb1, IVb2) are followed by a level (Crvena Stijena III) where pottery is found in association with the remains of wild animals and a Mesolithic stone industry (Benac 1957a; Benac and Brodar 1958).

A larger number of sites is available from the Iron Gate area of the lower Danube. Among the better studied sites, the open-air settlements of Lepenski Vir (Srejšović 1971, 1972), Vlasac (Srejšović and Letica 1978), Padina (Jovanović 1968, 1969, 1983a, 1987)

and the cave of Icoana (Bolomey 1973), are included. The subsistence strategies of the Mesolithic and Neolithic inhabitants of the sites presented above, will be discussed in the following section. The faunal and floral remains from the sites, are presented in tables 7.1-7.7.

7.2.1. Review of the subsistence data from Mesolithic and Neolithic sites

Mesolithic level: Study of the subsistence data from the Danubian sites shows that their inhabitants in parallel with their gathering, hunting and fishing activities, may also have been influencing or controlling the reproduction of animals and cereals. Bones of domesticated dog are common in all sites (table 7.1-7.4). According to Bökönyi (1975) Mesolithic Vlasac offers evidence for an *in situ* domestication of the animals. In the other sites, a different variety of dog has been identified (Bökönyi 1975). For Icoana, controlling of the pig population is proposed by Bolomey (1973, p.200) on the basis of the age death rate of animals. The faunal samples from Padina A consist mainly of the remains of wild animals, fish, birds and domesticated dog (Clason 1980). A small number of domesticated cattle, pig and sheep/goat bones has also been found (table 7.3). These bones have been explained as contaminations from higher levels (Prinz 1987, p.66).

The degree of control over the growth of cereals is not certain. Analysis of a number of fossil pollen samples from Vlasac has revealed the presence of cereal pollen which is outside the size range for wild cereals (Cârciumaru 1978). The exact stratigraphic position of these samples is far from clear (Prinz 1987, p.75), but it seems that they can be attributed to the Mesolithic levels.

The subsistence data from the later Mesolithic levels at Franchthi show that the inhabitants had a wide range of economic activities. Domesticated animals are absent but a heavy dependence on red deer, amounting over 80% of all non-fish bone, and on tuna

fish, reaching 20-40% of the total bulk of bone, is noticed (Payne 1975). A wide range of vegetable foods was also collected (Hansen and Renfrew 1978; table 7.7). The Mesolithic levels from Odmuť cave (Odmuť I) contain remains from wild animals, among which ibex and red deer are the most common (65% and 25% respectively: Srejović 1974; table 7.5); fishing also was quite important. Similarly, in the Mesolithic layers at Crvena Stijena (level IVa, IVb1, IVb2) remains of domestic animals are absent (Benac and Brodar 1958; table 7.6).

Neolithic levels: In Lepenski Vir III, bones of domesticated sheep/goat, cattle, pig and dog have been found (Bökönyi 1970). There is no evidence for *in situ* domestication of the animals, but the changes in the subsistence strategies are not abrupt, since the bulk of faunal remains consists of wild animals (table 3.2). A similar pattern emerges from the analysis of faunal remains from Padina B (table 7.3). Domesticated sheep/goat and cattle have also been found at Neolithic Odmuť (Odmuť II: Srejović 1974; table 7.5), but the faunal sample included large numbers of wild animals (ibex, red deer, wild pig, weasel and bear).

Radiochronologies from Franchthi show that the Mesolithic and Neolithic occupations were almost continuous (fig. 2.4). However, an abrupt change in subsistence patterns is evidenced, since the faunal samples from the Early Neolithic levels consist mainly of domestic animals (sheep/goat amount to 70%, pig to 30%: Payne 1975). Similarly, the botanical samples from the Ceramic Neolithic levels are comprised of the spectrum of cultivated crops which are usually found in all Neolithic sites (Hansen and Renfrew 1978; table 7.7). It should be noticed though, that domesticated seeds, and sickle-insets, are absent from the Pre-pottery levels (Perlès 1989, p.117).

Although none of the Neolithic sites offers evidence for the local domestication of

plants and animals, for a number of domesticates their wild progenitors were already present in the Mesolithic strata. Cereal pollen has been found at Vlasac, and barley, lentils, peas and oats are present at Franchthi. Moreover, Greece, south-east Bulgaria, Albania and Yugoslavia are within the present day distribution of wild einkorn (Zohari 1969). However, wild emmer and bread wheat, which form the bulk of cultivated plants in the Neolithic sites, are absent from the Mesolithic strata. It should be pointed out though, that the information for the Mesolithic floral remains is based on the Franchthi sample, since botanical samples have not been collected from the other sites.

Wild pig and cattle are present in all Mesolithic sites of the Iron Gate, and at Crvena Stijena. Wild pig is also found at Franchthi and Odmuť cave. Examples of goat are less common, but they are present in Late Pleistocene Bulgarian caves (see Dennell 1978, table 103), Franchthi and the Mesolithic Odmuť cave. Bones of wild sheep are absent from all these sites. Generally remains of sheep are scarce in European Pre-Neolithic strata, and in many cases they are found in uncertain contexts (Poplin *et al* 1986).

7.2.2 Discussion

Summarizing the above data, it can be seen that in one area at least (Iron Gate), a process towards the farming economy was in operation. Clason and Bolomey (Clason 1980, p.171; Bolomey 1973, p.51) conclude that the faunal remains from Padina and Icoana indicate year-round occupation of the sites. The perennial occupation of Lepenski Vir is questioned by Nandris (1972, p.426) on the basis of the geomorphological and the faunal evidence. Even in this case however, the repeated occupation of the site and the construction of substantial houses indicate the sufficiency of the subsistence strategies.

A single C¹⁴ date from Icoana (6415 ± 100 b.c.) identifies the Mesolithic adaptations as much earlier than the appearance of farming communities in the Balkan Peninsula. The

problems associated with the use of the C¹⁴ dates from Mesolithic Vlasac, Padina and Lepenski Vir, were analytically discussed in Chapter 2 (section 2.6.2). Similarly, the relative ordering of the sites, on typological comparisons, is not very clear. For example, Padina A is considered by Radovanović as being earlier than Icoana I (see Jovanović 1983a), by Srejović as being contemporary with Icoana I, Proto-Lepenski Vir and Vlasac I (Srejović 1988), and by Prinz (1987, table 12) as contemporary with Vlasac I & II, Lepenski Vir I & II.

By accepting the Neolithic Lepenski-Vir as contemporary with the beginning of Starčevo culture, it seems that the earlier stages of Mesolithic Lepenski Vir, Vlasac and Icoana should antedate the known Neolithic sites of the area. It should be pointed out however that irrespective of their absolute or relative chronology, the Iron Gate sites clearly demonstrate the very active role of the local populations towards the development of farming economy, a role ignored by the immigration model.

The occupations of Franchthi, Crvena Stijena and Odmut cave, apart from a specialization in hunting specific animals, do not provide any evidence for incipient domestication. Similar evidence is absent from the Early Neolithic sites.

It seems then that the appearance of the new economy could be explained more easily by an immigration model. However, the overflow of a large number of groups from the Near East, is not easily supported by the archaeological data. Surveys on some areas of the Near East, seem to show that settlement densities of the early agriculturalists were low, relative to the total carrying capacity of the regions (French 1970; McDonald 1979 referred by Dennell 1985). On the European side, analysis of the subsistence strategies of the early Thessalian farmers suggests that the small villages (40 to 250 inhabitants), could be supported by small clearings of 10-50 hectares (Halstead 1981). It also seems that

agricultural communities had low growth rates for a long time (Dennell 1985, p.119).

Furthermore, the successful adaptation of the Neolithic economy to the varying environmental and geophysical conditions of the different regions, is not explained by the immigration model alone. Instead, it presupposes an active role by the local inhabitants.

Comparative study of Mesolithic and Neolithic stone tool assemblages from Franchthi and Vlasac suggests a continuity of manufacturing techniques. From Neolithic Vlasac only a small sample was available (Prinz 1987). Study of the Pre-pottery lithic material from Franchthi (where a large sample was available) clearly demonstrates that despite the sudden change in subsistence data, 70% of the material was made with the same techniques used in the preceding Mesolithic strata (Perlès 1989). In contrast, at Lepenski Vir, where the changes in subsistence strategies are not so abrupt, a break in technology and raw materials is noticed between the Mesolithic and Neolithic stone tools (Kozłowski J. and Kozłowski S. 1984). A similar conclusion has been reached for the Neolithic industry of Sidari (Sordinas 1969).

In the lithic material from Pre-pottery Argissa, manufacturing techniques or tool types that could be connected with a Mesolithic tradition, are absent (Perlès 1989). The character of the lithic assemblage and the presence of fully domesticated plants and animals are considered as indications of the arrival of farmers from the Near East. The complete lack of similarities between the Thessalian and Near Eastern lithic industries could be explained by a very slow pace of movement (Perlès 1989), or by the fact that the intermediary sites have not been found yet. Alternatively, these transformations could have occurred in a site similar to Franchthi. It is obvious that for the testing of both hypotheses, further research has to be carried out.

In conclusion, the above review clearly shows that the available data are too

fragmentary to give a complete picture of the process leading to the appearance of a Neolithic economy, which as the lithic material indicates, was probably different from area to area. However, even from the few known Mesolithic settlements, the following conclusions have been reached:

(1) wild progenitors of some of the new domesticates were present in the Balkan Peninsula, before the appearance of the Neolithic communities.

(2) In one area at least, a local development towards the Neolithic economy, was in operation

(3) Evidence for continuation between the Mesolithic and Neolithic strata has been found in two sites.

(4) Although occasional movement of farming communities cannot be excluded, the overflow of a large number of groups from the Near East, is not easily supported by the archaeological data.

Ethnographic research shows that hunting and gathering groups usually cover large exploitation territories. The presence of non-local raw materials at Mesolithic sites, such as the Aegean obsidian at Franchthi (Renfrew C. 1973), clearly demonstrates that the knowledge of Mesolithic people was not restricted to their immediate environment and sources.

It has been noticed (Barker 1985) that the gradual appearance of farming communities across Europe is correlated very closely, with major climatic changes. This correlation could give an insight into the reasons for the abandonment of foraging. However, the earlier appearance of farming in the Near East and the gradual expansion westwards, seem to indicate that irrespective of any local processes towards domestication in Europe, contacts with fully developed Neolithic communities and exchange between them, should have played an important role in the development of farming economy.

7.3 Appearance of pottery in the FTN area

7.3.1 Introduction

Pottery is another element of the material culture which could provide information on the process involved in the appearance of farming communities. In the following pages, the appearance of pottery in the FTN area will be examined in order to assess the degree of external influence on the local population of the FTN area, and to locate the Neolithic communities with which the local groups came into contact.

We should be aware however, that the process followed for the development of pottery, might be different from the processes involved in the development of a farming economy. For instance, one difference between pottery and the new domesticates is that there is no need to anticipate complex procedures for acquiring the raw materials, since clay sources are widely available. Moreover, well-made ceramic vessels can be produced in a very short period of time, in contrast with the long period of time required for the domestication of wild species. Finally, the beginning of ceramic production, may not be simultaneous with the appearance of farming economy.

The first occupation levels of the Early Neolithic sites in south-east Albania, south Yugoslavia, Bulgaria and south-west Rumania, have produced a variety of decorated wares, among which W/R painted vessels are included (W/R Phase, see section 2.6.1). An earlier stratum, with monochrome pottery, is reported from some sites in central and north Yugoslavia (Serbia). As has been analysed in Chapter 2, the Monochrome Phase is not well documented, since in most cases the monochrome strata are distinguished mainly on typological comparisons and not on clear stratigraphic evidence.

A number of archaeologists consider that the W/R levels from the FTN sites show generic resemblances to the Thessalian sites and Nea Nikomedeia. Thus, Garašanin (1980,

p.71), Dumitrescu (1982, p.17) and Gimbutas (1976, p.70) define a south to north movement of agriculturalists from the Thessalian region, up to the FTN area. Moreover, Nica (1977), parallels the development of the Cîrcea site, with the Thessalian Decorated Phase (Protosesklo and Presesklo levels).

In contrast, an autonomous origin of the Neolithic culture in Serbia is proposed by Srejović (1978; 1988) on the basis of the archaeological material from the Danubian Mesolithic sites (evidence of the domestication of dog, indication for the manipulation of plants). According to Srejović, the early settlements of the Neolithic groups, are presented by the strata with monochrome pottery (Monochrome Phase).

7.3.2 Comparison of technology and painted decoration of the vessels from FTN W/R levels, and the Thessalian Decorated Phase.

Painted Decoration: According to Garašanin (1980) and Dumitrescu (Dumitrescu 1982) the generic resemblance between the ceramic assemblages of the Thessalian region and those of the FTN area, is evidenced mainly by the practice, shared by the people of both areas, of decorating the vessels with painted motifs. Painted vessels are absent from the sites of the Adriatic Littoral, and recent excavations at a number of sites in north-west Anatolia (Ilipinar: Roodenberg *et al* 1990; Fikirtepe: Bittel 1969-70; Pendik: Harmankaya 1983; Özdoğan 1983) show that painted decoration was not used by the earlier potters of this region.

For the decoration of the Thessalian and FTN vessels, white and red slips have been used which appear in two combinations: white motifs on a red coloured (slipped or unslipped) surface (W/R), and red patterns on a white-buff background (R/W). The distinction between W/R and R/W painted pottery at first glance, seems rather superficial. Since the technology for producing a red slip and a white slip was known, it seems that

both combinations were equally likely to have been used. However, this is not the case.

In the Thessalian sites, W/R pottery appears simultaneously with the R/W (Theocharis 1967, p.130). However, W/R vessels are found only in small numbers. At Otzaki for example, among the fifty-one painted sherds, there is only one W/R example (Milojčić 1971, table 1). Sesklo is one of the sites with the most abundant W/R vases. Even here however, such examples reach only up to 10-20% of the painted pottery (Theocharis 1967, p.130). Similarly at Nea Nikomedeia, W/R painted vessels amount to 4% of the painted decoration. In Thessaly, this strong preference for R/W continues into the Middle Neolithic period (Sesklo vases).

The situation appears to be totally different in the FTN area. In all sites, painted decoration is executed with a white colour on the red coloured surface of the vessels. Only few R/W sherds are present in some FTN sites: at Vashtëmi for example, the relative frequency of R/W and W/R painted sherds is 3% and 97% respectively (Korkuti 1982, p.122). Similarly, sporadic R/W sherds have been found at Amzabegovo I (Gimbutas 1976, p.43, fig. 49), Cîrcea (Nica 1976, fig. 10; 1977, p.22) and Gura Baciului (Vlassa 1972, fig. 57).

Thus, a strong preference for the R/W pottery in the Thessalian region, and an opposite preference for W/R vessels in the FTN area, is noticed.

Pottery Technology: Building a vase is a complicated process. The successful final product, that is an unbroken vessel, is affected by a large number of factors (e.g. type of clay, clay preparation, temperature, firing atmosphere etc). Ethnographic research clearly demonstrates that potters are rather conservative and as soon as they establish a successful procedure, they adhere to it strictly (Arnold 1985; Rice 1984; Steponaitis 1984)

The main manufacturing technique, used by the potters from Thessaly, Nea

Nikomedeia, Servia and the FTN area, was coil building. It is noticable however that in approximately the same area where W/R pottery appeared, an extra stage was added in the manufacturing process: the use of vegetable temper in the paste of vessels. This practice was not followed at two areas, namely south-east Albania (Vashtëmi and Podgorie) and Pelagonia (Veluška-Porodin group).

In all the other sites of the FTN complex, a large percentage of the pots were made from chaff-tempered clays. Such fabrics were used for the manufacture of coarse and medium textured vessels (Tringham 1971, p.79; Garašanin 1982, p.90 and 102; Gardner 1976, p.171; Fortier 1981 p.348; Stalio 1986, p.28; Nica 1977, p.22;). Painted and fine textured vases were usually made from fabrics free from plant inclusions, although in some sites chaff-tempered clays were used for all pottery wares (e.g. Gura Baciului: Vlassa 1972, p.13).

Addition of organic temper is unknown among the potters from Nea Nikomedeia, Servia and the Thessalian sites. The rare plant inclusions present at few Sesklo (Wijnen 1981, p.22), Achilleion (Gimbutas 1989, p.80) and Nea Nikomedeia sherds (section 4.6.3), most probably are clay impurities which were not cleaned off during the clay preparation. In all cases, these sherds do not exceed 1% of the ceramic material.

Deliberate addition of non plastic inclusions into the clay body may be introduced as a compensation for a poor quality clay or in order to make the vessels more heat resistant (Rye 1981, p.26-27).

The hypothesis that in all FTN sites, clay sources were so poor that plant inclusions were necessary to be added, is hardly acceptable. Study of the ceramic material from Amzabegovo (Gardner 1976, 1978), Nea Nikomedeia (section 4.6.1) and Achilleion (Gimbutas 1989) shows that potters were using a similar range of sedimentary or alluvial

clays. On the other hand, the presence of plant inclusions in the clay does not automatically mean that all these vessels were used for cooking. There are no functional analyses of the FTN ceramics apart from Garner's examination of Amzabegovo vessels. According to this analysis, the pottery from Amzabegovo was not suitable for withstanding repeated heating (Gardner 1978). It should be pointed out however, that chaff-tempered clays were also used for the manufacture of large, storage jars (Tringham 1971, p.79)

Although the reasons for the addition of plant inclusions in the fabrics of the FTN vessels are not easily detectable, it is clear that potters of the FTN sites, follow a similar potting tradition, which however is different from the Thessalian one. It should be pointed out that this difference in pottery tradition between the two areas, continues throughout the Neolithic period. Organic temper continues to be used in the later phases of Starčevo/Criș culture, and in the Vinča vessels (Gardner 1976, p.173). Similarly, plant inclusions are absent from the Middle and Late Neolithic Thessalian vessels (Kotsakis 1981, p.95; Gimbutas 1989).

Discussion: Examination of the pottery technology and painted decoration show that only Nea Nikomedeia and Servia can be included within the Thessalian tradition. Pottery assemblages from sites further north, have differences which do not allow generic connections to be made with Thessaly, at least at this stage. Any similarities observed between sites of the Thessalian tradition and those of the FTN, should be interpreted as being the result of contacts and relationships between areas with well developed traditions and not between a donor and a recipient area.

Since Thessaly and Greece in general, is the only region in the Balkan area where the practice of decorating the pots with painting has been developed, it has to be concluded

that the phase with W/R painted pottery was a local development.

This conclusion is in contrast with a south to north movement of agriculturalists, suggested by a number of archaeologists. Among them, Nica (1977, p.22-24) argues that Thessalian and Cîrcea potters share the same manufacturing technology, reflected by the use of clays of similar colour and by the absence of organic temper in the painted vessels from Cîrcea.

However, similarities in the colour of clay are meaningless, since as was discussed in the Chapter 4, the Neolithic potters were using a variety of clay sources. Moreover, plant inclusions are absent even from the plain vessels of Thessaly. As for the similarities in painted decoration mentioned by Nica, it should be pointed out that characteristic motifs of the painted pottery from Cîrcea, are floral motifs and patterns made by a combination of small white points on a red background (Nica 1976 fig. 1, fig. 11- 12, Nica 1977 fig. 5, 1a-1b). Dots and floral motifs, are absent from the decoration of the Thessalian vessels. In contrast, both motifs are widely distributed in the FTN area (Nandris 1970, fig. 1).

It should also be pointed that the W/R level cannot be considered as representing the first stage of the ceramic development in the FTN area. This is evidenced from the fact that potters were already using a variety of clay sources (e.g. Amzabegovo: Gardner 1976, p.170), and were preparing them in order to produce fine, medium and coarse textured vessels. Many pots are slipped, and a variety of types of decoration (painted, incised and impressed) are present from the beginning. For a local tradition to show such a variation, a period of development, should be considered as necessary.

Whether this earlier stage is represented by the monochrome strata reported from a number of sites is not clear, and remains to be elucidated by better documented assemblages. Examining the pottery from these monochrome strata it can be seen that

chaff-tempered clays were regularly used for the manufacture of vessels (Dimitrijević 1974, p.100; Jovanović 1969, p.31). Moreover, a number of pots from Dubanovci and Lepenski Vir had their surface smoothed with grass (Dimitrijević 1974, p.100). This practice is absent among the the potters from Nea Nikomedeia, Servia and the Thessalian sites.

Common characteristics, shared by the Thessalian and FTN monochrome ceramic assemblages, are the simplicity and uniformity of their shapes. Slightly closed and open vessels with round profiles, short bases, simple rims and rare string-hole lugs, are common features in all sites. These similarities however should be attributed, to a large extent, to the simple and basic manufacturing methods used by early potters.

7.3.3 South-east Albania and Pelagonia

The sites of south-east Albania (Vashtëmi and Podgorie) and Pelagonia (Veluška-Porodin group) produced ceramic material the decoration of which has all the characteristics of the FTN W/R levels: W/R painted, impressed and barbotine vessels are present in all sites. In pottery technology however, there is a differentiation from the other sites of the FTN complex, since chaff-tempered clays are absent from the Pelagonian sites (Simoska pers. comm.), and they are very scarcely used in south-east Albania (Korkuti 1982, p.121).

Pelagonia and south-east Albania form the southern extension of the FTN complex and they are within a radius of 100 km from Nea Nikomedeia. As has been discussed above, potters are reluctant to change their manufacturing techniques, and as soon as they establish a successful procedure, they strictly adhere to it.

Since the absence/scarcity of vegetable temper is an element of the ceramic tradition of the south-east Albanian sites in the W/R Phase, it has to be expected that plant

inclusions were also absent from the earliest ceramics of this area (not found yet). In fact, someone would anticipate that if there were any changes in the manufacturing techniques, from the earliest pottery levels to the levels with W/R pottery, these changes would have been towards the addition of plant inclusions and not the other way round.

Thus, of all the sites of the FTN complex, the Albanian sites offer the most clear indication that the development of their pottery technology could be connected with the Thessalian potting tradition. To a great extent, the influence of the Thessalian region should be attributed to the contiguity of the two regions. People situated in adjacent areas have more regular contacts and consequently have more chance to see the local vessels and to attend the whole manufacturing procedure.

The extension of technological elements of the Thessalian ceramic tradition into south-east Albania, supports the hypothesis that the appearance of pottery into the FTN area could have been influenced from the Thessalian region. Moreover, on the basis of the above discussion, the practice of using vegetable temper should have been introduced in areas north of the Albanian sites.

It should be pointed out that south-east Albanian sites have an easy access to the Adriatic Littoral region, as well. Vegetable tempering was absent among the Adriatic potters (Müller 1988, p.223, fig. 8; Garašanin 1982, p.107; Tringham 1971, p.102). As has been discussed in the chronology chapter, C¹⁴ dates for the Early Adriatic sites (Impressed A), are not available. However, the dates from Sidari (Monochrome level, 5717 ± 120 b.c.; Decorated level, 5390 ± 180 b.c.) point to an early appearance of pottery in the Adriatic area. Thus, contacts and influences on the south-east Albanian sites from the Adriatic settlements, should not be excluded.

Thus, south-east Albania could be differentiated as a transitional area which shares

elements of two (or three) cultural regions. The pottery technology seems to draw its origin from the Greek or Adriatic area, whereas the material culture as appears in the W/R levels is clearly connected with the FTN complex. Regular contacts between the Albanian and the Greek sites are suggested by the painted pottery of Nea Nikomedeia (see section 7.5.2), and by the impressed ware of the Albanian sites which show similarities both with the Adriatic and the Thessalian region (see section 7.4.3).

It is interesting to note that a similar situation is noticed at Obre I (Benac 1973). The site is located in central Bosnia, and is one of the westernmost sites of the Starčevo group (Dark/Red Phase: Starčevo IIb). Although the decoration of pottery and generally the material culture of the two lower strata (strata I and II) clearly belong to the Starčevo culture, the pottery is free from plant inclusions, drawing its origin from the Adriatic (Benac 1973, p.395). In the following phase (strata III and IV), the ties with the Adriatic are renewed, since the material belongs to the Kakanj culture. It is worth mentioning that Bosnia is an intermediary area, between the Wet Littoral zone (rainfall over 750 mm per annum: Nandris 1977a, p.44, fig. 4), and the European Temperate zone. Similarly, south-east Albania and Pelagonia are transitional areas surrounded by the Wet Littoral zone in the east, by the Temperate zone in the north, and the Mediterranean area in the south.

The absence of vegetable temper from the pots of the Veluška-Porodin group could also be attributed to an influence from the Thessalian or the Adriatic ceramic tradition. It should also be noticed that in one site at least (Mala Tumba), the Veluška-Porodin occupation levels are overlaid by strata which contain material related to the Adriatic Danilo culture (Simoska and Sanev 1976, p.17).

However, despite any exterior influences, the ceramic material of the Pelagonian sites, as appears in the W/R levels, shows a high degree of originality and local adaptation. This

can be seen in the pronounced bioconical contour of vessels (Simoska and Sanev 1975, plate VIII; Grbić *et al* 1960, plate XIX,8,10 ; Kitanonski 1977, fig. IIB-IIF), a feature which is absent from all other contemporary assemblages, and in the widespread use of round bottomed pots (Simoska and Sanev 1975, plate XIII, XVI, XVII,; Grbić *et al* 1960, plate XXXVII). The figurine material (Simoska and Sanev 1976, photo. 70, 76, 80, 93), "altars" (Simoska and Sanev 1976, photo. 40, 78) and house models (Simoska and Sanev 1976, photo. 90-92), also give a clear picture of the local tradition, which differentiates this small region from all the surrounding areas.

Pelagonian sites however, were not living in isolation. Contacts with other south Yugoslavian sites are evidenced by the presence of an anthropomorphic cylinder and of a house model in the layer I of Rug-Bajr (Sanev 1975, p.230) and of a house model found at Amzabegovo (Amzabegovo-Vršnik III: Garašanin 1982, p.100). Similarly, a painted sherd reminiscent of the Veluška-Porodin tradition, has been found at Middle Neolithic Serbia (Ridley and Wardle 1979).

7.3.4 Discussion on the origins and development of the pottery from the FTN region.

Review of the technology and decoration of the early ceramic material (W/R and monochrome horizon) from the FTN sites, concluded that pottery from the FTN area, does not show generic contacts with the Thessalian ceramics. The only exception concerns the material from south-east Albania and Pelagonia, which show technological similarities with the pottery from Nea Nikomedeia, Serbia and the Thessalian sites.

The addition of vegetable temper differentiates the pottery of the FTN, from all the other adjacent regions. This feature clearly indicates a strong local character in the development of the pottery tradition in the FTN area and excludes a large scale immigration of people. There are two alternative explanations then for the appearance of

pottery in the FTN area. First, ceramic technology was developed independently without any external influence and second, ceramic technology was developed through contacts with other areas.

The frequent use of foreign raw materials for the manufacture of stone tools, clearly demonstrates that the knowledge of the Mesolithic and Neolithic groups was not restricted to their surrounding environment. Since, the evidence so far, shows that pottery was in use in Greece much earlier than it appears in the FTN area, it can be assumed that the concept of using clay for making containers and then firing them, was known. In contrast with the new domesticates, the development of pottery is independent of the need to envisage complex processes for the acquisition of raw material, since clay sources are widely available.

It is not necessary to envisage the development of ceramic technology as taking place in every site of the FTN complex. The use of chaff temper over such a large area, indicates that within the FTN, the expansion of pottery technology was most probably related to close contacts. Tempering the paste of vessels is not the only technological element with a widespread distribution. The distinctive V-based bone spoon is a common feature of the FTN sites (Nandris 1972, 1977a). These spoons which are always made in the same way and from the same bone, a metacarpal of *Bos primigenius*, they have not yet been found further south than Amzabegovo.

The archaeological record shows that pottery appears in the FTN simultaneously with the first agricultural communities. However, the first occupation levels of the sites in south-east Albania, south Yugoslavia, Bulgaria and the great majority of the early FTN sites further north, contain ceramic material which cannot be considered as representing the first stages of pottery production in the FTN area. This might indicate that at the early

stages of the ceramic production, people were living in ephemeral sites. This type of occupation is incompatible with a fully developed farming economy, which requires a more permanent occupation for the attendance of fields and animals and the storage of crops.

Therefore, it can be speculated that the early stages of pottery manufacture could be placed before the appearance of a fully developed neolithic economy. In other words, the introduction of pottery might be placed in a transitional period, when elements of a farming economy coexisted with hunting-gathering activities.

A different picture is represented by the Thessalian sites. The first occupation levels at five sites seem to represent sedentary communities with a fully developed neolithic economy, which either did not use ceramic vessels or had a very limited ceramic production (see section 2.2.1). The fact that fired clay figurines and slingstones have been found at some sites, does not necessarily mean that people had also acquired the knowledge of pottery manufacture (Schmandt-Besserat 1974, 1977; Wijnen 1981, p.93). Comparison of the Early monochrome vessels (Monochrome phase) from the Thessalian sites, with the vessels from Anatolian settlements indicates that the similarities shared by the two assemblages could be attributed to the simple/basic methods used by the early potters (Wijnen 1981, p.97).

A different situation is presented by the material from Crvena Stijena, where pottery is found in association with the remains of wild animals and a Mesolithic stone industry (Benac 1957a; 1987). Scientific analyses (i.e. petrographic or chemical analyses) of the ceramic material are not available, but taking into consideration the negative evidence for large scale exchange of ceramics during the Neolithic period (see section 8.2), it seems that the vessels were locally made. However, the use of Cardium shells for the decoration

of pottery, in a site far from the sea, suggests that pottery technology and decoration were acquired through contacts with maritime settlements (Benac 1987, p.338).

The examples mentioned above, indicate that the introduction of pottery and changes in the economy were not necessary simultaneous, and that the appearance of farming economy and ceramic technology probably did not occur in a similar way in all regions.

7.4. Appearance of Impressed pottery in the Thessalian region

7.4.1 Introduction

As has been discussed in Chapter 2, impressed vessels appear in the Thessalian region at a developed stage of the Early Neolithic period. At many sites such as Gendiki (Theocharis 1962), Magoulitsa (Papadopoulou 1958), Otzaki (Milojčić 1971), Nessonis II (Theocharis 1962), the appearance of impressed pottery coincides, or is even preceded by the disappearance of painted and black topped vessels. In the remaining sites, i.e. Prodromos (Chourmouziadis 1971a, 1972), Soufli Magoula (Theocharis 1962) and Agia Anna Tirnavou (Chourmouziadis 1969), painted and other decorated vessels continue to be produced without interruption.

Impressed decoration consists of simple patterns made by pressing fingernails and finger tips (Milojčić 1971, plate M and plate N; Papadopoulou 1958 fig. 4; Theocharis 1962, fig. VII; Chourmouziadis 1971a, fig.4-5, 8, plate 27), or instruments into the leather-hard clay. A variety of impressions were produced, depending on the edge of the instrument used: small triangles, small and medium circles, short slashes, oblong impressions etc (Milojčić 1971, plate O; Theocharis 1962, plate X; Chourmouziadis 1967, fig. 197). Among the impressions made with an instrument, the so-called Cardium decoration is also included. The name given by Milojević is rather misleading as the

decoration, consisting of small perforations arranged in rows is hardly reminiscent of decorations made by Cardium shells (Milojčić 1971, plate P.; Theocharis 1962, plate X). In fact, the decoration was made with a comb-like tool (Milojčić 1971, p.78).

Estimations of the amount of impressed vessels found at each site are difficult to make since, except for Otzaki and Prodromos, information concerning their quantity is very vague (i.e. few, some or many sherds). Even so, it seems safe to conclude that impressed sherds are more numerous in the northern sites, amounting to 4-6% of the ceramic material from Otzaki (Milojčić 1971, table 1), being common in Nessonis II (Theocharis 1962, p. 80), Gendiki (Theocharis 1962, p.75) and Agia Anna (Chourmouziadis 1969, p.169).

In the western sites the amount of impressed sherds is smaller: in Prodromos they form 10% of decorated pottery (Chourmouziadis 1971a, p.174) and at Magoulitsa only sporadic examples are present (Papadopoulou 1958, p.44). In the southern sites, impressed pottery is absent from Pyrasos and Achilleion, whereas at Sesklo only a small number of sherds have been found (Wijnen 1981, p.37). Thus, the general trend which emerges is that impressed pottery decreases in quantity as we move towards the southern part of Thessalian region.

7.4.2 The invasion hypothesis

As an explanation for this differentiation noticed among the Thessalian sites, mainly the appearance of impressed pottery and the disappearance of painted pottery, an invasion by people from the FTN or the Adriatic Littoral has been proposed.

The arrival of new people was first proposed by Milojčić (1955), on the basis of the stratigraphy of the early excavated sites of Otzaki, Magoulitsa and Gendiki, where painted pottery had ceased to be produced. This explanation was generally accepted (Theocharis

1967; Holmberg 1964). Later excavations (Prodromos, Agia Anna) have shown that at some sites impressed pottery was used alongside the painted one (Chourmouziadis 1971a). Moreover, the cultural discontinuity was questioned on the grounds of evidence from the figurine material (Nandris 1970). Despite this, the invasion hypothesis is accepted by some archaeologists, as for example, by Hammond (1976), who considers that the new people arrived from the FTN area, most probably from Pelagonia.

Examination of pottery technology: It is to be expected that apart from differences in pottery decoration, the arrival of new people should be reflected in differences in pottery technology and vessel shapes.

Examining the ceramic material from Otzaki Magoula on which detailed publications are available (Milojčić 1971, table 1), it can be seen that red-brown monochrome vessels form the bulk of ceramic material in the levels with painted and impressed pottery, amounting to 88% and 89% respectively. In the levels with painted pottery, red-brown vessels appear in open and closed shapes with beaded rims (rim-form V, Milojčić 1971 fig. 7-10), and in short-necked jars with an angular joint (rim-form IV, Milojčić 1971 fig. 5-6). In the levels with impressed decoration, the same forms continue unchanged. At the same time, two new forms appear: short-necked jars with more pronounced angular joints (rim-form II, Milojčić 1971 fig. 3) and open vessels with ledge rims (rim-form III, Milojčić 1971, fig. 4)

Comparing the repertory of vessel forms present at Otzaki Magoula, with the shapes found at other contemporary Thessalian sites where painted pottery continues to be produced (e.g. Prodromos), or where impressed pottery is very scarce /absent (Achilleion and Sesklo), no differences can be seen in the contours of vessels: beaded lips, ledge rims and neck jars with angular joint, are present in these sites as well (Achilleion: Gimbutas

1989, fig. 5.43-49; Sesklo: Wijnen 1981, p.37; Prodromos: Chourmouziadis 1971a, fig. 9; Pyrasos: Theocharis 1959, fig. 9 and 11; Koskina Magoula: Chourmouziadis 1967, fig. 3-4).

In fact, all these features mentioned above have a long tradition in the Thessalian region and they are widely distributed in all sites. Beaded lip and ledge rim appear from the early levels along with monochrome pottery (e.g. beaded lip from Argissa: Milošević 1959, fig. 5, 3; ledge lip from Achilleion: Gimbutas 1989 fig. 5.37, 6, 7, 9, and fig. 5.39, 2-5, 7) and increase in frequency in the strata with decorated vessels. Beaded lip in particular, is considered as a characteristic attribute of the Early Neolithic painted pottery from Thessaly (Theocharis 1967, p.137), since it is found in most of the painted vessels.

Discussion: It can be concluded then, that there is a continuity in vessel forms, and consequently in pottery technology, between the levels with painted and impressed decoration. Moreover, no differences are noticed among contemporary sites which had different types of pottery decoration (only impressed; impressed and painted; only painted). This conclusion is incompatible with a theory which anticipates the arrival of new people at some of the Thessalian sites.

The invasion hypothesis becomes less convincing, if we consider that all features discussed above are absent from the regions where one would expect the immigrants to have come from. Among the sites north of Thessaly, beaded lip and ledge rim are found only at Servia (Wijnen 1979, p.193). They are absent from Nea Nikomedeia, the sites of the Adriatic Littoral and all the neighbouring sites of the FTN complex. Neck jars from these sites, including Servia, show a smooth and continuous transition between the body and the neck (Korkuti 1982, plate V; Simoska and Sanev 1975, plate VII and XIII; Gimbutas 1976, fig. 14, fig. 18 and fig. 20;).

A similar conclusion is reached from the examination of figurine material (Nandris 1970; Chourmouziadis 1971a, 1973). Two figurine types in particular, namely the pear shaped and the integral seat figure, demonstrate the case more clearly.

Pear shaped figurines were first found at Otzaki Magoula in the levels with impressed pottery, and they were considered by Milošević as an attribute of the new immigrants (Milošević 1955). Later excavations have shown that this figurine type was present before the appearance of impressed decoration (Prodromos: Chourmouziadis 1971a), and that it was found in sites where impressed decoration is absent (Achilleion: Gimbutas 1989 fig. 7.31.2; Sesklo: Theodoridis 1976). From the contemporary sites, outside the Thessalian region, only Servia (Wijnen 1979) has produced this figurine type. Some figurines from Amzabegovo and Vršnik (Gimbutas 1976, fig. 143; Garašanin 1982, fig. 11, 11) resembling the Thessalian ones, are of a later period (Amzabegovo-Vršnik II). Similarly, integral seat figurines, so far, have been found only within the Thessalian region (Nandris 1970; Chourmouziadis 1973).

Therefore, it can be seen that although the Thessalian sites differ in pottery decoration, they show a great similarity in other elements of material culture. This similarity can be considered as the result of the development from a common tradition and of the contiguity of the Thessalian sites.

The scarcity/absence of impressed pottery from the south Thessalian sites could be attributed to a local preference. A similar local differentiation is noticed in the distribution of black topped vessels. This decoration type was quite common in all western and most of the northern sites (Prodromos, Magoulitsa, Otzaki, Argissa, Nessonis, Gendiki and Agia Anna). At Otzaki for example, black topped and painted pottery were present in comparable quantities (Milošević 1971, table 1); at Prodromos black topped vessels amount

to 30% of decorated pottery (Chourmouziadis 1971a). In contrast, black topped decoration was absent from all the south Thessalian sites (Sesklo: Wijnen 1981; Pyrasos: Theocharis 1959; Achilleion: Gimbutas 1989).

7.4.3 Comparison of the Thessalian Impressed vessels with the vessels from the FTN and Adriatic Littoral sites.

Impressed decoration is a common trait of the FTN complex, and the Adriatic Littoral area. In the FTN sites impressed decoration was used simultaneously with painted, barbotine and applied decoration. In the sites of the Adriatic Littoral, impressions are the main form of pottery decoration.

A number of Thessalian vessels are decorated with finger and nail impressions. Such motifs are common in all sites of the FTN complex. At Vršnik I, nail and finger impressed vessels form the majority of decorated pottery (Garašanin M. and Garašanin D. 1961). At Amzabegovo I, nail-impressed vases are present, but in smaller amounts (Gimbutas 1976, table VIII). At the other sites with W/R assemblages, apart from the south-east Albanian settlements, impressed vessels are almost exclusively decorated with nail and finger impressions (Donja Branjevina: Karmanski 1975, plate 1, 7-9 ; Cîrca: Nica 1977, fig. 10; Drenovac: Vetnić 1972, plate I; Lepenski Vir III: Srejović 1971, fig. 8, 4-5 and fig. 10, 2; Srejović 1972 fig. 40-41; Padina B: Jovanović 1969, p.33; Gura Baciului: Vlăssă 1972, p.15; Mala Vrbica: Stalić 1986).

Vessels decorated with impressions made with instruments, are present in almost all northern and western Thessalian sites. This type of decoration is characteristic of the sites of the Adriatic Littoral, where nail and finger impressions are rare. Examples similar to the Thessalian vessels, decorated with small triangular and oblong impressions, are present at Crvena Stijena III (Benac 1987, fig. III, 2), Škarin Samograd (Müller 1988, fig. 5, 5),

Blaz II (Prendi and Andrea 1981, plate V, 8). Examples similar to the so called Cardium, are present at Smilčić (Batović 1966, fig. XXVIII, 9 and plate LXVII,1,2), where they were made with bone and stone tools. However, impressed decoration from the Adriatic sites is comprised of a much greater repertory of decorative motifs, executed with different types of shells, which are compounded to form complex patterns (Crvena Stijena III: Benac 1987 fig. II-III; Blaz II: Prendi and Andrea 1981, plates IV-V; Smilčić: Batović 1966, fig. plate XXXIII, XXXXII and XXXI; Müller 1988, fig. 12).

Impressions made with instruments, similar to the Thessalian ones, are abundant in the south-east Albanian sites (Prendi 1976, plate III; Korkuti 1982, plates XIII-XV; Prendi 1990, fig. 5, 10-14). At Vashtëmi they amount to 90% of impressed vessels (Korkuti 1982, p.123). However, Cardium decoration is absent. In the other sites of the FTN complex, only rare examples of vessels decorated with instrument impressions have been found (Vršnik: Garašanin 1982, p.93; Lepenski Vir III: Srejović 1972, p.114; Gura Baciului: Vlassa 1972, p.15).

Therefore, Thessalian impressed pottery shows similarities with the impressed vessels from the FTN and the Adriatic Littoral. In Nea Nikomedeia and Servia, two sites clearly related with the Thessalian tradition, impressed pottery is present from the beginning of occupation. Both sites are half-way between south Yugoslavia and south-east Albania, providing a path for contacts. Moreover, the material from Nea Nikomedeia shows a high degree of interaction (see section 7.5.2) between the inhabitants of this site and communities of the FTN area, indicating that at least a site by site contact between Thessaly and the FTN area, was in operation.

It seems then that the appearance of impressed decoration in Thessaly could be attributed to contacts with areas situated further north. As has been seen in section 7.3 3,

contacts with these areas could be traced even at an earlier phase, since technological elements of the Thessalian ceramic tradition most probably extended into Pelagonia and south-east Albania. It is of interest then, that the decorative motifs of the Thessalian impressed vessels also point mainly to south-east Albania, and through there, to the Adriatic Littoral.

However, it should be kept in mind that Thessalian impressed vessels were locally made, and were in use for a long period of time: the thickness of occupation deposits with impressed vessels, ranges from 3.10 m (Agia Anna: Chourmouziadis 1969) to 0.80 m (Gendiki: Theocharis 1962). During this period of time, impressed decoration was incorporated into the local tradition, and it was used alongside the R/W painted pottery and was applied to vessels with beaded or ledge rims (Milojčić 1971, plate M; Chourmouziadis 1971a, plate 23.).

Finally, it should be noticed that although the introduction of impressed decoration in Thessaly could be attributed to contacts with other areas, the disappearance of painted pottery is not easily explained. This phenomenon is more widespread in the northern sites, but is noticed in western (Magoulitsa) and southern (Sesklo) sites as well.

Ethnographic studies show that technological, social and economic changes could be responsible for variations in ceramic production, and for the introduction or disappearance of a decorative style (Hodder 1978). Technological reasons, such as deterioration in manufacturing techniques or scarcity of raw materials, do not seem to explain the disappearance of painted pottery from the Thessalian sites. Fine textured, slipped or unslipped vessels of high quality, continue to be made. Examination of the available subsistence data from the Thessalian sites (Halstead 1981; Renfrew J. 1973) does not indicate any economic changes during the Early Neolithic Period. It seems however that

for the examination of any social or economic changes, larger scale excavations are needed, since the trial trenches opened in most of the Thessalian sites and the summary presentation of their cultural remains, could mask any probable changes through time.

Even so, the available data indicate that in general, the production of the different pottery decoration types of the Thessalian sites follows a rather complicated pattern during the Early Neolithic period. There are examples of decorations which appear more or less simultaneously in all sites (e.g. painted), types that appear early in one site but not adopted immediately by the other sites (e.g. variegated pottery, present since the early Monochrome Phase at Achilleion: Gimbutas 1989) and decorative methods that are present only at few sites (e.g. pattern burnishing found only at Otzaki: Milošević 1971; Argissa: Milošević 1959; Sesklo: Wijnen 1981).

7.5 Cultural Affinities of Nea Nikomedeia.

7.5.1 Nea Nikomedeia and the Thessalian region

Comparing the cultural material from Nea Nikomedeia with the material from the Thessalian sites, a number of parallels can be drawn. These extend in pottery decoration, pottery technology, figurine material, and other small finds.

R/W painted vessels from Nea Nikomedeia and the Thessalian sites are decorated with a similar repertory of simple motifs, such as triangles, bold lines, zig-zag and lozenges. The organization of the motifs is also similar: decorative elements are repeated horizontally, vertically or diagonally covering the whole surface of the vessel. Thus, R/W painted vessels from Nea Nikomedeia (fig. 5.34) can be compared with those, for example, from Prodromos (Chourmouziadis 1971a, fig. 23), Sesklo (Theodoridis 1967, fig. 78; 79; 81; plate XXII B; XXIII A), Otzaki (Milošević 1971, plate F) and Achilleion

(Gimbutas 1989, fig. 5.70).

In pottery technology, it has been noticed that potters from both areas were working with clays which are free from plant inclusions, and they were using similar manufacturing techniques (coiling and pinching).

The figurine material from Nea Nikomedeia and Thessaly, is characterized by a great variety of types. Among them, the standing, steatopygeous female figures with the hands below the breasts can be mentioned, which are common in both areas (Theocharis 1973, plate 18; 16; 36).

Stone ear-studs and clay stamps found at Nea Nikomedeia (Rodden 1962, fig. 11; Theocharis 1973, fig. 116), show great affinities with the Thessalian examples (Theocharis 1967, plate XI, XII; Theocharis 1973, fig. 272; plate XX). The square-faced stamp seal in particular, so far has been found only at Nea Nikomedeia and the Thessalian sites (Nandris 1970, fig. 1; Theocharis 1959, p.69). The similarity of complex meandering patterns, absent from the painted pottery from both areas, indicates a copying of patterns (e.g. compare the Nea Nikomedeia stamps with the Nessonis and Pyrasos examples: Theocharis 1973, fig. 116, and fig. 272).

It should be pointed out however that there is a number of traits, common in the Thessalian region, which are absent from Nea Nikomedeia. These are, black topped and variegated pottery, beaded lip and ledge rim, pear shaped and integral seat figures. As these traits are present in Thessaly throughout the Decorated Phase, some of them even earlier, their absence from Nea Nikomedeia cannot be attributed to chronological reasons.

Moreover, there are some find categories which can be considered as characteristic of Nea Nikomedeia. Askoi, are absent from the sites in the wider vicinity of the site (Thessaly, Albania and south Yugoslavia). The examples from Early Neolithic

Peloponnese have a similar contour, but they are fine-textured vessels, with painted decoration and strap handles (Blegen 1975, plate 63; Phelps 1975).

Face vessels from Nea Nikomedeia are different from the examples found in the Early Neolithic Thessalian sites. Whereas in Nea Nikomedeia the features were modeled on the surface of the vessels, the Thessalian examples consist of figurines attached on the pots' surface (Theocharis 1967, p.150, plate XXV A). One example similar to those from Nea Nikomedeia, has been found at Servia (Wijnen 1979). Face vessels are absent from the contemporary Albanian and south Yugoslavian sites. Another feature which so far has been found only at Nea Nikomedeia, is the Z-form handle.

Taken into consideration the data mentioned above, Nea Nikomedeia can be clearly related to the Thessalian region. The direct parallels suggest regular contacts between the two areas. The most probable route of communication was through the valley of Aliakmon river (fig. 2.2). On the right bank of Aliakmon, 35 km south-west of Nea Nikomedeia, is situated the Early Neolithic site of Servia. Servia shows more close similarities with the Thessalian region, than does Nea Nikomedeia. Apart from similarities in painted vessels, variegated pottery is present in large quantities at Servia, and among the figurine material pear shaped figures are included. Moreover, ledge rims and beaded lips are a common feature of the pottery vessels (Wijnen 1979).

Servia and Nea Nikomedeia share a number of common traits. The presence, at Servia, of a face vessel similar to those from Nea Nikomedeia has been mentioned already. Moreover, Servia potters were covering some of their vessels with a coating which macroscopically at least, is similar to the pink coating used at Nea Nikomedeia. Similarly, polypod vases were found in both settlements. Therefore, the inhabitants of Nea Nikomedeia apart from having the possibility to communicate with Thessaly through the

valley of Aliakmon river, they could have contacts with settlements related to the Thessalian tradition, which were situated more near to the site.

Due to the paucity of impressed sherds found at Servia, Wijnen considers them as probable imports (Wijnen 1979). Although these sherds have a similar decoration with the Nea Nikomedeia impressed ware, macroscopical examination by the present author, showed that their fabric differ in colour and texture.

7.5.2. Nea Nikomedeia and the FTN.

Contacts between Nea Nikomedeia and the sites of south-east Albania and south Yugoslavia are suggested by similarities in decorated pottery, figurines, and in items of personal ornament.

The W/R painted pottery from Nea Nikomedeia illustrates more clearly these contacts, as the adoption and limited use, by the Nea Nikomedeia potters, of a different decorative style can be followed. In terms of numbers alone, W/R vessels are extremely few: only 4% of the painted vessels have a W/R decoration. Apart from the difference in colour, W/R and R/W vessels have a different syntax of decoration, and they are painted with different motifs.

In most of the W/R vessels, the decorative motifs are not restricted in horizontal or vertical rows, but they are freely combined in order to form more complex patterns (fig. 5.35, 5, 8, 9). This syntax of decoration is characteristic of the W/R painted pottery from the sites of south Yugoslavia and south-east Albania. Painted vessels from these areas are usually decorated with solid geometrical elements (triangles, parallelograms) which are compound to form complex patterns. In the case of Amzabegovo and Vršnik, these patterns resemble abstract floral motifs. Thus, the Nea Nikomedeia sherds (fig. 5.35, 6, 7, 13, 14) have parallels mainly in the Amzabegovo and Vršnik repertory (Gimbutas 1976,

fig. 23, 2; fig. 24; fig. 49; Garašanin et al. 1971, fig. 4; fig. 7). The most complete example of a floral motif from Nea Nikomedeia, is found on the base of a vessel (fig. 5.39, 1). It is made up from many small sized impressions, and it seems as a sketch of a pattern that the potter intended to make on another vessel.

Decorative motifs such as the tremolo lines (fig. 5.35, 5, 11, 12), absent from the R/W ware of Nea Nikomedeia, are common in the W/R pottery of Nea Nikomedeia and the vessels from Vashtëmi and Podgorie (Prendi 1990, fig. 6-9). However, the main similarity of the Nea Nikomedeia vessels with the painted ware of south-east Albania and south Yugoslavia, is in the syntax of decoration, and not in the use of identical decorative motifs. Therefore, in the case of W/R painted pottery from Nea Nikomedeia, we can see an adaptation of the painted tradition of the sites mentioned above.

Interaction with communities of the FTN area is also suggested by similarities in personal ornaments. A number of horned pendants, a trait characteristic of the FTN area, are present at Nea Nikomedeia (Nandris 1970, fig. 1). So far, Nea Nikomedeia is the southern Balkan site where this find-type has been found. Similarly, the greenstone pendant from Amzabegovo (Gimbutas 1976, fig. 211, 1), parallels one small find from Nea Nikomedeia (Rodden 1964a, fig. 4B). Furthermore, the small clay Rod-heads with a "top-knot" offer evidence for contacts between Nea Nikomedeia and the FTN complex (see Nandris 1970, fig. 2).

Apart from the traits presented above, the use of Aegean shells (*Spondylus gaederopus*), by the inhabitants of Amzabegovo, for the manufacture of ornaments (Gimbutas 1976, p.243), evidences that a communication was established between the Ovče Polje region and the Aegean Littoral area. A possible route was along the Axios-Vardar river, which reaches the Aegean sea near Nea Nikomedeia (fig. 2.2).

