The Palaeolithic of the Balkans

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MIDDLE PALAEOLITHIC INDUSTRIES OF KLISSOURA CAVE, GREECE

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Abstract: The long Middle Palaeolithic sequence in Cave # 1 in the Klissoura gorge (Eastern Peloponese), shows a microlithic character and a toolkit rich in side-scrapers, with some convergent tools, and poor in Quina elements and in Levallois debitage. During the excavations in 2001-2006, the Middle Palaeolithic levels yielded big opened fireplaces and abundant lithic industries, rich in retouched tools (various scrapers, points), as well as reduced cores and debitage products. Levallois items (e.g., for the first time in this cave a burnt Levallois point), elongated Mousterian points and convergent scrapers surprisingly appear in the upper part of the Middle Palaeolithic sequence. The thickness of the Mousterian layers is more than 6.5 meters.

Keywords: Mousterian, Greece, Lithic assemblages

INTRODUCTION

Although the Middle Palaeolithic of Greece is known at cave and open-air sites (Darlas 1994, 1999; Kyparissi-Apostolika 1999; Panagopoulou 2002-2004; Papaconstantinou 1988; Papagianni 2000), until recently not a single location with long and rich in situ sequence was documented.

The excavations of the Middle-Upper Palaeolithic stratified site of Klissoura, Cave 1 (eastern Peloponnese) have yielded important data dealing with origins, sediment stratigraphy, typological-technological patterns and human activities. To date only the uppermost Mousterian layers VII, VIIa, VIII and X, from the limited test pit excavated in 1997, have been analysed (Koumouzelis et al. 2001b); these reveal a microlithic character and a toolkit rich in scrapers, with some convergent tools, and poor in Quina elements and Levallois debitage. The extension of the excavated area during the 2001-2006 field seasons resulted in numerous MP occupations with open hearths, abundant faunal remains and lithic industries, rich in retouched tools (various scrapers, points), as well as reduced cores and debitage products. Levallois items, elongated points and convergent scrapers surprisingly appear in the upper part of the MP sequence. This preliminary paper presents the Mousterian industries with results from inter-assemblage technological and typological analyses. The observed patterns are based on a sample of 37411 artefacts coming from14 layers (Table 5.1). Additionally, part of upper unit XX was included in some analyses.

The Middle Palaeolithic sequence (up to 6.5 m thick) is represented by numerous high density occupations (from the top to bedrock throughout layers VI–XX a-g) and is as yet undated (a TL dating program directed by N. Mercier and H. Valladas is in progress). The Early Upper Palaeolithic industry with arched backed blades (Uluzzian) in layer V, which caps the MP, was radiocarbon dated to 40,010 ± 740 BP (GifA-99168) (Koumouzelis et al. 2001b). Layer VI was mixed with overlying Uluzzian in the initial test pit (Koumouzelis et al. 2001b); however, in another part of the trench a pure Mousterian assemblage was found.

KLISSOURA CAVE SEDIMENTS. MIDDLE PALAEOLITHIC SEQUENCE

The Middle Palaeolithic sequence of the Klissoura cave markedly contrasts with that of the Upper Palaeolithic. The layers of the latter are richer in anthropogenic components, and are looser and very stony. They have a gray to whitish coloration due to high amounts of dispersed calcitic ash and other burnt remains. They are also characterized by well defined clay-hearth structures and superimposed ashy layers (Karkanas et al., 2004,
Koumouzelis et al. 2001a, b). In contrast, the upper part of the MPL sequence (layers VII-XV, top to bottom) changes gradually but distinctly to more compacted, brownish or reddish fine-grained sediment with some stony layers towards the back of the cave. These features are the result of the incorporation of higher amounts of clay and other fine-grained clastic materials in the sediment, indicating the dominance of natural processes during the formation of the upper part of the MPL sequence. In addition, the anthropogenic component often appears in the form of discreet sub-layers of multicolored burnt remains in a predominantly natural matrix.

Several episodes of natural and anthropogenic sedimentation are defined in this upper part of the MPL sequence, separated by clear erosional contacts. Layers XI to XIV consist of alternating reddish clay-rich layers and thin, multicolored burnt layers. Most likely, the formation of the clay-rich layers was the result of surface rainwash that deposited clastic material transported from the hills above the cave. Layers XI to XIV also preserve well-developed carbonate crusts due to cementation of the underlying surface, and thus define small gaps in the depositional process. Layer XI is also a multicolored burnt layer that delineates the end of deposition of layers XVI-XI. Part of this sequence was eroded away forming a depression towards the exterior of the rockshelter. The formed discontinuity truncates layers XI and XII. Layers X and IX are locally strongly lithified and have a whitish color with some dark gray to black intercalation, apparently formed when burnt remains were cemented by the action of surface water. Another erosional event formed a trough that truncated all of the previously deposited layers of the upper MPL sequence. The trough runs from the northern profile in the back of the rockshelter to the western profile. The trough is filled with layers XIa and Xib, which are a mixture of burnt remains and natural sediments showing some stratification. At this point, it is unclear whether this sediment filling represents natural filling, or if the trough was used as a dump. Near the back of the cave the trench filling and the sequence below XI are directly beneath layers VIII to VI, which are the result of a combination of natural and anthropogenic processes. They are mostly clay-rich, with a brownish tint, but are occasionally enriched with burnt remains that give a darker colour to the sediment. It is clear that natural process in the form of rainwash material, catastrophic erosional events, or even secondary alterations by water action are characteristic features of the upper MPL sequence.

