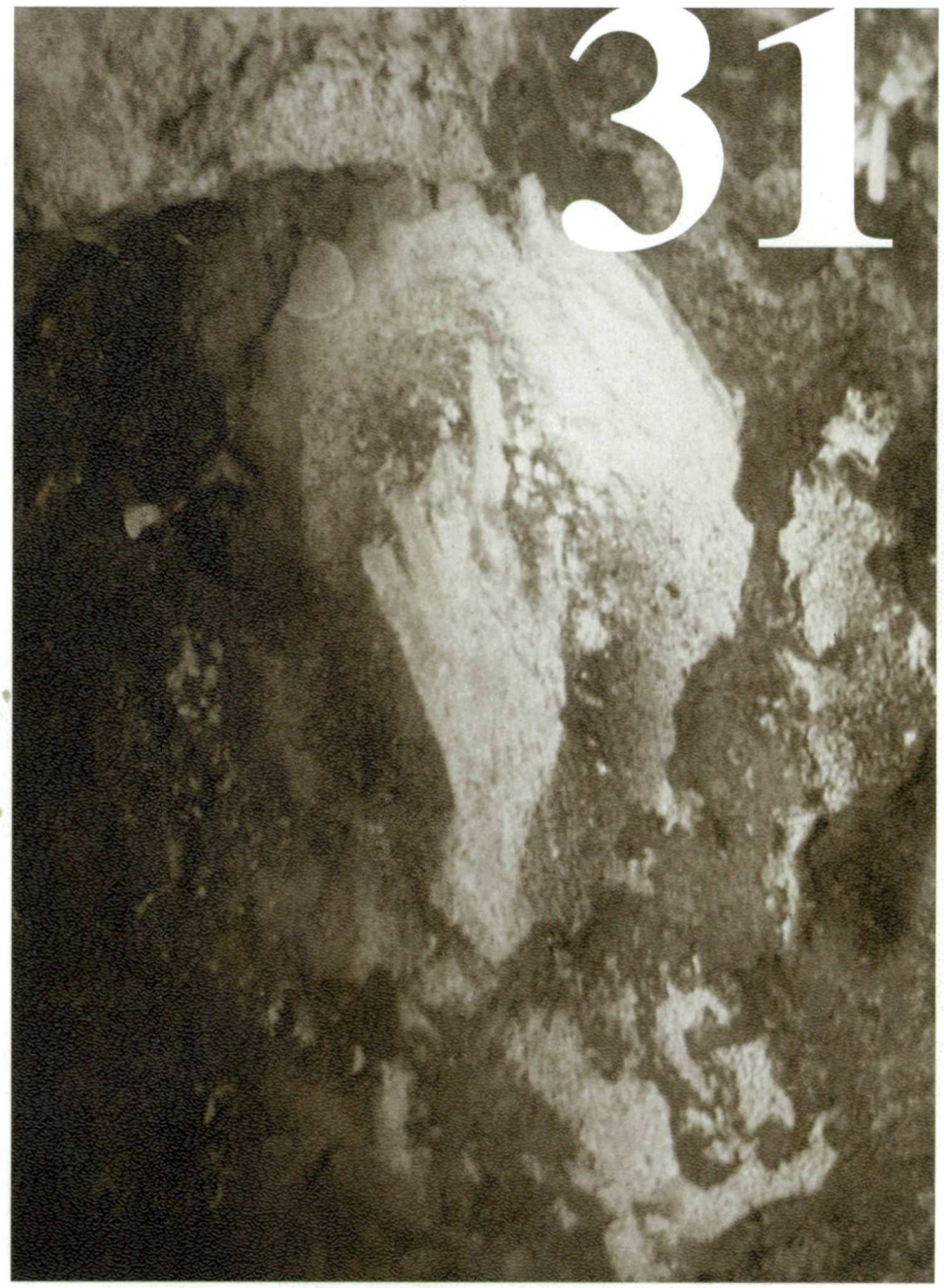
ANALECTA PRAEHISTORICA LEIDENSIA



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HUNTERS OF THE GOLDEN AGE

THE MID UPPER PALAEOLITHIC OF EURASIA 30,000 – 20,000 BP

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contents

Catherine Perlès

28 Greece, 30,000-20,000 bp

The earlier part of the Upper Palaeolithic in Greece (Aurignacian and Gravettian) is characterised by an extreme scarcity of archaeological data. It will be argued here that this situation is not solely due to insufficient research, but that it also reflects very sparse occupations, in an increasingly dry environment.

1. Introduction

The basic problem we were asked to address in this workshop was 'coping with climatic deterioration in the period 30-20 kyr bp'. But even a cursory look at the literature reveals that the data pertaining to the Early and Mid Upper Palaeolithic in Greece are scanty to the point of being almost nonexistent. We are thus faced with a straightforward alternative: is the poverty of the database due to adverse preservation conditions or to research biases? Or is it, more significantly, the result of 'deteriorating climatic conditions' and very sparse human occupation?

However, before this problem is addressed in detail, a presentation of the environmental and archaeological data is necessary, since none have been published in an easily accessible format. In addition, it will soon be apparent that, in Greece, a meaningful approach to the question requires that one considers the late Middle Palaeolithic as well as the early Upper Palaeolithic.

2. Climatic changes and environment, 30-20 kyr bp

2.1 The sources

The most comprehensive environmental data are provided by four pollen cores, taken in three different lakes: Ioannina 1 in Epirus (Bottema 1974, 1979, 1991; van Zeist and Bottema 1982), Ioannina 249 (Tzedakis 1993)[1], Xinias I in Thessaly (Bottema 1979, 1991; van Zeist and Bottema 1982), Tenagi Philippon in Macedonia (Wijmstra 1969; Bottema 1979, 1991; van Zeist and Bottema 1982). By analogy with the above mentioned sequences, the basis of the lake Kopaïs diagram, though not dated, can be broadly attributed to the Late Glacial and added to the list (Turner and Greig 1975; Allen 1986).

Although a broad climatic outline can be drawn, precise correlations between the different cores are rendered difficult by the scarcity of absolute datings and the specificity of each lake's environment: Ioannina and Xinias are both located in mountainous surroundings (respectively at 470 and 500 m a.s.l.), but Ioannina corresponds to the well-watered western side of the Pindus range (present-day mean precipitation of *c.* 1200 mm), whereas Xinias is located on the drier, eastern side, and receives only half this total. Rainfall at Tenagi, in the low-lying Macedonian plain, is comparable to that of Xinia (mean present-day precipitation around 500 mm), whilst Kopaïs, in Boeotia, receives only 300-400 mm of rain annually[2].

The Ioannina data can be extrapolated to the archaeological sites of Epirus, and those of Kopaïs can serve as a basis for the nearby Seïdi rock shelter. On the other hand, there are no diagrams from Southern Greece, where the topographical and hydrometric contexts are very different. The only information that can be gathered for Southern Greece is provided by the macrobotanical and faunal remains from the Franchthi Cave, since no data have been published from the important sequence of Kephalari[3] or from the small Arvenitsa cave, also in the Argolid (Table 1). Finally, important data are awaited from the newly excavated site of Theopetra in Thessaly, but preliminary reports only have been published (Kyparissi-Apostolika 1994, 1999).

2.2 Evidence for climatic change: the pollen diagrams of northern and central Greece

All available pollen diagrams indicate a decrease in tree cover after *c.* 30 kyr bp, which marks the onset of a long period of dry and cool climate.

