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THE FINAL PALAEOLITHIC HUNTING CAMP OF OURIAKOS ON THE ISLAND OF LEMNOS

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Abstract

Fieldwork conducted at the Epipalaeolithic site of Ouriakos on the coast of Lemnos has recently produced the first evidence for hunters and gatherers on one of the islands of the Aegean Sea during the time of the Younger Dryas (ca. 10,800-9,600 cal BC). The work in the field and the analysis of the large number of chipped stone tools found at the site are still in progress. While major advances have been made over the last 15 years when it comes to the study of Mesolithic sites on islands such as Youra (the Cyclops Cave) and Kythnos (Maroulas), there was, as late as 2008, still no site going back to the 11th millennium cal BC, which had been excavated on any of the islands that had formed in the Aegean Sea by end of the Pleistocene. Indeed, prior to the discovery of Ouriakos, little was known about the Final Palaeolithic (Epigravettian) – even on the mainland – at the head of the Northern Aegean. Thus, Ouriakos is filling in a major gap in knowledge when it comes to the prehistory of the northern Aegean. This article gives, by the way, the first full-length report on the results of the investigations at Ouriakos. Accordingly, emphasis is placed here on providing an overview on what has come to light at the campsite so far. In the context of the Wenner Gren Workshop on “Island Archaeology and the Origins of Seafaring in the Eastern Mediterranean,” there are two important questions that we need to consider. First, when did the rise in sea level at the end of the Pleistocene reach the point where Lemnos began to separate from the mainland and form as an island? And secondly, at what distance did the site of Ouriakos, as it is seen on land today, stand from the shoreline at the time of 12,000 years ago? In trying to come up with answers to these two basic questions, the investigations on Lemnos are still at the first level of approximation today. In short, much work remains to be done on the earth-science side of the story. After describing the fieldwork conducted at Ouriakos, the work on reconstructing the site’s environmental setting, the study of the chipped stone assemblages and the carbon dating of the site, the chapter closes with a discussion of some of the wider implications of the research, including the connections and interactions that Ouriakos appears to have had with coeval sites in the Eastern Mediterranean, which date to the time of the Younger Dryas.

Key words: Epipalaeolithic, hunter-gatherers, Younger Dryas, island archaeology, Aegean Sea

INTRODUCTION

Up until quite recently, the sequence of events that took place during the last millennia of the Pleistocene and the early years of the Holocene (11,000-9,000 cal BC) was poorly known in the North Aegean and this held even in the wider Aegean region as a whole (Kotjabopoulou and Adam, 2004:37; Galanidou and Perlès, 2003; Kozłowski and Kaczanowska, 2004). As mentioned in the abstract, there was for many years no known site of this age on any of the Aegean Islands. Previously, there had been, for one reason or another, a shortage of field surveys and excavations on the islands of the northern Aegean, which focused specifically on this period of time. Investigations in progress at the site of Ouriakos on the island of Lemnos (Figs 1-2) are now shedding new light on the lives and the activities of the hunters and gatherers who camped there during the cold snap in the earth’s climate history known as the Younger Dryas.
(10,800-9,800 BC). The site’s archaeological record, which is dominated by the production of microlithic tools in the tradition of the Final Palaeolithic (Harmankaya and Tanidi, 1996; Runnels and Ozdoğan, 2001:69; Kozłowski, 2005:520), includes undisturbed and stratified contexts, which are providing information on the technological, cultural and chronological identity of the group of hunter-gatherers active in the area. At the same time, some other aspects of the way of life of the hunter-gatherers who frequented the site, such as their subsistence preferences, are less well known due to the poor conditions of preservation of animal bones, plant remains and charcoal at the site. The distinctive lithic material found at Ouriakos is linked with the production of microlith tools: mainly lunates. The site’s assemblage clearly belongs to the Final Palaeolithic; it differs markedly from the subsequent Mesolithic horizon in the Aegean in terms of its technology and typology (Sampson et al., 2005:272, 2010; Kozłowski, 2007:39). Whether the changes observed in the Mesolithic should be seen as indicating meaningful new

Fig. 1. Map of the Aegean and the island of Lemnos (prepared by D. Kalpakis)
The Final Palaeolithic hunting camp of Ouriakos on the island of Lemnos

social, cultural and subsistence preferences, which involved turning more to the sea, is not yet clear but it seems likely. In all likelihood, the lithic tradition that we see at Ouriakos initially arose in a distant place such as the Levant and subsequently spread to Anatolia (the Öküzini Cave) and then, in turn, to the Aegean in the west. More will be said about this fascinating question later in this article. There are two main points to make here by way of introduction. First, the chipped stone assemblage that occurs at Ouriakos is adding a new dimension to the study of the Final Palaeolithic at the head of the Aegean. Secondly, there is a good chance the lithic tradition found at the site has connections with coeval sites of hunter-gatherers and coastal foragers over a wide area of the Eastern Mediterranean during the 11th millennium cal BC (for a map showing the locations of Ouriakos, Öküzini and five other Epipalaeolithic sites dating to the Younger Dryas, see fig. 2 in the contribution by Ammerman in this issue). The study of Ouriakos is of special interest since it falls in chronological, environmental and cultural terms at the time of the Younger Dryas and the transition to the start of the Holocene.

