Chapter IX: Summary and discussion

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CHAPTER IX

SUMMARY AND DISCUSSION

Our first and most important goal was to acquire better knowledge of the Early Neolithic I phase as represented at Sesklo. The second was to investigate to what extent other Early Neolithic sites in Thessaly and in the rest of Greece showed similarities with the Sesklo settlement. In the third place we examined whether it was possible to get a general idea of the environmental context of Early Neolithic settlements in Greece. In the fourth and last place we wanted to elucidate some points on the origin of Neolithic culture in Greece.

To this effect we discussed in the previous chapters the artefactual, geographical and environmental data relevant to the Early Neolithic I settlement at Sesklo. Subsequently we reviewed the other Early Neolithic sites in Thessaly and contemporaneous sites elsewhere in Greece. Finally we discussed their relationship with the Near East.

We have to admit that the data are very scarce, especially where ecological and geographical studies are concerned. The areas excavated are mostly too small to provide good information on architecture and settlement size. As a result there are many blank spaces which remain to be filled. Despite this fact it seems very useful to give a full account of our present knowledge of the Greek Early Neolithic, for still too often data are placed in the wrong context.

Sesklo is a settlement which was inhabited from the Pre-Pottery Neolithic to the Bronze Age. It is situated in a zone of low foothills an hour's walking distance from the plain of Volos and the plain of Larisa.

The Early Neolithic occupation should be divided into three phases both on stratigraphical and on ceramic evidence. The changes are gradual and there is no clear break between them. The first phase is characterised by monochrome pottery. It is made of micaceous clay, to which fine sand, in a few cases, pottery grit, generally not exceeding 3 mm in size, has been added. The shapes are simple, a convex-walled open bowl and a slightly closed globular jar being the most common. The vessels are mostly supported by a ring-base. The colour is generally incompletely oxidised. There is no decoration, except for pierced lugs.

During the second phase, painted decoration is introduced as well as red slip. The tempering material is finer grained. Shapes are still simple. Colours become more and more oxidised. During the third phase early painted decoration disappears, but plastic decoration is introduced. A large part of the vessels has a red slip. Shapes become slightly more complicated; they include collared vessels. Some 10% of the wares has a fine grained tempering material and is quite hard. The largest part has a fully oxidised surface colour. It was possible to discern changes within the phases, but they were gradual and are not stratigraphically indicated. Hence it is not possible to subdivide the phases, although within Early Neolithic I it is possible to assign large numbers of sherds to the beginning, middle or end of the phase.

Of the architecture of Early Neolithic Sesklo little is known. The Pre-Pottery stratum has traces of pits and of postholes in and near the pits – possibly pit – houses. The subsequent phases have dwellings erected in wattle and daub on a stone foundation. The house were rectangular although the exact dimensions are unknown.

Artefacts other than pottery included simple unretouched chert and obsidian blades, ground and polished stone tools, bone implements, ceramic utensils, ornaments and ceramic and marble figurines. With these objects it was not really possible to define clearly the different phases, although the typology becomes more and more differentiated as the period proceeds.

The subsistence pattern was an agricultural economy, involving cereals and pulses, caprovines, pig and cattle. Hunting and fishing were apparently of little significance to the diet.

Most raw materials are to be found in the vicinity of the settlement. Chert, greenstone and marble are probably Thessalian, but come from distances beyond a day's reach. The obsidian originates from Melos.

The data provided by our chronological table indicate the Early Neolithic – including Pre-Pottery – to have begun around 8100 BP (all dates are given in radiocarbon years BP). Pre-Pottery Neolithic would have lasted till ca 7750 BP, Early Neolithic I to 7400 BP, whereas Middle Neolithic begins around 7000 BP. Early Neolithic I is contemporaneous with the Early Neolithic of Anatolia and other parts of the Near East, the Near Eastern Levantine Pre-Pottery Neolithic excluded, and it precedes the Pre-Pottery Neolithic of Cyprus.

To date, more than half of the Early Neolithic sites recovered are situated in Thessaly . This is partly due to the fact that more systematic investigation has been carried out in Thessaly than elsewhere in Greece, partly to the fact that several areas suitable for the Early Neolithic economy are covered with recent alluvium. Thirdly, and perhaps most importantly, climate and environment have influenced the density of inhabitation. There are many areas in Greece where conditions are marginal, because of a low annual precipitation – e.g. Attica, Arcadia and the Cyclades – or because of very broken terrain – e.g. Epirus, which moreover has a very high annual rainfall. Thrace and Macedonia were probably densely wooded at the beginning of the Neolithic and may therefore have been less inviting. Thessaly, on the other hand, may have been very suitable for an agricultural economy. After all, it is still known as the granary of Greece.

The settlements are all situated on the boundary between two different ecological zones. It is hardly surprising that, outside Thessaly, quite a number are found on or near the seashore.

Investigating whether the development of Early Neolithic ceramic material would largely be the same for the whole of Greece or whether differences would exist between the various regions, we used as a model the pottery from Early Neolithic Sesklo and examined to what extent this was applicable to contemporaneous sites elsewhere. We noted that variations occur even within the restricted area of one settlement. We should realise, therefore, that a model derived from the analysis of artefacts from an incompletely excavated site has to be treated with caution. On the other hand, we are confronted with an even greater problem in applying the model to material from other sites, since the sample we investigate for comparative purposes will be chosen for supposedly representing the best sequence.

Even taking this sample bias into account, we observe that in Thessaly regional differences occur first only after Early Neolithic II. A subdivision into three phases remains valid for the Southern part of the region, although painted decoration continues to exist throughout the entire third phase. The Northeastern region requires however a four – part division – the fourth phase being characterised by impresso decorated ware. Of the Southwestern part we know little, but both early painted and impresso ware apparently occured along with plastic decoration in the third phase. Regional differences in Thessaly seem to be restricted to the use of decoration and do not much affect our model.

Divergences from the Sesklo sequence begin as early as during Early Neolithic II in Macedonia, Attica and Central Greece. We can still use the tripartite division in Macedonia when we take into account the difference of the early introduction of impresso ware. The situation is more difficult in Central Greece and Attica, where we encounter a greater shift in the appearance of characteristics. If we are able at all to make a subdivision within the period it should be bipartite rather than tripartite. We can therefore use the Sesklo sequence with certain reservations at Macedonian sites. In Central Greece and Attica it serves only to indicate the beginning and end of the period.

Pottery from the Northeastern Peleponnese shows an even greater divergence. Differences are no longer restricted to decoration, but also concern types of ware. Nevertheless, we can compare a well stratified site to the Sesklo sequence, since there are some similarities. The division remains basically tripartite if we use the introduction of early painted ware to define the second phase and take the introduction of fine ware as characteristic of the beginning of the third phase. However, if we want to compare material from an unstratified context, we are completely at a loss. The only solution is to use a sequence from a stratified site in that region.

Knossos on the island of Crete is a unique case to which no external model can be applied, be it Near Eastern or Greek.

Everywhere the artefacts other than pottery include a simple chipped stone industry, consisting largely of unretouched blades. Polished and ground stone tools, bone implements, ceramic objects such as sling missiles and disc spindlewhorls, ornaments and figurines are found at all sites. The latter may show some regional differences.

At all sites local materials were used for building purposes. As a result there are local differences – some dwellings being erected in wattle and daub on a stone foundation, others in wattle and daub in a wooden frame. The basic houseplan is, however, the same everywhere: either a single rectangular room or a rectangular block with two rooms, a larger and a smaller one. Knossos is the only site where mudbrick has been used.

In Thessaly some of the raw materials seem to have the same origin, situated within the region – like chert and volcanic stone. They are often found at a distance of more than a day's journey from the settlement. In other parts of Greece, most raw materials are found in the direct vicinity or within a day's reach. The exception is obsidian. This material, used in all regions but Epirus, Corfu and Macedonia, derives from the island of Melos. To obtain it a long voyage had to be made over land and sea.

In Thessaly, the only data on the way in which people disposed of their dead are given by a group of cremation burials, all accompanied by a well burnished pot and, in some cases, a tiny, crudely made pot, found at Soufli Magoula and dating to Early Neolithic III. Outside Thessaly there are only a few scattered burials, mostly of infants, and some pitgraves. Two burials have associated grave goods, in each case a burnished vessel.

All sites, within and outside Thessaly, had basically the same subsistence pattern – an agricultural economy. In Thessaly hunting apparently played no role, but at several sites outside Thessaly hunting and/or fishing seem to have been of some importance to the diet. Caprovines were the most common domestic animals (mostly 60-75%). There are indications that sheep dominated over goat. Pig and cattle make up the rest of the stock – in various percentages. A fairly large proportion of these animals, especially of pig, were slaughtered immature, indicating that they were kept for meat.

The crops included cereals, emmer being the most important at all sites except Knossos. A hitherto underestimated role may have been played by the pulses, which included peas and lentils.

It is undeniable that both domestic caprovines and wheat were imported from the Near East. Domestication of other crops and of the pig may have been local achievements. This was almost certainly the case with cattle. It is not clear in what way wheat and caprovines were introduced to Greece. There is no artefactual evidence indicating migration from the Near East: there are no similarities in architecture and technology. It is likely that the transmerance of seafaring people was rather important in the distribution of domestic crops and livestock.

In Greece the investigation of Early Neolithic settlements has often concentrated too much on the larger artefactual material, ceramics and other objects. Due to limited finances, excavations were mostly undertaken on a very small scale only. Many blanks in our present knowledge of the Greek Early Neolithic period could be filled if excavations were undertaken on a larger scale, if methods like water sieving, flotation and the scientific analysis of materials were used and if more attention was paid to ecological and geographical studies. There are also problems which are less easy to solve, like the relationship with the Near East, but even these will benefit from a better use of the possibilities which are at our disposal. With this in mind, we offer the conclusions from our present study.

We consider the development from Mesolithic to Neolithic society to be largely an indigenous achievement, albeit that the vital knowledge of plant and animal husbandry was acquired in some way from inhabitants of the Near East.

At the beginning of the Early Neolithic, settlements with a mixed farming economy are found over the whole of Greece. The importance of fishing and hunting depended on local circumstances, whereas the gathering of fruits, berries and seeds was still of significance at all sites. The existence of sea travel and/or exchange of goods can be deduced from the widespread distribution of Melian obsidian and non-local chert.

Our study of the Early Neolithic ceramic material leads to the following theses:

1. The whole of mainland Greece shows a similar initial stage of pottery manufacture; the 'Frühkeramikum' from Sesklo is well suited as a model.
2. The use of Sesklo as a model for the development of Early Neolithic ceramic material is possible to a limited extent only.
3. Regionalism begins earlier than generally suspected. After the initial stage, strong differences in development occur between the Northeastern Peloponnese, Attica, Central Greece and the Northern regions.
4. In most regions we are able to divide the Early Neolithic into three phases.
5. Knossos shows no similarities at all with mainland Greece in its ceramic production.

The final conclusion is that the overall development within the Early Neolithic period is largely the same for the whole of mainland Greece, but that strong regional differences exist where the ceramic material is concerned.

PETROGRAPHIC THIN SECTION, AND X-RAY DIFFRACTION ANALYSIS OF POTTERY FROM SESKLO AND ACHILLEION

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Macroscopic description

Judged by colour and thickness the Sesklo sherds under investigation are heterogeneous. The fresh fracture of number 79, the thinnest sherd (0.3 cm), is light reddish brown (2.5 YR 6/4**). The thicknesses of numbers 21a, 14, 8 and 5 vary from 0.5 to 0.9 cm, and the colours of the fresh fractures of these are red (YR 4/6), light red (2.5 YR 6/6), very pale brown (10 YR 7/3), and dusky red to reddish brown (2.5 YR 3/2 – 4/4) respectively. Number 22 is 1.4 cm, and numbers 29 and 89 are both 1.8 cm thick. The fresh fracture of 22 is reddish to light brown (5 YR 5/4 - 5/3), of 29 light brown (7 YR 6/4), and of 89 light reddish to reddish brown (5 YR 6/4 - 5/3).

In spite of this heterogeneity, the Sesklo sherds under investigation are all hard, compact, completely oxidised, and have a smooth surface. Sporadic, glittering mica flakes about 0.1 mm in size show up in the dense aphanic clay. The non-plastic component consists of schist-fragments from 0.3 to 0.6 mm and from 1.0 to 3.0 mm in size. But number 22 is out of tune. It not only contains far more schist-fragments, but these are larger, measuring 2 to 4 mm, darker and finer grained. The smooth surface of the Sesklo sherds is not painted.

Two of the three Achilleion sherds under investigation are much alike. Number A1-L33 and A5 are both 1.5 cm thick and the colour of the fresh fracture is brown (7.5 YR 5/2) to pinkish gray (7.5 YR 6/2). Oxidation during firing has not been complete as both sherds have a 0.3 to 0.4 cm wide dark centre. On the exterior side they are painted red (2.5 YR 4/6 - 4/8) and white: A5 pinkish white (5 YR 8/2), and A1-L33 light gray (2.5 YR 7/2).

Both sherds are hard, and like the Sesklo sherds their clay is dense and compact. Mica flakes averaging 0.1 mm are relatively abundant in A1-L33, but macroscopically wanting in A5. The non-plastic component is made up of schist-fragments also. The larger grains from 1.0 to 2.0 mm are above all black. Lighter coloured whitish grains predominate in the 0.3 to 0.5 grain size range. In places herbaceous material is perceptible in the non-oxidised zone.

The third sherd from Achilleion looks quite different. The 1.1 cm thick pottery fragment, D3-L21 is red (2.5 YR 5/6) and completely oxidised. Its non-plastics are not schistose. The majority is white and predominates in the 0.2 to 0.6 mm grain size range. Apart from these differences D3-L21 resembles the two other sherds from Achilleion in hardness, and in density and compactness of the clay. Its smooth outer surface is decorated with a white line design.

Microscopic study of the non-plastics

Optical petrographic, thin section analysis of the sherds under examination reveals that all sections contain fragments of schists, thrown together as tiny pieces of one or more jigsaw puzzles. It is hard to say whether the individual fragments belong to one or another kind of schist. In spite of this drawback it

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** Colours according to "Munsell Soil color charts".

was possible to subdivide the thin sections into three groups.

The first group, the lion's share, comprises thin sections of the Sesklo sherds No. 5, 8, 14, 29, 79 and 89. They contain quartz grains in the 0.01 to 1.0 mm particle size range, with a modal average of 0.2 to 0.3 mm. Sporadic feldspar and epidote occur in the same size range. The larger grains measuring 1.0 to 2.0 mm, in some cases even 3.0 up to 5.0 mm, are schist-fragments, but in three different forms: rather fine grained quartz-biotite, quartz-biotite-epidote-feldspar, and quartz-epidote-muscovite schists.

The quartz of the rather fine grained quartz-biotite schist is made up of an equigranular mosaic with granules of 0.02 to 0.03 mm, and of patches measuring 0.1 to 0.3 mm with wavy extinction. In most cases, the granules and the larger wavy patches show a parallel arrangement, parallel also to the biotite, and sericite they enclose. In the majority of these schist-fragments quartz predominates. Grains nearly or all biotite and sericite are in the minority.

