Stable Places and Changing Perceptions: Cave Archaeology in Greece

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Anonymous Cave Of Schisto At Keratsini, Attika: A Preliminary Report On A Diachronic Cave Occupation From The Pleistocene/Holocene Transition To The Byzantine Times

Fanis Mavridis, Lina Kormazopoulou, Antigone Papadea, Orestis Apostolikas, Daishuke Yamaguchi, Zarko Tankosic, Georgia Kotzamani, Katerina Trantalidou, Panagiotis Karkanas, Yannis Maniatis, Katerina Papagianni,and Dimitris Lambropoulos.

Introduction*

Fanis Mavridis and Lina Kormazopoulou

The excavation of the Anonymous Cave of Schisto at Keratsini is an ongoing research project of the Ephoreia of Palaeoanthropology and Speleology of Southern Greece. An international team of scholars is working in the field and the laboratory in order to extract all available information from a variety of remains. The cave was an important sanctuary during the Classical period, judging by the quality of the finds from that period (pottery, figurines, etc.,); there are traces of the cave's use for this purpose that can be dated from the Late Geometric to the Post-Roman times. Regarding the prehistoric use of the cave, there is evidence for it from at least the Middle Neolithic (radiocarbon dates indicate the presence of even earlier Neolithic phases; however, material to stylistically support this is absent for the moment) down to the Early Bronze Age. The most important evidence comes from repeated strata that have been dated to the Late Pleistocene/Early Holocene, currently unique in Attika. Study of animal bones and especially seeds indicate the importance of this site for understanding the transition to the Neolithic period in the Aegean. In this respect, the Schisto Cave can be paralleled to the Francthi and Theopetra Caves.

The Anonymous Schisto Cave at Keratsini became known to the Ephoreia of Palaeoanthropology and Speleology of Southern Greece after an illicit excavation was reported by a citizen. As a consequence, in 2000 a salvage excavation was conducted by Dimitris Hatzilazarou and Alexandra Zampiti (Zampiti this volume; Spathi and Hatzilazarou 2008) at the location of the illicit digging. This area, approached through a narrow corridor, can be described as an underground cavity formed after the collapse of very large rocks. Most of the material from this area belongs to the period of the Classical-Roman use of the cave (Zampiti this volume; Spathi and Hatzilazarou 2008). Numerous pottery sherds, clay figurines, a few minor objects of glass, faience, clay, and metal and a great number of animal bones were found then. Due to the morphology of the area and the types of finds this spot was interpreted as an *apothetis* (votive deposit, see Zampiti this volume). The quality and quantity of the finds suggest the existence of an important shrine in this part of Attika. A small number of prehistoric sherds were also recovered that indicate that the cave was first used during the Neolithic and the Early Bronze Age phases (Mavridis 2006). As a result, the research of the main chamber of the cave began in 2006 and it is still ongoing. Its aim is to systematically investigate the stratigraphic sequence and interpret the prehistoric use of the cave.

The cave (Fig. 16.1) lies inside the industrial park of the Schisto area (259 m above sea level), with a view over a wide area of surrounding landscape and the sea (for more information concerning the environment, see Trantalidou below). In the east, it has access to the unforested Aigaleo Mountain, while exactly opposite the mouth of the cave lies the top of the "Skaramanga Mountain" and the Gulf of Eleusis.

The area outside the cave is rocky with no visible sediments. The ancient entrance has collapsed and the existing mouth of the cave is wide and arched. A sloping descent leads towards the inner main chamber, (ca. 70 x 15 m). Close to the entrance the foundation of a rectangular building is still visible and further away there are a few carved blocks of stone.

Terraces and retaining walls enable descent to the main chamber, and some stairs have been carved into the bedrock of the main access area. Natural cavities (niches) can

* All results are preliminary since field research and study of finds are not completed. The different status of the results presented here is due to the progress that each individual scholar has accomplished in relation to the study of each category of finds. New excavations at the cave started at 2006 and are still ongoing. Fanis Mavridis and Lina Kormazopoulou would like to express their gratitude to the Kostopoulos Foundation and the Institute for Aegean Prehistory, New York, whose financial support has made this research possible. Also, to the former director of our Ephoreia, Dr. N. Kyparissi-Apostolika for her overall support and for the permission to process some of the flotation samples at Theopetra. Yannis Maniatis like to thank Dr. Bernd Kromer of Heidelberg Academy of Science for continuous help and support with technical matters regarding the laboratory procedures and for the $\delta^{13}C$ measurements, for which we are also indebted to the Institute of Environmental Physics, University of Heidelberg. The osteological material collected at the Anonymous Cave of Schisto, Municipality of Keratsini, during the 2006 and 2007 field campaigns, has been recorded by Konstantinos Trimmis (student at the University of Thessaloniki), Vasiliki Argiti (archaeologist, University of Athens), Maria Giannoukou (archaeologist, University of Crete), Giorgos Kazantzis (archaeologist, University of Ioannina) and Johan van Gent (Erasmus Program, Groningen-Athens Universities) at the facilities of the Ephoreia of Palaeoanthropology and Speleology of Southern Greece, as part of their training program in archaeozoology, under Katerina Trantalidou's supervision, who also bears the whole responsibility for any mistakes in the identification, the methods used, and the interpretation of the material. Topographical work was carried out by Thodoris Hatzitheodorou. Lakis Kontrolozos and Haris Bougadis helped during excavation. Graduate and postgraduate students of the University of Athens who have participated in the project are: Thomas Tsironis, Argyro Malliarou, Vaso Bethani, Marianna Philippoglou, Vasiliki Stagia. We also thank the conservators of the Ephoreia for Palaeoanthropology and Speleology of Southern Greece for their work. The paper is an updated version of that originally presented at the Irish Institute at Athens/Ephoreia for Caves Colloquium: 'Recent Research in Greek Caves', Athens, 24 May 2008.

be seen along the walls. Old roof collapse episodes have filled the floor of the main chamber with larger rocks and smaller stones. The most characteristic is a massive boulder in the back end of the cave.

Excavation
Fanis Mavridis, Lina Kormazopoulou, Daisuke Yamaguchi and Dimitris Lambropoulos

The presence of numerous large and smaller rocks and the existence of thick stalagmitic crusts on the floor of the cave made the choice of the area for trial excavation very difficult, especially in the main chamber. The goal of the first short field season was to determine the character of the sediments, to collect stratigraphic data, and to plan the following excavation seasons. Also, an excavation grid was put in place (Fig. 16.2).

The initial test trench, Trench 1, measuring 2 x 3 m, lies along the north wall of the cave (Fig. 16.3). Digging showed a disturbed surface layer, up to 80 cm thick, containing mainly boulders of different size that have sealed all other deposits below. Traces of burning and ash were also detected. This layer produced evidence of Prehistoric, Classical, and more recent use of the cave. In fact, very few potsherds and other finds were located in the layer. Few concentrations of sherds that were detected, dated to the Neolithic and, mainly, to the Early Bronze Age, represented the most important finds.

Further excavation of Trench 1, which reached the depth of about 2 m, brought to light a series of layers very different from the ones on the top: successive layers consisting mainly of gravel, which alternated with dark colored sediments. In all known cases thus far, these dark colored layers were found on top of the ones with gravel. It was also observed that most of the finds came from the group of layers containing gravel. The finds consisted of stone tools, animal bones, and a few seashells and land snails (Fig. 16.4). As it was initially pointed out by the geologist of the excavation, Dr. Panagiotis Karkanas (see below), the action of water was the main cause for the formation of these layers. Thin section analysis showed the different depositional history of the cave's layers: the black colored layers were mainly made of guano with traces of burning inside, whereas the gravel layers had been washed in by the action of water. It became obvious that these repeated and more or less disturbed layers constitute different phases of occupation, as it was also suggested by radiocarbon dating (see Karkanas below). At first, the picture obtained during the excavation was that the dark colored layers, which contained lighter material, were found on top of the heavier ones consisting mainly of gravel and archaeological finds. However, it seems at the moment that one layer containing carbon, ash, and other related materials is connected to those below with the heavier materials and finds. The different depositional history and the complex stratigraphic record of the archaeological layers in the Keratsini Cave became apparent during the 2008 excavation season, when habitation layers were found further below that contained traces of ash/burning with no evidence of severe disturbances.

In 2007 a new trench (Trench 3), measuring 2 x 2 m, was opened next to Trench 1. As in the case of the previous trench, the aim was to investigate in detail the stratigraphic sequence and the character of finds. The picture obtained was similar to that described above (Trench 1). After a thick disturbed layer, again many bones and flint tools were found but no pottery at all.

Trench 2 was also opened during the first field season in a natural cavity, along the opposite wall of the cave and closer to the entrance, with the goal of locating the Neolithic and the Early Bronze Age phases in more secure contexts. As it happened with Trench 1, the excavation did not uncover any *in situ* layers of the Neolithic or Early Bronze Age. The layers detected so far indicate that they were deposited through the action of water. The south-east corner of the trench produced repeated layers of fire and ash. Among the finds, few characteristic Neolithic sherds can be distinguished, although very fragmentary. Also a series of typical obsidian tools in the form of blades as well as some waste products come from the same deposit. From the deepest excavated layers of Trench 2 come a few flint tools, the character of which seems to be close to the examples from the deepest layers of Trench 1 and Trench 3.

So far the excavations have proved that the action of water caused damage to the prehistoric deposits in the cave, leaving none *in situ* that could be securely ascribed to the Neolithic or later periods. Earlier layers seem to have been formed by a variety of processes and it seems that more or less *in situ* deposits alternate with others that were washed in. The detailed typological and technological analysis of lithic assemblages together with radiocarbon dating of all layers will shed light on the dating of the succeeding, Pre-Neolithic, layers (see Mavridis et al. 2012).

Radiocarbon Dating Methods And Results
Yannis Maniatis

The detection of Pre-Neolithic deposits in Attika is very important and this is the first time that a site that contains them is being systematically explored. Problems in the nature and formation of the cave's stratigraphic sequence have been described above.

So far, four absolute dates are available from the cave. The first one comes from the deepest exposed layer of the 2006 excavation (Trench 1), while the other ones correspond to the cave's stratigraphy, despite the formation processes recorded. The two dates that correspond to the Early Neolithic phases come from the uppermost layers. The dates available so far are presented in Table 1.

Samples And Techniques

Four charcoal samples from different layers and locations in the cave were submitted for radiocarbon dating at the Laboratory of Archaeometry, N.C.S.R. "Demokritos", Greece. The laboratory uses the gas (CO_2) counting technique in proportional counters. All samples were rather small in quantity, but one was much smaller than the capabilities of the Gas Counting technique and thus it was sent for AMS (accelerator mass spectrometry) to the Oxford University Radiocarbon Accelerator Unit.

All samples were chemically pre-treated to remove any carbon compounds of non archaeological origin (Olsson 1979; Mook and Streurman 1983) by using the standard Acid-Base-Acid treatment. In particular, after a mechanical cleaning, where all obvious non charcoal particles were removed from the sample, and a light grinding of the charcoal to smaller particles, the samples were put into a 4% solution of HCl acid at 80ºC and stirred well for at least 30 minutes or as long as it was necessary to dilute any present carbonates from the soil. Then the samples were transferred to 4% NaOH solution, stirred well and left overnight at room temperature. Following that, the samples were placed again into an acid solution of 4% HCl at 80ºC and stirred for more than an hour. They were then neutralized with deionised water and dried in a dryer oven at 100°C.

The three somewhat larger dry samples were then combusted using the de Vries type continuous combustion system (de Vries and Barendsen 1953; Münnich 1957; Nydal 1983) and converted to CO_2. The gas sample was then purified in several stages by passing it through chemicals and precipitating it into calcium carbonate. Finally it was converted again into CO_2 and passed through a column filled with activated charcoal kept at 0^oC (Kromer and Munnich 1992) in order to remove radon and any other minor impurities. A very small portion of the pure gas sample is taken into a special ampoule and sent for ^{13}C measurement.

The Gas Counting Carbon-14 measuring system at the laboratory of Archaeometry, NCSR "Demokritos" consists of a series of copper cylindrical gas proportional counters, with capacities of 4 and 3 liters. The counters are surrounded by continuous flow (Ar + 10% CH_4) guard counters, which monitor all incoming environmental radiation and separate it electronically from the actual sample counts by an anti coincidence system. The samples are alternated every few days between the different counters and measured repeatedly. In this way the accuracy and reliability of the results is ensured.

Radiocarbon Dating: Results And Discussion

The dating results for the four samples are shown on Table 16.1. As mentioned above the initial amount of the samples was quite small, about and below 2 g, which produced approximately 0.5 g of carbon. For this reason, the samples were measured for a prolonged period of time in the gas proportional counters, rising to about one month. In any case, the small amount of samples and their old ages resulted in higher than usual errors in their measured radiocarbon age.

The calibration of the B.P. ages was performed using the Radiocarbon Calibration Program Rev. 5.0 (Stuiver and Reimer 1993) with the latest dataset (Reimer et al. 2004). Both uncertainty ranges of the calibrated dates, corresponding to 1 and 2 standard deviations (probability 68.3 and 95.4% respectively) are given in Table 1.

The calibrated results of all samples are plotted in the bar diagram of Fig. 16.5 using the 2σ values. The samples are plotted according to radiocarbon age, from older to younger. It appears that the ages span a period from 10,000 to 5,700 B.C., using the extreme values of the calibrated ages indicating a 5,000 year long period of occupation. No sample age shows any overlap with another, a fact that does not allow us to identify a period of most intensive use of the cave. However, this may be due to the selection of the samples.

Dates indicate a chronological range that exists between the deepest and the uppermost excavated layers. Currently available dates indicate the presence of phases belonging to the Late Pleistocene/Early Holocene transition. Considering the nature and formation of these layers, we need to be cautious and wait for more samples to be processed.

The Depositional Sequence
Panagiotis Karkanas

Methodology

Micromorphology is the study of undisturbed sediments and soils in thin sections (Courty, Goldberg and Macphail 1989). As it studies intact deposits, the original integrity of the materials is conserved, thus allowing for the observation of depositional and post-depositional features of natural or human origins.

In the the Anonymous Cave of Schisto the field description of the sediments was followed by the sampling of two intact blocks of sediment. The blocks were cut out with a sharp tool after being jacketed on the outside with plaster of Paris. The samples were oven dried for several days at 60° C and then impregnated with polyester resin diluted with styrene. The hardened blocks were then cut into cm-thick slabs and were processed into 50 x 75 mm petrographic thin sections by Quality Thin Sections (Tucson, AZ). In total five thin sections from Schisto were observed in plane-polarized and cross-polarized light (PPL and XPL, respectively) at magnifications ranging from 15x to 400x. (descriptive terminology of thin sections follows that of Bullock et al. 1985, modified by Stoops 2003; Courty, Goldberg and Macphail 1989).

Field Description (Fig. 16.6)

The sediments of the excavated trench can be clearly divided into two major units. The upper one consists of mostly clast supported angular cobble and boulder limestone. The lower one consists of more than three couplets of coarse and fine grained layers. The coarse layers are composed of matrix to clast supported fine gravel. Inverse grading of the coarse components was observed in one of the coarse layers. The contacts with the fine grained layers are mostly sharp, but deformation structures were also observed. The deformation structures are in the form of rounded protrusions of the underlying layer with sizes of a few centimeters. Fine layers consist of dark brown clayey silt. The lower most fine grained layer shows a fine laminated structure.