Taking into consideration the resemblance of the material culture of Nea Nikomedeia with that of the Thessalian sites, it can be concluded that in Nea Nikomedeia we find evidence of the contact between two areas (Thessalian and FTN) with developed but distinct ceramic traditions. Moreover, in the W/R pottery of Nea Nikomedeia an imitation of the painted tradition of south Yugoslavia and south-east Albania, by the inhabitants of Nea Nikomedeia, can be seen.

The process of adapting foreign elements into local material culture is usually long and slow and occurs through complex processes of selecting, reinterpreting and rejecting (Beals et al. 1973, p.319). The presence of W/R (and impressed pottery) since the beginning of the occupation of the site of Nea Nikomedeia, clearly demonstrates that Nea Nikomedeia and the excavated sites from south-east Albania and south Yugoslavia cannot be considered as representing the earlier Neolithic communities of these areas. This is also evidenced by the fact that their material culture includes traits that are technologically advanced (i.e. in pottery: slipping, coating, painting the vessels) and often characteristic of the settlements (i.e. face vessels, askoi, Z-form handles at Nea Nikomedeia; floral motifs of Amzabegovo and Vršnik; incised /grooved pottery from Vashtëmi).

CHAPTER 8

CONCLUSIONS

8.1 Pottery and the Site of Nea Nikomedeia

Study of the ceramic material from Nea Nikomedeia shows that the vessels were made by coiling and pinching, or a combination of the two techniques. Material from the original clay beds was used after a simple refining process, the addition of temper being very limited. The vessels were fired in bonfires at temperatures not exceeding 750-800° C. The pots were carefully made, since traces of the primary manufacturing techniques were usually obliterated by subsequent scraping, smoothing and surface coatings. Apart from the use of painted, impressed and applied decoration, other simple means such as the addition of ground mica into the slip and careful burnishing, were used for the production of highly decorative pots.

On the basis of ethnographic evidence, four modes of production are considered as being of relevance in Prehistoric contexts (Leeuw 1977, 1984; Peacock 1981, 1982): (1) Household production; (2) Household industry; (3) Individual workshop industry; (4) Nucleated workshops. The general trend is that as we progress from mode of production (1) to (4), there is an increasing degree of technological investment and craft specialization. The clearest indications of craft specialization are the existence of workshops and specialized tool-kits. Standardization of production (raw materials and forms), advanced manufacturing techniques, complexity and diversity of products and the

use of non-local raw materials are other elements indicative of craft specialization.

The following features indicate that at Nea Nikomedeia the ceramic manufacturing activities were at the household level of production: the high degree of variability in terms of the local raw materials used by the potters, the absence of any correlation between fabric types and vessel forms as well as the use of basic manufacturing techniques for the production of vessels with simple, rounded contours.

It has been suggested that vessels of high quality are made by specialists (Arnold 1975; Renfrew 1973). In Nea Nikomedeia the Porcelain R/W painted vessels have a very high quality of burnishing lustre and they are usually made with a very fine textured clay fabric. The difficulty of working with such clays should be stressed, as many fine textured clays are too plastic and they tend to crack during drying and firing. However, taking into consideration the even spatial distribution of the Porcelain ware all over the settlement and their rarity, it seems that these vessels were the most carefully made, and more time consuming, products of individual households and that they do not represent the products of specialists.

In the household level of production, which is usually associated with women potters, pottery manufacture is determined by the needs of individual houses. The estimated rate of annual pottery production for the houses revealed in the central excavation grid of Nea Nikomedeia is rather high (21-84 pots per year for all the houses), suggesting that pots were an important element of every-day life. In contrast, at Early Neolithic Franchthi, the only other site for which a functional analysis of the ceramic material is available, a very low rate of annual pottery production (12-13 pots per year for the whole site) has been estimated. This discrepancy may indicate a difference of activities between a cave occupation and an open-air settlement.

The fact that ceramic containers played an important role in the every-day activities of the Nea Nikomedeia inhabitants is also reflected by the vessels' variations of shape and size. Examination of the fabric types used by the potters shows that the majority of them were suitable for the manufacture of cooking pots. Indications of the use of vessels near the fire, have also been found. As for the storage capacity of the Nea Nikomedeia vessels, calculations of the volume of the pots shows that the storage of the seeds kept for sowing the following year was within the capacity of the containers. However, for the storage of the whole annual crop production, other types of containers must have been used by the inhabitants of Nea Nikomedeia.

Correlation between the fabric types and the size of the vessels was observed, as for example the frequent use of a rather coarse fabric (fabric D) for the manufacture of the thicker, and presumably larger, vessels with applied decoration. However, the lack of any correlation between fabric types or quality of paste and vessels' shapes, shows that the intended function of a vessel was not the main criterion in the selection of the fabric used for its manufacture.

Although the vessels at Nea Nikomedeia were made at the individual households, only a few differences in design and technique were observed, as, for example, the occasional addition of grog or the use of thrust lugs. In fact, the ceramic material shows a high degree of technological uniformity.

(1) The same fabric types were used by all potters and they are present in similar frequencies in all structures of the settlement.

(2) The same process was followed by all potters for the preparation and application of the pink coating.

(3) All pottery wares have an even spatial distribution all over the excavated

settlement, apart from the W/R painted ware which is absent from the south-east house (B-A6,B8-Ω7).

In conclusion, it can be seen that although the ceramic manufacturing activities at Nea Nikomedeia were at the household level of production, all potters follow the same potting tradition. This tradition was not restricted to the use of similar types of decoration but it extended to the use of the same raw materials and manufacturing techniques. The adherence of the potters to their potting tradition is underlined by the fact that the vessels from the First and Second building periods do not show any differences in the relative frequencies of shapes, surface treatments or fabric types.

8.2 The pottery of Nea Nikomedeia in its Balkan context

Petrographic analysis of the fabrics used by the Nea Nikomedeia potters show that all raw materials are compatible with the local geology. A number of W/R painted sherds were made from a fabric type which was encountered in only a few Porcelain painted vessels. The similarities in decoration of the Nea Nikomedeia W/R vessels and the painted vessels from south-west Yugoslavia and south-east Albania, raises the question of imports. However, since the fabric type of the Nea Nikomedeia vessels is compatible with the local geology and their decoration is not identical to that of the FTN examples, the W/R vessels are considered as local imitations rather than as imports.

This conclusion is in accordance with the results of the material sciences analyses of the Greek Neolithic ceramics (Jones 1986). The general picture which emerges from these analyses is that during the Neolithic Period, even in the Early Bronze Age, the functional demand for ceramic material was satisfied by each individual settlement. There are only a few cases where a limited number of suspected imports have been proven to be

incompatible with the local geology (Phelps 1986).

A similar situation is exemplified by the stratigraphies of the Early Neolithic Thessalian sites. At a number of these sites, painted or impressed sherds are completely absent for a long period of time, despite the fact that such vessels were made at contemporary sites. For example, in the 3 m deposits containing decorated vessel, at Otzaki and Magoulitsa, there is not a single painted sherd that could be considered either as locally made or as an import from another site (in the case of Magoulitsa, painted pottery could have been imported from Prodromos, 8 km away). It is of interest to note that a similar conclusion, that there was a very limited exchange of the ceramic material, has been reached from the analysis of the Vinča material.

In contrast, a different situation is represented by the lithic assemblages. Analyses of the origin of raw materials show that Neolithic people often used materials which were not available in the immediate vicinity of their settlements. Well-known examples are the widespread use of Aegean obsidian in the Greek Neolithic settlements (Renfrew C. 1973) and the use of Balkan flint and Hungarian obsidian, in the Iron Gates sites (Kozłowski J. and Kozłowski S. 1984; Nandris 1975). At a number of sites such as Argissa (Perlès 1989), Sesklo (Moundrea- Agraphioti 1981) Lepenski Vir and Vlasac (Kozłowski J. and Kozłowski S. 1984), tools made from imported materials predominate among the chipped stone assemblages. In most cases, the materials were imported in the form of preshaped cores or even blades and only part of the treatment was done at the settlement.

Despite the evidence against trade in pottery during the Neolithic period, there are indications of the interaction of potters from different settlements.

Urfirnis vessels have been found at a number of Middle Neolithic sites in central Greece, but they are abundant mainly in the north-east Peloponnese (Jacobsen 1984). The

most characteristic feature of this ware is its lustrous glaze-like finish which was prepared from finely levigated clays by the iron reduction technique and fired to a high temperature (Noll *et al* 1975, p.606). The difficulty of producing the Urfinis slip (Vitelli 1984) and the similarities in shapes, quality of fabric and decoration, shared by the vessels of the Peloponnesian sites, led to the hypothesis that this ware was the product of a specialized workshop. Analyses of the pots from Lerna and Franchthi (Jones 1986), show that at both sites, the vessels were made locally. However, the production of successful vessels over a large geographical area is not easily explained by a simple inspection, by the potters, of a finished product. Instead, the shared technological innovations suggest that an interaction of the potters should also be considered. In the Thessalian region this interaction of potters is suggested from the distribution of black topped vessels and scraped (A3d, A3c) pottery. The latter is also abundant in Middle Neolithic Servia.

Thus, although during the Neolithic period the functional demand for pots was satisfied by each individual settlement, the ceramic material from different settlements suggests that an interaction of potters and the exchange of technological know-how should be considered plausible. The spatial distribution of V-shaped bone spoons shows that this interaction was not restricted to ceramic material only.

In Chapter 7, south-east Albania (Vashtëmi and Podgorie), south-west Yugoslavia (Pelagonian sites) and northern Greece (Nea Nikomedeia), have been identified as transitional areas which combine elements from three regions with distinct ceramic traditions (Thessalian region, FTN and the Adriatic Littoral: fig. 8.1).

In the sites of south-east Albania and Pelagonia, pottery technology seems to draw its origin from the Thessalian or the Adriatic regions, whereas the material culture as appears in the W/R levels is clearly connected with the FTN complex. In Nea Nikomedeia, a site

clearly related to the Thessalian region, interaction with the sites of the FTN area is indicated by similarities in the figurine material and objects of personal ornament, as well as by the adoption and limited use of a decorative style which is characteristic of the FTN sites. These similarities are complemented by the evidence of the exchange of raw materials (Aegean shells at Amzabegovo).

Further south in Thessaly, influence from the FTN and the Adriatic sites is indicated by the adoption of impressed decoration. The cultural remains from Nea Nikomedeia and the position of the site halfway between south Yugoslavia and south-east Albania suggests that at least a "site by site" contact between Thessaly and the FTN area was in operation.

Regarding the appearance of farming communities in the FTN area, a south to north movement of Thessalian Neolithic groups into the FTN area has been proposed by a number of archaeologists. Examination of the ceramic material from the FTN sites showed that vessels are different in technology and decoration, from the pottery of the adjacent regions. The only exception concerns the material from south-east Albania and Pelagonia which shows technological similarities with the pottery from Nea Nikomedeia, Servia, the Thessalian sites and the Adriatic sites.

The extension of these technological elements into south-east Albania and Pelagonia supports the hypothesis that the appearance of pottery into the FTN area could have been influenced from the Thessalian region. However, the distinct potting tradition of the FTN potters excludes a large scale immigration of people and suggests that the development of ceramic production in the FTN area has to be considered, to a great extent, as a local development. This development seems to have occurred in a transitional period when elements of a Neolithic economy coexisted with hunting-gathering activities. On the other hand, the use of chaff-tempering over such a large area indicates that within the FTN

region the expansion of pottery technology was most probably facilitated by close contacts and the exchange of technological know-how.

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AAA	Archaeologika Analekta ex Athinon
AAC	Acta Archaeologica Carpathica
AAH	Acta archaeologica Academiae Scientiarum Hungaricae
AA	Archäologischer Anzeiger
ABSA	The Annual of the British School at Athens
AD	Archaeologiko Deltio
AE	Archaeologiki Ephimeris
AI	Archaeologica Iugoslavica
AJA	American Journal of Archaeology
AMN	Acta Musei Napocensis
Am. Antiq.	American Antiquity
Am. Anthr.	American Anthropologist
AK	Archäologisches Korrespondenzblatt
AP	Arheološki pregled
AS	Anatolian Studies
BAM	Beiträge zur ur-und frühgeschichtlichen Archäologie des Mittelmeer-Kulturraumes
BAR	British Archaeological Reports
BCH	Bulletin de Correspondance Hellénique
BEFG	Bulletin of the Experimental Firing Group
BIA	Bulletin of the University of London, Institute of Archaeology
BRGK	Bericht der Römisch-Germanisch Kommission
BS	Balkan Studies
CA	Current Anthropology
Dacia	Dacia, Recherches et découvertes archéologiques en Roumanie

Đerdapske sveske	Đerdapske sveske, Arheološki institut, Narodni muzej, Beograd, Odeljenje za arheologiju Filozofskog fakulteta
Germania	Anzeiger der Römisch-Germanischen Kommission des Deutschen Archaeologischen Instituts
Glasnik Sarajevo	Glasnik Zemaljskog Muzeja u Sarajevu
GNAMP	Godišnik na Narodnija Arkeologiški Muzej (Plovdiv)
GPAM	Godišnik na Plovdivskija Arkeologicheski Muzej
Godišnjak	Godišnjak. Centar za balkanološka ispitivanja.
JAS	Journal of Archaeological Science
JMAA	Journal of Mediterranean Archaeology and Anthropology
Jahrb. Röm.-Germ.	
Zentralmus. Mainz	Jahrbuch des Römisch-Germanischen Zentral-museums (Mainz)
JFA	Journal of Field Archaeology
ILN	Illustrated London News
Izvestija Sofia	Izvestija na Archeologiškija Institut Bulgarska Akademija na Naukite
MAA	Macedoniae Acta Archaeologica.
Materijali	Materijali Saveza arheoloških društava Jugoslavije
N. Jahrb. Min.	
Abh.	N. Jahrbuch für Mineralogie. Abhandlungen
PPS.	Proceedings of the Prehistoric Society
RC	Radiocarbon
RP	Razkopki i proušvanija na Narodnija Arkeologiški Musej v Sofija
SA	Slovenska Archeologia
SCIV	Studii și Cercetări de Istorie Veche
WA	World Archaeology
ZNMS	Zbornik na štipski narodni Muzej

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APPENDIX A

Fieldwork

The study of the ceramic material from Nea Nikomedeia involved two seasons of fieldwork (four and five months respectively) at the Verroia Museum, where the material is stored. The Early Neolithic pottery from the following sites was also examined: Achilleion (Larisa Museum), Soufli Magoula (Larisa Museum), Magoulitsa (Volos Museum), Nessonis I and Nessonis II (Volos Museum), Servia-Varythimidis (Florina Museum), Amzabegovo and Vršnik (Štip and Skopia Museums), as well as a selection of whole vessels from Veluška and Porodin (Bitola Museum).

Storing of pottery from Nea Nikomedeia

1961 campaign: The ceramic material collected during the 1961 campaign was washed and the feature sherds (rims, bases and lugs) of the monochrome vessels were stored in the Verroia Museum, according to their excavation square/spit designations. From the decorated vessels, all sherds were stored.

1963 and 1964 campaigns: The ceramic material from the main excavation grid (squares A1-M8) was washed and the possible joints were made. The monochrome sherds were divided by Rodden into three main groups: red-brown (fine and coarse), pink (fine and coarse) and beige (fine and coarse). For every excavation square/spit, the sherds from each group were counted and their surface area was measured by the excavator. Subsequently, only the feature sherds were stored in the Museum according to their excavation square/spit designations. The number of painted and impressed sherds present

in each excavation square/spit as well as their surface area was also recorded. In contrast with the monochrome pottery, all decorated sherds were stored in the Museum.

The ceramic material recovered in trenches TX, TY, TA, TB and TC was stored, unwashed, in the Verroia Museum.

Sampling of the plain pottery

During the excavations at Nea Nikomedeia, a large amount of Early Neolithic pottery was recovered. In fact the ceramic material found in the main excavation grid (squares A1-M8) alone, amounts to some 140000 sherds, the great majority of them being plain sherds. Thus, a sample was necessary to be taken from the plain (monochrome) pottery.

In order to use the preliminary work carried out by the excavator, it was decided to take a sample from the pottery recovered in the main excavation grid. Sampling was not extended in the pottery recovered during the 1961 campaign for the following reasons. Firstly, the ceramic material revealed in area L was attributed to a single building period whereas by sampling the pottery from the main excavation grid, ceramic material from both building periods could be selected. Comparative study of the pottery from both building periods was important for the examination of any changes through time. Secondly, because in the 1961 and 1963 campaigns two different grid reference systems were employed (2 m x 2 m square units in 1961; 4 m x 4 m in the 1963), it was decided to use the material from only the 1963 main excavation grid so that the sampling is based on units of comparable size.

Thirdly, the ceramic material found in Trenches TX, TY, TA, TB and TC was not included in the sampling because the stratigraphic/cultural associations of their deposits were still under study by the excavator.

After consulting Mr. C. Orton, it was decided that Selective Sampling (or Stratified

Random Sampling) was the most appropriate method for the case study. Stratification is a way of using prior knowledge to improve the precision of estimates, usually by minimizing the variability within each stratum. The results can be combined to give estimates for the population as a whole (Torrence 1978).

In Selective or Stratified Sampling the population is divided into a number of sub-populations (or strata). Then, a random sample is taken from each of these strata. The main excavation grid from Nea Nikomedeia was divided into 7 strata. Each area occupied by a building or a group of superimposed buildings, was considered as a separate stratum. The excavation squares included in each stratum as well as the excavation squares sampled from each stratum, are given in table 9.1. The amount of sampled squares correspond to a 25% of the total.

It is obvious that in many cases the boundaries of the strata are not clear cut, since a single excavation square is shared by two strata (e.g. excavation squares D2, C5, B8 etc). This is common in cases where a square is bisected by a house-wall. In these cases the square was incorporated into one of the two strata. This decision is not so arbitrary, if we take into consideration that during the excavations at Nea Nikomedeia there was no distinction among the sherds found inside or outside a house-wall; all sherds present in an excavation square were referred as bulk material to that particular square.

In sampling the excavation squares a fairly simple procedure was followed. After examining the ceramic material stored at the Verroia Museum, a few excavation squares (B7, A5, CO) were eliminated from the sampling. These were squares that did not have clear designation indexes (i.e. not clear or missing spit designations). The ceramic material from the excavation squares E0, E1, E2 E3 and E4 was also excluded from the sampling, because parts of these squares were excavated during the 1961 campaign and their

excavation was completed during the 1964 season (see section 3.4.1).

After this preliminary procedure, the excavation squares from each stratum were separated into two groups. One group consisted of excavation grids where according the excavator's measurement (number of sherds, and their surface area), a large amount of pottery has been found. The second group included squares where less pottery has been recovered. One or two random samples, depending on the size of the stratum, were selected from each group. Each sampled grid was studied vertically (the material from all spits present in it). The distinction of the excavation squares into two groups was made in order to make sure that the sample will include grids which will facilitate subsequent spatial, functional and chronological comparisons the ceramic material.

It should be pointed out that apart from the sherds from the sampled excavation squares which were studied analytically, the ceramic material from all excavation squares of the main grid was examined during the field-work.

Recording of Pottery

Using the sampling method described above, 4400 plain sherds were selected and studied. In contrast with the plain pottery were a sample was taken, all recovered sherds with impressed and applied decoration were studied.

For each sherd, the following form was completed

- | | |
|--------------------------|-----------------------------------|
| 1 Registration of sherd: | Excavation square/spit; |
| | Ware category: |
| | red/pink/beige/applied/impressed; |
| | Number of sherd: each sherd was |
| | given an individual number |
| | |
| 2 Shape: | Drawing: a right-hand section was |
| | drawn for each sherd; |

Rim/base diameter: it was calculated
by adjusting the sherd to a set of concentric
circles (the radius was increasing 0.5cm)

3 Surface colour:

The Munsell Soil Color Charts notations of
both interior and exterior surfaces, were
recorded

4 Fabric:

Hardness: the surface was scratched
with nail/glass/steel point;

The colour of sub-surface was recorded;

Frequency^{of} inclusions:

sparse/common/abundant;

Size of inclusions: very small (not visible
with the naked eye)/medium (smaller than
1 mm)/large (larger than 1 mm);

Sorting: well sorted/ill assorted;

Identification of inclusions: the following
types of inclusions were identified during
the field-work:

calcite/quartz/mica/shell/grog/plant

inclusions. For the other types of

inclusions their colour and shape

was recorded. Finally, the reaction of the fabric

with dilute hydrochloric was recorded

5 Firing:

Presence/absence of black core in the

cross-section;

Presence/absence of firing clouds on
the exterior surface/interior
surface/base;

6 Surface coating:

Present/absent;

Area covered:all surface/upper part;

Quality of coverage: adequate/poor/
wash-like cover;

Mica particles: few/many/absent;

Traces for the method of application
of coating: wiping/pouring/dipping;

The same information was recorded
for both exterior and interior surfaces

7 Burnishing:

Area covered with lustre: whole surface/
/upper part;

Quality of lustre: good/medium/poor;

Direction of burnishing strokes:
horizontal/diagonal/vertical/absent;

The same information was recorded
for both exterior and interior surfaces

8 Decoration:

Apart from the description of the different
types of decoration, typical examples of impressed and applied decoration were drawn.

9 Manufacturing techniques: All sherds were examined for any traces of the primary manufacturing techniques and the methods used for the application of bases and lugs.

Thin sections

In examining the sections a fairly simple procedure was followed. The colour of the matrix in plain polarizing light (PPL) and the number of voids were noted. Differences in colour between core and surface, were also briefly noted.

In examining the inclusions the aim was to note the major classes with a general percentage per total fabric using observational comparisons with percentage charts such as are used in sedimentary studies. For all classes of inclusions the identification was made with a note as to its relative abundance, size, angularity and sphericity. The latter two qualities were judged using the guide given in the Atlas of Sedimentary Rocks (Adams, Mackenzie and Guilford 1984).

Special attention was given on the technological data that can be ascertained from the examination of thin sections. In more details, the following aspects were examined.

(1) The processes involved in the preparation of the clay body prior to the manufacture. In order to investigate this, the relative amount as well as the shape and size of rock, mineral, argillaceous and organic inclusions, were examined.

(2) The method used in the manufacture of ceramics. In order to investigate this, the presence of voids, their orientation as well as the orientation of non-plastic inclusions were recorded (see Rye 1975, 1982; Woods 1982b, 1984-85).

(3) The nature of surface treatments. The characteristics of surface treatments as seen under the microscope, were recorded. On the basis of this examination, two different types of surface treatments were distinguished: a red-brown slip and a pink coating.

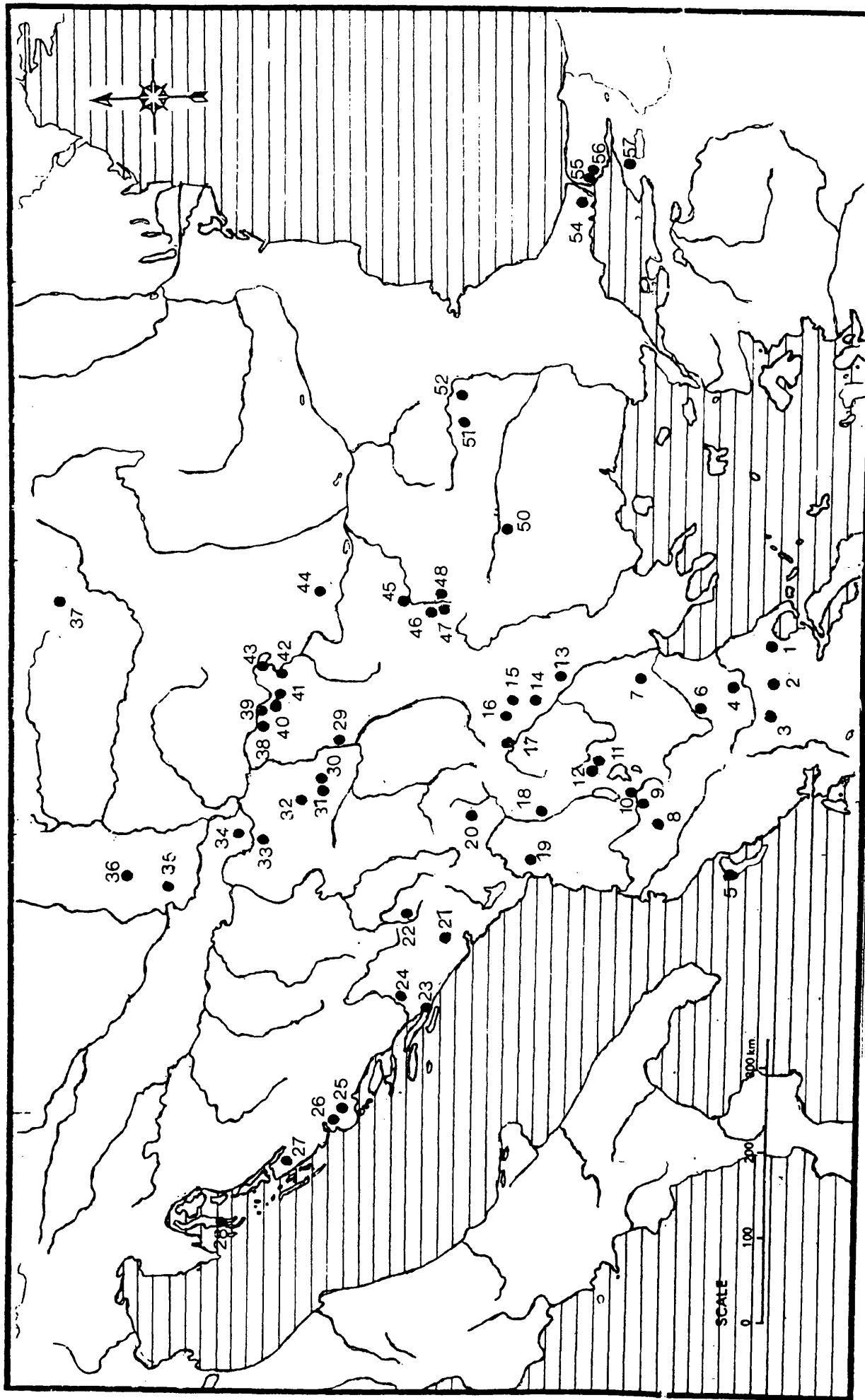


Figure 2.1 Distribution of Earlier Neolithic sites in the Balkan Peninsula

Key to Figure 2.1

1	Sesklo	30	Divostin
2	Achilleion	31	Grivac
3	Prodromos	32	Banja
4	Otzaki	33	Lug
5	Sidari	34	Dobanovci
6	Servia	35	Donja Branjevina
7	Nea Nikomedeia	36	Nosa Biserna obala
8	Vlush	37	Gura Baciului
9	Vashtëmi	38	Padina
10	Podgorie	39	Stubica
11	Veluška	40	Lepenski Vir
12	Porodin	41	Vlasac
13	Lakavica	42	Velesnica
14	Amzabegovo	43	Ajmana
15	Vršnik	44	Cîrcea
16	Rug-Bajr	45	Gradešnica
17	Zelenikovo	46	Kremicovci
18	Burim	47	Celopec
19	Blaz	48	Čavdar
20	Rudnic	49	Slatina
21	Crvena Stijena	50	Banjata
22	Odmut	51	Karanovo
23	Gundja	52	Asmaška
24	Zelena Pećina	53	Muldava
25	Škarin Samograd	54	Yarimburgaz
26	Pokrovnik	55	Fikirtepe
27	Smilčić	56	Pednik
28	Jamina Sredi	57	Ilipinar
29	Drenovac		

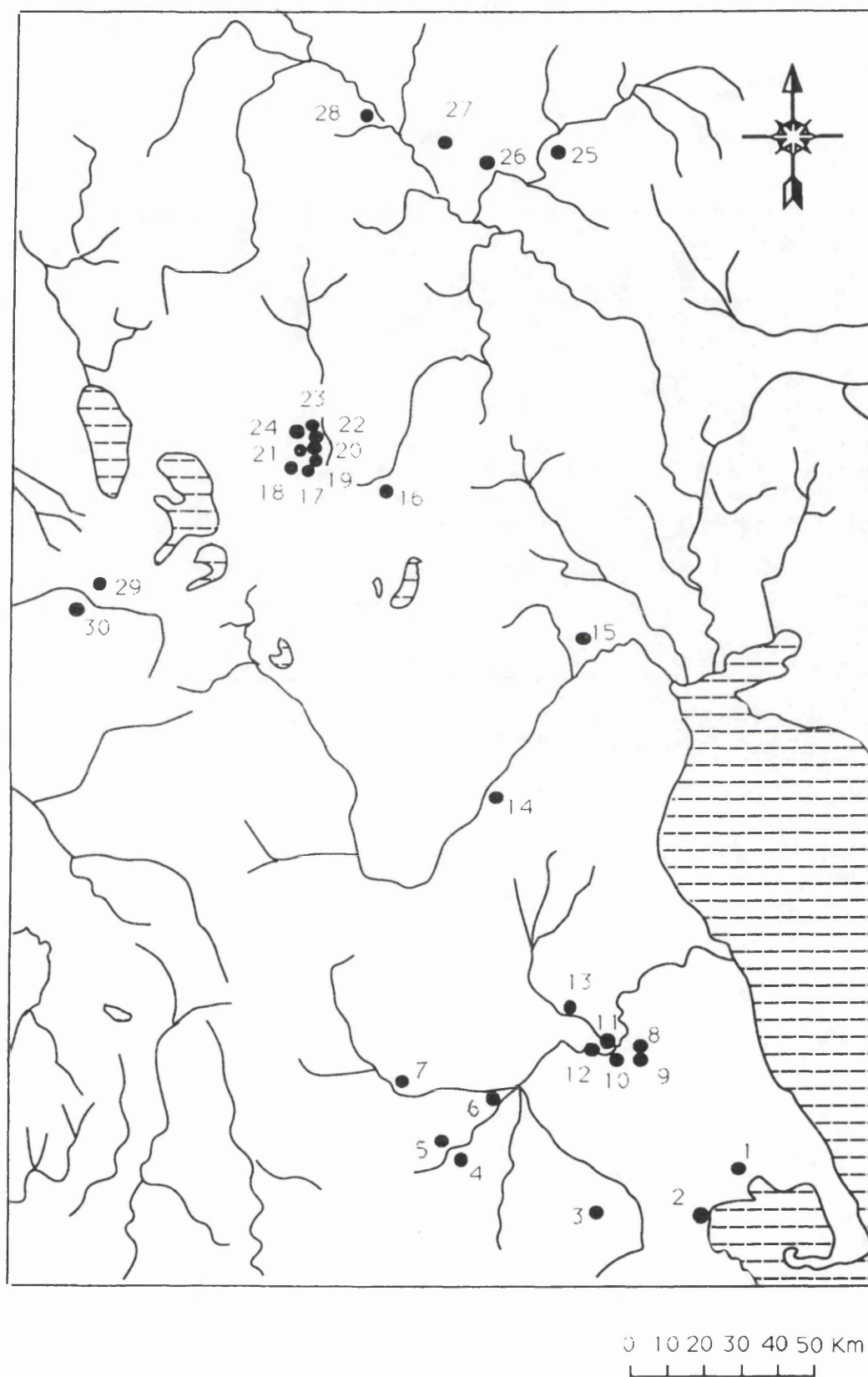


Figure 2.2 Distribution of the Earlier Neolithic sites of north Greece, south east Albania and south Yugoslavia

Key to Figure 2.2

1	Sesklo	16	Vlaku
2	Pyrasos	17	Veluška
3	Achilleion	18	Porodin
4	Prodromos	19	Optičari
5	Magoulitsa	20	Karamani
6	Magoula Koskina	21	Gurgur
7	Kefalovriso	22	Tm
8	Nessonis	23	Mala
9	Gendiki	24	Mogila
10	Soufli Magoula	25	Vrišnik
11	Otzaki	26	Amzabegovo
12	Argissa	27	Rug-Bajr
13	Agia Anna	28	Zelenikovo
14	Servia	29	Podgorie
15	Nea Nikomedeia	30	Vastěmi

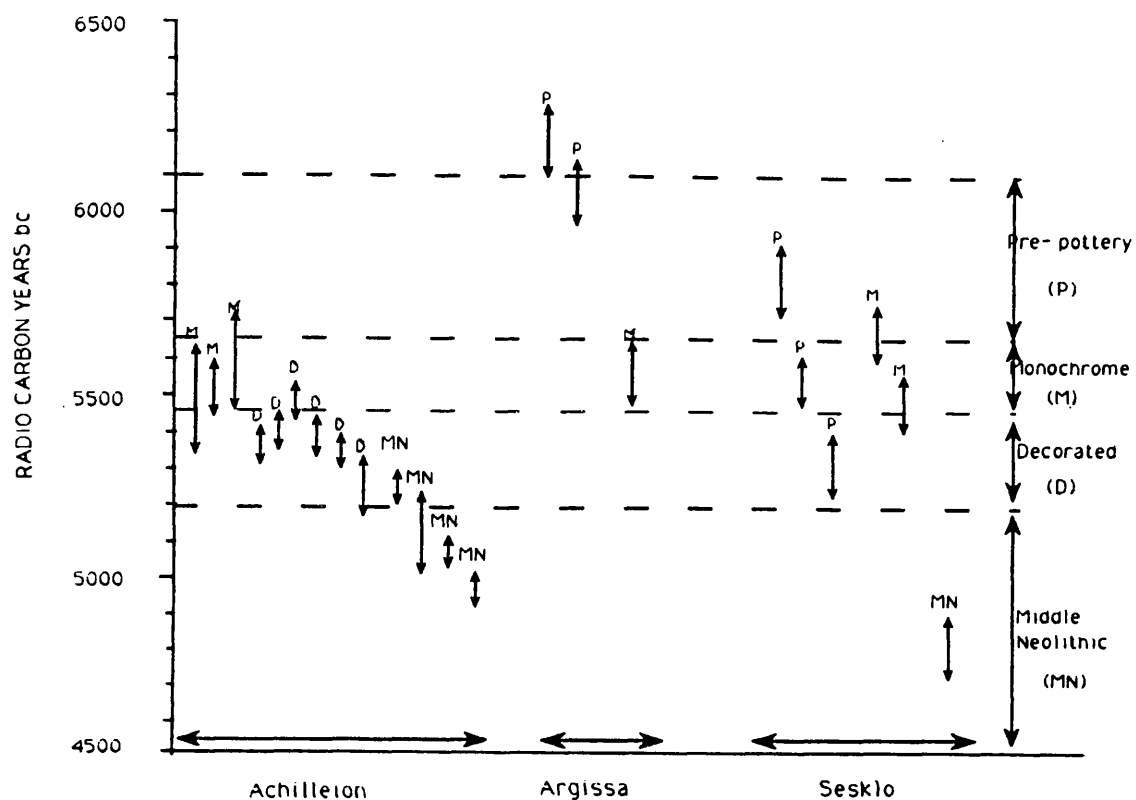


Figure 2.3 Uncalibrated radiocarbon dates (5568 half-life) from Early Neolithic Thessalian sites

Pre-pottery Phase (P), Monochrome Phase (M),
Early Decorated Phase (D), Middle Neolithic (MN).

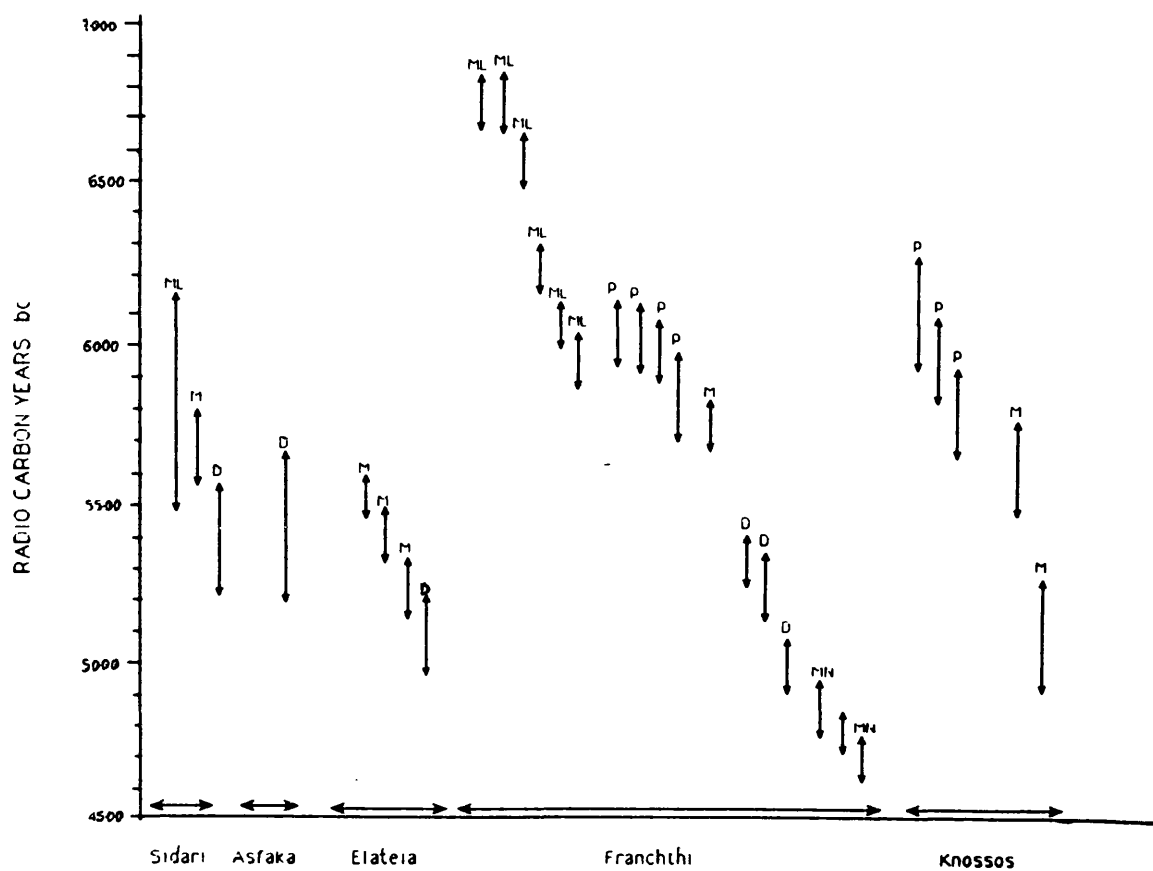


Figure 2.4 Uncalibrated radiocarbon dates (5568 half-life) from Mesolithic and Early Neolithic Greek sites

Upper Mesolithic (ML), Pre-pottery (P), Monochrome (M), Early Decorated (D), Middle Neolithic (MN).

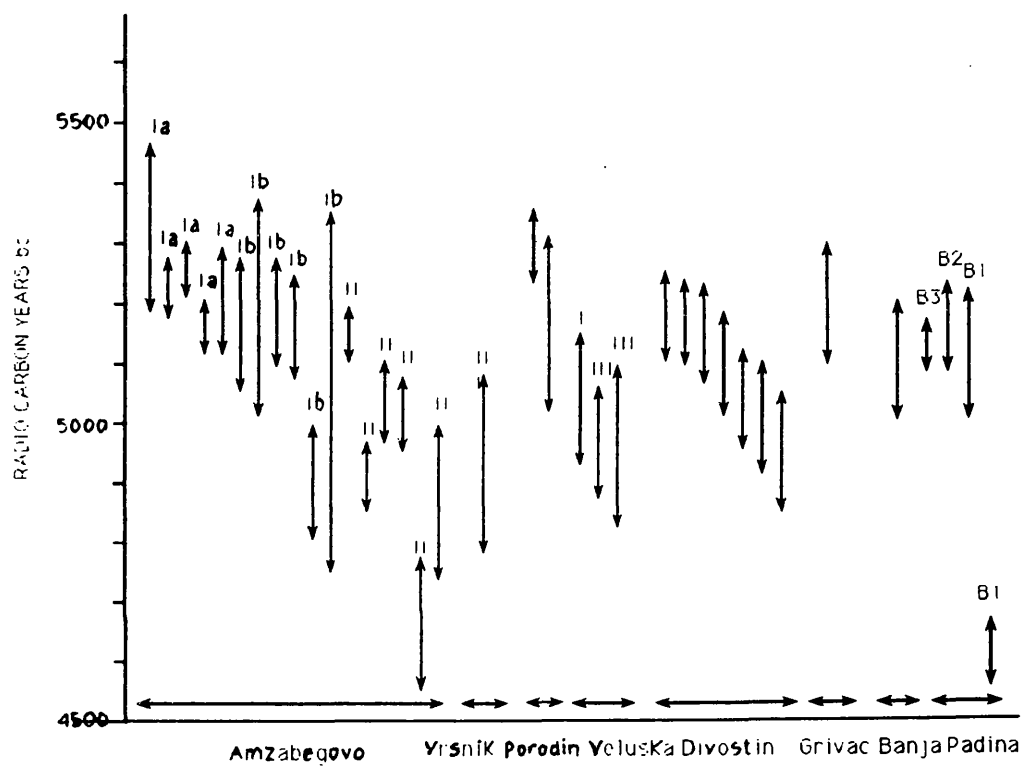


Figure 2.5 Uncalibrated radiocarbon dates (5568 half-life) from Early FTN sites. The occupation level from which the sample was taken, is given when known.

- 7500 - 6800 b.c
- ▲ 6800 - 6200 b.c
- 6100 - 5600 b.c
- 5600 - 5400 b.c
- 5400 - 5200 b.c
- ▲ 5200 - 5000 b.c
- ▲ 5000 - 4900 b.c

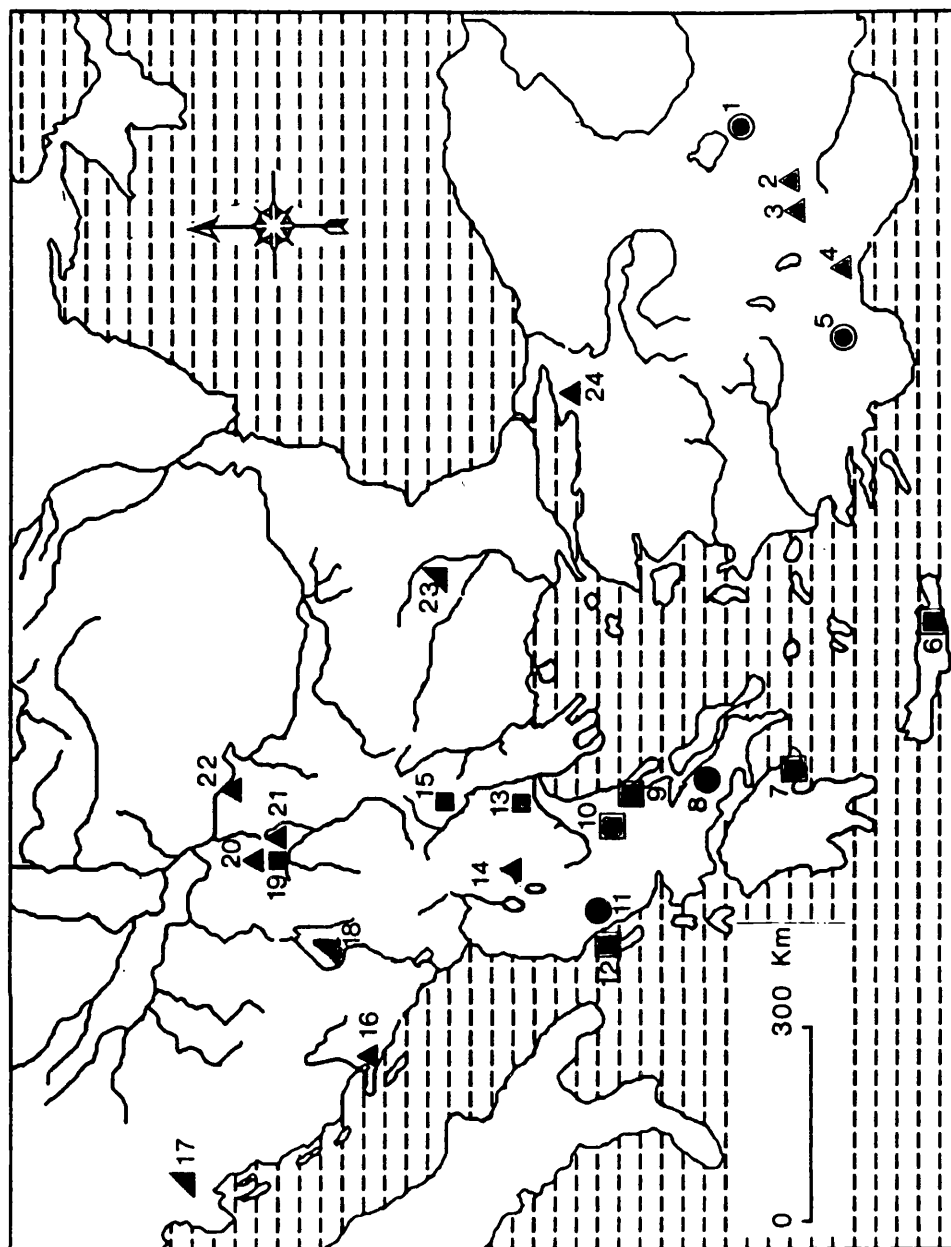


Figure 2.6 Radiochronologies from the first occupation levels of the Earlier Neolithic sites in the Balkan Peninsula and south-west Turkey

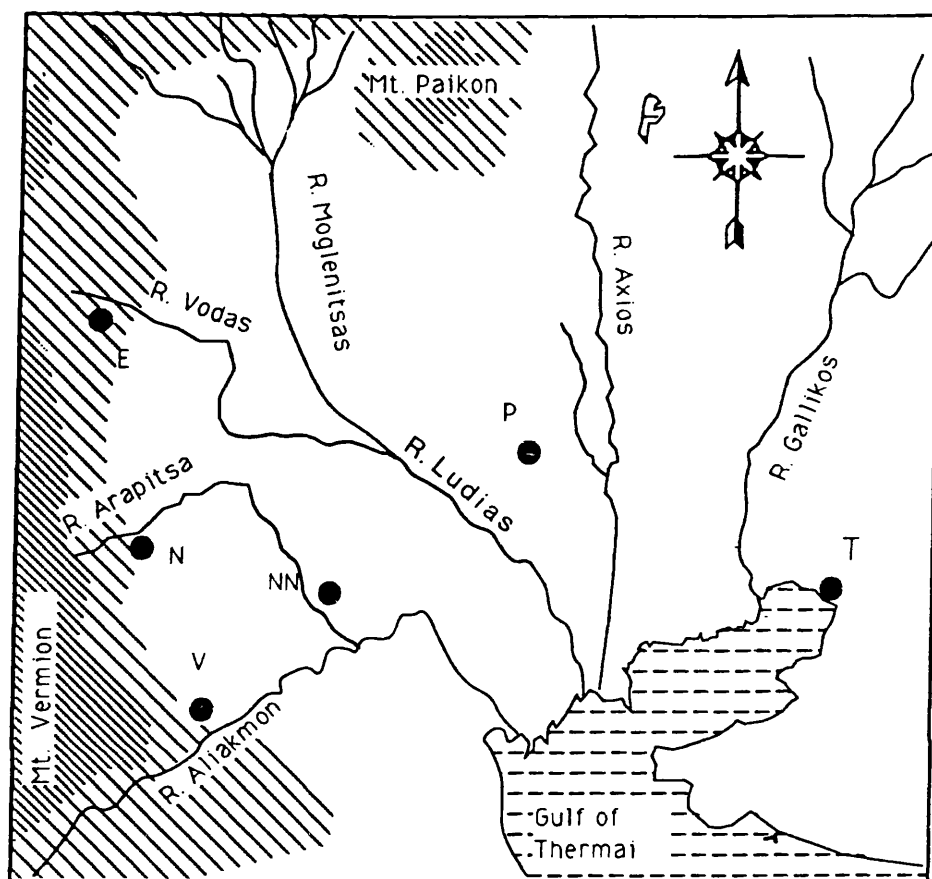
(n.b. For the Adriatic Littoral there are no C^{14} dates for the typologically earlier sites
At Ilipinar the earlier deposits are not excavated yet)

Key to Figure 2.6

1	Aşikli Hüyük	9	Sesklo	17	Pokrovnik
2	Can Hasan III	10	Argissa	18	Odmut
3	Catal Hüyük	11	Asfaka	19	Grivac
4	Suberde	12	Sidari	20	Banja
5	Hacilar	13	Nea Nikomedeia	21	Divostin
6	Knossos	14	Porodin	22	Padina
7	Franchthi	15	Amzabegovo	23	Asmaška
8	Elateia	16	Gudnja	24	Ilipinar

Sources for Figures 2.3, 2.4, 2.5 and 2.6

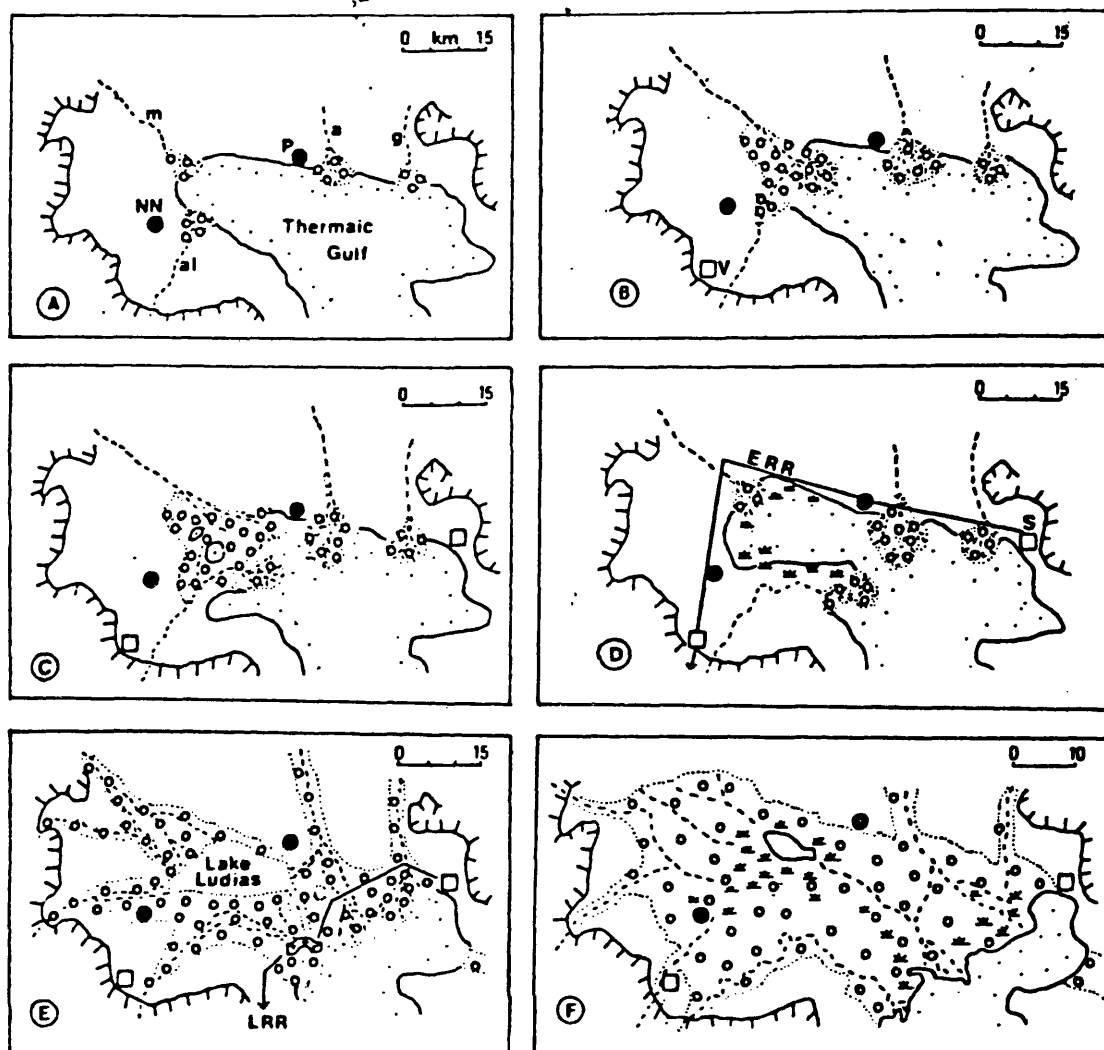
Achilleion:	Gimbutas 1989
Sesklo:	Lawn 1973
Argissa:	Breunig 1987
Sidari:	Sordinas 1967
Asfaka:	Higgs and Vita Finzi 1966
Elateia:	Weinberg 1962
Franchthi:	Lawn 1971; Lawn 1974; Lawn 1975
Knossos:	Barker and Mackey 1963; Barker <i>et al</i> 1969
Amzabegovo:	Gimbutas 1976
Vršnik:	Garašanin M. & Garašanin D. 1961
Veluška:	Simoska and Sanev 1975
Porodin:	Breunig 1987
Čuka:	Breunig 1987
Divostin:	McPherron and Srejović 1971
Grivac:	McPherron and Srejović 1971
Banja:	McPherron and Srejović 1971
Padina:	Clason 1980
Aşikli Hüyük:	Todd 1980
Can Hasan III:	Todd 1980
Catal Hüyük:	Todd 1980
Suberde:	Todd 1980
Hacilar:	Todd 1980






NN Nea Nikomedeia
 T Thessaloniki
 P Pella
 V Veroia
 N Naoussa
 E Edessa

0 10 km

Figure 3.1 The plain of Western Macedonia.