However, even during the preceding millennia the tree cover was not extensive. The last widespread forests had disappeared from the Ioannina and Xinias areas by *c.* 40 kyr/38 kyr bp (Zone T in Ioannina, V in Xinias) or even earlier in the drier Macedonian plain. From *c.* 38 kyr to *c.* 30 kyr bp important variations of the AP values are recorded in all diagrams, but they seldom reach 50% and more usually lie between 20 and 40%, with a decreasing gradient from west to east. In addition, the tree cover decreases through time: the percentage of the better represented trees, *Pinus* and *Quercus* cf. *cerris*, decreases irregularly from the beginning to the end of the period, when they hardly amount to 10% each. Thus, as early as *c.* 37 kyr bp, all sites were surrounded by a dominant steppe vegetation, characterised by abundant *Artemisia*,

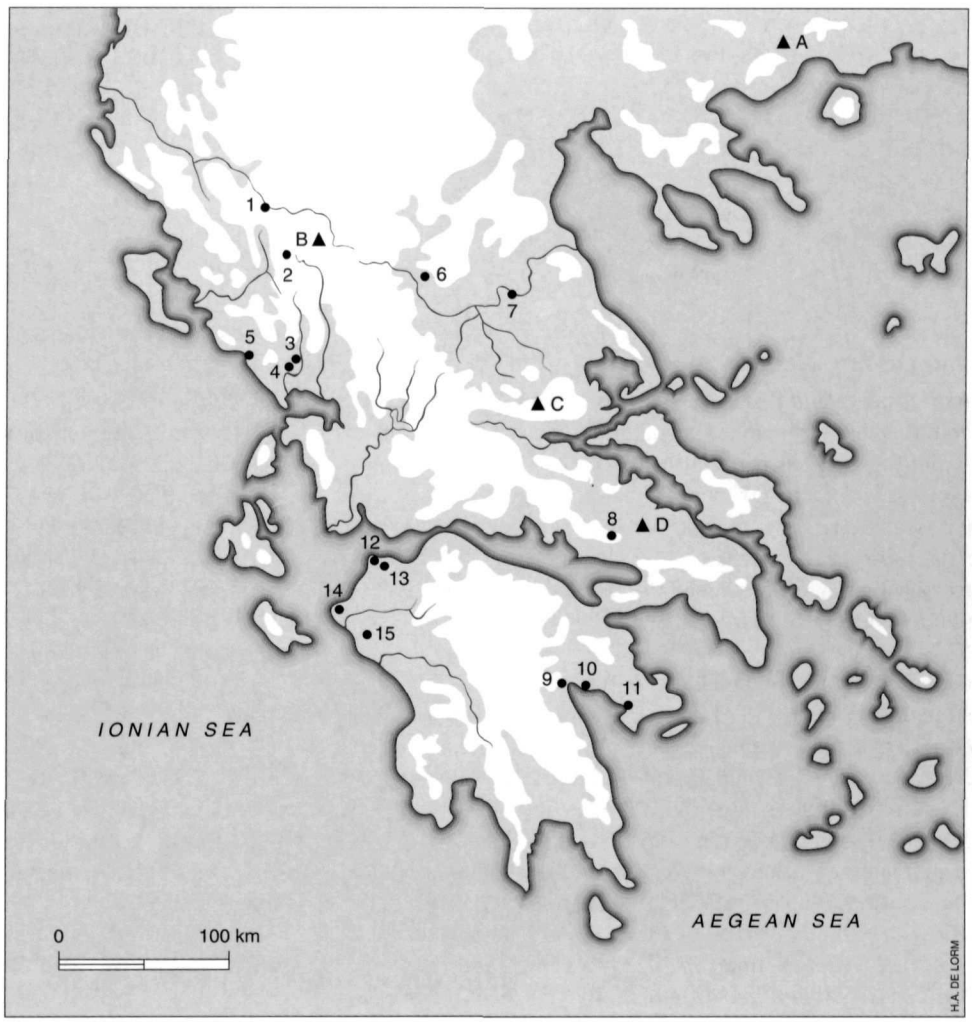

Fig. 1. Map of Greece showing the main locations quoted in the text. Triangles: pollen cores – A. Tenagi Philippon; B. Ioannina; C. Xinias; D. Kopaïs. Dots: archaeological sites – 1. Klithi; 2. Kastritsa; 3. Asprochaliko; 4. Kokkinopilos; 5. Spilaion; 6. Theopetra; 7. Group of sites from the Penios terraces; 8. Seïdi; 9. Kephalari; 10. Arvenitsa; 11. Franchthi; 12. Mavri Myti; 13. Elaiochori; 14. Group of sites from the Kastron region; 15. Group of sites from the Amalias region.

Chenopodiaceae and Gramineae; the steppic character of the vegetation increased through time.

A small 'peak' in AP pollen marks, however, the beginning of our period of study. At about 30 kyr bp, tree pollen again reach a value of *c.* 40% at Ioannina (zone V2), with *Quercus* and *Pinus* dominant, scarce *Ulmus*, *Carpinus betulus*, *Acer* and *Juniperus* at medium elevations, *Abies* and *Fagus* at higher elevations (Bottema 1974). But aside from Ioannina, where the trees that had found refuge on the higher, more watered western slopes of the Pindus could more rapidly recolonise the lower-lying areas, this brief episode of higher precipitation did not radically modify environmental conditions in Greece: at Xinias (zone W3/X) and Tenagi (zone P7?), AP values (mostly *Quercus* and *Pinus*) barely reach 20%.

This 'peak' is markedly asymmetrical, and the tree cover decreased rapidly after *c.* 30,000 bp. Between *c.* 30 and 20 kyr bp, all three regions appear to have been almost devoid of trees (see Fig. 2). The slight variations marked by the pollen diagrams do not significantly alter what Bottema qualified, even at Ioannina, as "extreme conditions" (Bottema 1974). At Ioannina (zone V3-7) the dominance of the steppe vegetation in the valley and on the slopes is indicated by NAP values of 60 to 80%. At higher elevations, deciduous oak, *Acer* and *Juniperus* may have formed open forests or steppe-forests. The very low values of other tree pollen may be taken as an indication of long-distance transport (Bottema 1974). At Xinias (zone X), NAP values are consistently above 80%. *Quercus*, *Pinus* and possibly *Betula* may have been growing in favourable habitats (van Zeist and Bottema 1982), or transported from further away (Bottema 1979). At Tenagi and Kopaïs (Zone K1), the tree cover was even more restricted, with AP values barely reaching 10% (Turner and Greig 1975: 175-176).

Thus, a steppe vegetation with *Artemisia*, Chenopodiaceae, Gramineae and a wide range of herbs constituted the dominant,

if not exclusive vegetation in all four regions. The countryside was open and dry, with trees restricted to small refuges and to the exposed higher slopes of the Western Pindus (Willis 1992a, b, c). AP values tend to decrease slightly between 30 and 28 kyr bp, but they were already so low at the start of the period that this further deterioration could hardly have had any significant impact on animal and human groups. Stability, not change, is what characterises the climate and environment of northern Greece between 30 and 20 kyr bp.

2.3 Faunal data: Northwestern Greece

Theoretically, the faunal sequences from the rock shelters of Asprochaliko and Kastritsa, near Ioannina, should reflect both the long-term environmental changes and the overall stability within our period of study. But Asprochaliko was excavated by E. Higgs more than twenty years ago (Higgs and Vita-Finzi 1966; Higgs 1968), and the stratigraphic notations proved insufficient when the material was revised for publication. So few identifiable specimens could be securely attributed to the Late Middle Palaeolithic ('Micromousterian')[4] and to the Upper Palaeolithic, that it proved impossible to subdivide each period according to the stratigraphy (Bailey *et al.* 1983a). At Kastritsa, on the contrary, faunal remains are listed for each stratum, but the figures are extremely small prior to 20 kyr bp (stratum 9).

In these conditions, the overall ungulate spectrum appears remarkably stable over the *c.* 90 kyr years of the Asprochaliko sequence (Table 2). Long-term climatic trends may, nevertheless, be reflected by the progressive decrease of *Dama* and the increase of *Ibex* from the mousterian to the Upper Palaeolithic strata; this would accord with the decrease in humidity, temperature and tree cover.

Neither species is present at the basis of the Kastritsa sequence, dated to > 22 kyr bp. *Cervus* is heavily dominant, *Equus* and *Bos*, which are absent in the Upper Palaeolithic of Asprochaliko, are here represented by a few bones; conversely, *Capreolus* and *Ibex*, present at Asprochaliko, are absent from strata 9 and 7 at Kastritsa. Hunting specialisation as well as diachronic trends have been suggested to account for these differences (Bailey *et al.* 1983a; Bailey and Gamble 1990). However, the Asprochaliko and Kastritsa faunal assemblages are palimpsests of occupations covering several millennia (more than ten at Asprochaliko): it is thus impossible to establish which faunal changes, if any, occurred between 30 and 20 kyr bp. Nevertheless these data, considered as a whole, suggest important differences with Franchthi and the other Peloponnesian sites.

2.4 Botanical and faunal data from Southern Greece

The environmental conditions in Southern Greece before 30 kyr remain unknown: the Middle Palaeolithic levels at the basis of the Franchthi cave have not been excavated (Perlès 1987), and the long Middle to Upper Palaeolithic sequence from Kephalari is not yet published in any detail. The situation is hardly more satisfactory for the Early Upper Palaeolithic, but the available evidence seems to reflect even drier conditions than in Northern Greece.