Micromorphological Description

The lower part of the laminated layer at the base of the sequence consists of massive to crudely bedded fluffy, very porous material consisting mainly of finely convoluted fibrous phosphate (most likely apatite) attributed to bird guano (Wattez, Courty and Macphail 1990). There are also intercalated laminae of burnt guano remains with some relatively big wood charcoal fragments. Very few fine dissolved rounded and etched bone fragments are observed. Several severely digested bone remnants and bone like features are inside the convolute fibrous apatite aggregates. There are also a few dispersed clusters of whitish opaque and some crystalline nodules of microcrystalline gypsum. A fine lamina of crudely sorted quartz grains was identified. The crude bedding and the clastic laminae can be interpreted as guano, which was redistributed slightly by low energy water action. The upper part of the laminated layer is more finely bedded. In addition, the apatite is more structureless but with signs of in situ precipitation (shrinkage features), although fibrous convolute apatite aggregates are still visible in places. There are also more distinct laminae of wood charcoal and a lot of microcrystalline gypsum nodules that look like being precipitated into the vughs of the surrounding material. In conclusion, this sediment looks definitely water lain, although its content is redistributed from the immediate surrounding area. The uppermost part of the laminated layer close to the base of the overlying coarse layer contains a lot of aggregated sediment, some of which looks rounded. There are a lot of red soil aggregates and quartz grains and some rounded etched fine bones. This clastic sediment is also formed by low energy water action.

Above the laminated layer, the sediments of the fine and coarse couplets are a mixture of what is already described. That is, of both intact layers of convolute fibrous apatite guano features and reworked layers containing aggregated moderately sorted material of apatite mixed with charred material and charcoal. Locally some of the fine material looks finely bedded. Gypsum nodules are frequent. The lower coarse layer studied consists of heavily altered limestone fragments (being replaced by phosphates) with big nodules of gypsum and some interstitial floating material of rounded brown soil aggregates and some heavily weathered bones. The uppermost coarse layer studied is a gravel horizon with almost clast supported angular pieces of limestone, most of which have rims of apatite alteration. There are also chert and calcite quartzite fragments. The interstitial material consists of unsorted brownish soil aggregates together with some fine dissolving bone and very few pieces of rounded charcoal.

The Depositional Sequence: Discussion And Interpretation

In summary, the fine grained guano rich layers are intact to moderately reworked deposits created by shifting water. The abundance of burnt features and their relation to the guano substrate imply that burning activities were taking place on the guano rich surface of the cave. The archaeological material might be slightly reworked and redistributed laterally on the existing depositional surfaces, but the general integrity of each layer is not disputed.

Nevertheless, the fine grained layers alternate with more coarse grained gravelly layers that are the result of higher energy sheet wash or debris flow activity. The deformation structures observed at the contact of a couplet are the result of unequal loading and liquefaction due to which the muddy layer below moved up in the form of tongues into the overlying coarser layer. The inverse grading observed in one of the coarse layers should be attributed to debris flows. Debris flows were formed when colluvium that had accumulated in the entrance of the cave was destabilized by water saturation and failed under the force of gravity. It was transformed into a high viscosity flow that fanned down into the main chamber. It is conceivable that archaeological findings in the coarse layers are more reworked and transported from a distance to the surface of the cave. However, since each coarse depositional increment is covered by a new layer of guano that has sharp non erosional contacts with the overlying next couplet, it is suggested that disturbance and reworking is restricted. However, since some of the clastic material that entered the cave from the outside and through the sloping entrance area was deposited on the main chamber, some older material might have been incorporated inside it.

The presence of guano has led to considerable chemical alteration of the deposits. Limestone fragments are altered and eventually pulverized. Bones are marginally affected, although the degree of their alteration is directly related to the phosphate minerals present (Karkanas et al. 2000). Although special mineralogical analysis of the phosphates was not undertaken, the preservation of limestone in most places might imply that the phosphate is apatite. In that case it is assumed that bones are still stable or marginally affected (Karkanas et al. 2000). Nevertheless, there are fine grained layers that are totally decalcified and presence of probably phosphate minerals may suggest a higher degree of alteration. In that case bone apatite should not be stable. Gypsum formation is also a byproduct of guano alteration (Shachack-Gross et al. 2004). It is of importance to note that fine bones with indications of digestion (etched and dissolving) were frequently encountered. They are associated with the bird guano.

The Lithic Assemblage
Antigoni Papadea and Orestis Apostolikas

A total of 316 stone artifacts were recovered in the cave during the 2006-2007 excavation periods. Of them, 128 artifacts came from Trench 1AB (which was formed after the unification of test Trench 1A and Trench 1B), eight were recovered from square 3A1 and 74 from square 3A2. Trench 2 produced a total of 41 stone artifacts (Tables 16.2, 16.3).

Since the artifacts (128 pieces) from trenches 1A, 1B, and 1AB are much greater in number compared to other trenches (Table 16.4), and due to the fact that excavation reached its maximum depth at Trench 1AB, we decided to analyze the data from this group of lithics in this presentation. It is needless to say, however, that these are only preliminary results since the excavations are in progress and the results from water floating are still to come out. For this reason only the general characteristics of the assemblages will be documented.

The stratigraphic sequence of the trench indicates that the vast majority of the artifacts were recovered inside the disturbed surface layers and among the gravel rich secondary depositional sequences that were formed by intense water activity inside the cave.

The density of lithic artifacts per layer is quite small, while a substantial proportion of them appear to be broken, most probably due to post-depositional movement. Traces of burns and patina have also been recorded, but on a much smaller number of artifacts. There is no substantial differentiation towards their technological and morphological aspects.

The raw materials that were mainly used for the production of stone artifacts were brown, grayish, and black flint, while radiolarite was present in the forms of cores, flakes, blades, and tools. Quartz was not extensively used and counts a total of eight samples from layers 10, 11, and 13 (for the presence of obsidian artifacts coming from these layers see Laskaris et al. 2011, for a discussion on the stratigraphy of the Late Pleistocene/Early Holocene deposits of the cave, see Mavridis et al. 2012).

The small number of cores does not allow the remodeling of reduction methods used at core shaping, while two of the cores seem to be exhausted and had probably been rejected. Plaques made mainly of radiolarite and flint pebbles were knapped, while one was made of quartz. Two small flake cores were recorded. The first has two technological axes perpendicular to each other, while the second has only one. The reduction of cores took place with no prior platform preparation. Another radiolarite core is characteristic for exhibiting traces of three different flaking methods that were used to produce the respective final products: flakes, small flakes, and blades (Figs. 16.7, 16.8). Flaking in this case also took place with no platform preparation. All three cores mentioned above retain a substantial proportion of cortex on their surface.

The most common group is represented by the unretouched artifacts which consist of 38 flakes, 15 blades, and 3 small flakes. In general, flakes are more common than blades, while tools (47 pieces) follow (Tables 16.5-7).

Little information can be added about the reduction methods of raw materials. The exterior surface of the flakes exhibits intersected unipolar, bipolar, and centripetal negative scars. The absence of platform preparation on cores is confirmed by the types of butts on the flakes (plain and cortical). However, the presence of more complex facetted butts should not be ruled out. Blades were extracted mainly from unipolar or bipolar cores without any platform preparation (plain butts). Small flakes were extracted from unipolar cores also with no platform preparation. A blade, a backed flake, and a flake from the rejuvenation of the core's platform are the only technical pieces of the assemblage.

Regarding tools (Tables 16.8-10), the most common type are the retouched flakes, followed by the notches, the scrapers, the retouched blades, and the backed blades, while characteristic are the points on double backed bladelettes (Fig. 16.9) Composite tools are represented by the following types:
1. Retouched notch and retouched flake
2. Clactonian notch and retouched flake
3. Retouched notch and denticulate on small flake
4. Borers on backed blade
5. Scraper and denticulate on exhausted core

The absence of microlithic tools and the microburin technique should not be taken for granted since water floating results are still unavailable.

Knapping was probably not systematically undertaken, as suggested by the limited number of stone artifacts and the apparent absence of basic stages of the operational sequence, such as decortification and raw material preparation.

Based on radiocarbon dating, the assemblages belong to the Late Pleistocene/Early Holocene, at the end of the Upper Palaeolithic and the beginning of the Mesolithic periods.

The two points on double backed bladelettes present a sharp point and are familiar from other Upper Palaeolithic sites in Greece, such as the Franchthi Cave (Elefanti 2003, 48; Perlès 1987) and the Boila Rockshelter (Kotjabopoulou, Panagopoulou and Adam 1997; 1999).

The emphasis on the production of flakes and their secondary processing is also characteristic of other sites in Greece such as the Franchti Cave (Perlès 2003, 82), Kleisoura Cave 1 (Koumouzelis, Kozlowski and Ginter 2003), the Theopetra Cave in Thessaly (Adam 2006) and Cave of Cyclops in Gioura (Sampson, Kozlowski and Kaczanowska 2003), as well as the open-air site of Sidari on Corfu (Sordinas 1970; 2003). The similarities among these sites are emphasized by the presence of common non microlithic tool types such as end scrapers and notches.

However, we should have in mind that the lithic assemblages from the Anonymous Cave of Schisto came from layers affected by post-depositional processes, and since the preliminary results exhibit no signs of clear differentiation in lithic technology, one must be very cautious in defining the assemblages as Upper Palaeolithic or Mesolithic. Furthermore, since water floating is still in progress we are not in position to create an integrated image of the presence or absence of microlithic tools in the cave.

Finally, special reference must be made to a hooked type bone object (Fig. 16.10). It can be paralleled to the numerous fish hooks known from the Cyclops Cave on Gioura (Moundrea-Agrafioti 2003, table 10.1). However, a single fragmented piece from a mountainous cave site with so far limited fish remains cannot present the reliable evidence needed in order to identify its use. Hooked type objects are also known from Early Neolithic sites in Thessaly and other regions (Moundrea-Agrafioti 2003, figs. 10.4-10.5).

Exploitation Of Animal Resources Focusing On The Ungulates Availability With Special Reference To The Late Pleistocene/Early Holocene Transition

Katerina Trantalidou

The trial trenches excavated on the middle terrace and in the deeper horizontal section of the cave produced 6305 bone fragments. To estimate the density of the bioarchaeological remains (Table 11) we emphasize that the dimensions of the consecutive trenches 1 and 2 were 2 x 3 m and those of the trench 3 are 2 x 2 m (Fig. 16.1, 16.2). The trenches had attained the depth of 2.50 m and 1.50 m respectively (see Mavridis and Kormazopoulou 2009; Mavridis et al. 2012; this article). The upper layers contained mixed pottery from the Byzantine (5^{th}-7^{th} c. A.D.), Imperial, Hellenistic, Classical, Geometric, Early Bronze Age and Late Neolithic I and II periods. Therefore, the food residues corresponded to the same periods.

A sample of 4284 specimens has been examined. Following the stratigraphic sequence the faunal material has been divided into two assemblages (Table 11): 1. The Late Pleistocene/Early Holocene (most probably Early Holocene according to the evidence from the animal bones) which, based on the bulk of sedimentation at the Schisto Cave, implies that it lasted one or two thousand years, documented here with three different events [on the present interglacial and the ice core chronology for the Greenland "Early Holocene (7.9–11.7 ka before Present)" see Rasmussen et al. 2007]. A Late Glacial occupation episode cannot be excluded [see Mavridis et al. 2012 for an absolute date (14,539±1280BP, based on the SIMS-SS method) determined from an obsidian artifact found at trench 1, layer 4, just below the concentration of the charcoal which yield 9,978 ± 100 BP].
2. The Middle-Late Holocene section, documented on the basis of the ceramic sherds, with several and frequent hiatuses (Mavridis and Kormazopoulou 2009; Mavridis and Tankosic this article; Kormazopoulou this article; Zampiti in this volume).

The Middle - Late Holocene Deposits (Table 16.11)

The Chronological Frame

We examined the upper layers together, combining the Neolithic, Bronze Age, and later periods because there was no clearly observable succession of layers. According to the stratigraphy and to the presence/absence of the ceramic evidence, the layers 1 to 3 in trenches 1 (Figs. 3, 4) and 2 are assigned to the Middle-Late Holocene period. Stratum 5 provided the bulk of this Middle-Late Holocene achaeozoological material. In trench 3, all excavated layers belong to the Middle-Late Holocene period, except for the lowest strata. Only a part of those data is presented in Table 11. Additionally, several hundreds of animal bones from trench 3 have been recorded but are not included in the statistics.

The Taphonomy

Due to trench dimensions and, probably, to the more intense cave occupation,the Middle-Late Holocene material is, actually, the most numerous. The preservation of the those Holocene bones is better, since they retain more organic substances and are proportionally less fragmented than the material from the lower strata.

The Species

The sample is dominated by the Caprinae family (63% of the recorded Holocene deposits). Bovidae (2.44%) and Suidae (1.84%) were also identified (Table 11). Sheep slightly outnumber goats. The presence of dog was sporadic.

The sheep and goat bone fusion data are classified into a three age model. A division of bones into early (up to 10 months), middle (up to 28 months) and late (up to 42 months) fusion categories was used to provide indication of age at death, whether natural –to bad weather and shortage of food- or due to culling practices up to the flocks fourth year. Animals younger than two years are well represented, but we are reluctant to indulge in any further interpretation given the small size of the sample and the disturbed stratigraphy.

Small game was important. Hunting of hare and partridge is still practiced nowadays in the same area, for example on the lower slopes of Mount Aigaleo. Hares seem to form 15.32% and birds 5.48% percentage of the assemblage. Apart from the dog and the small intrusive field mice, all fragments of the Cervidae - Equidae families and probably some hare and bird bones seem intrusive from the lowest levels. For instance, among the 2178 bones of the Holocene strata of Trench 3, wild fauna and especially big game accounted for 333 specimens, which constitute 15.35% of this assemblage. We are convinced that they are related to previous millennia. On the contrary, in the deepest excavated layers of the same trench (layers 8-10, strata 3-6; excavations 2007) of 428 bone fragments 65 (15.19%) belong to sheep and goats. The macroscopic examination shows that their deterioration is very different from the other bones (Tables 12; 13).

The Late Pleistocene/ Early Holocene Deposits (Tables 16.11-14, 16.17).

The Stratigraphy And The Faunal Composition

Trench 1 and Trench 2, layer 4, which were subdivided into strata 6 to 14, yielded 2729 fragments. We focus our remarks on that material. The material is heterogeneous since 528 bones (19.34%) from those strata belong to domestic animals. However, the distribution of domestic mammals was denser in strata 6-7 (Table 16.11). The same composition is attested in the deepest excavated strata of trench 3 (Table 16.13).

Bones of brown hare, a cervid, the small extinct equid, *Equus hydruntinus,* as well as bird bones (88 fragments) constitute the most important part of the wild species. They reached more than 70% of the bone accumulation in layer 4. The presence of a wild caprine is also not excluded.

The Taphonomy

The bones (Table 16.12) coming from *Lepus europaeus, Cervus elaphus*, *Equus hydruntinus* and some small unidentified Artiodactyls are preserved differently in comparison to the domestic species. They are fossilized, burnt (150 specimens corresponding to the 7.91% of the wild mammals) and highly fragmented. The fractures were produced during butchering, dismemberment (13 fragments bear cut marks, corresponding to 0.68% of the 1895 fragments of the wild fauna) and, mainly, during marrow extraction. 779 of 1895 fragments (42%) are flakes up to 3 cm long and a few millimeters large, while 33% are shaft fragments representing less than 1/5 of the entire bone. Traces of carnivore gnawing are very rare. Comparative remarks have been noted on the material of the assemblage from layer 4, stratum 11, as well as from stratum 8 and, in Trench 3, stratum 6 (Table 16.11).

