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THESPROTIA EXPEDITION II
ENVIRONMENT AND SETTLEMENT PATTERNS

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Cover: Megalo Karvounari seen from the northeast. Courtesy of the 32nd Ephorate for Prehistoric and Classical Antiquities

Layout: Esko Tikkala

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Megalo Karvounari Revisited

Stefanos Ligkovanlis

Introduction and background

When the Thesprotia Expedition, investigating the diachronic occupation of the Kokytos valley in Thesprotia, revisited the Palaeolithic open-air site Megalo Karvounari (PS 22), this resulted in the recovery (through an intensive surface collection of archaeological material) of a large quantity of stone artefacts. Of particular interest is the surface survey carried out in a clearly delimited part of the site, U(nit) 24. With the help of a grid system, a total of 1,601 Palaeolithic stone artefacts were brought to light. In this chapter I present the results of the technological and typological study of the U 24 finds, and examine their contribution to the discussion of the Palaeolithic occupation of Megalo Karvounari and the region of northwest Greece in general.

Megalo Karvounari is located 3 km south of the homonymous village in the Paramythia district, 22 km southeast of Igoumenitsa and 11 km from the nearest present-day coastline (Figs. 1-2). It is a large drainage basin measuring approximately 33,000 m², surrounded by low hills and full of characteristic terra rossa deposits. The site has been known since the 1960s. It was identified by E. Higgs and his team in the context of the first Cambridge University surface survey in Epirus, when it was described as 'a large but circumscribed area of red earth'.[1] More recently it has been realised that Megalo Karvounari is an ancient polje consisting of terra rossa deposits, 'deeply dissected by recent erosional gullies'.[2] The Cambridge team collected approximately 1,200 stone artefacts from Megalo Karvounari without reporting their exact findspots. Although the original publication of these finds was lacking in detail,[3] two relatively recent technological and typological studies of these finds describe a stone industry with characteristics of the Middle Palaeolithic period, including a low percentage (3.6%) of unpatinated or lightly patinated artefacts of later date.[4] The large number of finds from Megalo Karvounari, and the way they were scattered extensively across the landscape, show that this was an important open-air site for the human communities of the Middle Palaeolithic.

Spatial and temporal context of U 24

In the summer of 2005, a Thesprotia Expedition team, under the direction of Jeannette Forsén, undertook a surface collection of archaeological material at Megalo Karvounari,

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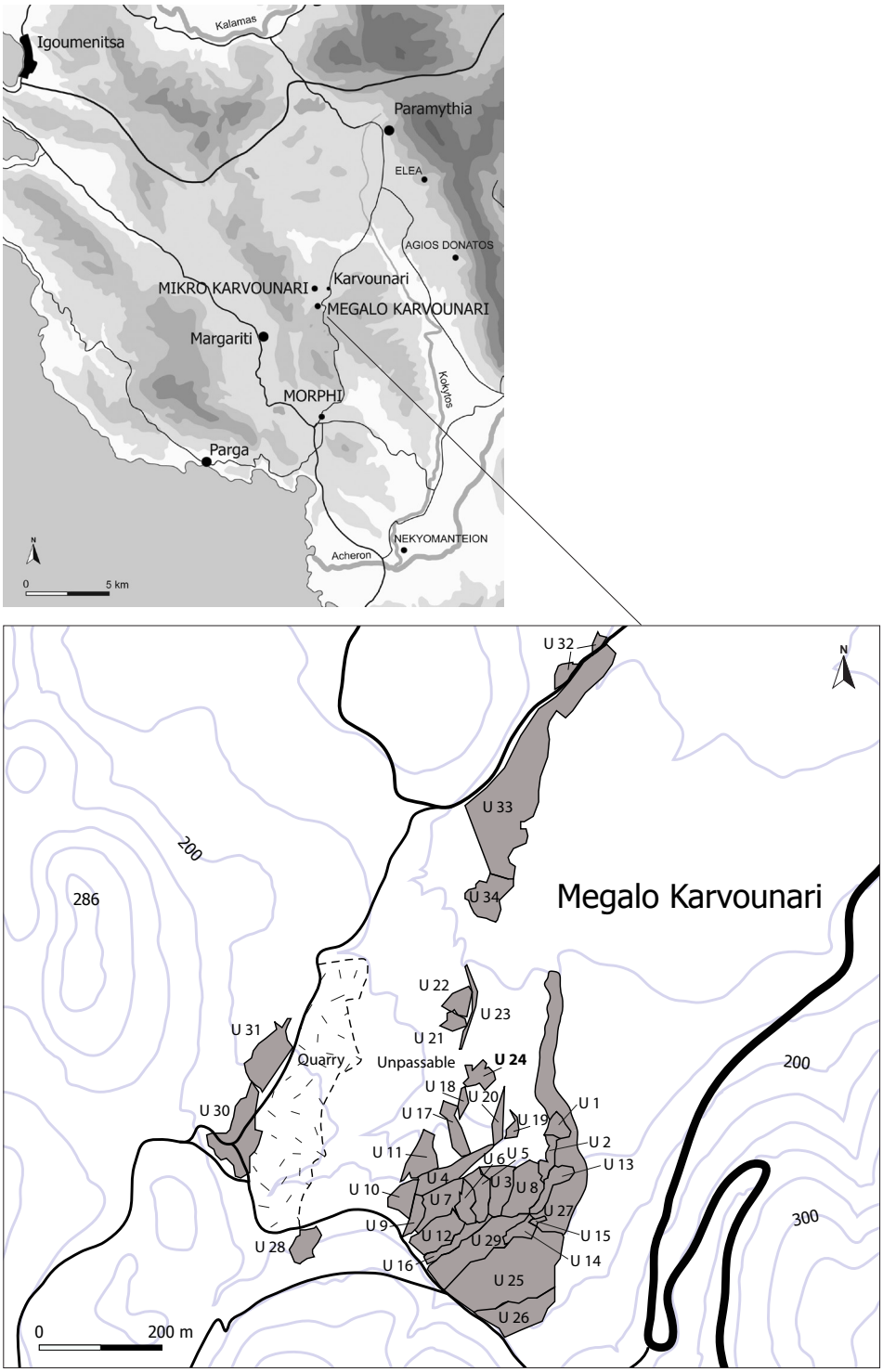
[1] Higgs 1965, 364. I would like to thank Björn Forsén and Jeannette Forsén for the invitation to study the finds from Megalo Karvounari. It could not have been realised without the contribution and assistance of the staff of the 32nd Ephorate of Antiquities and the program "Heraklitus II". I am also grateful to Nena Galanidou for the help she has offered. Figs. 1-2 are by Esko Tikkala and Fig. 3 by Sarianna Silvonen. The drawings of the lithics were made by the author and inked by Nikoletta Dolia. All other illustrations are by the author.

[2] Papagianni 2000, 47.

[3] Higgs and Vita Finzi 1966.

[4] Papaconstantinou and Vasilopoulou 1997, 465; Papagianni 2000, 48.



Figs. 1-2. Megalo Karvounari in its regional setting.

50 years after the first archaeological investigation of the area. Of particular interest is the surface collection carried out in U 24. An up-to-date methodology differentiates it from the other surveyed parts of the site, rendering its finds a contextualized study sample.

U 24 is located at the north part of Megalo Karvounari. It comprises an almost rectangular area of approximately 1,400 m^2, enclosed by clumps of trees, essentially a clearing. In its present form, the site is inclined on the east-west axis, while the terra rossa deposits are constantly eroded by seasonal streams produced by rainfall (Figs. 2-4). This results in hillocks of terra rossa, a landscape also seen in many similar parts of Epirus (e.g. Morphi, Kokkinopilos).