The research at Ouriakos directs our attention to the need for a refined record of sea-level change over the span of time between 15,000 and 11,000 years ago. This was the time when first Gökçeada (Imbros) and Lemnos (as one large island still connected with each other) began to separate from the mainland (around 14,000 years ago) and then
the subsequent time when Lemnos and Gökçeada began to form as two separate islands (by ca. 12,000 years ago). Bathymetric records draw from nautical charts and curves that reconstruct sea-level rise for the last 18,000 years constitute the two starting lines of evidence for the study of island formation. However, what is available today in both cases may not be refined enough for us to go all that far beyond the first level of approximation. In short, there is the need to be patient and wait for more detailed bathymetric charts to become available and better sea-level curves to be produced before we can make more precise chronological inferences about island formation. In addition, we need to take into account the role that local tectonic activity may have played in changes in relative sea level and to develop a better understanding of the marine transgression and the geomorphological processes associated with it, which transformed the east coast of Lemnos over the years of interest to us. Finally, in terms of the reconstruction of the environmental setting of the site as a whole, we have to incorporate what is currently known about the climate and the vegetation that obtained at various times in the past. This is a matter of particular interest when we are studying hunters and gatherers who lived during the Younger Dryas with its major fluctuations in temperature and precipitation. What all of this means is that there is a great deal to do and think about on the environmental side of the story at Ouriakos. In the space that is available in this preliminary report, I can only introduce briefly some of the work that has been initiated in trying to place the site in environmental context. Finally, Ouriakos will hopefully give us the chance to explore, in a wider sense, archaeological aspects of the social and ideological interactions, which in the form of ever changing landscapes, human activities and social relations, shape in every period the everyday lives of the groups involved.

SEA-LEVEL CHANGE AND ISLAND FORMATION

Over the last twenty years, earth scientists in the Mediterranean and around the world have made substantial gains in the study of trends in sea-level rise over the last 18,000 years. A glimpse of the big picture, as it stands today, is provided by the two generalized curves of global relative sea-level change published in the preface to Submerged Prehistory (Benjamin et al., 2011:xiii). What the curves show is that, at the time of the Late Glacial Maximum, sea level once stood at 120-130 m below its present level some 18,000 years ago. Between the 18th and the 10th millennium cal BC, the average rate of sea-level rise was around 10 m per millennium, which corresponds with a rate (again on average) of about 1 m per century. Of course, there must have been some fluctuations over such a long span of time but we are speaking of the main trend. Then sea level began slowing down in the years after 10,000 years ago. And by 6,000 years ago (in those areas of the Mediterranean with little or no tectonic activity), sea level had reached a height close to the one that obtains in our time (that is, it stood in a position that was in the range of 4-6 m lower than sea level today) and then the trend continues to flatten out until the present day. Turning to the specific case of Lemnos, what can we now say about sea-level change and island formation? The two are, of course, closely related to one another, and they will be dealt with in a nutshell here. In the case of the adjacent island of Gökçeada, Ozbek and Erdogan have taken up these two questions at greater length in this issue. Accordingly, much of what they have to say will not be repeated here. In terms of the previous literature on the subject in the Aegean, it is worth recalling that there are two rather different and often separate strands of research: one of them involves the interest in “island archaeology” on the part of archaeologists themselves (e.g., Cherry, 1981; Broodbank, 2006, 2013; Bailey, 2013), while the other strand entails the work of earth scientists whose primary interest is that of making contributions to their own fields of study and not necessarily “island archaeology” as such (e.g., Perissoratis and Conispoliatis, 2003; Lambeck, 1995, 1996, 2004; Lambeck and Purcell, 2005; Pirazzoli, 2005; Evelpidou et al., 2010; Vacchi et al., 2014).

As long as prehistory on the islands of the Aegean Sea went back only to the Neolithic period, these two questions were not, with a few exceptions, ones of leading interest or importance. However, once pre-Neolithic sites began to appear
on the scene in the last years of the 20th century, a new and different perspective was called for. If one goes back to 12,000 years ago, for instance, one is dealing with a time when sea level was much lower and when sea-level change was active and unceasing, as mentioned above. The question of whether or not a given island was actually an island at a given time in the remote past now becomes a fundamental one. In the case of pre-Neolithic sites such as the Cave of the Cyclops (Sampson, 2008) and Maroulas (Sampson et al., 2010), the question of island formation (respectively for Youra and Kythnos) has been considered briefly without going into the matter of sea-level change in any real depth. In the case of the Cyclops Cave, Sampson (2008:216-218) takes up concisely the question of sea level change in the Northern Aegean during the Holocene in the closing chapter of his monograph. What he is doing there is taking a pioneering step toward addressing the question. The map showing the bathymetry around Kythnos is a schematic one (Sampson, 2008:fig. 12.5, also fig. 9.1), and he draws upon an early study by Lambeck (1996) – not the more recent literature – in his treatment of sea level change (Sampson, 2008:fig. 12.6). There is no attempt to make a proper argument for when Sporades began to separate from the mainland at the end of the Pleistocene and when Youra then separated from the other islands near it. In the case of Maroulas, the treatments of bathymetry and sea-level rise are equally concise (Sampson et al., 2010:5, figs 1-2; in fairness to Sampson, there are deep waters on all sides of Kythnos, so it was definitely an island in the Mesolithic period). Thus, in neither of these two cases do we find sustained discourse on how and when the formation of a given island actually took place. In short, we are still dealing with something quite new in so far as work on pre-Neolithic sites on islands in the Aegean is concerned.