The type of fragmentation from the Anonymous Cave of Schisto is predominantly, if not entirely, of anthropogenic origin (Marshall 1989). In other words, the taphonomic processes created two distinguished assemblages, from all points of view, which correspond to two different ecosystems, geological, and cultural periods: the Latest Pleistocene/Early Holocene (most probably Early Holocene according to the data from the present study) and the Mid-Holocene cluster. The total number of the edible wild mammals in Trench 1 and Trench 2 is 1895 fragments (Table 16.12).

In fact, fragments of the three main wild species were found in every phase of occupation. They exhibit the same weathering, mineralization, discoloration, and fragmentation as those from the lower strata. It is obvious to us that some of the bones have been transported and dispersed either by animals and humans or by physical agents.

The Mammal Species

Cervidae and Equidae family amount to 1249 fragments (in Trench 1 and Trench 2) and 1424 in the whole assemblage.

Cervids seem to be the most important component. All parts of the animal are present. The 128 specimens (Table 14; Fig. 16.12) that were found corresponding to 65% of the wild fauna. The elements probably belong to the red deer since the flakes macroscopically seem more robust than those of the smaller fallow deer. 116 bones, identified on the anatomical level were preserved in less than the 1/5 of the initial bone. One premolar and one carpal bone were intact. From three other teeth (1 premolar, 2 molars) and one first phalanx, the 4/5 and the 3/5 of the entire bone were maintained. Finally, a cervical vertebra, a part of a tibia, and two first phalanges were preserved. A thoracic vertebra bears cut marks. A red deer bone (a tibia?) could have been the raw material used for the manufacture of the hook perform object (Papadea and Apostolikas this volume). All anatomical units were present. Deer that have been captured were prime or old adult animals, since all epiphyses were fused. Further distinction was not possible (Table 16.18). Red deer, tolerates a wide range of habitat from open moorland to mountain landscape and from mixed forest to forest. Group size is smaller in woodland area than in open country (Legge and Rowley-Conwy 1988, 13). The presence of red deer indicates mild, moist climatic conditions.

No studied faunal assemblages exist in Attika that could be used for close comparison, but travelers reported the presence of *Cervus elaphus* on Mount Parnes until the

19th century (de Heldreich 1878; Trantalidou 2000, 709-735). The presence of red deer throughout the Late Pleistocene to Holocene is also attested in Epirus, in Thessaly (Table 16.15), the southern Peloponnese caves (Darlas and Psathi 2008, note the presence of daim and, sometimes, roe deer as well as *Sus scrofa, Lepus europaeus, Felis silvestris, Vulpes vulpes, Martes* sp., cf. *Mustela*, *Ursus* cf. *arctos* or *Canis* cf. *lupus* but in small number of fragments) and the Argolid Peninsula (Table 16.16).

Moreover, similar game components (Table 16.11) have been recorded in other parts of the Southern East Europe during the late Quaternary climate history (Tables 16.15, 16.16). The studied osteological material from the Seïdi Cave, near Aliartos, Boeotia (Table 16.15), contained fragments of *Equus hydruntinus, Cervus elaphus, Capra ibex* and aurochs (Schmid 1965, 163-164).

At the Franchthi Cave, in the Argolid, in the Late Gravettian layers (22,320±1270 BP) red deer was present (30% of the corresponding archaeological deposit) together with *Equus hydruntinus* (70%), *Lepus,* suids and birds. The percentages varied from 40% to 20% for the small equid, 25% to 70% for the red deer at the level of 12,540±180 BP and 11,240 ± 140 BP respectively (trench HH1, Late and Final Paleolithic, Payne 1975, 120-131; Kourtessi-Philippakis 1986), indicating an increase of the deer, a decrease of the equid and a continuous climate transformation. Similar faunal spectrum was also recorded at the Kephalari Cave, 5 km south of Franchthi Cave, during the Upper Palaeolithic period. At Kephalari Cave, the taxonomic diversity was very rich. *Equus hydruntinus, Lepus europaeus, Canis lupus* as well as *Capra ibex, Bos* sp., *Sus scrofa, Vulpes vulpes, Lynx* sp., *Felis sylvestris*, *Erinaceus europaeus, Citellus* sp., *Spalax leucodon, Arvicola terrestris, Microtus nivalis* were also identified (Reisch 1976, 261-265). On the contrary, Kleisoura 1 cave, only 11 km from Kephalari, provided extremely few elements of the red deer (Table 16.16).

Equus hydruntinus, a species that inhabited Europe and the Middle East as far as Iran, for more than 300,000 years, is of some importance on Mount Aigaleo and at the southern Greek sites. Recent morphological studies on skulls and DNA analysis support the proximity of *Equus hydruntinus* and *Equus hemionus* (see Burke, Eisenmann and Ambler 2003; Orlando et al. 2006). The proximity to either *Equus burchelli* or the asses suggested by tooth morphology has been rejected.

At the Anonymous Cave of Schisto 37 fragments are attributed to *Equus hydruntinus* (Table 16.11). One tarsal bone and one third phalanx were intact. Seven teeth of the molar row were preserved at the 4/5, 3/5 and 2/5 of their size. 28 bones were identified at the anatomical level. They were preserved at 1/5 of the initial size. The mortality profile suggests the capture of mature animals, but given the small sample it is extremely precarious to proceed with further interpretation.

Equus hydruntinus points to the existence of drier open conditions. That remark joints the observations on the microfaunal material (Papagianni, this article) and reveals a more complex landscape. The equid could have grazed in the plain in the western foothills of Mount Aigaleo, which, at least, in Classical Antiquity bore two small lakes ("Rhetoi") and was an important wetland in Attika. The cave's altitude (259m above sea level) is not far away either from eastern (circular plain of Athens) and western (plain of Thriasion) areas of level country and permits the carcass transport. In former times, previous to 19th c., terraces raised up on both sides of the western division of Aigaleo, the Corydallus area, were proof of cultivation (hypothesis of Dodwell 1819, 509) and, therefore, of relatively easy access.

E.hydruntinus appears at the chronozone Allerød in the Ioannina basin (Table 16.15). The quantified remains of the animal seem to be less significant in the Argolid plain. Yet, it has been recorded in the strata of the Kleisoura 1 cave, dated from 37,500 to 9,150 BP (Starkovitch and Stiner 2010; Table 16), and therefore it was present during the Younger Dryas (12,500 to 11,700 yrs) and the Younger Dryas - Holocene transition. Its' absence underlines the shift from cool dry conditions to warmer ones. At Franchthi, at the end of 8th millennium B.C. (10,000-9,500 BP), as terrestrial resources declined the hunters-foragers turned to the sea (Stiner and Munro 2011, 633). At the same site, the exploitation of wild plants becomes common in latter phases of Pleistocene to Holocene transition (Hansen 1991; Perlès 2003).

Leporidae family totalizes 518 fragments (27% among the wild fauna; Table 17). A scapula fragment, two distal humeri and two ribs of the fast running animal bear cut marks and 40 specimens were visibly burnt. The exploitation of small game became an important component after the Last Glacial Maximum (Table 16.16).

Finally, three fragments were assigned to a medium size carnivore, probably wolf (Table 16.11). They were found inside burned lenses located in trenches 1 and 2 (layer 4, strata 6-14). They are all pieces (a mandible fragment, a radius and a metatarsus) no longer than the 1/5 of the initial bone.

Preliminary Considerations On The Use Of The Cave, The Environmental Conditions, And The Subsistence Strategies

I. Mid-Holocene use of the cave. Disturbed archaeological deposits in caves are the rule in the Greek Peninsula, especially when they have been used to pen animals (Trantalidou, Belegrinou and Andreasen 2010, 296) At the Anonymous Cave of Schisto, there are five reasons, which allow the archaeozoologist to presume that herding and keeping goats and sheep could illustrate one of the cave's uses in both the past and recent times: 1. The upper terraces of the cave itself give evidence of recent sheepfold; 2. At the main chamber the stratigraphy of the upper layers contained open hearths and goat dung; 3. The animal species recovered (Tables 16.11-12) point to husbandry; 4. The ages at death of sheep and goat, which point us towards an animal penning (Table 16.18), and 5. The etymology of the geographic locality. The cave is situated on the southern slopes of Mt Aigaleo: Aiga =goat, leo(s)= people, so, by extension, the area where goat herders keep their flocks. 1. Goat and sheep herders could have come from different ways since the mountain ring Parnes (north) to Aigaleo (south) is interrupted by three passes: 1. The way north of Mt. Aigaleo (Jones, Sackett and Eliot 1957). 2. The Daphni pass between Athens and the head of the bay. The terrace of the cave overlooks part of the way to Eleusis, a road which could have been used by enemies against Athens, by pilgrims to and from Eleusis and the local sanctuaries or by sheepherders during transhumance. It is impossible to ascertain if the Cave had any connection with the precinct of Aphrodite situated on the Sacred Way or the Daphni Pan cave, near the homonymus Monastery (Wickens 1986, 287-298) during the Classical Times. The bone fragments found at the three trenches, described above, reveal no affinities with beliefs and rites. 3.The narrow passage from Piraeus to Skaramanga peninsula on the Salamis bay.The eastern slopes via that pass seem to be the easiest access and hypothetically the area could have been used by persons frequent the Athens plain. The time to walk the distance from the temple of Theseus in Athens to Korydallos Mountain, through Phalero, was calculated some1½ hours (Gell 1827, 101).

II. The deposits. The presence of bones from domestic species in the earlier, thus far, excavated layers (Tables 16.11-12), could be the result of disturbance (inclination of the deposits, action of water, human activities etc, see Mavridis et al. 2012; Karkanas in this article). At the Anonymous Cave of Schisto, about 15-20% of the fragments are intrusive. The geological mechanisms are also responsible for the presence of domestic sheep and goat bones in Upper Palaeolithic-Mesolithic layers of the Theopetra Cave (Newton 2003, 199-205). The effects of contamination are always suspected even in a good context (see Mavridis et al. 2012).

III. The human diet breath at the level of 9,900BP. 1. The species distribution allows us to conclude that only one open hearth (Trench 1 and Trench 2, layer 4, stratum 11) was intact (Table 11). In spite of this serious handicap we can observe that ungulates represented the largest group, with 52 fragments (or 56.52% of the 92 bones recovered). Red deer played a more important role in the diet than the small equid. Hare encountered 39 fragments (42.39%). 2. Those three species, especially as far as the ungulate anatomy is concerned, provide us with information on the full scale butchering. Extraction of bone marrow and bone grease can also be attested (Tables 16.12, 16.13). 3. The diet breath (deer, equid, caprines, large bovids) of the Upper Palaeolithic mammal assemblages at Seidi Cave in Boeotia, Kephalari Cave in the Peloponnese or Kastritsa Cave in Epirus (Tables 16.15, 16.16) have not, until now, been full represented in the Anonymous Cave of Schisto. However, the acquisitions strategies and the exploitation of macrofauna at Schisto show similarities with the general trends of those occupations. A more profound and multidimensional approach is impossible since the stratigraphic phases of the sites are varied, the methodological approaches of the assemblages different, and the biotopes as well. At the same time, there is a clear contrast in the species composition (suids, red deer, hare, abundance of birds and fish) and in the segmentation of the carcasses observed so far in the Aegean Mesolithic sites located on the coast and in the plains (Trantalidou 2003, 143-72; Trantalidou 2008, 19-27; Newton 2003, 199-205). Suids and red deer are widely represented on several west European Mesolithic sites. 4. The material from strata 8 (Trench 1, layer 4) and 6 (Trench 3, layer 10) are too restrict to be reliable (Table 16.11, Fig. 16.12). They represent two different events and could document a restrict number of persons and discontinuity in the use of the cave. Those lenses could inform us that during the 9th and the beginning of the 8th millennium human diet rely heavily on small prey. A heavy reliance on lagomorphs has also been noted around the Mediterranean from Portugal to North Africa and the Near East at the Pleistocene/Holocene boundary (Stiner, Munro and Surovell 2000, 39-73).

IV. The presence of the hare. The actual semi mountain limestone environment of the cave with xerophytes bushes and scanty pine trees seem not to have varied very much from the Neolithic period. Brown hare, an important component of the faunal assemblage at the Schisto cave (Table 16.11) prefers temperate open habitats. The animal uses woodlands as resting areas during the day. Brown hares feed mainly on herbs in the summer, and predominantly grasses in the winter. They can live on altitudes of up to 1500 m, so they fit with the cave's altitude, which is about 259 m. The exploitation of small game (e.g. birds, hare, tortoise) occurs in Eastern Mediterranean in the Upper and Epi-Palaeolithic sites. It has been associated with Palaeolithic demographic pulses and the later evolution of food-producing economies (Stiner, Munro and Surovell 2000, 39-73).

VI. *Equus hydruntinus* in the faunal series of Southern East Europe. 1. No evidence exists, until now, that *E. hydruntinus* survived in the Upper Mesolithic (for the chronological correlations, see Facorellis 2003, 51-67) in the Greek Peninsula (Table 16.16), nor in island Mesolithic encampments [e.g. Maroulas on Kythnos dated from 9,755±35 to 9,350±35 BP and cave of Cyclops on Gioura dated from 9,274±43 onwards (Facorellis 2003; Facorellis et al. 2010, 133; Trantalidou 2003; 2008; 2010; 2011)]. That species has been identified in Late Pleistocene as well as Holocene deposits in more northern latitudes (for example at an elevation 700 m on the Crimean Mountains) but it becomes rare in the Early Holocene (9,150±150; 8,240 ±150 B.P.) (Benecke 1999, 107-20). 2. Certainly, most of the climatic events occurring in the late Pleistocene-Early Holocene are not synchronous throughout southern Europe and differences in resource exploitation have been testified even within the same small scale region (e.g. the inland and coastal Argolid plain, Table 16.16). Since changes in fauna are closely related to changes in climate and vegetation, judging from the presence of *E. hydruntinus,* it seems that in central Greece and the northern-eastern part of the Peloponnese the paleoclimatic conditions have some common features (Tables 16.15, 16.16) with respect to the Haimos Peninsula and the whole Easterm Mediterranean. 3. In the Aegean region, the onset of the Early Holocene is marked by a major increase of non-steppe herb pollen but precipitation was insufficient to support the Holocene reforestation until ~10.2 kyr BP. Throughout the time interval from ~9.7 to ~6.6 kyr BP, high percentages of pollen from broadleaved trees indicate that deciduous forests remained the dominating vegetation. However, several short-term, centennial-scale climatic deteriorations occur during this interval, centred at ~9.3, ~8.6, ~8.1, ~7.4 and ~6.5 kyr BP (Kotthoff *et al*. 2008, 1025).

The scanty faunal material from the Anonymous Cave of Schisto is relevant for the biotope, the fluctuations of the environmental record (cool dry steppe like vegetation/ moist- mild conditions etc), the human hunting as socio-economic mode of subsistence (Cervids, Equids, hares and birds, procurement of adult animals, scanty fishing) during the Early Holocene.