The quartz-biotite-epidote-feldspar schist is composed of parallel bands: bands of fine grained biotite, sericite, subordinate quartz, and epidote granules, bands of albite and quartz, and quartz bands made up of equigranular mosaics with granules of 0.02 to 0.03 mm, and quartz patches with wavy extinction. These patches measure 0.1 to as much as 2.0 mm. The albite of the bands of albite and quartz occurs in the 0.1 to 0.6 particle size range. An albite in the thin section of Sesklo sherd 29, however, has a length of 2.5 mm.

The quartz-epidote-muscovite schist is a coarse grained quartz mosaic containing some epidote grains, and muscovite flakes. The quartz ranges between 0.05 and 0.5 mm. The epidote granules average 0.05 mm, but the muscovite flakes reach up to 0.5 mm. Single epidote grains also occur. Quartz mosaic-epidote-muscovite fragments are particularly abundant in the Sesklo sherds 5 and, 14, where they form the greater part of the non-plastic component.

The second group of thin sections are sections of the red oxidised baked sherds 21a and D3-L21. They are characterised by quartz grains measuring 0.1 to 0.6 mm, and by granules of microcristaline calcite (micrite) with cross-sections from 0.2 to 1.2 mm. Schist-fragments in the same size fraction are occasionally encountered.

Macroscopically non-apparent, a 0.3 mm thin slip on the outside of 21a showed up beneath the microscope. A slip with non-plastics in the 0.01 to 0.03 mm grain size.

Very fine grained sericite schist-fragments, and amphibole enclosed in rock fragments, and as single grains set the thin sections of the sherds A1-L33 and A5 apart as a third group.

The grain size of the constituent parts of the very fine grained sericite schist falls under a quite different order of magnitude to those met so far in the thin sections under investigation. The quartz grains measure 4 μm - 10 μm (0,004 - 0,01 mm) and the lengths of the sericite flakes range between 4 and 20 μm. There are sericite schist-fragments where sericite and quartz occur in approximately equal quantity. But in most cases sericite is in excess of the quartz. Most of the amphibole carrying rock fragments of A1-L33 in particular, are made up of unoriented equigranular quartz grains in the size range of 0.05 - 0.1 mm, of muscovite flakes with lengths of 0.2 to 0.5 mm, and of amphibole with prism lengths measuring 0.2 up to 0.3 mm. The amphibole is colourless, has an inclined extinction of $Z \wedge c = +21°$, is biaxial negative with $-2V = \pm 80°$, and a weak $r<v$ dispersion. Its lack of colour and its maximum extinction angle of 21° point to tremolite, a magnesium-rich calcium amphibole.

Next to these relatively coarse grained, unorientated amphibole-muscovite-quartz rock fragments, one or two fragments of a fine grained amphibole carrying sericite schist occur. Muscovite flakes, and amphibole prisms both with lengths of 0.1 - 0.2 mm, are embedded in a matrix of a felty mass of sericite, and quartz. The grain size of the matrix ranges from 0.01 to 0.03 mm.

As we have seen the amphibole does not occur as a constituent of rock fragments only, but as single grains as well. The prism lengths of the loose grains measure 0.3 to 0.5 mm. These single amphibole grains are met with especially in the thin section of A5.

A5 differs from A1-L33 by containing also quartz sericite schists with sparry calcite aggregates. The equigranular quartz grains of these schists measure

0.02 to 0.03 mm, the sparite aggregates 0.05 - 0.1 mm. Loose sparry calcite grains of 0.01 to 0.02 mm also occur.

Sherd 22 stands alone. Its thin section contains a very fine grained sericite schist with quartz grains measuring 4 - 10 μm. These very fine schists favour A1-L33 and A5, but the amphibole carrying rock fragments, or the single amphibole grains are missing. On the other hand no epidote holding sericite schists occur, which sets sherds 22 also apart from the major Sesklo group.

The sherds investigated, generally do not contain sherd temper. There are three cases, however, sherds No. 22, 89, and D3-L21, which contain some pottery grit.

Results of thin section analysis of the non-plastics

The results of the thin section analysis of the non-plastics are summarised in Table 29. Except for numbers 21a and 22, the Sesklo sherds have single epidote granules, and epidote bearing mica schists in common.

Some of the Achilleion sherds are characterized by amphibole. D3-L21 from Achilleion does not contain amphibole. It stands out by a high percentage of quartz and microcristalline calcite grains, and its lack of epidote. Not including epidote bearing schists either, but microcristalline calcite and quartz grains, 21a seems to take after D3-L21.

Sesklo sherd 22 is a solitary case.

Collection of reference material of Sesklo schists

Miss M. Wijnen collected a representative assortment of schists on the surface at Sesklo to compare with the non-plastics of the scherds. Among these are several specimens, to a certain extent related to the schist fragments in the investigated sherds. Such as an amphibole holding schist, but without the sparry calcite, a quartz-mica-epidote schist, but with muscovite instead of biotite, and a quartz-biotite-epidote feldspar schist, but with additional sparry calcite, which should be wanting.

So, in spite of the variety of the collection of reference material, it does not contain schists that tally with those of the non-plastics of the pottery. This disparity suggests that the raw material for the temper was not collected at random but carefully selected.

The clay component

In both the Sesklo sherds, and those from Achilleion, the clay component appears as a brown to red brown filty mass in thin section. It is aswarm with sericite flakes that are 0.01 to 0.5 mm long. Apart from disseminated patches, hematite occurs in rounded grains as well.

To compare with the clay member of the pottery, Miss M. Wijnen, drew a raw clay sample at Sesklo. The dry sample is macroscopically reddish yellow (7.5 YR 6/6) and just as the Sesklo sherds, the clay contains mica flakes measuring 0.1 mm . Sporadic fragments of mica schists in the 1.0 to 1.5 mm size range account for the non-plastic component of our clay sample.

In thin section the clay, like the plastic member of the Sesklo sherds, has a filty appearance on account of numerous sericite flakes, measuring also 0.01 to 0.5 mm. The clay contains iron oxides in disseminated form, and as round and oblong granules. The non-plastics turn out to be rather fine grained quartz-biotite schists.

X-ray diffraction analysis

In order to examine the clay component of the sherds more closely an X-ray diffraction method was applied. Powder diagrams of the mineral mixtures of the pottery were obtained by a Guinier-de Wolff focussing, monochromator camera, Cu K_d radiation, 35 kV, 20 mA, and an exposure time of 3 hours. The quadruple exposures No. 5262 and 5269 were recorded by a camera kindly placed at our disposal by Prof. Dr. P. Hartman of the Geological Mineralogical Institute of Leiden University and operated by Mr J. Verhoeven. Prof. Dr. P.C. Zwaan of the Netherlands National Museum of Geology and Mineralogy in Leiden was so kind as to allow us to use the Guinier-de Wolff camera of his museum, by which Mr J.J.F. Hofstra made the quadruple exposures Nos. 8001, 8002, 8003, and 8004.

With reference to the combined thermal and X-ray diffraction techniques for identification of ceramic materials, introduced by Ipshording, 1974, X-ray photographs of the untreated powder samples were obtained first. Thereafter, the samples were heated at 1100° C for 4 hours, and the resulting diffraction patterns of the high temperature minerals were compared with the diagrams of the untreated samples.

The X-ray diagrams of the untreated samples.

From the Sesklo sherds 8, 14, 21a, 22, 89, and two added ones 21b and 21c powder samples were drawn, likewise from the Achilleion sherds A1-L33 and D3-L21. The Sesklo sherds 21b and 21c were added on account of heating experiments by Dr H.J. Franken, director of the Institute of Ceramic Technology of Leiden University. After heating these sherds for several hours at 1200° C, he found them to differ in colour, and he wondered as to how far this difference could be due to a non-conformity of the clay.

In the X-ray diagrams of all powder samples, the röntgen patterns of quartz, low albite, and possible lines of illite with d values of 4.5, 2.59, 2.56 and 1.50 Å are found. The 3.31 Å line of illite can not be seen as it coincides with the 3.34 Å quartz spacing. Faint reflections of hematite were noted in the diagrams of the Sesklo sherds 14, 22 and 89, whereas the X-ray diagrams of the Sesklo sherds 21a, and D3-L21 contain distinct hematite lines.

The strongest 3.03 Å reflection of calcite is faintly discernible in the X-ray diagrams of Sesklo numbers 14, 21a, 21b and of the Achilleion sample, D3-L21. An amphibole pattern is met with in the X-ray diagrams of 21a and A1-L33. In addition the diagram of A1-L33 carries reflections of chlorite affected by heat.

In the X-ray diagrams of the samples heated for A hours at 1100° C the patterns of quartz, low albite, spinel, mullite and hematite are generally encountered. Hematite, though, is missing in the diagram of number 8 and spinel in those of number 21a and A1-L33. As is to be expected, the diagrams of 21a and A1-L33 show the additional reflections of amphibole. Whereas A1-L33 stands out with a supplementory, distinct pattern of enstatite.

Spinel and mullite are high-temperature phase minerals of illite. However, according to Bradley and Grim, 1972, they should occur separately: the spinel between 1000° C and 1200° C, and the mullite above 1200°. But on the other hand, the same writers state that "very small amounts of some chemical elements may exert great influence on the high-temperature phases formed by heating the clay minerals. Descriptive data for any given illite are necessarily illustrative only and are not be construed as typical for the group."

For all that, in our case the first consideration is comparative. It is of importance that, except for 21a and A1-L33, the clays of the X-ray analysed sherds are characterised by the very same high-temperature minerals. The heat-treated sample of sherd 21a resembles A1-L33 in lacking spinel and containing amphibole.

Next to the high-temperature phase mullite, A1-L33 holds enstatite. As the unheated sample of A1-L33 carries chlorite and chlorite above 800° C should convert to olivine, the absence of olivine, and presence of enstatite is not understood. But, here again, the comparative aspect is the first consideration. It is quite possible that these enstatite reflections are an indicative feature of heat treated pottery material of sherds of the same category to which A1-L33 belongs.

General results of the X-ray diffraction analysis

Röntgenographically all sherds investigated have in common illite as a mineral, which by being heated for 4 hours at 1100° C is transformed into spinel and mullite.

Sherds 21a, and A1-L33 are a group apart. They both contain amphibole, and lack spinel in the high-temperature phase. It is questionable, however, whether the spinel is actually missing. The percentage of this mineral in the heat treated sample might have been too low to show up in the X-ray diagram. No amphibole being observed in the thin section of 21a, the amphibole pattern in its röntgen diagram came as a suprise. From this it follows that beyond the resemblance to the Achilleion sherd D3-L22 that was revealed microscopically, 21a takes after the amphibole bearing Achilleion sherds as well. This might imply that 21a belongs more likely to the Achilleion sherds than to those of Sesklo. Besides their conformity, A1-L33 differs from 21a by its additional chlorite reflections and the enstatite in the high-temperature phase.

Bearing no amphibole reflections next to their illite pattern, the Sesklo sherds 21b, and 21c, which were investigated on account of the heating experiments of Dr H.J. Franken, turn out as true representatives of the Sesklo group. In spite of their parity, these sherds show a slight divergence. The X-ray diagram of 21b holds reflections of calcite, that of 21c not. In consequence, this divergence, the calcite in 21b, might account for the colour difference of these heated sherds.

The local raw clay, chosen for comparison, shows the pattern of quartz and illite also. The illite spacings, however, coincide with those of muscovite. In addition the strongest lines of hematite are faintly visible. The pattern of low albite is failing.

Mullite and hematite show up strongly in the diagram of the heat treated sample. Of spinel, only the strongest 244 Å spacing is discernible.

Temperature of firing

In the X-ray diagrams of the unheated sherd samples, the illite pattern was still discernible. According to Bradley and Grim, 1972, the anhydrous illite will be destroyed above 850° C. At 1-atmosphiric pressure the dissociation of calcium carbonate occurs at 812° C. As both the illite and calcite patterns of the sherds that contain calcite are still visible in the röntgen diagrams and as the calcium carbonate in the thin sections does not appear to be affected, the firing temperature of the investigated sherds must have been less than 812° C. This might indicate that they were fired in an open fire.

Analysis of the white and red decoration

The Achilleion sherds A1-L33 and A5 are decorated white and red, and the outer surface of D3-L21 carries a white line design. Macroscopic investigation indicates that the burnished surface of A1-L33 and A5 is covered by a 0.3 mm thin white coat. In the red parts of the decoration the white coat bears an extremely thin red coating. Diluted cold hydrochloric acid caused the white and red coatings to effervesce.

To gain more insight into the nature of the decoration, a Guinier-de Wolff exposure No. 5018 was made by Mr J. Verhoeven, using Cu radiation, 25 kV, 20mA, and an exposure time of 3.5 hours. Prof. Dr. P. Hartman was so kind as to place the camera at our disposal.

As is to be expected on account of the effervescence, the X-ray powder diagram of the white coating shows a distinct calcite pattern. Next to this pattern, those of quartz, albite, illite and amphibole occur. The powder diagram of the red coating contains reflections of the same minerals as its white counterpart. But, in addition, the strongest lines of hematite are faintly discernible.

From this we learn that the white coating may be looked upon as a slip prepared from a very fine fraction of the same clay from which the pot was formed but with an added calcite pigment. On top of this slip the coating with iron oxides must have been added, which turned red after firing in an oxidising atmosphere.

Röntgenographically the white line decoration of D3-L21 proves also to be an admixture of calcite powder and very fine particles of the same clay of which the vessel was produced.

A final grouping

Having illite in common the investigated Sesklo and Achilleion sherds may be presented as belonging to a system of non-empty sets. In one of these sets the plastic member contains amphibole next to illite. The schematic boundaries of this set, and of the system are shown by broken lines in figure 24 to indicate that they are defined by components of the plastic parts of the sherds.

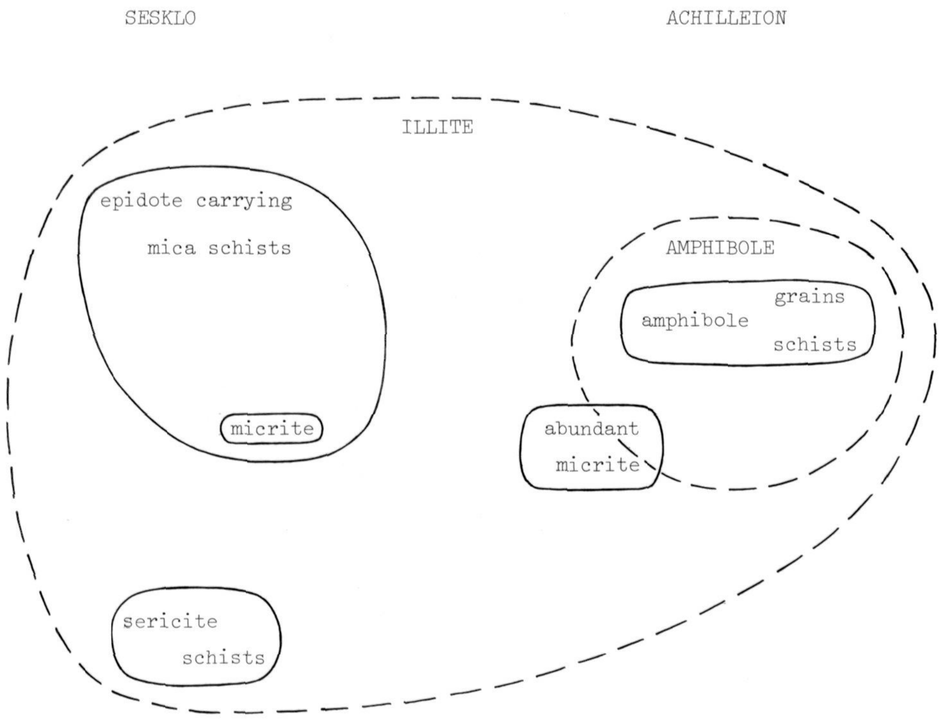

Fig. 24. Provisional diagram to compare the petrographic features of the investigated Sesklo sherds with those from Achilleion

Sets defined by characteristic non-plastics are represented by unbroken lines, such as the set of the epidote carrying mica schists that determine all but one of the Sesklo sherds. The exception just mentioned is Sesklo sherd 22, where epidote carrying mica schists are lacking, but fine grained sericite schists prevail. These two Sesklo sets are disjointed.