Lemnos offers a favorable place, on the whole, for addressing the two questions today. There are nautical charts that give the basic bathymetry off the east coast of the island (Figs 2-3). Of course, one could always ask for more, especially in the case of the bathymetry of the submerged narrow isthmus running between Lemnos and Gökçeada, which once linked the two islands. In addition, there is a local curve of predicted sea level for our area over the last 20,000 years: the one for the Dardenelles sill put forward in 2007 by Lambeck and co-workers (see Özbek and Erdogu in this issue). Furthermore, there is the recent publication of the geomorphological investigation undertaken on the basis of cores that were made in and around the Alyki lagoon, which is located at a distance of 7.5 km to the north of Ouriakos. The results of the work have led to a curve of sea level change at Alyki for the last 7,000 years based on a series of radiocarbon dates (Pavlopoulos et al., 2013:fig. 10). This curve is in good agreement with the curves proposed and tested elsewhere by Lambeck based on his glacio-hydro-isostatic model (Lambeck and Purcell, 2005). In effect, the curve for Alyki makes the case that there has been a low level of tectonic activity on the east coast of Lemnos for the last 7,000 years and that it is reasonable to think that tectonics should not be considered to be a major factor for the previous 7,000 years as well: that is, the time from 14,000 to 7,000 years ago (or in terms of calibrated radiocarbon years, 12,000 to 5,000 cal BC). Thus, we are in a good position to use Lambeck’s curve for the Dardennelles sill to estimate the level of the sea in front of Ouriakos at say 10,000 cal BC. Moreover, a broader review article on relative sea-level change in the northeast Aegean over the last 7,000 years has recently been published (Vacchi et al., 2014). It includes a map indicating the specific places where tectonic activity occurs in the region, which shows that Sector B, where Lemnos is located, has low tectonic activity. In short, this study confirms the results previously obtained by Pavlopoulos. It will be recalled that Lambeck’s model for reconstructing past sea levels is based on the assumption that local tectonics are not involved. Accordingly, we can use the available map of bathymetry on the east coast of Lemnos in combination with Lambeck’s curve for the Dardenelles sill to estimate, at the first level of approximation, when Gökçeada initially began to separate from the mainland: that is, around 14,000 year ago (see Özbek and Erdogu in this issue). And, in turn, based on the two more or less parallel contour lines of bathymetry at -50 m, defining for the submerged isthmus between Gökçeada and Lemnos, we can say that the two islands were starting to separate from one another around 12,000 years ago. Again
this should be regarded as a first approximation. If and when better bathymetry becomes available – in particular, showing in greater details those places on the submerged isthmus with elevations in the range of 50 m to 40 m below sea level today – it will be possible to refine the estimate of when Lemnos first formed as a separate island. It is perhaps worth adding here that we have to think in terms of more than just the elevations on a bathymetric map: storms and storm surges, in particular, produce higher heights of water from time to time, which anticipate the formation of two separate islands.

Turning to the related question of the distance of the site of Ouriakos from the shoreline at say 10,000 cal BC, we can again use the -50 m contour line for bathymetry as a proxy to estimate this value (see Fig. 4). The distance falls somewhere in the range of 1.5 km to 3.0 km. Again, this estimate is put forward at the level of a first approximate; we can expect that it too will be refined in the years to come. In short, Ouriakos at the time when it was frequented by hunter-gatherers was located not on the shoreline but well back from it. Those camping at the site once looked out over a low coastal plain of some width on the seaward side of Ouriakos. And it is reasonable to think that early sites probably occur there in a submerged position today (e.g., Bailey, 2013; Benjamin et al., 2011). In the case of Dive Site C in front of Aspros on Cyprus, lithics of Epipalaeolithic have been recovered in just such a submerged context (Ammerman et al., 2011; Kaczanowska and Kozlowski, 2014). In addition, we have made a tentative first attempt at reconstructing some of the features of the palaeogeography of the area around Oriakos. Without going into the details here, such things as geological faults, drainages and past coastlines of the Fysini bay are shown in Fig. 4. On a separate front, there is now

**Fig. 3.** Coastline reconstruction of northeast Lemnos and the submerged isthmus of Gokceada (prepared by A. Chalkioti)
evidence in the region for the climatic conditions and the kinds of vegetation that obtained at the time of the Younger Dryas on the basis of pollen analysis and the study of other biological markers (Kouli et al., 2010).

THE FIELDWORK AT OURIAKOS

The site of Ouriakos came to light inadvertently on the coast just behind the beach at Fysini in the southeastern part of Lemnos in July of 2006. Ammerman had stopped to take a swim at the Fysini beach after he had visited the nearby mound site of Poliochi. The local municipality had recently hired a road grader to clear and level out an area covered with low dunes in order to create better access to the beach as well as a place where a few cars could be parked (Fig. 5). This work had exposed scatters of lithics on the land surface that appeared to be of Mesolithic age or perhaps even earlier (for more on how the discovery of the site and its connection, in turn, with the subsequent discovery of the pre-Neolithic site of Üçdutla on the Gallipoli Peninsula, see Özpek and Erdogu in this issue). Ouriakos stands at a distance of some 20 m from the shoreline today and at an elevation of ca. 8 m above sea level. The site is situated on a low terrace of calcarenite that had formed in the context of consolidated inter-tidal sands, and there are two small seasonal streams that delimit the terrace area of the site (Fig. 5). Tens of thousands of work pieces of chipped stone occur at the site, which covers an area of

Fig. 4. The extent of the coastal plain in front of the site of Ouriakos in different periods of time based on bathymetric records (prepared by A. Chalkoti)
at least 1,500 square meters, and all of lithics that have been recovered at the site so far appear to belong to the Epipalaeolithic tradition, which in chronological terms is called the Final Palaeolithic in the Aegean. Of course, the full extent of the site is known only approximately, since there are formations of sand dunes (locally up to 1.5 m thick) and also the vegetation growing on the cover sands, which place limitations on visibility at the site. Indeed, in terms of the site’s survival down to the present day, there is the good fortune that much of Ouriakos has been covered for some time by the dunes that formed in the more recent part of the Holocene. Thus, working out the size of the site is not easy. Moreover, the absence of well defined features such as fire pits, hearths and midden deposits at the site – at least in the limited areas of it exposed by recent human activities (for example, the road grading) or else where excavations have been conducted on a small scale to date – does not help in this matter. In any event, the site has a fair size, and it is also remarkably rich in lithics. In fact, one of the main tasks of the first three field seasons was that of collecting the lithics that had recently come to light on the cleared surface improving access to the beach. The collections had to be done for purposes of cultural heritage: to keep the archaeological materials from being damaged and lost.