Microfaunal Remains
Katerina Papagianni

The microfaunal material was collected during soil flotation and heavy residue sorting. Details about the flotation technique (still in progress), mesh and sieve sizes will be given in another paper (see also the contribution of Georgia Kotzamani, this article). A total of 12 samples dated at the end of the Upper Palaeolithic/Early Mesolithic were examined under a Leica EZ4D stereomicroscope with 10x oculars and the following families, genera and species were identified: Rodentia (*Spermophilus citellus*, *Microtus* sp., *Arvicola* sp., *Mesocricetus* sp., *Spalax* sp., *Apodemus* sp., *Mus* sp.), Cheiroptera (*Myotis* sp., *Myotis* cf. *myotis*, *Miniopterus schreibersi*, *Rhinolophus* sp., *Rhinolophus* cf. *Ferrumequinum)*, Soricidae (*Crocidura* cf. *Suaveolens)*, Amphibia (*Pelobates* sp.), Reptilia (Lacertidae, *Anguis* sp.).

The majority of the samples contained bat and rodent skeletal remains with bats predominating. In most of the samples there were only postcranial bones, which for most of the genera are not attributable to species. Due to this fact, the majority of the rodent bones were not identified to genus/species level. The aforementioned identifications were possible due to the survival of dentitions, either upper or lower, which are the most characteristic skeletal element for the microfauna (Hillson 2005, 20-37, 73-103). According to the identified families and genera an overall image of a deciduous woodland or grassland alternating with open steppe around the cave is formed for the period in concern (Mitchell-Jones et al. 1999, 94, 114, 190, 254, 262, 274). It is interesting that the genus *Mesocricetus* sp. is not represented in the modern Greek fauna anymore (Mitchell-Jones et al. 1999, 206), something that can be interpreted as indicative of a different, possibly drier environment with steppe during the Palaeolithic, a fact also noticed in the Arnissa microfaunal assemblage too (Mayhew 1978).

The micromammal bones most probably have ended in the cave due to the roosting activity of prey birds, which roosted inside or immediately outside of the cave (Stahl 1996). Another taphonomic agent should definitely be the water action (Karkanas this article). The water that flooded the cave must have brought inside and mixed up pellets from the outside with dead corpses of micromammals that died in the cave. It has to be mentioned that the abundant bat bones belong possibly to bats hibernating in the cave and not in owl pellets. These bats could well have hibernated there in the Palaeolithic times as well, as some of their bones are black or dark brown, something that can be interpreted as burning (Stiner, Munro and Surovell 1995). The existence of two or three different species of bats at the same level can be interpreted as a coexistence of bat colonies in the cave, which means that the cave was probably not continuously occupied by humans throughout the year, as bats are easily scared by human sounds and presence. The presence of amphibians and reptiles, although not so dominant as the one of micromammals, can be interpreted as a reflection of the habitat outside the cave, which might have contained some source of fresh water (presence of frogs) as well as vegetation cover (snakes, lizards). Snakes might have also hibernated in the cave.

Archaeobotanical Remains
Georgia Kotzamani

Research Background

The application of a systematic archaeobotanical study at the Anonymous Cave of Schisto, which produced evidence for Late Pleistocene/Early Holocene human presence in the area of Attika, has been triggered by the increasingly more explicit awareness of the need to investigate as many aspects of the Pre-Neolithic human activity as possible in order to reformulate the currently fragmentary framework of discussion regarding the socioeconomic and cultural complexities, that characterize the mechanisms engaged in the transition to agriculture in Greece (Kotsakis 2000; 2003; Valamoti and Kotsakis 2007). In the past, the Pre-Neolithic human agent on the Greek peninsula had been attributed with a rather inconspicuous and passive role in the radical socioeconomic actions associated with the beginnings of the agricultural way of life, which was apparently credited to larger or smaller population groups coming from the east and inhabiting favorable microenvironments of the Greek territory to plant the seeds of a new way of life based on production (Ammerman and Cavalli-Sforza 1984). Until fairly recently, the Franchthi archaeobotanical assemblage, retrieved through excavation at the cave during the years 1967-1976, remained unique in providing clues on the modes of exploitation of the plant world by the Upper Palaeolithic and Mesolithic human groups in Greece and in contributing to the discussion on the initiation of plant cultivation in the Mediterranean basin (Hansen 1991, 1992). Since the end of the 1980s, a relevant category of material began to be systematically concentrated within the context of the excavation project of Theopetra Cave (1989-2006) (Mangafa 2000; Kyparissi-Apostolika and Kotzamani 2005; 2006; 2010), in the western extremity of the Thessalian Plain, which hosted the first well documented agrarian communities in the Aegean. The collection and analysis of an archaeobotanical set from the Anonymous Cave of Schisto is to be viewed as a complementary research assay, aiming at contributing to the enrichment of the scanty archaeobotanical record from Greece referring to this largely still unattended but utterly challenging period of Prehistory.

The Late Upper Palaeolithic Archaeobotanical Assemblage: An Overview

Up to the present only samples deriving from the Late Upper Palaeolithic horizon of the cave (Trench 1 A/B, Layer 4) (DEM 1701: 10010-9260 B.C.) have been studied to a sufficient degree for providing potential clues as regards the contribution of plants in the cave dwellers' living activities. The concise character of the present report confines the discussion towards a very brief assessment of their qualitative and quantitative aspects. The general attributes of the Late Pleistocene/Early Holocene archaeobotanical assemblage from the Anonymous cave of Schisto are given in Table 16.19. Collection of samples from the cave's deposits focused on clearly defined contexts bearing the remains of human activity, like hearths and/or plain concentrations of burnt material, so as to minimize the instances of accumulating disturbed and unstratified material that is frequent within the highly diagenetic environment of caves, and to maximize the probabilities of retrieving well preserved botanical finds that can elucidate aspects of the behavior adopted by humans for their elaboration and use. Samples were processed through flotation using a 1mm aperture mesh for retaining the heavy residue and two metal sieves with apertures of 1mm and 250μm for concentrating the floating coarse and fine material respectively. The main modes of preservation encountered in the archaeobotanical assemblage of the Anonymous Cave of Schisto are carbonization and mineralization, the latter very probably owed to the increased percentages of calcium carbonate ($CaCO_3$) observed in Mediterranean cave environments.

The repertoire of plant remains retrieved from the Late Upper Palaeolithic deposits of the Anonymous Cave of Schisto includes several representatives of cereals, pulses and fruits as well as a variety of seeds belonging to diverse families of the wild surrounding vegetation (Table 16.20).

Cereals are mainly represented by grains of wild barley (*Hordeum vulgare L.* ssp. *spontaneum*) and a few grains of wild oat (*Avena* sp.), both also detected in the Upper Palaeolithic and Mesolithic deposits of Franchthi Cave (Hansen 1991). The high fragmentation levels encountered among the cereal finds lead to the accommodation of many seed fragments within the generalized category of non identifiable cereal remains.

Complementary to the cereals is a series of wild pulses identified in the archaeobotanical assemblage from the Anonymous Cave of Schisto that includes vetch or vetchling (*Vicia/Lathyrus* sp.), lentil (*Lens sp.*), grasspea or vetchling (*Lathyrus sp.*) and common pea (*Pisum sativum* L.). The ruptured state of several pulse finds prompted their setting among more generalized identification categories, for example the "small seeded legumes" identification category and the more vague "indeterminate legumes" identification category.

The aforementioned spectrum of plants is complemented by the carbonized or mineralized remains of the following wild palatable fruits: juniper (*Juniperus* sp.), fig *(Ficus carica* L.), grape (*Vitis vinifera* L. ssp. *sylvestris*), cornelian cherry (*Cornus mas* L.), and elder (*Sambucus nigra* L.). Juniper finds that involve both the seeds and the carbonized parts of whole fruits as in the case of the Theopetra Cave assemblage (Kotzamani 2010), are among the most numerous in this category together with fig seeds. A few fragments of *Pistacia* cf *terebinthus* among the archaeobotanical finds suggest the probable exploitation of this plant species by the Palaeolithic users of the cave.

Finally, the assemblage consists of a relatively narrow range of seeds taxonomically belonging to major or minor plant families, among which the representatives of the Boraginaceae family exhibit dominant presence. Due to poor preservation conditions several of them were only tentatively identified to the family level.

The archaeobotanical data retrieved from the Late Upper Palaeolithic deposits of the Anonymous cave of Schisto hint towards the adoption by the human groups of the area of subsistence strategies focusing on a relatively broad spectrum of plant resources, that involved a variety of wild cereals, legumes and fruits in order to fulfill substantial nutritional needs in carbohydrates, proteins and vitamins. The role of the remaining wild flora elements of the assemblage, although potentially varietal, given the multiple inherent properties possessed by several of them (i.e. nutritional, medicinal or other), remains largely inaccessible in the light of available contextual information. Moreover, it is probable that many more botanical representatives of the surrounding vegetation would have been selected for exploitation by the Late Pleistocene/Early Holocene human groups of the area but their failure to come in contact with fire and attain preservation in the archaeological deposits through it has resulted in the absence of any visible evidence for their presence and use.

Overall, the still rather turbid picture composed out of the so far available botanical evidence of the Anonymous Cave of Schisto, in combination with the respective contemporaneous data sets from the caves of Franchthi and Theopetra, is that of an active population inhabiting the Greek peninsula during the end of the Pleistocene and the beginning of the Holocene Era, engaged in operative links of appropriation and mutuality with the plant components of the natural world in which they lived and subsisted, whose actions, motivations, behavioral expressions, and contribution in the shaping of things are still to be quested for and configured. Future archaeobotanical work on the site of the Anonymous Cave of Schisto will follow research directions focusing on the recruitment and analysis of a larger data set covering the whole chronological sequence of the cave's occupation, the clarification of samples' contextual associations and the recording of potential uses of the plants comprising the botanical spectrum of the assemblage, which will hopefully contribute positive feedback on some of the research questions posed by the archaeobotanical study.

Neolithic And Early Bronze Age Pottery
Fanis Mavridis and Zarko Tankosic

The excavated trenches (2006-2007) have yielded a fairly large amount of pottery that can be dated to different Prehistoric periods with greater or lesser degree of certainty. Unfortunately, the stratigraphic situation associated with the pottery assemblages from the Anonymous Cave of Schisto is somewhat problematic. This lack of consistent stratification was a factor that did not aid in the identification and chronological assignation of the pottery from the cave. Since the bulk of the pottery is still awaiting proper analysis, we present here some of the more interesting pieces selected with the intention to illustrate the presence of particularly pertinent chronological periods. The more thorough and complete presentation of pottery is forthcoming and will also include new evidence from the future excavation seasons.

Four Prehistoric periods can be identified in the excavated ceramic material with a high degree of certainty - the Middle Neolithic, the Late Neolithic I and II, and the Early Bronze Age. The Middle Neolithic phase is characterized by only a few (ca. 3% of the examined assemblage) fragmentary examples belonging to the red on white painted ware. The bulk of our prehistoric pottery can be dated to the remaining periods (Fig. 16.12), comprising more than 90% of the total assemblage, including both fine and coarse wares. The caveat is that only diagnostic sherds have been studied thus far, which makes this percentage prone to change when the study of the pottery is completed or, indeed, in the light of new evidence from future excavation.

Late Neolithic I-IB

About 22% of the pottery from the Anonymous Cave of Schisto can, with a degree of certainty, be dated to the Late Neolithic (Fig. 16.13). The Late Neolithic period is most visibly represented by matt painted wares, typical for this age in most of the central and southern Greece. Our examples are usually made of well cleaned and well fired clay with few (if any) visible inclusions. Both inner and outer surfaces of the vessels are slipped with very fine slip. Following the application of slip, the surface of the vessels was most likely wiped, or perhaps first burnished and then wiped to remove the typical troughs that are the telltale sign of burnishing. An alternative explanation for the lack of luster can be connected to the firing procedures during which highly polished ceramic surfaces can lose their pre-firing luster. This treatment produced a surface that is very smooth but which is, at the same time, without or almost without luster. The color of the ceramic surfaces is usually of different hues of buff. The most common shape in the assemblage associated with this prehistoric phase is an open bowl with almost vertical or slightly incurving rim. There is also one example of a carinated vessel and one example of a shouldered bowl with a slightly spreading neck.

The defining characteristic of our Late Neolithic I sherds is the decoration, although undecorated Late Neolithic I sherds also exist in the assemblage. All fragments that bear decoration are decorated using paint that lacks luster. The color of the paint varies but is usually dark grayish brown, although in some cases it can be more yellowish brown or even close to red. The decoration is either applied on the surface of the vessel directly, on top of the whitish/buff slip, or, rarely, on a whitish base. All of the sherds whose rims are extant also have decoration on the inside of the vessel, just below or attached to the inner side of the rim itself. This decoration usually consists of a row of triangles whose apexes point downwards. The decoration found on the outer surface of the surviving sherds is always rectilinear. Its most common constituent stylistic elements or motifs are horizontal, vertical, and diagonal lines that can intersect or join. Sometimes the lines are arranged in such a way as to form fields. These fields can be left empty, but they can also be either solidly painted or contain one or more zigzag lines of variable thickness. Some of these lines are positioned parallel to each other, thus forming bands that are either filled with paint or left unpainted. Joined triangles also represent a motif found on the pottery from the Anonymous Cave of Schisto. Some of these elements are combined to form complex decorations. In addition to the matt-painted pottery, there is a number of monochrome fine burnished sherds that can also be dated to the Late Neolithic period, as well as sherds with incised decoration and some sherds coming from "scoops" decorated with horned handles.

The decorative motifs and vessel shapes of the Late Neolithic pottery from the Anonymous Cave of Schisto belong to the repertoire that is more or less common for this period in central and southern Greece. For example, they can be found at Gonia (Phelps 2004, pls. 38.2, 43.18, 18a, 44.21, 83.6, 12, 15), Corinth (Phelps 2004, pl. 81.7-12), the Klenia (Phelps 2004, figs. 33.17, 39.1, 12, 44.22, 48.14, 53.3) and Alepotrypa (Phelps 2004, fig. 53.3) Caves in the Peloponnese, as well as at the Kitsos Cave (Lambert 1981, types 13, 14, 15, 18) or the Leontari Cave (the Lion Cave) in Attika (Karali, Mavridis and Kormazopoulou 2006), and many others.

Late Neolithic II

The Late Neolithic II/Final Neolithic period is also well represented in the pottery finds from the Anonymous Cave of Schisto and comprises about 24% of the ceramic assemblage (Fig. 16.14). Since the Late Neolithic II/Final Neolithic is a very long and still insufficiently understood part of the Aegean Prehistory, the exact chronological placing of the finds from the Anonymous Cave of Schisto within the Late Neolithic II/Final Neolithic timeframe is somewhat problematic. Some features of the assemblage point to the links with the Attika-Kephala cultural and, perhaps, chronological horizon of the central Greece and northern Cyclades. They include the fairly typical incised or grooved decoration, in this case found on a broad strap handle. The handle in question starts from the rim and is, in fact, slightly swung above it. On the highest point of the strap handle there is a knob like application, which has many parallels not only from other Attika-Kephala sites but also among other examples from the Anonymous Cave of Schisto. Other examples of strap handles from the Schisto Cave, however, are not grooved. At the same time, some of the most obvious or at least the most expected characteristics of the Attika-Kephala pottery are missing from the Anonymous Cave of Schisto, e.g. the red burnished and pattern burnished pottery, coarse vessels with rows of perforations located under the rim (“cheese pots/pans”), “elephant lugs”, crusted pottery, and the Kephala type scoops (Coleman 1977).

Other examples of the Late Neolithic II/Final Neolithic pottery include vessels with vertical or slightly incurving rims, which are sometimes decorated with incisions but are more often left plain, hole-mouthed jars with inward sloping conical necks, and open bowls with horizontal strap handles or vertically pierced lugs not far below the rim. There is also some evidence for large pithoid jars that are fairly typical for the period and which are usually decorated with rope-like (*taenia*) impressed bands.