No pollen were recovered from the Upper Palaeolithic sequence at Franchthi. Carpological data are rich, but difficult to compare with the pollen data of Northern Greece. The entire time span between *c.* 30 and 20 kyr bp is comprised in Botanical zone I (Hansen 1991), characterised by abundant uncarbonised remains of Boraginaceae (*Buglossoides arvensis* [*Lithospermum arvense*], *Alkanna* sp. and *Anchusa* sp.), none of which appears in the pollen diagrams. Since all three species can be found in steppic environments, a constantly cold, dry climate is inferred. An inversion between the proportions of *Alkanna* and *Buglossoides* allows for a division into two subzones, which correspond to the (undated) limit between lithic phases I and II. A temporal hiatus is probable, but it is not possible to state whether this inversion corresponds to environmental transformations (Hansen 1991: 104). *Juniperus* is dominant in wood charcoals (Hansen 1994: 176), which confirms an open environment, with sparse trees. The presence of many tiny seashells, in particular *Bittium* spp. (Shackleton 1988), probably windblown, also supports the absence of an extensive tree cover.

Unfortunately, the faunal remains corresponding to Botanical zone Ia, i.e. to the earliest Upper Palaeolithic, have not yet been published. The earliest available data (faunal phase A) correspond to Botanical zone Ib and to Lithic phases II and III, i.e. to *c.* 25-20 kyr bp (Table 3). *Equus* cf. *hydruntinus* is the most abundant species in the trench recovery (*c.* 70%); it is accompanied by the ubiquitous *Cervus elaphus* (*c.* 30%), hare and tortoises (and a single bone of *Sus*), but also by abundant lizards and birds and scarce rodents such as *Microtus*, *Mus* and *Spalax* (Payne 1975, 1982). This assemblage suggests again a dry and open environment that did not change significantly during the millennia under consideration. Interestingly, *Equus* cf. *hydruntinus* and *Cervus elaphus* are also well represented in the minute faunal sample from Seïdi in Boeotia and at Kephalari, in natural environments comparable to that of Franchthi (Schmid 1965; Reisch 1976). This probably indicates that *Equus* cf. *hydruntinus*, a species adapted to open and dry steppes (Payne 1975), was more abundant in the plains of Central and Southern Greece (where it may have been the dominant ungulate species) than in the mountains of Northern Greece.

2.5 The potential impact of climatic changes

All available data suggest that environmental changes around 30 kyr bp and between 30 and 20 kyr bp were of limited

Table 1. Main sites and regions quoted in the text.

SITE	REGION	NATURE OF SITE	SEQUENCE
KOKKINOPILOS	Epiros	Open air	Early phase of Upper Pal. ? Backed blades and bladelets; apparently no shouldered points, microburins or geometrics
ASPROCHALIKO	Epiros	Shelter	Middle Palaeolithic (Mousterian and "Micro-mousterian"), Upper Palaeolithic (phase with microgravettes followed by phase with microburins and geometrics), Bronze
KASTRITSA	Epiros	Cave	From the 23rd/22nd mill. to the 14th mill. bp. Phase with backed bladelets, phase with shouldered points, phase with microburins and microgravettes (without geometrics)
KLITHI	Epiros	Shelter	From the 18th to the 11th millennium bp. Archaeological sequence soon to be fully published. Upper levels with backed bladelets and microburins (without geometrics)
KATSIKA	Epiros	Open air	"Long backed blades", backed bladelets. Occupation earlier than the lake's transgression
KONITSA	Epiros	Cave	"Upper Palaeolithic" industry with bladelets (probably backed bladelets) and small endscrapers in brecchiated sediments. No excavations
SPILIAION	Epiros	Open air	Attributed to the Aurignacian
THEOPETRA	Thessaly	Cave	Middle Palaeolithic, Upper Palaeolithic, Mesolithic (burial), Neolithic
Valley of the PENEIOS	Thessaly	Open air	Late Middle Palaeolithic with foliate points and Aurignacian elements
Region of the KOPAÏS lake	Beotia	Caves and shelters	Upper Palaeolithic ? (cf. mentions of what seem to be backed bladelets)
SEÏDI	Beotia	Shelter	Two thick Upper Palaeolithic strata. Carinated endscrapers, shouldered point, gravettes (successive levels not distinguished in the publications). Seemingly no geometrics
ULBRICH	Argolid	Cave	Upper Palaeolithic ("Aurignacian" and "Magdalenian"), Mesolithic ("Azilian" and "Azilo-Tardenoisian"), Neolithic
ARVENITSA	Argolid	Cave	Aurignacian
KEPHALARI	Argolid	Cave	Mousterian, Upper Palaeolithic (strata with gravettes and microgravettes. No details published), Neolithic, Historical
KLISSOURA	Argolid	Shelter	Upper Palaeolithic (Aurignacian, Gravettian), Mesolithic

Table 1. Main sites and regions quoted in the text.

SITE	^{14}C DATES bp	FIELDWORK	MAIN REFERENCES
KOKKINOPILOS	None	S. Dakaris and E. Higgs, 1962	Dakaris *et al.* 1964, Higgs 1968
ASPROCHALIKO	26,600 ± 900 for C.9 or 10 (phase with gravettes)	E. Higgs 1964-1966	Higgs and Vita-Finzi 1966, Higgs 1968, Bailey and Gamble 1990, Bailey *et al.* 1983b, 1992, Huxtable *et al.* 1992, Adam 1989
KASTRITSA	5 dates from 21,800 ± 470 to 13,400 ± 210 BP	E. Higgs 1966-1967	Higgs *et al.* 1967, Higgs 1968, Bailey and Gamble 1990, Bailey *et al.* 1983a, 1983b, 1992, Adam 1989
KLITHI	6 dates, from 17,400 ± 400 at the basis, to 10,420 ± 150 at the top	G.N. Bailey 1984-1988	Bailey 1992, Bailey and Gamble 1990, Bailey (ed.), 1997a and 1997b
KATSIKA	None		Higgs 1965: 368
KONITSA	None		Higgs and Vita-Finzi 1966: 22
SPILIAION	None	Discovered by C. Runnels *et al.* (survey of the Preveza region)	Runnels *et al.* in press
THEOPETRA	Numerous dates from > 34,000 bp to the present	Ongoing excavations by N. Kyparissi-Apostolika	Preliminary reports: Kyparissi-Apostolika 1994, 1999
Valley of the PENEIOS	c. 45,000 à 30,000 bp	Surveys by V.L. Milojcic *et al.* in the 60's, then by C. Runnels *et al.* in the 80's	Milojcic *et al.* 1965, Runnels 1988
Region of the KOPAÏS lake	None	Survey T. Spyropoulos	Preliminary report: Spyropoulos 1973
SEÏDI	None	R. Stampfuss 1941, E. Schmid 1956	Stampfuss 1942, Schmid 1965
ULBRICH	None	A. Markovits, c. 1920	Markovits 1928
ARVENITSA	None	E. Deïlaki	Preliminary report: Protonariou-Deïlaki 1975
KEPHALARI	None	R. Felsch 1972, L. Reisch 1975-1976	Felsch 1973, Reisch 1976, Reisch 1980, Reisch 1982
KLISSOURA	Not yet published	Surveys C. Runnels and B. Wells, c. 1988-1992. Ongoing excavations by J.K. Kozlowki	Koumouzelis *et al.* 1996

Table 1 continued. Main sites and regions quoted in the text.

SITE	REGION	NATURE OF SITE	SEQUENCE
FRANCHTHI	Argolid	Cave	Middle Palaeolithic (unexcavated), Upper Palaeolithic (early and late), Mesolithic, Neolithic, Classical
LOUKAITI	Argolid	Open air	Considered as Upper Palaeolithic
ELAIOCHORI	Achaïa	Open air	"Archaïc Aurignacian" (including a Middle Palaeolithic component)
MAVRI MYTI	Achaïa	Open air	In situ Middle Palaeolithic: Typical Mousterian and numerous pebble tools
Region of AMALIAS	Elis	Open air	Series of loci in alluvial sediments. Middle Palaeolithic and Early Upper Palaeolithic tools, usually found in association
Region of KASTRON	Elis	Open air	Series of loci in alluvial sediments. Middle Palaeolithic and Early Upper Palaeolithic tools, usually found in association

magnitude. Conditions were already extreme in all but the most exposed regions, and climatic deterioration after 30 kyr bp would have mainly restricted the development of trees on the higher mountain slopes. The vegetation in the valleys and plains, already dominated by the *Artemisia* steppe, remained fundamentally unchanged (see pollen diagram from Ioannina I). In spite of a long time gap, there is no faunal turnover at Asprochaliko between the 'Micromousterian' and the Upper Palaeolithic. The shift in hunting strategies was not drastic: the same species are present in both periods[5], and *Cervus* and *Dama* altogether constitute more than 50% of the total assemblage in each case. At Franchthi, the three earliest Upper Palaeolithic phases (lithic phases I to III) are inscribed within one Botanical zone and one Faunal phase only. This comes as a further confirmation of the overall climatic and environmental stability, already indicated by the pollen diagrams.