For the requirements of the surface survey, U 24 was divided into 14 squares measuring 10x10 m and the finds on the surface of the ground were collected (Fig. 3). The 1,601 flint artefacts collected from U 24, together with three pieces of limonite, are the only types of find on this site. The finds were bagged and labeled by square, while any large, spatially distinct concentrations within the squares were noted. This detailed recording of the find contexts could potentially help us to identify spatial patterns of site use, if any preserved in primary archaeological deposition.[5]

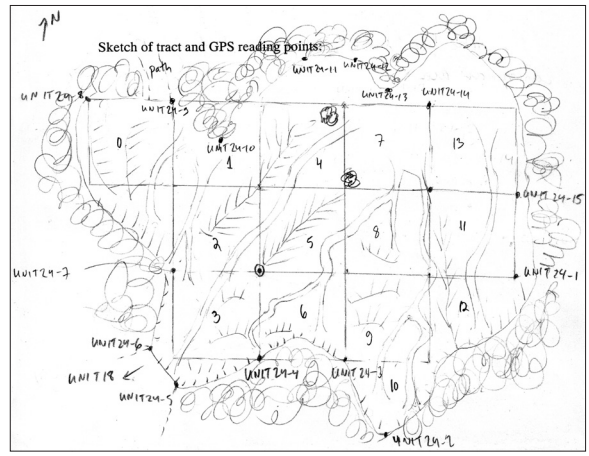


Fig. 3. Drawing of Unit 24 Squares, vegetation and routes of erosional gullies.

Fig. 4. Eroded terra rossa hillock slope in U 24.

In the summer of 2009 we revisited the U 24 area and observed that, due to the constant erosion of the terra rossa deposits, a larger number of stone artefacts could be collected by using the same recovery methodology. The course of the seasonal streams formed by rainfall was visible. These streams, combined with the wind, erode the deposits,

[5] For further discussion of the possibility of recovering archaeological material in primary contexts on terra rossa sites see Dakaris *et al.* 1964; Bailey *et al.* 1992; Papagianni 2000; Runnels and van Andel 2003, van Andel and Runnels 2005.

Square and square concentration	0	1	2	3	4	4 c1	5	6	7	8	8 c1	9	9 c1	9 c2	9 c3	9 c4	10	11	11 c1	12	13	13 c1	Total
Unpatinated or lightly patinated degrees 0, 1, 2	10	11	1	2	15	69	27	1	5	135	70	19	83	21	15	11	24	5	8	17	3	36	588
Heavily patinated degrees 3, 4	56	0	35	11	45	172	84	15	14	129	34	26	97	32	12	15	40	9	21	9	0	60	916
Multiple patina degrees 0+3, 1+3, 2+3	0	7	0	0	5	4	5	1	1	18	13	3	15	2	5	1	6	3	1	3	0	4	97
Total	66	18	36	13	65	245	116	17	20	282	117	48	195	55	32	27	70	17	30	29	3	100	1601

Fig. 5. Distribution of stone artifacts in squares and square concentrations by patina.

Square and square concentration	0	1	2	3	4	4 c1	5	6	7	8	8 c1	9	9 c1	9 c2	9 c3	9 c4	10	11	11 c1	12	13	13 c1	Total
IND	29	14	17	7	38	118	60	2	18	164	59	30	112	29	19	17	35	12	23	18	3	63	887
c	0	0	0	0	1	0	0	0	0	1	6	1	1	1	0	0	1	1	0	0	0	0	13
t	0	0	0	0	0	2	1	1	1	2	0	0	2	0	0	1	2	0	1	0	0	1	14
pf	29	14	17	7	37	116	59	1	17	161	53	29	109	28	19	16	32	11	22	18	3	62	860
UP	3	1	6	2	11	75	28	5	1	61	45	12	38	14	7	5	15	2	2	9	0	19	361
c	0	0	1	1	0	7	3	0	0	12	11	2	5	1	2	0	1	0	0	1	0	2	49
t	3	1	3	1	7	23	8	5	0	17	9	7	20	7	1	2	13	1	2	5	0	9	144
pf	0	0	2	0	4	45	17	0	1	32	25	3	13	6	4	3	1	1	0	3	0	8	168
MP	34	3	13	4	16	52	28	10	1	57	13	6	45	12	6	5	20	3	5	2	0	18	353
c	4	0	2	0	1	0	3	1	0	3	3	0	11	0	2	0	2	0	0	0	0	0	31
t	16	1	5	1	5	17	14	4	1	25	7	3	19	5	1	2	7	3	3	0	0	8	147
pf	14	2	6	3	11	35	11	5	0	29	3	3	15	7	3	3	11	0	2	2	0	10	175

Fig. 6. The distribution of stone artifacts in squares and square concentrations by date (assessed on the basis of typological and technological features). IND = Indeterminate, UP = Upper Palaeolithic, MP = Middle Palaeolithic, c = cores, t = tools, pf = plain flakes.

constantly revealing artefacts on the surface of the soil and on the slopes of the terra rossa hillocks (Figs. 3-4). Many of these objects are then washed down from the upper to the lower levels of the site, forming larger concentrations of stone artefacts there. Our observations made on site during the 2009 visit to U 24 were fully confirmed during the first stages of studying the stone artefacts. A high percentage of artefacts bore distinct traces of rolling (mainly flakings due to natural causes), while only 30% of the artefacts were intact. The largest distinct concentrations of artefacts within the squares, recorded in the project day-books during their collection, came from the lower levels of the site (Figs. 3, 5-6), due to the mechanism of erosion and their transportation there from higher up, while attempts to refit artefacts originating from a single square or concentration proved fruitless.

Apart from the traces of rolling, the surfaces of the artefacts also showed other forms of weathering and patination,[6] while on 7% there was a type of lichen present. Although the heavily patinated artefacts formed the majority and presented clear Middle Palaeolithic technological and typological features (e.g. Levallois cores, sidescrapers on Levallois flakes), there was also a significant number of lightly patinated and unpatinated artefacts, while many objects bore two or even three different degrees of patination on their surface (Fig. 5). Generally speaking, the lightly patinated and unpatinated artefacts were technologically and typologically different (e.g. bladelet cores, scrapers on blades) from the heavily patinated artefacts. However, the recognition of Upper Palaeolithic features on heavily patinated artefacts discouraged the 'automatic' temporal classification of units based on the degree of patination. In any case, it is generally accepted that patina is not a reliable indication of age.

All the above observations led us to the conclusion that the lithic collection from U 24 came from a secondary archaeological context, essentially forming a palimpsest which might, at first glance, be placed in the Middle and Upper Palaeolithic. Given the palimpsest character and mixed nature of the recovered assemblage, I focused on those technological and typological elements which might shed more light on the character and date of occupation at U 24 (Fig. 6).

Of the assemblage recovered, 887 artefacts were not possible to be dated with any certainly diagnostic elements which would help us place them in a cultural unit, or being items which might form part of either the Upper or the Middle Palaeolithic industry. The vast majority of this group consists of flake and blade fragments (mostly with a maximum diameter under 3 cm), knapping debris, many primary flakes, and a few cores or core fragments of uncertain technology and date. This category also included a few borers, burins and truncations which could belong to either an Upper or a Middle Palaeolithic toolkit.

The Middle Palaeolithic component of U 24 (n=353)

The 31 cores and 322 pieces of debitage comprising the Middle Palaeolithic component form a sample that reflects trends during Mousterian at U 24. Good-quality fine-grained flint was used for the stone industry; the exact type is hard to determine due to the high

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[6] The patina on the artefacts was recorded on a scale of 0-5 based on the degree of surface discoloration: 0 = unpatinated, 1, 2 = lightly patinated, 3, 4 = heavily patinated artefacts.