The fabrics of the pottery that can be assigned to this period are much coarser in comparison to the Late Neolithic ones; they are often calcareous, medium to medium coarse, with many other inclusions. The surface of these vessels is usually only smoothed or evened or, in some cases, only slightly burnished and it commonly lacks luster.

Good parallels for grooved and incised decoration and strap handles with knobs from the Anonymous Cave of Schisto can be found at Kephala (Coleman 1977), Athenian Agora (Immerwahr 1971), and the Kitsos Cave (Lambert 1981). At those sites grooved decoration is used frequently, especially on scoops, and an exact parallel of a grooved strap handle (without the knob, however) exists at the Kitsos Cave (Karali 1981, fig. 237). Strap handles with knobs on top are also known from all three sites (Coleman 1977, BG, BH; Immerwahr 1971, pl. 13.205; Karali 1981, pl. XLII g), the Klenia Cave in the Peloponnese (Phelps 2004, fig. 51.16, 20), the Hagia Triada Cave in Karystos (Mavridis and Tankosic 2008; 2009a, b, c.), and others.

The combination of incised and pointillé techniques, occasionally with white incrustation, is known from the Kitsos Cave in Attika, where Nicole Lambert dates it to the end of the 5th or the very beginning of the 4th millennium B.C. (Lambert 1981, 278, 290, type 6), the Pan Cave in Marathon (Oinoe II) in Attika (Lambert 1981, 279), and the Hagia Triada Cave in Karystos (Mavridis and Tankosic 2009a). This type of decoration is also known from the Athenian Agora (Immerwahr 1971, pl. 7.99) (only one piece) and other locations (Karali, Mavridis and Kormazopoulou 2006). The open bowl with vertically pierced conical lug has parallels in the material from the Klenia Cave in the Peloponnese (Phelps 2004, fig. 51.10, 14). Jars with inward sloping conical necks are well represented at Kephala (Coleman 1977) and other Attika-Kephala sites and are rather typical for this period. Finally, pithoid jars with rope decoration are ubiquitous in this period [for example, Lerna in the Argolid (Vitelli 2007), the Hagia Triada Cave in Karystos (Mavridis and Tankosic 2008; 2009a, b, c.), the Kitsos Cave in Attika (Lambert 1981), Kephala on Keos (Coleman 1977) and others].

Early Bronze Age

The most numerous pottery group from the cave belongs to the Early Bronze Age period; it comprises about 51% of the studied prehistoric assemblage (Fig. 16.15). The pottery of this period is represented by a variety of thickened “T-rims” that belong to open bowls or basins of different sizes that are often decorated by rope like impressed plastic bands below or on the rim. The second most common form from this period is a simple bowl with incurving and sometimes slightly thickened rims. Besides these, there is evidence for pedestaled or footed vessels (most likely bowls), and there are also several fragments of sauceboats. Most of the Early Bronze Age pottery from the Anonymous Cave of Schisto can be tentatively assigned to the Early Helladic IIA period, although there are several sherds that resemble, in fabric and finish, the wares typical of the Early Helladic IIB or Lefkandi I/Kastri phase, which is also equated with Phase III at Hagia Eirini on Kea.

The fabric of the Early Bronze vessels varies from fine to medium coarse. The clays are usually calcareous but they can also contain other inclusions, like schist, sand, or quartzite, or have no inclusions at all (most often this is the case with the fabric of sauceboats). The sherds are often unslipped and their surface is finished either by smoothing or scraping, the latter of which produces the characteristic Early Bronze Age scored finish. The sauceboat fragments are always slipped and some are covered with *Urfirnis*, another hallmark of the Early Bronze Age II period. Some sherds have mending holes on them, suggesting the post-firing pottery repair.

Good parallels for our Early Bronze Age material exist at all locations where pottery of comparable date can be found; for example, at Lerna (Wiencke 2000, figs. II.5.P58, II.6.P96, P97, II.10.P175, II.13.P220-P223, II.14.P234, II.15.P261, II.19.P364, II.36.P650, P657, P658), Hagia Eirini on Kea (Wilson 1999, II.139-141, II.509, III:71, III.103) , Eutresis (Caskey and Caskey 1960, fig. 4.III.11, III.15), and southern Euboea, particularly the area around Karystos and the Early Bronze Age site of Hagios Georgios. Besides the *Urfirnis*, some sauceboat fragments belong to the yellow mottled ware as defined at Hagia Eirini (Wilson 1999).

The feature of the Anonymous Cave of Schisto's ceramic assemblage that is immediately obvious is the almost complete absence of fragments of large storage vessels. This assertion is valid for all three Prehistoric periods in question suggesting that storage of goods and especially foodstuffs was likely not done at the site. This in turn points to the impermanent occupation of the cave during the time period between the end of the Neolithic and the middle part of the Early Bronze Age. Another problem with the prehistoric pottery assemblage from this cave is the lack of chronologically consistent stratification. For example, the pottery from all three periods is found mixed in all excavated layers of Trench 2 and, in some cases, sherds that were found in different layers can be joined. Similar situation exists in the other trench, at least as far as Late Neolithic and later material is concerned. The tentative and preliminary conclusion that can be drawn from this is that the pottery has been redeposited to its current position by the action of water combined with the natural inclination of the terrain inside the cave. The lack of sherds that belong to the larger storage vessels may also be explained in this way, as those sherds are usually heavier and therefore more difficult to transport by natural causes and, if there were any, they were more likely to remain in their original positions closer to the entrance of the cave.

The phases of the Neolithic and the Bronze Age were detected and defined through a number of characteristic pottery sherds and through a few pieces of obsidian. Unfortunately, no contextual associations were found *in situ* since the excavation showed that deposits were likely washed in and redeposited by the action of water. Dating of the material is, therefore, a difficult task, which is based on typological and stylistic grounds only.

Historical Times
Lina Kormazopoulou

From the disturbed surface layers of the main chamber comes pottery from all the Historical periods represented inside the cave (Fig. 16.16) (see Zampiti in this volume). So far the scarce presence of pottery sherds from the Late Geometric, Archaic, Classical and Hellenistic use of the cave is remarkable compared to the vast numbers of such finds from the "votive" deposit.

Late and Post-Roman pottery is moderately represented in the excavated part of the main area, including mostly undiagnostic body sherds of plain and coarse wares. Reference can be made to a body sherd from a Late Roman 2 transport amphora with wavy incisions (end of 6th-7th century A.D.), and the sherd of a jug decorated with a rough wavy line. A whole lamp from Trench 2 decorated with herringbone pattern on the rim and rosette on its half broken discus can be dated to the mid 5th century A.D. (Fig. 16.17). Late pottery in the main chamber points to a rather sporadic use of the cave, of practical character (for the use of caves in Late Antiquity in Attika, see Skias 1918; Wickens 1986; Schörner and Göette 2004).

Conclusions

The significance of the Anonymous Cave of Schisto lies, above all, in the presence of multiple occupation/use layers that span several millennia of both prehistoric and historic periods. Particularly significant layers are the ones belonging to the Pre-Neolithic deposits. They indicate the presence of multiple strata that belong to the Late Pleistocene/Early Holocene transition. Preliminary results point to an economy of hunter-gatherers with an important presence of wild cereals and pulses. This evidence together with the early presence of obsidian artifacts (Laskaris et al. 2011; Mavridis at al. 2012) indicate that what we knew thus far from the Franchthi Cave excavation represents a wider phenomenon. The date and the contents of these layers are potentially important for the poorly attested and understood transition to the Neolithic period in the Aegean.

Regarding the prehistoric ceramic phases, very few sherds indicate the presence of the Middle Neolithic, while the Late Neolithic I and II phases are better preserved. The Early Bronze Age is also present at Schisto, which is not usually the case in caves (Mavridis 2006; Mavridis, Jensen and Kormazopoulou introduction to this volume). Unfortunately, pottery and a few lithic fragments that have been found until now come from contexts that are not stratigraphically secure and very little can be said about the character of the use of the cave during these periods.

The Schisto Cave use continued well into the Historical Times from at least the Late Geometric down to the Roman and Byzantine periods (for a detailed discussion, see Zamptiti in this volume).

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Figure 16.1. The entrance of the cave and the surrounding area (Photo by F. Mavridis).

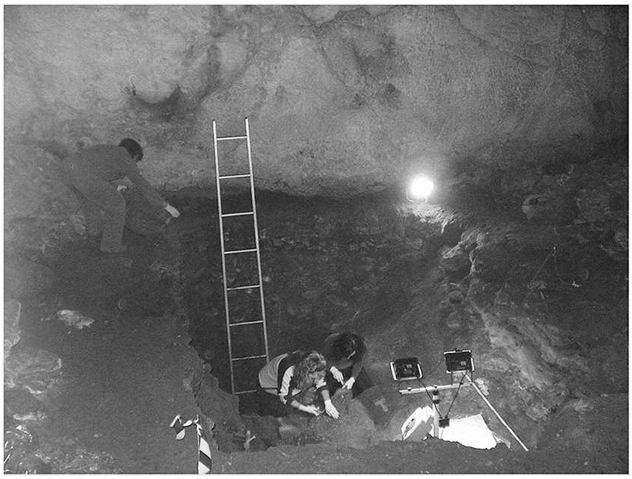

Figure 16.3. The area of the excavation (Photo by F. Mavridis).

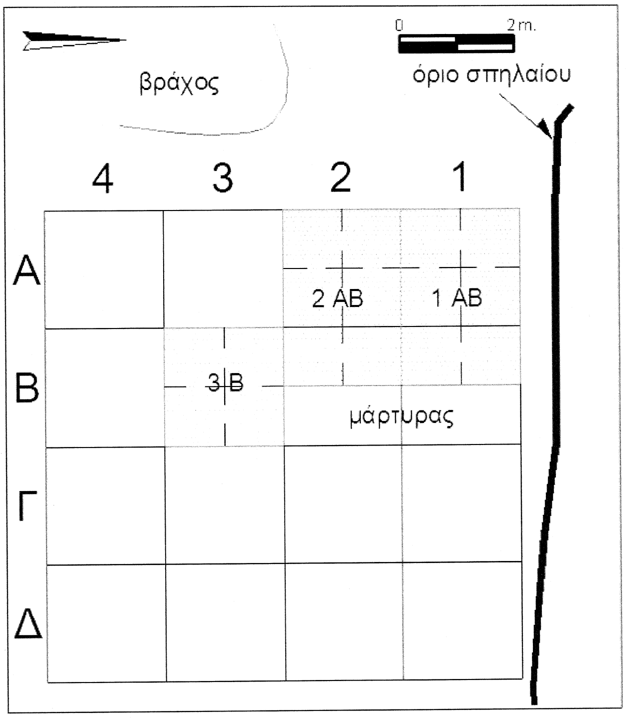

Figure 16.2. Sketch plan of the excavation (Th. Hatzitheodorou).

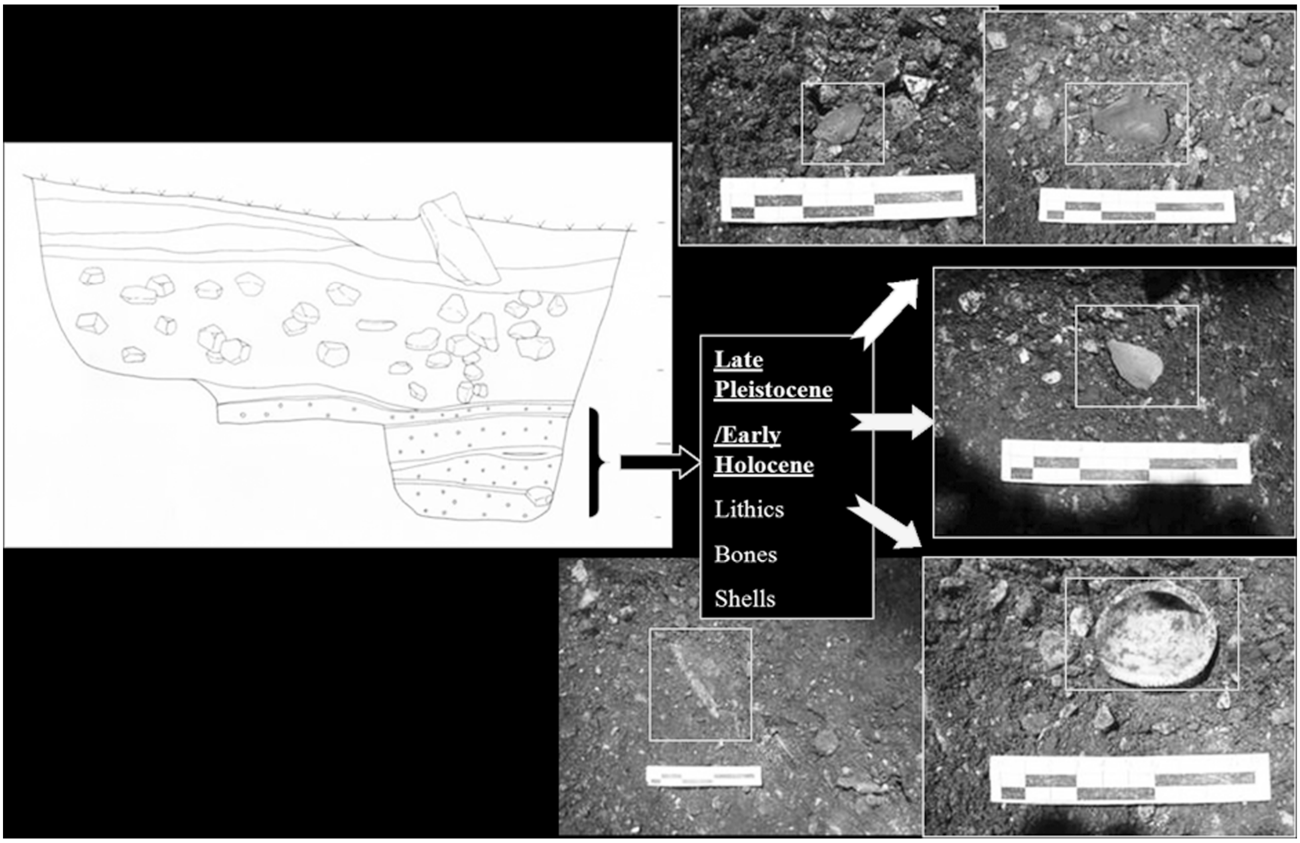

Figure 16.4. Stratigraphy and representative finds of the Late Pleistocene/ Early Holocene phases (Photos by F. Mavridis, Illustrations by D.Yamaguchi).

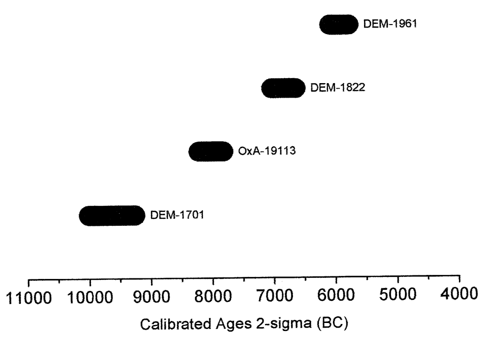

Figure 16.5. Bar diagram of 2σ calibrated ages (Y. Maniatis).