The real contrast is not here: the most drastic environmental changes had occurred much earlier, around *c.* 40 kyr bp. Before *c.* 40 kyr bp, extensive forests covered all the mountains of Northern Greece, with AP values reaching 90% or more in the well-watered Western Pindus, and 50% in the Eastern Pindus. Interestingly, regional contrasts are revealed even more sharply: in the plain of Drama (Tenagi), the steppe was already the dominant vegetation (Fig. 2). From then on, and until the Tardiglacial, "forests or tree stands decrease or even disappear with the passage of time, sometimes recovering during short fluctuations but on the whole constantly losing terrain" (Bottema 1979: 36).

Consequently, the impact of climatic changes on human settlement and subsistence patterns must be viewed against a wider framework, encompassing the Late Middle Palaeolithic as well as the Early Upper Palaeolithic. In particular, if tree growth was progressively impeded by the lack of precipitation more than by low temperatures, as stated by Bottema (1979), the lack of water may have become a limiting factor to the spread of large mammals and human groups away from permanent lakes or perennial rivers. It may even have been the cause of the disappearance of the Middle Palaeolithic Neanderthal groups, who settled preferentially in territories where water sources were plentiful (Runnels 1995). By *c.* 30 kyr bp, Middle Palaeolithic groups had vanished, and Greece appears to have been quasi-deserted, with only a few aurignacian groups remaining in localised areas. A most fundamental and original feature of the Greek Palaeolithic is, indeed, the drastic decrease in the number of sites from the Middle Palaeolithic to the Aurignacian and the 'Gravettian'.

3. Human occupation: from the Middle Palaeolithic to the early Upper Palaeolithic

3.1 The archaeological sequence: an outline

The archaeological sequence that needs to be considered here can be summarised as follows (Kourtessi-Phillipakis 1986; Perlès 1987; Runnels 1988; Darlas 1994):

– (a) Middle Palaeolithic assemblages are very varied in their composition. Several facies are represented, including chronological and functional ones (Darlas 1994, 1995). Kozlowski (1992) tentatively assigns the lowest occupational level at Asprochaliko, TL dated at *c.* 100 kyr bp (Bailey *et al.* 1992; Huxtable *et al.* 1992), and the industries from Elea in the Peloponnese, to a 'charentoïd' Mousterian. Later Mousterians are generally characterised by Levallois and discoïd cores, Levallois flakes, blades and points, well-made sidescrapers and Mousterian points, scarce Quina retouch. Some, however, include a fair component of tools made on pebbles (Darlas 1994), others, like the 'Micromousterian' from Asprochaliko, presented an original method for the production of triangular flakes (Papaconstantinou 1989).

– (b) These 'typical mousterian' or 'levalloiso-mousterian' industries are succeeded by assemblages containing a mixture of Middle and Upper Palaeolithic (aurignacian)

Table 1 continued. Main sites and regions quoted in the text.

SITE	^{14}C DATES bp	FIELDWORK	MAIN REFERENCES
FRANCHTHI	More than sixty altogether (cf. Jacobsen and Farrand 1987)	T.W. Jacobsen 1967-1978	Hansen 1991, Jacobsen and Farrand 1987, Payne 1975, Perlès 1987, 1990a, Shackleton 1988, van Andel and Sutton 1987, Wilkinson and Duhon 1990
LOUKAITI	None		Bintliff 1977: 236-237 Jacobsen 1976: 78
ELAIOCHORI	None	A. Darlas	Darlas 1989
MAVRI MYTI	None	A. Darlas	Darlas 1995
Region of AMALIAS	None	Surveys A. Leroi-Gourhan, J. and N. Chavaillon, F. Hours, during the 60's	Chavaillon *et al.* 1967, 1969
Region of KASTRON		Surveys A. Leroi-Gourhan, J. and N. Chavaillon, F. Hours, during the 60's	Chavaillon *et al.* 1967, 1969

elements, most often found in fluviatile contexts; they are regularly associated with bifacial foliate points which recall szeletian ones (Runnels 1988: table 1; Darlas 1994).

These 'mixed assemblages', with Middle Palaeolithic components, a rare use of the Levallois technique, bifacial points and/or aurignacian elements, have been found repeatedly in Greece. They are characteristic, for instance, of alluvial deposits in Elid and Achaïa (Chavaillon *et al.* 1967, 1969), in Thessaly (Milojcic *et al.* 1965; Runnels 1988; Runnels and van Andel 1999) and of the various findspots of the Preveza area (Runnels *et al.* 1999). They are also found in the basal Upper Palaeolithic levels (levels 21-26) of Kephalari in the Argolid (Reisch 1980), but contaminations from the underlying mousterian deposits cannot be ruled out. However, the association is too recurrent to be attributed to systematic contaminations. In Thessaly in particular, Runnels and van Andel (1999) underline the fact that the findspots correspond to temporary camps or kill sites on the gravelbars or interfluves of the braided channels of the river, and not to the reworking of material coming from upstream.

Foliate points appear to cover a long time span, and to evolve through time from bipointed to oval-based types. The oldest dated ones go back to 50,000 bp (Pope *et al.* 1984) and might be associated with a 'pure' Middle Palaeolithic component. Most, however, are found in 'transitional' assemblages, containing both Middle and Upper Palaeolithic components. They have been dated in the alluvial sediments of the Peneios (Thessaly) from *c.* 45 to 30 kyr bp (Runnels 1988, 1995).

They may be also occasionally associated with aurignacian industries: Darlas mentions two fragmentary points in the "archaïc Aurignacian" of Elaiochori in Achaïa (Darlas 1994: 323). This industry includes a definite Middle Palaeolithic component (Levallois flakes, flat discoïd cores, sidescrapers), but it is largely overrun by aurignacian elements (endscrapers on blades, carinated endscrapers, dihedral burins and busked burins). Darlas attributes this industry to a late "Transitional" phase (Darlas 1989, 1994). Another possible fragment of a foliate point from an aurignacian context is illustrated in level 23 of Kephalari (Reisch 1980, fig. 26:8).

The varied contexts associated with the foliate points recall the general situation of the 'final micoquian' and 'szeletian' assemblages of Central and Southeastern Europe. In Greece, as elsewhere, it would appear that a variety of 'Late Middle Palaeolithic' or 'transitional' industries covered the time span between 40 and 30 kyr bp. Contacts between Middle Palaeolithic and aurignacian groups are suggested by the presence of typical aurignacian tools[6].

– (c) 'Pure' aurignacian assemblages have yielded no split-based points, but carinated endscrapers, nosed endscrapers, Dufour bladelets, and aurignacian blades are well-represented and typical.

No ^{14}C date from the aurignacian sites or levels has been published so far, and none of the sites that were occupied during the Middle to Upper Palaeolithic transition has yet been published in detail[7]. The aurignacian tools in the Peneios late mousterian assemblages argue in favour of an aurignacian presence between *c.* 40 and 30 kyr bp. At Franchthi the aurignacian level rested on an ash level, identified as the tephra Y-5 of the Adriatic cores; curiously, the widely differing dates suggested for this tephra vary within the same time range: 40 to 25 kyr bp (Vitaliano *et al.* 1981). Thus, the Aurignacian from Franchthi may also be older than 30 kyr bp, a hypothesis that would explain the