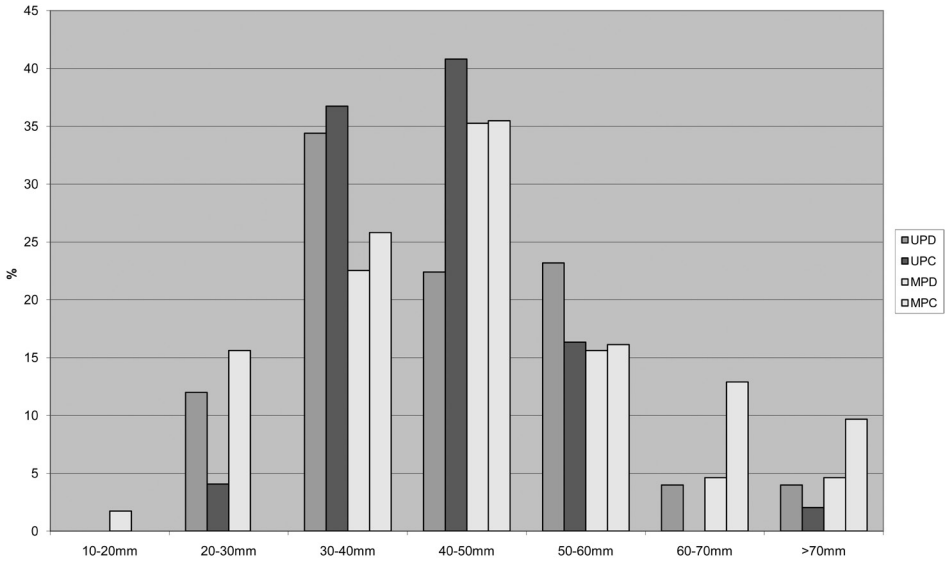

Fig. 7. Size distribution of intact artefacts in Upper and Middle Palaeolithic component debitage (UPD=125; MPD=173) and cores (UPC=49; MPC=31).

degree of patination covering most of the surfaces of the artefacts in this group. However, the study of recently broken surfaces of artefacts which had not yet been fully discoloured by patina allowed us to identify a variety of flint types, mainly grey, red and reddish-brown.

The length distribution of the intact artefacts (debitage and cores) of the Middle Palaeolithic component (Fig. 7) shows an assemblage of relatively large objects, with a clear tendency to elongation of the final products (54 [31%] pieces of debitage with a length-width ratio of over 1.5) (Fig. 8). The Levallois technique is the dominant core reduction method, chiefly through its centripetal variations, linear and recurrent,[7] producing mostly oval flakes (Figs. 9: i-ii; 10: vi; 11: i). However, there are also examples of parallel reduction Levallois method, intended to produce elongated artefacts (Fig. 9: iv). There are also examples of large, rectangular cores indicating the use of non-Levallois flaking methods, which bear traces of parallel bipolar flaking and prepared striking platforms (Fig. 10: i). This type of core also produces elongated artefacts, which are difficult to

Debitage (intact artifacts)	Upper Palaeolithic component	Middle Palaeolithic component
Flakes	15 (12%)	119 (68.79%)
Laminar flakes	15 (12%)	42 (24.28%)
Blades	70 (56%)	12 (6.94%)
Bladelets	25 (20%)	0
Total	125	173

Fig. 8. Relative frequency of debitage type in Upper and Middle Palaeolithic component.

[7] Böeda 1993.

distinguish from those produced by parallel Levallois reduction methods (Figs. 10: iii-iv; 11: vi). Three typical discoid cores (Fig. 9: iii) were also found.

The same reduction method characteristics were identified during the study of the dorsal scars of the pieces of debitage. The only difference in this category consists of artefacts with convergent dorsal scars (Fig. 11: ii,vii-viii) (many of these are Levallois points produced by either centripetal or parallel Levallois cores), while no corresponding cores were found in our sample. As has been proposed,[8] it is very likely that this kind of debitage is produced during parallel reduction.

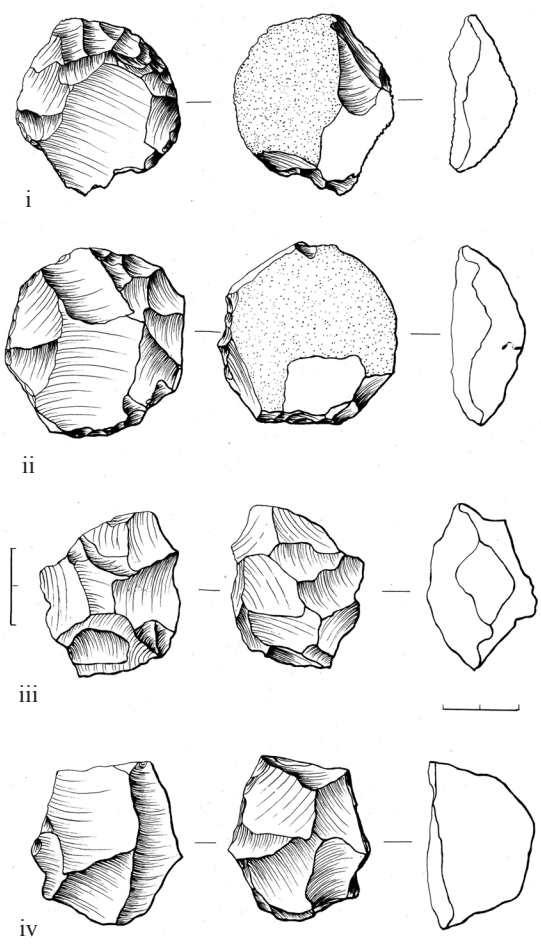

Fig. 9. Middle Palaeolithic component. i, ii, iv) Levallois cores, iii) disc core. Scale 1:2.

Debitage produced by means of the use of parallel reduction generally has a greater mean length (46.2 mm) than that produced by centripetal reduction methods (40.4 mm). The centripetal cores appear to result in more effective exploitation of the raw material than the parallel cores, if we examine the mean length of the scars of the last detached products and the debitage betraying the corresponding reduction method. Moreover, it cannot be excluded that primary flaking methods could change during the reduction of cores (mainly from parallel to centripetal reduction), according to the percentages of cores and the corresponding debitage in the sample. Debitage indicating parallel flaking is more numerous than the corresponding cores, whereas debitage indicating centripetal flaking is less numerous than the corresponding cores. However, these observations are not absolutely safe due to the limitations of the palimpsest.

In typological terms, apart from the abundant technologically defined tools sensu Debeneath and Dibble (i.e. unretouched Levallois points, unretouched pseudo-Levallois points, naturally backed knives)[9] (Figs. 11: iii-vii, 16), the stone industry from U 24 seems

[8] Papagianni 2000, 45.
[9] Debeneath and Dibble 1994, 43-55 (typical and atypical Levallois flakes are not included).