- 1  Crystalline limestone upland
- 2  Tertiary and Quaternary lacustrine marls, sands, silts and travertines.
- 3  Younger 'Historic' Alluvial Fill and Holocene deltaic fill.

ERR: Early Roman Road; LRR: Late Roman Road

Figure 3.2 Bintliff's reconstruction of the growth of the Plain of Macedonia

- n.b. A = Early prehistoric period;
 B = 5th century B.C.;
 C = 4th century B.C.;
 D = around 0 B.C./A.D.
 E = Late Roman period, around 500 A.D.;
 F = 1908 A.D.;

(from Bintliff 1976)

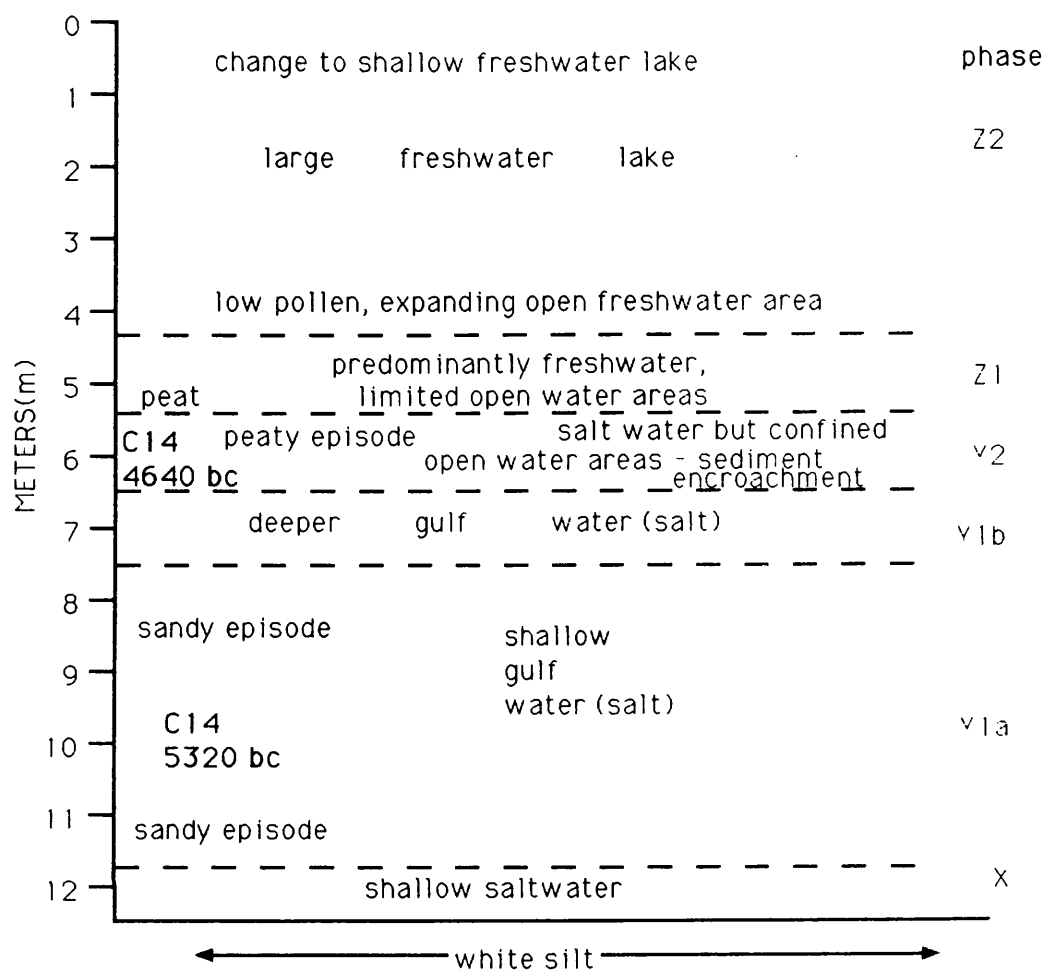


Figure 3.3 The sedimentary sequence in the Yiannitsa core.

n.b. Phases are vegetational divisions, characterised as follows:

X = deciduous woods and swampy forests;

Y1a = as in X but increased proportion of swamp forest;

Y1b = notable decline in plain forest, especially swamp variety;

Y2 = return to conditions of Y1a;

Z1 = as Y2;

Z2 = as X and Y1a with occasional clearance phases possibly due to farming and herding.

(from Bottema 1974)

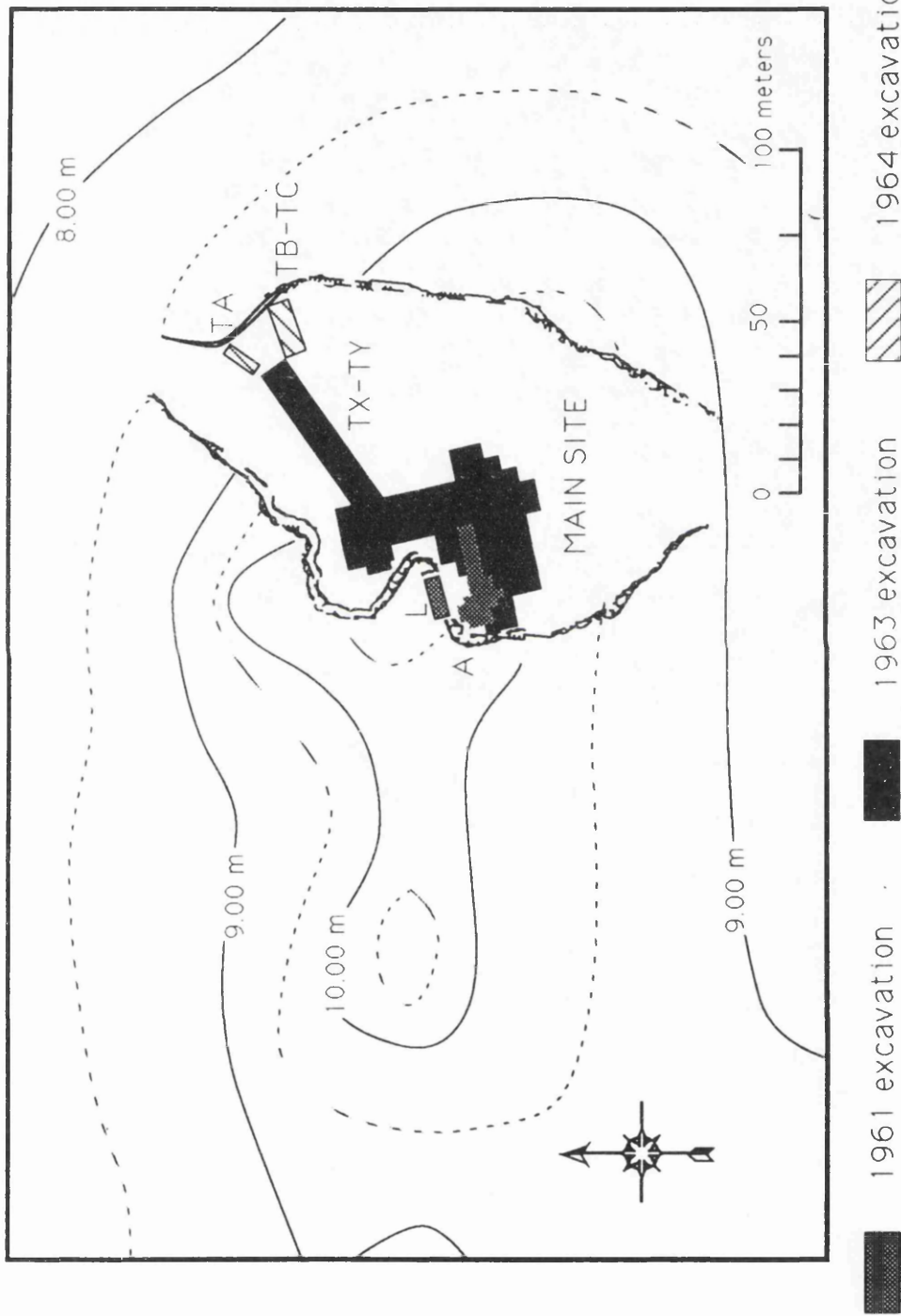


Figure 3.4 Contour Plan of the mound of Nea Nikomedeia, showing the excavation trenches
(Contour Plan and 1961 trenches from Rodden 1962.)

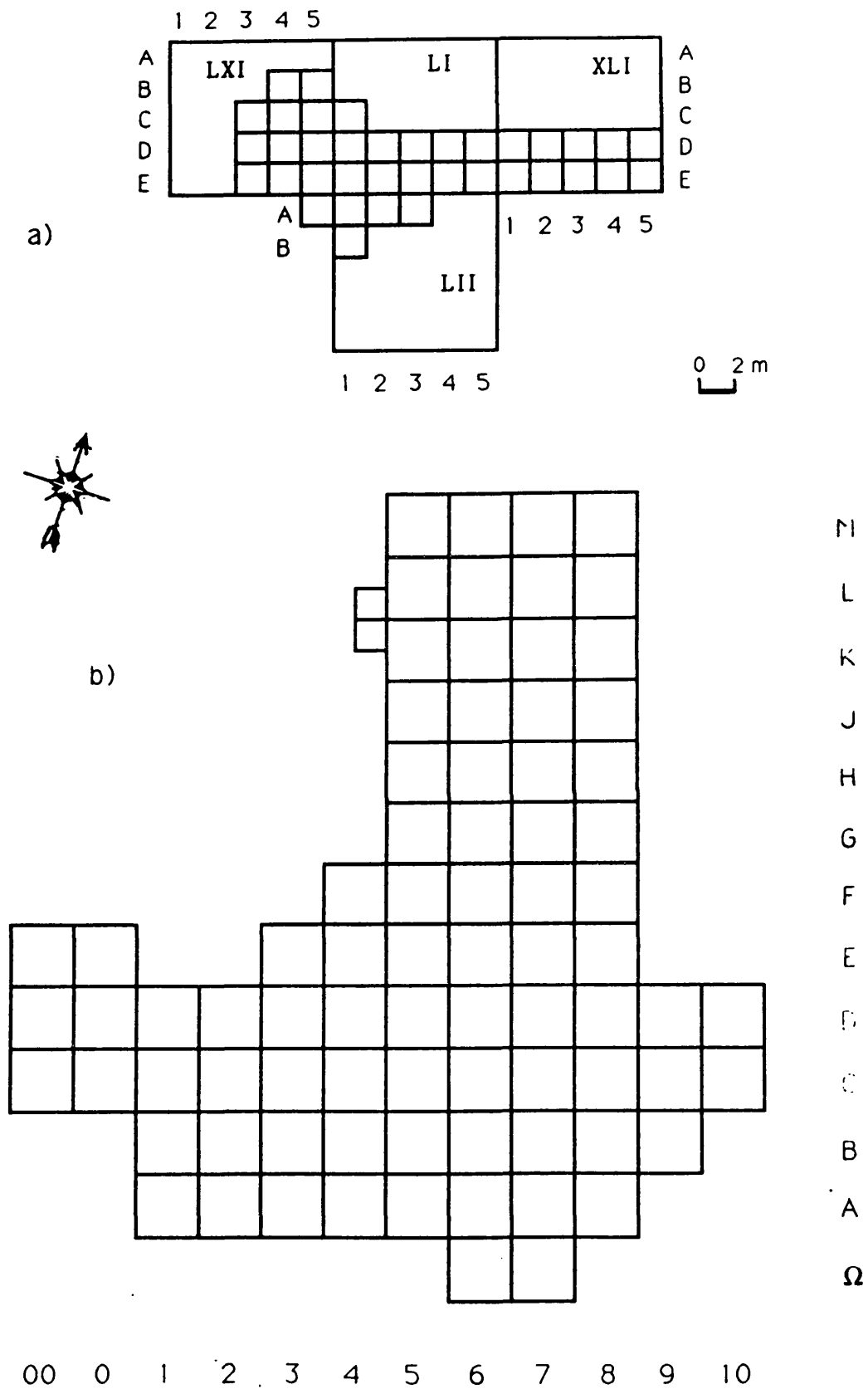


Figure 3.5 a) Excavation Grid of Cutting A (1961 campaign);
b) Main Excavation Grid of the lower site (1963 campaign)

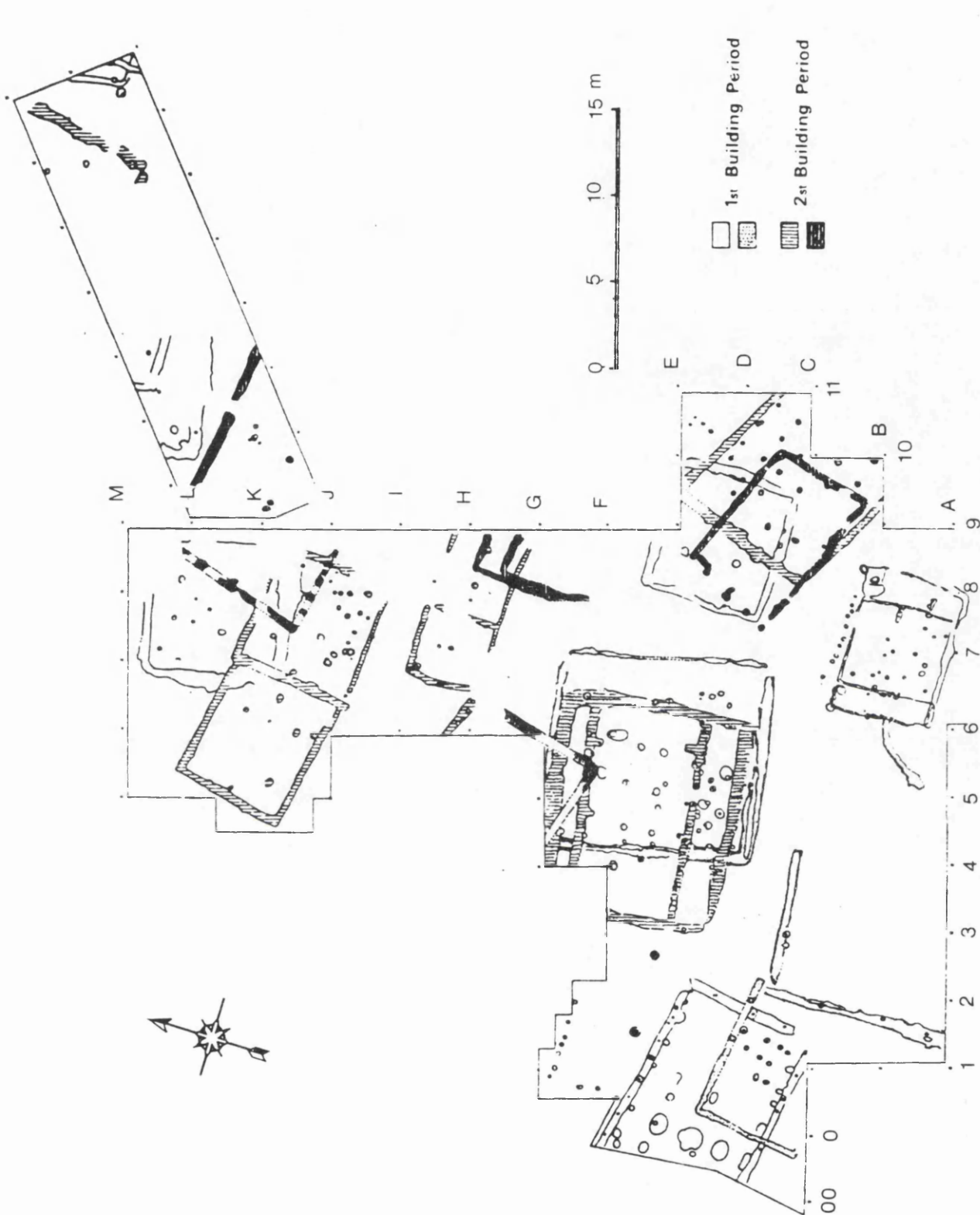


Figure 3.6 Architectural features from the Lower site (1963 campaign)

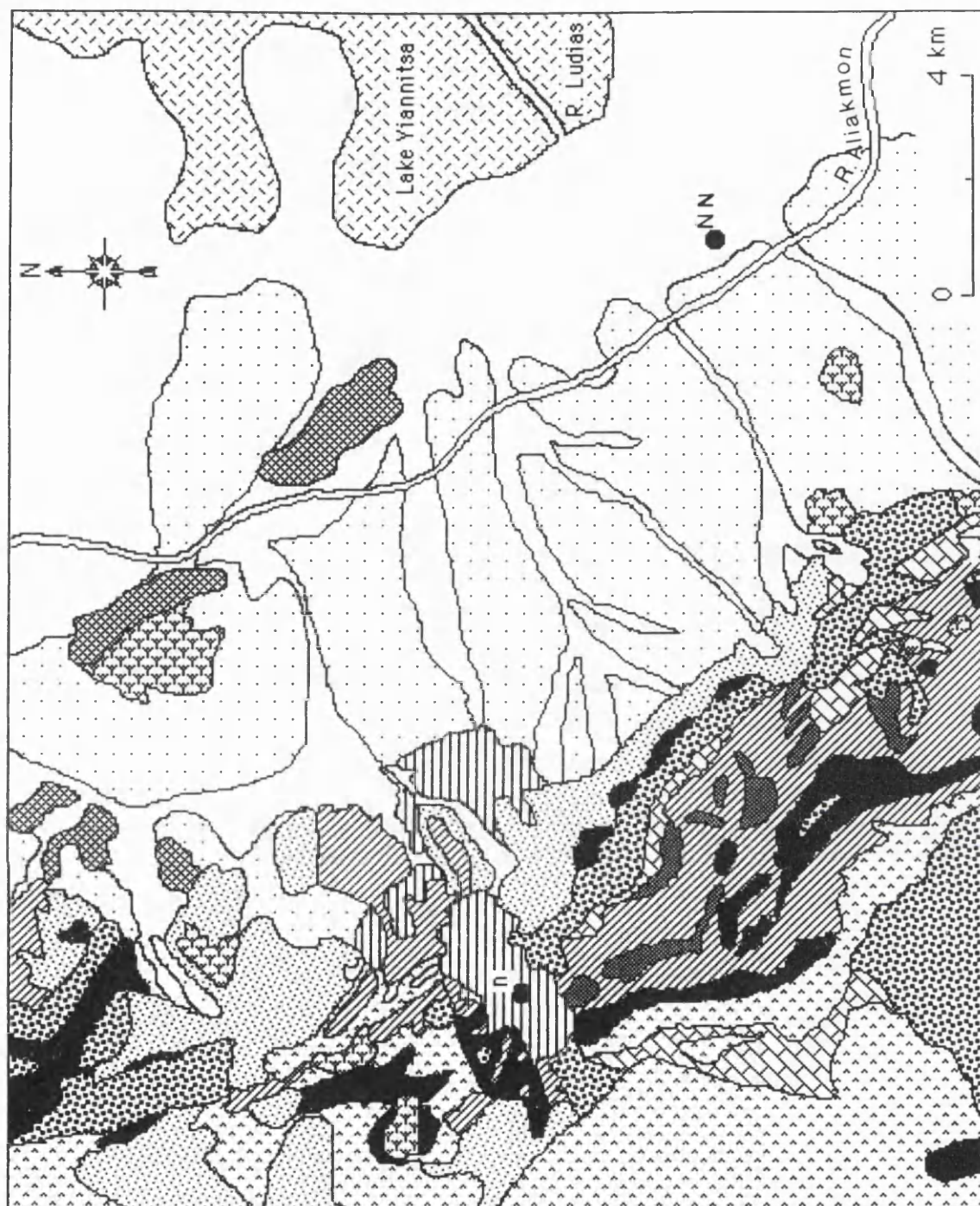


Figure 4.1 Geological map of the area surrounding Nikomedeia
(map based on Institute of Geology and Mineral Exploration, Veroia Sheet)

- Trachyte & Andesite
- Schist, Conglomerate & Limestone
- Ancient Conglomerate
- Serpentine
- Sandstone
- Schist
- Schist & Conglomerate
- Limestone
- Travertine
- Gabbros & Tuff
- Cones & Terraces on Piedmont (Metamorphic Rocks)
- Alluvial Deposits
- Naousa
- Neolithic Naousa

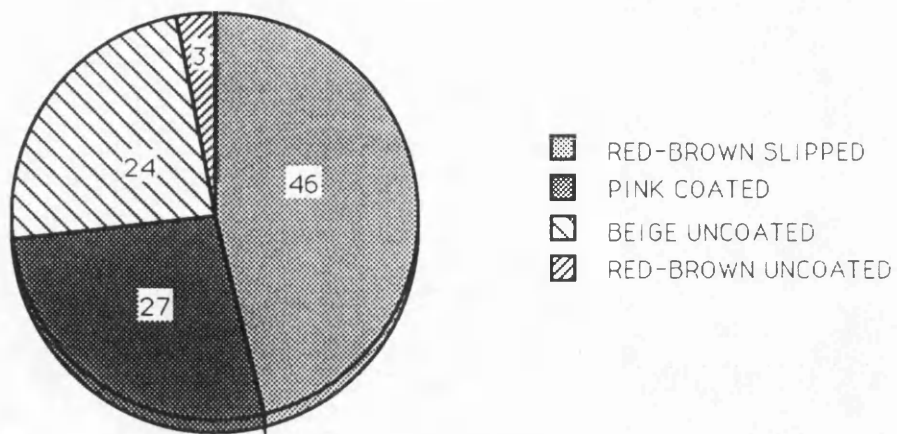


Figure 5.1 Plain Pottery : Relative Frequency of Burnished Vessels and Vessels with a Surface Coating

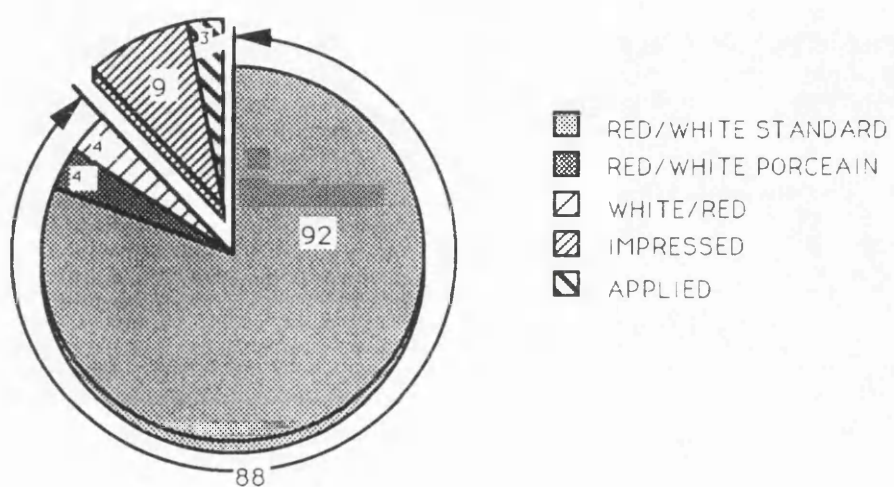


Figure 5.2 Relative Frequency of the different types of Decorated Pottery

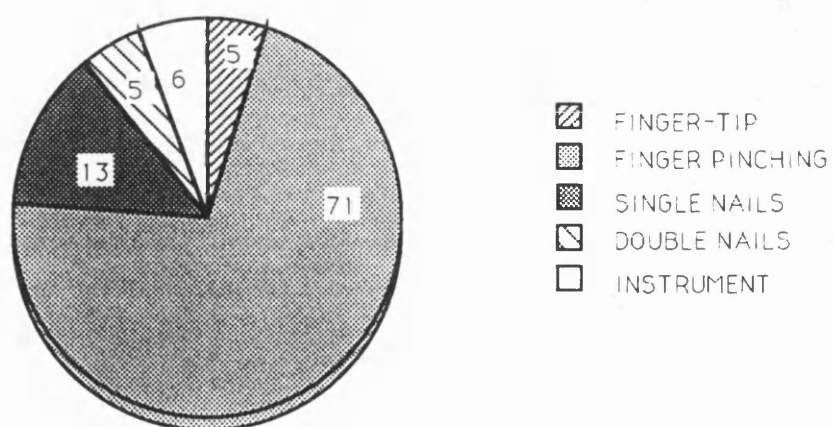


Figure 5.3 Relative Frequency of the different types of Impressed Decorations

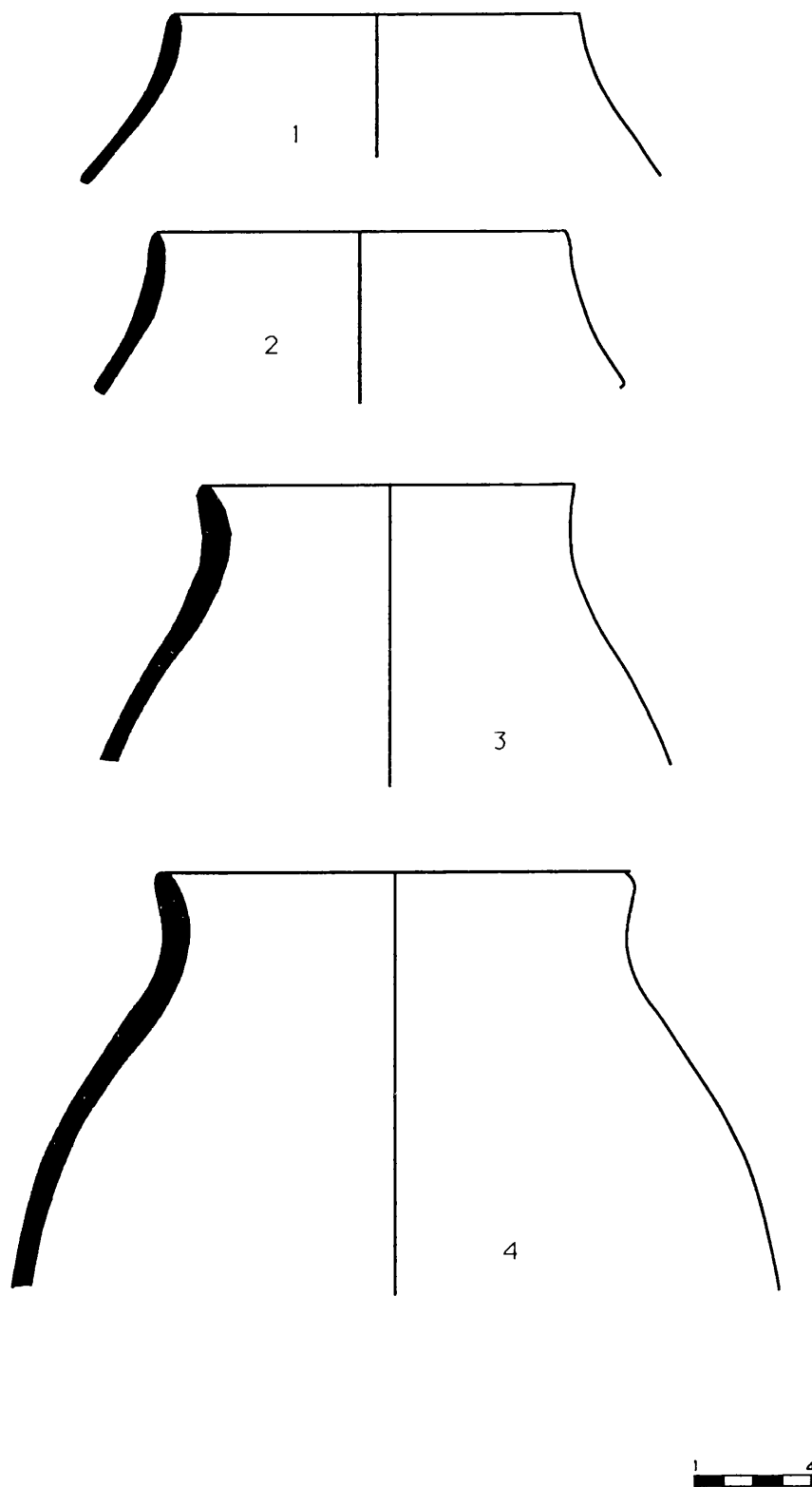


FIGURE 5.4 Neck Jars:
1-3 Intermediary between Hole-Mouthed Jars and Neck Jars (A1)
4 Neck Jar with Medium Collar (A2)

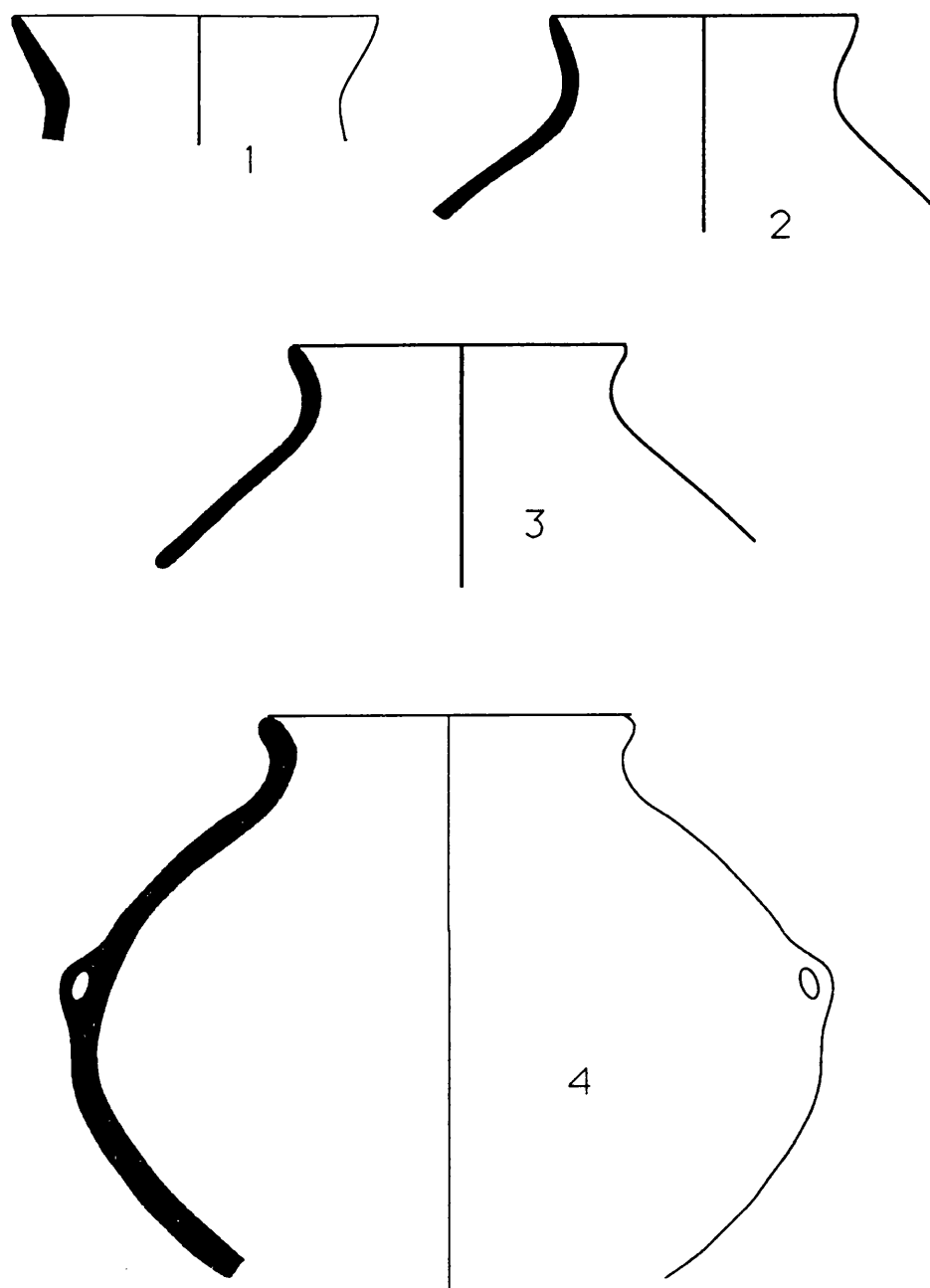


FIGURE 5.5 Neck Jars with Medium Collar (A2)

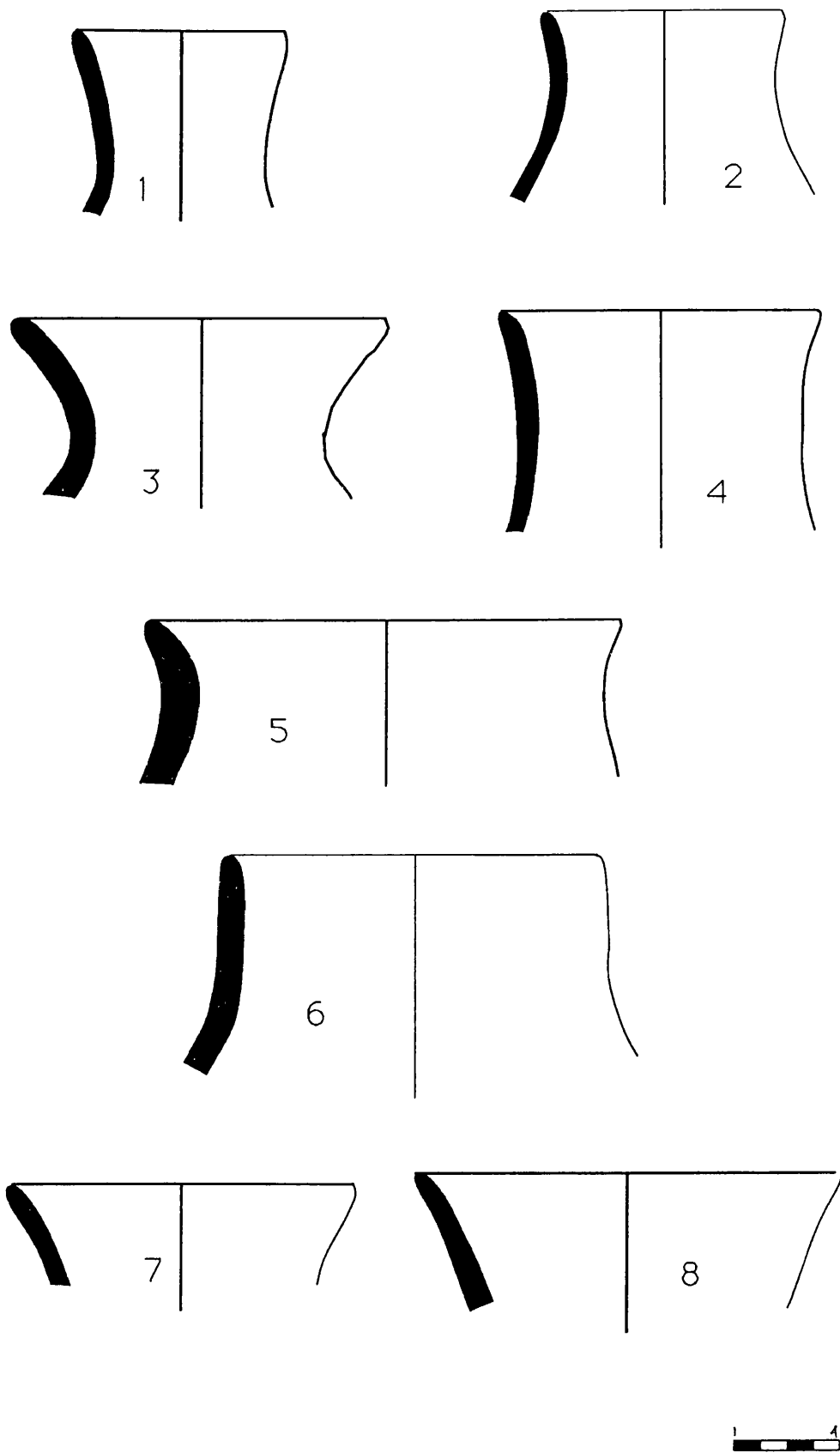


FIGURE 5.6 Neck Jars with High Collar (1-6)
7-8: Probable Neck Jars

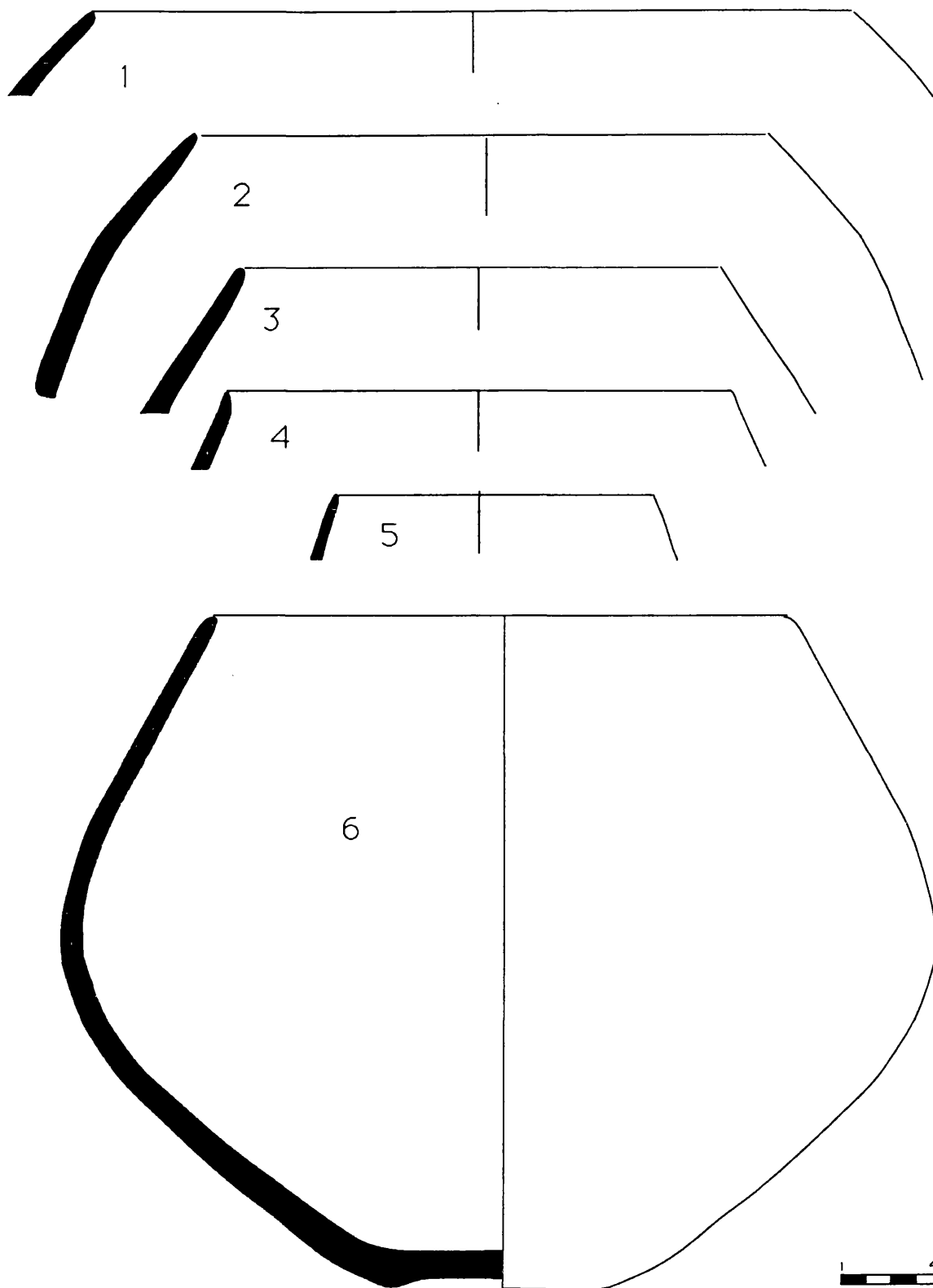


Figure 5.7 Closed Vessels with rim angle larger than 115°
(Hole - Mouthed Jars)

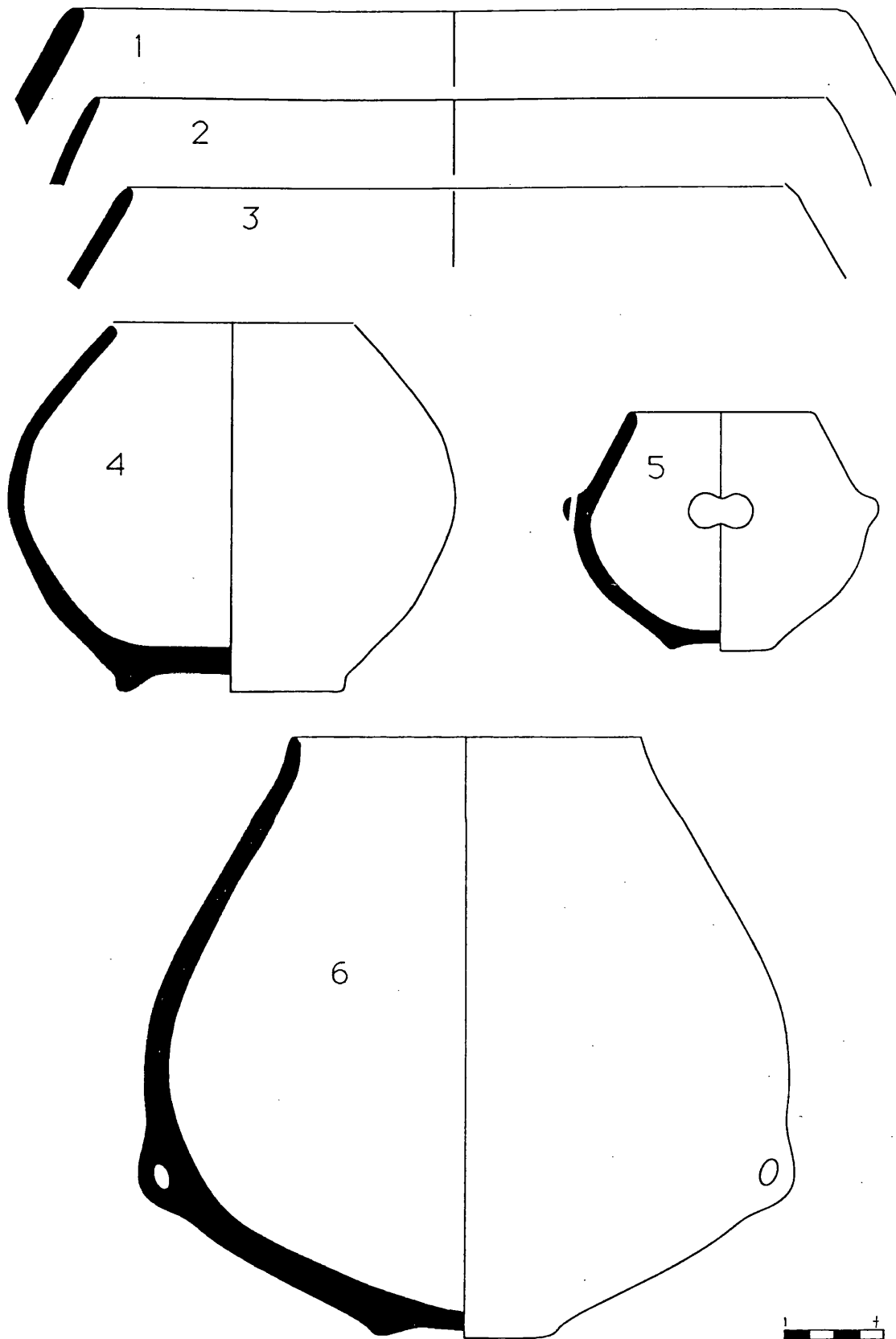


Figure 5.8 Closed Vessels with rim angle larger than 115°
(Hole - Mouthed Jars)

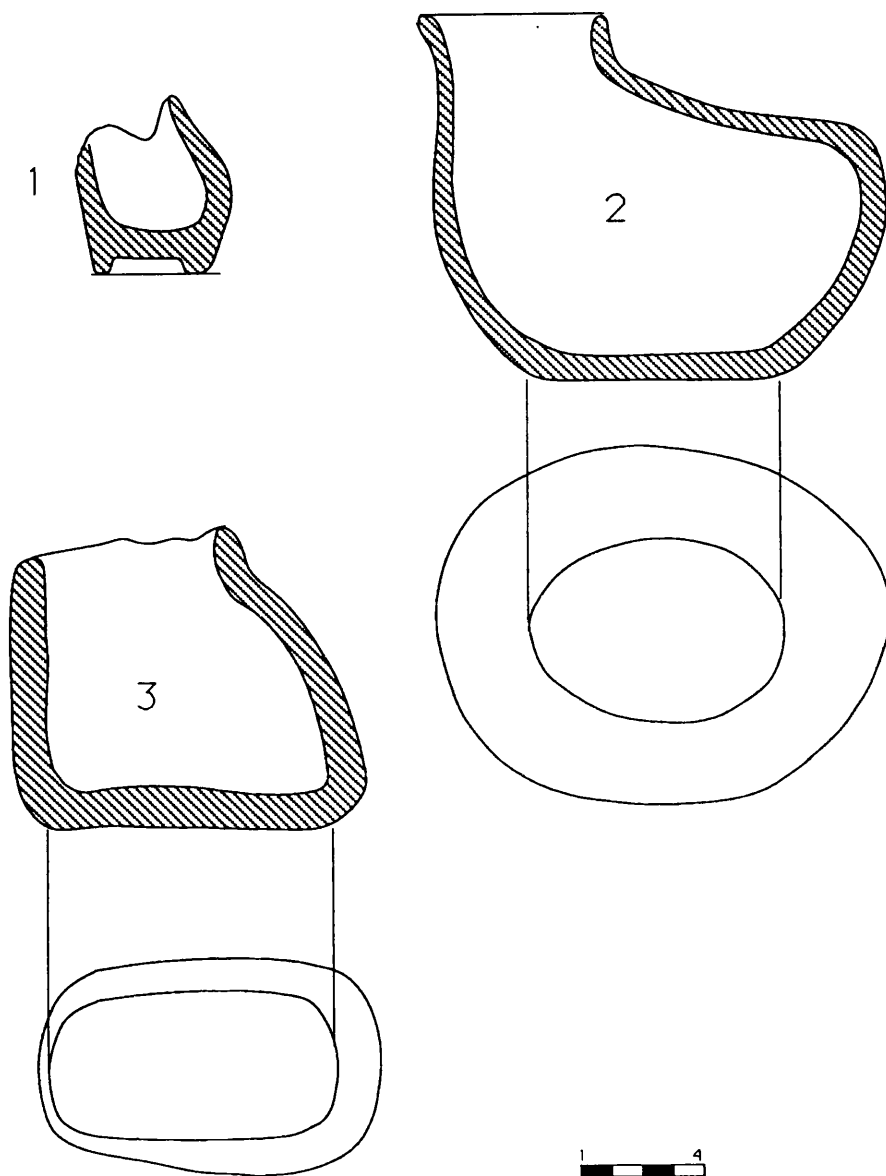


Figure 5.9 Askoid Vessels

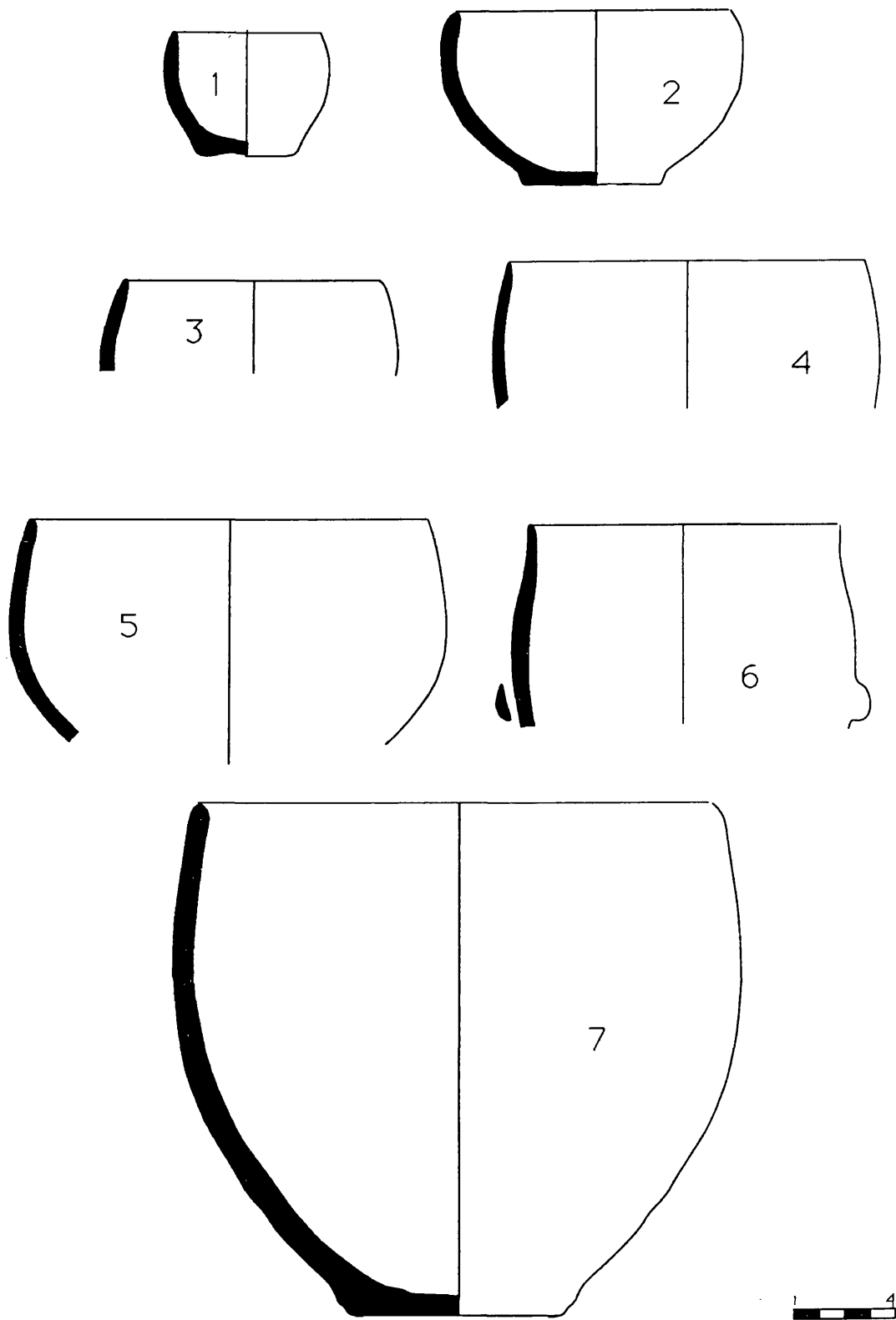


Figure 5.10 Slightly Closed Vessels with rim angle from $91^{\circ} - 114^{\circ}$