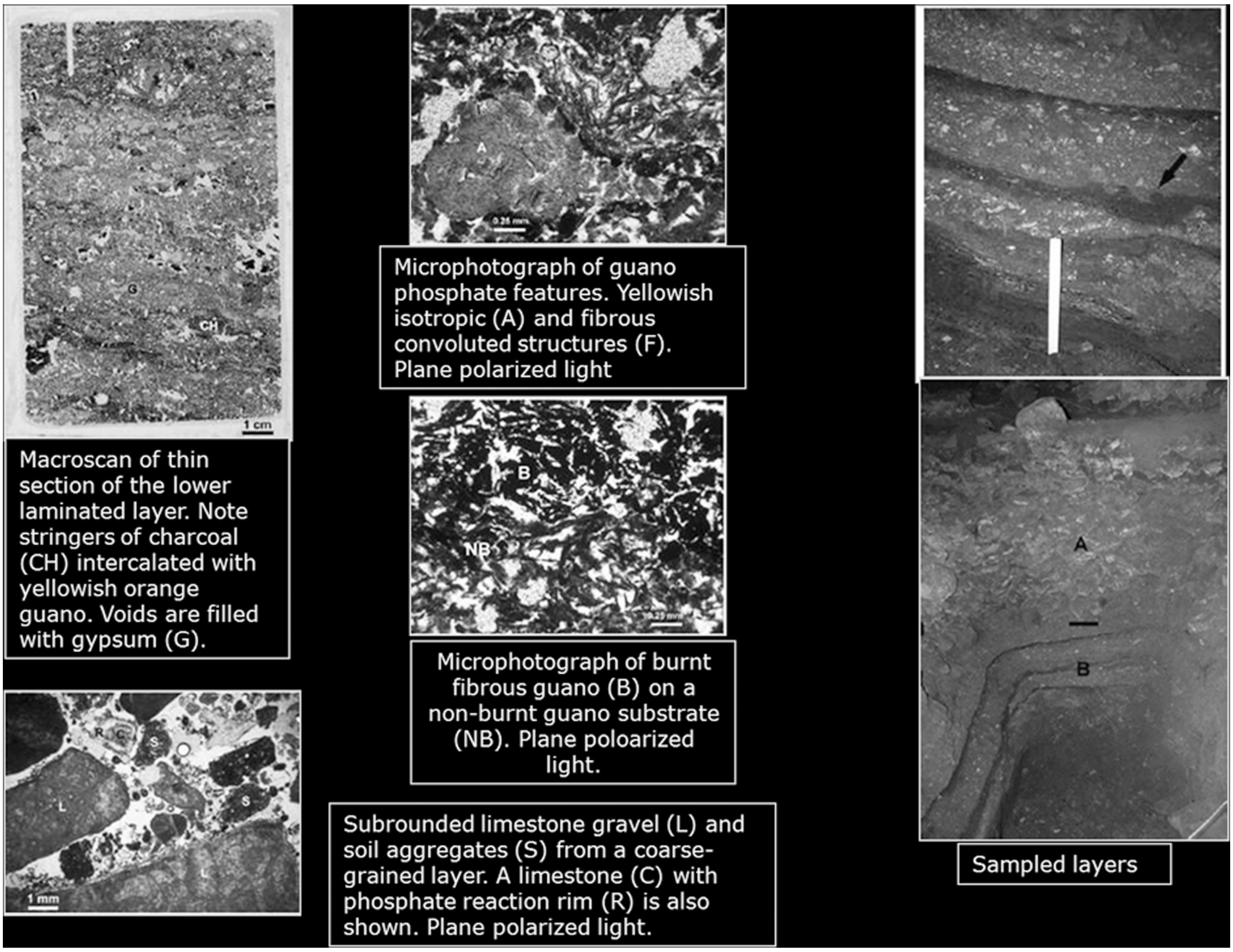

Figure 16.6. Geomorphological analysis and sampled layers (Photo by P. Karkanas).

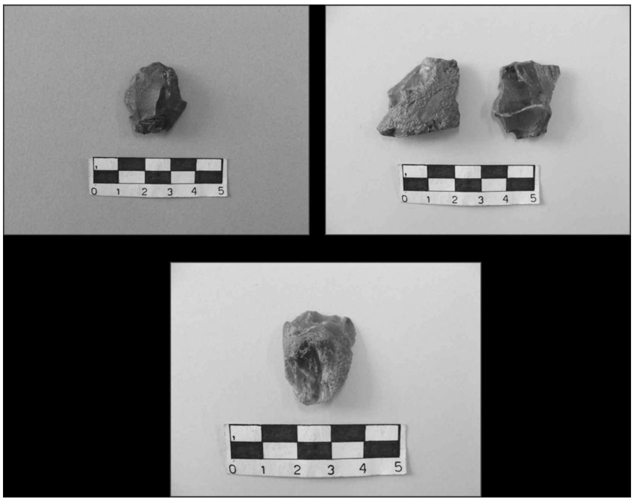
Figure 16.7. Flakes (Photos by A. Papadea).

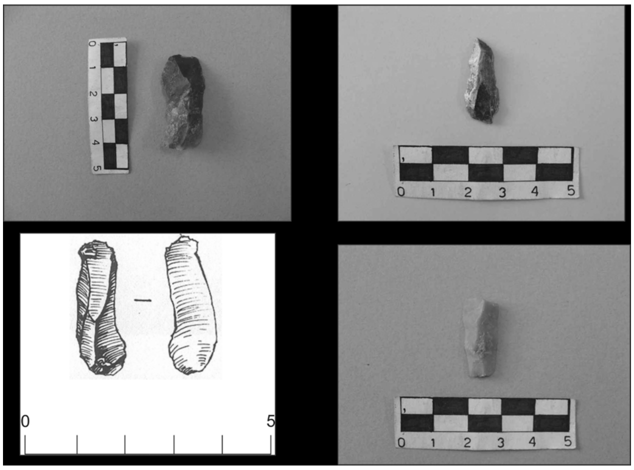
Figure 16.8. Blades (Photos by A. Papadea, Illustration by D. Bakogiannaki).

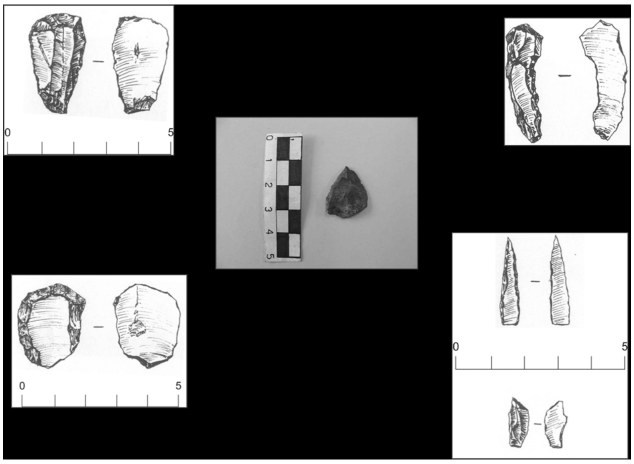

Figure 16.9. Selected lithics: carinated scraper, point on flake, retouched blade, scraper, double backed blade, non geometric microlith (Photo by A. Papadea, Illustrations by D. Bakogiannaki).

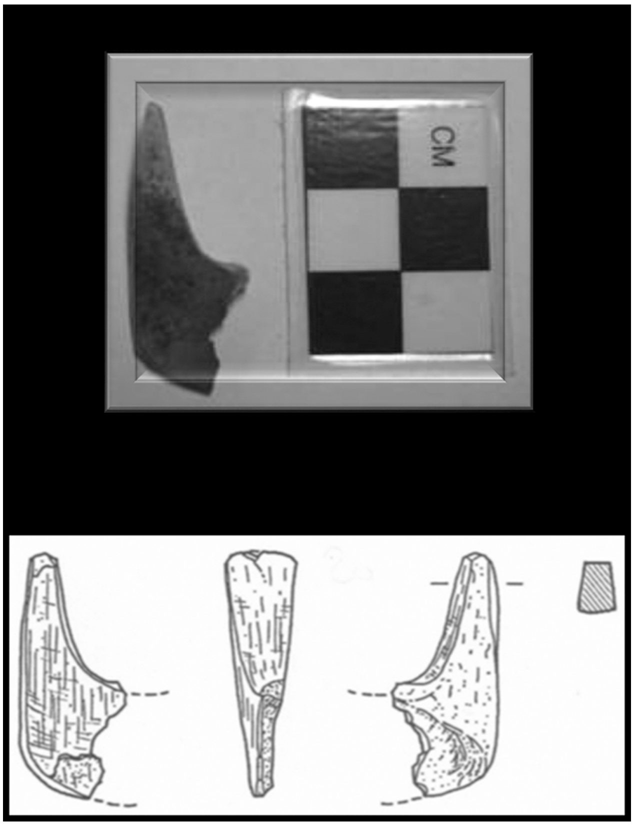

Figure 16.10. Hooked-type bone artifact (Illustration by D. Yamaguchi).

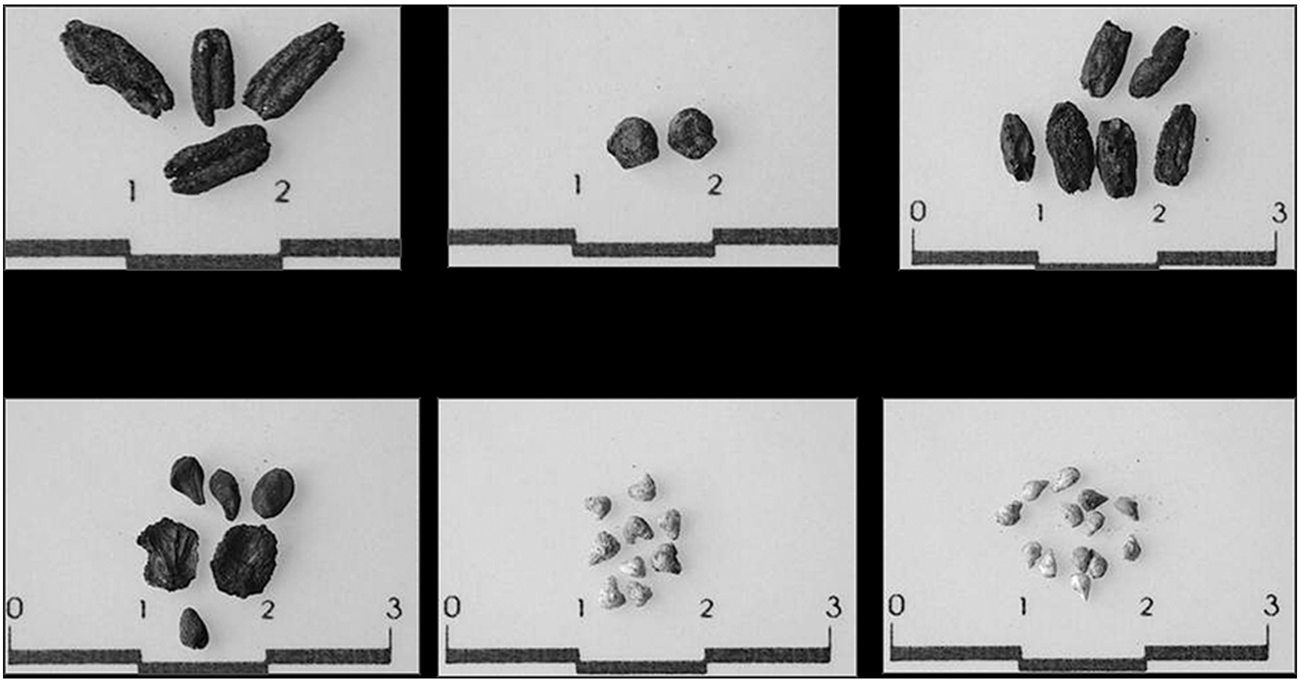

Figure 16.11. Archaeobotanical remains: Avena sp, Lathyrus sp, Hordeum sp, Juniperus sp, Alkanna sp, Lithospermum sp. (Photo by A. Iliakopoulos).

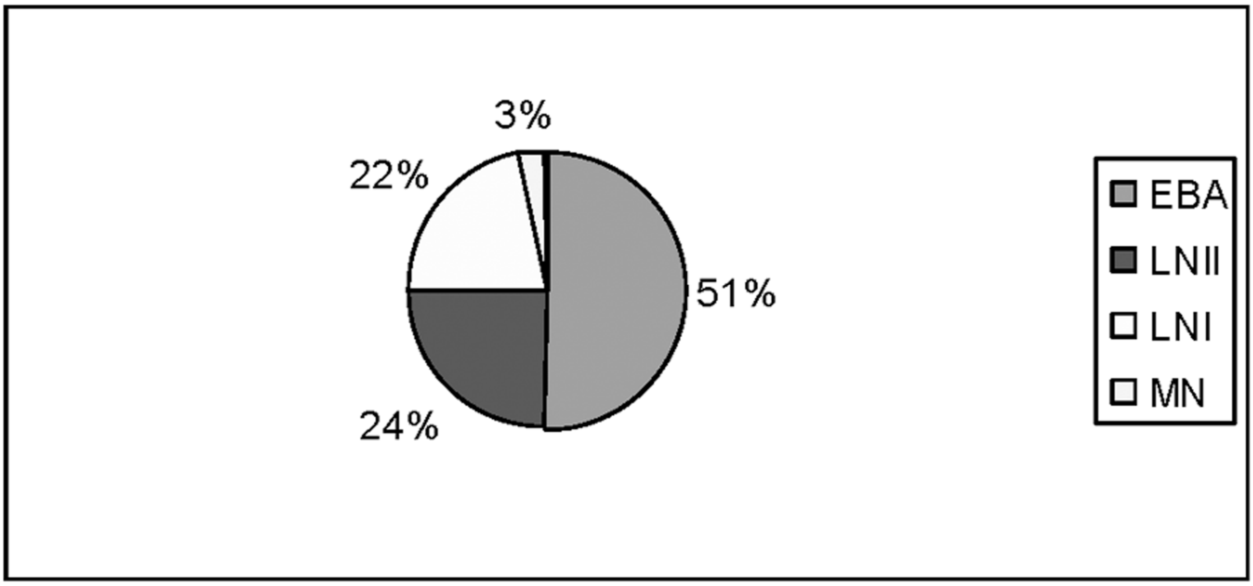

Figure 16.12. Percentages of prehistoric pottery per phase (2006-2007).