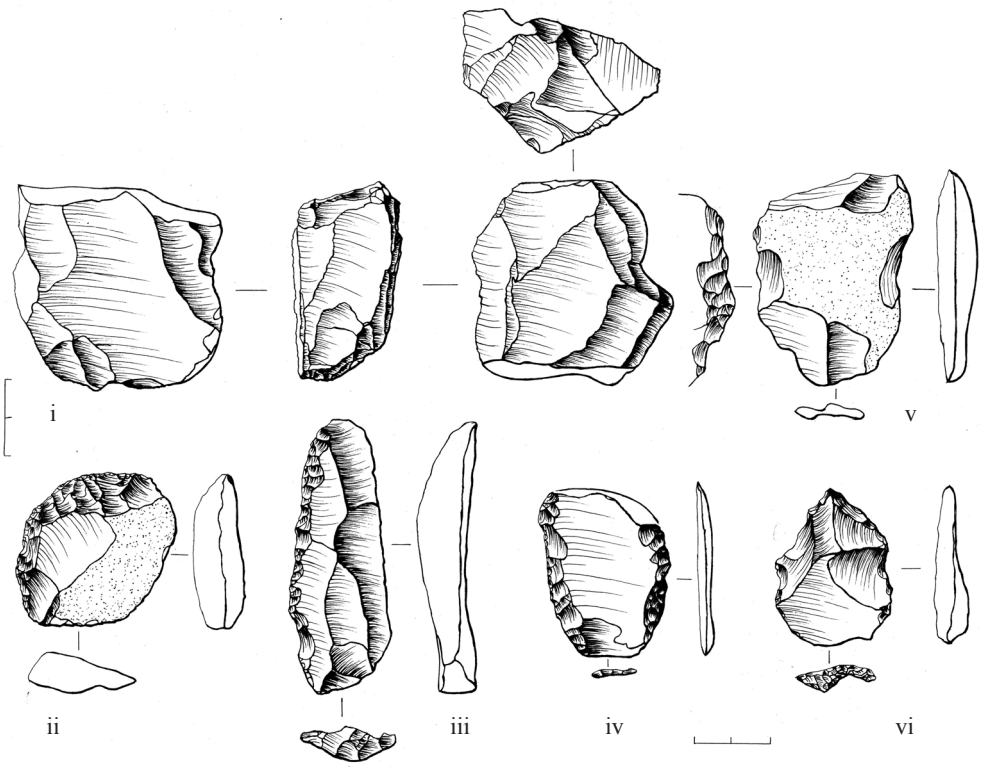

Fig. 10. Middle Palaeolithic componenet. i) «prismatic» core, ii, iii, iv, v) sidescrapers, vi) Mousterian point. Scale 1:2.

fairly 'typical', with various types of sidescraper predominating in the tools category (Fig. 10: ii-v). Retouching is mainly scaled and of reasonably good quality, although there are also three examples of stepped retouch of the Quina and demi-Quina type. The resharpening of sidescrapers, measured following Kuhn's Geometric Index,[10] is not very intensive (Fig. 17). Of particular interest from a typological point of view are two rabots on thick blanks (Fig. 11: iv) and a group of small objects with invasive bifacially flat retouch, referred to in the bibliography by many different names (Mousterian discs, Tata scrapers, etc.)[11] (Fig. 11: ix). Tools usually referred to in the bibliography as 'Upper Palaeolithic types'[12] were also classified in the Middle Palaeolithic component (e.g. 9 borers, 3 endscrapers, 2 truncations). I considered these objects to be Mousterian products based on their type of blank (e.g. Levallois flakes, pseudo-Levallois points) and the atypical character of their retouch (e.g. borers with very small pointed tips) (Fig. 15). As regards technology, artefacts produced by a specific reduction method do not appear to have been used as blanks to make a specific type of tool. The tool butts do not differ significantly from those of the unretouched flakes (Fig. 14).

[10] Kuhn 1990; Hiscock and Clarkson 2005.
[11] Debeneath and Dibble 1994, 88, 124.
[12] Debeneath and Dibble 1994, 93-102.

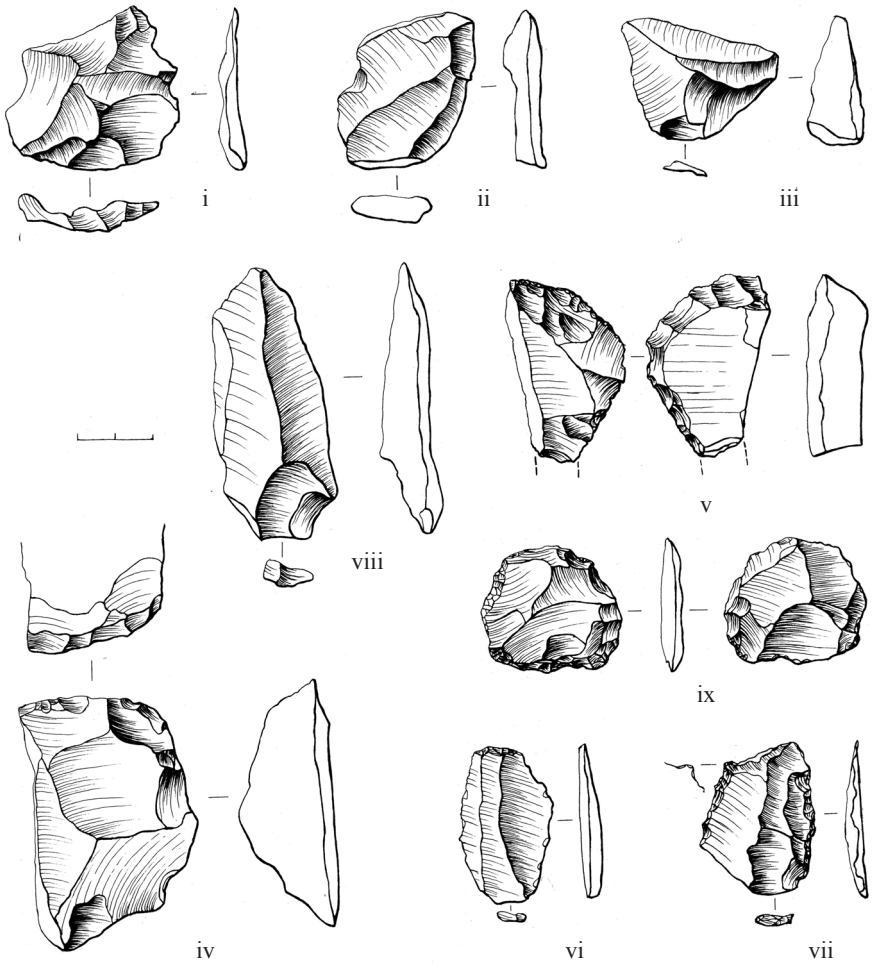

Fig. 11. Middle Palaeolithic component. i) denticulate, ii) notch, iii) Pseudolevallois point, iv) rabot, v) hachoir, vi) truncation, vii) sidescraper and borer, viii) elongated Levallois point, ix) bifacially retouched piece. Scale 1:2.

Compared to the published Mousterian assemblage from Megalo Karvounari,[13] the Middle Palaeolithic component of U 24 does not appear significantly different. The main features observed previously, such as the tendency towards elongation of debitage, the predominance of centripetal reduction methods, and the predominance of sidescrapers in the tools category, are confirmed by our study, the only difference being that the bipolar parallel reduction method is more common than the unipolar. I believe, however, that this is only to be expected at sites representing palimpsests of multiple depositions of lithic material.

In conclusion, therefore, the Middle Palaeolithic assemblage from U 24 is a 'typical' example of Mousterian industry, with abundant use of the Levallois method, and presenting common features with the assemblages identified at other Palaeolithic open-air sites in

[13] Papaconstantinou and Vasilopoulou 1997, 465-466; Papagianni 2000, 48-50.