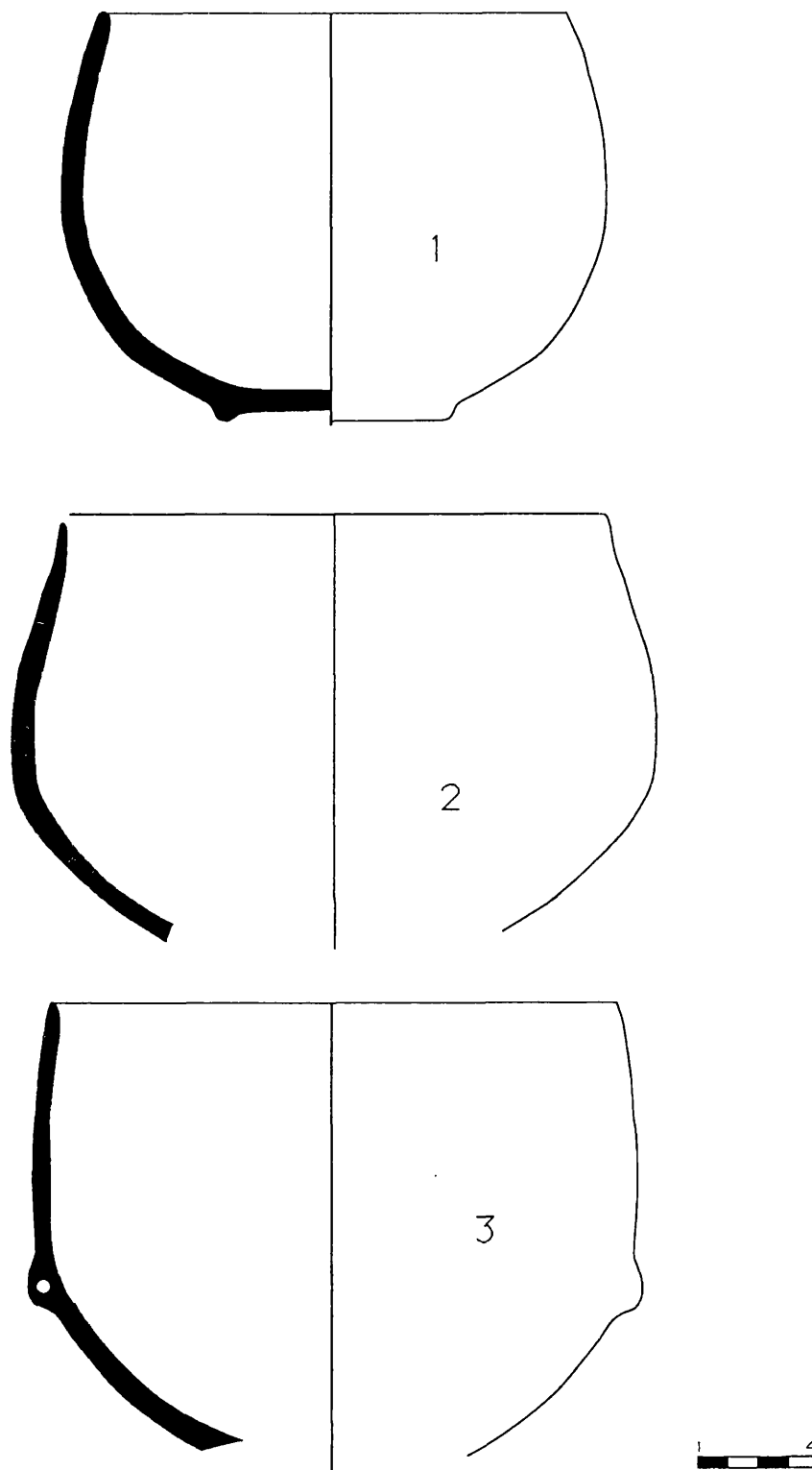


Figure 5.11 Slightly Closed Vessels with rim angle from 91° - 114°

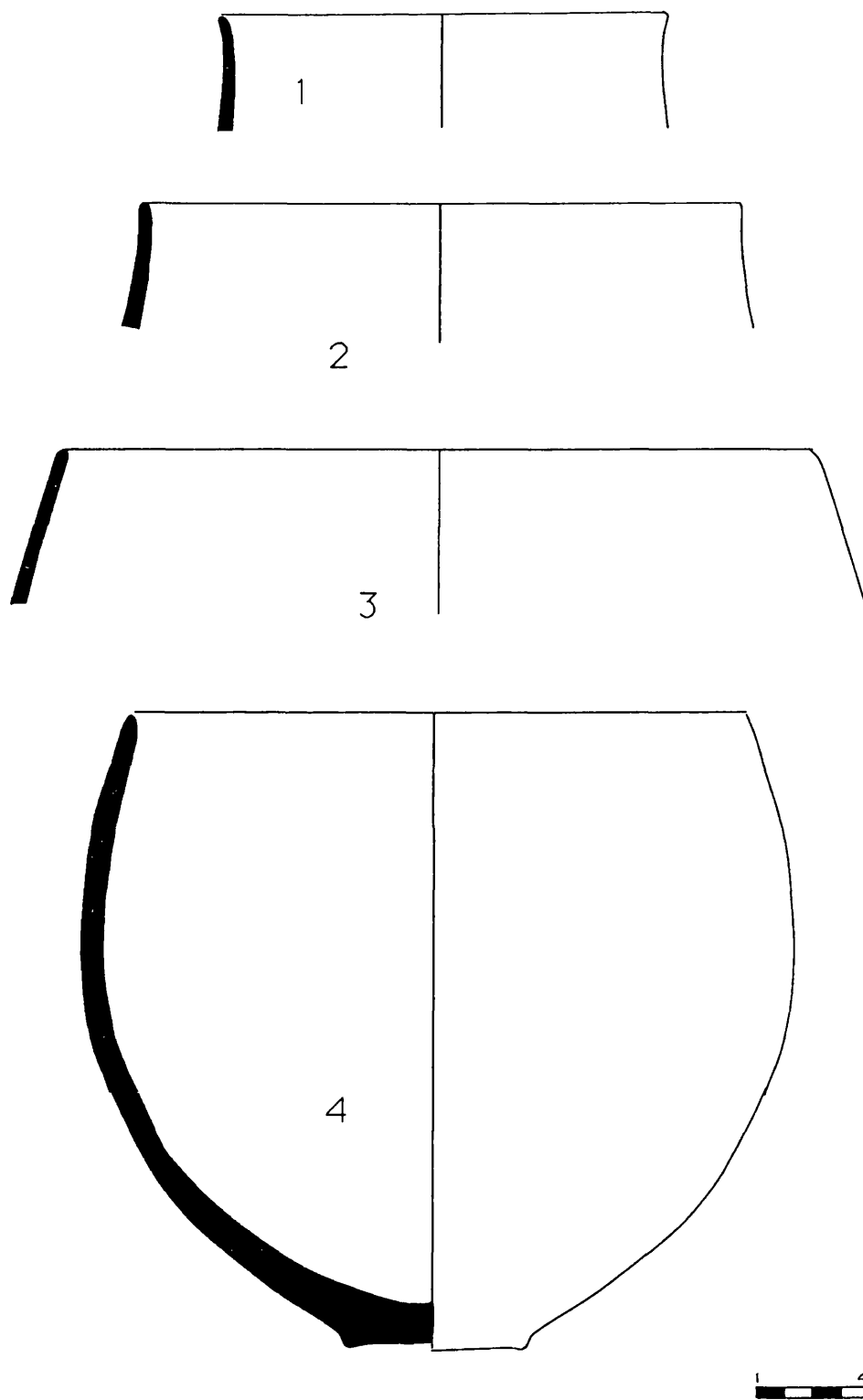


Figure 5.12 Slightly Closed Vessels with rim angle from 91° - 114°

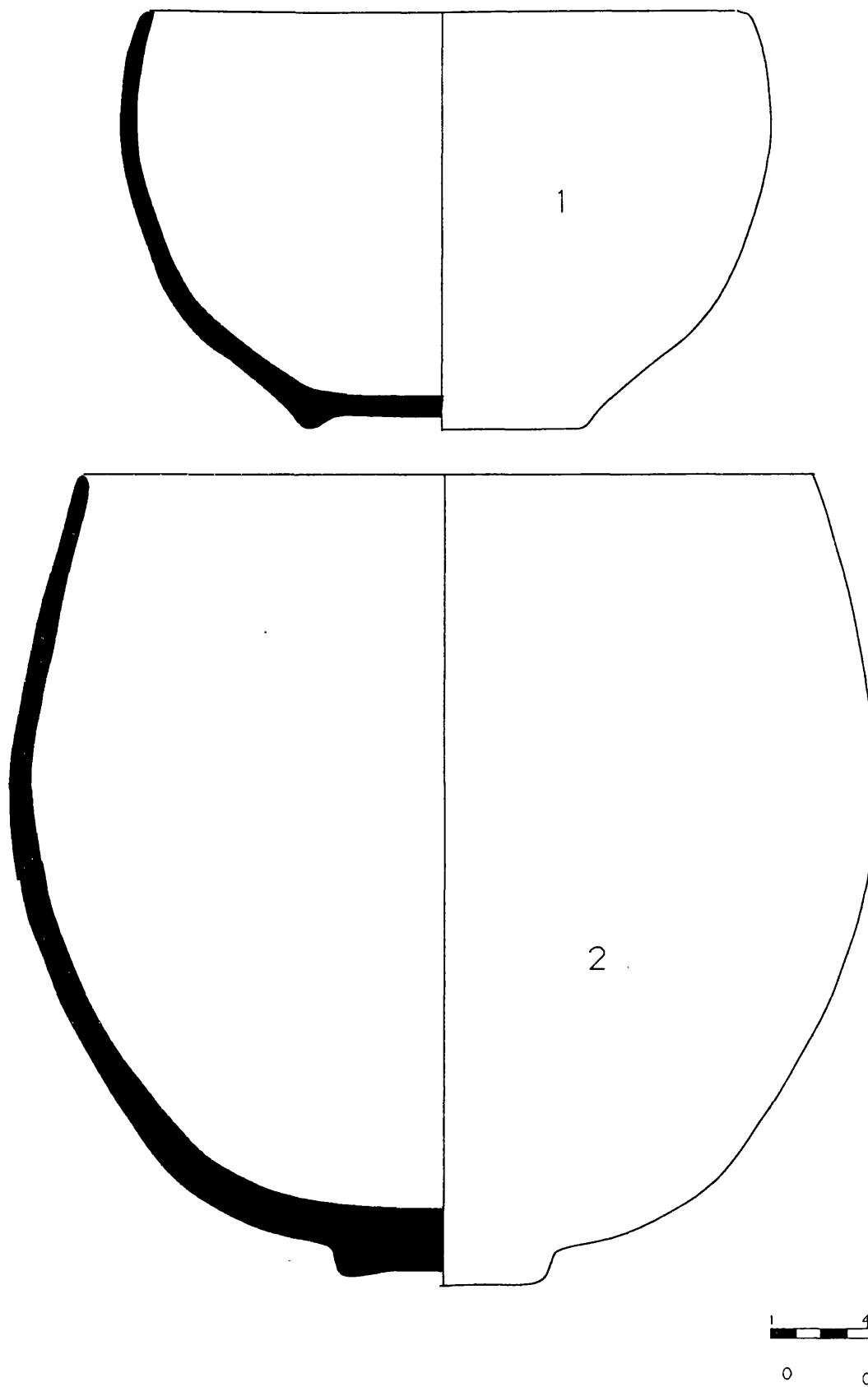


Figure 5.13 Slightly Closed Vessels with rim angle from 91 - 114

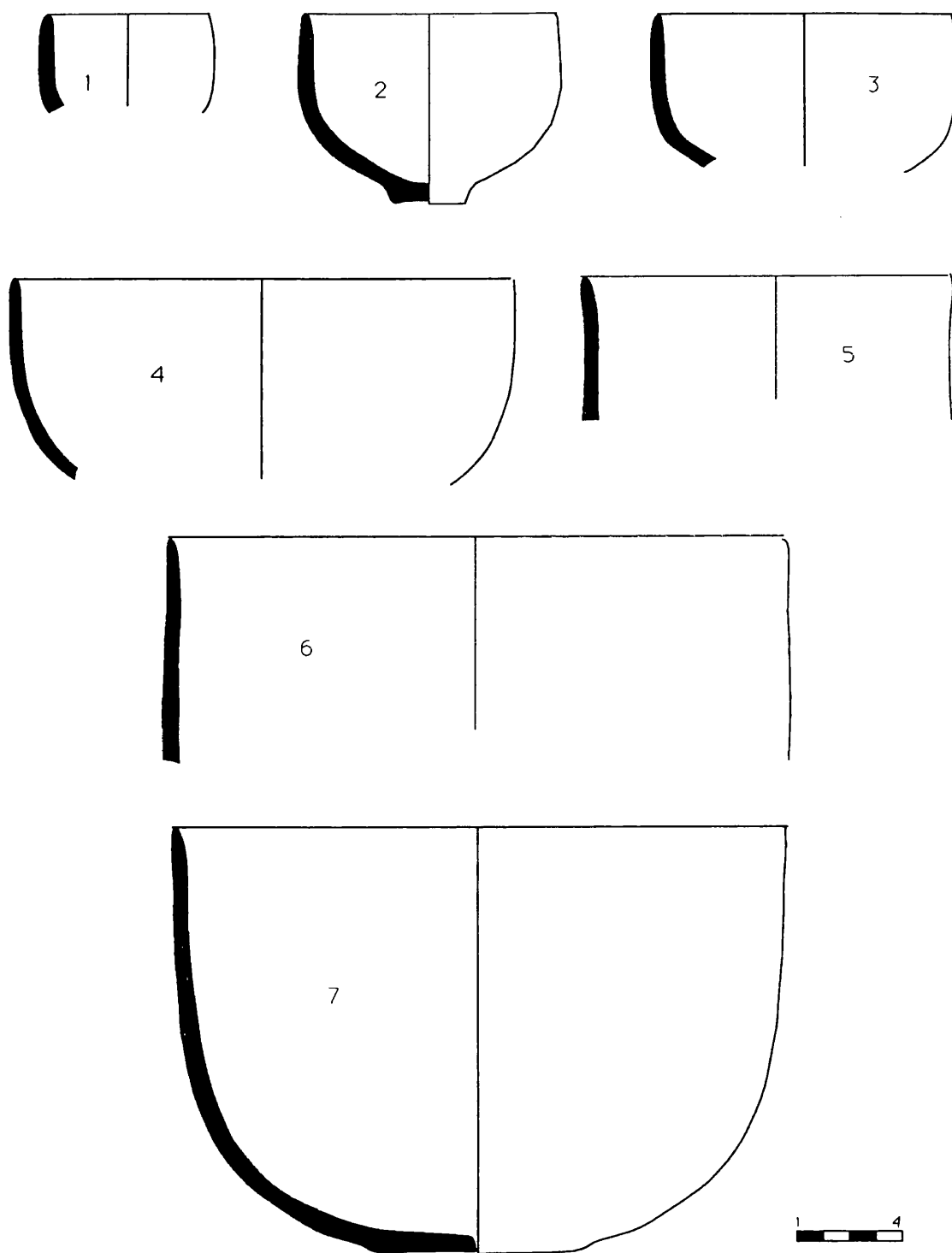


Figure 5.14 Open Vessels with rim angle from 84° - 90°

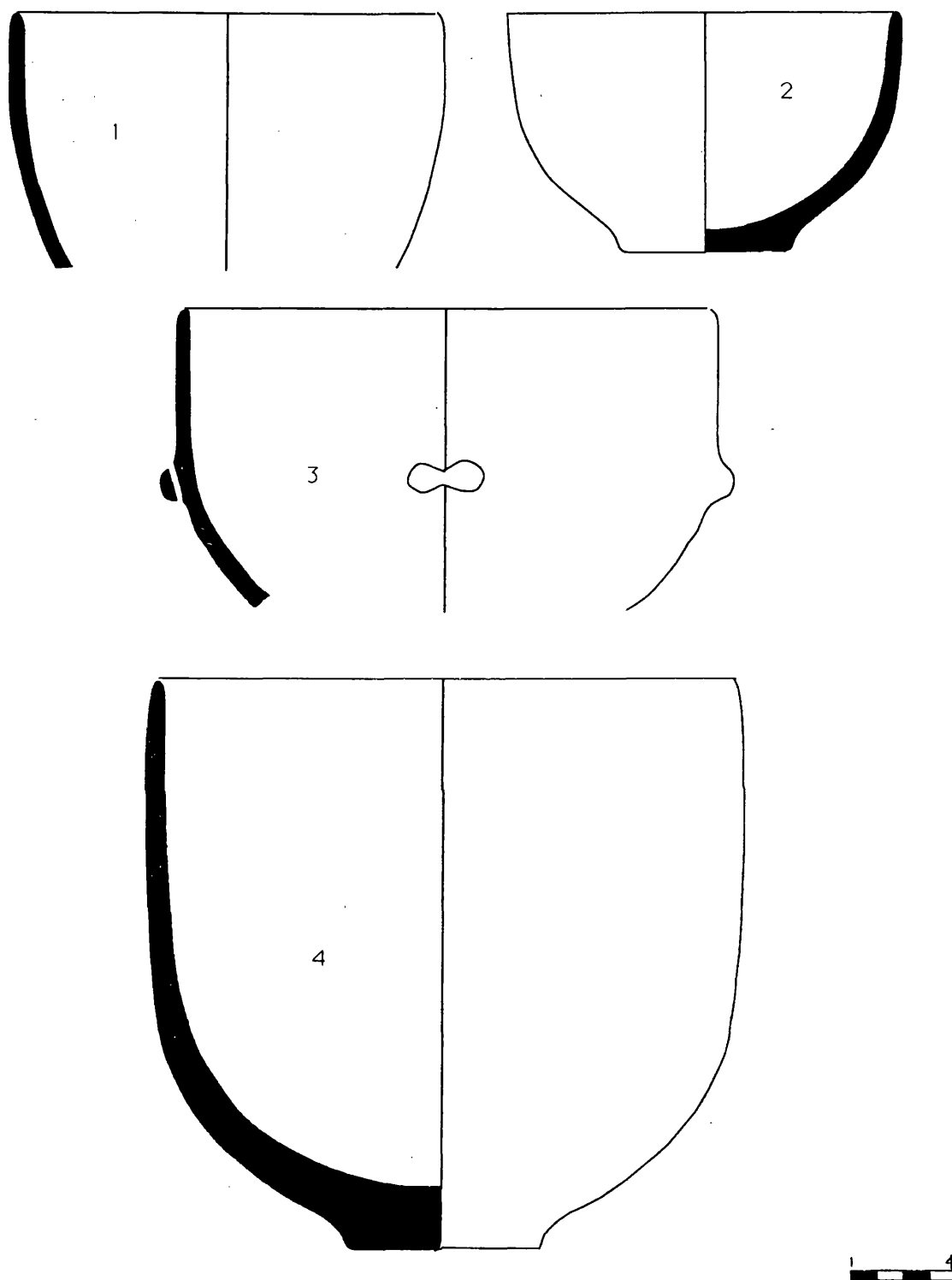


Figure 5.15 Open Vessels with rim angle from $84^{\circ} - 90^{\circ}$

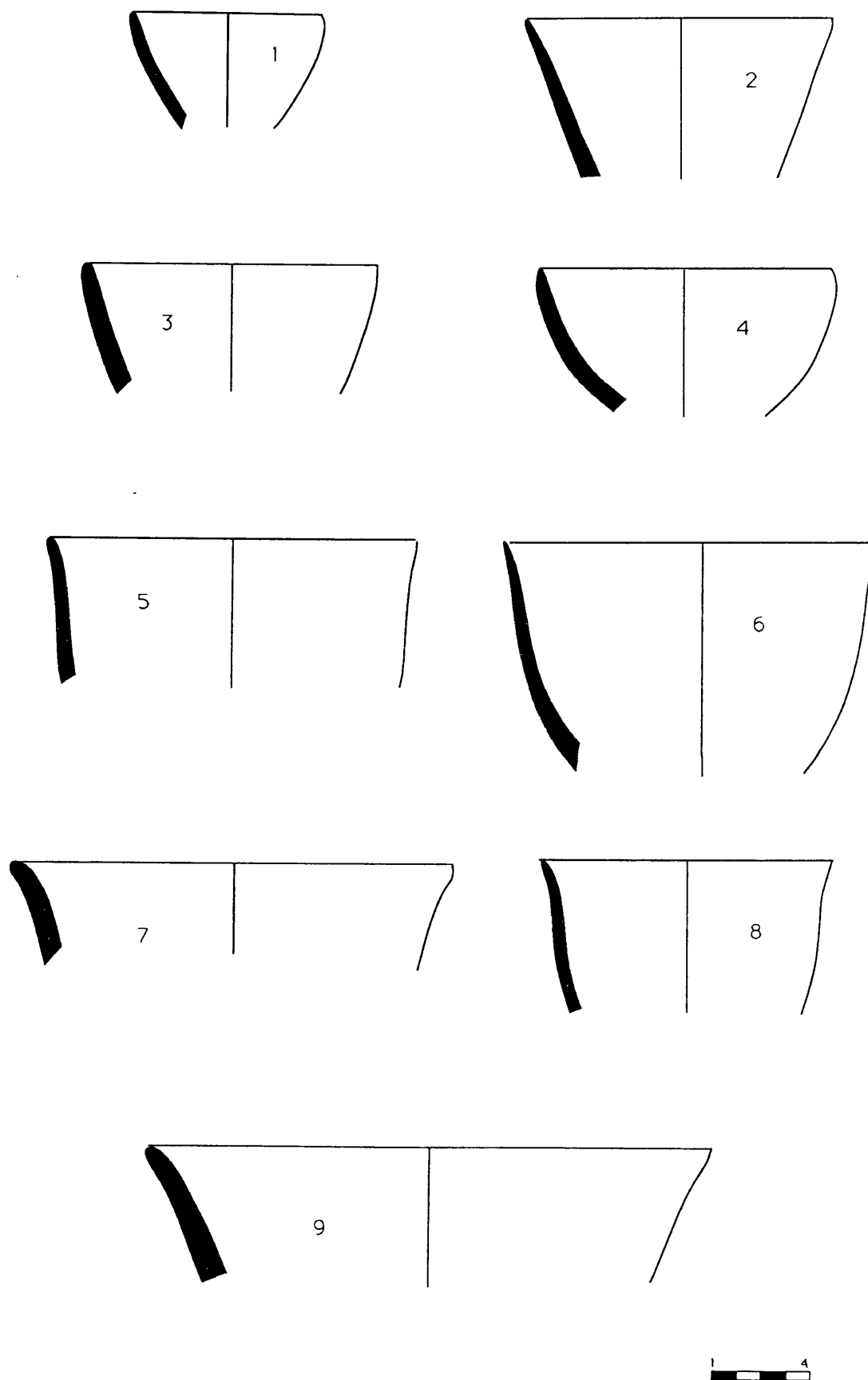


Figure 5. 16 Open Vessels with rim angle from $84^{\circ} - 60^{\circ}$

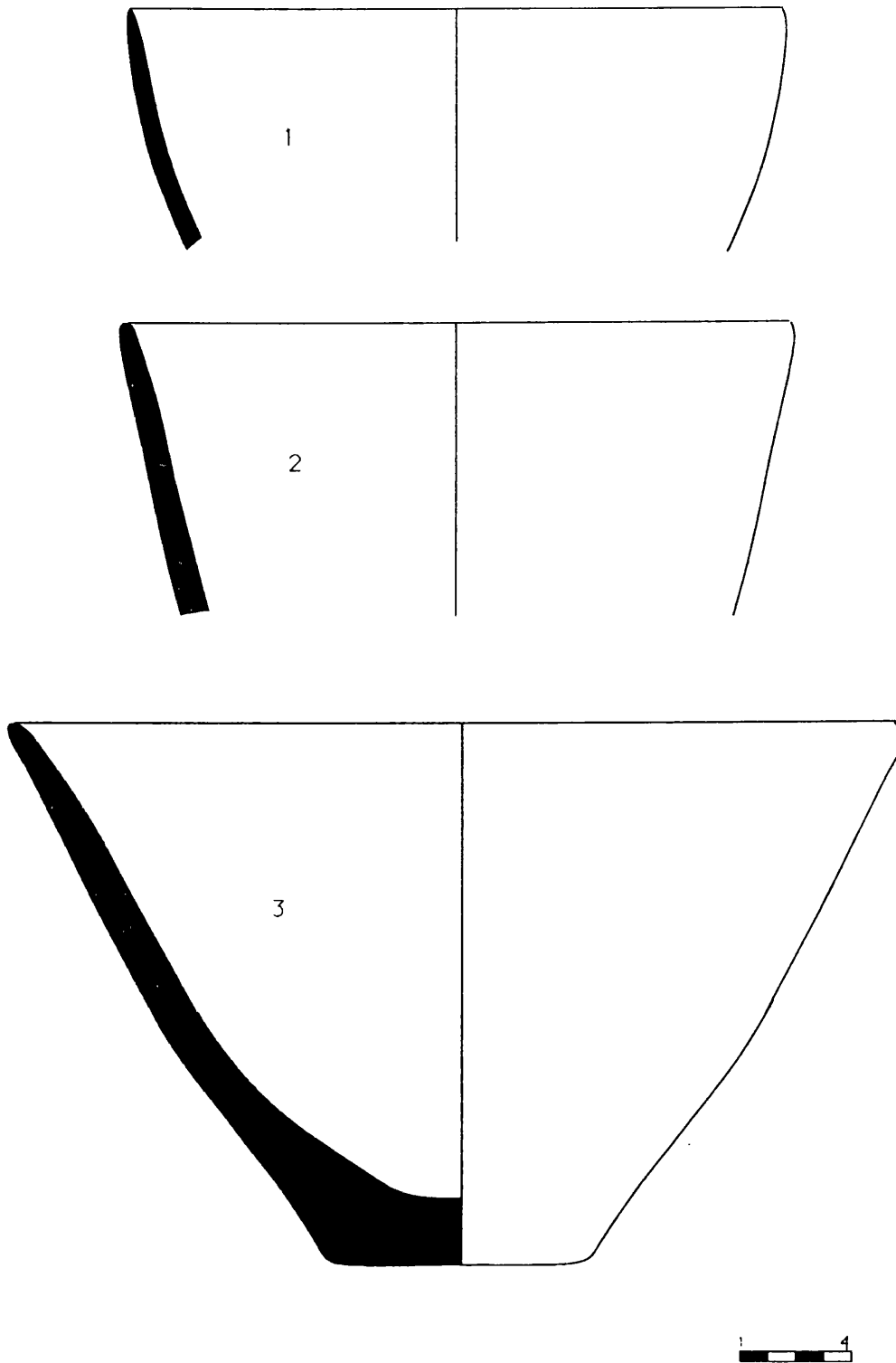


Figure 5. 17 Open Vessels with rim angle from 84° - 60°

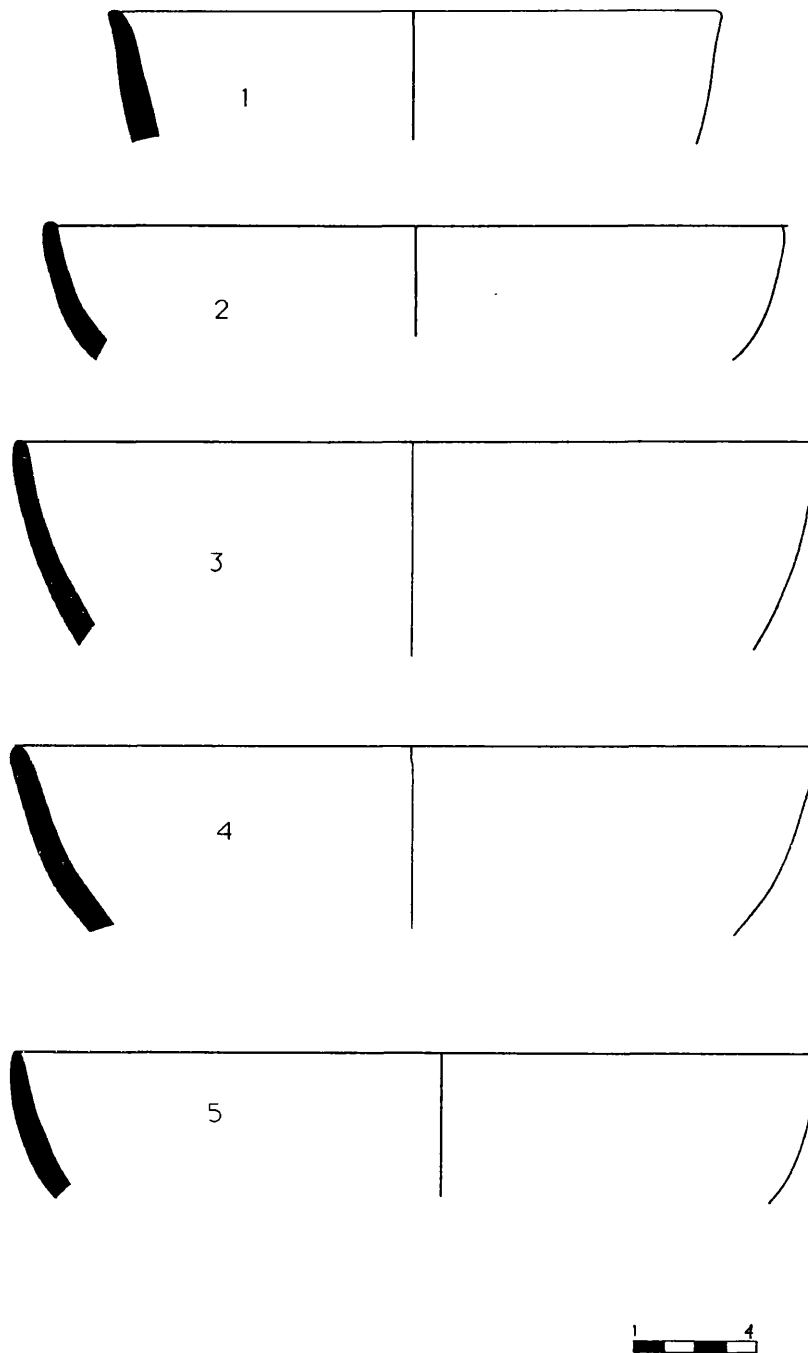


Figure 5. 18 Shallow Vessels with rim angle from 84° - 60°

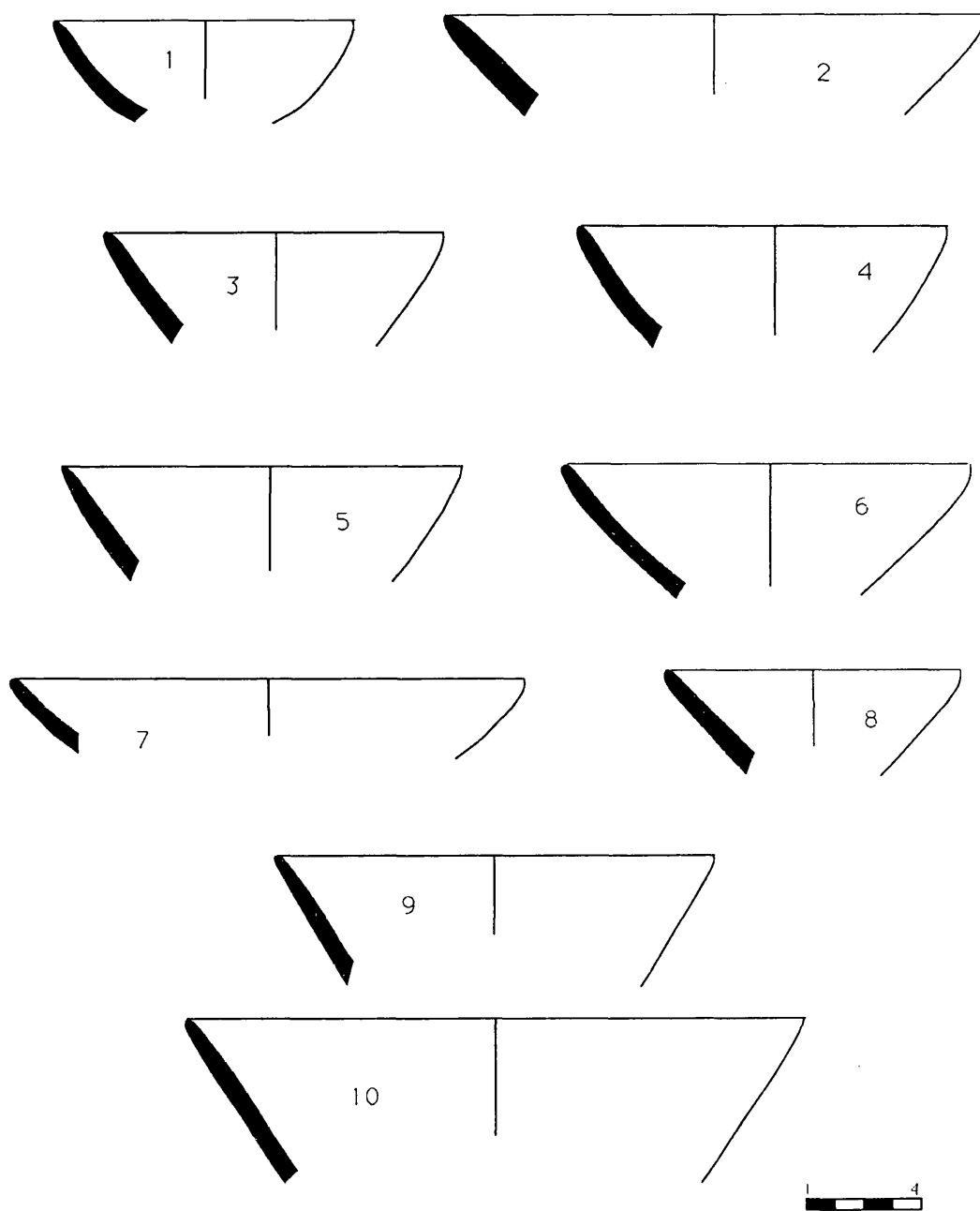


Figure 5.19 Open Vessels with rim angle less than 60°

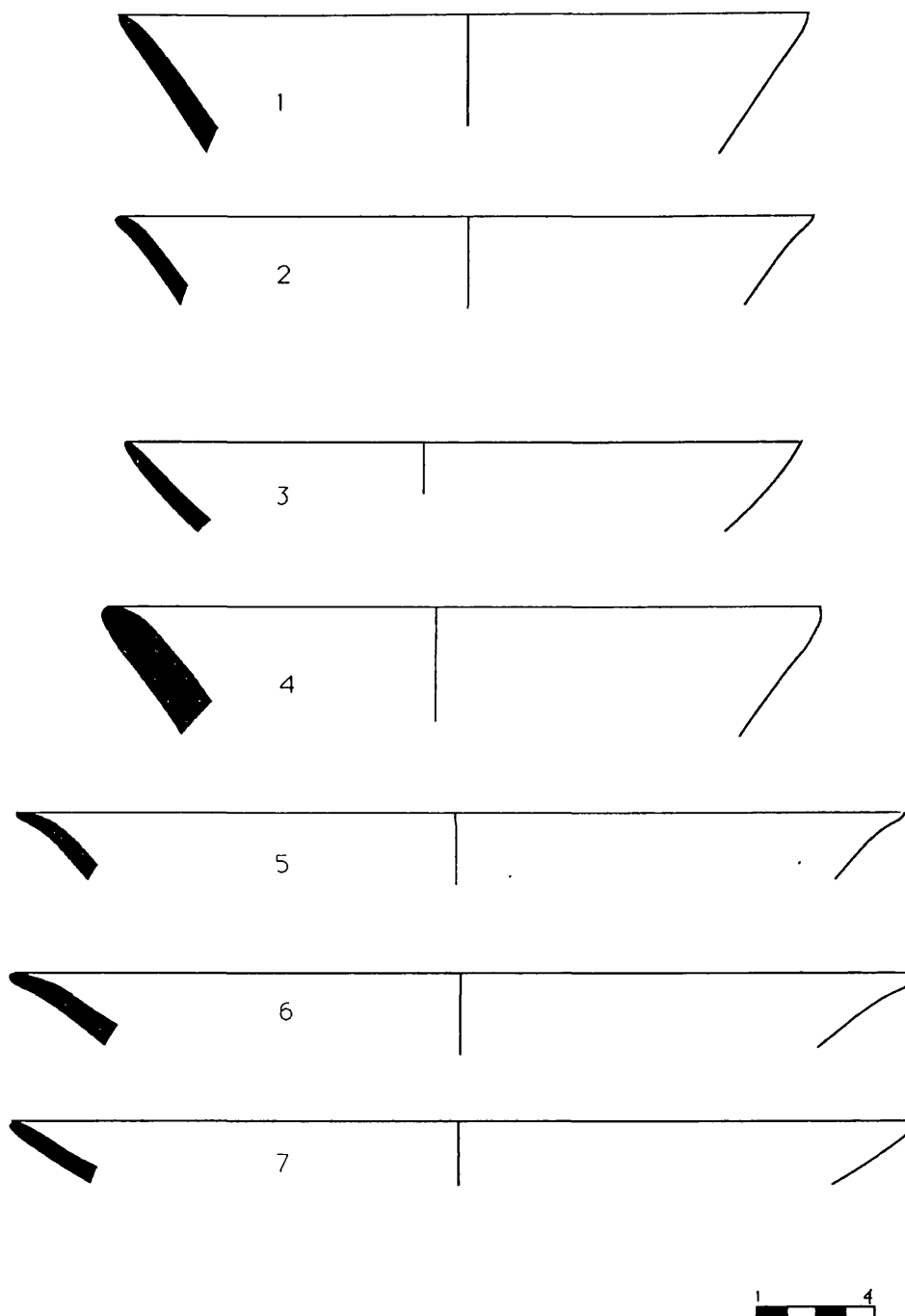


Figure 5.20 Open Vessels with rim angle less than 60⁰

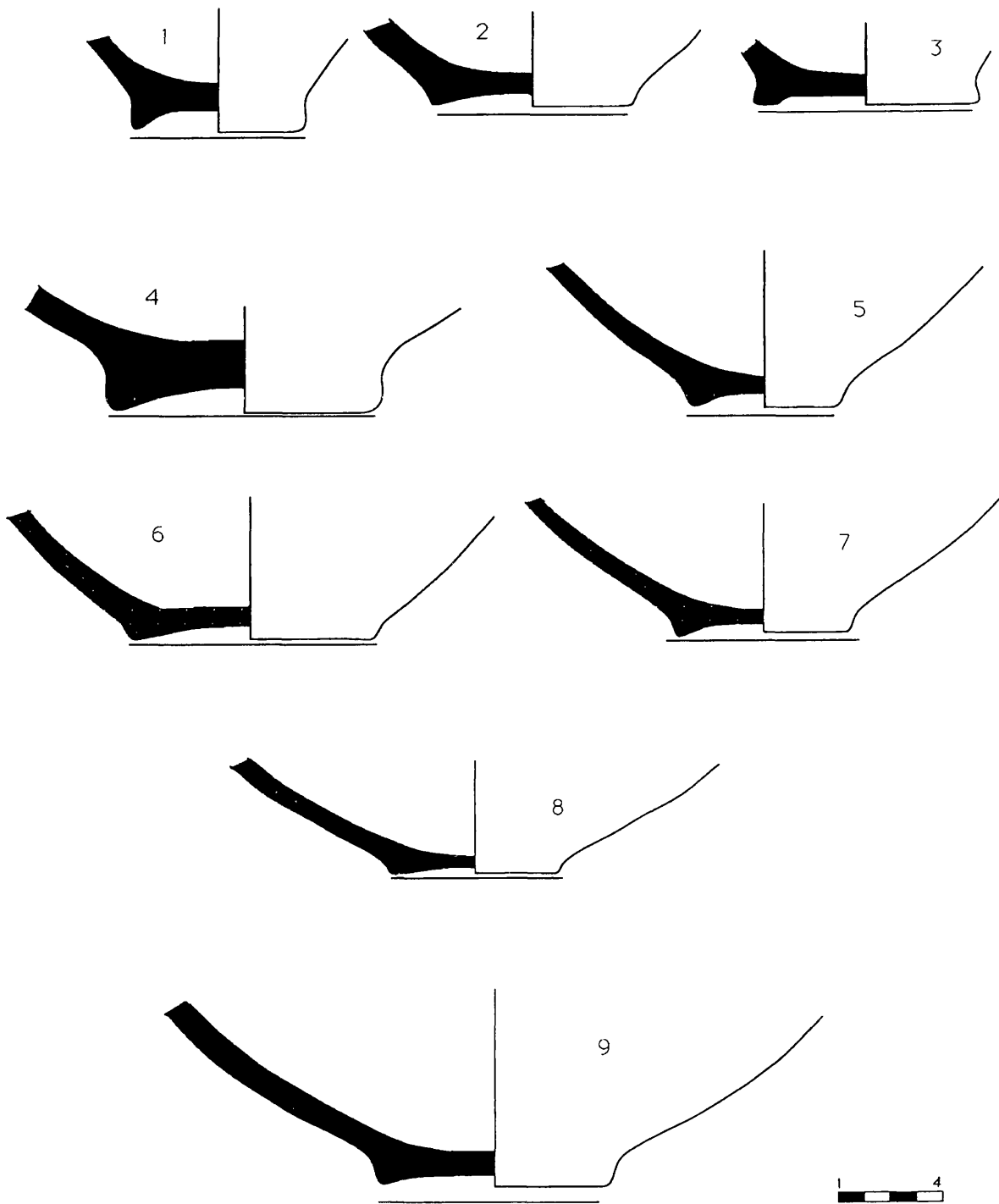


Figure 5.21 Ring based Vessels

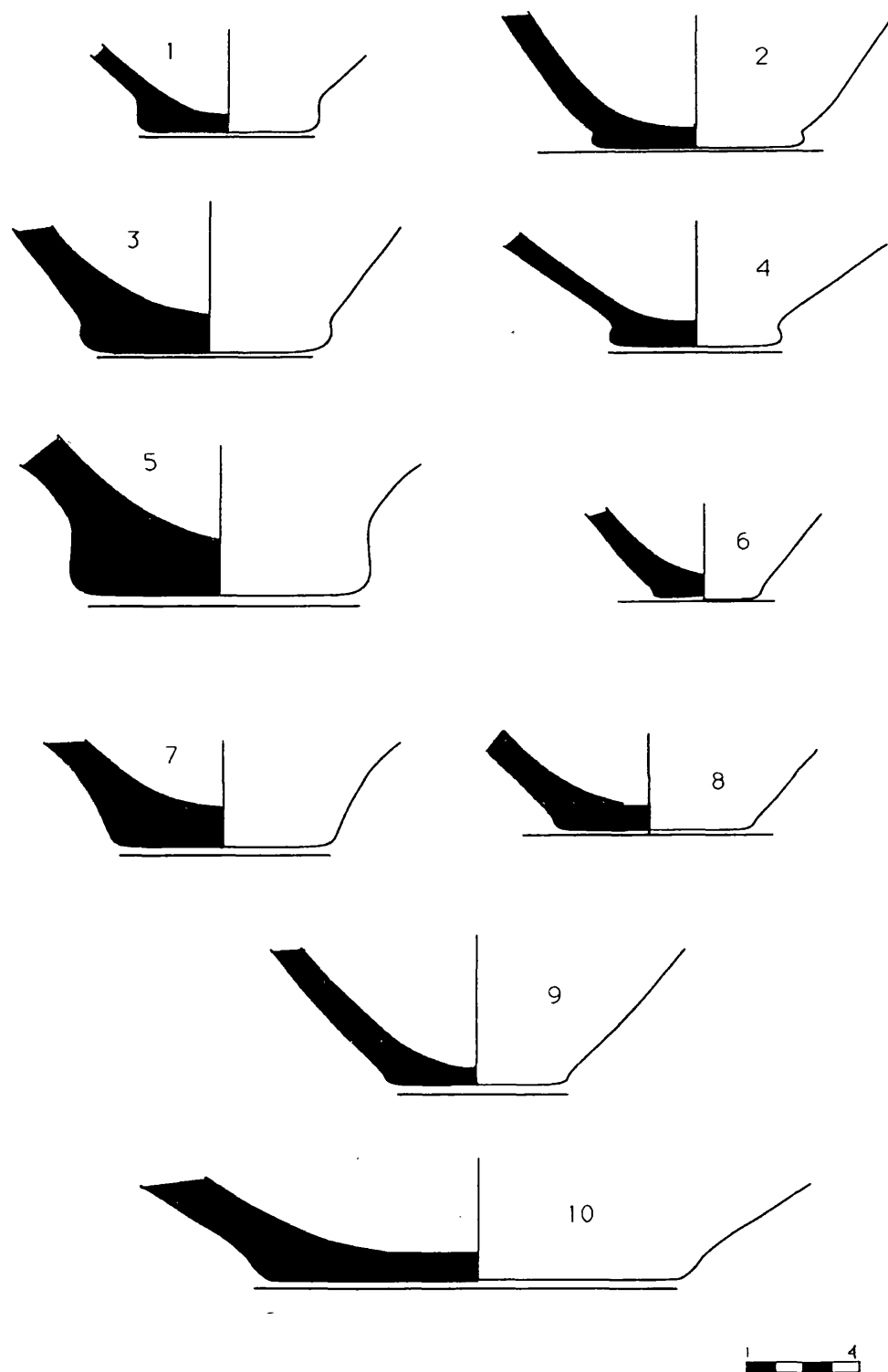


Figure 5.22 Flat based Vessels
 1-5: Vessels with a Low Foot

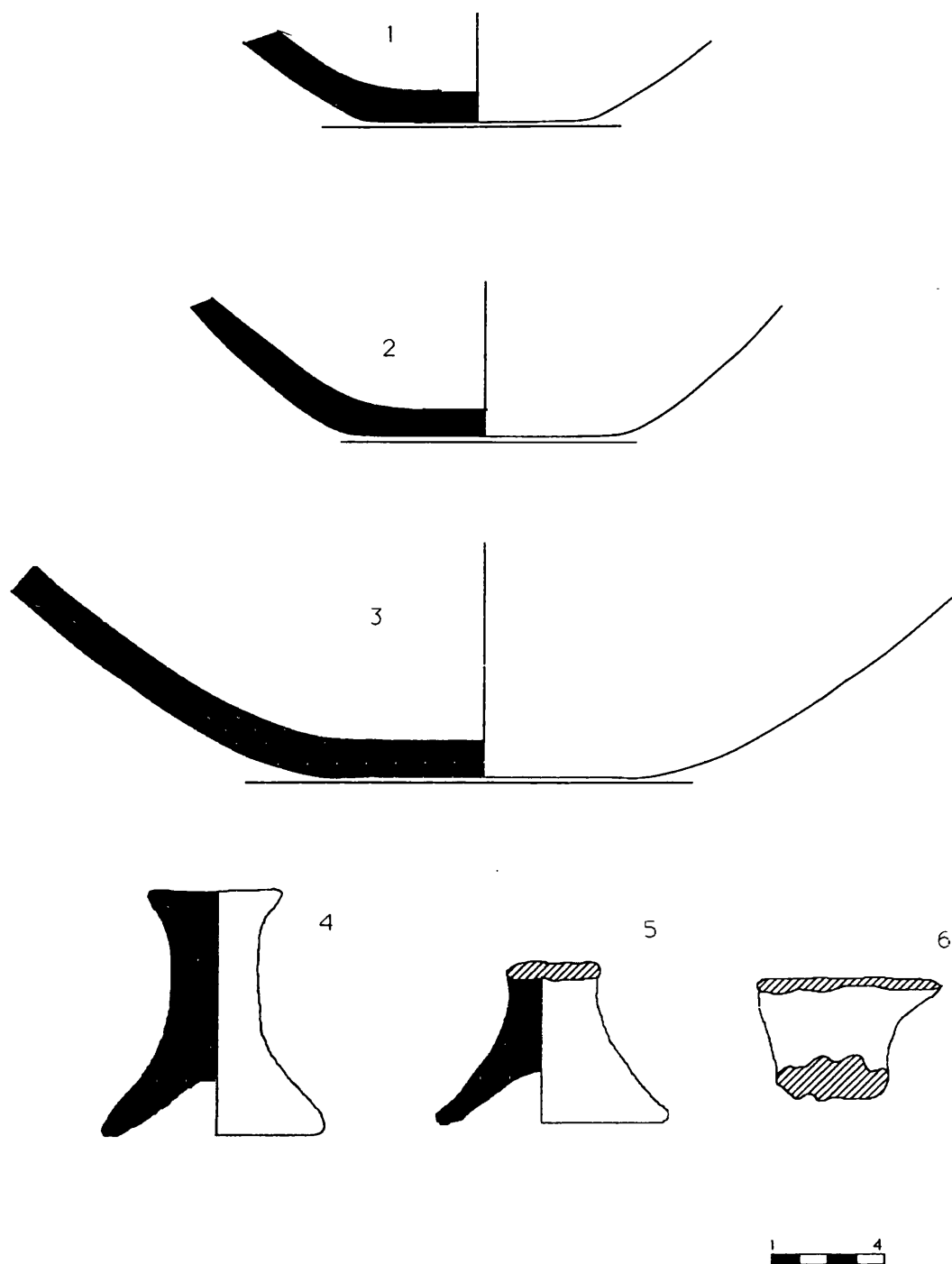


Figure 5.23 Round bottomed Vessels (1-3)
Pedestal bases (4-6)