The work at the site began in the summer of 2008. There were two main aims of the short first field season: (1) to collect a fair number of lithics from the surface so that the age of the site could be established and (2) to make a small sounding in order gain an initial idea of the stratigraphic sequence at Ouriakos. The results of the first season were positive, and this then led to longer field seasons in 2009 and 2010 when the focus was on the systematic collection of the material in the leveled surface (Fig. 5) and on the start of an excavation of larger size there. More will be said below about the work of the subsequent field seasons. The fieldwork as a whole has led to the recovery a large quantity of chipped stone, and the work on its classification and analysis is still in progress. The work of the second and

Fig. 5. The terrace of Ouriakos with its surface scattered with lithics
third field seasons began with the systematic collection of the pieces of chipped stone exposed on the surface of the parking area. A system of grid of squares measuring 1 m on a side was laid out for this purpose (Fig. 6). Once this work was completed, there was the excavation of a number of the grid squares down to the bedrock. The method of excavation followed the protocol of palaeolithic archaeology based the three-dimensional recording of finds (Fig. 7). In fact, the density of the lithics on the surface was so high in some squares on the grid that we decided to divide them into four quadrants (measuring 50 cm on a side with the four quadrants of a given square collected separately). Even then the surface of a given quadrant might produce up to 50 or pieces of chipped stone (tools, core fragments and other by-products of lithic reduction technology). Each square on the grid was first photographed before the surface material on its four quadrants was collected. In 2010, we repeated the collection of some of the squares collected systematically in 2009 and found that it was again common to recover a fair number of pieces from the surface of a given square. What we learned in this way was that the lithics that occur on the surface are being “refreshed” from one year to the next by the gradual deflation of the site’s surface (that is, by erosion due to wind and rain during the course of a year). In short, the repeated collection of the grid squares shed further light on the remarkable richness of this part of the site. From the heritage perspective, it also meant that a single collection of the surface was not really enough in the context of a deflating land surface. In addition, there was the opportunity, without going into the details here, to make quantitative comparisons in terms of spatial patterns between the two years (2009 and 2010).

Some of the richer meter squares were then selected for further examination by means of excavation. One of the things that we now learned was that the material on the surface of the site was often not in situ in the strict sense of the terms. Instead, there was local movement or displacement over time down the slight slope of

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Fig. 6. The grid system used for recording the repeated collection of surface finds (prepared by M. Katsianis and S. Tsipidis)
the terrace due to processes of erosion. Movement in this way was then confirmed by an actualistic experiment that we did on the terrace. It involved placing small coins in recorded positions on the surface and then measuring their displacement because of the rain and wind (and also due to people walking on the surface on their way to and from the beach) over the course of a year. The pattern of movement observed in this way was clear with regard to direction. If a given piece had moved, it was always down the slope as one might expect. The scale or distance of the displacement of a given coin was variable as one might expect. Most of the movements, if displacement had taken place, were fairly small but there were a few pieces that had moved a distance of more than 1 m. And if one took into consideration the cumulative effect of a series of such short movements over a span of say 20 years, then the pieces on the site’s surface were definitely not sitting still. Indeed, there was a good chance that some of the pieces would end up moving a substantial distance over the course of time. In contrast, the archaeological materials not on the surface but found at a greater depth in the soil, especially in the pockets of the bedrock, were not exposed to the various processes operating on the surface of the site in the terrace area. This was reflected, for example, by the pattern of recovery of tiny fragments of burnt bone. The contexts in which most of them were found were not on the site’s surface or its uppermost spits but in the lower spits and, in particular, the deepest ones in the pockets in the bedrock. What one is dealing with then is a rather complex vertical palimpsest of materials in the terrace area. In short, while the archaeological materials recovered from the pockets of the bedrock have not moved much over time, the opposite is the case for those pieces that have happened to find themselves exposed on
the sloping surface of the terrace for any length of time. In turn, this complication, once we began to appreciate it, means that the most best finds recovered by the excavation in the terrace area are those that come from the pockets in the bedrock. At the same time, this now led us to start looking for other places at the site where the natural land surface was flatter and less subject to the lateral displacement of artifacts.

It was thus important to develop a better understanding of the geology and geomorphology of the site and the operation of the dynamics involved in the formation of the landscape and the coastline. Toward this end, Panagiotis Karkanas, an experienced geoarchaeologist, came out to Lemnos and spent several days making observations on the landscape around the site and at Ouriakos itself. Indeed, from the perspective of the earth scientist, the nature and history of the place where the site is located turns out to be quite complex, as one might expect. This is not the place to go into the technical details of this line of investigation, which is still in progress. In addition, it was of interest to gain a better knowledge of those places at the site where the cover sands have not been removed by human activity in our own time but are still in place and to find out how thick they are and what occurs immediately below them. Toward this end, Albert Ammerman made a number of soil cores in the terrace area. In brief, the thickness of the sand dunes, whose formation dates at least to Roman times (based on the presence of material of this age in one of the lower horizons of the dune soil) can range from ca. 0.5 m up to 1.5 m, as mentioned before. All of the finds, as mentioned above, were individually plotted in three dimensions. Given the richness the key role that visibility places when it comes to the discovery of early sites in the Aegean and elsewhere in the Mediterranean world as well. This has turned out to be one of the leading factors to consider in the approach that one takes to the identification of early sites on the landscape (Ammerman, 2010, 2013a). Furthermore, given the small size of microlithic tools, they are quite easy to miss unless the survey archaeologist pays close attention to their visibility on the modern land surface. In retrospect, there is a good change that, without the occurrence of “windows of visibility” on the landscape, the project at Ouriakos might never have started on Lemnos. In our case, this basic concept was then confirmed by the geomorphological “windows” that occur in a dune area located several hundred meters to the east of Ouriakos. There, in 2009, Paolo Biagi was able to find a fair number of lithic scatters in those places with a deflated land surface. In short, all of the scatters came to light in places with “windows of visibility,” as shown when the scatters and find spots were then plotted on a Quick Bird image map (showing clearly the “windows” in the dune area on the satellite imagery). In contrast, early lithics were not found by survey coverage in those places on the dunes without “windows.” There are two main implications that arise here: (1) the spatial distribution of the find spots and light scatters of lithics obtained by the survey should be seen as an artifact of the “windows of visibility” on the modern landscape and not as a pattern to be interpreted merely in cultural terms and (2) given that the “windows” taken together cover only a small proportion of the dune area, it is reasonable to think that there are many more scatters of the same kind that are still buried beneath the cover sands and thus the actual spatial distribution of lithic scatters on the landscape is much more widespread than shown by the results of the survey.