Due to differences in their non-plastics, the sherds with amphibole in the plastic member may be subdivided into two sets: One set where the non-plastics hold amphibole, the other where amphibole in the non-plastics is wanting. The latter set contains one element only, i.e. sherd 21a, which, instead of amphibole bearing non-plastics, holds abundant grains of micrite.

As micrite prevails also in the non-plastic component of D3-L22, this sherd and 21a may be considered to belong to one set. On account of no amphibole being perceived in the plastic member of D3-L22, the set defined by prevailing micrite non-plastics intersects the set of sherds with amphibole in the plastic member, 21a belonging to the intersection. It is true that a few of the Sesklo sherds carry some micrite grains too, but this subset holds epidote carrying mica schists as well, which are lacking in D3-L22 and 21a.

This provisional diagram, provisional on account of the relatively small number of sherds investigated, may facilitate a comparative review of the Sesklo and Achilleion sherds. The clays come up for discussion first.

Illite has been found in both groups. The plastic part of the Sesklo group does not hold amphibole, neither does the sample of raw clay taken from a recent pottery clay source in Sesklo.

At that, as appeared from the thin sections, the clay of the Sesklo sherds, and the raw clay have a filty mass of sericite and a noteworthy amount of iron oxides in common. But of more importance are the rather fine grained quarz-biotite schist-fragments that were found as non-plastics in both the Sesklo sherds and the raw clay. In view of these corresponding characteristics, the possibility is not precluded that a comparable raw clay, rich in sericite, has been used at Sesklo for the manufacture of the Sesklo pottery under investigation.

The plastics of the Achilleion sherds hold additional amphibole. But there is one sherd, D3-L21, where amphibole is lacking. Does this mean that there were two different raw clay sources in Achilleion, one with amphibole, the other without? Or did D3-L21 come from elsewhere? It would be interesting to examine if there are clays with and without amphibole in and around Achilleion. One thing is sure, however, the slips coloured by pigment of the Achilleion pottery indicate that the potters of Achilleion had reached an advanced stage in refining the clay. It remains in question whether, and if so how far, they have made use of refining pits.

As regards the non-plastics, epidote carrying mica schists distinguish about all the investigated Sesklo sherds from those of Achilleion. Amphibole, or abundant micrite characterise the sherds from Achilleion. Sesklo sherd 22, with its sericite schist-fragments is an exceptional case.

So far, the indices of relationships of the investigated Sesklo sherds do not intersect those of Achilleion. Out of this non-intersection, thin section analysis of the non-plastics is the obvious way to try to solve questions about sherds of uncertain origin in this area.

REFERENCES

Bradley, W.F., Grim, R.E. 1972: ''Mica clay minerals.'' In Brown, D. (ed.): The X-ray identification and crystal structures of clay minerals. Mineralogical Society (Clay minerals group). London: 208-241.

Isphording, W.C., 1974: Combined thermal and X-ray diffraction technique for identification of ceramicware temper and paste minerals. *American Antiquity, 39:*477-483.

Munsell Color Company, Inc., 1954: *Munsell Soil Color Charts*. Baltimore, Munsell Col. Comp. Inc.: 21 p.

APPENDIX II

THE FAUNA FROM EARLY NEOLITHIC SESKLO

C.A. SCHWARTZ*

The animal bone sample from the 1972 season at Sesklo compares favourably with other Early Greek Neolithic samples though it is statistically small (table 30).

Caprovines (sheep and goat) are the most frequent domestic species (60.1%) with pig (18.1%), cattle (12.1%) and dog (0.4%) following respectively. The wild fauna is relatively small (9.3%) consisting of red deer, roe deer, wild pig and hare (table 31). No aurochs material is present. Badger and bird are also identified.

A high sample fragmentation is reflected by a low identification rate; from a total of approximately 1950 bones only 25% were identifiable. The constitution of the sample is mainly due to butchering practices though a few elements had fresh breaks. Two elements, a humerus and femur shaft (caprovine) had butchering marks; some worked bone also occurred with the majority having been sorted out prior to analysis (the latter have been analysed in 1978, M.W.). There is burned bone and evidence of gnawing by carnivores.

Age distributions of cattle, sheep/goat and pig are difficult to ascertain with such a small sample. Cattle are represented by one juvenile, two sub-adult and two adult individuals while caprovines had only one sub-adult specimen with several individuals in the other two categories. Pigs are represented (one each) in all three categories including one immature and one senile individual.

Both sheep and pig from Sesklo compare well with those from Achilleion and Aghios Petros. There seems to be a slight tendency for the Sesklo forms to be broader anteriorly-posteriorly. Only one measurable cattle element is identified; a distal humerus (88 mm width - 81 mm diameter). It is similar in size to those found at Achilleion (Bökönyi, personal communication 1977).

Two interesting features are the occurrence of crab and the two hornless sheep skull fragments. The latter, which do occur infrequently in modern day populations, are good indicators of early domestic forms in the Neolithic (Bökönyi 1974). The presence of only one crab claw is surprising considering the proximity of Sesklo to the sea. However, other crab elements may have been included in the molluscan sample not examined by the author.

Any conclusions at this time, without additional samples are premature.

* London Institute of Archaeology, March 1977.

GEOLOGISCHE ÜBERSICHT THESSALIENS

T. DOUTSOS*

Thessalien liegt im Zentral-Griechenland und geologisch gesehen gehört wie sie im Alpinischen Raum. Der geologische Bau Thessaliens gliedert sich in zwei übereinander folgenden Einheiten, die sich stratigraphisch, lithologisch und tektonisch aneinander unterscheiden: Das Grundgebirge und das Deckgebirge.

GRUNDGEBIRGE

Das Grundgebirge wird von alpidisch gefalteten und metamorphisierten Gesteinserien aufgebaut. An einigen Stellen sind Fossilreste von der Metamorphose nicht betroffen, so daß heute eine grobe Stratigraphische Einteilung möglich ist:
Paläezoikum. Sandige Tonsteine, Sandsteine, mergelige Sandsteine mit basichen Einschaltung sind durch intensive Metamorphose in Glimmerschiefern, Gneissen und Ampiboliten umgewandelt. Stellenweise sind Anatexiten, Migmatiten und Graniten anzutreffen.
Perm-Trias. Auf den paläozoischen Metamorphiten liegen konkordant permische bis triasische dickbankige Marmorserien. Der Übergang zwischen beiden Gesteinseinheiten scheint kontinuierlich zu sein. Leitfossilien wie Diplopora dokumentieren hier das Alter der Gesteinen.
Kreide. Auf den permotriasischen Carbonatgesteinen sind transgressiv kretazischen dick-bis dünnbankige Kalkserien sedimentiert. Sehr oft treten bituminösen Einschaltungen auf. Die Alterbestimmung dieser gesteine wurde durch Rudisten durchgeführt.

* Geological Service, Larisa

Flysch. Der eozäne Flysch wird von mächtigen Sandsteinen, kalkige Sandsteinen, Mergeln und Tonen zusammengesetzt. Faltung und Metamorphose haben dieses Sedimentpakett erheblich verädbert. Entstehung: Einige Gebirgsstreifen der alpidischen Orogenese sind schon früh gefaltet und herausgehoben; ihr Abtragungsmaterial wird in unruhigen Absenkungszonen zugeführt und als Fluß-bzw Deltabildungen abgesetzt. Flysch-Ablagerungen sind generell Fossilarm, enthalten aber in bestimmten Gesteinhorizonten reiche Globigerina-Fauna.

DECKGEBIRGE

Nach der post-eozäne Faltungs-bzw Deckenbewegungen ist das ganze alpidische Orogen hauptsächlich isostatisch aufgehoben. Dabei sind langgestreckte Intramontane Becken herausgebildet, die von Abtragungsmaterial des aufsteigenden Grundgebirges gefüllt wurden.
Molasse. Oligozäne bis Miozäne marine linsenartige Ablagerungen. Feinkörnige bis grobkörnige Sandsteine wechsellagern mit Tonschiechten, so daß im Mikro-und Makrobereich Rhythmiten entstehen. Als wesentliche Bestandteil der oft auftretenden Konglomeraten (z.b. bei Meteora) sind Kristallin-Geröllen anzusehen. Manche Gesteinsbereiche tragen reiche Korallen-Fauna.
Neogen. Seit Pannon (Pikermi Fauna) sind in den Intramontanen Becken kontinentale Sedimente, limnisch-fluviatiler Entstehung abgelagert. Außer Sandsteine und Tone sind sporadisch limnisch Kalke und Kohlenbildungen anzutreffen.
Pleistozän. An der letzten Stadien der postorogenen Herauswölbung bilden sich ebenfalls kontinentale

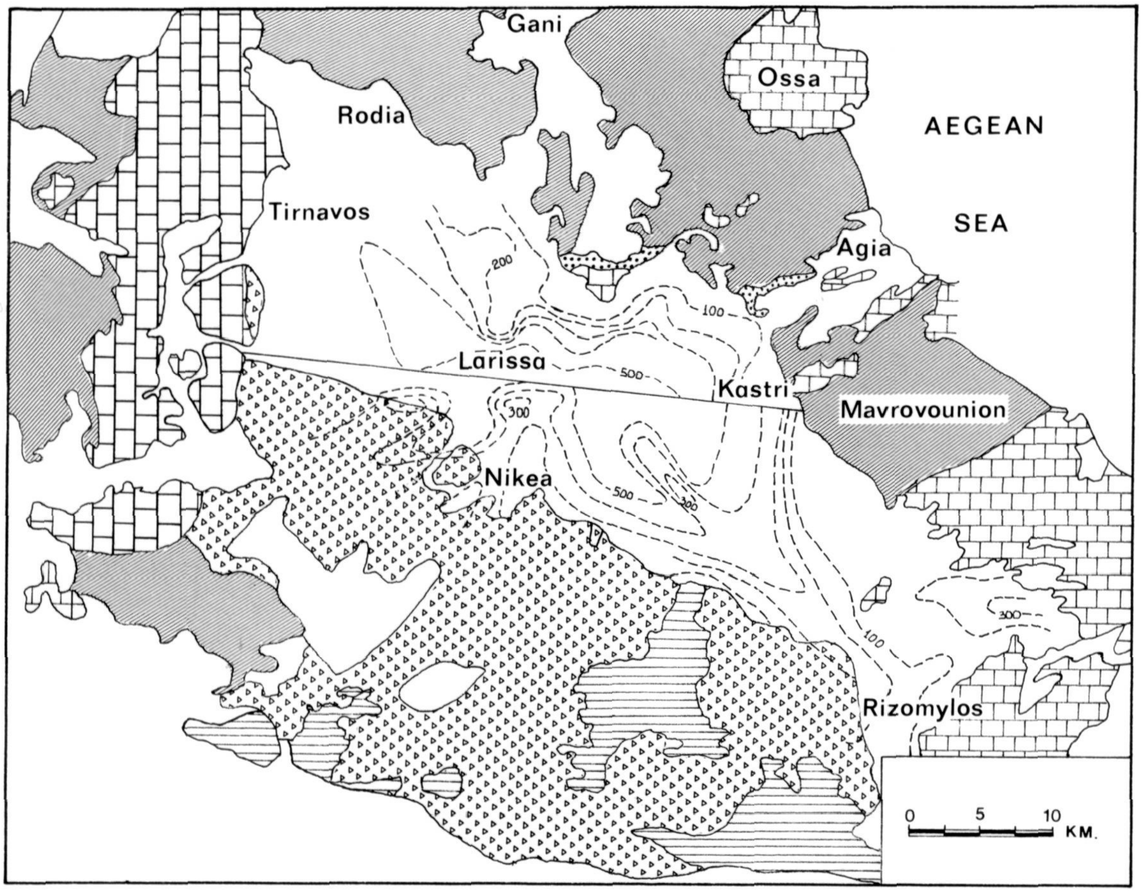

Fig. 25 Geological outline map of East Thessaly.

meist fluviatile Schuttablagerungen. Sie sind in tektonischen Gräben abgelagert.

Außer der vertikalen Gliederung Thessaliens in übereinander folgenden scharf abgegrenzten tektonischen Stockwerken läßt sich auch eine *horizontale Einteilung* feststellen: Von Osten nach Westen werden 3 Geotektonische Einheiten unterschieden. (fig. 25)

Pelagonische Zone. Hauptsächlich wird von paläozischen Gneissen und permotriasischen Carbonaten gebaut. Darauf sind Kreidereste von der postorogenen Abtragung verschont geblieben. Neogen ist nur hier weit verbreitet.

Subpelagonische Zone. Gegen Westen sinkt die Pelagonische Zone ein und wird vorwiegend durch Jurasische Schiefern, Ophiolithen und kretazischen Kalken zugedeckt. Postalpidisch bildet sich hier die Mesohellenische Furche, in der Oligozäne bis Miozäne Molasse sedimentiert ist. Pelagonische- und Subpelogonische Zone bauen die Pelagonische Plattform zusammen. Sie ist weit aus dem ägäischen Raum durch Deckenbewegungen in die heutige Lage verfrachtet.

Pindos Zone. Mächtige Jurasische und kretazische Kalksedimente sind unter alpidischen eugeosynklinalen Bedingungen abgesetzt. Die darüberfolgenden Flyschserien besitzen einen miogeosynklinalen Charakter.