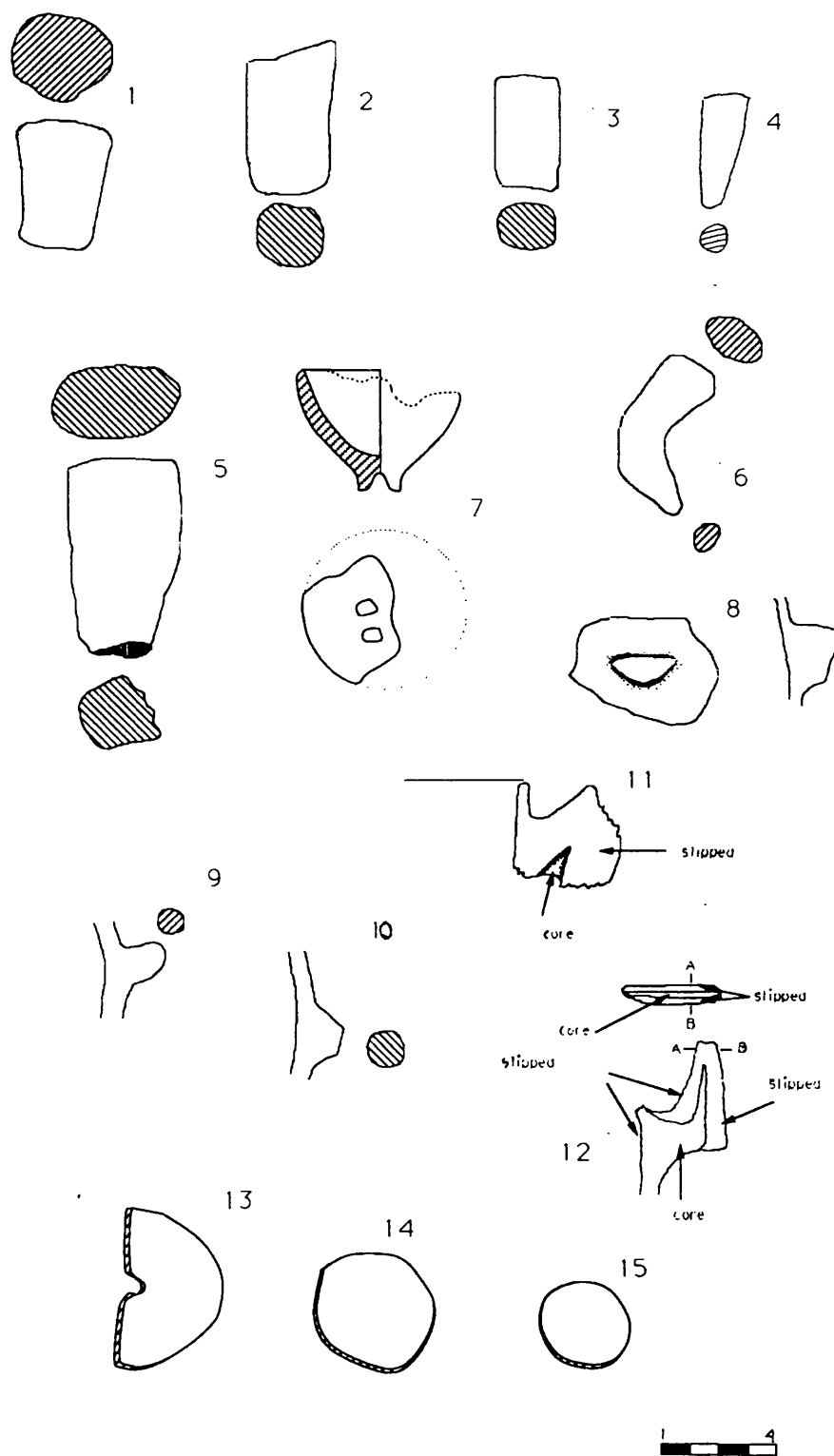


Figure 5.24 Legs from Polypod Vessels (1-6)
 Polypod Miniature Vessel (7)
 Unpierced Lugs (8-10)
 Z-shaped lugs (11-12)
 Spindle-whorl (13)
 Round sherds (14-15)

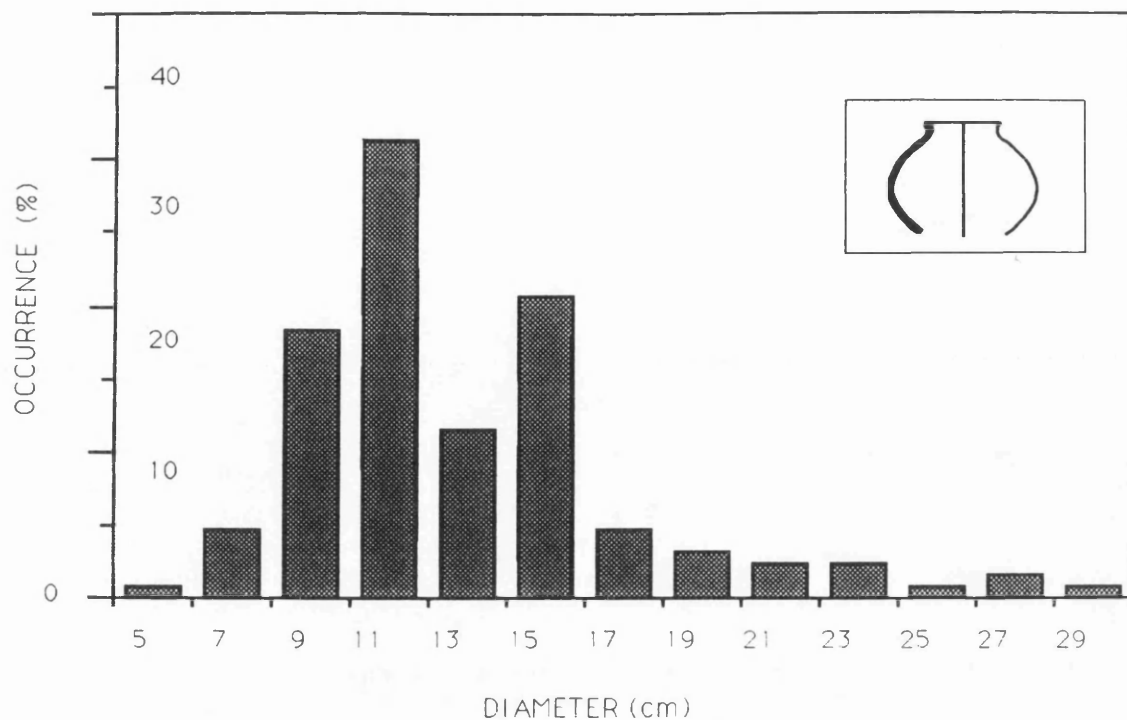


Figure 5. 25 Distribution of rim diameters for Neck Jars

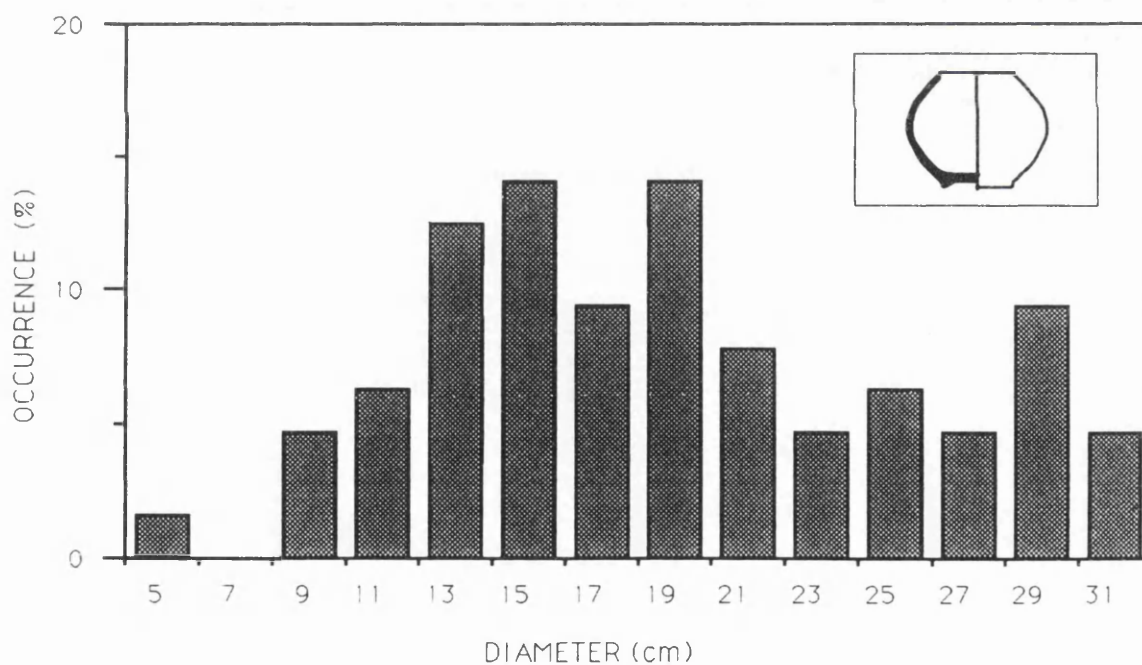


Figure 5. 26 Distribution of rim diameters for Closed Vessels with rim angle larger than 115°

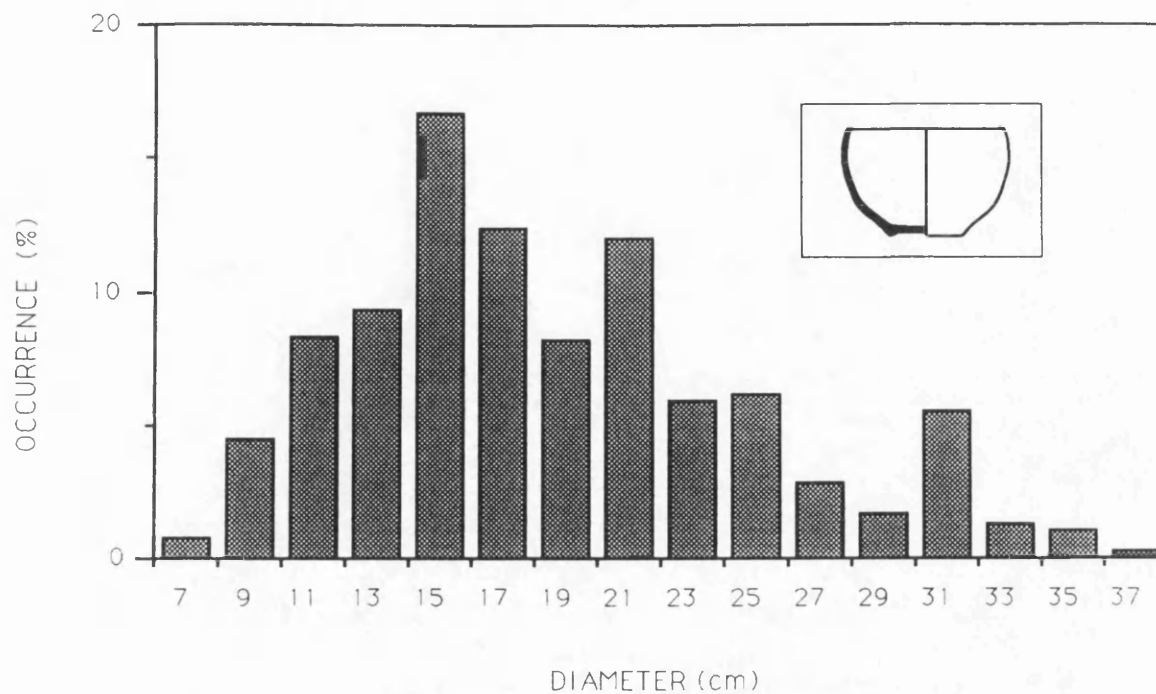


Figure 5. 27 Distribution of rim diameters for Closed Vessels with rim angle from 91° TO 114°

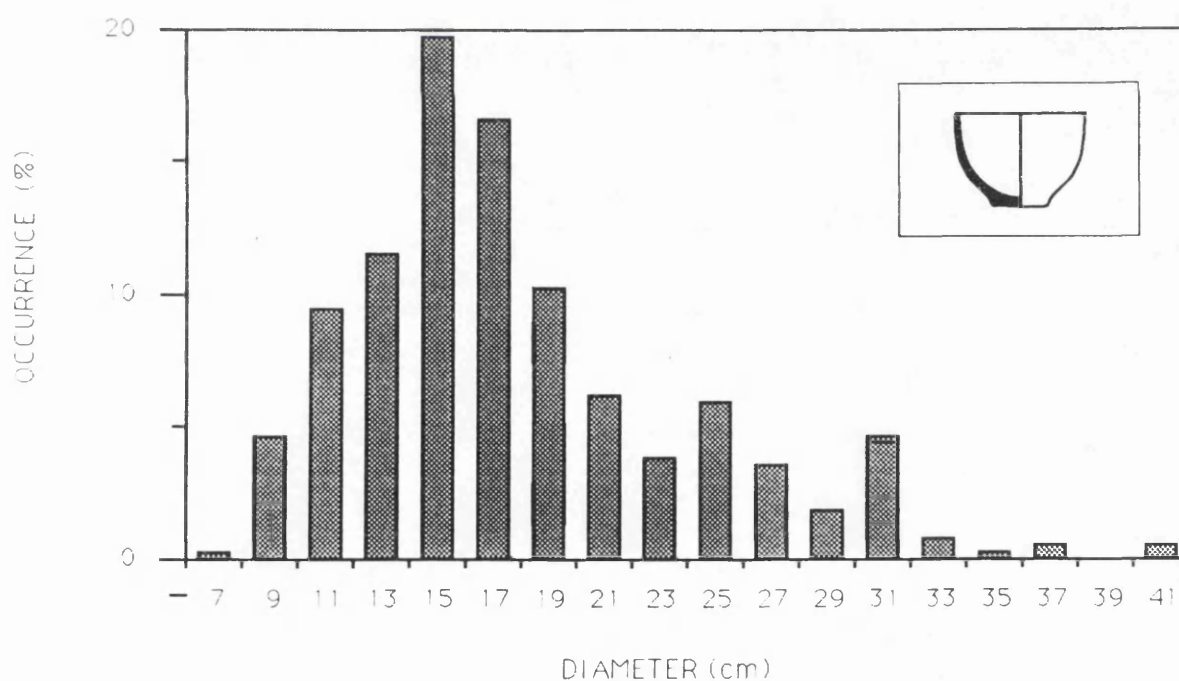


Figure 5. 28 Distribution of rim diameters for Open Vessels with rim angle from 85° TO 90°

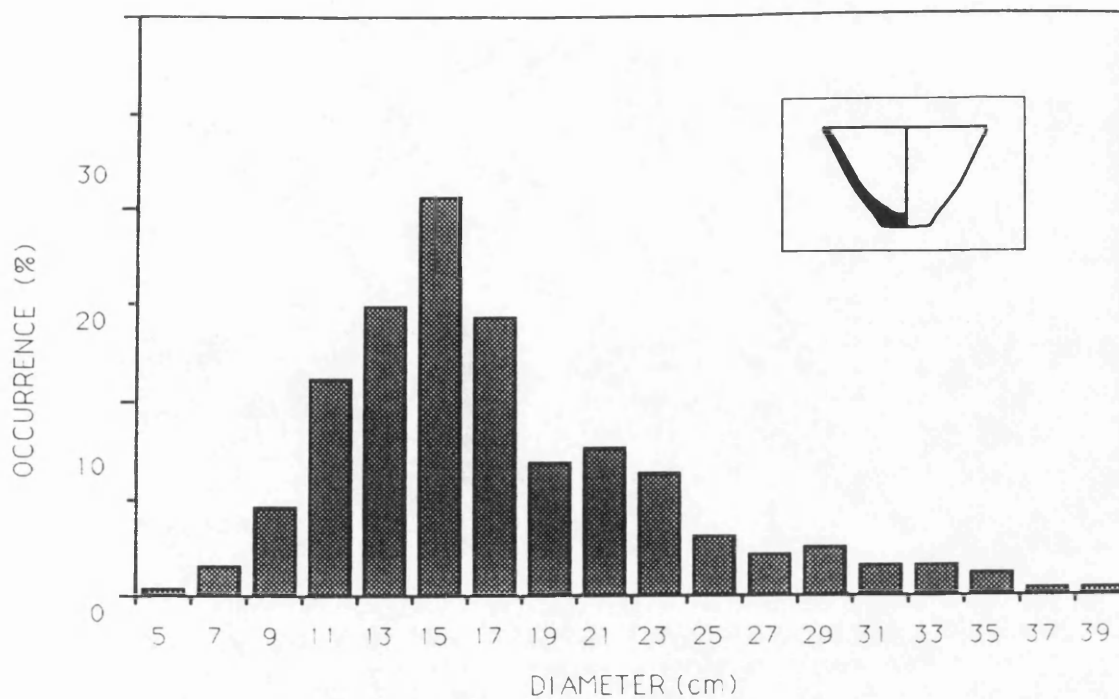


Figure 5. 29 Distribution of rim diameters for Open Vessels with rim angle from 60 TO 84

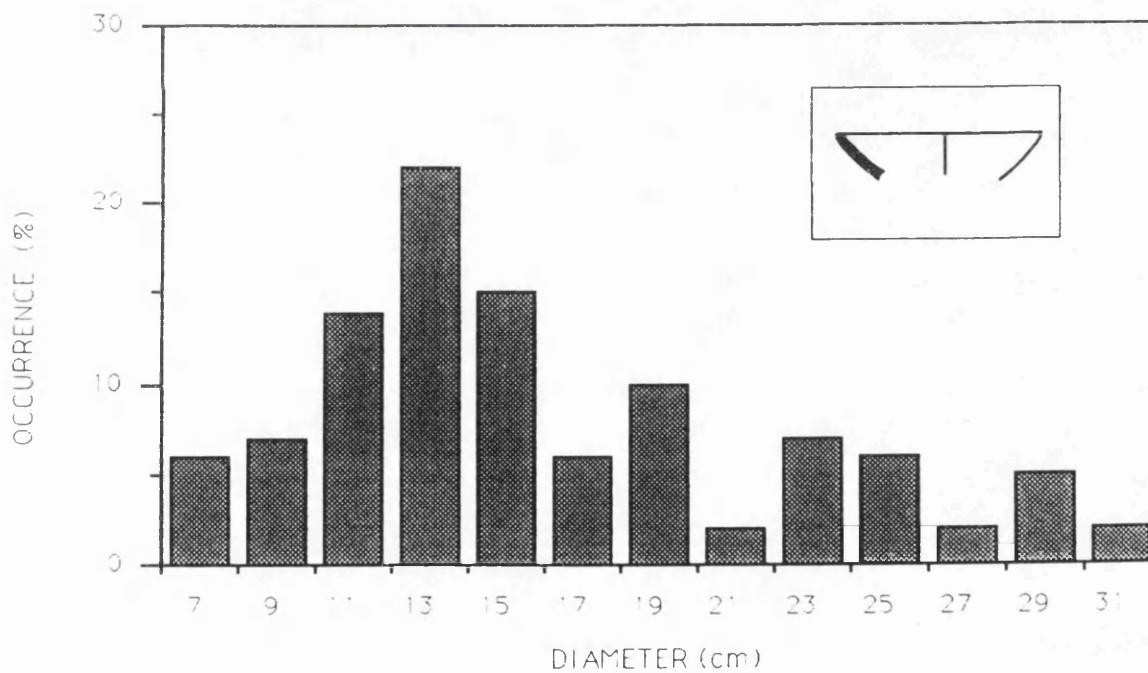


Figure 5. 30 Distribution of rim diameters for Open Vessels with rim angle smaller than 60°

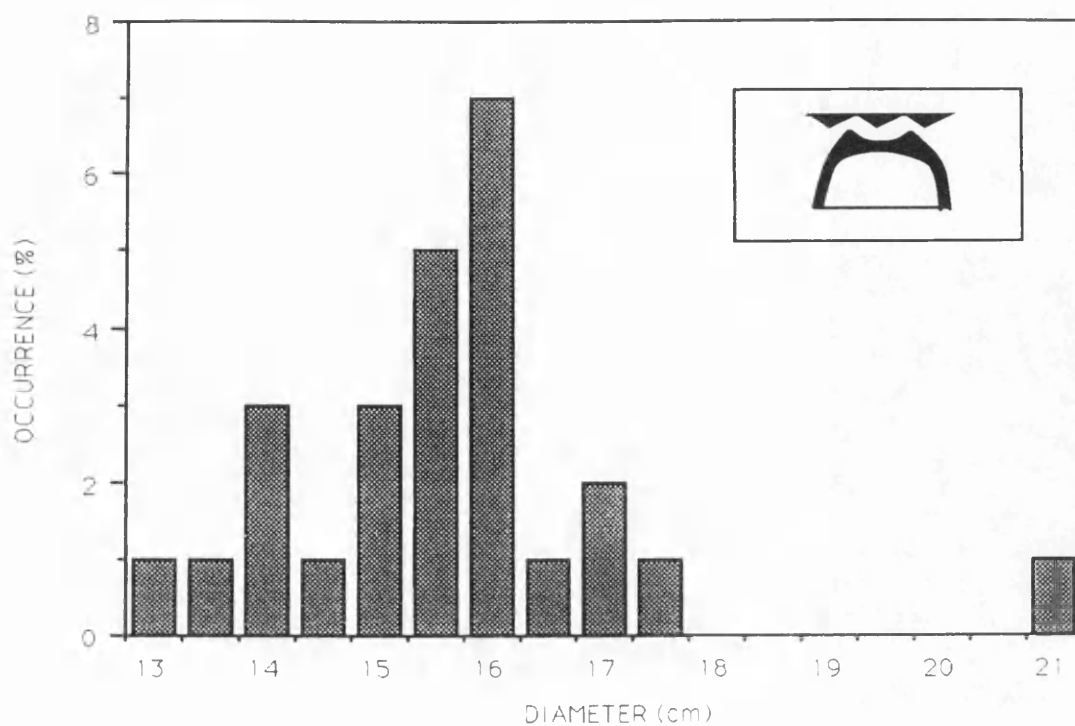


Figure 5.31 Distribution of rim diameters of Painted Vessels
(data from D.K. Washburn 1984)

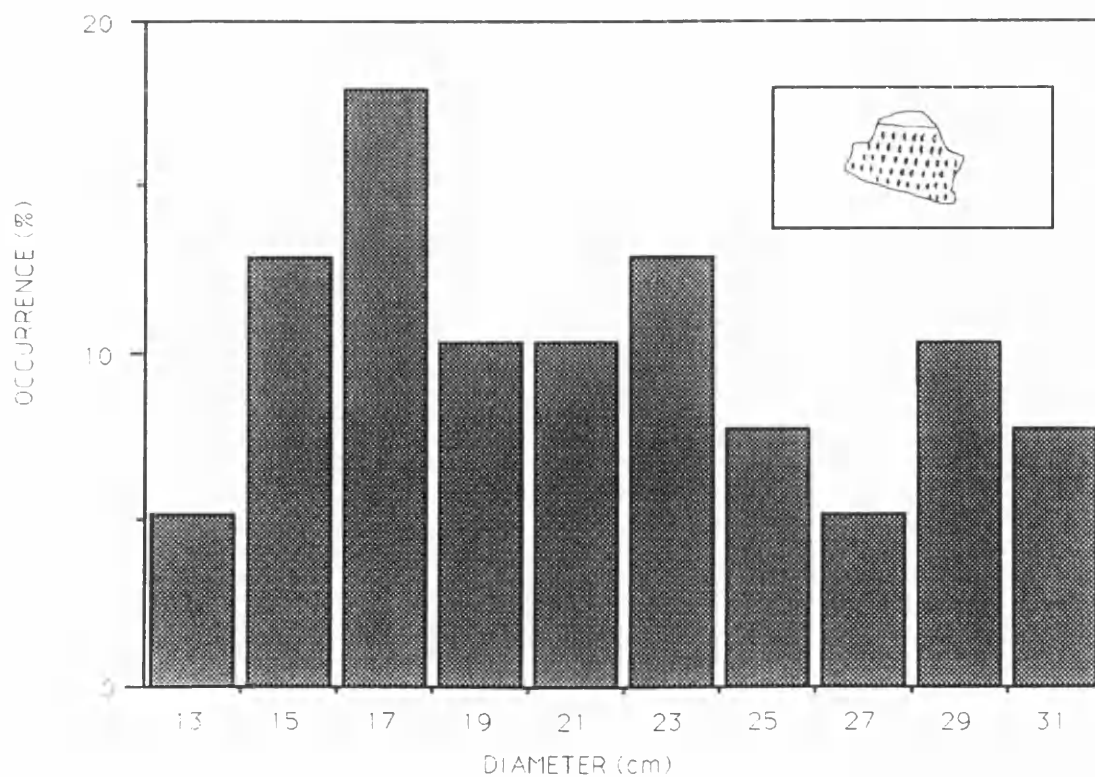


Figure 5.32 Distribution of rim diameters of Impressed Vessels

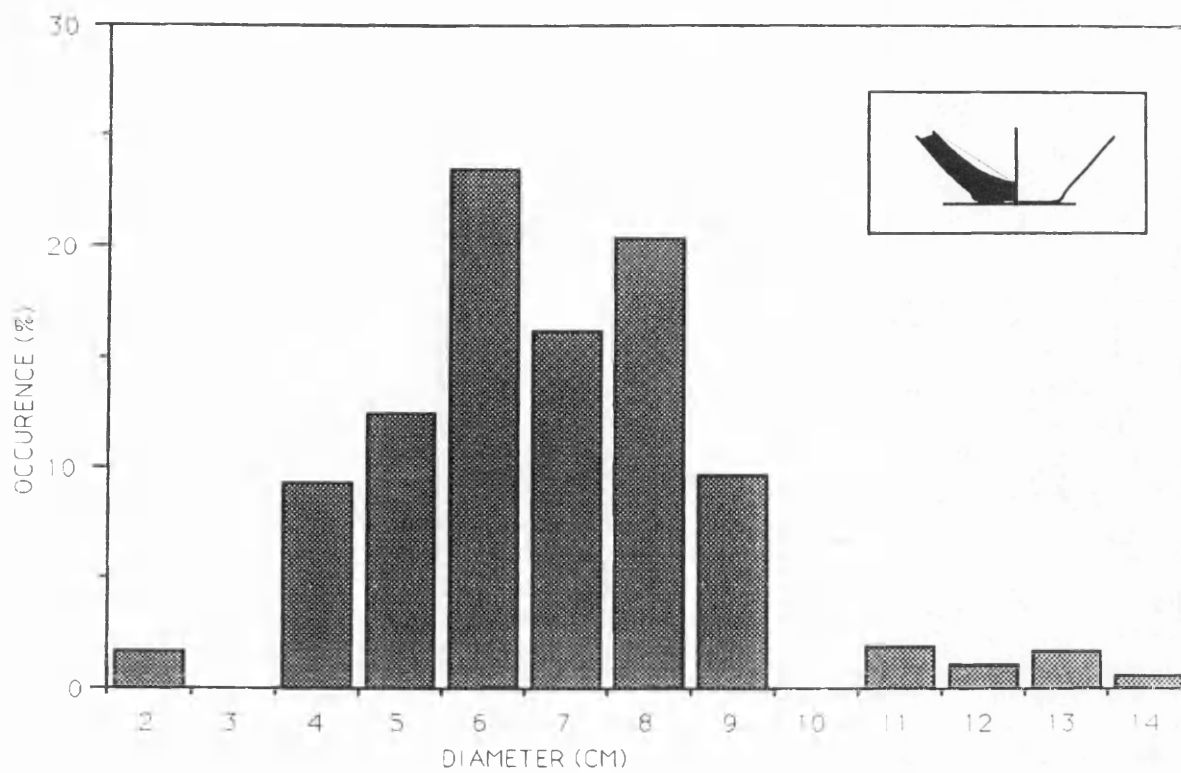


Figure 3.33 Distribution of basal diameters of Plain Pottery

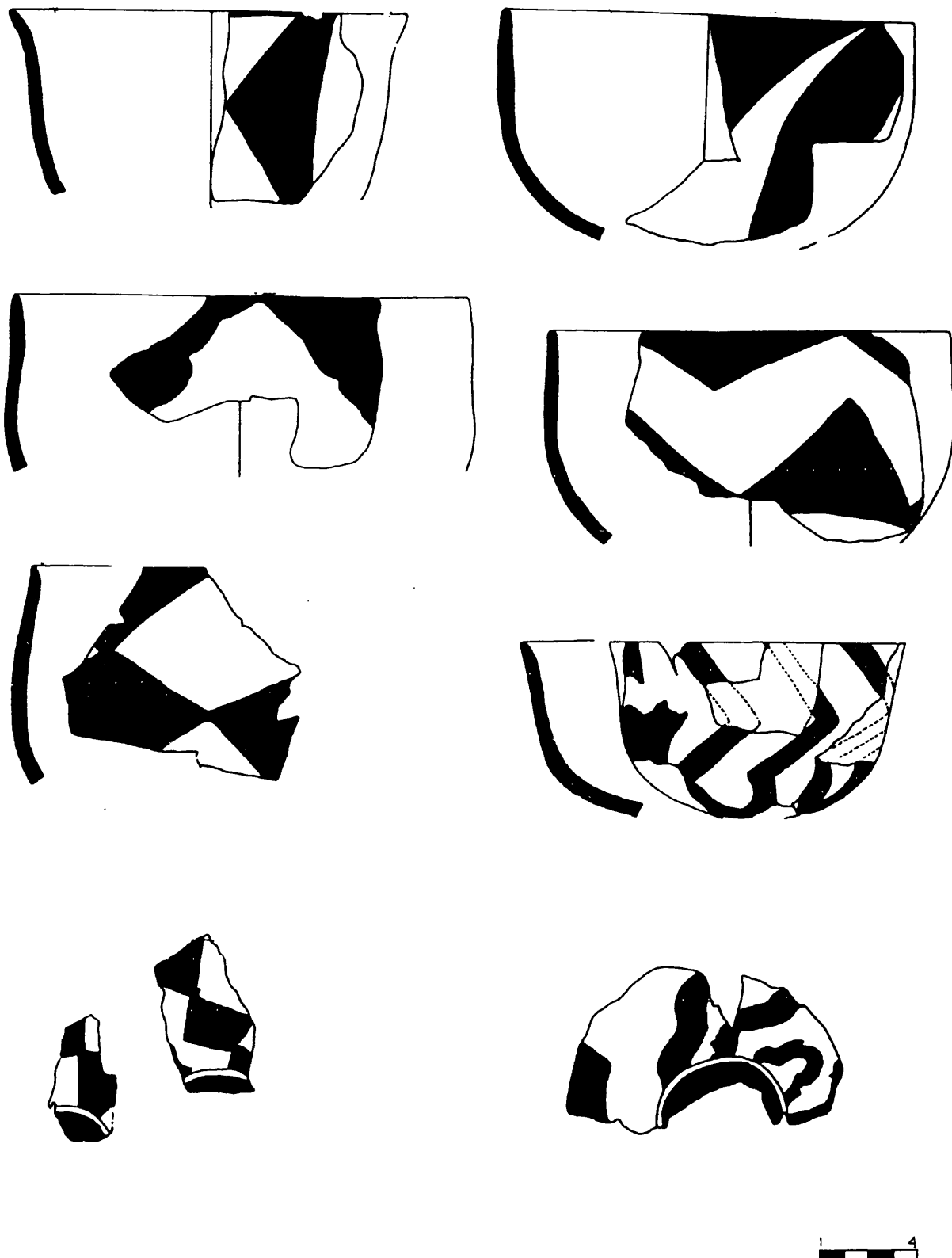


Figure 5.34 Painted pottery, Red/White Standard Ware
(drawings from D.K. Washburn 1984)

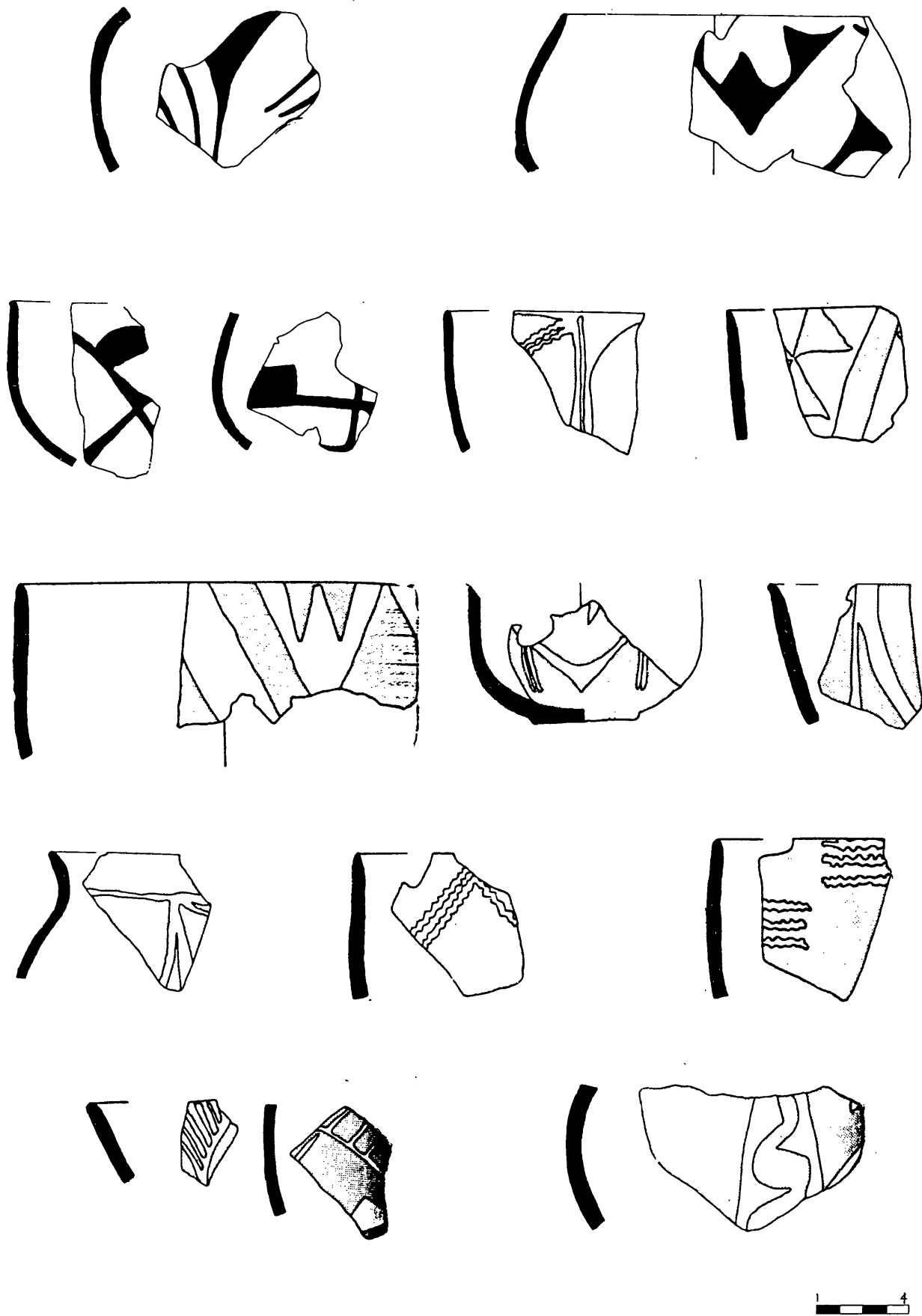


Figure 5.35 Painted pottery: Red/White Porcelain Ware (1-4)
 White/Red (5-15)
 (drawings from D.K. Washburn 1984)

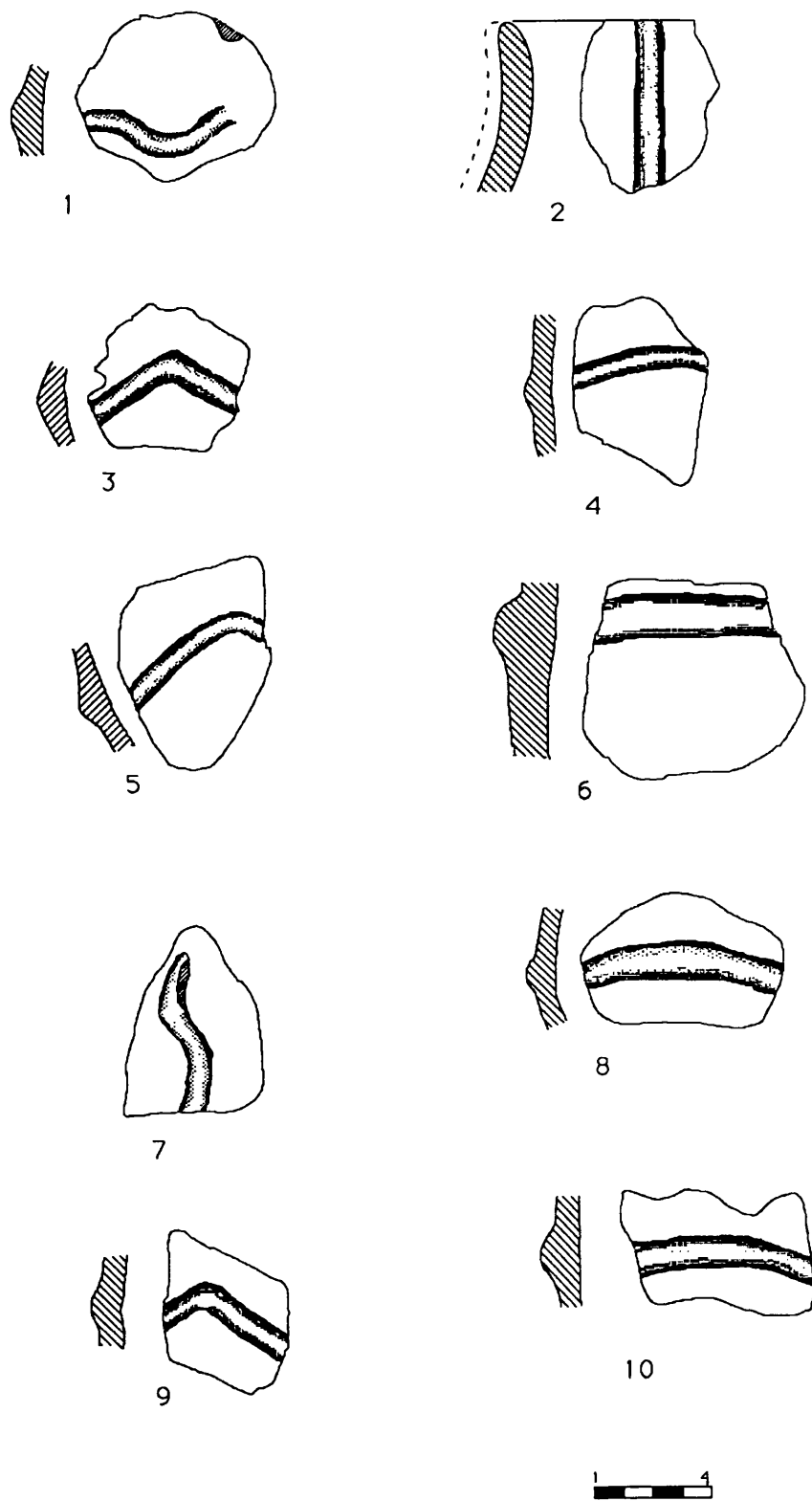


Figure 5.36 Applied Decoration : Sherds with raised bands

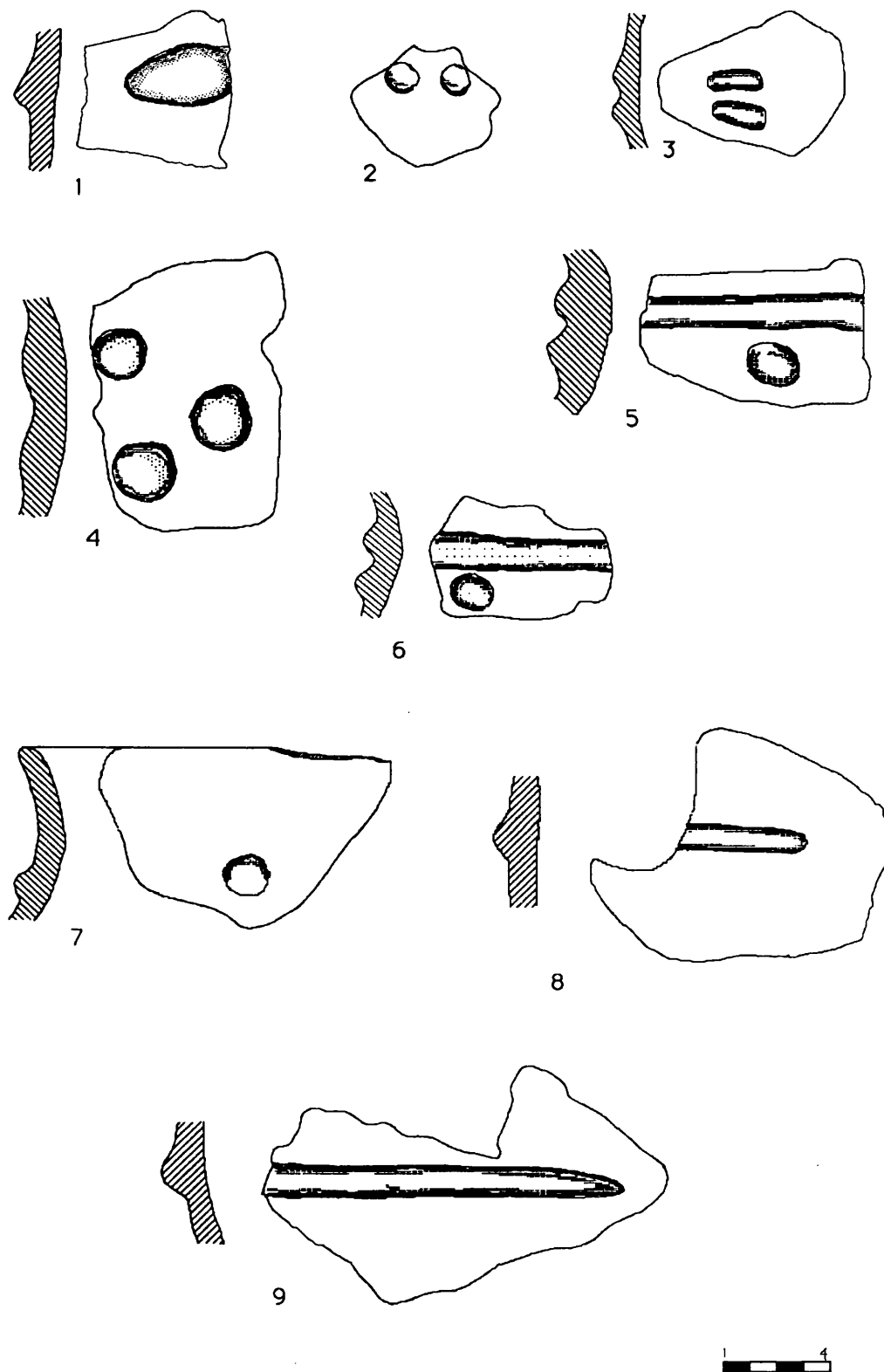


Figure 5.37 Applied Decoration: Sherds with raised bands and blobs

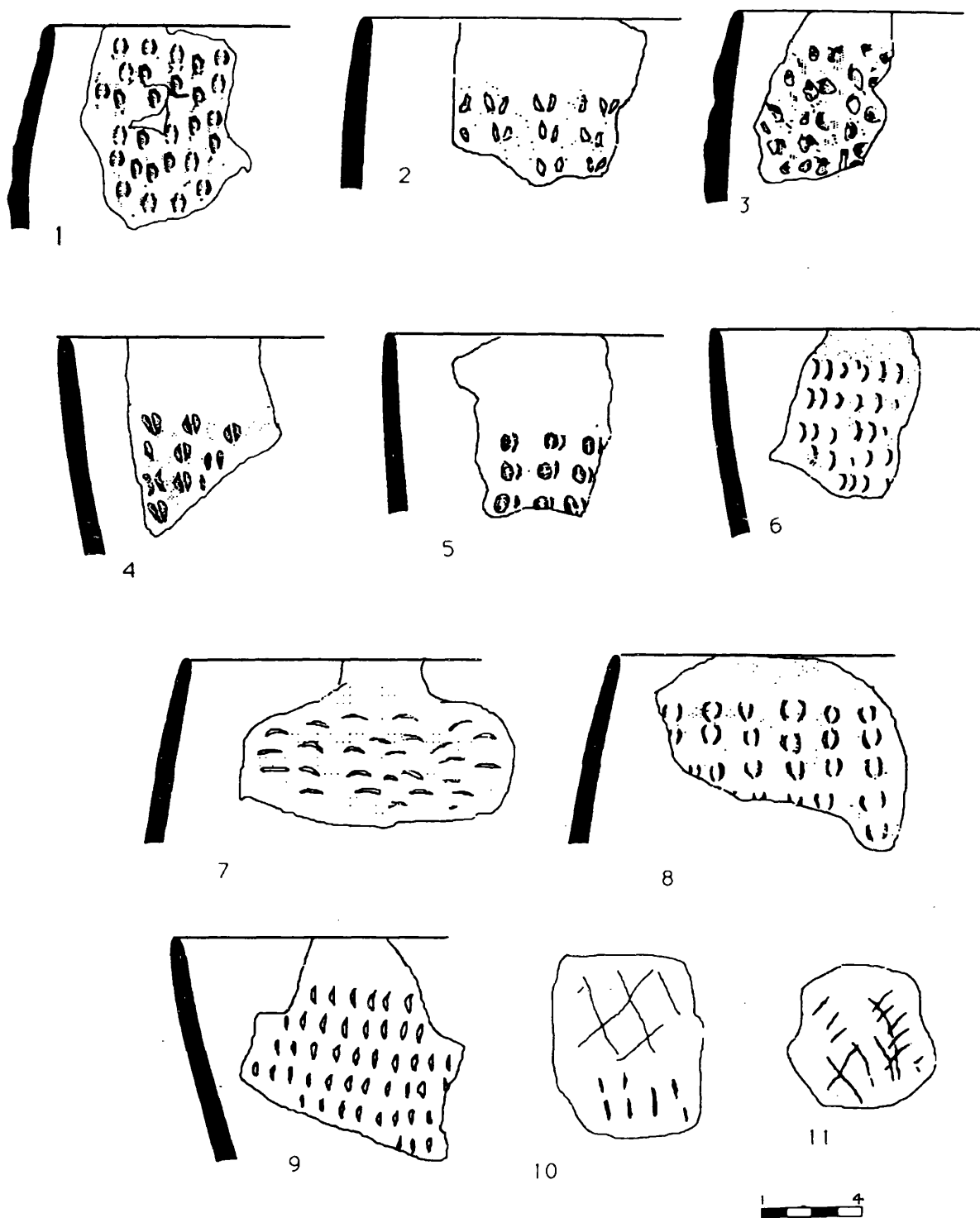


Figure 5.38 Impressed decoration:
 Vessels decorated with finger pinchings (1 - 4) ;
 Vessels decorated with finger nail impressions (5 - 8) ;
 Vessels decorated with instruments (9-11) .

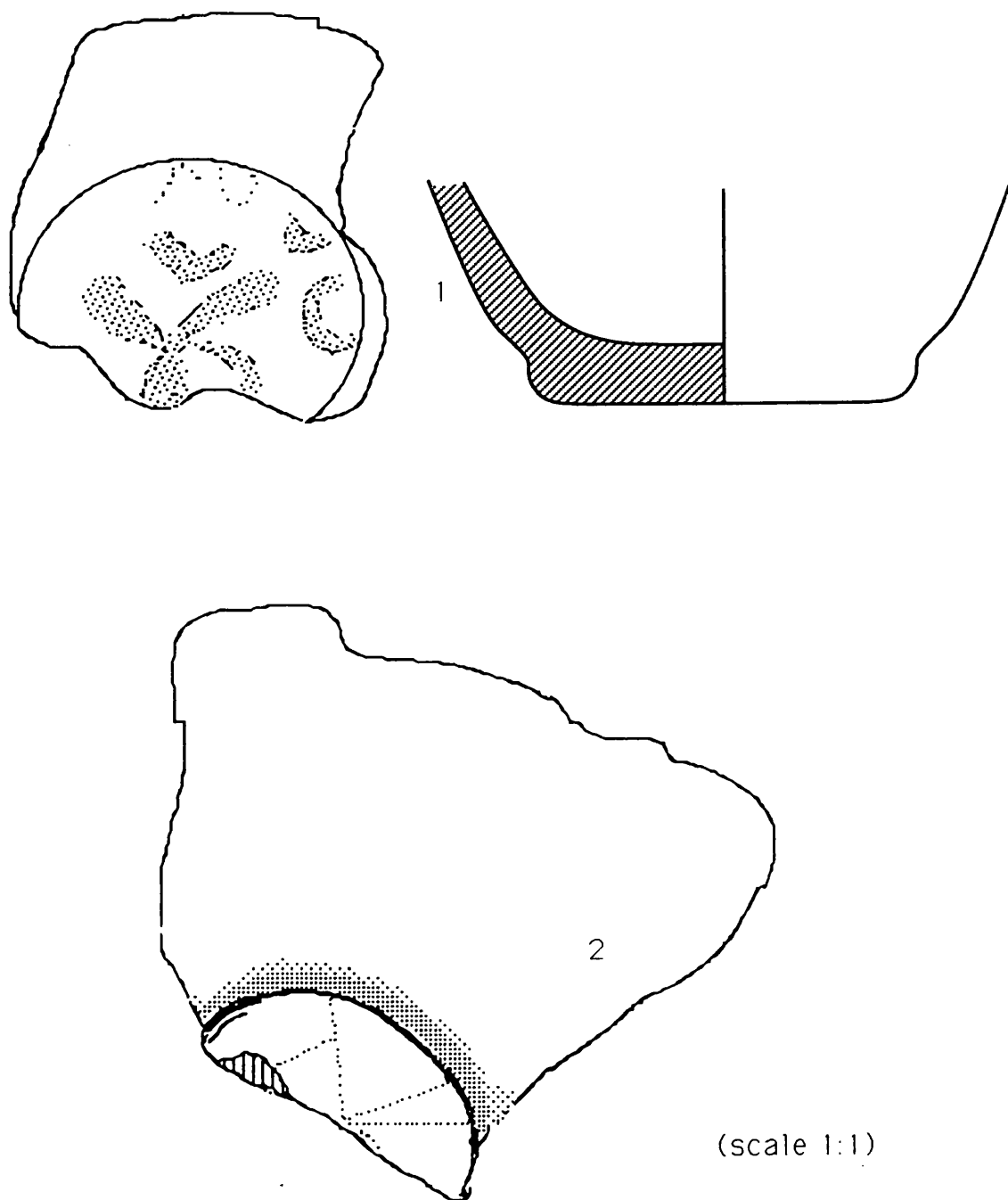


Figure 5.39 Bases decorated with sharp pointed instrument.