The excavation in 2009 involved opening a number of contiguous squares in the central part of the grid used for the surface collections in the terrace area. The work involved excavating a series of thin flat spits in each of the selected meter squares. In most of them, the excavation was taken down to the top of the underlying bedrock. All of the finds, as mentioned above, were individually plotted in three dimensions. Given the richnes
of the finds in combination with the firm and grainy nature of the soil matrix, a fair number of finds were recovered from each spit in a given square (Fig. 7). Small nails with attached labels in different colors for different classes of material (chipped stone, bone and so forth) were used to mark the position of each find recovered from a given spit in the respective squares. The work was laborious and progressed slowly because of the great number of finds that we encountered. The use of a total station in 2011 sped up the recording process and produced more accuracy in plotting the positions of the many chipped stone pieces recovered during the course of the excavation. The total depth of the archaeological deposit – depending on the relief of the top of the underlying bedrock – ranged commonly between 15 cm and 20 cm. The excavated soil was first dry and then wet sieved. The latter produced many small fragments of lithics and animal bones (heavily burnt in most cases), red ochre, land snails and even a few fragments of marine shell. The maps of the excavated squares after we completed the excavation of a given square were quite impressive with hundreds of finds in dense clusters. However, it is unfortunate, as mentioned above, that most of the finds, especially those in the upper spits, cannot be considered to be in situ in any meaningful sense of the term (even in the realistic sense of a campsite whose surface and finds have experience various bouts of trampling at the time of occupation). Indeed, some of pieces, especially those in the upper spits of the excavation were observed to have a vertical and not horizontal orientation or else they were found wedged in cracks of the bedrock. While many of the finds recovered on the site’s surface and in its upper spits are clearly not in primary context, this does not hold in the case of materials coming from the lower spits and, more specifically, the pockets in the bedrocks (where photographs show that many of lithics have horizontal orientations). Of special interest in illustrating this difference between the upper spits and the lowest ones are the fragments of red ochre recovered from the latter. This class of find is then of interest not only for cultural reasons but also for a better understanding of the processes of site formations in operation in the terrace area. Red ochre is a fairly soft and friable raw material – especially in comparison with chert and flint. The surface of an ochre fragment will start to break down when it is exposed to active processes of erosion on the surface of a site, and grains of red ochre will tend to become dispersed in the soil if a fragment of ochre begin to move around under such conditions. However, based on the images obtained by using a scanning electronic microscope (SEM) to examine in detail a sample of red ochre and its surrounding soil recovered from one of the lower spits, no evidence was found for the dispersal of reddish grains indicating that the movement of the piece of ochre was quite limited in this context.

By 2012, there was the realization that we needed to explore other parts of the site and excavate in a place that offered better conditions of preservation. What we were looking for was a place where the original land surface was flatter and where the lowest anthropic layer rested on an old paleosol and not the hard bedrock of calcarenite. With these two considerations in mind, we now opened a trench on the opposite side of the stream (Fig. 8). And the results were rewarding. Under a formation of cover sands 60 to 80 cm thick, the layer of occupation found there was clearly in situ. The same basic lithics (pebble cores and microlithic lunates) were recovered but this time they were coming from a much better stratigraphic context: a sequence of thin anthropic layers resting on an older paleosol (without lithics or other archaeological materials). In other words, we had managed to find just what we were looking forward, and this now gave us a point of departure for a better knowledge of the remains of the hunter-gatherers who camped at the site as well as a better understanding of the limitations of what the terrace area has to offer. The excavation on the opposite bank was called trench 1. The excavation of trench 1 continued in 2013, and it produced more chipped stone tools and fragments of bone but no structural remains as such. In the future, it will be of interest to open up a larger area on the opposite bank in the expectation of recovering such features. Here the main point to make is that Ouriakos, which is an open air site of fairly large in size as mentioned before, has at least two different parts to it – and probably more than this – and each one of them has its own characteristics and contributions to make to the study of the campsite as a whole. Of course, we
Fig. 8. Trench 1, on the other side of the stream, with archaeological material (lithics and bones) found in situ
are just at the start of learning about the nature of spatial variability at the site – less than 1 per cent of Ouriakos has been excavated so far – but the first steps in the work clearly show that the site has considerable potential.

THE LITHIC MATERIAL AND THE RADIOCARBON DATES

At this point, it is useful to turn to several of the other lines of the investigation at Ouriakos: the chipped stone tools, the source of the raw material used for making them and the first radiocarbon determinations that have come for dating the site in terms of absolute chronology. Starting with the lithics, the preliminary study of the material collected from the central part of the terrace area and trench 1 was done by Paolo Biagi and Elisabetta Starnini. Their study provides a first glimpse of the main technological and typological characteristics of the lithic assemblage. It soon became evident that the industry belongs to the end of the Palaeolithic period and that the assemblage includes certain tool types that are either rare or else completely missing at pre-Neolithic sites previously known in the Aegean and northwest Anatolia (Fig. 9). Indeed, the two dominant tool types are lunates and end-scrapers with no evidence for the use of the micro-burin technique. In addition, numerous cores were collected from the surface of the terrace area, and they were used to produce microbladelets (Efstratiou et al., 2013:fig. 8 and 9). The same positions are shared by Janusz Kozłowski and Małgorzata Kaczanowska, who had the opportunity to see some of the material during their visit at the site in 2010. They all agree on three main points: (1) the lithics at Ouriakos are different from what is seen in the assemblages that belong to the Aegean Mesolithic (that is, the material from the sites of Mesolithic age on the islands of Yioura, Kythnos, Ikaria and Naxos; see Kaczanowska and Kozłowski in this issue), (2) the assemblages that occur at Ouriakos are older and they should date to the end of the Pleistocene and (3) the closest parallels to the material found at Ouriakos occur in the Final Palaeolithic of the Antalya region of Anatolia and, in particular, with what is found at the Öküzini Cave, which is equally rich in lunate microliths and where layers III-VI have been carbon dated to the years between 13,700 and 11,300 cal BC (Kartal, 2002:49; López Bayón et al., 2002:56). Turning to the source of the raw material used for making the tools at Ouriakos, reconnaissance work on the island has made it possible to identify a good source at Havouli Beach, which is located at a distance of 7 km (as crow flies) to northwest of Ouriakos (Efstratiou et al., 2013:fig. 1). There, apart from the impressive geological outcrops of volcanic rock, fluvial terraces there offered abundant jasper pebbles: that is, raw material that was already at an appropriate size for making cores and that was abundant and readily available for procurement by the hunter-gatherers who lived in the southeast part of the island. At the same time, we would like to leave open the possibility, pending further reconnaissance work in the vicinity of Ouriakos, that there might be other sources of raw materials that could have been exploited by the hunter and gatherers who frequented the site. It is perhaps worth adding here that no piece of obsidian from the island of Melos has been recovered so far at Ouriakos.