TABLE 1: Stratigraphic distribution of colours. Percentages

	Incompletely oxidised light	dark	Non-oxidised dark	Oxidised	Total
Stratum C	80/28.4%	136/48.2%	53/18.8%	13/ 4.6%	282
Stratum B	89/24.2%	224/60.9%	50/13.6%	5/ 1.4%	368
Stratum A	164/41.5%	164/41.5%	46/11.6%	21/ 5.3%	395

TABLE 2: Stratigraphic distribution of colours according to vessel shape. χ^2 computation

	Incompletely oxidised light (1)	(2)	dark (1)	(2)	Non-oxidised dark (1)	(2)	Oxidised (1)	(2)	Total
Stratum C	14/11.9	7/6.7	21/24.1	1/5.1	7/4.8	9/6.1	1/1.2	0/0	60
Stratum B	9/15.2	6/8.6	39/30.9	8/6.6	6/6.2	9/7.8	0/1.6	0/0	77
Stratum A	14/ 9.9	8/5.6	15/20.1	7/4.3	2/4.0	1/5.1	3/1.1	0/0	50
Total	37	21	75	16	15	19	4	0	187

2 a: Hole mouthed jar. (1) oxidised core (2) non-oxidised core
$\chi^2 = 27.419$ df = 12 α = .01 → 26.217 α =.001 → 32.989

	Incompletely oxidised light (1)	(2)	dark (1)	(2)	Non-oxidised dark (1)	(2)	Oxidised (1)	(2)	Total
Stratum C	22/22.6	4/10.3	54/48.0	3/ 9.3	13/ 9.3	9/ 7.8	6/2.5	0/1.3	111
Stratum B	31/35.4	12/16.1	94/75.2	14/14.6	12/14.7	9/12.2	0/3.9	2/2.0	174
Stratum A	37/32.0	25/14.6	43/67.8	20/13.1	12/13.1	13/11.0	4/3.6	3/1.8	157
Total	90	41	191	37	37	31	10	5	442

2 b: Slightly closed globular jar (1) oxidised core (2) non-oxidised core
$\chi^2 = 50.146$ df = 14 α =.001 → 36.123

	Incompletely oxidised light (1)	(2)	dark (1)	(2)	Non-oxidised dark (1)	(2)	Oxidised (1)	(2)	Total
Stratum C	21/18.7	4/ 9.8	34/32.0	13/11.9	3/2.3	8/7.8	2/2.8	1/0.8	86
Stratum B	14/20.4	7/10.8	49/35.0	10/13.0	3/3.5	9/8.5	1/3.0	1/0.8	94
Stratum A	39/34.9	28/18.4	44/60.0	24/22.2	3/4.2	14/14.6	8/5.2	1/1.4	161
Total	74	39	127	47	9	31	11	3	341

2 c: Convex-walled open bowl (1) oxidised core (2) non-oxidised core
$\chi^2 = 26.45$ df = 14 α = .06 → 23.685 α = .02 → 26.873

(contd.)

	Incompletely light (1)	(2)	oxidised dark (1)	(2)	Non-oxidised dark (1)	(2)	Oxidised (1)	(2)	Total
Stratum C	6/7.0	2/3.3	8/8.0	2/2.3	3/1.0	1/1.3	1/1.3	2/0.7	25
Stratum B	9/6.4	1/3.1	10/7.4	0/2.1	0/0.9	2/1.2	1/1.2	0/0.6	23
Stratum A	6/7.6	7/3.6	6/8.6	5/2.5	0/1.1	1/1.4	2/1.4	0/0.7	27
Total	21	10	24	7	3	4	4	2	75

2 d: Open bowl with flaring wall (1) oxidised core (2) non-oxidised core

$\chi^2 = 24.111$ df = 14 $\alpha = .05 \rightarrow 23.685$ $\alpha = .02 \rightarrow 26.837$

	Incompletely light (1)	(2)	oxidised dark (1)	(2)	Non-oxidised dark (1)	(2)	Oxidised (1)	(2)	Total
Stratum C	63/59.9	17/30.0	117/112.5	19/28.9	25/17.3	27/22.9	10/ 7.8	3/2.7	282
Stratum B	63/78.2	26/39.1	192/146.6	32/37.7	21/22.5	29/29.9	2/10.2	3/3.5	368
Stratum A	96/83.9	68/42.0	108/157.6	56/40.4	17/24.2	29/32.1	17/11.0	4/3.8	395
Total	222	111	417	107	64	85	29	10	1045

2 e: All rims, disregarding vessel shape (1) oxidised core (2) non-oxidised core

$\chi^2 = 89.34$ df = 14 $\alpha = .001 \rightarrow 36.123$

TABLE 3: Stratigraphic distribution of oxidised and non-oxidised vessel cores. Percentages

	(slightly) oxidised surface: oxidised core	non-oxidised core	Non-oxidised surface: oxidised core	non-oxidised core	Total
Stratum C	190/67.4%	39/13.8%	26/ 9.2%	27/ 9.6%	282
Stratum B	257/69.8%	61/16.6%	21/ 5.7%	29/ 7.9%	368
Stratum A	221/55.9%	128/32.4%	17/ 4.3%	29/ 7.3%	395

TABLE 4: Stratigraphic distribution of oxidised and non-oxidised vessel cores, according to vessel shape. Percentages

	(slightly) oxidised surface		non-oxidised surface		Total
	oxidised core	non-oxidised core	oxidised core	non-oxidised core	
Hole-mouthed jar	36/12.8%	8/ 2.8%	7/ 2.5%	9/ 3.2%	60
Slightly closed globular jar	82/29.1%	7/ 2.5%	13/ 4.6%	9/ 3.2%	111
Convex-walled open bowl	57/20.2%	18/ 6.4%	3/ 1.1%	8/ 2.8%	86
Open bowl with flaring wall	15/ 5.3%	6/ 2.1%	3/ 1.1%	1/ 0.4%	25
Total	190/67.4%	39/13.8%	26/ 9.2%	27/ 9.6%	282

4 a: Stratum C

	(slightly) oxidised surface		non-oxidised surface		Total
	oxidised core	non-oxidised core	oxidised core	non-oxidised core	
Hole-mouthed jar	48/13.0%	14/ 3.8%	6/ 1.6%	9/ 2.4%	77
Slightly closed globular jar	125/34.0%	28/ 7.6%	12/ 3.3%	9/ 2.4%	174
Convex-walled open bowl	64/17.4%	18/ 4.9%	3/ 0.8%	9/ 2.4%	94
Open bowl with flaring wall	20/ 5.4%	1/ 0.3%	0/ 0.0%	2/ 0.5%	23
Total	257/69.8%	61/16.6%	21/ 5.7%	29/ 7.9%	368

4 b: Stratum B

	(slightly) oxidised surface		non-oxidised surface		Total
	oxidised core	non-oxidised core	oxidised core	non-oxidised core	
Hole-mouthed jar	32/ 8.1%	15/ 3.8%	2/ 0.5%	1/ 0.3%	50
Slightly closed globular jar	84/21.3%	48/12.2%	12/ 3.0%	13/ 3.3%	157
Convex-walled open bowl	91/23.0%	53/13.4%	3/ 0.8%	14/ 3.5%	161
Open bowl with flaring wall	14/ 3.5%	12/ 3.0%	0/ 0.0%	1/ 0.3%	27
Total	221/55.9%	128/ 32.4%	17/ 4.3%	29/ 7.3%	395

4 c: Stratum A

TABLE 5: Stratigraphic distribution of oxidation of vessel core, according to vessel shape. χ^2-computation

	(slightly) oxidised surface		non-oxidised surface		Total
	oxidised core	non-oxidised core	oxidised core	non-oxidised core	
Stratum C	190/180.3	39/61.5	26/17.3	27/22.9	282
Stratum B	257/235.2	61/80.3	21/22.5	29/29.9	368
Stratum A	221/252.5	128/86.2	17/24.2	29/32.1	395
Total	568	228	64	85	1045

5 a: All vessel shapes. $\chi^2 = 47.390$ df = 6 $\alpha = .001 \rightarrow 22.457$

	(slightly) oxidised surface		non-oxidised surface		Total
	oxidised core	non-oxidised core	oxidised core	non-oxidised core	
Stratum C	36/35.5	8/11.3	7/ 4.6	5/ 4.6	56
Stratum B	48/48.8	14/15.6	6/ 6.3	9/ 6.3	77
Stratum A	32/31.7	15/10.1	2/ 4.1	1/ 4.1	50
Total	116	37	15	15	183

5 b: Hole-mouthed jar. $\chi^2 = 9.406$ df = 6 $\alpha = .20 \rightarrow 8.558$
$= .10 \rightarrow 10.645$

	(slightly) oxidised surface		non-oxidised surface		Total
	oxidised core	non-oxidised core	oxidised core	non-oxidised core	
Stratum C	82/ 73.1	7/20.8	13/ 9.3	9/ 7.8	111
Stratum B	125/114.6	28/32.7	12/14.6	9/12.2	174
Stratum A	84/103.4	48/29.5	12/13.1	13/11.0	157
Total	291	83	37	31	442

5 c: Slightly-closed globular jar. $\chi^2 = 30.415$ df = 6 $\alpha = .001 \rightarrow 22.457$

	(slightly) oxidised surface		non-oxidised surface		Total
	oxidised core	non-oxidised core	oxidised core	non-oxidised core	
Stratum C	37/ 53.5	18/22.4	3/ 2.3	8/ 7.8	86
Stratum B	64/ 58.4	18/24.5	3/ 2.5	9/ 8.5	94
Stratum A	91/100.1	53/42.0	3/ 4.2	14/14.6	161
Total	212	89	9	31	341

5 d: Convex-walled open bowl. $\chi^2 = 7.978$ df = 6 $\alpha = .30 \rightarrow 7.213$
$= .20 \rightarrow 8.558$

(contd.)

	(slightly) oxidised surface		non-oxidised surface		Total
	oxidised core	non-oxidised core	oxidised core	non-oxidised core	
Stratum C	15/16.3	6/ 6.3	3/ 1.0	1/ 1.3	25
Stratum B	20/15.0	1/ 5.8	0/ 0.9	2/ 1.2	23
Stratum A	14/17.6	12/ 6.8	0/ 1.1	1/ 1.4	27
Total	49	19	3	4	75

5 e: Open bowl with flaring wall. $\chi^2 = 17.487$ df = 6 α = .01 → 16.812

α = .001 → 22.457

TABLE 6: Stratigraphic distribution of wall thickness. Percentages

	< 5 mm	> 5 < 10 mm	Total
Stratum C	95/34.1%	184/65.9%	279
Stratum B	155/42.2%	212/57.8%	367
Stratum A	165/42.9%	220/57.1%	385
Total	415/40.3%	616/59.7%	1031

TABLE 7: Stratigraphic distribution of wall thickness, according to vessel shape. Percentages

	Hole-mouthed jar	Slightly closed globular jar	Convex-walled open bowl	Open bowl with flaring wall	Total
Stratum C	14/14.7%	36/37.9%	36/37.9%	9/ 9.5%	95
Stratum B	21/13.5%	72/46.5%	46/29.7%	16/10.3%	155
Stratum A	14/ 8.5%	63/38.2%	71/43.0%	17/10.3%	165

7 a: Wall thickness < 5 mm

	Hole-mouthed jar	Slightly closed globular jar	Convex-walled open bowl	Open bowl with flaring wall	Total
Stratum C	46/25.0%	71/38.6%	51/27.7%	16/ 8.7%	184
Stratum B	56/26.4%	100/47.2%	45/21.2%	11/ 5.2%	212
Stratum A	35/15.9%	97/44.1%	78/35.4%	10/ 4.5%	220

7 b: Wall thickness > 5 < 10 mm

TABLE 8: Stratigraphic distribution of wall thickness. χ^2-computation

	< 5 mm	> 5 < 10 mm	Total
Stratum C	95/112.3	184/166.7	279
Stratum B	155/147.7	212/219.3	367
Stratum A	165/155.0	220/230.0	385
Total	415	616	1031

$\chi^2 = 6.144$ df = 2 $\alpha = .05 \rightarrow 5.991$

$\alpha = .02 \rightarrow 7.824$

TABLE 9: Stratigraphic distribution of vessel shapes. Percentages

	Hole-mouthed jar	Slightly closed globular jar	Convex-walled open bowl	Open bowl with flaring wall	Total
Stratum C	59/20.7%	113/39.6%	88/30.9%	25/ 8.8%	285
Stratum B	78/21.1%	173/46.9%	93/25.2%	25/ 6.8%	369
Stratum A	48/12.2%	158/40.3%	158/40.3%	28/ 7.1%	392

TABLE 10: Stratigraphic distribution of vessel shapes. χ^2-computation

	Hole-mouthed jar	Slightly closed globular jar	Convex-walled open bowl	Open bowl with flaring wall	Total
Stratum C	59/50.4	113/121.0	88/ 92.4	25/21.3	285
Stratum B	78/65.3	173/156.6	93/119.6	25/27.5	369
Stratum A	48/69.3	158/166.4	158/127.0	28/29.2	392
Total	185	444	339	78	1046

$\chi^2 = 27.76$ df = 6 $\alpha = .001 \rightarrow 22.457$

TABLE 11: Stratigraphic distribution of surface finish types, according to vessel shape. Percentages

	Interior }smooth Exterior	Interior smooth Exterior burnished	Interior }burnished Exterior	Total
Hole-mouthed jar	43/15.6%	9/ 3.3%	8/ 2.9%	60
Slightly closed globular jar	89/32.2%	6/ 2.2%	10/ 3.6%	105
Convex-walled open bowl	56/20.3%	9/ 3.3%	20/ 7.2%	85
Open bowl with flaring wall	19/ 6.9%	1/ 0.3%	6/ 2.2%	26
Total	207/75.0%	25/ 9.0%	44/15.9%	276

11 a: Stratum C

	Interior }smooth Exterior	Interior smooth Exterior burnished	Interior }burnished Exterior	Total
Hole-mouthed jar	52/14.6%	6/ 1.7%	14/ 3.9%	72
Slightly closed globular jar	118/33.2%	18/ 5.1%	32/ 9.0%	168
Convex-walled open bowl	57/16.0%	13/ 3.7%	19/ 5.3%	89
Open bowl with flaring wall	15/ 4.2%	5/ 1.4%	7/ 6.0%	27
Total	242/68.0%	42/11.8%	72/20.2%	356

11 b: Stratum B

	Interior }smooth Exterior	Interior smooth Exterior burnished	Interior }burnished Exterior	Total
Hole-mouthed jar	35/ 9.2%	6/ 1.6%	7/ 1.8%	48
Slightly closed globular jar	114/30.1%	16/ 4.2%	20/ 5.3%	150
Convex-walled open bowl	110/29.0%	10/ 2.6%	34/ 9.0%	154
Open bowl with flaring wall	19/ 5.0%	3/ 0.8%	5/ 1.3%	27
Total	278/73.3%	35/ 9.2%	66/17.4%	379

11 c: Stratum A

TABLE 12: Stratigraphic distribution of the different rim shapes, according to vessel shape. Percentages

	Plain	Thickened	Thinned	Turned up/out	Total
Hole-mouthed jar	35/12.2%	12/ 4.2%	12/ 4.2%	2/ 0.7%	61
Slightly closed globular jar	60/21.0%	16/ 5.6%	27/ 9.4%	9/ 3.1%	112
Convex-walled open bowl	45/15.7%	11/ 3.8%	30/10.5%	1/ 0.3%	87
Open bowl with flaring wall	15/ 5.2%	5/ 1.7%	6/ 2.1%	0/ 0.0%	26
Total	155/54.2%	44/15.4%	75/26.2%	12/ 4.2%	286

a: Stratum C

	Plain	Thickened	Thinned	Turned up/out	Total
Hole-mouthed jar	49/13.5%	13/ 3.6%	10/ 2.7%	4/ 1.1%	76
Slightly closed globular jar	108/29.7%	25/ 6.9%	35/ 9.6%	2/ 0.5%	170
Convex-walled open bowl	61/16.8%	6/ 1.6%	22/ 6.0%	3/ 0.8%	92
Open bowl with flaring wall	17/ 4.7%	4/ 1.1%	4/ 1.1%	0/ 0.0%	25
Total	235/64.7%	48/13.2%	71/19.6%	9/ 2.5%	363

b: Stratum B

	Plain	Thickened	Thinned	Turned up/out	Total
Hole-mouthed jar	22/ 5.6%	8/ 2.0%	6/ 1.5%	12/ 3.1%	48
Slightly closed globular jar	90/23.0%	28/ 7.1%	29/ 7.4%	14/ 3.6%	161
Convex-walled open bowl	102/26.0%	11/ 2.8%	46/11.9%	1/ 0.3%	160
Open bowl with flaring wall	17/ 4.3%	1/ 0.3%	5/ 1.3%	0/ 0.0%	23
Total	231/58.9%	48/12.2%	86/21.9%	27/ 6.9%	392

c: Stratum A

TABLE 13: Stratigraphic distribution of rim shapes, according to vessel shape. χ^2-computation