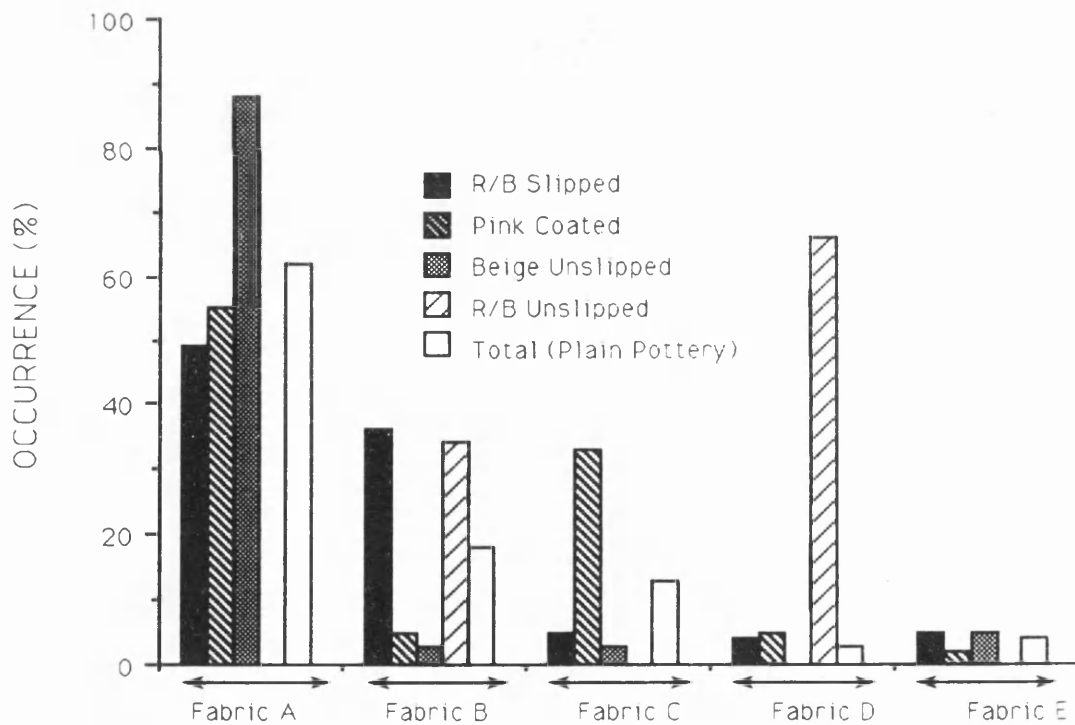
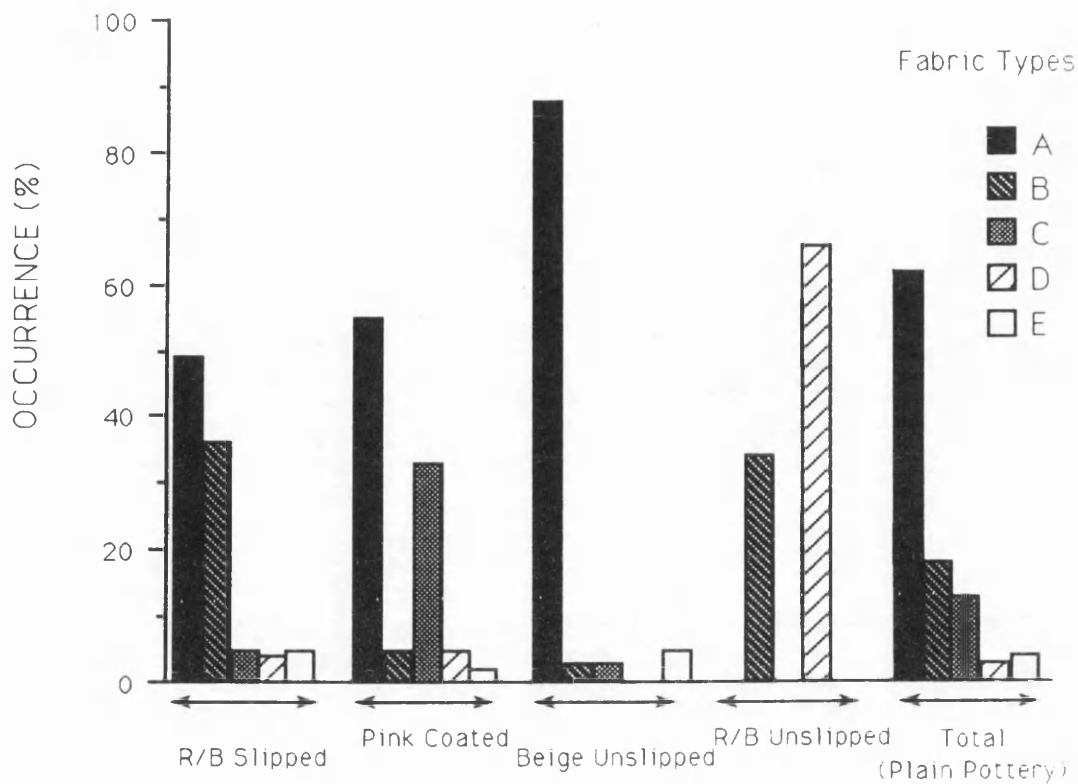


Figure 5.40 Plain Pottery: Correlation of Surface Treatment and Fabric Types

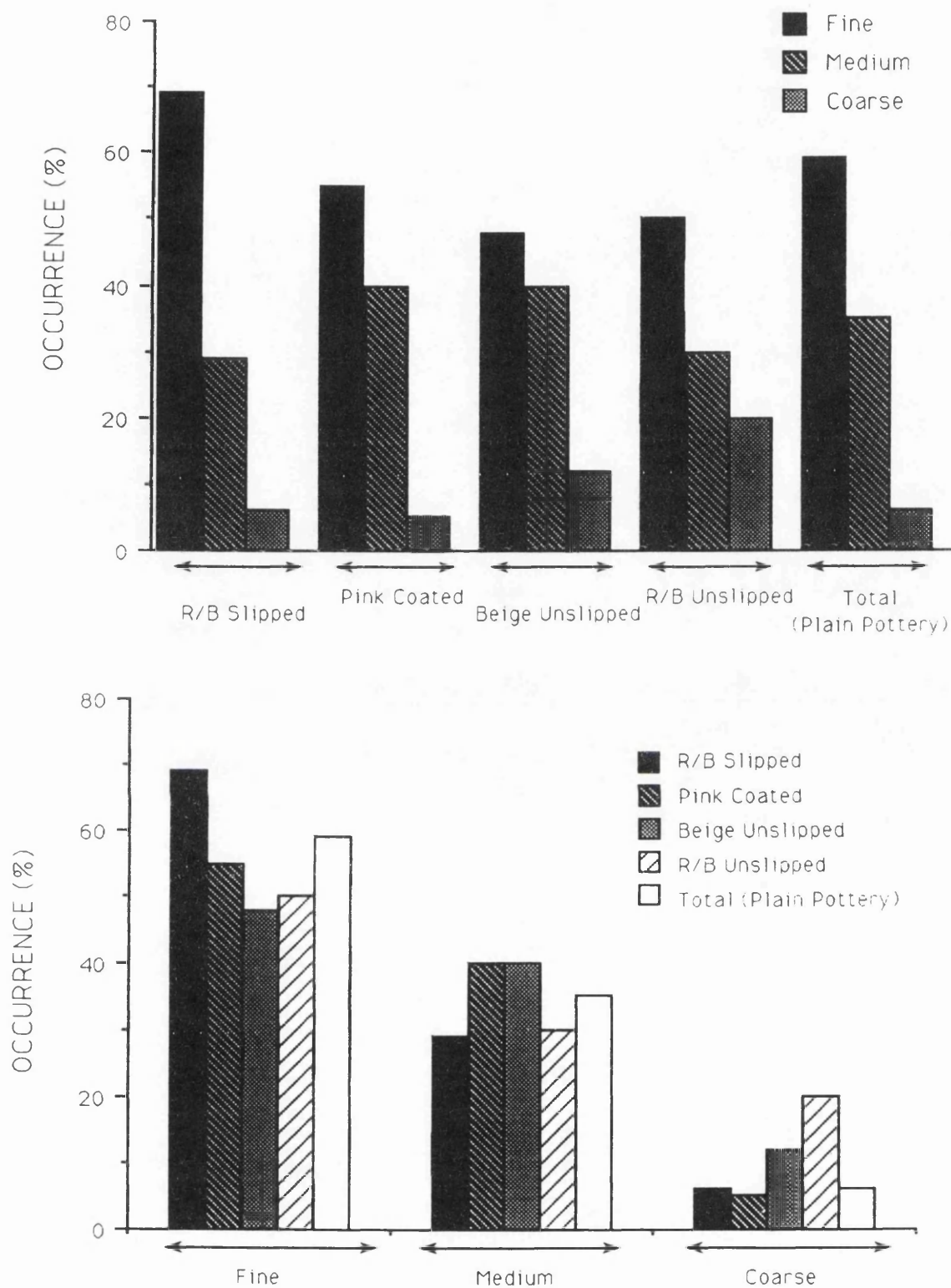


Figure 5.41 Plain Pottery: Correlation of Surface Treatment and Paste Quality

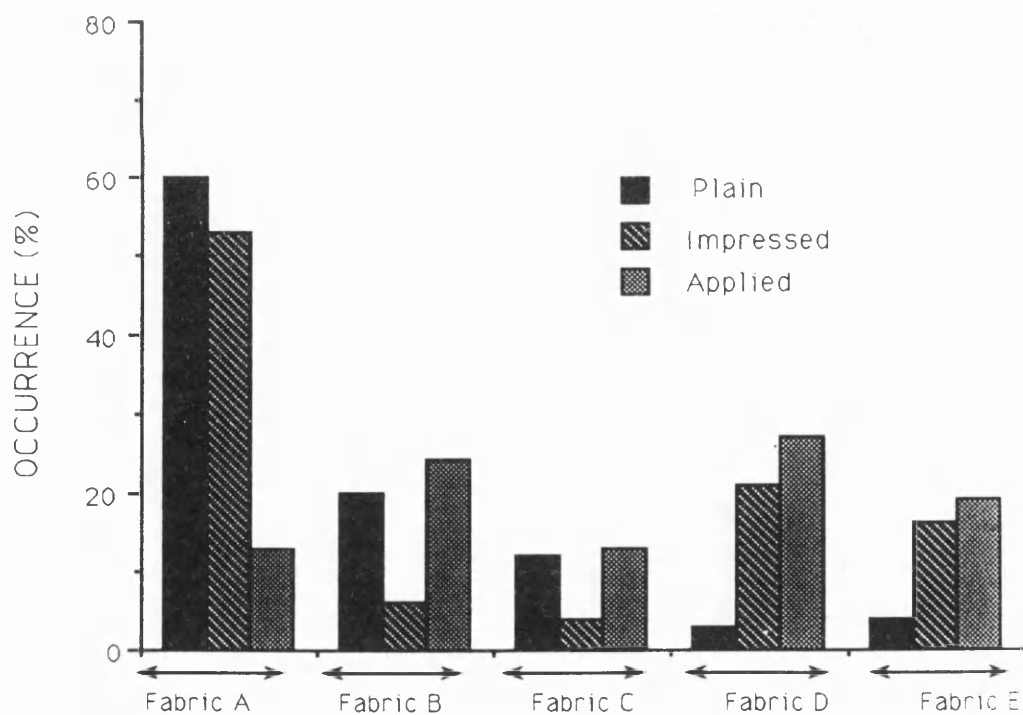
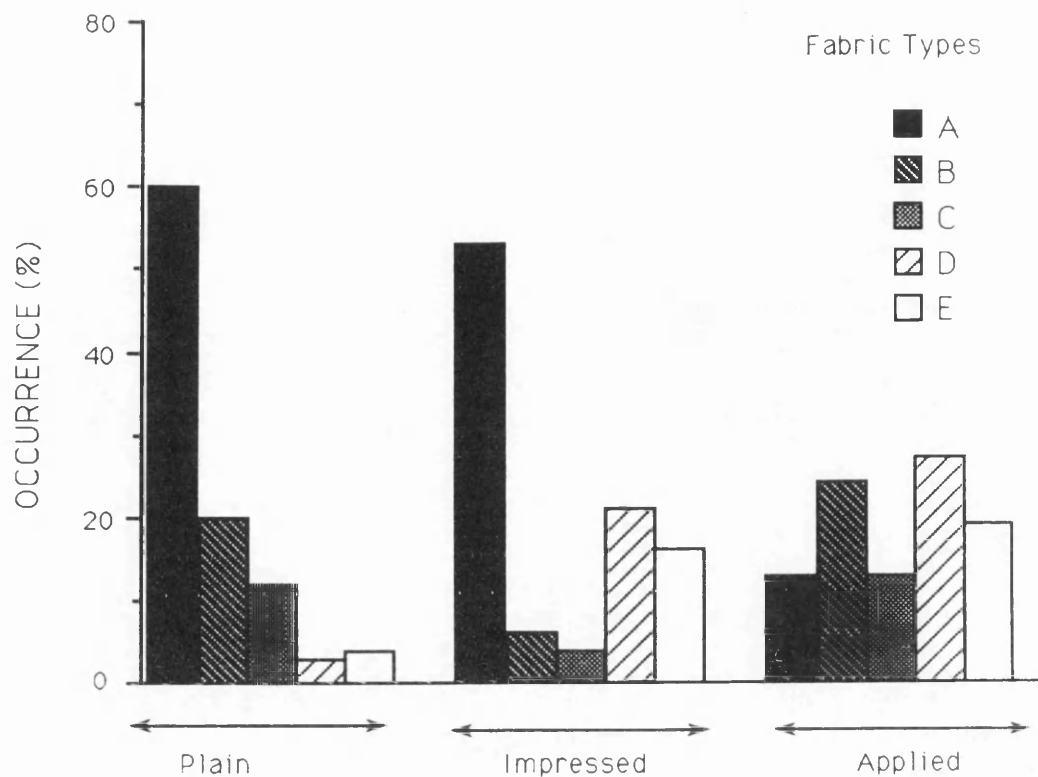


Figure 5.42 Relative Frequency of Fabric Types in Plain, Impressed and Applied Pottery

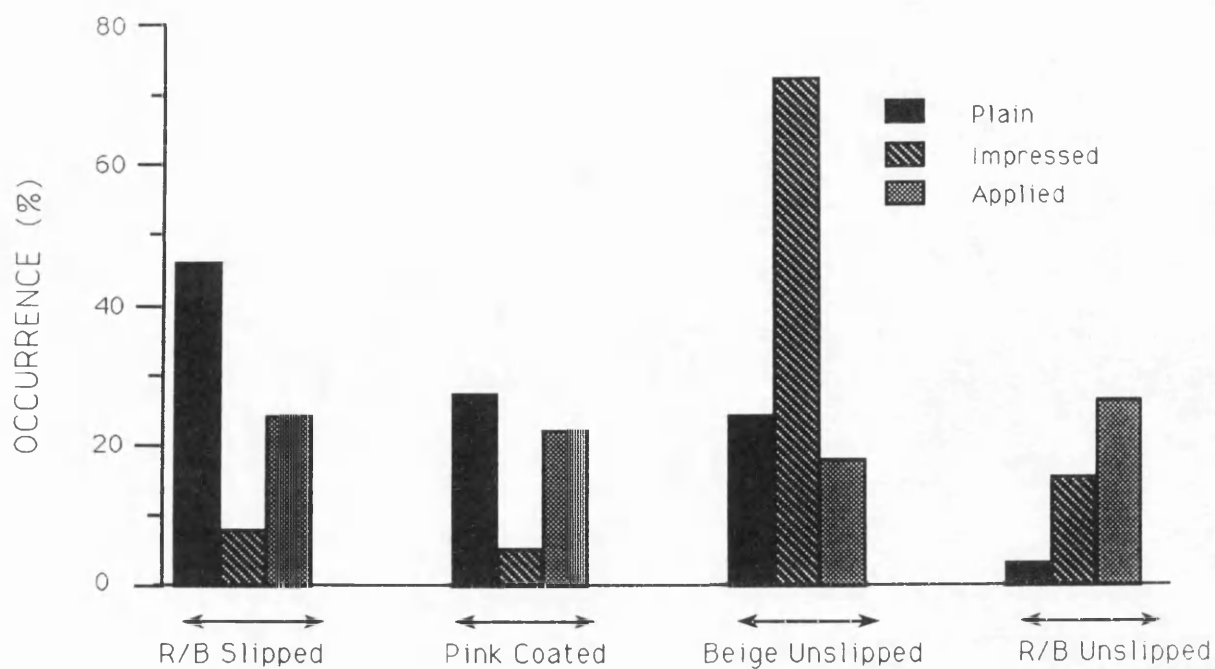


Figure 5.43 Relative Frequency of Surface Coating, in Plain, Impressed and Applied Pottery

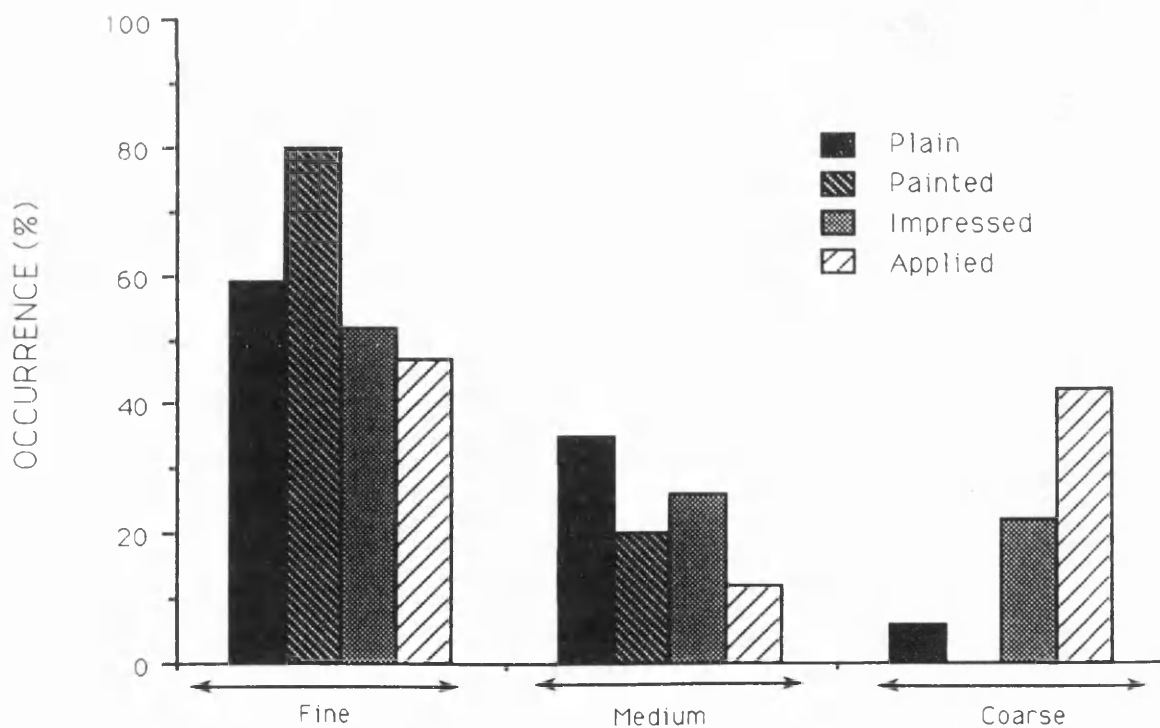


Figure 5.44 Relative Frequency of Fine, Medium and Coarse Vessels in Plain, Painted, Impressed and Applied Pottery

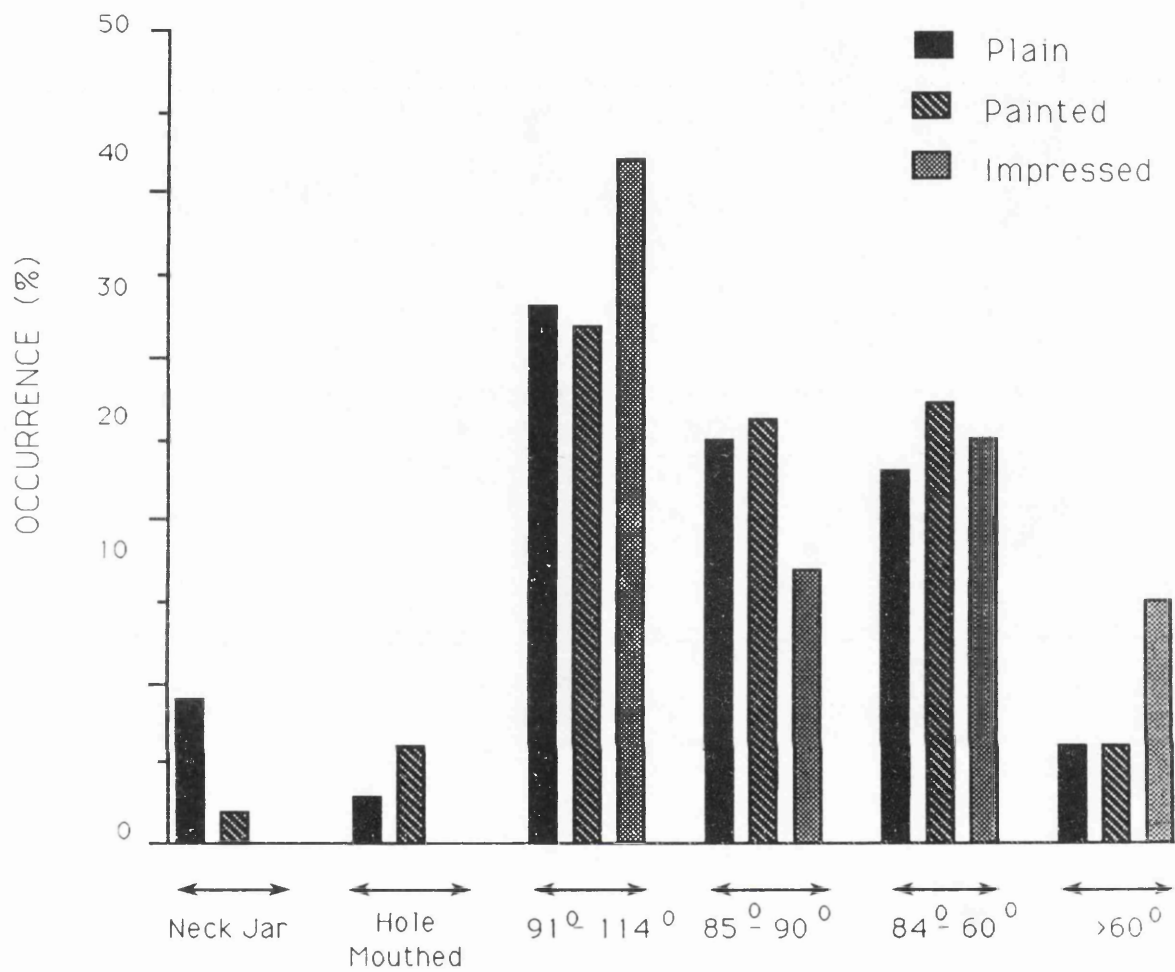


FIGURE 5.45 Relative Frequency of Vessel Shapes in Plain, Painted and Impressed Pottery

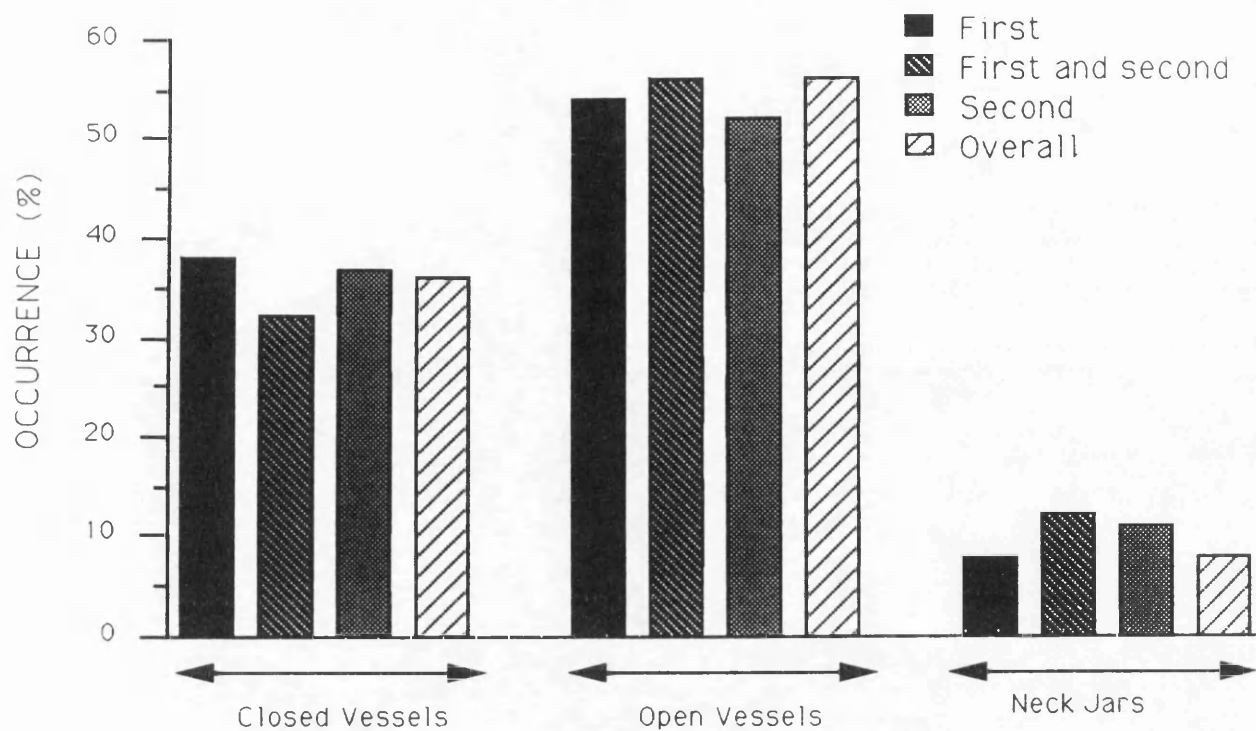


Figure 5.46 Relative Frequency of Open, Closed Pots and Neck Jars in First and Second Building Periods

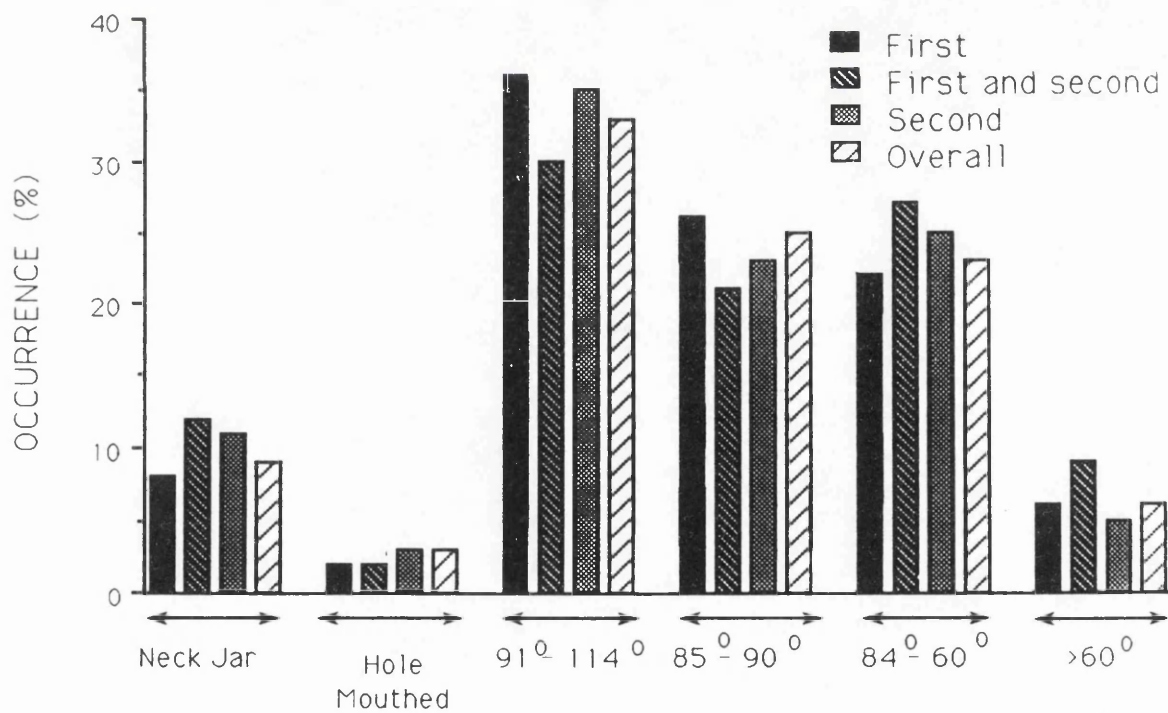


Figure 5.47 Relative Frequency of different Vessel Forms from First and Second Building Periods

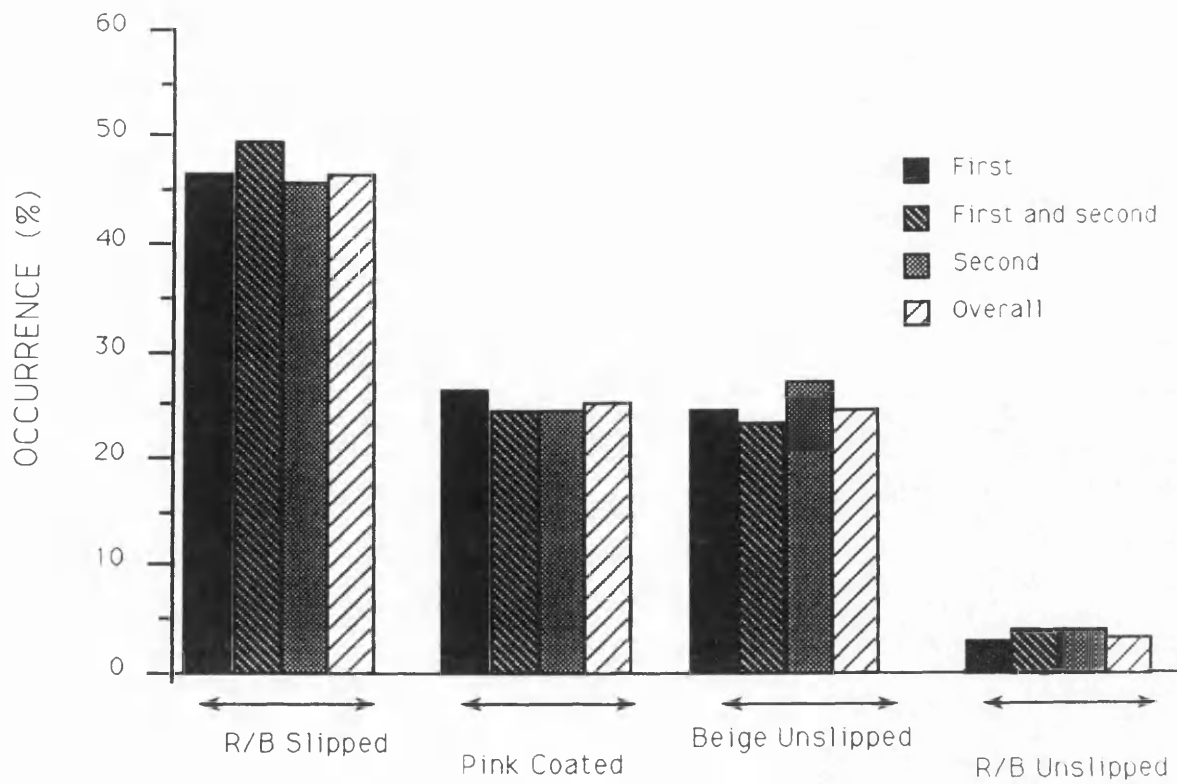


Figure 5.48 Relative Frequency of Surface Coating in First and Second Building Periods

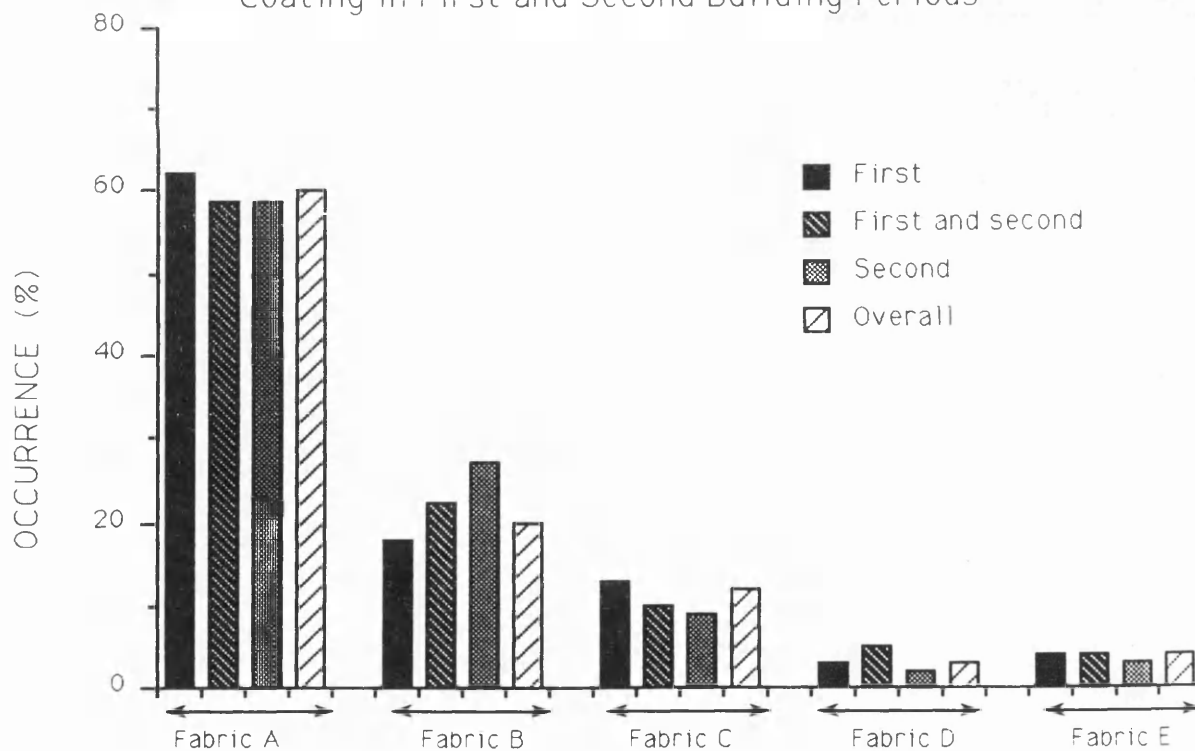


Figure 5.49 Relative Frequency of Fabric Types from First and Second Building Periods

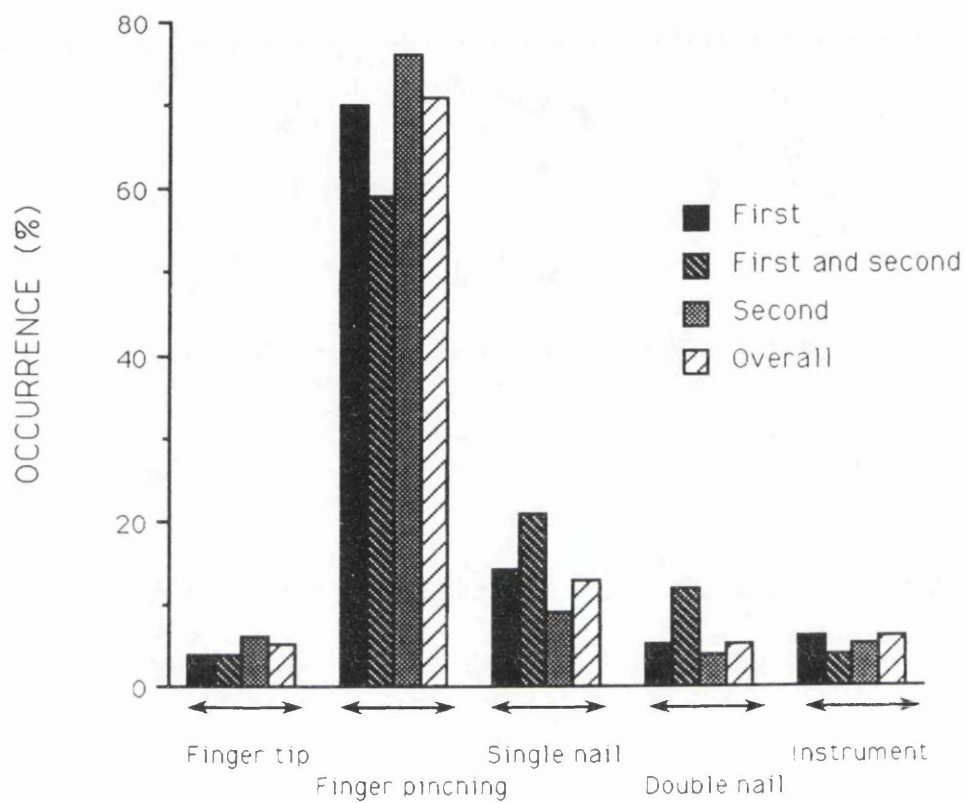


Figure 5.50 Relative Frequency of different types of Impressed Decoration from First and Second Building Periods

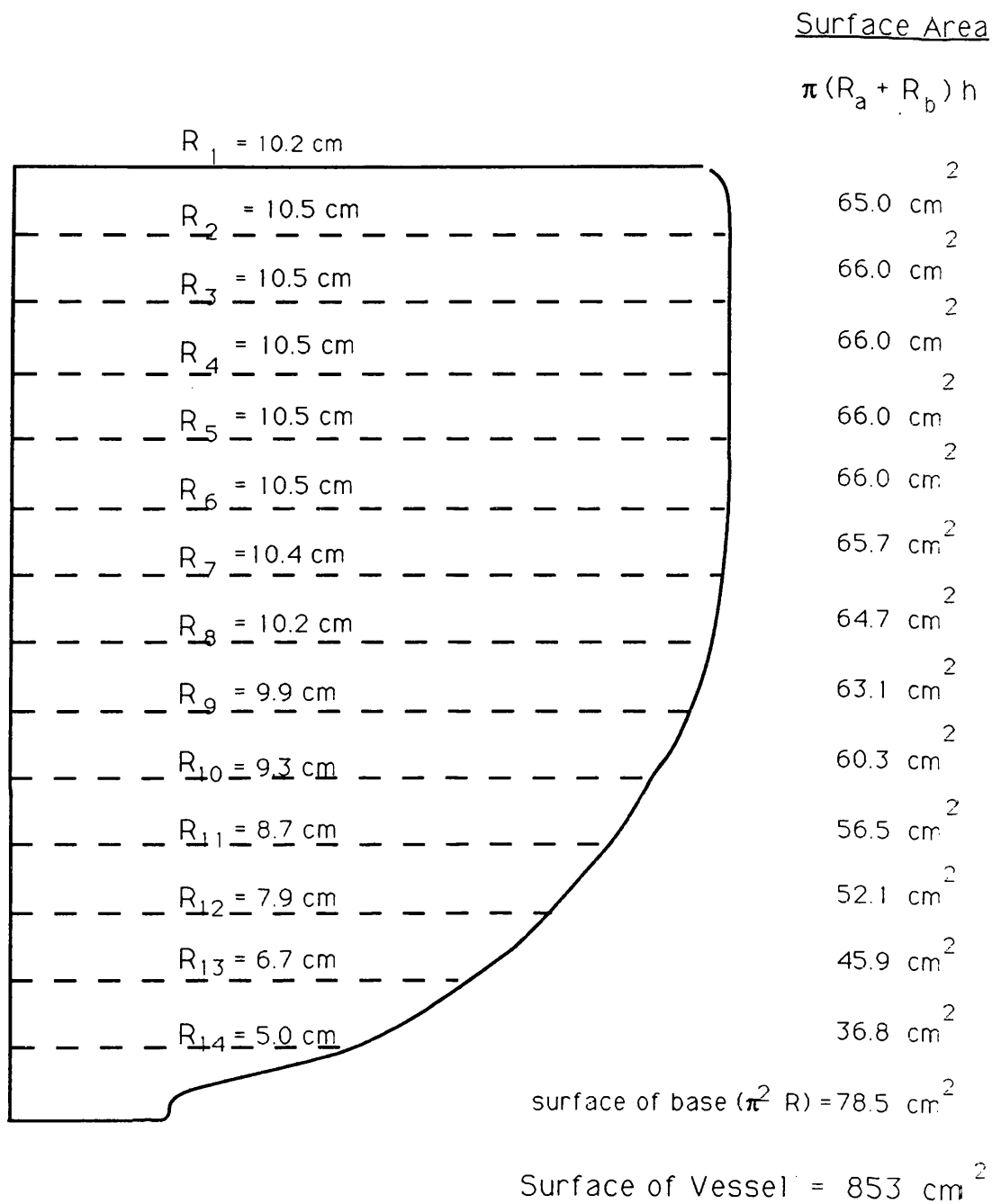


Figure 6.1 Calculation of the Surface Area of a Vessel with rim angle 85°-90°

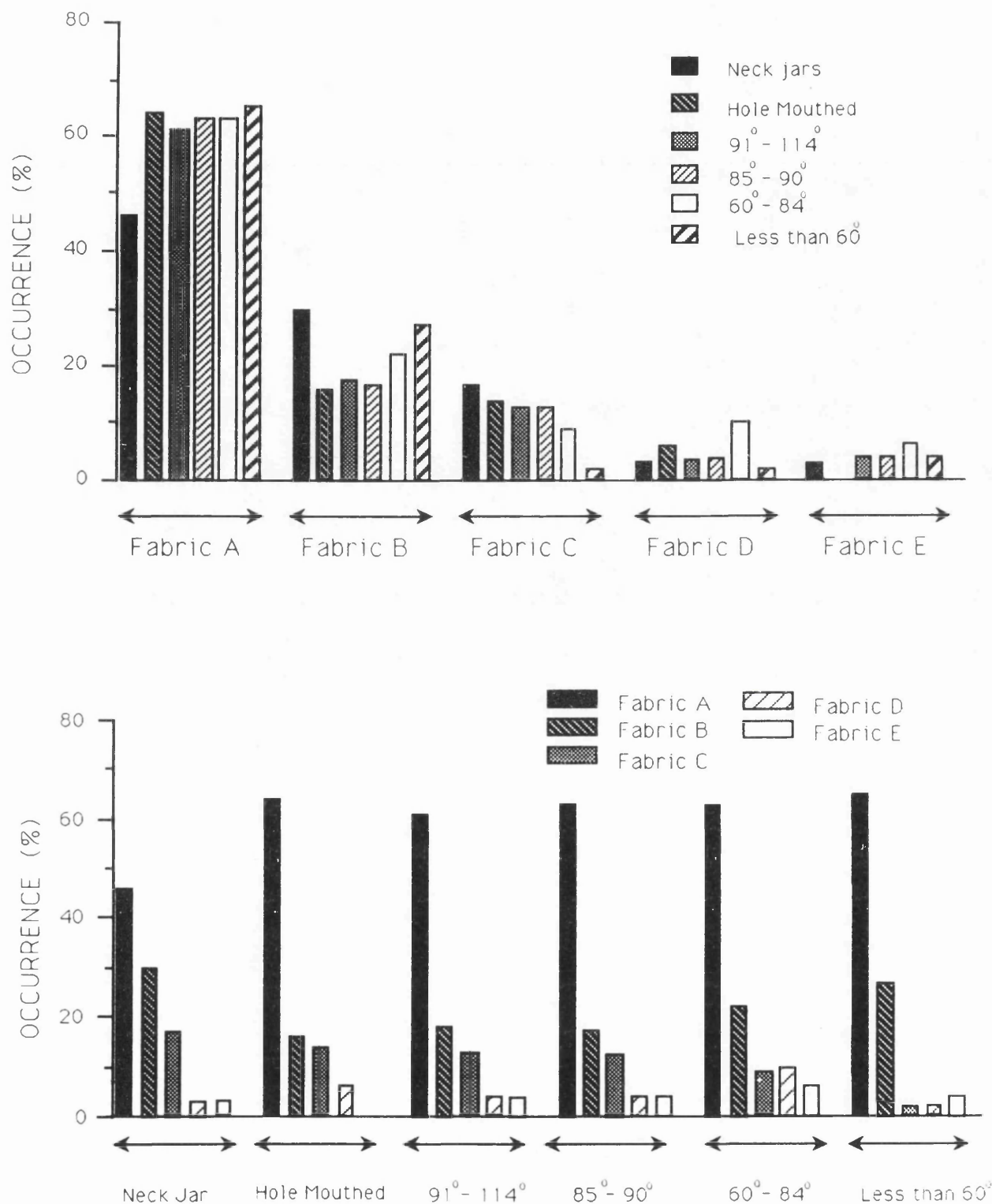


Figure 6.2 Correlation of Fabric Type and Vessel form

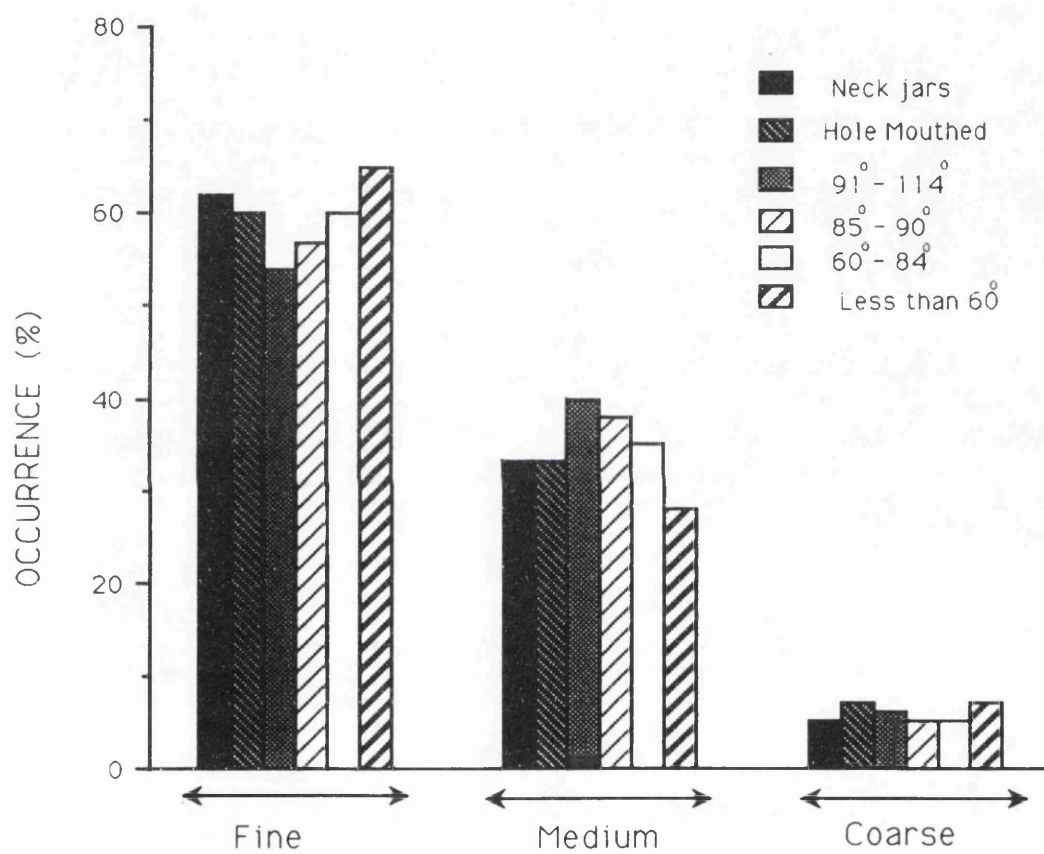


Figure 6.3 Correlation of Quality of Texture and Vessel form

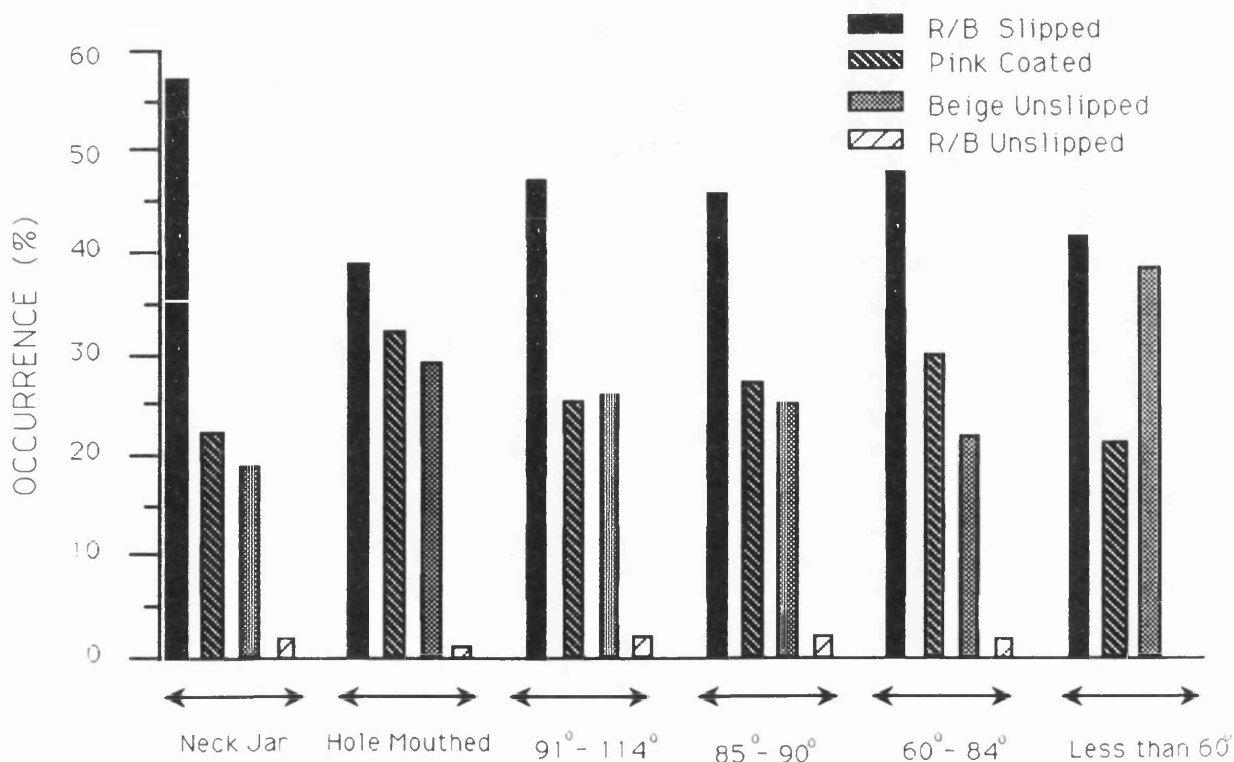
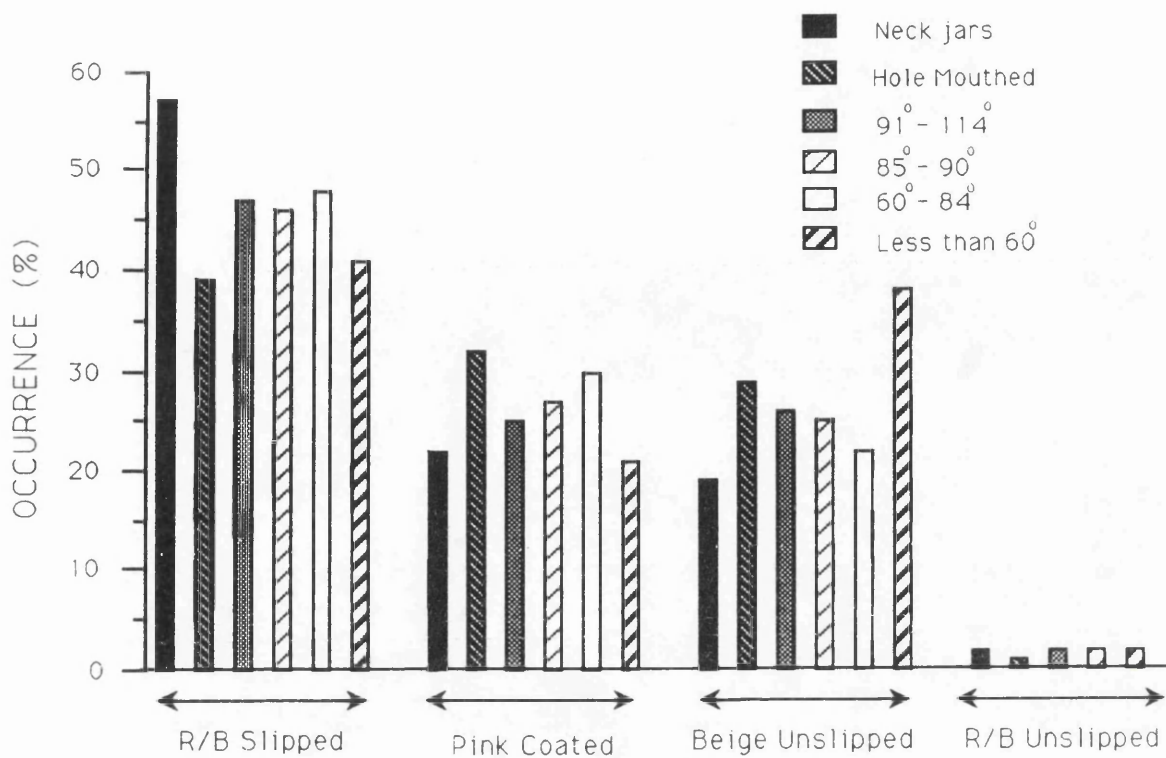