Obtaining absolute dates for the site was from the start a difficult endeavor since no charcoal was recovered even though dry sieving was systematically done for all of the soil excavated at Ouriakos. The recovery of a fragment of charred animal bone, which comes from the central part of the terrace excavation (specifically from spit 7 at a depth of 29 cm in the ground), provides the first absolute date for the site: GrN-53229: 10390 ± 45 BP / 10437-10198 BC (1σ) 10563-10121 BC (2σ). This date fits in well with what is known about the chipped stone at the site. In addition, there is a radiocarbon determination at Groningen of an intact marine shell (Cerithium Vulgatum), which was recovered from the same spit (7) as the burnt bone mentioned above. The shell sample has yielded the following age: GrN-53223: 31960 ± 220 BP / 34550-33590 BC (1σ) 34630-33330 BC (2σ). It may well represent an old shell collected for purposes of decoration by those camping at Ouriakos, although it shows no visible signs of working. Returning to the bone determination above, whose age falls in the second half of the 11th millennium cal BC, it is important to note that it dates to the middle part of the climate event...
known as the Younger Dryas (e.g., Ammerman, 2013:132-133; see also his contribution in this issue). This is thought to be a time when hunter-gatherers had a heightened mobility and also when one begins to see the emergence at the end of the Pleistocene of connections and perhaps even interactions between sites in different parts of the Eastern Mediterranean ranging from the Aegean to Anatolia, Cyprus and the Levant (López Bayón et al., 2002:56; for the names and locations of some of the other sites whose lithic assemblages show varying degrees of similarity with one another at this time, see Fig. 2 in the contribution by Ammerman in this issue).

INTERPRETING OURIAKOS

After six years of fieldwork at the site and notwithstanding the fact that the investigations at the site and the studies of the archaeological materials are still in progress, the picture that is coming to light at Ouriakos is that of an important Epipalaeolithic site – both for the Aegean and for the Eastern Mediterranean in a wider sense (Efstratiou, 2014a:169). To put it another way, Ouriakos – even to the limited extent that the site is known today – represents a campsite that is unique in the Aegean region. To begin with, there are still very few sites going back to the 11th millennium on any of the islands in the Aegean Sea, and there are few other pre-Neolithic sites on its islands that have a comparable richness in terms of chipped stone production. Usually, the lithic assemblage found at a pre-Neolithic site on one of the Aegean Islands tends to have a more modest in character. Whether the specific location of Ouriakos was used for short and repeated visits or where it was frequented for longer periods of time, it is difficult to say at this time. On the other hand, the considerable volume of material culture found there (in all, tens of thousand of pieces of chipped occur at the site) does not support the idea that Ouriakos was frequented just once or only a few times. In all likelihood, what we are dealing with is a site that was frequented over the course of a fair number of years. The rather specialized character of the lithic assemblage – perhaps one that some archaeologists might consider it to be rather monotonous – was oriented toward the on-site production of geometric microliths probably used as inserts in hunting weapons. In the latter

Fig. 9. The typical microlithic Ouriakos assemblage (lunates, scrapers, cores) (photo by N. Thompson)
N. Efstratiou

In this case, they were probably used as inserts in hunting weapons. The availability of a good source of raw material at Havouli put the hunter-gatherers who camped at Ouriakos in a position to make as many lunates and end-scrapers as they wished (Efstratiou et al., 2013:fig. 1 and 7).

There are several questions of interest that we need to consider at this point. If final answers to most of them are not available, the questions encourage us to think about the nature of Ouriakos in broader terms. To begin with, there is the idea that what is found at Ouriakos is not unique on Lemnos. In other words, it may be reasonable to think that comparable workshops (that is, dense clusters or loci of lithics connected with the production of chipped stone tools on a certain scale) occur elsewhere in the southeast part of the island. The corollary of this suggestion that that groups of hunter-gatherers were living on Lemnos for some time but that the recognition of comparable workshops has been hindered by limitations of site visibility on the modern landscape. The discovery of the terrace area at Ouriakos took place because of the leveling of sand dunes created a “window of visibility” as mentioned before. And the documentation of the well-preserved part of the campsite on the opposite side of the stream (trench 1) was only made possible by digging below a thick formation of cover sands. In addition, support for the basic idea of one or more other workshops on the island would appear to be given by the scatters of lithics found on the old land surface in the “windows of visibility” that occur in the recent sand dunes that occur just to the north of the site. However, all of the scatters identified there so far are comparatively light or thin ones. And still further to the north, none of the early scatters recognized on the landscape in the Fysini area (close to the modern coast) has the kind of richness that we see at Ouriakos. In short, much remains to be done – even along complete new fronts – in the area around Ouriakos in the years to come.