	Plain	Thickened	Thinned	Turned up/out	Total
Stratum C	35/35.0	12/10.9	12/ 9.2	2/ 5.9	61
Stratum B	49/43.6	13/13.6	10/11.5	4/ 7.4	76
Stratum A	22/27.5	8/ 8.6	6/ 7.3	12/ 4.7	48
Total	106	33	28	18	185

a: Hole-mouthed jar. $\chi^2 = 18.632$ df = 6 $\alpha = .01 \rightarrow 16.812$
$\alpha = .001 \rightarrow 22.457$

	Plain	Thickened	Thinned	Turned up/out	Total
Stratum C	60/64.7	16/17.4	27/23.0	9/ 5.8	112
Stratum B	108/99.0	25/26.5	35/34.9	2/ 8.8	170
Stratum A	90/93.8	28/25.1	29/33.1	14/ 8.4	161
Total	258	69	91	23	443

b: Slightly closed globular jar. $\chi^2 = 16.393$ df = 6 $\alpha = .02 \rightarrow 15.033$
$\alpha = .01 \rightarrow 16.812$

	Plain	Thickened	Thinned	Turned up/out	Total
Stratum C	45/53.8	11/ 7.2	30/25.4	1/ 1.3	87
Stratum B	61/56.3	6/ 7.6	22/26.5	3/ 1.4	92
Stratum A	102/97.9	11/13.2	46/46.1	1/ 2.4	160
Total	208	28	98	5	339

c: Convex-walled open bowl. $\chi^2 = 7.924$ df = 6 $\alpha = .30 \rightarrow 7.213$
$\alpha = .20 \rightarrow 8.558$

	Plain	Thickened	Thinned	Turned up/out	Total
Stratum C	15/17.2	5/ 3.5	6/ 5.3	0/ 0.0	26
Stratum B	17/16.6	4/ 3.4	4/ 5.1	0/ 0.0	25
Stratum A	17/15.2	1/ 3.1	5/ 4.7	0/ 0.0	23
Total	49	10	15	0	74

d: Open bowl with flaring wall. $\chi^2 = 3.050$ df = 4 $\alpha = .50 \rightarrow 3.357$

	Plain	Thickened	Thinned	Turned up/out	Total
Stratum C	155/170.6	44/38.5	75/63.7	12/13.2	286
Stratum B	235/216.5	48/48.8	71/80.9	9/16.7	353
Stratum A	231/233.8	48/52.7	86/87.4	27/18.1	392
Total	521	140	232	48	

e: All rims, disregarding vessel shape. $\chi^2 = 15.633$ df = 6 $\alpha = .02 \rightarrow 15.033$
$\alpha = .01 \rightarrow 16.812$

TABLE 14: Stratigraphic distribution of base forms. Percentages

	Ring base	Flat	Plano-convex	Flat-footed	Total
Stratum C	22/57.9%	2/ 5.3%	13/34.2%	1/ 2.6%	38
Stratum B	36/58.1%	5/ 8.1%	14/22.6%	7/11.3%	62
Stratum A	83/83.0%	4/ 4.0%	5/ 5.0%	8/ 8.0%	100
Total	141/70.5%	11/ 5.5%	32/16.0%	16/ 8.0%	200

TABLE 15: Stratigraphic distribution of base forms. χ^2-computation

	Ring base	Flat	Plano-convex	Flat-footed	Total
Stratum C	22/26.8	2/ 2.1	13/ 6.1	1/ 3.0	38
Stratum B	36/43.7	5/ 3.4	14/ 9.9	7/ 5.0	62
Stratum A	83/70.5	4/ 5.5	5/16.0	8/ 8.0	100
Total	141	11	32	16	200
	χ^2= 24.80	df = 6	α = .001 → 22.461		

TABLE 16: Relationship between colour and vessel shape. Percentages

	Incompletely oxidised light	dark	Non-oxidised dark	Oxidised	Total
Hole mouthed jar	58/ 5.6%	91/ 8.7%	34/ 3.3%	4/ 0.4%	187
Slightly closed globular jar	131/12.5%	228/21.8%	68/ 6.5%	15/ 1.4%	442
Convex-walled open bowl	113/10.8%	174/16.7%	40/ 3.8%	14/ 1.3%	341
Open bowl with flaring wall	31/ 3.0%	31/ 3.0%	7/ 0.7%	6/ 0.6%	75
Total	333/31.9%	524/50.1%	149/14.3%	39/ 3.7%	1045

TABLE 17: Relationship between surface colour, oxidation of the core and vessel shape. Percentages

	Incompletely oxidised light (1)	Incompletely oxidised light (2)	Incompletely oxidised dark (1)	Incompletely oxidised dark (2)	Non-oxidised dark (1)	Non-oxidised dark (2)	Oxidised (1)	Oxidised (2)	Total
Hole-mouthed jar	37/19.8%	21/11.2%	75/40.1%	16/ 8.6%	15/8.0%	19/10.2%	4/2.1%	0/0.0%	187
Slightly closed globular jar	90/20.4%	41/ 9.3%	191/43.2%	37/ 8.4%	37/8.4%	31/ 7.0%	10/2.3%	5/1.1%	442
Convex-walled open bowl	74/21.7%	39/11.4%	127/37.2%	47/13.8%	9/2.7%	31/ 9.1%	11/3.2%	3/0.9%	341
Open bowl with flaring wall	21/28.0%	10/13.3%	24/32.0%	7/ 9.3%	3/4.0%	4/ 5.3%	4/5.3%	2/2.7%	75

(1) = oxidised core (2) = non-oxidised core

TABLE 18: Relationship between vessel shape and colour. χ^2-computation

	Incompletely oxidised light (1)	Incompletely oxidised light (2)	Incompletely oxidised dark (1)	Incompletely oxidised dark (2)	Non-oxidised dark (1)	Non-oxidised dark (2)	Oxidised (1)	Oxidised (2)	Total
Hole-mouthed jar	37/39.7	21/19.9	75/ 74.6	16/19.1	15/11.5	19/15.2	4/ 5.2	0/1.8	187
Slightly closed globular jar	90/93.9	41/46.9	191/176.4	37/45.3	37/27.1	31/36.0	10/12.3	5/4.2	442
Convex-walled open bowl	74/72.2	39/36.2	127/131.1	47/34.9	9/20.9	31/27.7	11/ 9.8	3/3.3	341
Open bowl with flaring wall	21/15.9	10/ 8.0	24/ 24.9	7/ 7.7	3/ 4.6	4/ 6.1	4/ 3.2	2/0.7	75
Total	222	111	417	107	64	85	29	10	1045

(1) = oxidised core (2) = non-oxidised core

χ^2 = 34.533 df = 21 α = .05 → 32.671

α = .02 → 36.343

TABLE 19: Relationship between oxidation of the core and vessel shape. Percentages

	(slightly) oxidised surface: oxidised core	(slightly) oxidised surface: non-oxidised core	Non-oxidised surface: oxidised core	Non-oxidised surface: non-oxidised core	Total
Hole-mouthed jar	125/11.8%	23/ 2.2%	16/ 1.5%	17/ 1.6%	181
Slightly closed globular jar	294/27.8%	101/ 9.5%	32/ 3.0%	28/ 2.6%	455
Convex-walled open bowl	212/20.0%	93/ 8.8%	9/ 0.8%	29/ 2.7%	343
Open bowl with flaring wall	52/ 4.9%	18/ 1.7%	3/ 0.3%	6/ 0.6%	80
Total	684/64.4%	235/22.2%	60/ 5.7%	80/ 7.6%	1059

TABLE 20: Relationship between oxidation of the core and vessel shape. χ^2-computation

	(slightly)oxidised surface		Non-oxidised surface		Total
	oxidised core	non-oxidised core	oxidised core	non-oxidised core	
Hole-mouthed jar	125/116.9	23/ 40.2	16/10.3	17/13.7	181
Slightly closed globular jar	294/293.9	101/101.0	32/25.8	28/34.4	455
Convex-walled open bowl	212/221.5	93/ 76.1	9/19.4	29/25.9	343
Open bowl with flaring wall	53/ 51.7	18/ 17.8	3/ 4.5	6/ 6.0	80
Total	684	235	60	80	1059

χ^2= 25.092 df = 9 α = .01 → 21.656

α = .001 → 27.877

TABLE 21: Relationship between wall thickness and vessel shape. Percentages

	< 5 mm	> 5 < 10 mm	> 10 mm	Total
Hole-mouthed jar	52/ 4.8%	141/13.1 %	0/ 0.0%	193
Slightly closed globular jar	177/16.4%	273/25.3%	6/ 0.6%	456
Convex-walled open bowl	155/14.4%	191/17.7%	2/ 0.2%	348
Open bowl with flaring wall	43/ 4.0%	36/ 3.3%	2/ 0.2%	81
Total	427/39.6%	641/59.5%	10/ 0.9%	1078

TABLE 22: Relationship between wall thickness and vessel shape. χ^2-computation

	< 5 mm	> 5 < 10 mm	> 10 mm	Total
Hole-mouthed jar	52/ 76.4	141/114.6	0/ 1.8	193
Slightly closed globular jar	177/180.6	273/271.1	6/ 4.2	456
Convex-walled open bowl	155/137.8	191/206.9	2/ 3.2	348
Open bowl with flaring wall	43/ 32.1	36/ 48.2	2/ 0.8	81
Total	427	641	10	1078

χ^2= 28.936 df = 6 α = .001 → 22.457

TABLE 23: Relationship between surface finish and vessel shape. Percentages

	Interior }smooth Exterior	Interior smooth Exterior burnished	Interior }burnished Exterior	Total
Hole-mouthed jar	133/12.9%	23/ 2.2%	32/ 3.1%	188
Slightly closed globular jar	333/32.2%	43/ 4.2%	62/ 6.0%	438
Convex-walled open bowl	227/22.0%	28/ 2.7%	76/ 7.4%	331
Open bowl with flaring wall	52/ 5.0%	8/ 0.8%	17/ 1.6%	77
Total	745/72.1%	102/ 9.9%	187/18.1%	1034

TABLE 24: Relationship between surface finish and vessel shape. χ^2-computation

	Interior }smooth Exterior	Interior smooth Exterior burnished	Interior }burnished Exterior	Int. burnished Ext. smooth	Total
Hole-mouthed jar	133/134.0	23/18.3	32/32.6	1/3.1	189
Slightly closed globular jar	333/316.9	43/43.4	62/79.5	9/7.2	447
Convex-walled open bowl	227/239.6	28/32.6	76/60.1	7/5.5	338
Open bowl with flaring wall	52/ 54.6	8/ 7.5	17/13.7	0/1.2	77
Total	745	102	187	17	1051

$\chi^2 = 16.152$ df = 9 α = .10 → 14.684

α = .05 → 16.919

TABLE 25: Relationship between rim shape and vessel shape. Percentages

	Plain	Thickened	Thinned	Turned up/out	Total
Hole-mouthed jar	109/10.3%	33/ 3.1%	29/ 2.7%	18/ 1.7%	189
Slightly closed globular jar	265/25.0%	72/ 6.8%	94/ 8.9%	25/ 2.4%	456
Convex-walled open bowl	212/20.0%	28/ 2.6%	98/ 9.2%	7/ 2.0%	345
Open bowl with flaring wall	50/ 4.7%	9/ 0.8%	15/ 1.4%	1/ 0.1%	75
Total	636/60.0%	142/13.4%	236/22.3%	51/ 4.8%	1065

TABLE 26: Relationship between rim form and vessel shape. χ^2-computation

	I. Plain				II. Thickened				Total
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	
Hole-mouthed jar	76/ 83.4	17/ 7.4	11/20.0	2/0.7	19/13.8	12/ 7.2	2/3.9	0/0.0	
Slightly closed globular jar	202/204.6	16/18.1	47/49.0	0/1.7	31/34.0	24/17.6	17/9.5	0/0.0	
Convex-walled open bowl	153/154.1	8/13.6	49/36.9	2/1.3	22/25.6	3/13.3	3/7.1	0/0.0	
Open bowl with flaring wall	42/ 33.8	1/ 3.0	7/ 8.1	0/0.2	7/ 5.6	2/2.9	0/1.6	0/0.0	
Total	476	42	114	4	79	41	22	0	

	II. Thickened				IV. Turned up/out				
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	
Hole-mouthed jar	18/32.6	8/2.6	2/ 5.6	1/0.5	16/ 6.7	0/0.2	1/1.9	1/0.2	189
Slightly closed globular jar	75/80.0	6/6.4	12/13.8	1/1.3	16/16.3	1/0.4	8/4.7	0/0.4	456
Convex-walled open bowl	79/60.2	1/4.9	17/10.4	1/1.0	5/12.3	0/0.3	2/3.6	0/0.3	345
Open bowl with flaring wall	14/13.2	0/1.1	1/ 2.3	0/0.2	1/2.7	0/0.1	0/0.8	0/0.1	75
Total	189	15	32	3	36	1	11	1	1065

χ^2=112.584 df = 30 α = .001 → 59.703

(1) = blunt lip (2) = flattened lip (3) = tapered lip (4) = rolled lip
Categories I.4, II.4, III.4, IV.2 and IV.4 have not been considered in the computation of χ^2.