FIGURE 6.4 Correlation of Surface Treatment and Vessel form

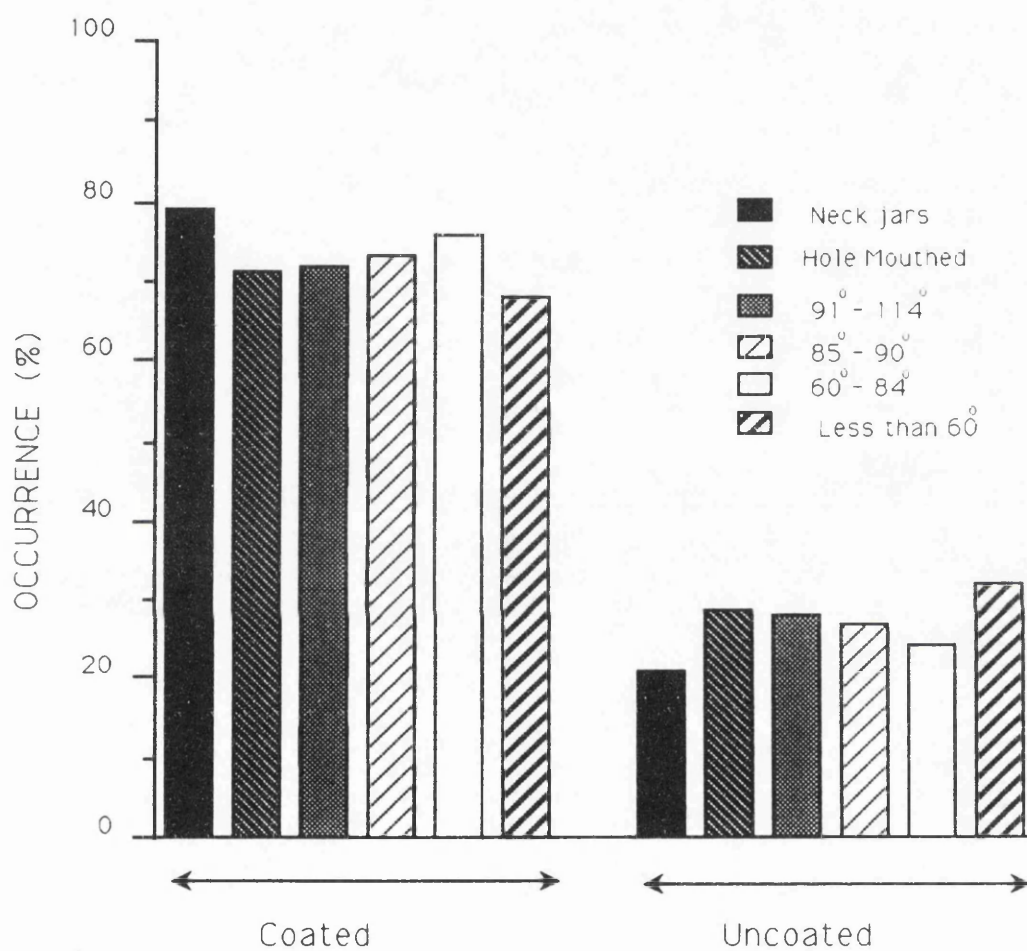


FIGURE 6.5 Correlation of Surface Treatment and Vessel form

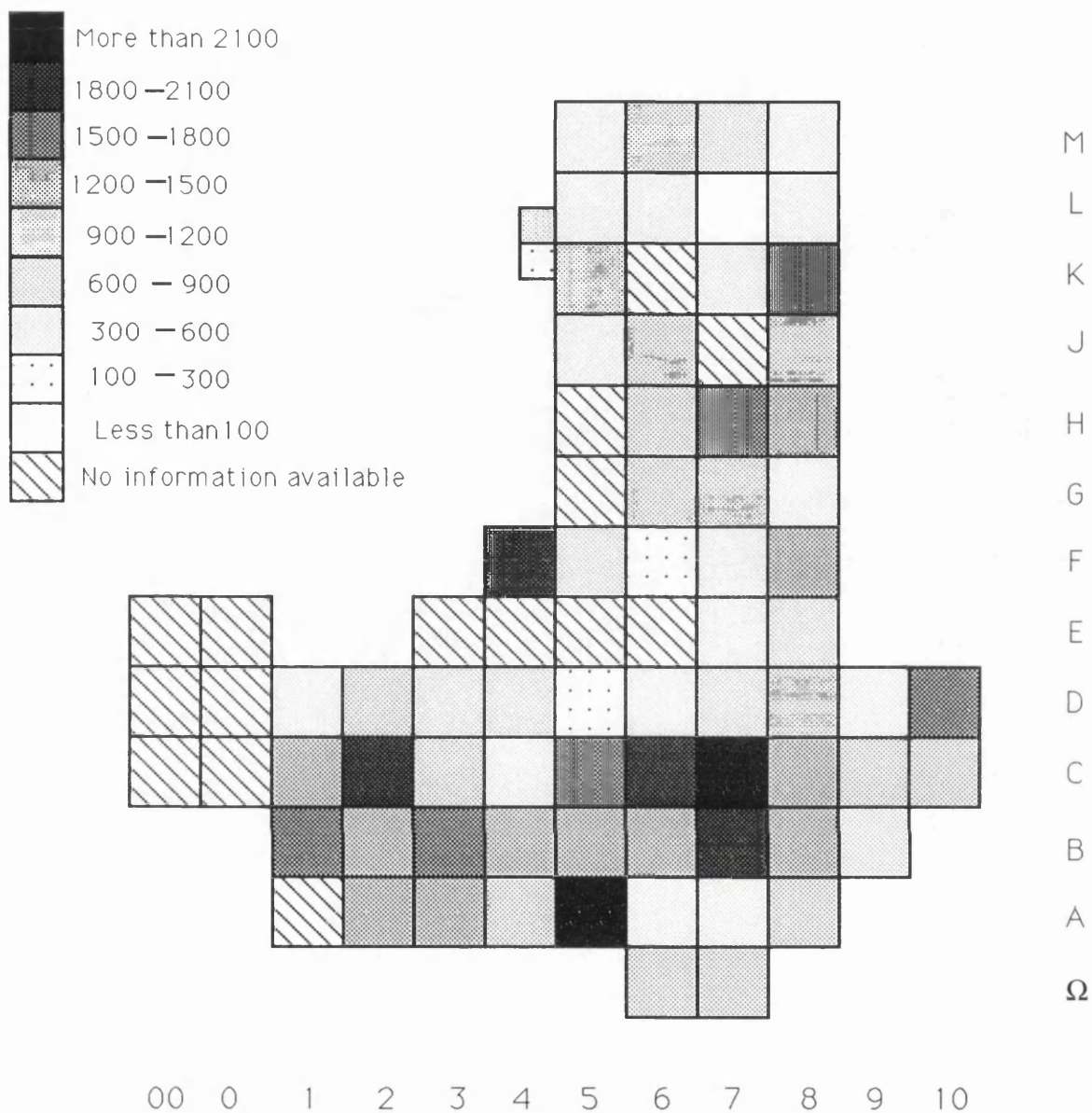


Figure 6. 6 Spatial distribution of Plain and Decorated Pottery from Spit 1

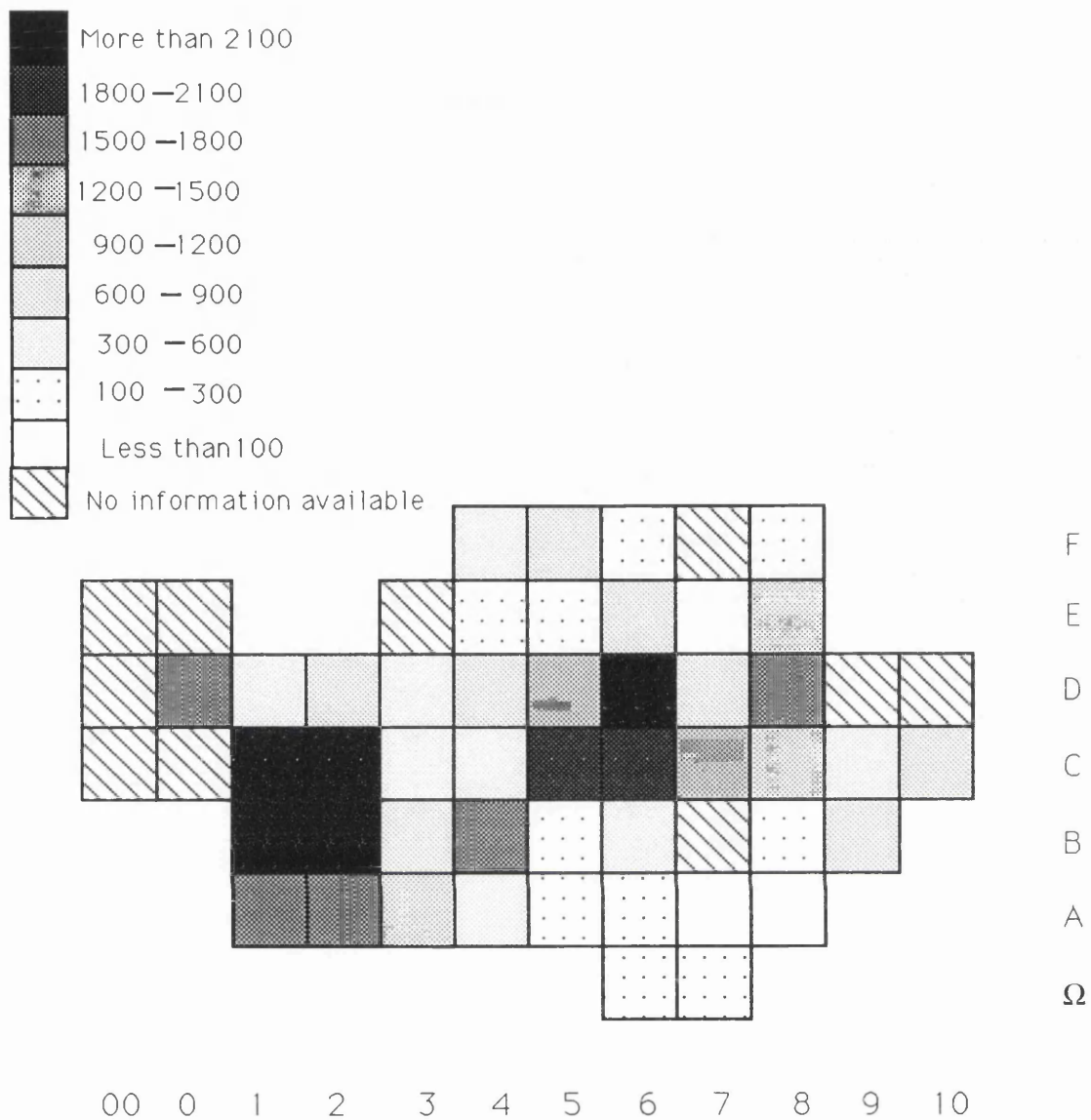


Figure 6. 7 Spatial distribution of Plain and Decorated Pottery from Spit 2

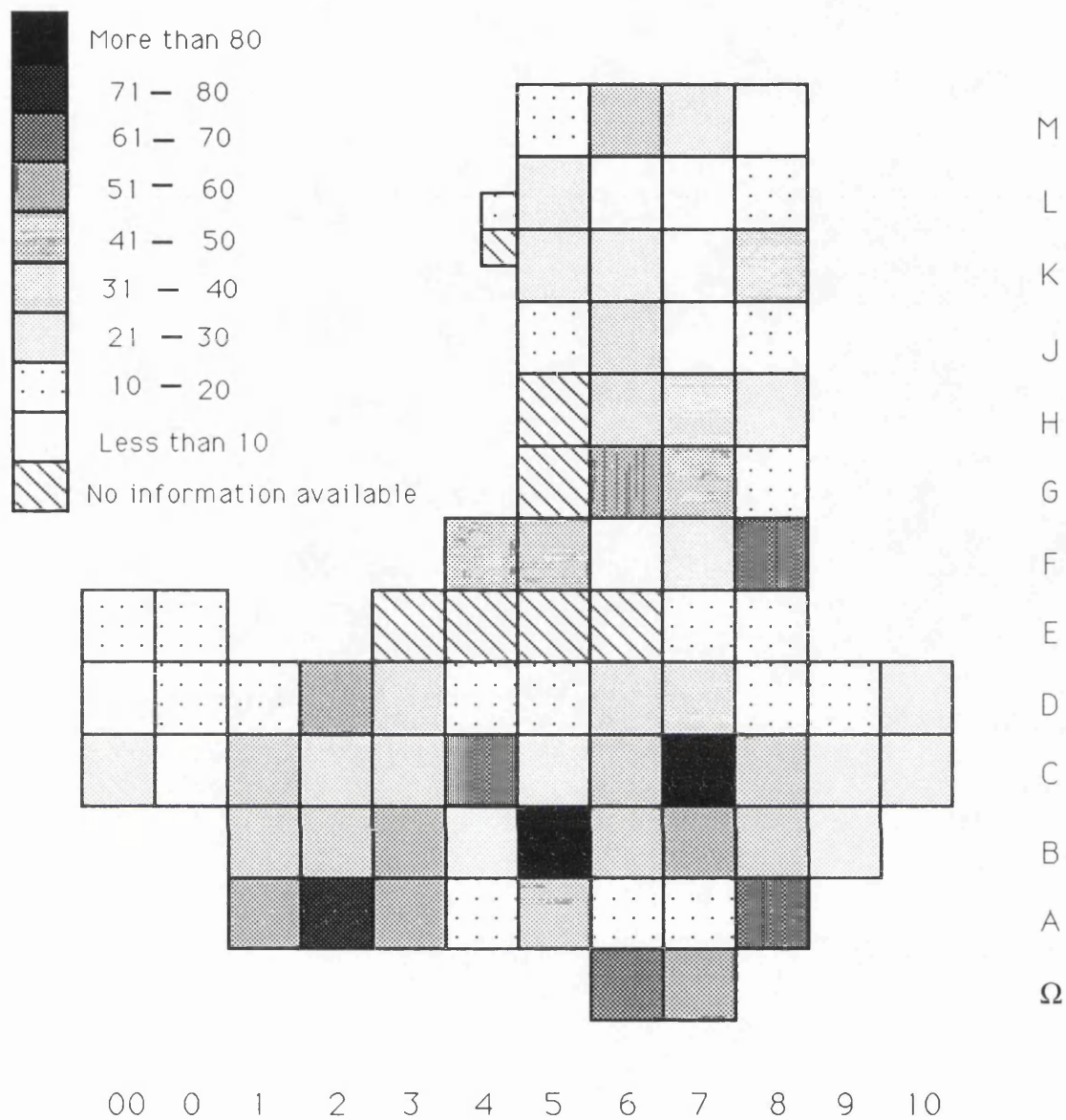


Figure 6. 8 Spatial distribution of Decorated Pottery from Spit 1

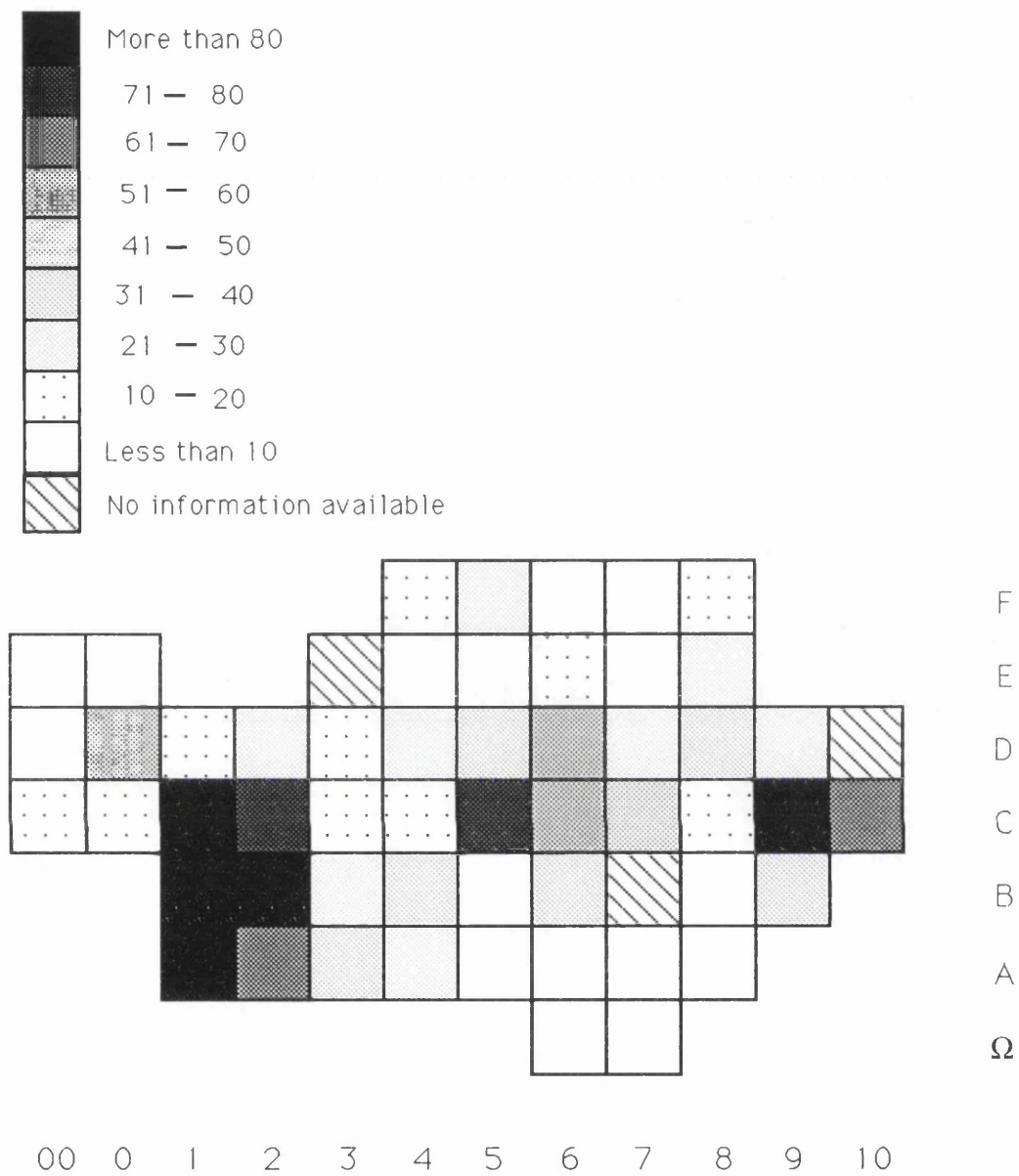


Figure 6. 9 Spatial distribution of Decorated Pottery from Spit 2

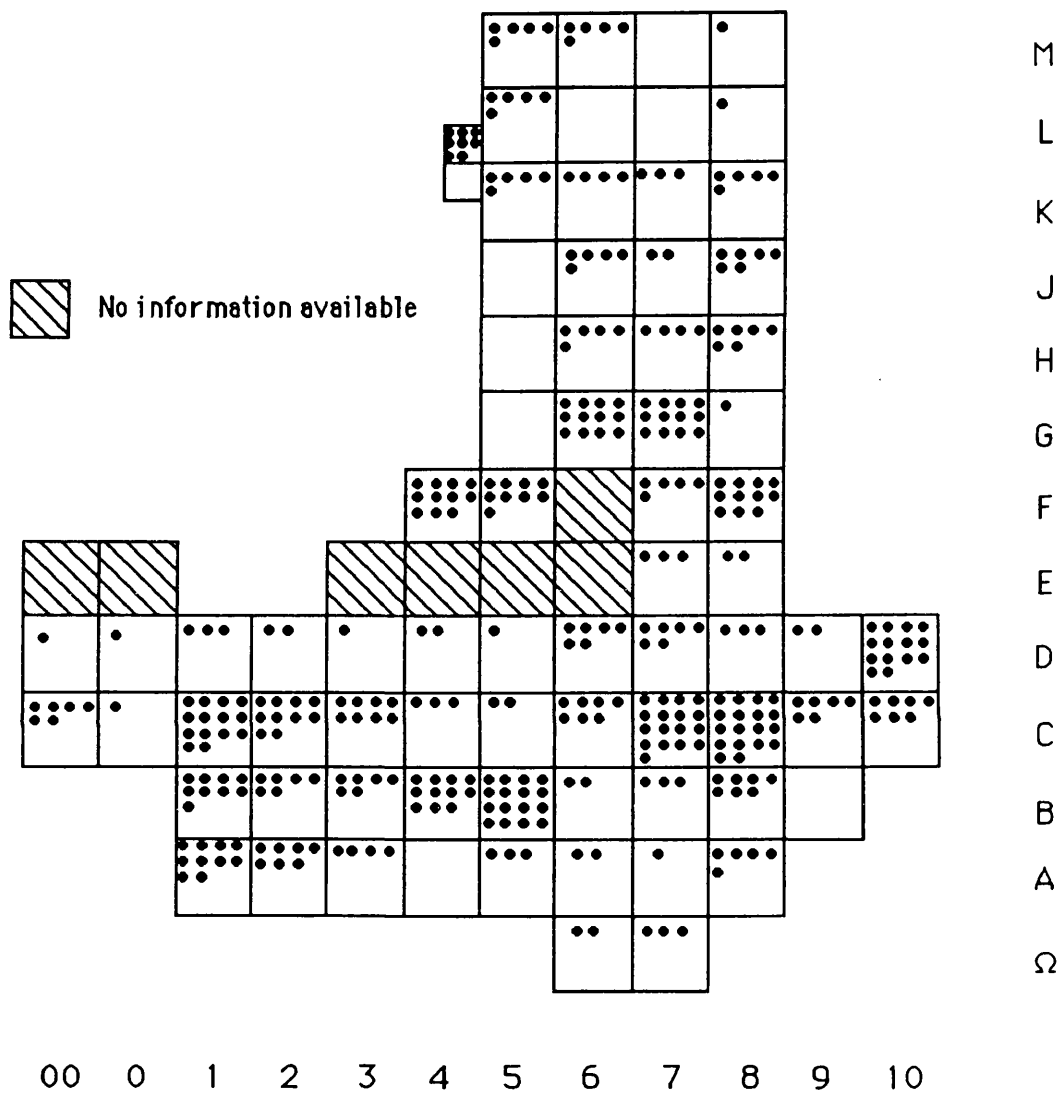


Figure 6. 10 Spatial distribution of Impressed Pottery from Spit 1
 Number of points equals the number of
 sherds found in each square

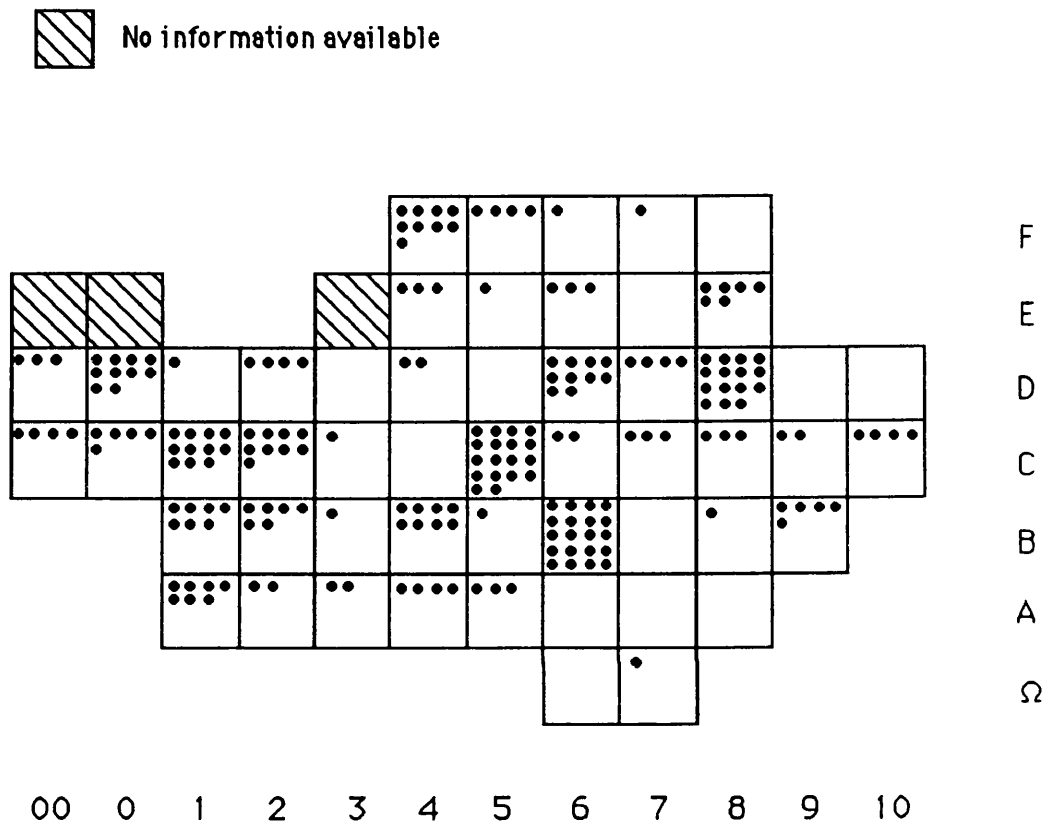


Figure 6. 11 Spatial distribution of Impressed Pottery from Spit 2
 Number of points equals the number of
 sherds found in each square

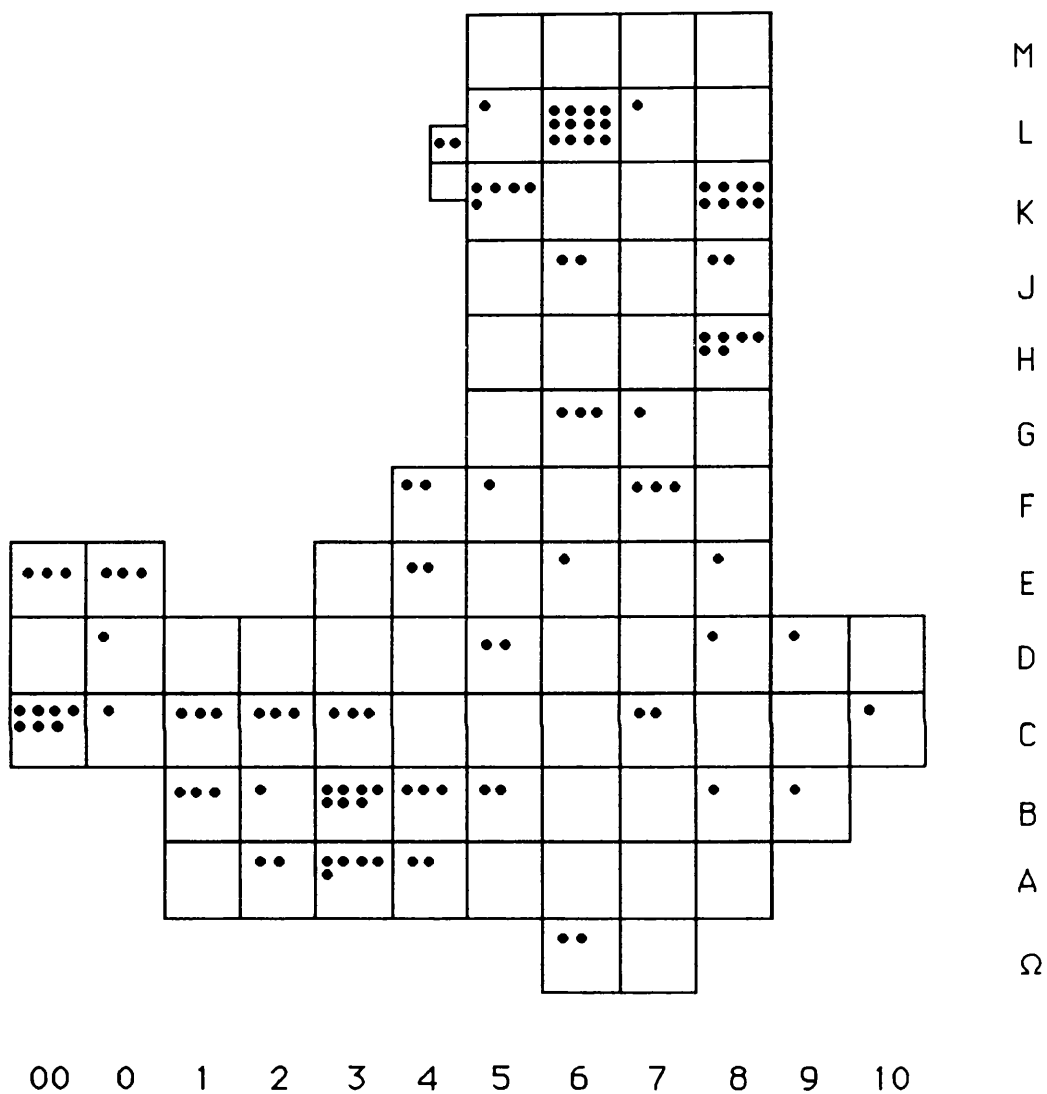


Figure 6. 12 Spatial distribution of White/Red Painted Pottery from Spit 1 and 2
 Number of points equals the number of sherds found in each square

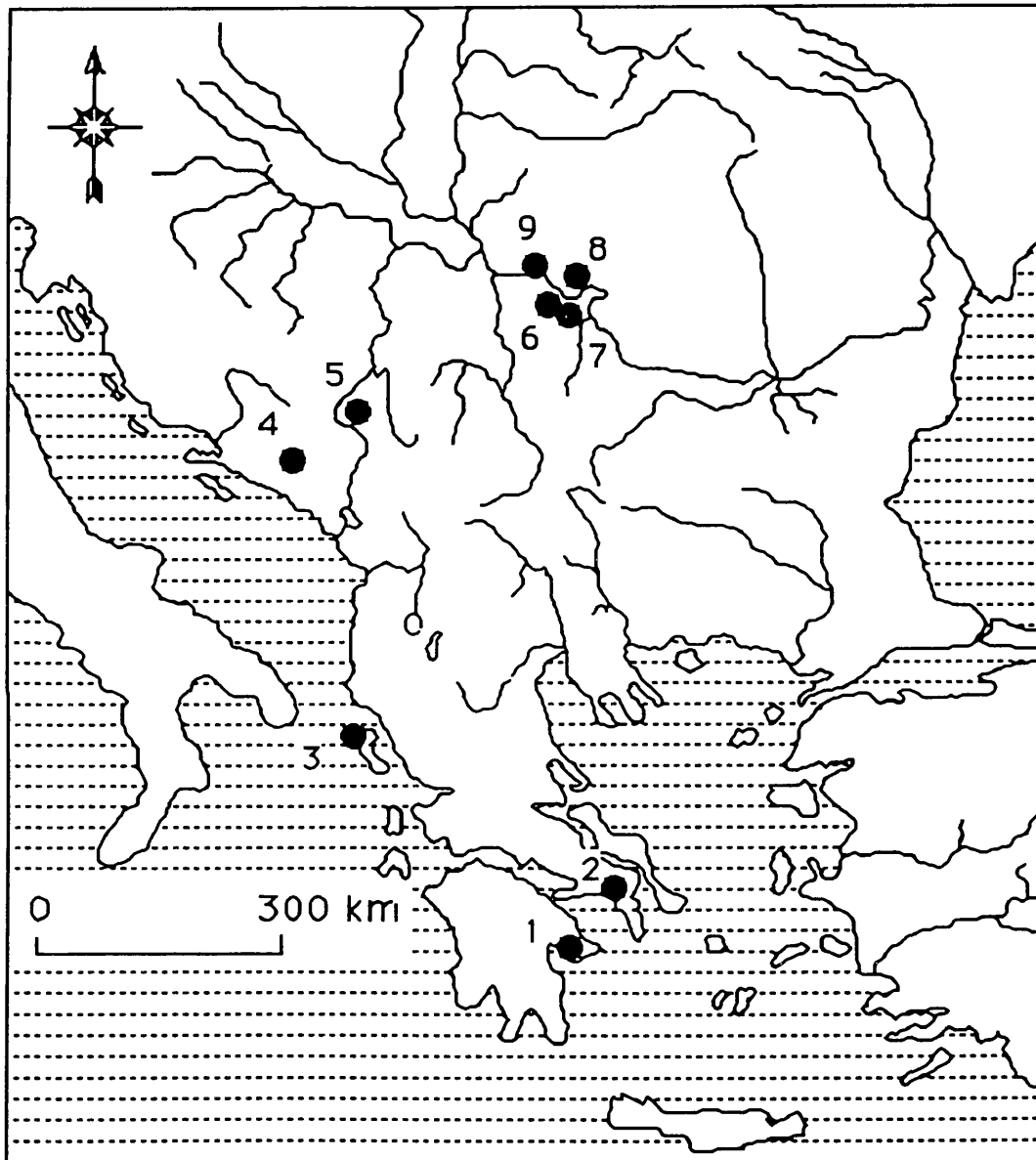


Figure 7.1 Distribution of late Mesolithic sites in the Balkan Peninsula

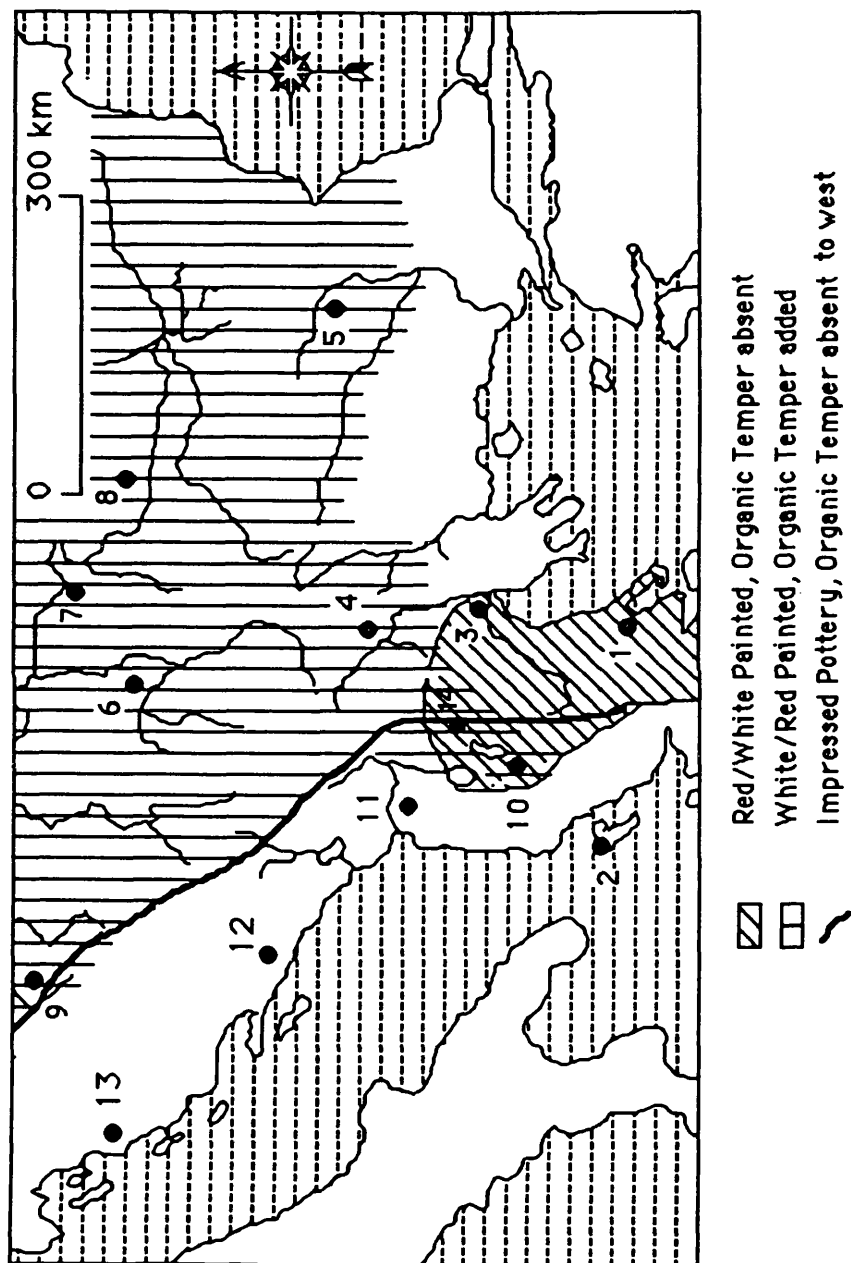


Figure 8.1 Spatial distribution of different pottery traditions during the Early Neolithic in the Balkan Peninsula

(n.b. Intersection of the pottery traditions can be seen in S.E. Albania - S.W. Yugoslavia)

Key to Figure 7.1

- 1 Franchthi
- 2 Zaimis
- 3 Sidari
- 4 Crvena Stijena
- 5 Odmut
- 6 Lepenski Vir
- 7 Vlasac
- 8 Icoana
- 9 Padina

Key to Figure 8.1

- 1 Sesklo
- 2 Sidari
- 3 Nea Nikomedeia
- 4 Amzabegovo
- 5 Asmaška
- 6 Divostin
- 7 Lepenski Vir
- 8 Cîrcea
- 9 Obre
- 10 Vashtëmi
- 11 Blaz
- 12 Crvena Stijena
- 13 Škarin Samograd
- 14 Veluška



Photo 4.1 Coils seen on the interior of rim sherds



Photo 4.2 Miniature vessel with traces of pinching



Photo 4.3 Sherds showing the method of base attachment



Photo 4.4 "Thrust Lugs "

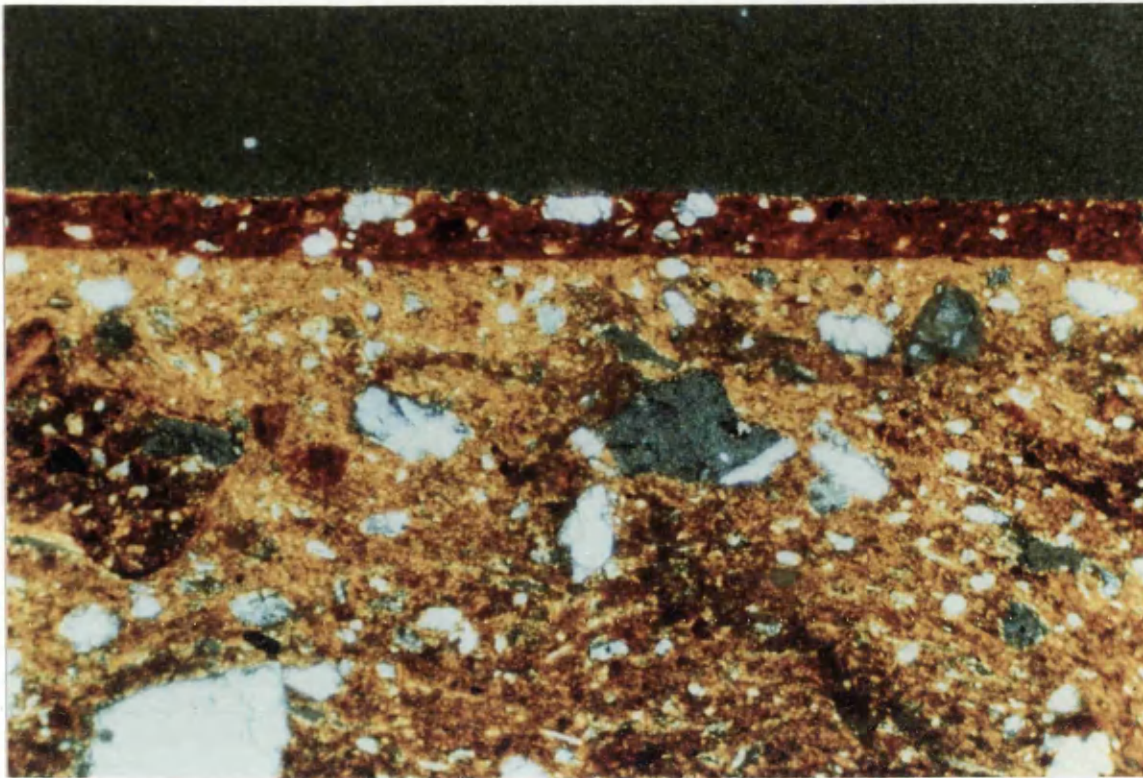


Photo 4.5 Red-Brown Slip (crossed polars 170X)

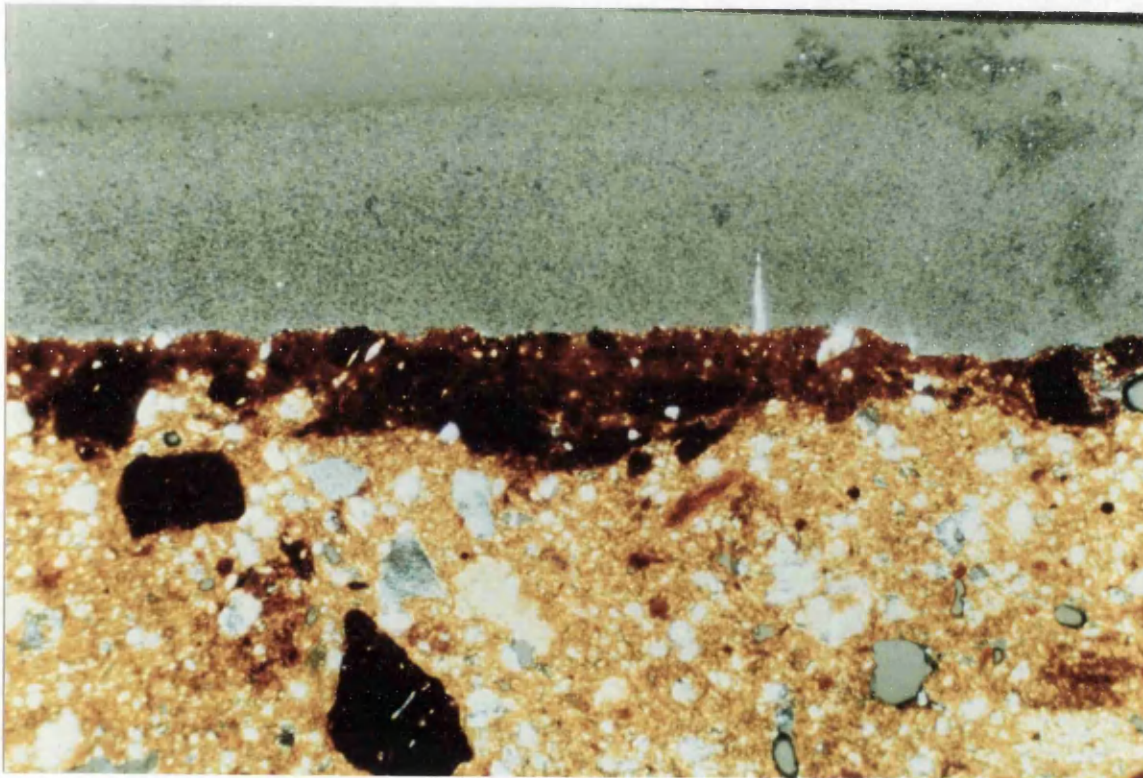


Photo 4.6 Pink Coating (crossed polars 170X)

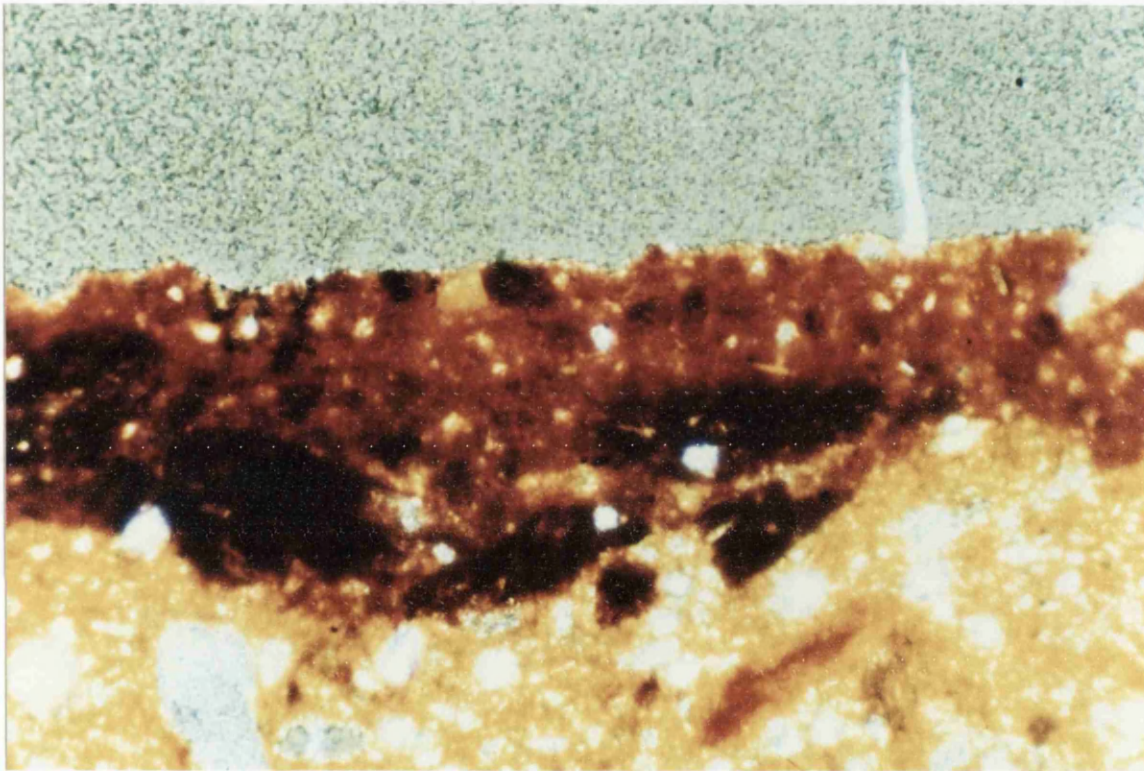


Photo 4.7 Pink Coating (crossed polars 420X)

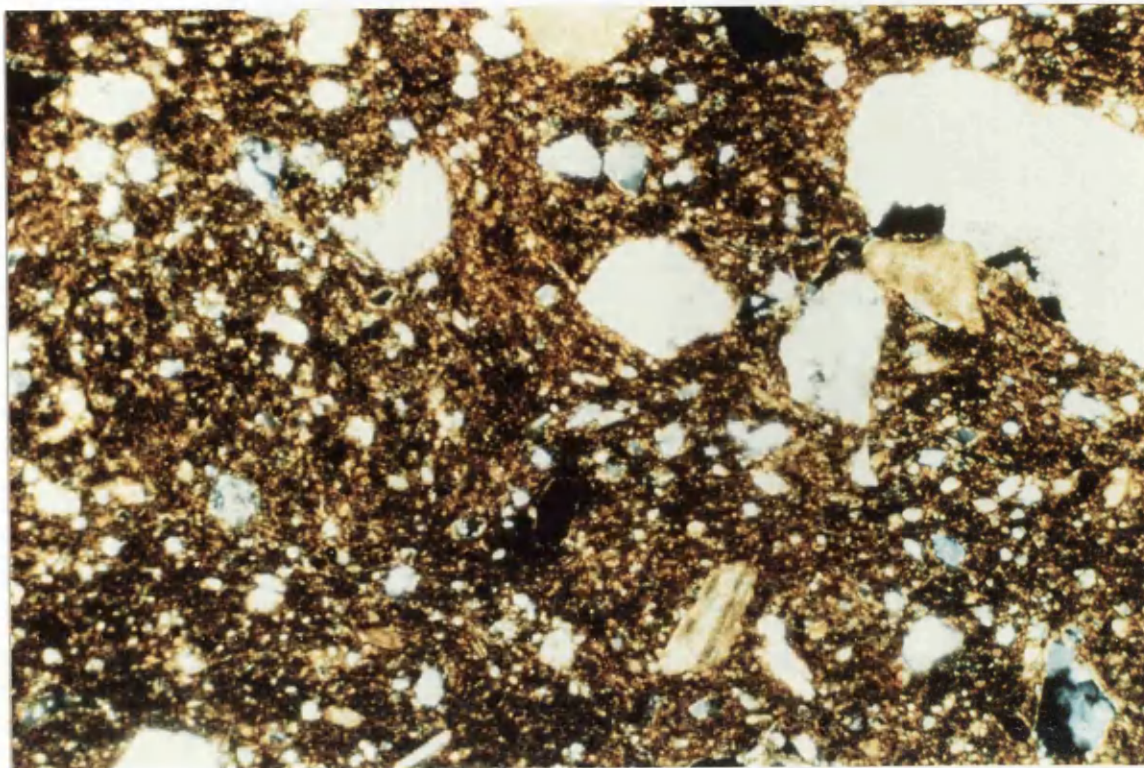


Photo 4.8 Fabric A (crossed polars 170X)



Photo 4.9 Fabric A (crossed polars 170X)

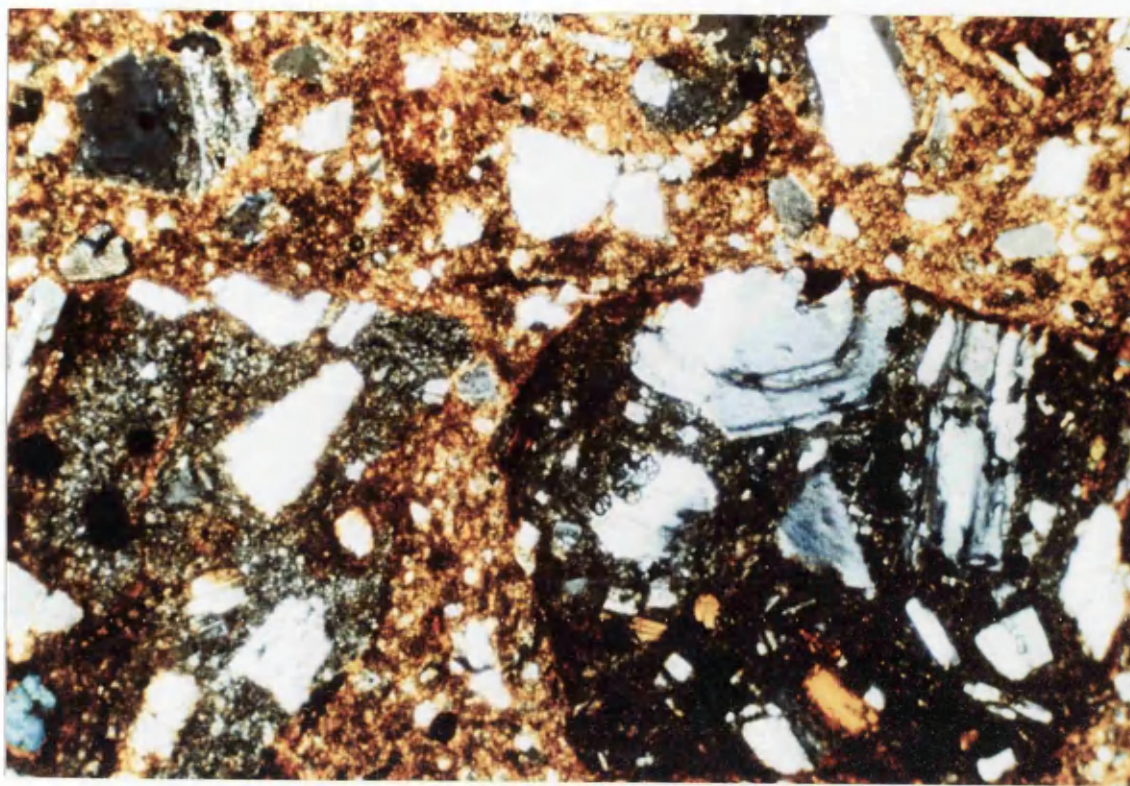


Photo 4.10 Fabric B-1 (crossed polars 170X)