Another question of major interest concerns the extent to which the hunter-gatherers who frequented Ouriakos were engaged, on a seasonal basis or perhaps even for just a few short times each year, in the exploitation of shellfish and fish. In other words, were those who camped at the Ouriakos essentially hunters and gatherers, who took little or no interest in what was potentially available on the shoreline at the time or were they also foragers who engaged seasonally in exploiting what was on the coast? On the face of things, based on the evidence that has been recovered at Ouriakos to date, the former would appear to be the case. We have found little evidence for the consumption shellfish as a source of food (and even for purposes of decoration) and no evidence at all for the remains of fish. However, the latter may be connected with the poor conditions of the soil for the preservation of bones of any kind at the site. And there is good evidence in the ethnographic record that foragers often prefer to consume most of the shellfish on or near the shoreline where it is collected and not at sites in the interior (see the reference in the report by Ken Thomas on the marine shells recovered at Nissi Beach in Ammerman et al., 2012). So again, we are dealing with a question that is up in the air. The absence of marine resource exploitation may be simply a consequence of the site’s distance from the shoreline some 12,000 years ago. With regard to this question, it is important to keep in mind that only a very small proportion of site has been excavated so far, and there may well be surprises in store for us in future when excavations are conducted on a larger scale at Ouriakos. Today it is premature to tilt one way and the other way on the rapid growth of submerged prehistory in recent years, see Benjamin et al., 2011; Bailey, 2013). The low coastal plain there would have been about 2 km wide 12,000 years ago. So far, we have not made an attempt to get our feet wet on Lemnos. On the island of Cyprus, as mentioned before, work of this kind at Dive Site C in front of the openair site of Aspros on land was highly productive in finding lithics of Epipaleolithic age on the seabed (Ammerman et al., 2011; Ammerman, 2013:129-131; Kaczanowska and Kozlowski, 2014). In short, much remains to be done – even along complete new fronts – in the area around Ouriakos in the years to come.
This important question. Over the long run, there are two lines of investigation that may help in sorting out this question. One of them is again to conduct underwater archaeology closer to the shorelines at the time of the Younger Dryas. The other one calls for doing isotope analysis if and when human bones of this age are recovered on Lemnos (for recent work along this line of research on the island of Sicily, see Mannino et al., 2012). The important thing at this stage of the research on Lemnos is to formulate the question in terms that are clear and that may lead to answers.

Another topic of interest concerns early voyaging (what in common parlance is commonly called “seafaring”) but this may not be the right terms to use for hunter-gatherers who may have made only seasonal voyages in small groups over fairly short distances at the end of the Pleistocene (on this issue and the Siassi as a surviving example of “voyagers” of this kind in the 20th century; see Ammerman, 2013a:14). In short, did the hunter-gatherers who camped at Ouriakos actually “get in small boats” and make voyages on the open sea? The question of pre-Neolithic voyaging in the Aegean region has been one of interest for some time (Perlès, 1979). However, even at the end of the century two decades later (in 1999), it was not really possible to make much headway on this question because of the acute shortage of sites of Mesolithic and Final Palaeolithic age on the Aegean Islands. The situation then improved rapidly in the opening years of the 21st century. Indeed, this was one of the reasons for organizing the Wenner Gren Workshop held in 2012 at Reggio Calabria, where the discussion often focused on pre-Neolithic voyaging in the various regions of the Mediterranean. In the case of Cyprus, there is, for example, now good evidence for voyaging in the 11th millennium cal BC (e.g., Ammerman, 2013b; Simmons, 2013), and it may well go back to the previous millennium (Kaczanowska et al., 2014:45). And there is the working hypothesis that early voyaging on a regular basis was sparked by the effects of the cold snap of the Younger Dryas (ca. 10,800 to 9,600 cal BC) together with a progressive rise in sea level, which promoted change in the ways in which hunter-gatherers were moving around on the landscape and the seascape as well.

It will be recalled that Gökçeada began to separate from the mainland by around 12,000 cal BC and then Lemnos and Gökçeada separate from each other (forming two distinct islands) during the course of the 11th millennium cal BC. So this was clearly a time of environmental change in the North Aegean: hunter-gatherers living there had to adapt to new situations on the landscape, although we are still far from being a good position to trace and explain how this all unfolded. If climate change during the Younger Dryas led to increasing mobility on the part of hunter-gatherers as well as changes in their way of life in a region such as the Levant (Bar Yosef, 2001:129), the Levantine character of the distinctive lithic tradition at Ouriakos (microlithic lunates), in combination with the appearance of another site whose lithics show similar characteristics in the “west” (the Öküzini Cave) would seem to be consonant with the idea of heightened mobility among groups of hunter-gatherers in the Eastern Mediterranean. In any event, whether hunter-gatherers chose to go to sea as a new form of transportation (preferring perhaps coastal routes and crossing narrow bodies of water only when it was called for) or whether they stayed basically on land is not well known today. The exception here is, of course, the case of Cyprus where voyaging clearly goes back to the 11th millennium cal BC, as mentioned before. In the case of the Aegean, there is a still a lack of firm evidence that would take voyaging back to the time before the start of the Holocene (that is, ca. 9,600 cal BC), when it is well documented by the fair number of piece of obsidian from Melos found in lithic phase VII at the Franchthi Cave (that is, more than just few pieces of obsidian, possibly due to taphonic processes, found in the previous lithic phase (VI) at Franchthi; Ammerman, 2010:86). So by this time (say the first half of the 10th millennium cal BC) and possibly even earlier (the second half of the 11th millennium cal BC, if one is optimistic and takes the few obsidian pieces associated with lithic phase VI to be in situ), one is closing in on the threshold when voyaging is definitely making its appearance in the Aegean Sea. However, we need to be cautious and not just jump on the bandwagon of current enthusiasm for early voyaging. In other words, we have to keep our feet on the ground when it comes to evaluating the tempi and the slow processes that
may have been involved in the emergence of the new means of moving around (voyaging on the open sea) and along with it a new mode of subsistence (active foraging for seafood). There may well be changes in social relations (such as specialization, ownership and sharing as well as other considerations of a more abstract character such as those discussed by Carchedi, 2011:18). While the study of such social relations may appear at times to be rather enigmatic and obscure from the viewpoint of the archaeologist conducting fieldwork, we should try to take them into account. They represent challenging topics that Broodbank (2013) and other contributors to the proceedings of the Wenner Gren Workshop are now starting to take up and think about. My own attempt at doing so previously – at trying to recount the “micro-stories” of islands in transition – has recently been published elsewhere (Efstratiou, 2014b). This is not the place to repeat the same stories. The main purpose of this article is to produce the first preliminary report on the fieldwork at Ouriakos and to provide a summary where currently stand in the work at the site. Today there is a good deal of work that to be done in completing the studies that are now in progress. And there is much that is still largely unknown: for instance, the submerged prehistory of the area in front of Ouriakos. It may well have clues to offer in trying to answer some of the questions raised above. In short, some of the basic pieces in the puzzle are still missing. In our efforts to interpret the site, we should not be in too much of a rush and force things at the present time. Indeed, when I look back on the ideas about Ouriakos that I have held at one time or another over the last six year, what I see, in retrospect, is a pathway with many twists and turns, and things are not likely to change all that much in the next six years.