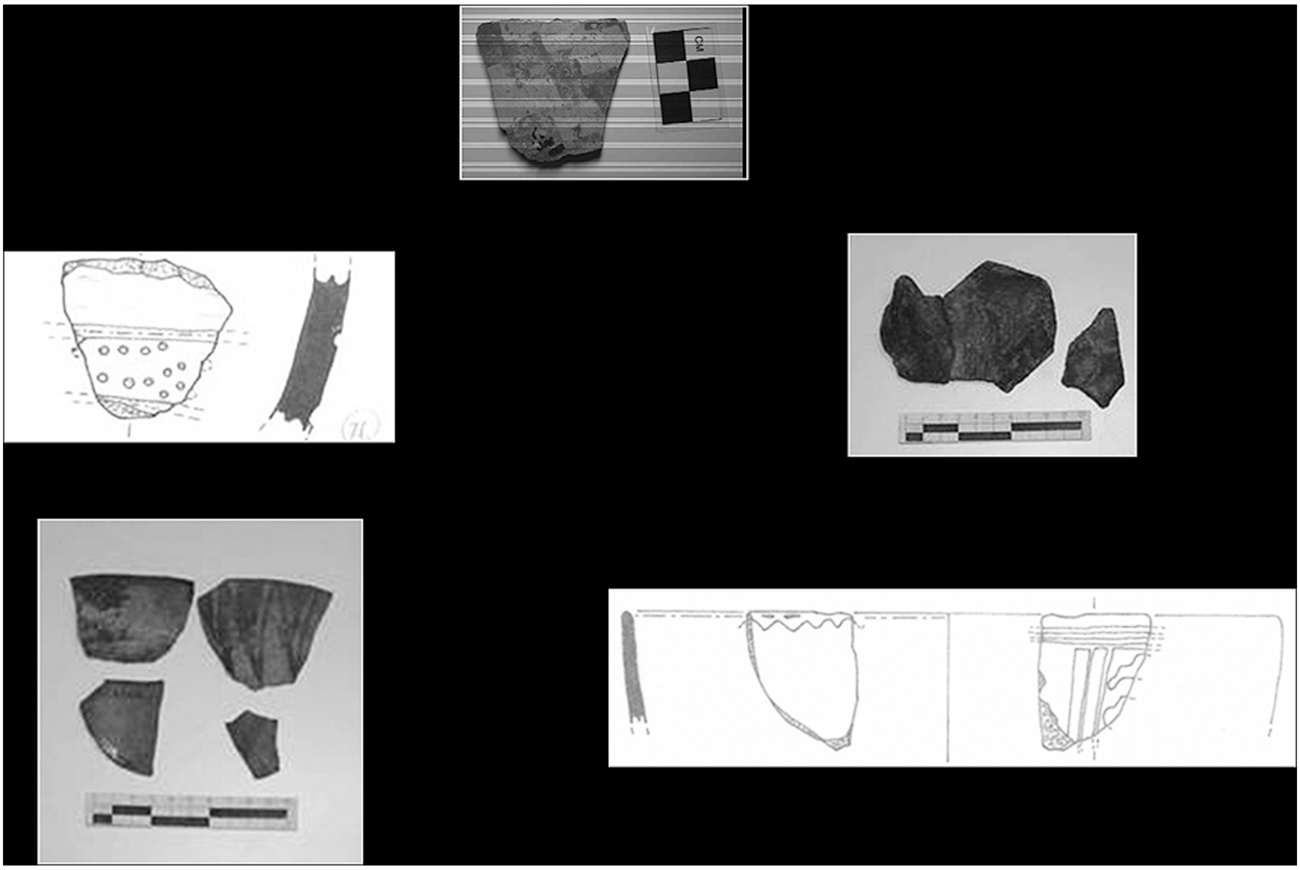

Figure 16.13. Middle-Late Neolithic sherds (Photo by Z. Tankosic).

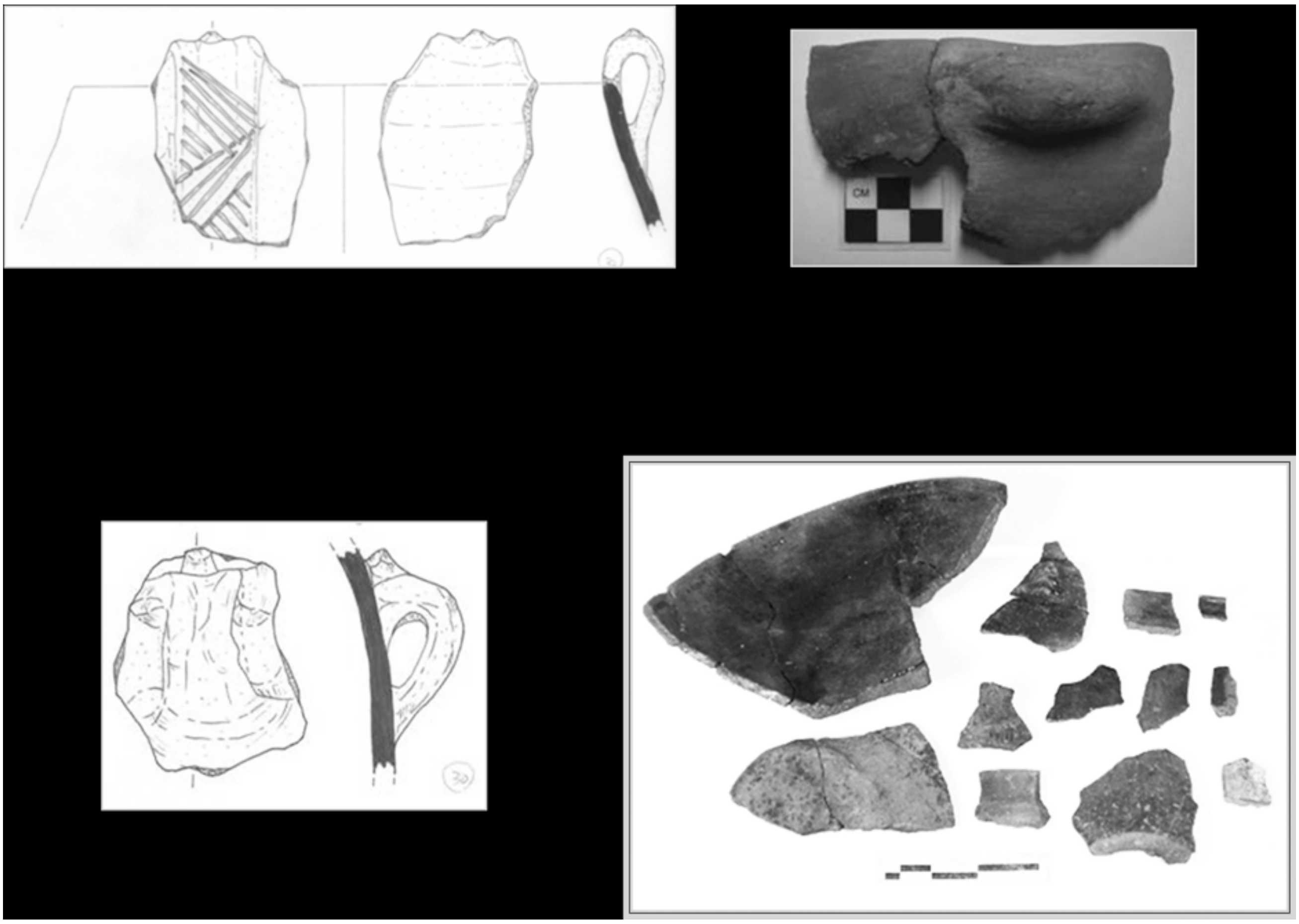

Figure 16.14. Late Neolithic Ib-II pottery (Photo by Z. Tankosic).

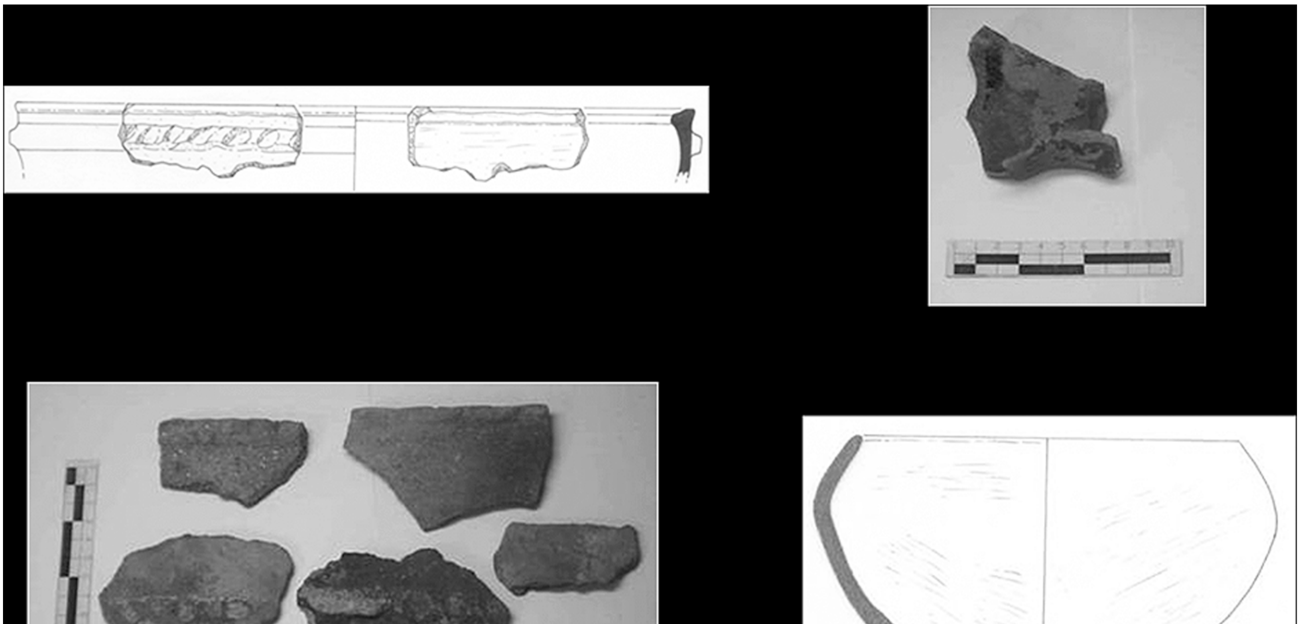

Figure 16.15. Early Bronze Age pottery (Photo by Z. Tankosic).

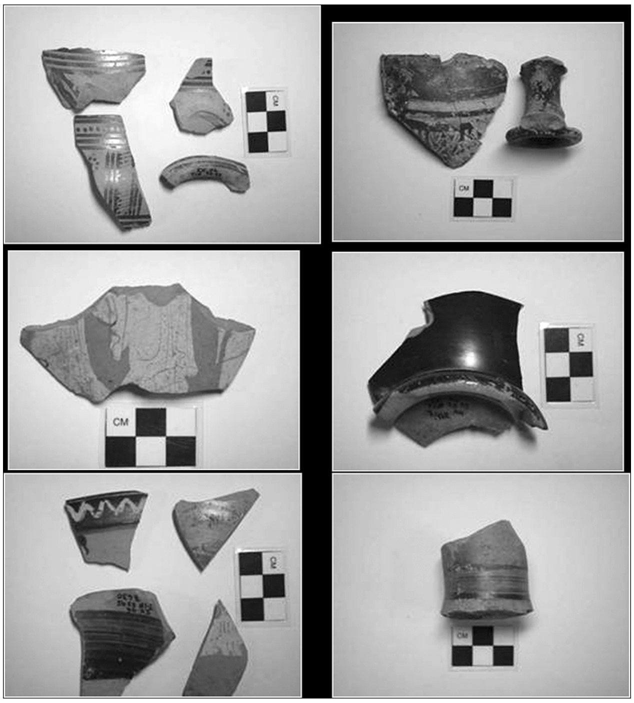

Figure 16.16. Historical Times: sherds (Photo by L. Kormazopoulou).

Figure 16.17. Sherds of Late/Post Roman pottery (Photo by L. Kormazopoulou).

Laboratory Sample Code	Sample Location Details	Material	Radiocarbon Age (B.P.)	$\delta^{13}C$ (‰)	Calibrated Age (B.C.)	Probability
DEM – 1701	J7, Tr. 1A/B, L.4, S. 11, D. 2.37 m (Deepest excavation layer)	Charcoal	9978 ± 100	-24,00	9660 – 9310 10010 – 9260	(68,3%) (95,4%)
DEM – 1822	J3, Tr. 3A1, L. 10, S.6, D. 1.69 m	Charcoal	7895 ± 55	-24,02	6980 – 6630 7030 – 6640	(68,3%) (95,4%)
(OxA-19113)	J4, Tr. 1, L.4, S. 8, D. 1.86 m	Charcoal	8856 ± 39	-23,40	8210 – 7940 8215 – 7820	(68,3%) (95,4%)
DEM – 1961	J3, Tr. 3A2, L.11, D. 1.82 m	Charcoal	7076 ± 75	-23,86	6030 – 5880 6080 – 5770	(68,3%) (95,4%)

Table 16.1. Radiocarbon results and sample information (Y.Maniatis).

Trench 1A		
Strata	4	4
Layer	6	7
Intact	1	2
Broken	1	2
Burnt	0	0
Total	2	4

Table 16.2. Condition of preservation of knapped artifacts per layer (A. Papadea and O. Apostolikas).

Trench 1B		
Strata	4	4
Layer	6	7
Intact	3	9
Broken	2	6
Burnt	0	1
Total	5	16

Table 16.3. Condition of preservation of knapped artifacts per layer (A. Papadea and O. Apostolikas).

Trench 1AB						
Strata	4	4	4	4	4	4
Layer	8	9	10	11	12	13
Intact	8	4	17	11	2	4
Broken	8	6	19	9	0	2
Burnt	3	2	3	2	0	0
Total	19	12	39	22	2	6

Table 16.4. Condition of preservation of knapped artifacts per layer (A. Papadea and O. Apostolikas).

Trench 1A		
Strata	4	4
Layer	6	7
Unretouched flakes	0	2
Tools	1	2
Unretouched waste products	1	0

Table 16.5. Basic typological categories per layer (A. Papadea and O. Apostolikas).

Trench 1B		
Strata	4	4
Layer	6	7
Cores/exhausted cores	0	1
Unretouched flakes	1	4
Unretouched blades	0	2
Unretouched small flake	0	1
Tools	4	2
Unretouched waste products	0	0

Table 16.6. Basic typological categories per layer (A. Papadea and O. Apostolikas).

Trench 1AB						
Strata	4	4	4	4	4	4
Layer	8	9	10	11	12	13
Cores/exhausted cores	0	0	2	4	0	1
Unretouched flakes	6	4	16	3	1	1
Unretouched blades	4	2	3	4	0	0
Unretouched small flake	0	0	1	1	0	0
Tools	6	5	17	7	1	2
Unretouched waste products	2	0	1	3	0	1
Unclassifiable	1	1	0	1	0	0

Table 16.7. Basic typological categories per layer (A. Papadea and O. Apostolikas).

Trench 1A		
Strata	4	4
Layer	6	7
Point on a double-backed bladelette	1	0
End scrapper on flake	0	1
Robust bec(beak) on waste product	0	1

Table 16.8. Tools per layer (A. Papadea and O. Apostolikas).

Trench 1B		
Strata	4	4
Layer	6	7
Carinated scraper on flake	0	1
Scraper on flake	1	0
Retouched flake	2	1
Retouched blade	0	2
Retouched waste product	1	0

Table 16.9. Tools per layer (A. Papadea and O. Apostolikas).

Trench 1AB						
Strata	4	4	4	4	4	4
Layer	8	9	10	11	12	13
Retouched flake	1	1	2	1	0	0
Retouched notch on flake	1	1	0	1	0	0
Clactonian notch on flake	0	1	1	0	0	0
Denticulate on blade	0	0	1	0	0	0
Triple notch on flake	0	0	1	0	0	0
End scraper on flake	1	0	0	0	0	0
Backed blade	1	1	1 ;	0	1	1
Retouched blade	1	0	1	0	0	0
Point on double-backed bladelette	1	0	0	0	0	0
Convex backed bladelette	0	1	0	0	0	0
Convex single scraper on waste product	0	1	0	0	0	0
Point on flake	0	0	2	0	0	0
Borer on waste product	0	0	1	0	0	1
Borer on flake	0	0	0	1	0	0
Retouched core	0	0	1	1	0	0
Composite tool on flake	0	0	1	1	0	0
Composite tool on blade	0	0	2	0	0	0
Composite tool on small flake	0	0	1	0	0	0
Composite tool on exhausted core	0	0	0	1	0	0

Table 16.10. Tools per layer (A. Papadea and O. Apostolikas).