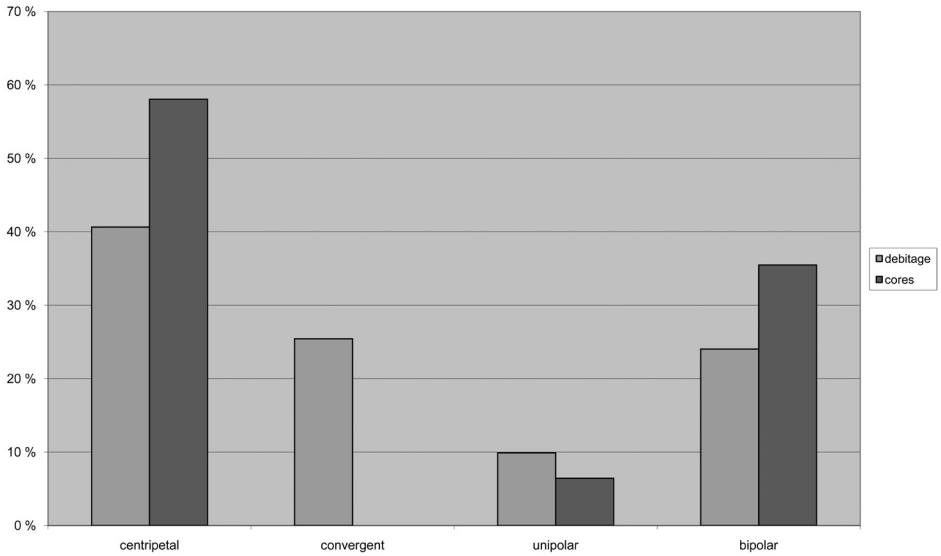

Fig. 12. Middle Palaeolithic component: relative frequencies of reduction methods on debitage and cores.

Reduction method	Cores	Last detached blank	Corresponding Debitage
Centripetal mean length (mm)	45.4	29.9	40.4
Deviation	11	8.5	13.8
Parallel mean length (mm)	54.1	46.2	46.2
Deviation	19	15.9	11.8

Fig. 13. Middle Palaeolithic component: mean length of cores, their last detached blank, and corresponding debitage on the basis of reduction methods.

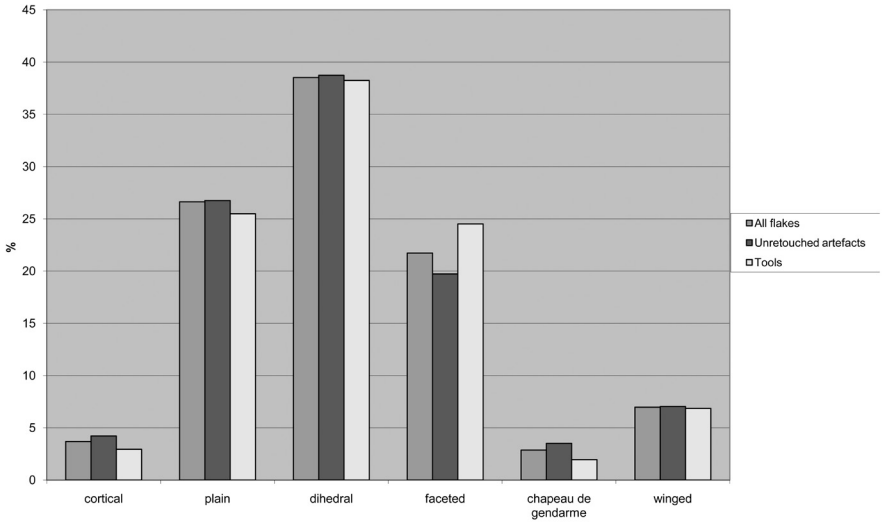

Fig. 14. Middle Palaeolithic component: relative frequencies of butts on all flakes, unretouched artefacts and tools.

the so-called coastal zone of Epirus (e.g. Morphi, Alonaki).[14] This type of stone industry, as noted elsewhere,[15] resembles the basal Mousterian of the Asprochaliko Rockshelter, which is dated to around 102 Kyr BP,[16] as well as stone industries of the same period from the Theopetra Cave in Thessaly.[16]

The high degree of technological and typological variability identified in the Mousterian industry of U 24 is similar to that found at other Palaeolithic open-air sites of Epirus.[18] It is certainly a limiting factor in providing any interpretation of the diachronic use of the area. At Megalo Karvounari, however, as at the majority of similar large open-air sites in Epirus, the data provided by the lithic assemblages confirm a multidimensional use of the area. All types of stone flaking product are present in the Mousterian component of U 24 (cores, primary flakes, unretouched flakes, tools), demonstrating that flakes and tools were produced there, while it is very probable that many of the retouched artefacts were discarded on the spot after being worked and used on the same site. However, we cannot say whether Megalo Karvounari was a base camp during the Middle Palaeolithic, or whether the use of the area changed according to the needs of the hominids who visited it during the Mousterian period. What

Sidescrapers	57	(38.09%)
straight	8	(5.44%)
convex	26	(17.68%)
concave	3	(2.04%)
transverse	1	(0.68%)
double straight- convex	3	(2.04%)
double straight-concave	1	(0.68%)
double convex-convex	1	(0.68%)
on interior surface	9	(13.23%)
bifacial retouched	3	(2.04%)
denticulate	2	(1.36%)
Mousterian points	2	(1.36%)
Notches	39	(26.53%)
Denticulates	19	(13.61%)
Tayac points	1	(0.68%)
Endscrapers	3	(2.04%)
Borers	9	(6.12%)
Truncations	2	(1.36%)
Hachoirs	1	(0.68%)
Rabots	2	(1.36%)
Stemmed point	1	(0.68%)
Composite tools	3	(2.04%)
sidescraper + borer	3	(2.04%)
Pieces with bifacial retouch	8	(5.44%)
Total	147	

Fig. 15. Typology of tools identified in the Middle Palaeolithic component.

Unretouched Levallois points	20
Unretouched Pseudolevallois points	13
Naturally-backed knives	6

Fig. 16. Middle Palaeolithic component technologically defined tools.

Sidescraper type	Single	Double	On interior surface	Denticulate	
Index of resharpening	0.52	0.56	0.3	0.51	Total 0.47

Fig. 17. Middle Palaeolithic sidescraper Kuhn's reduction index (t/T).

[14] Papaconstantinou and Vasilopoulou 1997; Papagianni 2000.
[15] Papagianni 2000, 80.
[16] Huxtable *et al.* 1992.
[17] Panagopoulou 2000; Valladas *et al.* 2007.
[18] Papaconstantinou and Vasilopoulou 1997; Papagianni 2000. (However, there are also some differences such as the low percentages of prepared butts in the basal Mousterian of Asprochaliko.)

is certain, though, is that the site must be seen within the context of the wider network of occupation of the Epirus area during the Middle Palaeolithic, in which the ancient wetlands now delimited by the terra rossa deposits seem to have played a very important part.[19]

The Upper Palaeolithic component of U 24 (n=361)

Very little information on the Upper Palaeolithic period at open-air sites in Epirus has so far come to light. Although some post-Mousterian artefacts are mentioned at certain sites (e.g. blades, bladelet cores), they are too few for us to draw a safe conclusion regarding the character of site use during the Upper Palaeolithic period. The exception (of the

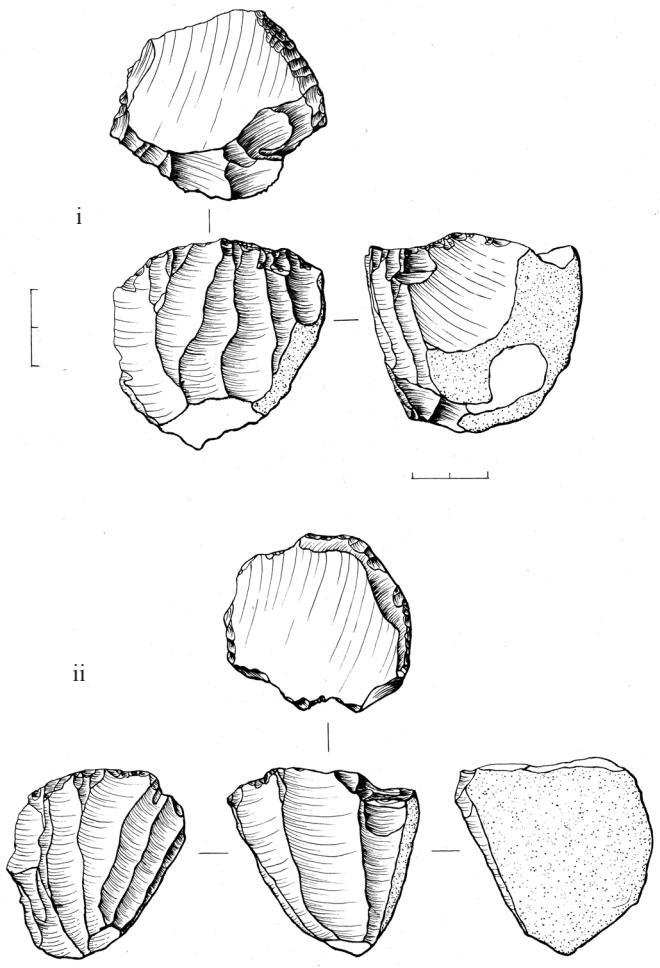

Fig. 18. Upper Palaeolithic component. i, ii) blade cores. Scale 1:2.