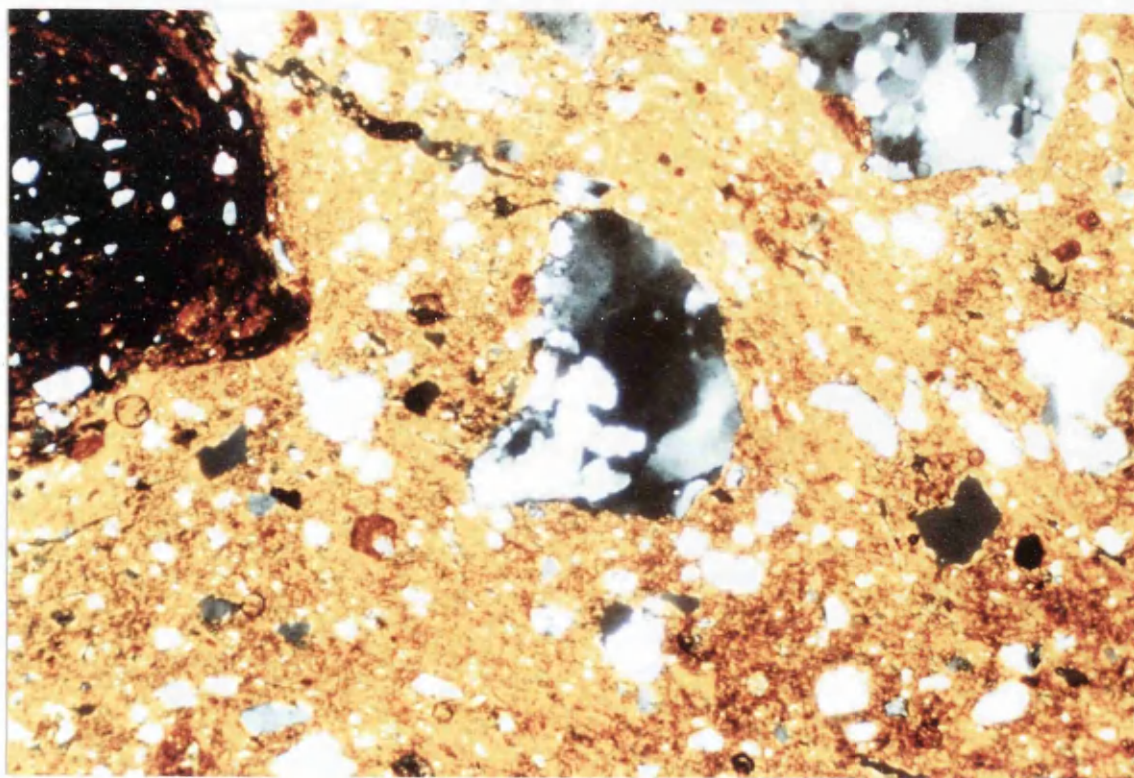


Photo 4.11 Fabric B-2 (crossed polars 170X)

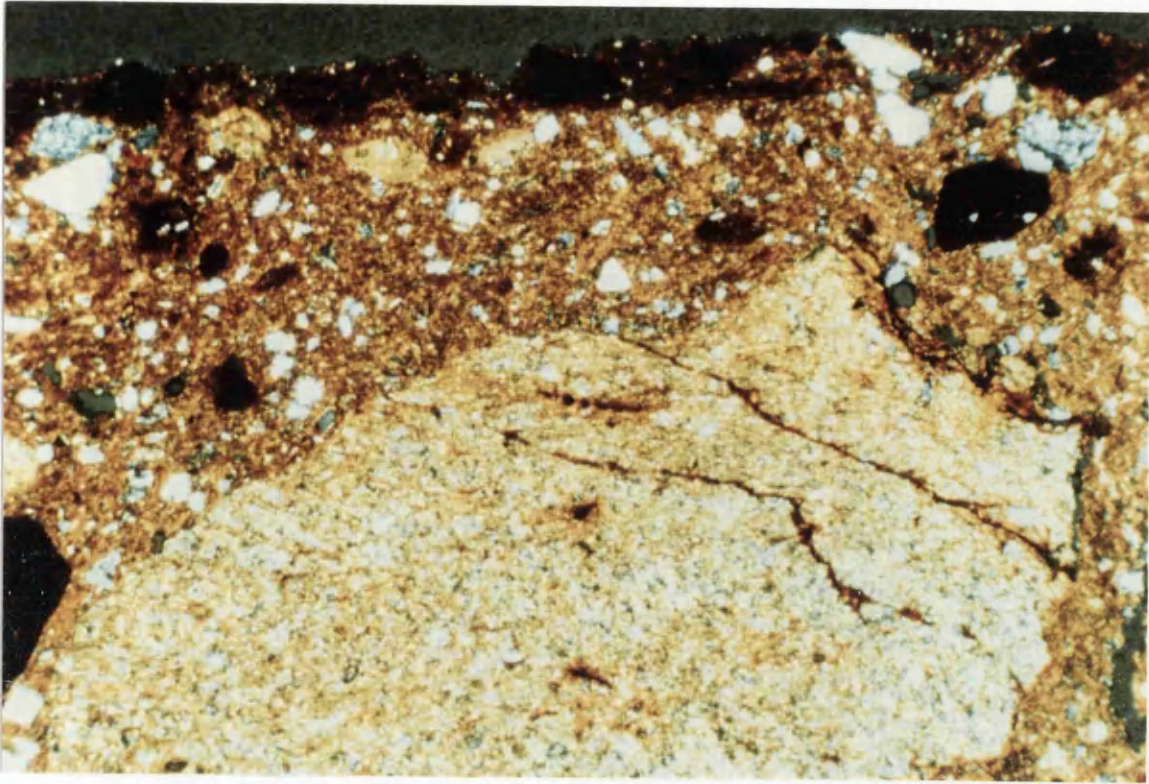


Photo 4.12 Fabric C (crossed polars 170X)

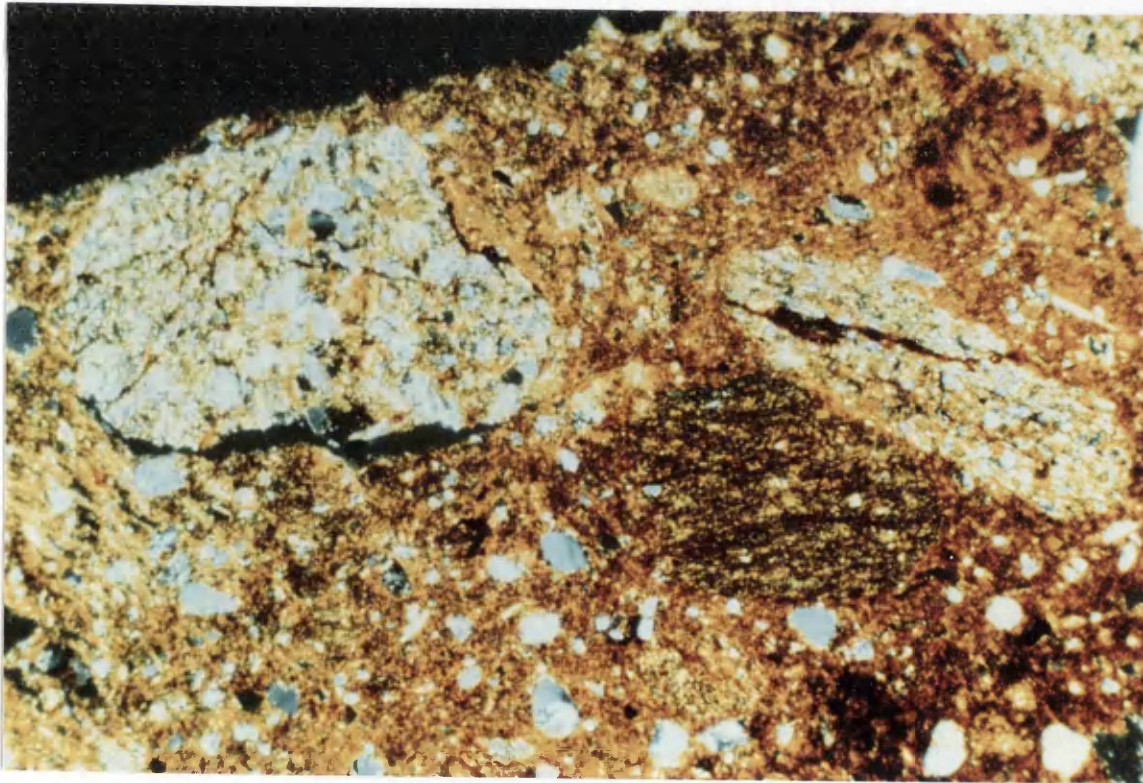


Photo 4.13 Fabric D (crossed polars 170X)

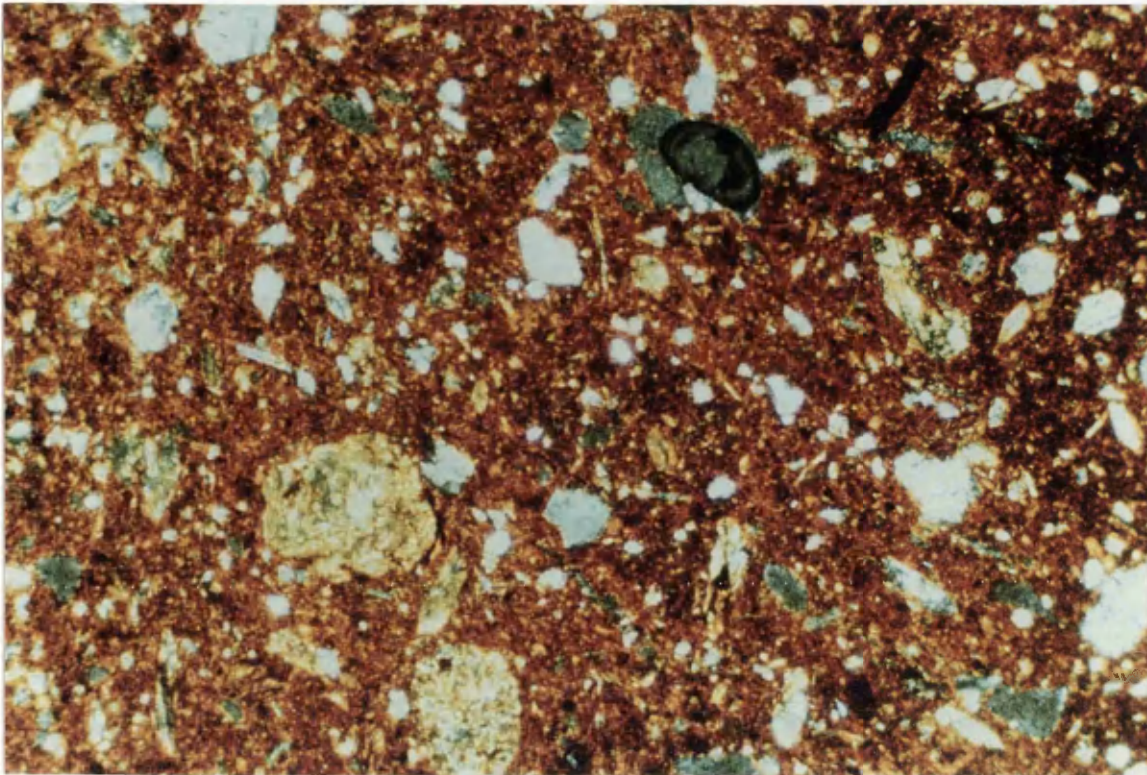


Photo 4.14 Fabric E (crossed polars 170X)

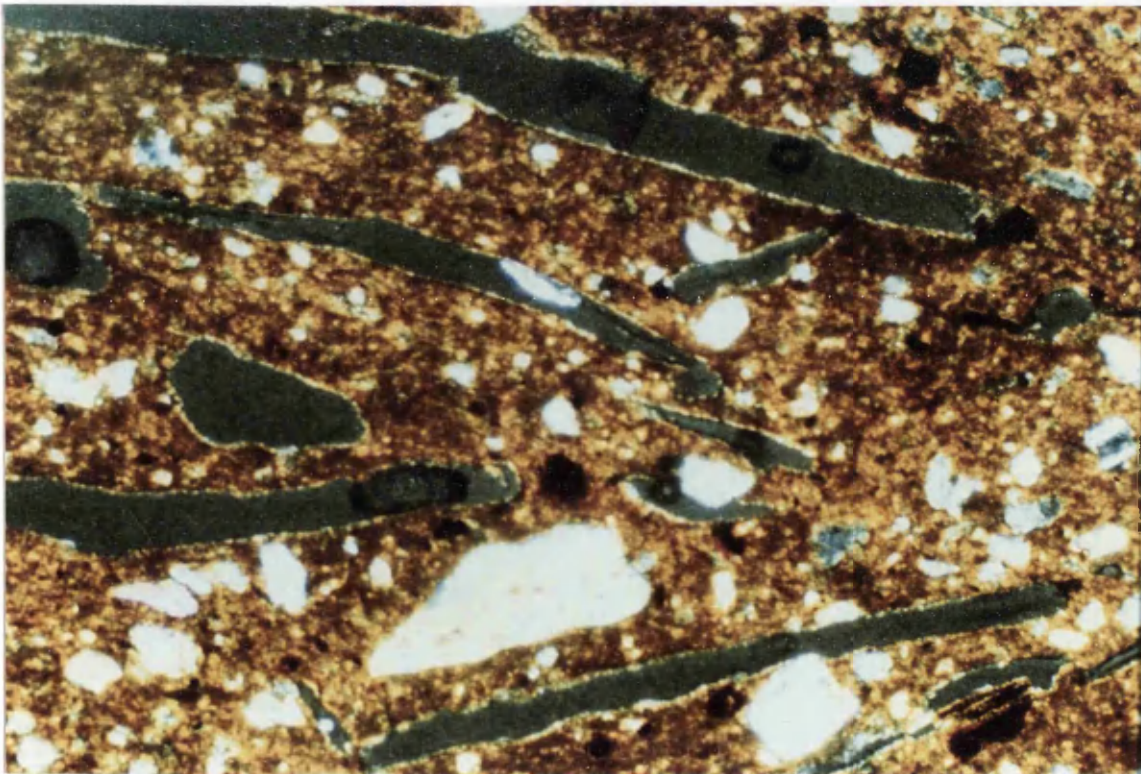


Photo 4.15 Charred plant inclusions (crossed polars 170X)



Photo 5.1 Painted Sherds (R/W)



Photo 5.2 Painted Sherds (W/R)



Photo 5.3 Sherds impressed with finger tips



Photo 5.4 Sherds impressed with finger pinching and nail impressions



Photo 5.5 Sherds impressed with finger pinching



Photo 5.6 Sherds impressed with finger pinching



Photo 5.7 Sherds impressed with nails



Photo 6.1 Askos with traces of sooting

Table 2.1: Radiocarbon Dates from Padina (5568 half-life, uncorrected).

Grave Number	Lab. no.	C ¹⁴ date b.c.
Ursus	BM -1403	6188 ± 121
39	BM -1404	7342 ± 148
14	BM -1147	7248 ± 102
12	BM -1146	7381 ± 58
7	BM -1144	6847 ± 83
2	BM -1143	5788 ± 51

Source: Živanović S., 1979

Table 2.2: Radiocarbon Dates from Mesolithic Lepenski Vir
(5568 half-life, uncorrected).

Site Level	Lab. no.	C ¹⁴ date b.c.
Ia	Bln -740b	5410 ± 100
	Bln -740a	5360 ± 100
Ib/c	Bln -653	5275 ± 100
Id	Bln -379	4950 ± 100
	Bln -678	4950 ± 100
	Bln -649	4850 ± 100
	Bln -575	4910 ± 100
	Bln -647	4895 ± 100
	Bln -576	4870 ± 100
Ie	Bln -652	4670 ± 100
	Bln -650	4870 ± 100
II	Bln -654	4680 ± 100
	Bln -655	4610 ± 100

Source: Quitta H., 1972

**Table 2.3: Radiocarbon Dates from Early Bulgarian sites
(5568 half-life, uncorrected)**

Site Level		Lab. no.	C ¹⁴ date b.c.
Asmaška 1.i	(Karanovo I)	Bln -293	5353 ± 150
Asmaška 1.i	(Karanovo I)	Bln -291	5208 ± 150
Asmaška 1.i	(Karanovo I)	Bln -292	4938 ± 100
Asmaška 1.i	(Karanovo I)	Bln -294	4818 ± 100
Asmaška 1.ii	(Karanovo I)	Bln -296	4829 ± 100
Asmaška 1.iii	(Karanovo I)	Bln -295	4770 ± 100
Asmaška 1.iii	(Karanovo I)	Bln -299	4862 ± 100
Asmaška 1.iii	(Karanovo I)	Bln -297	4725 ± 100
Asmaška 1.iii	(Karanovo I)	Bln -298	4590 ± 100
Asmaška 1.iv	(Karanovo I)	Bln -301	4533 ± 100
Asmaška 1.iv	(Karanovo I)	Bln -300	4476 ± 156
Asmaška 1.v	(Karanovo I)	Bln -430	4329 ± 120
Asmaška 1	(Karanovo I)	Bln -203	4930 ± 100
Asmaška 1	(Karanovo I)	Bln -267	4808 ± 100
Asmaška 1-4	(Karanovo I)	Bln -224	4702 ± 150
Karanovo	(Karanovo II)	Bln -152	4857 ± 100
Karanovo	(Karanovo II)	Bln -201	4623 ± 100
Karanovo	(Karanovo II)	Bln -234	4550 ± 150

Source: Kohl H. and Quitta H., 1966

**Table 2.4: Radiocarbon Dates (5568 half -life, uncorrected)
from the Adriatic Littoral sites.**

Site Level	Lab. no.	C ¹⁴ date b.c.
Gudnja XXV (Impressed)	GrN -10316	5220 ± 70
Gudnja XXIV (Impressed)	GrN -10314	4985 ± 50
Gudnja depth 4.6 m (Impressed/Danilo)	GrN -10311	4610 ± 50
Gudnja XIX (Danilo)	GrN -10313	4570 ± 40
Gudnja XVII (Danilo)	GrN -10312	4465 ± 40
Odmut II (Impressed)	Si -2217	5035 ± 100
Odmut II (Impressed)	Si -2219	5005 ± 100
Odmut II (Impressed)	Si -2222	4950 ± 110
Pokrovnik		5050 ± 100

Source: Chapman J. C., 1982;

Srejović D., 1974;

Brusić Z., 1976

Table 3.1: Thickness of undisturbed deposits from the main excavation grid of Nea Nikomedeia (1963 campaign).

Thick. depos.	Excav. squar.
60 cm	A1-A4; B1-B4; CO-C2; DO-D5; B9; D8; C7; C8; E8; F8.
40 cm	O6-O7; A5-A9; B5-B9; COO; C3-C11; DOO; D6-D11; E3-E8; F4; F8.
20 cm	G6-G8; H6-H8; J6-J8; K4-K8; L4- L8; M5-M8; TX1-TX12; TY1-TY12.

Key to Table 3.1

Thick. depos. : Thickness of deposits
Excav. squar. : Excavation squares

Table 3.2: Relative frequency of wild and domestic fauna, present in Early/Middle Neolithic sites.

Site	WD	DC	S/G	CTL	PG	DG
Nea Nikomedeia	6	94	66	13	15	
Argissa	1	99	84	5	10	
Servia	10	90	60	15	15	
Sesklo	8.5	90.5	60	12	18	0.5
Knossos	1	99	75	6	18	
Anza I	3	97	78	10	8.5	0.4
Rug Bajar	3	97	67	14	15	1
Divostin	8	92	43	45	4	
Lepenski Vir	74.5	25.5	3	16	0.5	6
Padina	92.6	7.4	0.2	0.7	0.2	6.3
Biserna-obala	75	25	13	10	2	

Key to Table 3.2

WD : Wild	CTL: Cattle
DC : Domestic	PG : Pig
S/G : Sheep/Goat	DG : Dog

Sources for Table 3.2

Nea Nikomedeia	: Early Neolithic; Higgs E. S., 1962
Argissa	: Aceramic; Boessneck J., 1962
Servia	: Middle Neolithic; Hubbard R. N., 1979
Sesklo	: Early Neolithic; Schwartz C. A., 1981
Knossos	: Aceramic; Jarman M. R. and Jarman H. N. 1968
Anza I	: Early Neolithic; Bökönyi S., 1976
Rug Baji	: Middle Neolithic; Schwartz C. A., 1976
Divostin	: Early /Middle Neolithic; Bökönyi S., 1971
Lepenski Vir III	: Early Neolithic; Bökönyi S., 1972
Padina B	: Early Neolithic; Clason A., 1980
Biserna-obala	: Early Neolithic; Bökönyi S., 1984

Table 3.3: Principle plants present in Early/Middle Neolithic sites.

Plant	Settlements									
	1	2	3	4	5	6	7	8	9	10
einkorn	x	x	x	x	x	x	x	x	x	x
emmer	x	x		x	x	x	x	x	x	x
bread-wheat						x			x	x
barley	x	x	x	x	x	x			x	x
vetch	x				x	x			x	x
lentil	x	x		x	x	x	x	x	x	x
pea	x		x		x	x			x	x
flax									x	x
Cor.cherry	x					x			x	x
apple						x			x	x
blackberry									x	x
walnut										x

Sources for table 3.3

Settlements

- (1) Nea Nikomedeia : Early Neolithic; Zeist W. and Bottema S., 1971
- (2) Argissa : Aceramic; Hopf M., 1962
- (3) Sesklo : Aceramic; Renfrew J. 1973
- (4) Achilleion : Aceramic; Renfrew J. 1973
- (5) Gendiki : Aceramic; Renfrew J. 1973
- (6) Anza I : Early Neolithic; Renfrew J., 1976
- (7) Azmak : Early/ Middle Neolithic; Renfrew J., 1969
- (8) Karanovo : Early/Middle Neolithic; Renfrew J., 1969
- (9) Čavdar : Early/Middle Neolithic; Dennell R. W., 1981
- (10) Kazanluk : Early/Middle Neolithic; Dennell R. W., 1981

Table 4.1: List of thin sections examined with polarizing microscope

NAME	PLN/DEC	SURF.TREAT.	MUNSELL COL.	FABRIC
D4/2, R13	Plain	Slipped	2.5YR 4/6	A
D4/2, R32	Plain	Slipped	2.5YR 4/6	A
A3/3, R16	Plain	Slipped	2.5YR 4/6	A
B1/3, R23	Plain	Slipped	5YR 4/4	A
DO/1, R18	Plain	Slipped	2.5YR 6/6	A
C3/1, B21	Plain	Uncoated	10YR 6/3	A
B4/2, R5	Plain	Slipped	2.5YR 3/6	A
L8/1, B31	Plain	Uncoated	10YR 6/3	A
B4/1	Impressed	Uncoated	10YR 6/3	A
C6/1	Impressed	Uncoated	7.5YR 7/4	A
C9/1, R1	Plain	Slipped	5YR 4/6	B-1
D4/1, R11	Plain	Slipped	2.5YR 6/6	B-1
A3/3, R2	Plain	Slipped	2.5YR 4/6	B-1
K5/1, R16	Plain	Slipped	2.5YR 6/6	B-1
D0/1, R23	Plain	Unslipped	5YR 4/6	B-1
C9/1, R35	Plain	Slipped	5YR 3/4	B-1
M5/1, R25	Plain	Slipped	5YR 5/4	B-1
K5/1, R5	Plain	Slipped	2.5YR 4/4	B-1
D4/2, R45	Plain	Slipped	2.5YR 4/6	B-1
G8/1, R7	Plain	Slipped	2.5YR 5/4	B-1
A5/2, R12	Plain	Slipped	2.5YR 4/8	B-1
C10/1, R67	Plain	Slipped	5YR 3/3	B-1

Table 4.1: List of thin sections examined with polarizing microscope (continued)

NAME	PLN/DEC	SURF.TREAT.	MUNSELL COL.	FABRIC
D0/1, R1	Plain	Slipped	2.5YR 4/4	B-1
D6/2, R15	Plain	Slipped	2.5YR 3/3	B-1
C7/1, R27	Plain	Slipped	2.5YR 4/6	B-1
COO/2, B19	Plain	Uncoated	7.5YR 6/4B -2	
G8/1, R33	Plain	Slipped	2.5YR 6/6	B-2
A6/2, B7	Plain	Uncoated	7.5YR 6/2	B-2
D2/2, R10	Impressed	Slipped	2.5YR 4/6	B-2
DO/2 B3	Impressed	Uncoated	7.5YR 6/4	B-2
B9/3, B2	Plain	Uncoated	7.5YR 7/4	C
C10/1, P25	Plain	Coated	10R 4/6	C
D4/2, R13	Plain	Slipped	2.5YR 6/6	C
G8/1, P3	Plain	Coated	10R 5/6	C
D4/2, P2	Plain	Coated	7.5R 5/6	C
A3/3, P5	Plain	Coated	7.5R 5/6	C
C10/1, P1	Plain	Coated	10R 5/6	C
C5/2, P22	Plain	Coated	10R 5/4	C
M7/1, P4	Plain	Coated	10R 5/6	C
D10/2, P19	Plain	Coated	10R 5/4	C
K5/1, P24	Plain	Coated	7.5R 5/6	C
B1/3, P8	Plain	Coated	10R 5/6	C
F7/1, P6	Impressed	Coated	10R 4/6	C

Table 4.1: List of thin sections examined with polarizing microscope (continued)

NAME	PLN/DEC	SURF.TREAT.	MUNSELL COL.	FABRIC
J6/1, R3	Plain	Uncoated	2.5YR 4/6	D
A2/3, R49	Plain	Uncoated	2.5YR 4/8	D
B9/2, R45	Plain	Uncoated	5YR 4/6	D
B6/1, P3	Plain	Coated	7.5R 5/4	D
B9/3, R12	Applied	Uncoated	2.5YR 6/6	D
E7/1, R3	Impressed	Uncoated	5YR 4/6	D
B3/1, R12	Impressed	Uncoated	2.5YR 5/6	D
A1/3, B4	Plain	Uncoated	10YR 6/3	E
B2/1, B33	Plain	Uncoated	10YR 7/3	E
F4/1, B17	Plain	Uncoated	7.5R 7/4	E
C3/2, B22	Plain	Uncoated	10YR 6/3	E

Key to Table 4.1

NAME: Refers to excavation square/spit number, followed by the number given to sherds during macroscopic examination (R: Red; P: Pink; B: Beige)

PLN/DEC : Plain/Deorated sherd

SURF.TREAT. : Surface treatment: Slipped/Coated/Uncoated

MUNSELL COL. : Munsell Soil Color notations of the exterior surface

FABRIC : Fabric types, as described in Chapter 4

Table 4.2: List of thin sections examined with SEM

NAME	PLN/DEC	SURF.TREAT.	MUNSELL COL.	FABRIC
D4/1, R11	Plain	Slipped	2.5YR 6/6	B-1
C9/1, R35	Plain	Slipped	5YR 3/4	B-1
K5/1, R16	Plain	Slipped	2.5YR 6/6	B-1
C10/1, P25	Plain	Coated	10R 4/6	C

Table 4.3: List of sherds refired at 800° C, for 40 minutes

NAME	PLN/DEC	SURF.TREAT.	MUNSELL COL.	FABRIC
A3/3, R16	Plain	Slipped	2.5YR 4/6	A
D4/2, R45	Plain	Slipped	2.5YR 4/6	B-1
G8/1, P3	Plain	Coated	10R 5/6	C
M7/1, P4	Plain	Coated	10R 5/6	C
B9/3, R12	Applied	Uncoated	2.5YR 6/6	D

Key to Tables 4.2, 4.3

NAME: Refers to excavation square/ spit number, followed by the number given to sherds during macroscopic examination (R: Red; P: Pink; B: Beige)

PLN/DEC : Plain/Deorated sherd

SURF.TREAT. : Surface treatment: Slipped/Coated/Uncoated

MUNSELL COL. : Munsell Soil Color notations of the exterior surface

FABRIC : Fabric types, as described in Chapter 4

Table 4.4: Surface colour of the plain vessels from Nea Nikomedeia.

Pottery	Munsell Soil Color Notations
Red-brown slipped	2.5YR 5/6; 2.5YR 5/4; 2.5YR 4/8; 2.5YR 4/6; 2.5YR 4/4; 2.5YR 3/6; 2.5YR 3/4; 5YR 5/6; 5YR 5/4; 5YR 4/6; 5YR 4/4; 5YR 4/3; 5YR 3/4; 5YR 3/3; 5YR 3/2
Pink coated	10R 5/6; 10R 5/4; 10R 4/6; 10R 4/4; 7.5R 5/6; 7.5R 5/4
Beige unslipped	10YR 7/3; 10YR 7/4; 10YR 6/3; 10YR 7/4; 7.5YR 7/4; 7.5YR 6/4; 7.5YR 6/2
Red-brown unslipped	2.5YR 4/6; 2.5YR 5/4; 2.5YR 4/4; 5YR 6/6; 5YR 6/4; 5YR 5/6; 5YR 5/4; 5YR 4/6; 5YR 4/4

Table 4.5: SEM Analysis of Red Slip (D4/1, R11)

SHERD(D4/1, R11), RED SLIP

LIVETIME (spec.)= 100

ENERGY RES AREA

4.4 82.56 59605

TOTAL AREA= 151860

.....

FIT INDEX= 3.75

ELMT APP.CON ERROR (WT%)

SiK : 1	19.150	.119
AlK : 1	5.693	.102
NaK : 1	.306	.110
K K : 1	1.318	.042
MgK : 1	.219	.068
CaK : 1	.664	.036
FeK : 1	2.751	.082
MnK : 1	.032	.040 * < 2 Sigma*
CrK : 1	.052	.034 * < 2 Sigma*
TiK : 1	.144	.029
CuK : 1	-.001	.061 * < 2 Sigma*
S K : 1	.042	.017
P K : 1	-.212	.042 * < 2 Sigma*
C1K : 1	-.009	.027 * < 2 Sigma*

....[2 ZAF'S]

20.00 kV TILT= .00 ELEV= 31.46 AZIM= .00 COSINE= .522

Spectrum: Sherd (D4/1, R11), Red slip

Last elmt by STOICH., NORMALISED

ELMT	ZAF	% ELMT	ATOM %	% OXIDE	FORMULA
SiK : 1	.987	31.803	23.818	Si102	68.032 11.168
AlK : 1	.976	9.566	7.459	Al203	18.076 3.498
NaK : 1	1.042	.481	.440	Na201	.649 .206
K K : 1	1.056	2.046	1.101	K 201	2.464 .516
MgK : 1	.348	.894	.402	Mg101	.666 .163
CaK : 1	.969	1.123	.590	Ca101	1.572 .276
FeK : 1	.840	5.371	2.023	Fe203	7.679 .949
MnK : 1	.823	.064	.025	Mn102	.102 .012
CrK : 1	.847	.101	.041	Cr203	.148 .019
TiK : 1	.824	.287	.126	Ti102	.479 .059
CuK : 1	.804	.000	.000	Cu101	.000 .000
S K : 1	.889	.077	.051	S 101	.115 .024
P K : 0	.736	.000	.000	P 205	.000 .000
C1K : 0	.759	.000	.000	C1102	.000 .000
O K : 0	.000	48.661	63.980		30.000
TOTAL		99.982	100.000		99.982 16.890

Table 4.6: SEM Analysis of Red Micaceous Slip (K5/1, R16)

SHERD (K5/1, R16), RED MICACEOUS SLIP LIVETIME (spec.)= 100

ENERGY RES AREA

4.6 82.22 59386

TOTAL AREA= 155550

.....
FIT INDEX= 3.35

ELMT APP.CON ERROR (WT%)

SiK : 1	15.849	.111	
AlK : 1	6.265	.105	
NaK : 1	.462	.115	
K K : 1	2.246	.050	
MgK : 1	.337	.071	
CaK : 1	.718	.038	
FeK : 1	3.158	.088	
MnK : 1	.055	.042	* < 2 Sigma*
CrK : 1	.058	.036	* < 2 Sigma*
TiK : 1	.203	.032	
CuK : 1	.010	.066	* < 2 Sigma*
K K : 1	.028	.018	* < 2 Sigma*
P K : 1	-.177	.043	* < 2 Sigma*
C1K : 1	.007	.028	* < 2 Sigma*

....[2 ZAF'S]

20.00 kV TILT= .00 ELEV= 31.46 AZIM= .00 COSINE= .522

Spectrum: Sherd (K5/1, R16), Red micaceous slip

Last elmt by STOICH., NORMALISED

ELMT	ZAF	% ELMT	ATOM %		% OXIDE	FORMULA
SiK : 1	.952	28.245	21.474	Si102	60.102	10.223
AlK : 1	.954	11.152	8.828	Al203	21.073	4.202
NaK : 1	1.018	.770	.716	Na201	1.038	.341
K K : 1	1.066	3.576	1.953	K 201	4.308	.930
MgK : 1	.873	.655	.575	Mg101	1.086	.274
CaK : 1	.968	1.260	.671	Ca101	1.763	.320
FeK : 1	.842	6.369	2.435	Fe203	9.106	1.159
MnK : 1	.824	.114	.044	Mn102	.181	.021
CrK : 1	.850	.115	.047	Cr203	.168	.022
TiK : 1	.824	.419	.187	Ti102	.699	.089
CuK : 1	.805	.020	.007	Cu101	.026	.003
S K : 1	.902	.053	.036	S 101	.080	.017
P K : 0	.750	.000	.000	P 205	.000	.000
C1K : 0	.769	.015	.009	C1102	.028	.004
O K : 0	.000	47.213	63.018			30.000
TOTAL		99.978	100.000		99.978	17.606

Table 4.7: SEM Analysis of Brown Slip (C9/1, R35)

SHERD (C9/1, R33), BROWN SLIP				LIVETIME (spec.)= 100		
ENERGY	RES	AREA				
4.4	82.44	59721				
TOTAL AREA=		157074				
.....						
FIT INDEX=		3.47				
ELMT	APP.CON	ERROR (WT%)				
SiK : 1	17.111	.114				
AlK : 1	5.729	.103				
NaK : 1	.637	.119				
K K : 1	1.980	.048				
MgK : 1	.251	.072				
CaK : 1	1.160	.042				
FeK : 1	2.583	.082				
MnK : 1	.071	.042	*	< 2 Sigma*		
CrK : 1	-.021	.036	*	< 2 Sigma*		
TiK : 1	.215	.032				
CuK : 1	.098	.065	*	< 2 Sigma*		
S K : 1	.054	.017	*	< 2 Sigma*		
P K : 1	-.230	.042	*	< 2 Sigma*		
C1K : 1	.067	.028	*			
....[2 ZAF'S]						
20.00 kV TILT= .00 ELEV= 31.46 AZIM= .00 COSINE= .522						
Spectrum: Sherd (C9/1, R35), Brown Slip						
Last elmt by STOICH., NORMALISED						
ELMT	ZAF	% ELMT	ATOM %	% OXIDE		FORMULA
SiK : 1	.973	29.561	22.396	Si102	63.237	10.626
AlK : 1	.962	10.014	7.889	Al203	18.922	3.740
NaK : 1	1.035	1.034	.956	Na201	1.394	.454
K K : 1	1.064	3.130	1.702	K 201	3.770	.808
MgK : 1	.879	.480	.419	Mg10	1.795	.199
CaK : 1	.968	2.015	1.069	Ca101	2.820	.508
FeK : 1	.840	5.169	1.967	Fe203	7.390	.934
MnK : 1	.822	.145	.056	Mn102	.230	.027
CrK : 1	.844	.000	.000	Cr203	.000	.000
TiK : 1	.820	.441	.196	Ti102	.736	.093
CuK : 1	.805	.204	.068	Cu101	.255	.032
S K : 1	.901	.100	.066	S 101	.150	.031
P K : 0	.748	.000	.000	P 205	.000	.000
C1K : 0	.768	.047	.088	C1102	.279	.042
O K : 0	.000	47.539	63.154			30.000
TOTAL		99.979	100.000		99.979	17.503

Table 4.8: SEM Analysis of Clay matrix (K5/1, R16)

SHERD (K5/1,R16), CLAY MATRIX			LIVETIME (spec.)= 100		
ENERGY	RES	AREA			
4.7	83.06	59175			
TOTAL AREA=		157646			
.....					
FIT INDEX=		3.41			
ELMT	APP.CON	ERROR (WT%)			
SiK : 1	17.210	.114			
AlK : 1	5.557	.102			
NaK : 1	.871	.117			
K K : 1	1.948	.048			
MgK : 1	.423	.072			
CaK : 1	.839	.039			
FeK : 1	2.913	.085			
MnK : 1	.054	.042 *	< 2 Sigma*		
CrK : 1	.045	.036 *	< 2 Sigma*		
TiK : 1	.274	.033			
CuK : 1	-.019	.066 *	< 2 Sigma*		
S K : 1	.042	.018			
P K : 1	-.123	.043 *	< 2 Sigma*		
C1K : 1	.082	.030			
....[3 ZAF'S]					
20.00 kV		TILT=	.00	ELEV=	31.46
		AZIM=	.00	COSINE=	.522
Spectrum: Sherd (K5/1,R16), Clay Matrix					
Last elmt by STOICH., NORMALISED					
ELMT	ZAF	% ELMT	ATOM %	% OXIDE	FORMULA
SiK : 1	.972	29.273	22.150	Si102	63.620 10.538
AlK : 1	.951	9.657	7.608	Al203	18.247 3.618
NaK : 1	1.032	1.395	1.290	Na201	1.880 .614
K K : 1	1.063	3.031	1.648	K 201	3.651 .784
MgK : 1	.872	.802	.701	Mg101	1.330 .334
CaK : 1	.968	1.433	.760	Ca101	2.005 .362
FeK : 1	.840	5.729	2.180	Fe203	8.191 1.037
MnK : 1	.823	.108	.042	Mn102	.171 .020
CrK : 1	.847	.088	.036	Cr203	.129 .017
TiK : 1	.823	.551	.245	Ti102	.920 .116
CuK : 1	.804	.000	.000	Cu101	.000 .000
S K : 1	.902	.077	.051	S 101	.115 .024
P K : 0	.750	.000	.000	P 205	.000 .000
C1K : 0	.769	.391	.234	C1102	.743 .111
O K : 0	.000	47.467	63.057		30.000
TOTAL		100.001	100.000	100.001	17.576

Table 4.9: SEM Analysis of Pink Coated Sherd (C10/1, P25)

SHERD (C10/1,P25), PINK PATICLES & SURFACE

LIVETIME (spec.)= 100

ENERGY RES AREA

5.6 81.30 61498

TOTAL AREA= 111472

.....

Peak at 16.74 keV omitted?

FIT INDEX=1.94

ELMT APP.CON ERROR (WT%)

FeK : 1 9.800 .165

TiK : 1 .232 .041

K K : 1 2.609 .065

SiK : 1 20.485 .147

Alk : 1 5.411 .113

MgK : 1 1.684 .099

...[3 ZAF'S]

20.00 kV TILT= .00 ELEV= 31.46 AZIM= .00 COSINE= .522

Spectrum: SHERD (C10/1 P25), PINK PARTICLES & SURFACE

Last elmt by STOICH., NORMALISED

ELMT	ZAF	% ELMT	ATOM %	% OXIDE	FORMULA
Fek : 1	.852	14.038	5.544	Fe203	20.071 .264
TiK : 1	.846	.334	.154	Ti102	.558 .007
K K : 1	1.076	2.960	1.670	K 201	3.565 .079
SiK : 1	.938	26.654	20.931	Si102	57.019 .995
AlK : 1	.861	7.670	6.271	Al203	14.497 .298
MgK : 1	.793	2.591	2.351	Mg101	4.297 .112
O K : 0	.000	45.755	63.079		100.003 3.000
Total		100.003	100.000		1.756

Table 5.1: Relative frequency (%) of the lip-types
represented on the Nea Nikomedeia vessels

SHAPE TYPES OF LIPS		%				
		A	B	C	D	E
rim-angle	> 115°	49%	29%	16%		3%
rim-angle	91°-114°	45%	19%	33%	3%	4%
rim-angle	85° -90°	50%	21%	29%		
rim-angle	60° -84°	51%	17%	28%		
rim-angle	<60°	69%	8%	27%		

Key to table 5.1

Type A :Round lip

Type B :Lip thinned from the interior

Type C :Lip thinned from both sides

Type D :Lip thickened from the Interior

Type E :Flat lip

Table 6.1: Average surface area (cm²), volume (cm³) and the diameter/height ratio of the different vessel forms from Nea Nikomedeia

Vessels	Ratio	Surface (cm ²)	Volume (cm ³)
neck jar	0.59	618	10416
larger than 115°	0.61	3784	28032
91° -114°	1.04	1319	7886
85° -90°	1.52	735	3580
60° -84°	2.11	630	2850
less than 60°	2.58	483	1916

Table 6.2: Thickness of occupation deposits of the
Thessalian sites with Early Decorated Wares

Sites	Thickness (m)	Duration (C ¹⁴ years)
Otzaki	4.20	250
Achilleion	1.60	250
Prodromos	3.15	250
Géndiki	3.30	250
Magoulitsa	3.40	250
Agia Anna	3.10	250

Sources for Table 6.2

Otzaki	: Miložić V., 1971
Achilleion	: Gimbutas M., 1989
Prodromos	: Chourmouziadis G. Ch., 1971
Gendiki	: Theocharis D., 1962
Magoulitsa	: Papadopoulou M. G., 1958
Agia Anna	: Chourmouziadis G. Ch., 1969

Table 6.3: Measurement of the weight of 1 litre
of cereals and pulses

Volume (litres)		Weight (grams)
wheat	1	850
barley	1	750
peas	1	710
lentil	1	890

(n.b. the sample comprises cereals and pulses bought at a Greek market)

Table 7.1: Fauna from Mesolithic Vlasac

	No.	%	MNI
DOMESTIC			
<i>Canis familiaris</i> (dog)	1914	6.58	160
WILD			
<i>Bos primigenius</i> (aurochs)	54	0.19	4/5
<i>Rupicapra rupicapra</i> (chamois)	22	0.07	4
<i>Cervus elaphus</i> (red deer)	6732	23.13	90
<i>Capreolus capreolus</i> (roe deer)	510	1.75	19
<i>Sus scrofa</i> (wild swine)	1165	4.07	28
<i>Felix silvestris</i> (wild cat)	45)		7/8
<i>Lynx lynx</i> (lynx)	5)		2
<i>Mustelidae</i> (weasel)	8)		
<i>Martes martes</i> (pine marten)	248)		38
<i>Meles meles</i> (badger)	58)	2.33	8
<i>Ursus arctos</i> (brown bear)	168)		10
<i>Canis lupus</i> (wolf)	103)		10
<i>Vulpes vulpes</i> (red fox)	30)		6
small carnivore	13)		
<i>Castor fiber</i> (beaver)	71)		9
<i>Sciurus vulgaris</i> (squirrel)	5)		3
<i>Lepus europaeus</i> (brown hare)	22)	0.34	4
<i>Leuropaeus</i> (hedghog)	1)		1
<i>Pelecanus cf. onocratalus</i> (white pelican)	3)		
<i>Phalacrocorax carbo</i> (cormorant)	3)		
<i>Egretta alba</i> (great white egret)	2)		
<i>Anas platyrhyncho</i> (mallard)	2)		
<i>Anas creca</i> (teal)	2)		
<i>Aythya nyroca</i> (ferruginous duck)	1)		
<i>Milvus migrans</i> (black kite)	5)	0.50	
<i>Aquila heliaca</i> (imperial eagle)	6)		
<i>Haliaeetus albicilla</i> (white tailed eagle)	27)		
<i>Strix aluco</i> (tawny owl)	2)		
<i>Carrulus glanduarius</i> (jay)	1)		
<i>Pica pica</i> (magpie)	4)		
<i>Corvus corax</i> (raven)	4)		
unidentified birds	87)		

Table 7.1: Fauna from Mesolithic Vlasac (continued)

	No.	%	MNI
WILD			
<i>Emys orbicularis</i> (pond tortoise)	317	1.09	
<i>Cyprinus carpio</i> (carp)	1552)		
<i>Cyprinidae</i>	5320)		
<i>Esox lucius</i> (pike)	11)		59.95
<i>Silurus glanis</i> (catfish)	2283)		
unidentified fish	8372)		

Source: Bökönyi S., 1978

Table 7.2: Fauna from Mesolithic Lepenski Vir

	<u>Phase I</u>		<u>Phase II</u>	
	No.	%	No.	%
DOMESTIC				
<i>Canis familiaris</i> (dog)	21	4.95	23	11.16
WILD				
<i>Bos primigenius</i> (aurochs)	14	3.30	7	3.4
<i>Cervus elaphus</i> (red deer)	115	27.12	111	53.88
<i>Capreolus capreolus</i> (roe deer)	4	0.94	1	0.49
<i>Sus scrofa</i> (wild swine)	10	2.36	6	2.91
<i>Martes sp.</i> (marten)	6	1.42	3	1.45
<i>Meles meles</i> (badger)	3	0.71		
<i>Ursus arctos</i> (brown bear)			1	0.49
<i>Castor fiber</i> (beaver)	2	0.47		
<i>Aves sp.</i> (birds)	6	1.42	1	0.49
Cyprinids	86	20.28	1	0.49
<i>Silurus glanis</i> (catfish)	3	0.71	5	2.42
<i>Pisces, sp.</i> (fishes)	154	36.32	47	21.81
TOTAL	424		206	

Source: Bökönyi S., 1970

Table 7.3: Fauna from prehistoric Padina

	<u>Padina A</u>	<u>Padina B</u>
	No.	No.
DOMESTIC		
<i>Bos taurus</i> (cattle)	7	21
<i>Ovis/Capra</i> (sheep/goat)	6	6
<i>Sus domesticus</i> (pig)	12	5
<i>Canis familiaris</i> (dog)	42	179
WILD		
<i>Erinaceus europaeus</i> (hedgehog)	-	1
<i>Lepus capensis</i> (brown hare)	4	1
<i>Castor fiber</i> (beaver)	37	10
<i>Vulpes vulpes</i> (fox)	6	-
<i>Canis lupus</i> (dog/wolf)	-	3
<i>Canis lupus</i> (wolf)	6	3
<i>Martes martes</i> (pine marten)	3	2
<i>Martes sp.</i> (marten)	3	4
<i>Felix silvestris</i> (wild cat)	4	5
<i>Lynx lynx</i> (lynx)	2	2
<i>Meles meles</i> (badger)	1	-
<i>Ursus arctos</i> (brown bear)	30	15
<i>Equus sp.</i> (horse)	1	-
<i>Sus scrofa</i> (pig)	55	50
<i>Sus sp.</i> (pig)	22	10
<i>Capreolus capreolus</i> (roe deer)	37	9
<i>Cervus elaphus</i> (red deer)	763+114	263+50
<i>Bos/cervus</i>	41	12
<i>Bos primigenius</i> (aurochs)	28	8
<i>Bos sp.</i>	17	20
<i>Rupicapra rupicapra</i> (chamois)	3	-
<i>Aves</i> (birds)	16	4
<i>Emys orbicularis</i> (European pond terrapin)	1	1
<i>Hucho hucho</i> (Danube salmon)	15	41
<i>Acipenser sp./ Huso huso</i> (sturgeon)	8	55
<i>Silurus glanis</i> (catfish)	201(24)	1298
<i>Cyprinus caprio</i> (carp)	-	32
<i>Cyprinidae</i>	80	229
unidentified	63	620
TOTAL	1653	2959

Source: Clason A., 1980

Table 7.4: Fauna from Mesolithic Icoana

	No.	MNI	%MNI
<i>Sus sp.</i> (pig)	2038	40	31.0
<i>Cervus elaphus</i> (red deer)	1474	26	20.2
<i>Capreolus capreolus</i> (roe deer)	237	14	10.9
<i>Canis sp.</i> (dog/wolf)	236	12	9.3
<i>Castor fiber</i> (beaver)	34	9	7.0
<i>Martes sp.</i> (marten)	44	8	6.2
<i>Rupicapra rupicapra</i> (chamois)	22	4	3.1
<i>Felix silvestris</i> (wild cat)	7	3	2.3
<i>Meles meles</i> (badger)	13	3	2.3
<i>Canis lupus</i> (wolf)	9	2	1.5
<i>Ursus arctos</i> (brown bear)	16	2	1.5
<i>Lepus europaeus</i> (brown hare)	11	2	1.5
<i>Bos/Bison</i> (bison)	21	2	1.5
<i>Lutra lutra</i> (otter)	2	1	0.8
<i>Lynx lynx</i> (lynx)	2	1	0.8
Total	4056	129	

Source: Bolomey A., 1973

Table 7.5: Fauna from Mesolithic and Neolithic Odmut cave

	Odmut I		Odmut II
	Lower Mesl.	Upper Mesl.	
DOMESTICATED			
Sheep/goat			x
Cattle			x
WILD			
Ibex	x	x	x
Red deer	x	x	x
Wild pig	x	x	x
Bear	x	x	x
Roe deer	x	x	
Wild goat	x	x	
Wild cat	x	x	
Beaver	x		
Wolf	x		
Fox	x		
Lynx	x		
Aurochs		x	
Weasel			x
Fish	x	x	

Source: Srejović D., 1974; Marković C., 1974

(n.b. the relative frequency of the different species is not given, apart from ibex and red deer which amount to 65% and 25% of the sample, in both Mesolithic levels)

Table 7.6: Fauna from Mesolithic (IVa, IVb1, IVb2) and "Neolithic" (III) Crvena Stijena

	Mesolithic			"Neolithic"
	IVa	IVb1	IVB2	III
Red deer	x	x	x	x
Wild pig	x	x	x	x
Aurochs	x	x	x	
Chamois	x	x	x	x
Roe deer		x		
Fox	x	x		x
Wild cats	x	x		
Badger	x	x		
Hare		x		
Bear	x			
Lynx				x
Snails		x		

Source: Benac A. and Brodar M., 1958

Table 7.7: Floral remains from Mesolithic and Neolithic Franchthi

	MESOLITHIC	NEOLITHIC
<i>Lithospermum arvense</i> L.	x	x
<i>Alkanna cf.orientalis</i>	x	x
<i>Anchusa</i> sp.	x	x
<i>Vicia</i> sp.	x	x
<i>Pistacia</i> sp.	x	x
<i>Prunus amygdalus</i> Batch	x	x
<i>Hoedeum spontaneum</i> C.Koch.	x	
<i>Avena</i> Sp.	x	
<i>Lens</i> sp.	x	
<i>Pisum</i> sp.	x	
<i>Pyrus amygdaliformis</i> Vill.	x	
<i>Triticum dicoccum</i> Schubl.		x
<i>Hordeum distichum</i> L.		x
<i>Lens cf. culinaris</i> Medik.		x
<i>Triticum monococcum</i> L.	x	

Source: Hansen J. and Renfrew J., 1978.

Table 9.1: Sampled excavation squares from the main excavation grid of Nea Nikomedeia (1963 season)

STRATUM	NUM.	SAMPLED GRIDS
STRATUM 1		
COO, CO, C1, DOO, DO D1, EOO, EO	8	(2): COO, DO
STRATUM 2		
A1, A3, A2, A4, A5 B1, B2, B3, B4, B5 C2, C3, C4,	13	(4): B1, A3, C3, B4
STRATUM 3		
A6, A7, A8, B6, B7 Ω6, Ω7	7	(3): A6, A7, B6
STRATUM 4		
C7, C8, C9, C10, D7 D8, D9, D10, B9, E8 E9	11	(3): B9, C10, C7
STRATUM 5		
D3, D4, D5, D6, E3 E4, E5, E6, F4, F5 F6, B6, C5, C6	14	(4): D4, F6, D6, C5
STRATUM 6		
F7, F8, G6, G7, G8 H6, H7, H8	8	(2): M7, G8

Table 9.1: Sampled excavation squares from the main excavation grid of Nea Nikomedeia (1963 season), continued

STRATUM	NUM.	SAMPLED GRIDS
STRATUM 7		
J6, J7, J8, K4, K5 K6, K7, K8, L4, L5 L6, L7, L8, M5, M6 M7, M8	17	(4): L4, K5, J6, L8

(n.b. the first and second columns give the name and number of the excavation squares present in each stratum; the third column presents the sampled excavation squares)