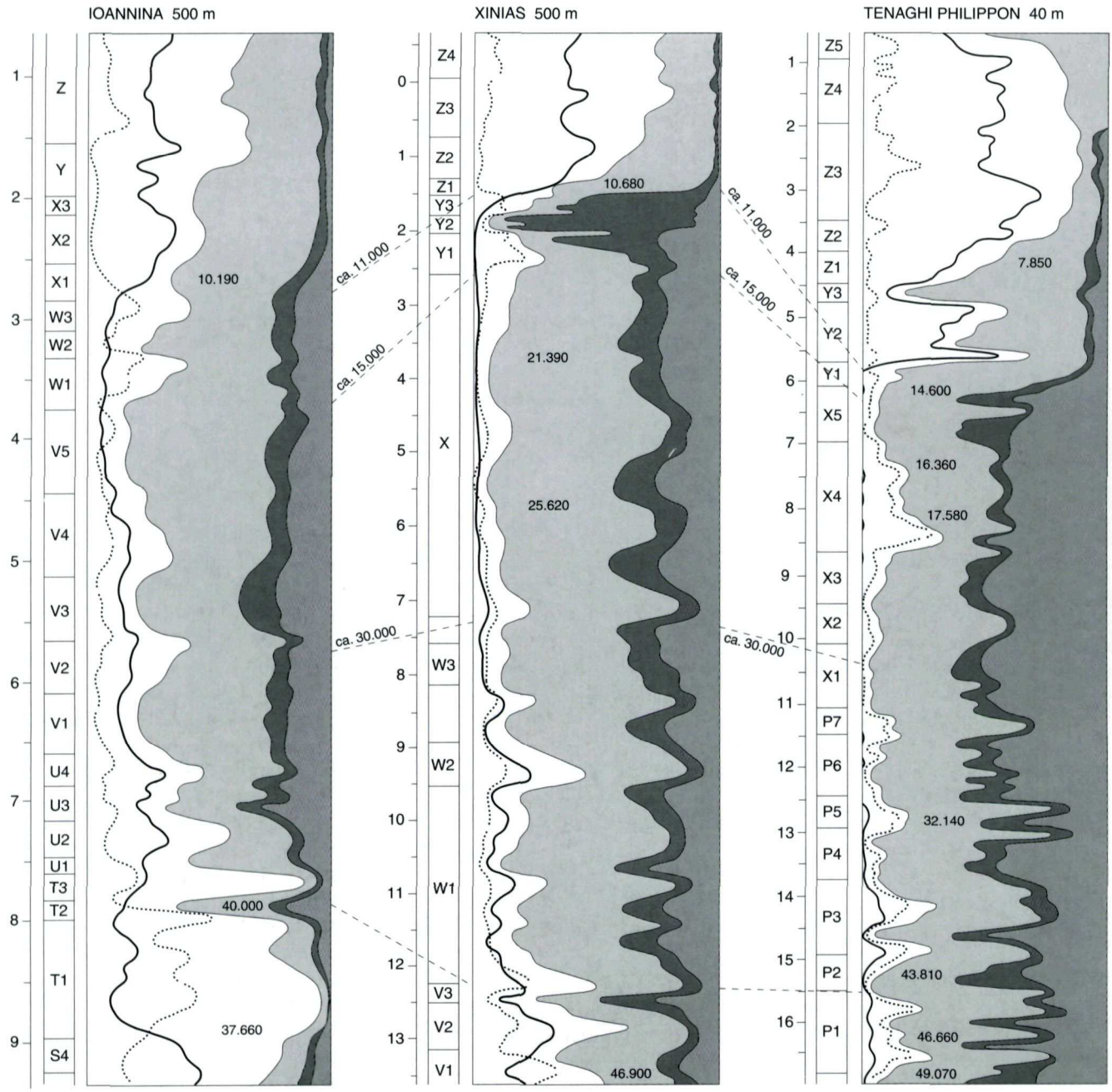

Fig. 2. Schematic pollen diagrams from Ioannina, Xinias and Tenagi Philippon, showing, from left to right, the curves of oak (thick black line) and pine (dotted line), the AP/NAP ratio (thin black line), *Artemisia* (light grey area), Chenopodiaceae (dark grey area) and other herbaceous pollens (medium grey area) (after Bottema 1979).

botanical changes between the aurignacian and the earliest 'gravettian' levels[8].

– (d) 'Gravettian' industries succeed the Aurignacian, with assemblages characterised by abundant backed bladelets of small size. These comprise straight-sided backed bladelets, bipointed double-backed bladelets, curved-backed pointed bladelets and microgravettes (see details, *infra*). Real Gravette points are almost nonexistent. The oldest available ^{14}C date is around 26 kyr bp, at Asprochaliko (Table 4). Assemblages dominated by backed bladelets and backed

Table 2. Ungulate remains at Asprochaliko and Kastritsa in the Middle and early Upper Palaeolithic in numbers of identified specimen (after Bailey *et al.* 1983a).

	Asprochaliko stratum 5 (Mousterian)	Asprochaliko stratum 3 (Micro-mousterian	Asprochaliko stratum 1 (Upper Palaeolithic)	Kastritsa stratum 9 (> 20,000)	Kastritsa stratum 7 (c. 20,000 bp)
Cervus	128	144	38	58	194
Dama	44	170	15	0	0
Capreolus	18	34	7	0	0
Bos	6	11	0	7	6
Ibex	44	59	36	0	0
Equus	0	0	0	4	3
Sus	4	14	4	2	1
TOTAL	244	432	100	71	204

Table 3. Synthetic data on the earlier Upper Palaeolithic at Franchthi.

PERIOD	^{14}C bp	BOTAN. ZONE	BOTANICAL SPECIES	FAUN. PHASE	FAUNAL SPECIES	MARINE MOLLUSCAN ZONATION	MARINE MOLLUSCS	TERRESTRIAL MOLLUSCS	LITHIC PHASE
Probably 30,000 bp or older		Ia	*Alkanna* sp., *Lithospermum arvense*, *Anchusa* sp. (uncarbonised seeds)		Data not available	0	Small species such as cf. *Bittium* sp. (natural deposition)	A few *Helix* sp. Pupillidae and *Helicella* sp.	I
c. 23rd millennium bp	22,330±127 0 (I-6140) 21,480±350 (P-2233)	Ib	*Alkanna* sp., *Lithospermum arvense*, *Anchusa* sp. (uncarbonised seeds)	A	Equids (*Equus* cf. *hydruntinus*) and Cervids (*Cervus*), plus tortoises, hares, lizards, birds, rare Microtini, Murinae and Cricetini	0	idem	*Helix* sp., *Helicella* sp. and Pupillidae, more abundant	II
c. 20/22nd millennium bp		Ib	*Alkanna* sp., *Lithospermum arvense*, *Anchusa* sp. (uncarbonised seeds)	A	idem	0	idem	idem	III
Hiatus									

points will last until the end of the Upper Palaeolithic, with the later addition of shouldered points and geometrics (Perlès 1987; Adam 1989; Kozlowski 1992; Roubet 1997).

3.2 Distribution of sites and density of occupation

Considering the traditional lack of interest for palaeolithic research in Greece[9], the abundance of Middle Palaeolithic remains is all the more striking: Middle Palaeolithic sites, and even more so Middle Palaeolithic findspots (including 'late mousterian' and/or 'transitional' industries) can be found in large numbers over wide parts of Greece. The *c.* 50 published excavations and surface findspots, most recently listed by Darlas 1994, give only a very partial image of the numerous Middle Palaeolithic tools visible on the surface or in private collections. Significantly, recent surveys are adding a whole new series of Middle Palaeolithic sites (see Runnels 1988, 1995; Darlas 1989, 1995; Papaconstantinou 1991; Bailey *et al.* 1999). These confirm the importance of water for Middle Palaeolithic groups (Bailey *et al.* 1983a and b; Rolland 1985, 1988; Runnels 1988): most of the sites are concentrated along the main rivers and lakes (the Peneios in Thessaly, the Alpheios and Peneios in Elid, the lakes and rivers of Epirus and Aetolo-Akaranania) or on the coastal plains of Northwestern Greece.

However, systematic surveys (led by the same scholars) also reveal the contrasts between the well-watered Northwestern Greece and the more arid Southeastern Greece: one site and a dozen tools only were identified during the Berbati survey in the Argolid (60 km^2), whereas 20 sites, some of which extremely rich, were discovered around Preveza (Wells *et al.* 1990; Runnels 1995; Runnels *et al.* 1999).

'Pure' aurignacian assemblages, by contrast, are much rarer. Their geographic distribution also differs, since several sites are precisely located in the Argolid: Franchthi[10], Arvenitsa[11], Klissoura[12], and probably Kephalari[13] and Ulbrich[14]. The high proportion of caves is another contrast between Late Middle Palaeolithic and aurignacian sites. Aside from the above mentioned site of Elaiochori in Achaïa, which may date to a very early phase of the Aurignacian, the only possible open air settlement was recently discovered by an American survey in the region of Preveza, at Spilaion (Runnels *et al.* 1999)[15]. Finally, a few pieces characteristic of the Aurignacian were found in the lowest Upper Palaeolithic level from Asprochaliko (Adam 1989), suggesting that a brief aurignacian occupation may have taken place. Even with the addition of these new sites, the total remains much lower than for 'late mousterian' or 'transitional' sites. This difference is all the more significant as the Aurignacian must, logically, have lasted several millennia (see discussion *supra*).