[19] Runnels and van Andel 2003.

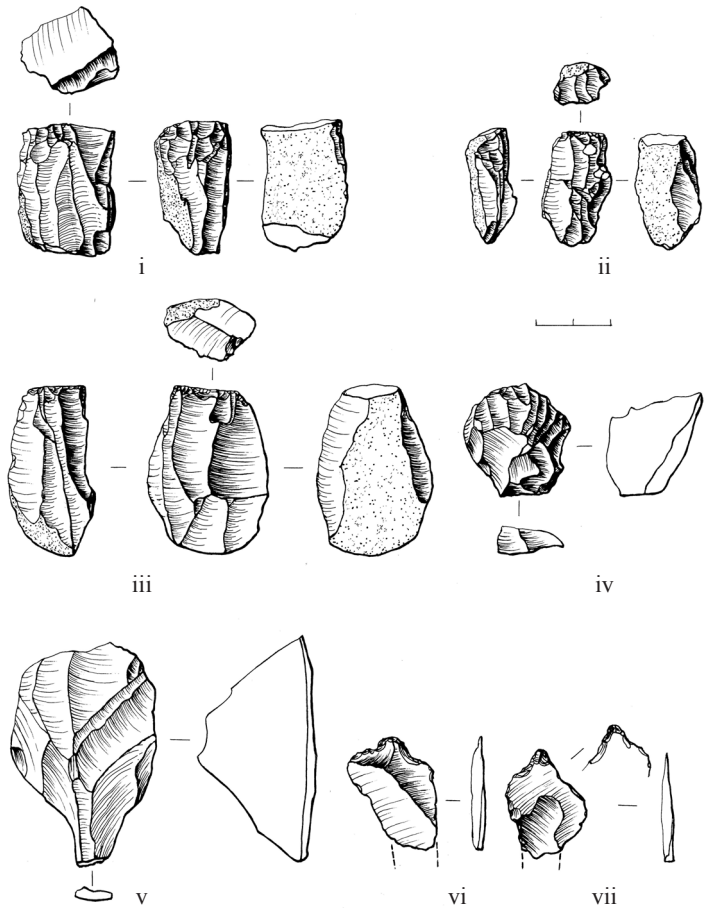

Fig. 19. Upper Palaeolithic component. i, ii) bladelet cores, iii) blade and bladelet core, iv, v) carinated endscrapers, vi, vii) nosed endscrapers (flat). Scale 1:2.

published sites) is Kokkinopilos, where an Upper Palaeolithic stone industry was reported to have been recovered in situ in the test trench dug by E. Higgs at Site a.[20] It was later realised, however, that this material was mixed with Mousterian artefacts and recovered from a secondary archaeological context, while certain characteristic Upper Palaeolithic artefacts (backed bladelets, burins, bladelet cores) were dated to the Gravettian.[21]

The Upper Palaeolithic component of U 24 numbers 49 cores and 312 pieces of debitage, forming an assemblage of equal size to the Middle Palaeolithic one (Fig. 6). Generally speaking, the artefacts of this group are lightly patinated or unpatinated, although there are also several heavily patinated examples. The types of flint used for this group of artefacts are similar to those observed in the Mousterian component, the only difference being that there are also very small quantities of white and honey-coloured flint.

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[20] Dakaris *et al.* 1964.
[21] Bailey *et al.* 1992; Papagianni 2000, 75.

Reduction method	Cores	Last detached blank	Corresponding Debitage
Centripetal mean length (mm)	43.9	45.1	48.9
Deviation	15.6	10.6	12.7
Parallel mean length (mm)	40.1	26.9	27.4
Deviation	7.3	7.3	5.9

Fig. 20. Upper Palaeolithic component: mean length dimension of cores, their last detached blank, and corresponding debitage on the basis of reduction methods.

The stone industry has a length distribution similar to that of the Middle Palaeolithic (Fig. 7). Stone flaking is mainly intended to produce artefacts the size of blades and bladelets, from prismatic and cylindrical cores bearing traces of unipolar and bipolar flaking and mostly prepared striking platforms (Figs. 18: i-ii; 19: i-iii). There are abundant products of these cores in U 24, with blades being the most numerous, followed by bladelets (Fig. 8). The mean length of the scars of the last flakings of the blade and bladelet cores is not significantly different from the mean length of the corresponding debitage (Fig. 20). However, bladelet cores (n=27) are more numerous than blade cores (n=20), which may indicate that blade cores are turned into bladelet cores during the reduction sequence; there are also two examples of cores which seem to have produced both blades and bladelets (Fig. 19: iii). A fairly large percentage of bulbs of percussion indicate use of a soft hammer. Butts are mainly flat and linear, although there are also some punctiform and dihedral examples (Fig. 21).

Endscrapers of various types predominate in the retouched artefacts. Nosed endscrapers (thick, and mostly flat types), carinated scrapers and scrapers on blades are the most numerous (Figs. 22: iv-vii; 11: i-iii). The many burins are mainly simple or dihedral on blades or on blade-like flakes (Fig. 22: v-vi). Although most of the bladelets are unretouched, two backed bladelets and a few truncated and denticulate bladelets

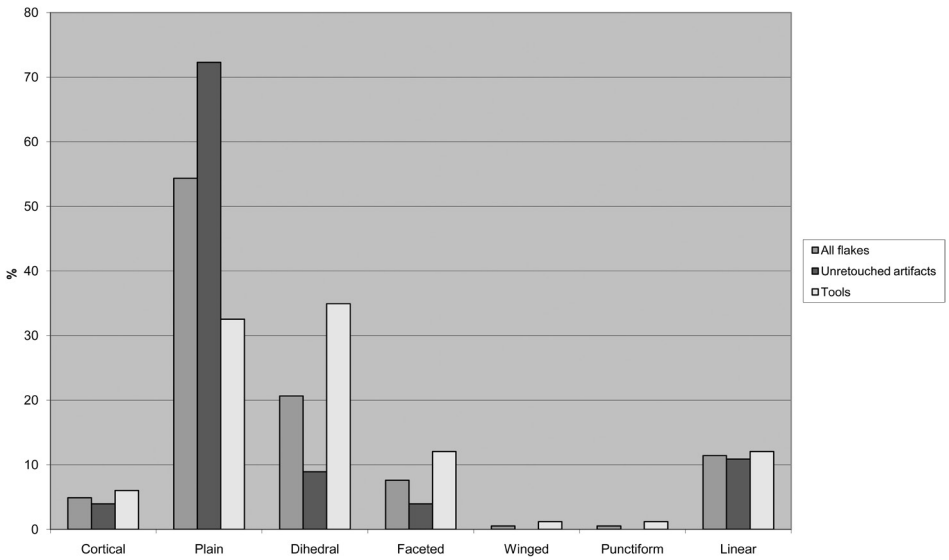

Fig. 21. Upper Palaeolithic component: relative frequencies of butts on all flakes, unretouched artefacts and tools.