TABLE 27: Relationship between surface colour and oxidation of the core. χ^2-computation

	Oxidised	Incompletely oxidised light	Incompletely oxidised dark	Non-oxidised	Total
Oxidised core	29/27.3	222/233.3	417/367.1	64/104.4	732
Non-oxidised core	10/11.7	111/ 99.7	107/156.9	85/ 44.6	313
Total	39	333	524	149	1045

27 a: All vessel shapes. $\chi^2 = 77.063$ df = 3 $\alpha = .001 \rightarrow 16.268$

	Oxidised	Incompletely oxidised light	Incompletely oxidised dark	Non-oxidised	Total
Oxidised core	4/ 2.6	37/ 37.5	75/ 58.9	15/22.0	131
Non-oxidised core	0/ 1.2	21/ 17.4	16/ 27.3	19/10.2	56
Total	4	58	91	34	187

27 b: Hole-mouthed jar $\chi^2 = 31.503$ df = 3 $\alpha = .001 \rightarrow 16.268$

	Oxidised	Incompletely oxidised light	Incompletely oxidised dark	Non-oxidised	Total
Oxidised core	10/11.1	90/97.2	191/169.2	37/50.5	328
Non-oxidised core	5/ 3.9	41/33.8	37/ 58.8	31/17.5	114
Total	15	131	228	68	442

27 c: Slightly closed globular jar $\chi^2 = 27.401$ df = 3 $\alpha = .001 \rightarrow 16.268$

	Oxidised	Incompletely oxidised light	Incompletely oxidised dark	Non-oxidised	Total
Oxidised core	11/ 9.1	74/73.2	127/112.8	9/25.9	221
Non-oxidised core	3/ 4.9	39/39.8	47/ 61.2	31/14.1	120
Total	14	113	174	40	341

27 d: Convex-walled open bowl. $\chi^2 = 37.542$ df = 3 $\alpha = .001 \rightarrow 16.268$

	Oxidised	Incompletely oxidised light	Incompletely oxidised dark	Non-oxidised	Total
Oxidised core	4/ 4.2	21/21.5	24/ 21.5	3/ 4.9	52
Non-oxidised core	2/ 1.8	10/ 9.5	7/ 9.5	4/ 2.1	23
Total	6	31	31	7	75

27 e: Open bowl with flaring wall $\chi^2 = 3.474$ df = 3 $\alpha = .50 \rightarrow 2.366$

$\alpha = .30 \rightarrow 3.665$

TABLE 28: Chronological Table

Site	No	Date BP
	LOWER MESOLITHIC	
Franchthi	P 1665	9477 ± 134
Franchthi	P 2227	9430 ± 160
Franchthi	P 2103	9300 ± 100
Franchthi	P 1522	9298 ± 130
Franchthi	P 2102	9290 ± 100
Franchthi	P 2230	9280 ± 110
Franchthi	P 2104	9270 ± 110
Franchthi	P 1519	9264 ± 144
Franchthi	P 2108	9250 ± 120
Franchthi	P 2229	9210 ± 110
Franchthi	P 2097	9150 ± 100
Franchthi	P 1398	9098 ± 139
Franchthi	P 2228	9060 ± 110
Franchthi	P 1517	9034 ± 108
Franchthi	P 1664	8941 ± 117
Franchthi	P 1518	8938 ± 100
Franchthi	P 1666	8742 ± 114
Franchthi	P 1518-A	8717 ± 110[1]
	UPPER MESOLITHIC	
Franchthi	P 2097	9152 ± 97
Franchthi	P 2106	8730 ± 90
Franchthi	P 2096	8710 ± 100
Franchthi	P 2107	8530 ± 90
Franchthi	P 1536	8189 ± 78
Franchthi	P 1526	8022 ± 76
Franchthi	P 1527	7897 ± 88
Sidari	GXO 770	7770 ± 340
	PRE POTTERY NEOLITHIC	
Argissa	UCLA 1657 A	8130 ± 100
Knossos X	BM 124	8050 ± 180
Argissa	UCLA 1657 B	7990 ± 90
Franchthi	P 2905	7981 ± 105
Franchthi	P 2095	7980 ± 110
Franchthi	P 2094	7930 ± 100
Knossos X	BM 278	7910 ± 140
Kythnos	GX 2837	7875 ± 500
Franchthi	P 1392	7794 ± 140

(contd)

Site	No	Date BP
Sesklo	P 1681	7755 ± 97
	EARLY NEOLITHIC I	
Knossos IX	BM 436	7740 ± 140
Franchthi	P 1525	7704 ± 81
Sidari	GXO 771	7670 ± 120
Sesklo	P 1679	7611 ± 83
Knossos IX	BM 272	7570 ± 150
Argissa	GrN 4145	7500 ± 90
Elateia	GrN 2973	7480 ± 70
Achilleion	P 2118	7470 ± 80
Sesklo	P 1678	7427 ± 78
Elateia	GrN 3037	7360 ± 90
Achilleion	LJ 3329	7360 ± 50
Achilleion	LJ 3184	7320 ± 50
	TRANSITIONAL EARLY NEOLITHIC I/II	
Nea Nikomedeia	Q 655	8180 ± 50[2]
Nea Nikomedeia	P 1202	7557 ± 91
Achilleion	LJ 3186	7290 ± 50
Nea Nikomedeia	P 1203 A	7281 ± 74
Achilleion	P 2117	7270 ± 80
	EARLY NEOLITHIC II	
Achilleion	LJ 3180	7550 ± 60[3]
Asfaka	(Higgs, 1966, p. 22)	7380 ± 240
Sidari	GXO 772	7340 ± 180
Franchthi	P 1667	7278 ± 86
Achilleion	LJ 3181	7240 ± 50
Elateia	GrN 3041	7190 ± 100
Achilleon	LJ 3325	7280 ± 50
Achilleion	LJ 3326	7260 ± 80
	EARLY NEOLITHIC III	
Elateia	GrN 3539	8240 ± 110[4]
Achilleion	P 2120	7340 ± 70
Achilleion	LJ 3328	7300 ± 50
Achilleion	LJ 3201	7210 ± 90
Franchthi	P 1399	7194 ± 112
Elateia	GrN 3502	7040 ± 130
Knossos V	BM 126	7000 ± 180
Franchthi	P 2093	6940 ± 90

(contd)

Site		No	Date BP
TRANSITIONAL EARLY NEOLITHIC III / MIDDLE NEOLITHIC			
Achilleion		LJ 2942	7200 ± 50
Achilleion		LJ 3327	7120 ± 60
Achilleion		LJ 2944	7020 ± 50
Achilleion		LJ 3182	6920 ± 50
(EARLY) NEOLITHIC			
Knossos VI		BM 273	6210 ± 150
Knossos V		BM 274	6140 ± 150
ANATOLIA			
Suberde II (lower)	PPN	P 1387	8276 ± 200
Suberde II (lower)	PPN	P 1391	8249 ± 91
Suberde II (lower)	PPN	P 1388	8176 ± 79
Suberde II (lower)	PPN	P 1389	7584 ± 85
Suberde II (upper)	PPN	P 1386	7995 ± 76
Suberde II (uuper)	PPN	P 1385	7905 ± 88
Hacilar	Aceramic	BM 127	8700 ± 180
Hacilar IX	Late Neo.	P 314	7340 ± 94
Hacilar VII	Late Neo.	BM 125	7770 ± 180[5]
Hacilar VI	Late Neo.	BM 48	7550 ± 180[6]
Hacilar VI	Late Neo.	P 313 A	7350 ± 85
Hacilar II	Early Chalc.	P 316	7170 ± 134
Hacilar I a	Early Chalc.	P 315	6990 ± 120
Can Hassan II	Early Chalc.E	P 795	6832 ± 78
Can Hassan II	Early Chalc.D	P 794	7033 ± 89
Can Hassan II	Early Chalc.C	P 793	6254 ± 78
Can Hassan II	Early Chalc.B	P 791	6755 ± 80
Can Hassan	Early Chalc.A	P 790	6830 ± 78
Can Hassan II	Early/Middle Chalcolithic	BM 153	7190 ± 150
Can Hassan II	Early/Middle Chalcolithic	BM 151	6880 ± 150
Catal Hüyük XII	Neolithic	P 1374	7757 ± 92[7]
Catal Hüyük X	Neolithic	P 782	8092 ± 98
Catal Hüyük X	Neolithic	P 1370	8036 ± 104
Catal Hüyük X	Neolithic	P 1369	7937 ± 109
Catal Hüyük X	Neolithic	P 1372	7915 ± 85
Catal Hüyük X	Neolithic	P 1371	7844 ± 102
Catal Hüyük IX	Neolithic	P 779	8190 ± 99[8]
Catal Hüyük VIII	Neolithic	P 1367	7853 ± 97
Catal Hüyük VIII	Neolithic	P 1366	7684 ± 90

(contd)

Site		No	Date BP
Catal Hüyük VII	Neolithic	P 778	7538 ± 89
Catal Hüyük VI B	Neolithic	P 777	7704 ± 91
Catal Hüyük VI B	Neolithic	P 797	7629 ± 90
Catal Hüyük VI B	Neolithic	P 781	7524 ± 90
Catal Hüyük VI A/B	Neolithic	P 827	7579 ± 86
Catal Hüyük VI A	Neolithic	P 1365	7729 ± 80
Catal Hüyük VI A	Neolithic	P 772	7572 ± 91
Catal Hüyük VI A	Neolithic	P 769	7505 ± 93
Catal Hüyük VI	Neolithic	P 1375	7661 ± 99
Catal Hüyük V	Neolithic	P 776	7640 ± 91
Catal Hüyük V	Neolithic	P 1361	7499 ± 93
Catal Hüyük II	Neolithic	P 796	7521 ± 77
CYPRUS PRE-POTTERY NEOLITHIC			
Khirokitia		St 415	7710 ± 160
Khirokitia		St 414	7540 ± 125
Khirokitia		St 416	7500 ± 160
Khirokitia		BM 853	7451 ± 81
Khirokitia		BM 854	7442 ± 61
Khirokitia		BM 855	7308 ± 74
Khirokitia		BM 852	7294 ± 78
Kalavasos		P 2548	8350 ± 200[9]
Kalavasos		P 2555	7430 ± 90
Kalavasos		P 2552	7250 ± 100
Kalavasos		P 2550	7180 ± 90
Kalavasos		P 2551	7140 ± 90
Kalavasos		P 2553	7110 ± 90

NOTES

1. Same as P 1518, but without NaOH pretreatment.
2. This date is generally considered to be too high.
3. This date is probably too high. Derived from a beam, which possible had been reused.
4. This date is generally considered too high.
5. Compared to the preceding date (which seems a little low, but quite possible) and the following date, this seems too high.
6. This date is considered to be too high. It comes from a beam, which possibly had been reused.
7. This date we suppose to be too low (coming from intrusive material?). It should be around 8100 BP.
8. This date is considered to be too high.
9. Compared to the other dates from the same area this date is far too high.

TABLE 29: Colour, thickness and non-plastics of the sherds that were examined in thin section

	Sesklo								Achilleion		
indication of sherd	5	8	14	29	79	89	22	212	D3-L21	A1-L33	A5
colour of fresh fracture											
2.5 YR[1]	3/2-4/4[2]		6/6		6/4			4/6	5/6		
5 YR						6/4-5/3	5-6/4				
7 YR				6/4							
7.5 YR										5-6/2	5-6/2
10 YR		7/3									
Thickness of sherd in cm											
0.3					0.3						
0.5 - 0.9	0.9	0.7	0.6					0.5			
1.1									1.1		
1.4 - 1.8				1.8		1.8	1.4			1.5	1.5
Non-plastics											
rather fine grained quartz-biotite schist	-	++	-	++	++	++					
quartz-biotite-epidote-feldspar schist	-	-		+							
quartz-epidote-muscovite schist	++		++	-	-	-					
very fine grained mica schist							++				
amphibole-muscovite-quartz rockfragments										++	+
quartz-sericite schist with sparty calcite											+
quartz grains 0.1 - 1.0 mm	+	+	+	+	-	++		++	++	+	-
calcite {micrite			+			++		++			
calcite {sparite											++
sherd grit				-			-		-		

1. Munsell colour notation for hue
2. Munsell colour notation for value/chroma

- few
+ several
++ much

TABLE 30: Distribution of faunal sample from various Early Neolithic sites in Greece. Percentages

Site	Wild	Domestic	Cattle	Sheep/goat	Pig	Dog	
Lerna I	4.30	95.70	17.60	50.60	26.50	1.00	Gejvall
Aghios Petros	2.93	97.07	6.80	82.58	7.58	0.32	Schwartz
Sesklo (1972)	10.30	89.70	11.70	60.60	17.80	0.60	Schwartz
Achilleion	4.99	95.01	5.51	74.89	13.60	0.94	Bökönyi
Argissa	0.92	99.08	4.76	84.15	9.49	0.18	Boessneck
Nea Nikomedeia	7.00	93.00	14.55	70.45	14.77	0.23	Higgs

TABLE 31: Distribution of Faunal Sample from Early Neolithic Sesklo, excavated during the 1972 season

	B(I)E	B 1972	section C	Pre-Pottery	Total
Cattle	25/43.1%	15/25.9%	18/31.0%		58
Sheep/goat	70/23.4%	115/38.3%	106/35.9%	9/3.0%	300
Pig, dom.	16/18.1%	29/32.6%	40/45.0%	4/4.5%	89
Dog	1	1	1		3
Red deer	2	4	7		13
Roe deer		4	3		7
Pig, wild	3	2			5
Hare	5	8	4		17
Badger		1			1
Bird			1		1
Crab	1				1
Total	123	179	180	13	495

TABLE 32: Distribution of faunal sample from Early Ceramic Sesklo, excavated during the 1972, 1976 and 1977 seasons in section C and B(I)E

Cattle	92	13.8%		
Sheep/goat	427	64.1%	666 domesticates	92.4%
Pig, dom.	144	21.6%		
Dog	3	0.4%		
Red deer	14	1.9%		
Roe deer	7	1.0%		
Badger	2	0.3%		
Lynx	1	0.1%	56 wild	7.6%
Hare	30	4.2%		
Tortoise	1	0.1%		

TABLE 33: Distribution of Faunal Sample from the Pre-Pottery at Sesklo, excavated during the 1972 and 1977 seasons in section C.

Cattle	21	23.1%		
Sheep/goat	58	65.7%	89 domesticates	100.0%
Pig, dom.	10	11.2%		

BIBLIOGRAPHY

Anastassiades, P.A., 1949: General features on the soils of Greece. *Soil Science 67:* 347 - 363.

Andel, T.H. van, Th. W. Jacobsen, J.B. Jolly and N. Lianos, 1980: Late Quaternary History of the Coastal Zone near Franchthi Cave, Southern Argolid, Greece. *Journal of Field Archaeology 7:* 389 - 403.

Angel, J.L. 1971: Early Neolithic skeletons from Catal Hüyük. *Anatolian Studies 21:* 77 - 99.

Aubouin, J., 1959: Les confins de l'Epire et de la Thessalie. *Annales Géologiques des Pays Helléniques X:* 1 - 526.

Aupert, P., 1975: Chronique des Fouilles en 1974. Grotte de Franchti. *Bulletin de Correspondance Hellénique 99:* 618 - 621.

Biesantz, H., 1959: Bericht über die Ausgrabungen in Thessalien 1958 II: Die Ausgrabung bei der Soufli-Magula. *Archäologischer Anzeiger:* 56 - 74.

Bintliff, J.L., 1976: The plain of Western Macedonia and the Neolithic site of Nea Nikomedeia. *Proceedings of the Prehistoric Society 42:* 241 - 262.

Bintliff, J.L., 1977: *Natural Environment and Human Settlement in Prehistoric Greece.* British Archaeological Reports, Supplementary Series 28. Oxford.

Bittel, K., 1969-70: Bemerkungen über die prähistorische Ansiedlung auf dem Fikirtepe bei Kadiköy (Istanbul). *Instanbuler Mitteilungen 19/20.* 1 - 20.

Blegen, C.W., 1954: Excavations at Pylos. *American Journal of Archaeology 58:* 27 - 32.

Blegen, C.W., 1975: Neolithic Remains at Nemea. *Hesperia 44:* 224 - 227.

Boessneck, J., 1962: "Die Tierreste aus der Argissa-Magula von präkeramischen Neolithikum bis zur mittleren Bronzezeit." In: Milojčić, Boessneck und Hopf, 1962: 27 - 99.

Bokönyi, S., 1969: "Archeaological problems of recognizing animal domestication". In: Ucko and Dimbleby (eds.) 1969: 219 - 230.

Bökönyi, S., 1973 "Stockbreeding." In: Theocharis 1973a: 165 - 178.

Bökönyi, S., 1977: *Animal remains from the Kermanshah Valley, Iran.* British Archaeological Reports, Supplementary Series 34. Oxford.