On the whole, aurignacian occupation appears to have been very sparse and geographically restricted. Many regions exploited by Late Middle Palaeolithic groups are devoid of 'pure' aurignacian settlement: Thessaly[16], Elid, the Southern Peloponnese. On the other hand, the dry conditions of the Argolid (and possibly Boeotia) do not seem to have been an obstacle to a comparatively 'dense' settlement.

Finally, at the end of our chronological spectrum, four sites only can be allocated, without doubt, to the period between *c.* 26,000 and 20,000 bp: Asprochaliko and Kastritsa in Epirus, Theopetra in Thessaly and Franchthi in the Argolid. All four sites were dated by ^{14}C (Table 4) and yielded industries dominated by backed bladelets and backed points (including microgravettes). In addition, half a dozen sites (or levels), rich in backed bladelets and points, may also have been occupied by then (Kokkinopilos and Katsika in Epirus, Seïdi in Boeotia, Ulbrich and Kephalari in the Argolid) but, given the scanty typological data and the absence of absolute chronology, they could equally well be dated between 20,000 and 15,000 bp. It should be noted that all these sites are caves, and that no 'Gravettian' is known from open air sites[17].

A sharp decrease in the number of sites would thus correspond to the onset of the very dry and cold period which lasted between *c.* 30 and 20 kyr bp. It would, at the same time, correspond to the disappearance of the last sites that can be attributed to the Neanderthals. Since the Aurignacian remains undated, it is actually possible that it predates 30 kyr bp, and that this trend started earlier. No level has been radiocarbon dated between 30 and 26 kyr bp, so that it is even possible to consider an occupation gap during this period, as appears to be the case in Italy (Mussi, this volume). On the other hand, the sample of sites and radiocarbon dates is too small to be considered reliable, and the possibility of sample biases must be discussed before Greece should be considered as a near human desert.

3.3 The Early Upper Palaeolithic vanishing occupation: sample biases?

Three factors may, in theory, account for the scarcity of sites between *c.* 30 and 20 kyr bp: erosion, coastal submersion and poor recovery during surveys.

Especially along the wide coastal plains of Northwestern Greece, eustatic rise may have led to the submersion of coastal sites. On the other hand, the prevailing dry conditions were not, *a priori*, favourable for a widespread phase of erosional activity and massive destruction or obliteration of inland sites. That no such erosion occurred is confirmed by geological studies: no alluvial phase is recorded in Thessaly between *c.* 27 kyr and *c.* 10 kyr bp,

Table 4. ^{14}C dates for the period c. 30,000 to 20,000 bp in Greece.

SITE	LEVEL	INDUSTRY	LAB. REF.	SAMPLE	DATE bp	COMMENT	BIBLIOGRAPHY
Theopetra	Z7-S13: 3.15-3.30 m		DEM-374		33,231±1820	Context not yet published	Kyparissi, in press
Theopetra	T10: 2.74 m		DEM-247		33,086±1573	Context not yet published	Kyparissi, in press
Theopetra	T10-I10: 2.63-3.00 m		DEM-223		30,023±876	Context not yet published	Kyparissi, in press
Theopetra	Z8: 3.02-3.23 m		DEM-61		25,354±2132	Context not yet published	Kyparissi, in press
Asprochaliko	Level 10, stratum 1	Unilat. and bilat. backed bladelets, microgravettes	I-1965		26,000 +900 -800	Also published as level 9	Higgs and Vita-Finzi 1968, Higgs 1968, Bailey *et al.* 1983
Franchthi	H1A-219, lithic phase II	Straight backed bladelets and pointed double-backed bladelets	I-6140	Wood charcoal	22,330±1270		Jacobsen and Farrand 1987
Franchthi	H1B-191-192, lithic phase II	idem	P-2233	Carbonized matter	21,480±350		Jacobsen and Farrand 1987
Kastritsa	layer 21, str. 9	Unilat. backed bladelets	I-2467		21,800±470		Bailey *et al.* 1983
Kastritsa	layer 21, str. 9	idem	I-2468		20,200±480		Bailey *et al.* 1983
Kastritsa	layer 20, str. 7	idem	I-2466		20,800±810		Bailey *et al.* 1983

and the latter is of very limited extension (Demitrack 1986; van Andel *et al.* 1990). In the Argolid, the last extensive phase of alluviation ended before 32 kyr bp, and a stable landscape persisted until about 4500 bp (Pope *et al.* 1984). After extensive archaeological and geological work in Thessaly, Epirus and the Argolid, Runnels and van Andel are quite clear in their conclusions: the drastic contrast in the number of Middle and Upper Palaeolithic findspots is not related to the erosion of contemporary sediments or their burial under younger sediments. They conclude in favour of a definite occupational hiatus in Thessaly (Runnels and van Andel 1999) and suggest that, in the Preveza area, "it appears that the use of polje sites for encampments was abandoned in the Later Pleistocene, during the high glacial, perhaps because of a return to a sharply colder and drier climate" (Runnels *et al.* 1999: 10). Similarly, in the Argolid, they estimate that the potential loss of sites under recent alluvium would amount to less than 8% of the present land surface (Jameson *et al.* 1994: 243). Although idiosyncratic factors may have entailed local erosion, especially in caves, this cannot have been sufficiently widespread to account for the scarcity of inland aurignacian and gravettian sites.

Poor recovery during surface surveys must also be considered, since the small backed blade industries of the Upper Palaeolithic might be more difficult to spot than the larger Middle Palaeolithic ones. Nevertheless Runnels in particular conducted very thorough surveys along the Peneios river in Thessaly and on its Old Terrace (*Niederterrasse*), and carefully searched for evidence of Upper Palaeolithic industries. Although he identified 32 palaeolithic findspots, none could be attributed to the Upper Palaeolithic *sensu stricto* and not a single backed bladelet or backed point was discovered (Runnels 1988). In the Preveza region, Runnels and his colleagues found one possible aurignacian site (as opposed to 20 mousterian ones) but no Gravettian, and they consider it unlikely that this absence is the result of inexperience on the part of fieldwalkers (Runnels *et al.* 1999: 10). A similar situation obtained in Elid and Achaïa, where the French surveys yielded only one backed bladelet and one backed point, whereas Middle

Palaeolithic findspots (sometimes including aurignacian types) amounted to more than 40 (Chavaillon *et al.* 1967, 1969).

In these inland regions at least, the scarcity or absence of Upper Palaeolithic sites, from *c.* 27 kyr bp on, is real. Often this situation lasted until the advent of the Neolithic (Perlès 1995): the inner alluvial basins were deserted by palaeolithic hunter-gatherers, whose settlements were found mostly in the mountains and hillsides. But these sparse occupations cannot, as we shall discuss now, have represented the full territorial range of these hunters. Since the sea level was drastically lower at the time, liberating wide coastal plains (especially in Northwest Greece), there remains the possibility that the densest occupation occurred in the now submerged coastal areas.

3.4 Territorial exploitation

This possibility leads us to consider changes in settlement patterns from another point of view, territorial exploitation. Middle Palaeolithic sites and 'transitional' ones tended to cluster in well-watered low-altitude and coastal areas (Rolland 1988; Runnels 1995)[18]. Upper Palaeolithic sites, by contrast, are more evenly distributed over the wetter and drier areas of Greece[19], but they desert the large alluvial basins. In Epirus, sites spread further inland in mountainous environments, although the highest zones will only be occupied after the Pleniglacial (Bailey *et al.* 1984, 1986a and b, 1999).

This apparent shift in settlement patterns is linked by Rolland (1985, 1988) and by Bailey *et al.* (1983a and b; Bailey and Gamble 1990) to a transformation in subsistence strategies. Small, mobile, Middle Palaeolithic hunter-gatherer residential units would have exploited a diversified and rich biotope from a restricted home range, occasionally intercepting migrating herds, but without important seasonal migrations of the human groups themselves. According to Runnels (1995), the distribution of late mousterian sites in the Argolid indicates some form of logistical planning, with specialised stone working camps and hunting stands within a day's walk of the base camps (caves like Franchthi and Kephalari, for instance), and isolated lost weapons on elevated grounds further away.

In contrast, the Epirotes Upper Palaeolithic groups, after 30 kyr bp, would have practised a seasonal migration between coastal and inland sites, respectively occupied during the winter and summer seasons (Bailey and Gamble 1990). Asprochaliko, as already suggested by Higgs (Higgs *et al.* 1967), would have been used during the spring and autumn deer migrations from the coasts to the mountains. Its main interest, however, would have resided in the control of an isolated grazing area to the north of the site where the herds could be diverted (Bailey and Gamble 1990: 161). In parallel, ibexes could have been intercepted during their vertical movements between highlands and lowlands. Inland sites, such as Kastritsa and Klithi, would have constituted specialised hunting stations, exploited during the summer, each concentrating on the most abundant species locally available. But the focus of activities would have remained centred on lowland coastal sites, as yet to be discovered or submerged under water (*ibid*: 162).