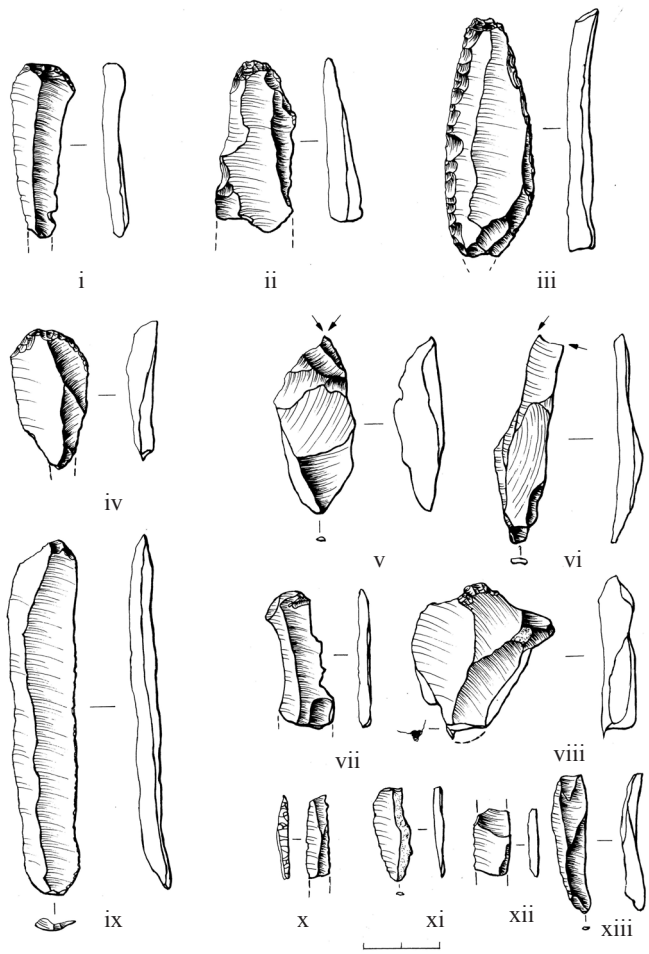

Fig. 22. Upper Palaeolithic component. i, ii, iii) endscrapers on blades, iv) endscraper, v, vi) burins, vii) denticulate, viii) nosed endscraper and borer, ix) blade, x) backed bladelet, xi) truncated bladelet, xii) denticulate bladelet, xiii) unretouched bladelet. Scale 1:2.

were found (Fig. 22: x-xiii). There are also some retouched blades and three borers with retouched long tip (a diagnostic feature I used for their classification as Upper Palaeolithic artefacts) (Fig. 23).

Most of the diagnostic tool types of the Upper Palaeolithic component of U 24 indicate an Aurignacian industry. Some elements of the lithic assemblage, however, may belong to a different time unit. The bladelets and bladelet cores, for example, are diachronic characteristics of the Upper Palaeolithic period in the region studied (abundant bladelets are found in the Gravettian and Epigravettian of Epirus,[22] but also in Aurignacian industries of the Balkans and Greece).[23] However, the diagnostic elements of another phase

[22] Adam 1999.
[23] Kozlowski and Otte 2000; Koumouzelis *et al.* 2001.

Endscrapers	62	(43.66%)	Denticulates	2	(1.41%)
carinated	18	(12.68%)	on blade	1	(0.7%)
nosed	14	(9.86%)	on bladelet	1	(0.7%)
on blade	23	(16.20%)	Borers	3	(2.11%)
on aurignacian blade	1	(0.70%)	Retouched blades	7	(3.93%)
double endscraper	2	(1.41%)	Points	2	(1.41%)
other	4	(2.82%)	shouldered point	1	(0.7%)
Burins	52	(36.62%)	natural point	1	(0.7%)
single	25	(17.61%)	Composites	3	(2.11%)
dihedral	17	(11.97%)	nosed endscraper + burin	1	(0.7%)
on truncation	8	(5.63%)	nosed endscraper + borer	2	(1.41%)
multiple	1	(0.7%)			
carinated	1	(0.7%)			
Backed bladelets	2	(1.41%)			
Truncations	9	(6.34%)			
on blade	5	(3.52%)			
on bladelet	3	(2.11%)			
other	1	(0.7%)			
			Total	142	

Fig. 23. Typology of tools identified in Upper Palaeolithic component.

of the Upper Palaeolithic period at U 24 are limited to a possible Gravettian shouldered point of bad quality. The above discussion once more highlights the difficulties arising from the attempt to disentangle the components of the Megalo Karvounari palimpsest.

The Aurignacian elements of the U 24 stone industry are the first to be identified at an Epirus site connected to terra rossa deposits. Recently, another site, dated by its finds to the Aurignacian period (although two Middle Palaeolithic Levallois cores are also reported), was discovered less than 15 km south of Megalo Karvounari at the Spilaion site, though in a different palaoenvironment. The Spilaion is located in 'a sinkhole on the northern side of the hillock, which is in fact a limestone outcrop made up of a highly weathered karst surface'.[24] The artefacts from Spilaion presenting characteristic features of the Typical Balkan Aurignacian[25] are far more numerous than those from U 24, but the two assemblages do have some common features, such as the absence of Dufour bladelets and the presence of carinated scrapers, nosed endscrapers and burins. However, core-processing activities at Spilaion show that lithic strategies were expedient and opportunistic in terms of goals and techniques (e.g. absence of prepared striking platforms, few blade cores),[26] something which is not observed at U 24, where the flaking techniques appear to be well organised, with specific goals.

Aurignacian industries are absent from the excavated caves and rockshelters of Epirus. Characteristically, at Asprochaliko, the site with the richest chrono-stratigraphical sequence, there is a hiatus between the later Mousterian (40 Kyr BP) and the Gravettian, which seems to start around 26 Kyr BP. At Kastritsa, according to the latest data, use seems to begin around 23 Kyr BP,[27] with Gravettian-type industries;[28] however, a

[24] Runnels *et al.* 2003, 138.
[25] Runnels *et al*. 2003, 142.
[26] Runnels *et al.* 2003, 143.
[27] Galanidou and Tzedakis 2001.
[28] Adam 1999; Galanidou *et al.* 2000.

carinated endscraper[29] is reported from the lowest level of the cave, perhaps indicating an earlier phase which has not survived, possibly due to the rising water level of Lake Pamvotis. At Klithi, too, occupation seems to begin even later, around 17 Kyr BP.[30]

The data on the Aurignacian period in Greece are scanty. Apart from some references to the presence of isolated artefacts with Aurignacian features, mainly carinated endscrapers, at open-air sites in the Peloponnese and Thessaly,[31] a debated Aurignacian phase at the Franchthi and Kefalari caves,[32] and a published Aurignacian industry mixed with Mousterian artefacts from the open-air site at Elaiochori in the Peloponnese,[33] the only stratified site in Greece to contain safely dated Aurignacian units is Cave 1 at Klisoura in the Argolid.[34] While the detailed publication of the Klisoura finds is pending, the preliminary study describes four distinct Aurignacian industries (uppermost, upper, middle and lower, layers III-IV) ranging from 34 to 22 Kyr BP, when the Gravettian was already developed in Epirus.