CLOSING REMARKS

The discovery of the site of Ouriakos on Lemnos and the fieldwork that we conducted there in the years from 2008 through 2013 have established beyond a doubt its significance in the Aegean world. The time period we are concerned with at Ouriakos dates the end of the Pleistocene: essentially the 11th millennium cal BC and the beginning of the following millennium (the boundary to the Holocene is now placed at ca. 9,600 cal BC on the basis of the isotope ratios in the deep cores made in the Greenland ice sheet). Remarkably, very few sites dating to this time are known in our neck of the woods today: that is, northwest Anatolia, the Black Sea, the southern Balkans (Kozłowski, 2005:520) and the Aegean Islands. In fact, prior to the work at Ouriakos, no site of this age had been excavated on an island in the Aegean Sea. Thus, as mentioned in the opening section of this article, the campsite know as Ouriakos, after the name of the stream passing on its west side, is now starting to close what had been for years a major gap in the literature. So the site of Ouriakos is an important one simply for this reason. And the potential significance of the site is even greater if we consider it in the light of the following two considerations: (1) the climate changes associated with the Younger Dryas and the onset of warmer and wetter conditions at the start of the Holocene and (2) the advent of early voyaging on the part of hunter-gatherers and coastal foragers in the Aegean. In the later case, it is of major interest to know how far back in time we as archaeologists can trace voyaging in this region of the Mediterranean. And it is of no less interest to work out whether the hunter-gatherers who camped at Ouriakos did go to sea from time to time. As mentioned in the previous section, one might be tempted to accept the idea of voyaging on the basis of what is currently known in the case of Cyprus. However, we need to be cautious and make sure that there is reliable archaeological evidence on Lemnos itself, which provides support for the inference for voyaging there. In our case, it is probably best to view this as an open question at the present time. Indeed, as I have said above, much work remains to be done at our site and on the island of Lemnos in the years to come. At the same time, it is important to realize that, in many respects, our hands are tied when it comes to putting forward discourse of a broader scope on Ouriakos. This is due to the very small number of sites of the same age in neighboring regions. On a playing field where sites other than Ouriakos are so rare, we are not in a good position to compare sites or to say much about their similarities and differences. In effect,
The primary task of the fieldwork at Ouriakos is to fill in a major gap. But the gap itself places limitations on the discourse that we have the chance to make today. In the future, when more sites of this age are known on the Aegean Islands and in adjacent regions such as Northwest Anatolia, this will become much easier to do.

Today the best parallel to draw is with the Öküzini Cave in southwestern Anatolia (Kartal, 2002:235). In addition, it is intriguing to look out to sites of Epipalaeolithic age even further to the east. In southeastern Anatolia, a number of new excavations are now being conducted at sites such as the Direkli Cave (Erek, 2010), and they are shedding new light on the lithic traditions there at the end of the Pleistocene and on the question of the spread of the microlithic tradition from the Near East toward the west. In addition, we need to take into consideration what is happening at early sites on Cyprus such as Dive Site C in front of Aspros where close parallels have recently been recognized with the microlithic tradition at the Öküzini Cave (Ammerman, 2013b:130; Kaczanowska and Kozłowski, 2014:63; on the site of Aspros itself and its connection with the same lithic tradition in a wider sense, see Kaczanowska et al., 2014:45; on Aetokremnos, see Simmons, 2013; for an overview on early Cyprus, see Efstratiou, 2012). Whether such similarities (making due allowance for some local differences in reduction technology) in the chipped stone assemblages at sites located at such considerable distances from one another are to be explained in terms of long-distance Leventine cultural influence, which spread on the basis of the mobility of groups of hunter-gatherers or whether it is the consequence of inter-groups contacts that took place on a more local scale, it is too soon to say. The idea that sea routes may have facilitated cultural contacts and led to lithic tradition being shared over a wide area in the Final Palaeolithic – perhaps extending all of the way to the Aegean – should be regarded as an open possibility. The seemingly “extrovert” tradition of the Epipalaeolithic (with a blade/bladelet technology and dating to the 11th millennium cal BC) as seen at sites both on the Anatolian mainland and more recently on the islands of Cyprus and Lemnos, and the seemingly “introvert” tradition of the Aegean Mesolithic (with a flake-based technology and dating to the 9th and 8th millennia cal BC) represent two fascinating chapters in sequence of the transition from the Pleistocene to the Holocene. Finally, in trying to address the question of “why Lemnos is important for the Final Palaeolithic hunters and foragers in this part of the northeast Aegean,” it may be idle to think in terms of a straightforward or simple answer. In all likelihood, it may well have to do with the rich sources of raw material on Lemnos for making chipped stone tools – sources that attracted hunter-gathers when the future island was still attached to the mainland and ones that then continued to attract them once the island had formed, even though this now meant that one had to have access to a small boat in order to do so. At the same time, a site such as Ouriakos has much to offer a group of hunter-gathers living on the island or just visit it from time to time: a good elevated position from which to look out over the wide coastal plain for game, a stream that passed through the site providing a source of water at first hand and the well-defined calcarenite terrace, which was a dry place to camp and make chipped stone tools during the wetter months of the year when most of other soils in the area (including those elsewhere on the site) were too wet or moist and did not make good places to spend the night.

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The Final Palaeolithic hunting camp of Ouriakos on the island of Lemnos

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