There is little evidence, however, to support this model for the early phases of the Upper Palaeolithic. Hunting specialisation is suggested by the differences in the faunal spectra from Asprochaliko and Kastritsa and by the strong predominance of *Cervus* at Kastritsa. The predominance of two large ungulate species at Franchthi (*Equus* and *Cervus*) may also result from hunting specialisation[20]. On the other hand, Klithi and the other high-altitude specialised hunting stations were not yet occupied, the Upper Palaeolithic faunal spectrum from Asprochaliko is hardly less diversified than the 'micromousterian' one (five species versus six) and it is not more specialised in terms of species proportions. In addition, it appears difficult to reconstruct subsistence patterns and territorial exploitation when the samples from each site or level are so extremely small.

The poverty of artefactual and faunal remains *is indeed the main, and probably the most significant characteristic of all sites* for which information is available. The whole of stratum 9 at Kastritsa yielded only 71 identified faunal specimens and 28 tools (squares R2, R4 and R5, Adam 1989)[21]. Level 10 at Asprochaliko was 'richer', but the 1335 stone fragments listed in Bailey *et al.* (1983a: table 10) comprised only 47 retouched tools (square R2, Adam 1989: 78). The same situation obtains at Franchthi: 30 retouched tools in Phase I, 138 in phase II and 52 in phase III, associated with scant faunal remains. The early Upper Palaeolithic levels at Kephalari are also very poor (Reisch 1980), while fewer than 50 faunal remains were identified from Seïdi (Stampfuss 1942); during her subsequent excavations at Seïdi, Schmid recovered only *c.* 650 stone pieces in a sounding of 12 square metres and more than 1.50 m deep (Schmid 1965). At Franchthi at least the sediments were water-sieved and dry-sorted, so that the meagreness of the industry is not the result of poor excavations. In addition, in sites such as Franchthi, Kastritsa and Asprochaliko, there is a sharp contrast in the density of material before and after 20,000 bp (or, more accurately, 15/16 kyr bp). The small samples are not merely an effect of smaller excavated areas at the bottom of the trenches, and there is little doubt that extremely sparse occupations characterise all the sites presently known during the period 30-20 kyr bp. Each of the first three lithic 'phases' at Franchthi, for instance, covers a depth of 50 to 80 cm which might represent, according to Farrand's estimates of the rate of sedimentation (Farrand

1993), a duration of about 5 to 10 centuries. Accordingly, the number of discarded artefacts would not be above 10 to 20 pieces a century in the excavated area. As a further confirmation of the low intensity of activity, one can note that no excavation unit (of a few centimetres deep each) has yielded more than 20 lithic artefacts (Perlès 1987).

The nature of these occupations is best illustrated at Franchthi, where, in lithic phases II and III, backed bladelets and points represent 75% and 79% of the total assemblage. In contrast with the following periods, no molluscs were collected, no fish was brought back to the cave and there is no evidence of plant gathering: plant remains are mostly uncarbonised and of natural origins. This, linked with predominance of two large animal species and the very small number of bones, suggests a hunting station with very brief, discontinuous occupations. The activities would have been focused around the treatment of the carcasses and the maintenance of the hunting equipment. The same picture probably holds true for the other rock shelters and caves[22], where backed bladelets and points must be severely underrepresented in the absence of water-sieving (or of any kind of sieving). At Kastritsa, the absence of bone tools and burins in stratum 9 contrasts with what obtains in levels 1-5 and may be taken as a further confirmation of the specialised nature of the occupation[23] (Bailey *et al.* 1983a, table 10).

Thus, as Bailey and Gamble (1990) underlined, excavated sites cannot represent the full range of settlements and activities of hunter groups in Greece between 30 and 20 kyr bp. Whether these specialised activity camps are related to larger settlements in the now submerged coastal areas, or whether the groups were constantly moving around from site to site is difficult to state. Given the dryness of the climate and the nature of the steppe, it may well have proven difficult to settle for several weeks or months in the same location. But, even thus, a site such as Franchthi appears to be too specialised (and lacking in domestic equipment) to represent the full range of tasks and activities of a mobile group. The fact that all presently-known sites are rock shelters or caves (often of small size) also points to their specialised nature.

This appears to have held true throughout the ten millennia between 30 and 20 kyr bp. A most remarkable feature of these sites, so far as the evidence goes, is how little change there is in terms of intensity of occupation, nature of occupation and activities. Even if, as will now be shown through Franchthi, technical or stylistic transformations did occur in the lithic assemblages, the latter cannot be related to changes in the function of the sites.

4. Cultural data and cultural change

The specialised nature of the excavated sites precludes a fair assessment of cultural changes during the 30-20 kyr bp period. No bone tools (except for an odd point at Kastritsa), and, to my knowledge, no element of mobile art or ornaments[24] can be attributed with any certainty to the levels between 30 and 20 kyr bp.

No clear patterning emerges from the 30-20 kyr bp lithic assemblages at Asprochaliko and Kastritsa, which appear to include both aurignacian and gravettian elements (Table 5). The succession is clearer at Franchthi (Table 6), where three lithic phases can be recognised: (a) an aurignacian phase (phase I), which, it will be recalled, can be dated anything between 26 and 40 kyr bp. Though the sample of tools is extremely small (30 retouched pieces), the assemblage is characteristic: besides notches and denticulates, it includes characteristic carinated and nosed endscrapers as well as the corresponding twisted bladelets. Phase II, which was dated to 21,480 ± 350 and 22,330 ± 1270 bp, is dominated by single-backed, obtuse bladelets (64% on a total of 138 retouched pieces), followed by double-backed, pointed bladelets (12%). Truncated pieces, endscrapers, notches and denticulates are all scarce. Phase III, which was not radiocarbon dated but appears to be in direct stratigraphic continuity with phase II, only differs from the preceding one by the replacement of the long double-backed pointed bladelets by short, single-backed curved pointed bladelets. No real 'micrograveTte' or Vachon point was found at Franchthi. Though the total number of tools is smaller than in phase II, the percentage of backed elements remains remarkably stable (79%).

The extent to which this typological evolution, which differs in details from that of Temnata Cave, for instance (Kozlowski *et al.* 1992) or of Italy (Mussi, this volume), can be generalised to the whole of Greece is not known so far. In addition, at Franchthi at least, there is no indication that changes in the lithic assemblage can be directly related to environmental or economic transformations. They are better accounted for by idiosyncratic transformations of the hunting equipment. Similarly, the absence of mobile art and the scarcity of bone tools is a general phenomenon in the Upper Palaeolithic of Greece, that does not appear to be related to specific environments or to a given category of sites. Even when the site's occupation shifted to a more residential pattern at Franchthi, during the Late Upper Palaeolithic (Perlès 1987, 1999), no element of mobile art or bone tools was recovered[25].

5. Conclusions

All available data, whether coming from pollen cores, macrobotanical remains or faunal remains, point to a long period of environmental stability between *c.* 30 and 20 kyr bp. There are no 'deteriorating climatic conditions' of any significant scale at the time: the major episodes of climatic deterioration had taken place long before, and the trend towards a progressively colder and drier climate had started

Table 5. Stone tools from the early Upper Palaeolithic levels at Kastritsa and Asprochaliko (after Adam 1989).

TYPE	ASPROCHALIKO LEVEL 10, R2	KASTRITSA STR. 9, R4	KASTRITSA STR. 9, R2	KASTRITSA STR. 9, R5
Simple endscraper	4		1	
Atypical endscraper			1	1
Double endscraper	2			
Endscraper on retouched blade or flake	2	1	3	
Endscraper/truncation			1	
Bec			1	
Bitruncated piece		1		
Truncated flake or blade			2	
Truncated bladelet	1	2		
Micrograveltte	2			
Plain unilateral backed bladelet	5	1	2	
Unilateral backed bladelet with opposed retouch	4			
Bilateral backed bladelet, plain	5			
Backed bladelet with inversely retouched end		1		
Truncated blacked bladelet	4		1	
Piece with continuous unilateral retouch	1		2	
Aurignacian blade	1		2	
Dufour bladelet	2			
Notched piece	1		1	
Notched bladelet			1	
Bladelet with semi-abrupt retouch	5			
Sidescraper	5		1	1
Totally or partially retouched piece	1	1		
TOTAL	47	7	19	2

some ten millennia earlier. Conditions were already extreme just after 30 kyr bp (when a minor amelioration is perceptible), and the small fluctuations in the representation of the trees cannot have had any perceptible impact in the widely open *Artemisia* steppe.