Near Epirus, in the Northern Balkans and Italy, the Aurignacian, as identified through stratified assemblages at many sites (Bacho Kiro and Temnata Caves in Bulgaria, Sandalja II and Vindija Caves in Croatia, Riparo Mochi, Fontana Nuova di Ragusa Caves in Italy)[35], may even begin before 40 Kyr BP at Bacho Kiro and Temnata cave,[36] at a time when in Epirus at Asprochaliko we still find Mousterian assemblages, and end around 26 Kyr BP. The only exception is the Sandalja II site, where samples of Aurignacian industries have been dated to 23 Kyr BP, an age concordant with the latest dating from Klisoura.[37] Detailed typological and technological studies of these assemblages have created a chrono-stratigraphical frame for the beginning, development and end of the Aurignacian in southeast Europe (e.g. Proto-Aurignacian, Typical Aurignacian, etc.).[38] It is very likely that the disparate elements making up the stone industry at Megalo Karvounari have accumulated over several millennia, covering all the stages of the Aurignacian identified at high-resolution sites in nearby regions. However, Megalo Karvounari, being a low-resolution site, does not permit a more refined discussion and comparison.

The Aurignacian assemblage of U 24 is connected with the presence of Homo sapiens at Megalo Karvounari. Together with the stone industry from Spilaion, it testifies to the presence of what was until recently a missing link in the Palaeolithic record of Epirus. Human presence in the Epirus caves ceased at the end of the Mousterian in around 40 Kyr BP (Asprochaliko) and resumed in the Gravettian, around 26 Kyr BP (Kastritsa).

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[29] Galanidou 1997, 502, Fig. 26.4.
[30] Bailey and Woodward 1997.
[31] Chavaillon *et al.* 1967; Runnels 1988.
[32] For the Franchthi and Kefalari caves see Perlès 1987.
[33] Darlas 1989.
[34] Koumouzelis *et al.* 2001.
[35] Kozlowski 1982; Ginter and Kozlowski 1992; Karananić 2003, Karananić and Smith 1998; Kuhn and Stiner 1998; Chilardi *et al.* 1996.
[36] Opinion is still divided as to whether the 'Pre-Aurignacian' of the Balkans (Bacho-Kirian) should be included in the Aurignacian industries. For further discussion of this issue, see Otte and Kozlowski 2003, 20-24; Zilhao and d'Errico 1999, 43.
[37] Koumouzelis *et al.* 2000, 534
[38] Kozlowski and Otte 2000; Koumouzelis *et al.* 2001.

Discussion

The methodology of the surface collection at U 24 permitted the detailed examination of a large area, while the exact recording of the spatial distribution of the finds contributed to the partial understanding of the taphonomic history of the lithic assemblage. At U 24 the archaeological material was not recovered in situ, confirming, in this case, pessimistic views regarding the likelihood of discovering finds in primary archaeological contexts in open-air sites connected to terra rossa deposits.[39]

Although the study of the Mousterian component of U 24 did not modify our knowledge of the occupation of Megalo Karvounari during the Middle Palaeolithic, the discovery and identification of elements of an Aurignacian assemblage at a second open-air site of Epirus extends the time depth of the Upper Palaeolithic occupation of the region.

At the outset of their investigation in the 1960s, the open-air sites of Epirus, based on the majority of the finds, were largely linked to Neanderthal activity. Conversely, with the exception of Kokkinopilos, only the excavated caves and rockshelters (Asprochaliko and Kastritsa) had provided abundant and diagnostic data on the Upper Palaeolithic period. This had led to the belief that, during the Middle Palaeolithic, the occupation network was concentrated at low-altitude open-air sites, near the coastal zone of Epirus. With the transition to the Upper Palaeolithic period and the arrival of populations of anatomically modern humans, occupation was reoriented to caves and rockshelters, mainly in the interior of the region.[40]

Following the Cambridge University surface surveys in Epirus from the 1980s onwards, however, and the re-evaluation of all the identified open-air sites and finds, this model was partially revised. Although there was appreciably less information on the Upper Palaeolithic period in open-air sites, it was enough to determine that anatomically modern humans were also clearly present at those sites. Unfortunately the small number and indeterminate age of the Upper Palaeolithic finds at open-air sites (e.g. chronologically non-diagnostic tool types) meant that the type and precise chronological range of this occupation could not be clearly determined.[41]

The information available today on the finds from Palaeolithic open-air sites in Epirus, identified over the past 50 years by surveys conducted by British and Greek-American teams, certainly places most of them in the Middle Palaeolithic period, although many sites have also produced very small quantities of purely Upper Palaeolithic finds. A significant number of sites, however, has yielded finds dated to both the Middle and Upper Palaeolithic periods. The Upper

Date	
Middle Palaeolithic	51
Upper Palaeolithic	10
Middle + Upper Palaeolithic	14
Palaeolithic	39
Total	114

Fig. 24. Dating of Palaeolithic open-air sites of Epirus recorded by the Cambridge surveys and the Nikopolis Project.

[39] Bailey *et al.* 1992, but see also for the opposite opinion Runnels and van Andel 2003; van Andel and Runnels 2005; Tourloukis 2009.
[40] Bailey *et al.* 1997, 521; Papaconstantinou and Vasilopoulou 1997, 479.
[41] Bailey *et al*. 1997.

Palaeolithic component of these sites is limited (with the exception of Kokkinopilos) and chronologically non-diagnostic, meaning that they were not used intensively at that time, nor can they be dated to a specific phase of this period (Fig. 24).[42] Up to now, Megalo Karvounari could have been placed in this category, once a small percentage of chronologically indeterminate post-Mousterian artefacts had been reported in addition to the abundant Middle Palaeolithic artefacts.

Following the study of the U 24 assemblage, we can now certify that the Upper Palaeolithic use of Megalo Karvounari was significant, placing it relatively confidently in the Aurignacian, without, however, being able to exclude the possibility that another Upper Palaeolithic time unit may lie hidden in the palimpsest of U 24 (e.g. elements of a transitional Middle to Upper Palaeolithic unit, a Gravettian or Epigravettian unit lacking diagnostic features, with the exception of the shouldered point mentioned above). Even the elements of the lithic assemblage from U 24 (number of cores, primary flakes, number of tools), albeit not completely clear due to the limitations of the palimpsest, do not seem to indicate a distinct change of use during the Middle and Upper Palaeolithic.

These indications are confirmed, at least preliminarily, by the as-yet-unpublished excavation material from open-air sites with terra rossa deposits near Megalo Karvounari: Eleftherouhori (site 7) and Molondra.[43] These sites have also produced lithic assemblages presenting clear characteristics of both the Middle and Upper Palaeolithic; most of the diagnostic elements of the latter period are dated to the Aurignacian and are present in significant numbers. This is evidence that, at least during the Early Upper Palaeolithic, the ancient wetlands delimited by terra rossa deposits, whose rich plant and animal resources attracted hominids, continued in use.

At this stage it cannot be determined whether the lack of comparable diagnostic material, at least from the open-air sites examined up to the mid-1960s, is due to the recovery methodology, or whether it reflects a true picture of their chronological range of use. That is a matter for future investigation, perhaps by more assiduous studies using modern methodologies for the retrieval of archaeological material from many of the sites examined at the outset of this long journey into the Epirus countryside, which have not yet been destroyed by modern human activity.

To conclude, the return of the Thesprotia Expedition to Megalo Karvounari, despite the weaknesses due to the unstratified nature of the material, demonstrates the value of the 50-year investigation of the low-resolution Palaeolithic open-air sites of Epirus, offering new knowledge and food for thought, solving problems of the past and expressing new ones for the future, thereby fulfilling the basic requirements of scientific research. A single lifetime is not enough to discover everything; we therefore have a duty to invest in the future, adding one more piece to the corpus of our as-yet-scanty knowledge of human existence, even if it proves necessary to return again and again to the − perhaps uninteresting after so many years − 'scene of the crime'.

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[42] Elefanti *et al.* 2009. Data processing by Stefanos Ligkovanlis.
[43] Palli and Papadea 2002; Ligkovanlis forthcoming.

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