Bottema, S., 1967: A Late Quaternary Pollen Diagram from Ioannina, Northwestern Greece. *Proceedings of the Prehistoric Society 33:* 26 - 29.

Bottema, S., 1974: *Late Quaternary Vegetation History of Northwestern Greece.* Thesis. Groningen.

Bottema, S., 1978: "The Late Glacial in the Eastern Mediterranean and the Near East." In: Brice (ed.) 1978: 15 - 28.

Bottema, S., 1980: Pollen analytical investigations in Thessaly (Greece). In press.

Braidwood, R.J., 1969: The earliest village communities of Southwest Asia reconsidered. *Prehistoric Agriculture 1971:* 236 - 251.

Braidwood, R.J. and B. Howe, 1960: *Prehistoric investigations in Iraqi Kurdistan.* Chicago: University of Chicago Press.

Brice, W.C., (ed.), 1978: *The environmental History of the Near and Middle East since the last Ice Age.* London: Academic Press.

Buchholz, H.G. and V. Karageorgis, 1971: *Altägäis und Altkypros.* Tübingen: Wasmuth.

Butzer, K.W., 1957: Late Glacial and Postglacial Climatic Variations. *Erdkunde 11:* 21 - 35.

Butzer, K.W., 1972: *Environment and Archaeology.* London: Methuen 2nd revised edn.

Cann, J.R. and C. Renfrew, 1964: The characterization of Obsidian and its application in the Mediterranean region. *Proceedings of the Prehistoric Society 30:* 111 - 133.

Caskey, J.L., 1954: Excavations at Lerna 1952/53. *Hesperia 23:* 3 - 30.

Caskey, J.L., 1955: Excavations at Lerna 1954. *Hesperia 24:* 25 - 49.

Caskey, J.L., 1956: Excavations at Lerna 1955. *Hesperia 25:* 147 - 173.

Caskey, J.L., 1957: Excavations at Lerna 1956. *Hesperia 26:* 142 - 162.

Caskey, J.L., 1958: Excavations at Lerna 1957. *Hesperia 27:* 125 - 140.

Caskey, J.L., 1959: Activities at Lerna 1958/59. *Hesperia 28:* 202 - 207.

Childe, V.G., 1925: *The dawn of European Civilization*. London: Routledge and Kegan Paul. (6th revd. edn. 1957).

Childe, V.G., 1950: *Prehistoric Migrations in Europe*. Oslo: Aschehaug.

Childe, V.G., 1958: *The prehistory of European Society*. Harmondsworth: Penguin.

Clark, J.G.D., 1965: Radiocarbon dating and the expansion of farming culture from the Near East over Europe. *Proceedings of the Prehistoric Society 31:* 58 - 73.

Clarke, D.L., 1978: *Mesolithic Europe, the Economic Base*. London: Duckworth. (originally in: G. de G. Sieveking et al. (eds.) 1976: Problems in Economic and Social Archaeology, London: Duckworth.)

Clason, A., 1977: Die Tierknochen. *Analecta Praehistorica Leidensia X:* 101 - 116.

Cornwall, I.W., 1958: *Soils for the Archaeologist*. London: Phoenix.

Crabtree, D.E., 1972: *An Introduction to Flintworking*. Pocatello, Idaho: Idaho State University Papers 28.

Dennell, R., 1978: *Early Farming in South Bulgaria from the 6th to the 3rd Millennia B.C.* British Archaeological Reports, Supplementary Series 45. Oxford.

Ehrich, R.W., (ed.), 1965: *Chronologies in Old World Archaeology*. Chicago: University of Chicago Press.

Eisma, D., 1978: "Stream deposition and erosion by the Eastern shore of the Aegean." In: Brice (ed.) 1978: 67 - 81.

Elsker, E., 1976: "The Chipped Stone Industry." In: Gimbutas 1976: 257 - 278.

Evans, Sir Arthur, 1921: *The Palace of Minos at Knossos I*. London: MacMillan and Co.

Evans, J.D., 1964: Excavations in the Neolithic settlement of Knossos, 1957 - 60, Part I. *British School Annual 59:* 132 - 240.

Evans, J.D., 1970: The significance of the Knossos Early Neolithic I culture for Aegean Prehistory. *Actes du 7e Congrès International des Sciences Préhistoriques et Protohistoriques (1966):* 381- 384.

Evans, J.D. 1971: Neolithic Knossos; the Growth of a Settlement. *Proceedings of the Prehistoric Society 37, part 2:* 95 - 118.

Flannery, K.V., 1969: "Origins and ecological effects of early domestication in Iran and the Near East." In: Ucko and Dimbleby (eds) 1969: 73 - 100.

French, D.H., 1965: Early Pottery sites from West Anatolia. *Bulletin of the Institute of Archaeology 5:* 15 - 25.

French, D.H., 1966: Some problems in Macedonian Prehistory. *Balkan Studies 7:* 103 - 110.

French, D.H., forthcoming: *A survey of prehistoric sites in Thessaly*.

French, D.H. et al., 1972: "Excavations at Can Hasan III, 1969 - 1970." In: E.S. Higgs (ed) 1972: *Papers in Economic Prehistory*. Cambridge: Cambridge University Press: 181 - 190.

Frost, G., 1978: *Geological structure of the Volos region, Greece*. Unpubl. thesis. Edinburgh.

Furness, A., 1953: The Neolithic Pottery of Knossos. *British School Annual 48:* 94 - 134.

Gallis, C.J., 1975: Cremation Burials since Early Neolithic Age in Thessaly. *Athens Annals of Archaeology 8:* 241 - 258.

Gejvall, N.G. 1969: *Lerna, a Preclassical site in the Argolid, Vol. I: The Fauna*. Princeton: Princeton University Press.

Gimbutas, M., 1974a: Achilleion: A Neolithic mound in Thessaly. Preliminary Report on the 1973/1974 excavations. *Journal of Field Archeology vol. 1:* 277 - 303.

Gimbutas, M., 1974b: *The Gods and Goddesses of Old Europe*. London: Methuen.

Gimbutas, M. (ed.), 1976: *Neolithic Macedonia*. Los Angeles: University of California Press.

Goldman, H., 1940: The Acropolis of Halae. *Hesperia 9:* 381 - 514.

Greig, J.R.A. and J. Turner, 1974: Some Pollen diagrams from Greece and their Archaeological Significance. *Journal of Archaeological Science 1:* 177 - 194.

Grundman, K., 1932: Aus neolithischen Siedlungen bei Larisa. *Athenische Mitteilungen 57:* 102 - 123.

Grundmann, K., 1937: Magula Hadzimissiotiki: Eine steinzeiltiche Siedlung im Karla-See. *Athenische Mitteillungen 62:* 56 - 69.

Halstead, P., 1981: "Counting sheep in Neolithic and Bronze Age Greece." In: I. Hodder, G. Isaac and N. Hammond (eds): Pattern of the past: Studies in honour of David Clarke: 307 - 339.

Halstead, P. and G. Jones, 1980: Early Neolithic economy in Thessaly. *Anthropologika 1:* 93 - 118.

Hansen, J. and J.M. Renfrew, 1978: Palaeolithic - Neolithic seed remains at Franchti Cave, Greece. *Nature 271:* 349 - 352.

Hanschmann, E., 1977: cf. Milojčić, V. und E. Hanschmann, 1977.

Helbaek, H., 1964: First Impressions of the Catal Hüyük Plant Husbandry. *Anatolian Studies 14:* 121 - 124.

Heurtley, W.A., 1939: *Prehistoric Macedonia*. Cambridge: University Press.

Higgs, E.S., 1978: "Environmental changes in Northern Greece." In: Brice (ed.) 1978: 41 - 50.

Higgs, E.S. S.I. Dakaris and R.W. Hey, 1964: The climate, environment and industries of Stone Age Greece, Part I. *Proceedings of the Prehistoric Society 30:* 199 - 245.

Higgs, E.S. and C. Vita-Finzi, 1966: The climate, environment and industries of Stone Age Greece, Part II. *Proceedings of the Prehistoric Society 32:* 1 - 29.

Hodges, H., 1964: *Artifacts, an introduction to early materials and technology*. London: J. Baker.

Hole, F. and K.V. Flannery, 1967: The Prehistory of Southwestern Iran: A Preliminary Report. *Proceedings of the Prehistoric Society 33:* 147 - 206.

Hole, F., K.V. Flannery and J.A. Neely, 1969: *Prehistory and Human Ecology of the Deh Luran plain*. Ann Arbor: University of Michigan Press.

Honea, K., 1975: Prehistoric remains on the island of Kythnos. *American Journal of Archaeology 79:* 277 - 279.

Hopf, M., 1962: "Bericht über die Untersuchung von Samen und Holzkohlenresten von der Argissa-Magula aus den präkeramischen bis mittelbronzezeitliche Schichten." In: Milojčić, Boessneck and Hopf, 1962: 101 - 110.

Hopf, M., 1962b: Nutzpflanzen vom Lernäischen Golf. *Jahrbuch Römisches und Germanisches Zentralmuseum Mainz 9:* 1 - 19.

Hourmouziades, G.Ch., 1969a: Newsletter from Thessaly. *Athens Annals of Archaeology 2:* 93 - 95. (In Greek, English summary).

Hourmouziades, G.Ch., 1969b: Newsletter from Thessaly. *Athens Annals of Archaeology 2:* 169 - 172. (In Greek, English summary).

Hourmouziades, G., 1971: Dio nee enkatastasis tis archaeoteras Neolithikis is tin Ditikin Thessalian. *Athens Annals of Archaeology 4:* 164 - 175. (In Greek, English summary).

Hourmouziades, G., 1972: Anaskaphe is ton Prodromon Karditsis. *Archaeologikon Deltion 27 B2:* 394 - 396. (In Greek).

Hourmouziades, G.Ch., 1973: *I anthropomorphi Idoloplastiki tis Neolithikis Thessalias*. Athens. (In Greek).

Hubbard, R.N.L., 1979: "Ancient Agriculture and Ecology at Servia." In: C.C. Ridley and K.A. Wardle, 1979: 226 - 228.

Jacobson, T.W., 1969: Excavations at Porto Cheli and vicinity. Preliminary Report II: The Franchti Cave 1967 - 1968. *Hesperia 38:* 343 - 381.

Jacobson, T.W., 1970: Excavations in the Franchti Cave. *Archeologikon Deltion 25 Chronika:* 169 - 172.

Jacobsen, T.W., 1973a: Excavations in the Franchti Cave 1969 - 1971, Part I. *Hesperia 42:* 45 - 89.

Jacobsen, T.W., 1973b: Excavations in the Franchti Cave 1969 - 1971, Part II. *Hesperia 42:* 253 - 283.

Jacobsen, T.W., 1974: New Radiocarbondates from Franchti Cave: A preliminary Note Regarding Collection of Samples by Means of Flotation. *Journal of Field Archaeology 1:* 303 - 304.

Jacobsen, T.W. and D.M. Van Horn, 1974: The Franchti Cave Flint Survey: Some Preliminary Results. *Journal of Field Archaeology 1:* 304 - 308.

Kraft, J.C., G.R. Rapp Jr. and S.E. Aschenbrenner, 1980: Late Holocene Palaeogeomorphic Reconstructions in the Area of the Bay of Navarino: Sandy Pylos. *Journal of Archeological Science 7:* 187 - 210.

Lamb, H.H., P.W. Lewis and A. Woodroffe, 1966: "Atmospheric circulation and the main climate variables between 8000 and 0 B.C.: meteorological evidence." In: World Climate from 8000 to 0 B.C. London: 174 - 217.

Lambert, N., 1974: Grotte de Kitsos (Lavrion.) *Bulletin de Correspondance Hellénique 98:* 723 - 758.

Lavezzi, John D., 1978: Prehistoric Investigations at Corinth. *Hesperia 47:* 402 - 451.

Leake, W.M., 1835: *Travels in Northern Greece IV*. London.

Limbrey, S., 1975: *Soil Science and Archaeology*. London.

Lolling, H.G., 1884: Mitteilungen aus Thessalien I. Ormenion und Aisoneia. *Athenische Mitteilungen 9:* 97 - 116.

Loy, W.G. and H.E. Wright Jr., 1972: "The physical setting." In: McDonald and Rapp (eds.) 1972: 37 - 46.

McDonald, W. and R. Hope Simpson, 1961: Prehistoric Habitation in the Southwestern Peleponnese. *American Journal of Archaeology 65:* 221 - 260.

McDonald, W. and G. Rapp (eds.) 1972: *The Minnesota Messenia Expedition: Reconstruction of a Bronze Age Environment*. Minneapolis: University of Minnesota Press.

Mackenzie, D., 1903: The pottery of Knossos. *Journal of Hellenic Studies 23:* 157 - 205.

Mellaart, J., 1959: Excavations at Hacilar, Second Preliminary Report 1959. *Anatolian Studies IX:* 51 - 66.

Mellaart, J., 1960: Excavations at Hacilar, Third Preliminary Report 1959. *Anatolian Studies X:* 83 - 105.

Mellaart, J., 1961a: Early Cultures of the South Anatolian Plateau. *Anatolian Studies XI:* 159 - 185.

Mellaart, J., 1961b: Excavations at Hacilar. Fourth Preliminary Report 1960. *Anatolian Studies XI:* 39 - 75.

Mellaart, J., 1962: Excavations at Catal Hüyük, First Preliminary Report 1961. *Anatolian Studies XII:* 41 - 65.

Mellaart, J., 1963: Excavations at Catal Hüyük, Second Preliminary Report 1962. *Anatolian Studies XIII:*43 - 104.

Mellaart, J., 1964: Excavations at Catal Hüyük, Third Preliminary Report 1963. *Anatolian Studies XIV:* 39 - 121.

Mellaart, J., 1966: Excavations at Catal Hüyük 1965; Fourth Preliminary Report. *Anatolian Studies XVI:* 165 - 191.

Mellaart, J., 1967: *Catal Hüyük, A Neolithic Town in Anatolia*. London: Thames and Hudson.

Mellaart, J., 1970a: *Excavations at Hacilar*. Edinburgh: Edinburgh University Press.

Mellaart, J., 1970b: "(a)The earliest settlements in Western Asia, from the ninth to the end of the fifth millennium B.C. (b) Anatolia before 4000 B.C." In: The Cambridge Ancient History, Vol. I, Part 1: Chapter VII 248 - 326.

Mellaart, J., 1975: *The Neolithic of the Near East*. London: Thames and Hudson.

Mellink, M., 1970: Archaeology in Asia Minor. *American Journal of Archaeology 74:* 157 - 178.

Mellink, M., 1972: Archaeology in Asia Minor. *American Journal of Archaeology 76:* 165 - 188.

Michaud, J.P., 1974: Chronique des fouilles en 1973; Grotte de Franchti. *Bulletin de Correspondance Hellénique 98:* 610 - 612.

Miller, S.G., 1975: Excavations at Nemea. *Hesperia 44:* 143 - 172.

Milojčić, V., 1949: *Chronologie der jüngeren Steinzeit Mittel- und Südosteuropas*. Berlin.

Milojčić, V., 1950/51: Zur Chronologie der jüngeren Steinzeit Griechenlands. *Jahrbuch des deutschen archäologischen Instituts 65/66:* 1 -90.