These steppes were exploited by groups of hunters, who preyed on deer and ibexes in the mountains of the North, deer and *Equus* cf. *hydruntinus* in the lower plains and hills of Central and Southern Greece. They used to stop briefly in hunting stations, leaving behind a few bones, tools and weapons (backed bladelets and points). These hunting stations are, apparently, all that was recovered from these aurignacian and gravettian hunter-gatherers. They are few in number, and, even more so, poor in remains. Recently discovered open air aurignacian sites may represent the other end of the functional spectrum, i.e. richer and more diversified residential camps. But these sites are as yet undated, and could easily pre-date the period under consideration. In the latter case, they would fit well in the general pattern of more numerous and richer occupations prior to 30 kyr bp.

The present picture, albeit based on drastically limited data, shows that the 30-20 kyr bp period is indeed

Table 6. Typological composition of the early Upper Palaeolithic industries from Franchthi (after Perlès 1987).

	LITHIC PHASE I	LITHIC PHASE II	LITHIC PHASE III
Nosed endscrapers	1		
Carinated endscrapers	5		
Steep-front endscrapers	4		
Endscrapers on blades		2	
Simple endscrapers on flakes		3	4
Notches	7	5	-
Denticulates	4	1	-
Continuous lateral retouch	4	9	3
Fine abrupt retouch	1		
Proximal truncations on flakes		4	1
Truncated bladelets	1	4	1
Mesial or prox. fragments of single backed bladelets		42	16
Straight single backed bladelets		40	18
Curved, pointed, single backed bladelets		3	7
Truncated backed bladelets		2	
Mesial or prox. fragment of double backed bladelets		9	
Pointed double backed bladelets		7	
Backed flakes		2	
Unidentified backed fragments		2	2
Geometrics		1	
Burins		1	
Becs	2		
Splintered pieces	1		
Varia		1	
TOTAL	30	138	52
Number of typological group	6	9	4

characterised by the diminution in the number of sites and in the density of their occupation. The limitation in the database is the most characteristic feature of the period. Sites were far more numerous in the Early and Late Middle Palaeolithic, and even in the scarce sites of the Tardiglacial, the density of occupation was substantially higher.

Does this imply that Greece was depopulated as a consequence of climatic changes? Probably yes, but certainly not to the extent suggested by the presently available database.

The onset of this period apparently corresponds with the disappearance of the last Neanderthal groups in Greece. If, as suggested by various authors, the Neanderthals were attracted by well-watered environments, the increasing dryness after 30 kyr bp may have had direct bearings on their disappearance. But the striking phenomenon is that in many regions of Greece, they were *not* replaced by Upper Palaeolithic groups. Large areas of Greece appear to have remained unexploited and unpopulated until the Neolithic, and the overall Upper Palaeolithic population in Greece seems to have remained very low.

On the other hand, Greece never seems to have been completely deserted. Minimal breeding populations had maintained themselves in Epirus, Thessaly, Central Greece and the Peloponnese. Obviously, the number of sites presently known is far below the number of sites that such populations must have left behind. It will be recalled that, if Bailey's, Rolland's and Runnel's hypotheses are right, now-submerged coastal sites would have been the most important foci of activities during the Upper Palaeolithic. Whether

more important sites are indeed to be found in coastal areas, rather than inland, is impossible to assess. Let us note, in favour of inland sites[26], that I know of no remains of coastal origin in any of these sites.

But it is difficult to escape the conclusion that the progressively drier environment limited the density and spread of animal and human populations. This situation, which started around 40 kyr bp and culminated after 30,000 bp, lasted until the end of the Pleniglacial. It was probably reinforced by the relative isolation of Greece, where lithic assemblages demonstrate many idiosyncratic features. There is no evidence of close contacts with the nearby Southeast Balkans, and even less of influx of populations. Even the milder climate of the Tardiglacial and Early Holocene did not lead to a rapid increase of the human population, and it is not until migrant colonists arrived, at the beginning of the Neolithic, that the trend was drastically reversed.

Note: This synthesis was elaborated before any data were available on the ongoing excavations at Klissoura Cave (Argolid). A preliminary report has been published since on this sequence of major importance, that includes thick EUP deposits (see Kouzoumelis *et al.* 1996). The inclusion of those preliminary data, which so far do not seem to contradict the general picture drawn here, would have required a substantial revision of the text and tables. The latter did not seem justified, since further reports will probably render a synthesis based on the presently available data rapidly obsolete.

notes

1 This extremely long and important sequence has only been presented in a preliminary report.

2 Greig and Turner 1974. This figure seems more plausible than the figure of 500-800 mm published in Turner and Greig 1975.

3 The faunal data, in particular, have not yet been published according to the stratigraphy.

4 For a discussion of the notion of 'Micromousterian' at Asprochaliko, see Papaconstantinou 1989.

5 With the exception of *Bos*, but it amounted to 3% only of the 'Micromousterian' assemblage.

6 This is again a typical situation in Central and Southeastern Europe (Boëda, oral comm.). For a discussion of 'acculturation' in the Middle/Upper Palaeolithic transition, see Perlès 1990b.

7 The forthcoming publication of Theopetra may thus be of utmost importance.

8 On the other hand, the absence of sedimentological change can be taken to support a late dating.

9 A trend which has fortunately been recently reversed, as demonstrated by the success and quality of the First International Conference on the Greek Palaeolithic, organised at Ioannina in September 1994 (Bailey *et al.* 1999).

10 Although a few, usually patinated, Middle Palaeolithic flakes have been found in the Upper Palaeolithic levels of Franchthi, these are clearly intrusive and not especially associated with the aurignacian levels (Perlès 1987, *contra* Runnels 1988).

11 There is only a very brief preliminary report on this site (Protonariou-Deïlaki 1975), but the material exhibited at the Museum of Nafplion appears to be Aurignacian.

12 Several stratified aurignacian levels have recently been reported from the ongoing excavation of Klissoura, under the direction of J.K. Kozlowski. No detailed information was available to the author when this paper was sent to press.

13 If the presence of Middle Palaeolithic elements is due to contaminations, as I suspect.

14 Where Markovits (1928) specifically mentioned some "Aurignacian".

15 The industry has not yet been described in detail, and the attribution is only given by the authors as provisional.

16 Unless there is an aurignacian level at Theopetra.

17 A very rich "Upper Palaeolithic" site was discovered near Mavrommati during surveys in Boeotia, but no details on the industry were published (Bintliff and Snodgrass 1985: 137). Similarly, it seems that industries with backed bladelets were discovered during test excavations in caves and rock shelters of Boeotia (Spyropoulos 1973). It is thus probable that the Seïdi cave was isolated, but the exact period of occupation of these other sites cannot be ascertained.

18 According to Runnels (1988) the older Middle Palaeolithic sites were concentrated in the better watered Western Greece; penetration east of the Pindus and in southern Greece would have occurred only after 50,000 bp, an extension which may have been required by the contraction of the coastal plains during OIS 3. The recent discovery of Middle Palaeolithic artefacts in eastern Macedonia or in Messenia, as well as unpublished artefacts from Attica, shows, however, that this regional distribution may be an artefact of research.

19 Maybe because the difference was less pronounced at that time?

20 But it may also reflect their relative abundance compared with other species.

21 Bailey *et al.* indicate much more abundant stone artefacts in stratum 9 at Kastritsa (see Bailey *et al.* 1983a, table 10) but their counts do not correspond to Adam's detailed study (1989) and were presumably done before the natural debris, dominant in stratum 9, was sorted out. The same probably holds true for Asprochaliko.

22 According to Bailey *et al.* (1983a) backed bladelets constitute the single dominant category at Kastritsa (stratum 9) and Asprochaliko (layer 10) but the counts do not match those of Adam (1989).

23 Even if the volume of excavated sediment is substantially lower than in the more recent strata.

24 Except for 9 *dentalia* at Franchthi, which show no evidence of work or use, contrary to later examples.

25 Interestingly, the Upper Palaeolithic levels of Franchthi yielded 7 humain remains, including shed milk teeth (Cullen 1995). None, however, came from the earlier phases, which would confirm a shift in the nature of the cave's occupation (Perlès 1999).

26 Here again, the publication of Theopetra, located in an altogether new region and environment for the Upper Palaeolithic, may shed new light on settlement patterns. With the recent excavations of Klissoura, this demonstrates the potential for new and important discoveries in Greece.

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