Taxon	**10th-9th Millennia BP**		**Trench 1 and 2, Layer 4, Str. 11**		**Trench 1, Layer 4, Str. 8**		**Trench 3, Layer 10, Str. 6**		**6th Millennium BP - Present**	
			9,978 ± 100 BP, 9,660-9,310BC; 10,010-9,260 B.C.		8,856 ± 39 BP, 8,210-7,940BC; 8,215-7,820BC		7,895 ± 55 BP, 6,980-6,630BC; 7,030-6,640BC			
	NISP	%	NISP	%	NISP	%	NISP	%	NISP	%
Equidae	37	1.85	5	5.43			3	30.0	7	0.32
Cervidae	128	6.40	8	8.70					21	0.97
Cervidae-Equidae	1084	54.17	39	42.39			4	40.0	147	6.76
Lagomorpha	518	25.89	39	42.39	18	100.0	3	30.0	333	15.32
Artiodactyla	125	6.25	1	1.09						
Canis lupus	3	0.15								
Canis familiaris									2	0.09
Caprinae									1311	60.33
Capra hircus									50	0.23
Ovis aries									53	2.44
Bovidae									53	2.44
Suidae									40	1.84
Rodentia	18	0.90							37	1.70
Aves	88	4.40							119	5.48
TOTAL	**2001**		**92***		**18****		**10*****		**2173**	

Table 16.11. Anonymous Cave of Schisto at Keratsini. Excavations 2006 and 2007. Total Number of Identified Specimens (NISP): 4284 fragments in the Mammalia/Aves Class. Comments: * Five of those bones were burnt at a heat of 250˚c-650˚c. Among them there are 12 flakes. One bone bear cut marks. ** Four fragments were burnt, one bears a cut mark. ***Five of those bones were burnt at a heat of 350˚c-650˚c. (K. Trantalidou)

TAXON	**NISP**	%	**Side**		**Modification due to Human Activities**						**Modified: Animal Gnawing**
					Burned					**Flakes**	
			R	L	250˚c-350˚c	350˚c-650˚c	650˚c-700˚c	cut marks	chopped	oblique, spiral	
Equidae	37	1,36	1	3	1					1	1
Cervidae	128	4,7	3	2	2	3			1	16	
Cervidae-Equidae	430	15,8	1	1	26	90	2	6		68	3
LBFR Cervidae-Equidae	654	24								654	
Lagomorpha	518	19	23	33	6	15	1	4		37	
Artiodactyla	125	4,58	1	2		4		2		3	
Canis lupus	3	0,11									
Sub -total	1895	69			35	112	3	12	1	779	4
Caprinae	461	16,9				59		1		15	
Capra hircus	11	0,4	6	3		1					
Ovis aries	15	0,55	4	3				1			
Bovidae	23	0,84	1	2		1				3	
Suidae	18	0,66	1	3		1					
Subtotal	528	19				62		2		17	
Rodentia	18	0,66	6	6							
Aves	88	3,22									
Total	2729					124	4			35	

Table 16.12. Burned lenses (found in trenches 1 and 2, Layer 4, str. 6-14) with more than 70% osteological material belonging to the Final Palaeolithic. Domesticated species are found mostly in the upper strata 6 and 7. (K. Trantalidou)

TAXON	NISP	%	Modification due to Human Activities			
			Burned specimens			
			250˚c-350˚c	350˚c-650˚c	650˚c-700˚c	Cut marks
Cervidae-Equidae	81	18,93		6		2
Cervidae	21	4,91	2	2		
Equidae	7	1,64		6		
Lagomorpha	243	56,77		18		3
Caprinae	65	15,19				
Rodentia	9	2,11				
Aves	2	0,47				
TOTAL:	**428**		2	32		5

Table 16.13. Anonymous Cave of Schisto at Keratsini. Trench 3, layers 8-10, strata 3-6. Excavations 2007. (K. Trantalidou)

Element	**NISP**	**Side**		**Fragmentation**					**Modification due to Human Activities**			**MNI**
		R	L	1I5	2I5	3I5	4I5	5I5	Cut Marks	Burnt	Flakes Oblique, Spiral	
Skull	8			7				1				
Maxille	5		3	3	1		1			1		
mandible	8	2	5	2	2		1	3			1	
Teeth	20	6	6	4			3	10				
Scapula	13			10	1	2			1	1		
cervical vertebra	1			1								
Rib	34			24	8	1	1		2	4		
humerus	27			24	3					5	5	
humerus, d	4	2		3	1				1		2	2
Radius	24	1	3	19	3	1	1				1	
Ulna	12	1	3	6	2	2	2			1	2	
ulna, p	1		1			1						1
metacarpal	8			4				4				
Sacrum	2						1	1				
Pelvis	18	2	5							3		
Femur	84			76	3	4	1			7	12	
Tibia	220			199	9	9	2	1		13	14	
tibia, p	1	1			1					1		1
tibia, d	5	3	2	4			1			1		3
metapodium	4	1		2		2				2		
metatarsal	8	2	1	4		1	2	1		1		
metatarsal, p	4	1	3	2	1	1						3
metatarsal, d	1		1					1				1
astragalus	2	1		1			1					
calcaneum	3			1	2							
first phalanx	1							1				
Total	518	23	33	396	37	24	17	23	4	40	37	3

Table 16.14. Anonymous Cave of Schisto at Keratsini. Burned layers (found in trenches 1-2, layer 4, str. 4-14) with more than 70% osteological material of the Final Palaeolithic period. Specimens indentified as lagomorphs are shown anatomically using the NISP (Number of Indentified Specimens) and the MNI (Minimum number of individuals) methods. (K. Trantalidou)

TAXA	**Sites and Periods**															
	Epirus						**Thessaly**						**Mainland Greece**			
	Kastritsa, Ioannina Bassin, Stratum 1, 19,400 ± 210 BP		Klithi, Voidomatis River, str. 5-10, 16,250±170 - 13,640±100 BP		Boïla, Voidomatis River, Units Ib-III, 14,310 ±100 - 10,190 ± 90 BP (uncal.), Epigravettian Industry		Theopetra, foothills of the Koziakas mt, Lechaios River, 14,895 ± 181 BP-10,972 ± 87 BP						Seïdi, Copais Basin, Aurignacian- Gravettian Industry, Layers I-III		Keratsini, Mt Aigaleo, 9,978±100 BP	
							Tardiglacial		Late Upper Palaeol.		Early Upper Palaeol.					
	NISP	%	NISP	%	NISP	%	NISP	%	NISP	%	NISP	%	NISP	%	NISP	%
Bos sp.	28	2.4			1	0.08	1	1.75					1	5.0		
Caprinae	84	7.3	5679	94.99	725	63.48	13	22.81	17	29.82	22	16.18	2	10.0	1	1.09
Cervidae	747+14*	**65.9**	11	**0.18**	225	**19.70**	13+1*	**24.56**	6+3*	**15.79**	6+7*+1#	**10.24**	6	**30.0**	8	**8.70**
Cervidae-Equidae															39	42.39
Sus scrofa	14	1.2			6	0.52			2	3.51	1	0.74				
Equus hydruntinus	64	**5.6**											11	**55.0**	5	**5.43**
Perissodactytla									3	3.95	5	3.68				
Carnivora	51	4.4	14	0.23	21	1.83	14	24.56	10	17.54	13	9.56				
Lagomorpha	6	**0.5**	20	**0.33**	36	**3.15**	1	**1.75**	5	**6.58**	14	**10.24**			39	**42.39**
Rodentia	X		42	0.70	2	0.17			1	1.32						
Reptilia (tortoise)	X				4	0.35	1	1.75	8	10.53	47	34.56				
Aves	133	11.5	202	3.37	64	5.60	14	24.56	24	31.58	19	13.97				
Pisces			10	0.16	40	3.50										
Other	14	1.2			18	1.57										
Total	**1155**		**5978**		**1142**		**57**		**76**		**136**		**20**		**92**	
Data from (modified)	Kotjabopoulou 2001, 177		Gamble 1999, 178 (NISP 142,728 fragments **)		Kotjabopoulou 2001, 223 (NISP 1203 fragments ***)		Newton 2001, 118						Schimd 1965 (NISP 285 fragments)		Trantalidou in this article	

Table 16.15. Caves and rockshelters on the western and central part of continental Greece, occupied throughout the 15,000 to 9,700 BP. Relative abundances of Ungulates, Small game animals and Carnivores. Key: NISP = Number of Identified Specimens. * Presence of roe deer. # Presence of daim. **107,750 are small, medium and large artiodactyls, treated collectively. Due to intense fragmentation, those specimens correspond to the 75.49% of the whole assemblage. * 61 (5.1% of the analysed assemblage) are elements of the Cervus/ Capra category. Stratigraphic Unit IV 10,680 ± 90 to 9,525±75 BP at Boila did not yield any bioarchaeological remains.**

Taxa	Anatomical Element	NISP	Fused	Un-fused
Equus hydruntinus	Metacarpal,p	1	1	
Cervus elaphus	Humerus,d	1	1	
	Metacarpal,p	1	1	
	Metatarsal,d	1	1	
	First phalanx,p	1	1	
Lagomorphs	Scapula,p	1	1	
	Humerus,d	4	4	
	Radius,p	1	1	
	Radius,d	1	1	
	Ulna,p	2	1	1
	Metacarpal,d	4	3	1
	Pelvis	3	3	
	Femur,p	1	1	
	Tibia,p	4	3	1
	Tibia,d	4	4	
	Tibia,p,d	1		1
	Metatarsal,p	6	6	
	Metatarsal,d	2	2	
Caprinae	Scapula,p	1		1
	Radius,p	1		1
	Metacarpal,p	1	1	
	Metacarpal,d	1		1
	Tibia,p	2	1	1
	Tibia,d	1	1	
	Metatarsal,d	1	1	
	Rib,p	1	1	
	Thoracic vertebra	1		1
Capra hircus	Pelvis	2	2	
	Metatarsal,d	1		1
Ovis aries	Scapula, p	1	1	
	Calcaneum,p	1		1
Suidae	Axis	1		1

Table 16.16. Caves and rockshelters on the western and central part of continental Greece, occupied throughout the 15,000 to 9,700 BP. Relative abundances of Ungulates, Small game animals and Carnivores. Key: NISP = Number of Identified Specimens. * Presence of roe deer. # Presence of daim. **107,750 are small, medium and large artiodactyls, treated collectively. Due to intense fragmentation, those specimens correspond to the 75.49% of the whole assemblage. * 61 (5.1% of the analysed assemblage) are elements of the Cervus/ Capra category. Stratigraphic Unit IV 10,680 ± 90 to 9,525±75 BP at Boila did not yield any bioarchaeological remains.**

Element	**NISP**	**Side**		**Fragmentation**					**Modification due to human activities**			**MNI**
		R	L	1I5	2I5	3I5	4I5	5I5	Cut marks	Burnt	Flakes oblique, spiral	
Skull	8			7				1				
Maxille	5		3	3	1		1			1		
Mandible	8	2	5	2	2		1	3			1	
Teeth	20	6	6	4			3	10				
Scapula	13			10	1	2			1	1		
cervical vertebra	1			1								
Rib	34			24	8	1	1		2	4		
Humerus	27			24	3					5	5	
humerus, d	4	2		3	1				1		2	2
radius	24	1	3	19	3	1	1				1	
ulna	12	1	3	6	2	2	2			1	2	
ulna, p	1		1			1						1
metacarpal	8			4				4				
sacrum	2						1	1				
pelvis	18	2	5							3		
femur	84			76	3	4	1			7	12	
tibia	220			199	9	9	2	1		13	14	
tibia, p	1	1			1					1		1
tibia, d	5	3	2	4			1			1		**3**
metapodium	4	1		2		2				2		
metatarsal	8	2	1	4		1	2	1		1		
metatarsal, p	4	1	3	2	1	1						3
metatarsal, d	1		1					1				1
astragalus	2	1		1			1					
calcaneum	3			1	2							
first phalanx	1							1				
TOTAL	518	23	33	396	37	24	17	23	4	40	37	3

Table 16.17. Anonymous Cave of Schisto at Keratsini. Burned layers (found in trenches 1-2, layer 4, str. 4-14) with more than 70% of the osteological material of the Early Holocene period. Specimens indentified as lagomorphs are shown anatomically using the NISP (Number of Indentified Specimens) and the MNI (Minimum number of individuals) methods. (K. Trantalidou)

Taxa	Anatomical Element	NISP	Fused	Unfused
Equus hydruntinus	Metacarpal,p	1	1	
Cervus elaphus	Humerus,d	1	1	
	Metacarpal,p	1	1	
	Metatarsal,d	1	1	
	First phalanx,p	1	1	
Lagomorphs	Scapula,p	1	1	
	Humerus,d	4	4	
	Radius,p	1	1	
	Radius,d	1	1	
	Ulna,p	2	1	1
	Metacarpal,d	4	3	1
	Pelvis	3	3	
	Femur,p	1	1	
	Tibia,p	4	3	1
	Tibia,d	4	4	
	Tibia,p,d	1		1
	Metatarsal,p	6	6	
	Metatarsal,d	2	2	
Caprinae	Scapula,p	1		1
	Radius,p	1		1
	Metacarpal,p	1	1	
	Metacarpal,d	1		1
	Tibia,p	2	1	1
	Tibia,d	1	1	
	Metatarsal,d	1	1	
	Rib,p	1	1	
	Thoracic vertebra	1		1
Capra hircus	Pelvis	2	2	
	Metatarsal,d	1		1
Ovis aries	Scapula, p	1	1	
	Calcaneum,p	1		1
Suidae	Axis	1		1

Table 16.18. Anonymus Cave of Schisto at Keratsini. Ages at death of the main taxa, based on the fusion of the long bone epiphyses. Observations on material sorted from the burned lenses (found in trenches 1 and 2, layer 4 str. 4-14) with more than 70% of bones belonging to the 10th and 9th millennium sequences. The remains of the Caprinae and Suidae families are assigned to the Mid-Holocene period. (K. Trantalidou)

Anonymous Cave of Schisto Archaeobotanical Assemblage	
LATE UPPER PALAEOLITHIC (DEM-1701: 10010 – 9260 B.C.)	Total number of samples: **7** Samples with preserved archaepbptanical remains: **7** Total volume of processed soil (lt): **112** Total number of archaeobotanical remains: **477**

Table 16.19. General attributes of the Anonymous Cave of Schisto archaeobotanical assemblage (G. Kotzamani).

	Sum of Archaeobotanical Finds
CEREALS	
Hordeum vulgare ssp. *spontaneum* grains	26
Avena sp. grains	8
Cerealia fragments	+
LEGUMES	
Vicia/Lathyrus sp.	5
Lens sp.	4
Lathyrus sp.	2
Pisum sativum	3
Small seeded legumes	4
Legumes indet.	10
FRUITS	
Juniperus sp. seeds	23
Juniperus sp. fruit fragments	3
Ficus carica	9
Pistacia cf *terebinthus*	+
Cornus mas	1
Sambucus nigra	1
Fruit/Nut shell fragments	1
Fruit/Nut indet.	4
WILD FLORA	
Polygonaceae	2
Chenopodium cf *album*	1
Malvaceae	1
Galium/Asperula	8
Lithospermum arvensis	193
Alkanna sp.	144
Echium sp.	1
Nepeta cf *nuda*	5
Ornithogalum sp.	5
Gramineae	8
Wild indet.	5
TOTAL	**477**

Table 16.20. Range of species and sum of finds of the Anonymous Cave of Schisto. Late Upper Palaeolithic archaeobotanical assemblage (G. Kotzamani).