Milojčić, V., 1954: Vorbericht über die Versuchungen an der Otzaki-Magula bei Larisa. *Archäologischer Anzeiger: 1 - 28.*

Milojčić, V., 1955a: Vorbericht über die Ausgrabung auf der Otzaki-Magula *Archäologischer Anzeiger: 157 - 181.*

Milojčić, V., 1955b: Vorbericht über die Ausgrabungen auf den Magulen von Otzaki, Arapi und Gremnos bei Larisa. *Archäologischer Anzeiger:* 182 - 231.

Milojčić, V., 1956: Die erste präkeramische bäuerliche Siedlung der Jungsteinzeit in Europa. *Germania 34:* 208 - 210.

Milojčić, V., 1959: Ergebnisse der deutschen Ausgrabungen in Thessalien, 1953 - 1958. *Jahrbuch Römisches und Germanisches Zentralmuseum Mainz 6:* 10 - 56.

Milojčić, V., 1960: Präkeramisches Neolithikum auf der Balkanhalbinsel. *Germania 38:* 320 - 335.

Milojčić, V., 1965: "Ausgrabungen in Thessalien." In: Neue deutsche Ausgrabungen im Mittelmeergebiet und im Vorderen Orient: 225 - 236.

Milojčić, V., J. Boessneck and M. Hopf, 1962: *Die deutschen Ausgrabungen auf der Argissa-Magula in Thessalien I. Das präkeramischen Neolithikum, sowie Tier- und Pflanzenreste*. Bonn: Habelt.

Milojčić, V., J. Boessneck, D. Jung and H. Schneider, 1965: *Paläolithikum um Larisa in Thessalien*. Bonn: Habelt.

Milojčić, V. and J. Milojčić-von Zumbusch, 1971: *Die deutschen Ausgrabungen auf der Otzaki-Magula in Thessalien I. Das frühe Neolithikum*. Bonn: Habelt.

Milojčić, V., A. van den Driesch, K. Enderle, J. Milojčić-von Zumbusch and K. Kilian, 1976: *Magulen um Larisa 1966*. Bonn: Habelt.

Milojčić, V. and E. Hanschmann, 1977: *Die deutschen Ausgrabungen auf der Arissa-Magula in Thessalien II. Frühe und beginnende mittlere Bronzezeit*. Bonn: Habelt.

Murray, J., 1970: *The first European Agriculture*. Edinburgh: Edinburgh University Press.

Nandris, J., 1970: The development and relationships of the earlier Greek Neolithic. *Man V:* 192 - 213.

Papadopoulou, M.G., 1958: Magoulitsa, Neolithikos Synikismos para tin Karditsan. *Thessalika 1:* 39 - 49.

Payne, S., 1972: "Can Hasan III, The Anatolian Aceramic and the Greek Neolithic." In: E.S. Higgs, 1972: *Papers in Economic Prehistory*. Cambridge: Cambridge University Press: 191 - 194.

Perkins, D., 1969: Fauna of Catal Hüyük: Evidence for early Cattle Domestication in Anatolia. *Science N.Y. 144:* 177 - 179.

Philippson, A., 1950/59: *Die griechische Landschaften. 5 Vols*. Ed. E. Kirsten, Frankfurt: Vittorio Klostermann.

Quitta, H., 1971: "Der Balkan als Mittler zwischen Vorderem Orient und Europa." In: F. Schlette (ed.) 1971: Evolution und Revolution im Alten Orient und in Europa. Berlin: Akademie Verlag: 38 - 63.

Read, C.A., 1969: "The pattern of Animal Domestication in the Prehistoric Near East." In: Ucko and Dimbleby (eds.) 1969: 361 - 380.

Renfrew, C., 1972: *The emergence of Civilization*. London: Methuen.

Renfrew, C., 1973: "Trade and Craft Specialization." In: Theocharis 1973a 179 - 200.

Renfrew, C., J.R. Cann and J.E. Dixon, 1965: Obsidian in the Aegean. *British School Annual 60:* 225 - 247.

Renfrew, C., J.E. Dixon and J.R. Cann, 1968: Further analysis of Near Eastern Obsidians. *Proceedings of the Prehistoric Society 34:* 319 - 331.

Renfrew, J., 1966: A report on recent finds of carbonized cereal grains and seeds from Prehistoric Thessaly. *Thessalika 5:* 21 - 36.

Renfrew, J.M., 1960: "The archaeological evidence for the domestication of plants: methods and problems." In: Ucko and Dimbleby (eds.) 1969: 149 - 172.

NeolithicRenfrew, J.M., 1973: "Agriculture." In: Theocharis 1973a: 147 - 163.

Ridley, C. and K.A. Wardle, 1979: Rescue excavations at Servia 1971 - 1973, a preliminary Report. *British School Annual 74:* 185 - 230.

Rhomniopoulou, K. and C. Ridley, 1973: Excavations at Servia 1972. *Athens Annals of Archaeology 6:* 419 - 426.

Rhomniopoulou, K. and C. Ridley, 1974: Excavations at Servia 1973. *Athens Annals of Archaeology 7:* 351 - 360.

Robinson, H.S., 1976: Excavations at Corinth: Temple Hill 1968 - 1972. *Hesperia 45:* 203 - 239.

Rodden, R.J., 1962: Excavations at the Early Neolithic site at Nea Nikomedeia, Greek Macedonia (1961 season). *Proceedings of the Prehistoric Society 28:* 267 - 288.

Rodden, R.J., 1964: Recent discoveries from Prehistoric Macedonia: An interim Report. *Balkan Studies 5:* 109 - 124.

Rodden, R.J., 1965: "An Early Neolithic Village in Greece." In: C.C. Lamberg-Karlovsky (ed.), 1972 *Old World Archaology: Foundations of Civilisation.* San Francisco: Freeman and Co: 95 - 103.

Schachermeyr, F., 1955: *Die ältesten Kulturen Griechenlands.* Stuttgart: Kohlhammer Verlag.

Schmandt-Besserat, D., 1974: The use of clay before pottery in the Zagros. *Expedition 16:* 11 - 18.

Schmandt-Besserat, D., 1977a: The earliest uses of clay in Syria. *Expedition 19:* 28 - 43.

Schmandt-Besserat, D., 1977b: The invention of writing. *Discovery 1:* 4 -9.

Schmandt-Besserat, D., 1977c: The beginning of the use of clay in Turkey. *Anatolian Studies XXVII:* 133 - 150.

Schmandt-Besserat, D., 1978: The earliest precursor of writing. *Scientific American (June):* 38 - 48.

Schneider, H.J., 1968: *Quartärgeologische Entwicklungsgeschichte Thessaliens.* Bonn: Habelt.

Semenov, S.A., 1973 *Prehistoric Technology.* (third ed.). London: Cory, Adams and Mackay.

Shepard, A.O., 1976: *Ceramics for the Archaeologist* (ninth printing). Washington D.C.: Carnegie Institution.

Singh, P., 1974: *Neolithic Cultures of Western Asia.* London: Seminar Press.

Smoor, B., 1976: "(a) Polished Stone Tools. (b) Bone Tools." In: Gimbutas (ed.) 1976: 177 - 197.

Sordinas, A., 1968: *The Prehistory of the Ionean Islands – the Flint and the Pottery.* Thesis, unpubl. MS. Harvard.

Sordinas, A., 1969: Investigations of the Prehistory of Corfu, 1964 - 1966. *Balkan Studies 10:* 393 - 424.

Soteriades, G., 1912: Fouilles préhistoriques en Phocide. *Revue des Etudes Greques 25:* 253 - 299.

Srejovič, D., 1969: *Lepenski Vir.* Beograd.

Stählin, F., 1924: *Das Hellenische Thessalien.* Stuttgart.

Starkel, L., 1966: "The moulding of European Relief." In: Word Climate from 8000 to 0 B.C. London: 15 - 33.

Theocharis, D.R., 1956: Nea Makri, eine grosze neolithische Siedlung in der Nähe von Marathon. *Athenische Mitteilungen 71:* 1 - 29.

Theocharis, D.R., 1957: E Archè tou Politismou en Sesklοϊ. *Praktika tis Akademias Athinon 32:* 151 - 159. (in Greek).

Theocharis, D.R., 1958: Ek tis Prokeramikís Thessalías. *Thessalika 1:* 70 - 86. (in Greek).

Theocharis, D.R., 1959: Pyrasos. *Thessalika 2:* 29 - 68. (in Greek).
Theocharis, D.R., 1960: Topografike Erevne. *Archeologikon Deltion 16, Chronika:* 185 - 186. (in Greek).
Theocharis, D.R., 1961: Tycheia Erevmata. 9: Magoula Demerli. *Archeologikon Deltion 17, Chronika:* 178 - 179 (in Greek).
Theocharis, D.R., 1962a: Anaskafè en Sesklоï. *Praktika tis Archeologikis Eterías:* 24 - 35. (in Greek).
Theocharis, D.R., 1962b: Apo ti Neolithikì Thessalía. I. *Thessalika 4:* 63 - 83. (in Greek).
Theocharis, D.R., 1963: Anaskafè en Sesklоï. *Praktika tis Archeologikis Eterías:* 40 - 44. (in Greek).
Theocharis, D.R., 1964: Bournarbasi. *Archeologikon Deltion 19, Chronika:* 262. (in Greek).
Theocharis, D.R., 1965a: Anaskafè en Sesklоï. *Praktika tis Archeologikis Eterías:* 5 - 10. (in Greek).
Theocharis, D.R., 1965b: Proïstorike Synikismì ke Evrímata. *Archeologikon Deltion 20, Chronika:* 319. (in Greek).
Theocharis, D.R., 1966: Anaskafè en Sesklоï. *Praktika tis Archeologikis Eterías:* 5 - 8. (in Greek).
Theocharis, D.R., 1967: *I Avghi tis Thessalikis Proïstorías: Archì ke proïmì Exelíxi tis Neolithikís.* Volos: Philarcheos Etería; Bonn: Habelt. (in Greek, English Summary).
Theocharis, D.R., 1968: Anaskafè en Sesklоï. *Praktika tis Archeologikis Eterías:* 24 - 31. (in Greek).
Theocharis, D.R., 1970: Anaskafì epi tis Nisidos tou Agiou Petrou. *Archeologikon Deltion 25 Chronika:* 271 - 277.
Theocharis, D.R., 1971a: Anaskafè en Sesklоï. *Praktika tis Archeologikis Eterías:* 15 - 19 (in Greek).
Theocharis, D.R., 1971b: Prehistory of Eastern Macedonia and Thrace. *Ancient Greek Cities 9.*
Theocharis, D.R., 1972: Anaskafì en Sesklоï. *Praktika tis Archeologikis Eterías:* 8 - 11. (in Greek).
Theocharis, D.R., 1973a: *Neolithic Greece.* Athens: National Bank of Greece.
Theocharis, D.R., 1973b: Anaskafì en Sesklоï. *Praktika tis Archeologikis Eterías:* 22 - 25.
Theocharis, D.R., 1974: "Prehistory and Protohistory." *History of the Hellenic World I.* Athene: Edoktiki Athinon: 18 - 28; 32 - 79.
Theocharis, D.R., 1976: Anaskafì en Sesklоï. *Praktika tis Archeologikis Eterías:* 154 - 162 (in Greek).
Todd. I.A. 1966: Asikli Hüyük, a Protoneolithic site in Central Anatolia. *Anatolian Studies 16:* 139 - 164.
Tringham, R., 1971: *Hunters, Fishers and Farmers of Eastern Europe.* London: Hutchinson University Library.
Turner, J. and J.R.A. Greig, 1975: Some Holocene Pollen diagrams from Greece. *Review of Paleobotany and Palynology 20:* 171 - 204.
Ucko, P.J. and G.W. Dimbleby (eds.) 1969: *The Domestication and Exploitation of Plants and Animals.* London: Duckworth.
Vita-Finzi, C., 1969: *The Mediterranean Valleys.* Cambridge: Cambridge University Press.
Vitelli, K.D., 1977: Neolithic Potter's Marks from Lerna and the Franchti Cave, *Journal of Walters Art Gallery 36:* 17 - 30.
Voliotis, D., 1973: Beziehungen zwischen Klima, Boden und Vegetation und Vegetations-zonen in Griechenland. *Scientific Annals. Fac. Phys. and Mathem. Univ. Thessaloniki 13.*
Vriezen, K.J.H., 1977: Die Gefäsze der Chamergruppe. *Analecta Praehistorica Leidensia X:* 77 - 100.
Wace, A.J.B. and M.S. Thompson, 1912: *Prehistoric Thessaly.* Cambridge: University Press.
Walker-Kosmopoulos, L., 1948: *The Prehistoric inhabitation of Corinth.* (3 vols). München: Münchner Verlag.
Walther, H. und H. Lieth, 1964: *Klimadiagramm-Weltatlas.* 1e Lieferung 1960. 2e Lieferung 1964, Jena.
Warren, P., M.R. and H.N. Jarman, N.J. Shackleton and J.D. Evans, 1968: Knossos Neolithic, Part II. *British School Annual 63:* 239 - 276.
Waterbolk, H.T. 1971: Working with Radiocarbon Dates. *Proceedings of the Prehistoric Society 37, part II:* 15 - 33.

Watson, J.P. N., 1979: "Faunal remains." In: C.C. Ridley and K.A. Wardle 1979: 228 - 29.

Weinberg, S.S., 1937: Remains from Prehistoric Corinth. *Hesperia 6:* 487 - 52.

Weinberg, S.S., 1942: The Cronology of the Neolithic Period and the Early Bronze Age in the Aegean. *American Journal of Archaeology 46:* 121.

Weinberg, S.S., 1947: Aegean Cronology: Neolithic Period and Early Bronze Age. *American Journal of Archaeology 51:* 165 - 182.

Weinberg, S.S., 1948: A cross-section of Corinthian Antiquities. *Hesperia 17:* 197 - 241.

Weinberg, S.S., 1962: Excavations at Prehistoric Elateia, 1959. *Hesperia 31:* 158 - 209.

Weinberg, S.S., 1965: "The Relative Chronology of the Aegean in the Neolithic Period and the Early Bronze Age." In: Ehrich 1965: 86 - 107.

Weinberg, S.S., 1970 "The Stone Age in the Aegean." In: Cambridge Ancient History, Vol. I, Part 1: Chapter X 557 - 618.

Weinberg, S.S. and H. Robinson, 1960: Excavations at Corinth 1959. *Hesperia 29:* 225 - 253.

Williams II, C.K., J. MacIntosh and J.E. Fisher, 1974: Excavations at Corinth 1973. *Hesperia 43:* 1 - 76.

Wright, G.A., 1969: *Obsidian analysis and Prehistoric Near Eastern Trade 7500 - 3500 B.C.* Ann Arbor: University of Michigan Press.

Zeist, W. van, 1967: Late Quaternary Vegetation History of Western Iran. *Review of Palaeobotany and Palynology 2:* 301 - 311.

Zeist, W. van and S. Bottema, 1971: Plant husbandry in Early Neolithic Nea Nikomedeia, Greece. *Acta Bot. Neerl. 20 (5):* 524 - 38.

Zohary, D., 1969: "The progenitors of wheat and barley in relation to domestication and agricultural dispersal in the Old World." In: Ucko and Dimbleby (eds.) 1969: 47 - 66.

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