The contact between the upper and the lower MPL sequence is locally sharp, bringing in contact totally different sediment types: stone-rich reddish clayey sediment of the upper sequence, and fine-grained gray, silty and ashy sediment of the lower sequence. This difference is probably related to the change of the karstic configuration of the cave. At about the time that layer XV was forming, the back chamber of the cave probably collapsed and became the open chimney present today. Thus, surges of rain water, terra-rossa and roofspall entered the cave and produced the depositional and erosional features of the upper part of the MPL sequence.

The lower MPL sequence (XVI to XX) is highly coherent and fine-grained with signs of post-depositional chemical alteration that become dominant in the lowermost layer, XX. The alteration is in the form of phosphate nodules, and phosphate reaction rims around limestone boulders. There is also a gradual increase in the inclination of the layers towards the entrance from the top to the bottom of the lower MPL sequence.

Layers XVI and XVII consist of alternating gray and whitish ashy sub-layers with considerable lateral conti-
nuity. Layer XVIII is brownish-gray, silty, and very rich in bone and lithics. The large amount of artefacts gives almost a stony appearance to the layer. Layer XIX is dark gray, silty and homogeneous. Layers XXa, XXc, and XXf have a considerable amount of burnt remains in the form of whitish and black lenses. In contrast, layers XXa, and XXb are light brownish, silty and less anthropogenic. The lateral variation of XXa is layer XXa1, which is reddish and defined by a considerable terra-rossa component. Layers XXe and XXf are moderately cemented by large amounts of phosphate veins and nodules, which also have a major sand component. Layer XXg is a loose, gray, sandy layer probably forming a cut-and-fill structure inside layers XXe and XXf. Layer XXI is found only towards the eastern wall of the cave, forming a small dark red fan that rests directly on the limestone bedrock of the cave. It consists of terra-rossa with large amount of limestone boulders and gravel with signs of intense phosphate alteration. The contact between layer XXI and the rest of the overlying sequence is a discontinuity, likely reflecting a major environmental change.

Although it is premature to make definite conclusions, it seems that the majority of the MPL sequence was deposited under a more humid climate in relation to the UPL. In particular, the lowestmost sand-rich layers seem to have been deposited by running water, probably by the river that is flowing along the gorge of Klissoura and at the time the sediments were deposited was flooding the area close to the cave. This has probably resulted in a rise of the water table that facilitated the observed chemical alteration of the sediments. Phosphate in the alteration features was most likely released by decayed guano present at that time in large amounts in the cave.

**GENERAL ARTEFACTS COMPOSITION**

The general structure of all Middle Palaeolithic assemblages exhibits the dominance of small debitage/retouching products: chips (<1.5 cm) (usually 30-55% after preliminary count) and small fragments (up to 20%; they are numerous in uppermost layers from X to VII) as well as small flakes. However, chips become less frequent (less than 20%) in industries from the middle part of the MP sequence (XIb, XII, XIII). There is a mostly moderate to rather high presence of tools (from 3.7% to 20%) and some retouching products (re-sharpening flakes) in contrast with the low quantity of cores was documented. In essential counts (without chips, chunks and fragments), flakes dominate (70-85%) over the other categories of lithic artefacts, where tools occupied second position (11-25%; the lowest rate is in upper layers VII and VIIa). The percentages of cores (from 2.3% to 4.4%) and blades (1.5%-4.4%) are the lowest. While the percentage of cores remains low throughout the entire sequence, blades become more frequent in lowermost layers XVIII and XIX (6.8-10.5%). Tested blocks, chunks (as raw material reserve) as well as hammerstones, knapped pebbles are absent or occurred in very small quantity in several, also mostly lowermost, layers. The tool to core ratio is high throughout all MP assemblages: from 3:6:1 up to 9.6:1. The blank to core ratio displays also a high level: usually from 20:1 to 35:1; the highest ratios were recorded at the top as well as at the bottom of MP section. Thus, the lithic artefact composition of MP assemblages suggests on-site core reduction, tool production and use. A few differences in artefact composition were documented throughout MP sequence. The most considerable is an increase in blades/bladelets in the oldest MP assemblages.

The radiolarite group dominates in all Palaeolithic layers in Cave 1 (fig. 5.1) and comprises from 60-80% of Middle Palaeolithic assemblages. Flint is always in the second place (15-32%). Other rocks play a minor role in knapping activity (never more than 4%, usually 1-2%). However, in the middle and lowermost layers, limestone and especially quartz were used more often. On the other hand, some rare materials (such as chalcedony) become scarce and occurred in small quantities in the lowermost layers. Nothing changed with respect to quality and quantity of the used materials: small sizes of initial chunks, plaquettes and fragments; average quality of most of modified stones which produces many examples of false burin fractures (Siret accident), hinging and breakage. The raw material characteristics (and especially of some types of radiolarite) show a rather high level of diffused bulbs on flakes, which probably gives a wrong impression about the use of soft hammers.

**CORES**

Three main types of cores are dominant: unidirectional, centripetal and discoidal (Table 5.2) (fig. 5.2:14). Unidirectional flake and blade/bladelet cores (fig. 5.2:12-13) are more numerous (up to 50%) in the uppermost two layers (VII and VIIa) and in the lowermost layers (XV, XVIII and XIX). Often they are transversal with a final invasive broad flake scar present. Rare cores bear traces of preliminary preparation (crest) and a partially turned flaking surface. Platforms normally are plain. Bi-directional cores are scarce, but, however, occurred more frequently in both the upper and lower parts of the sequence (layers VII and XIX).

Blade/bladelet cores are mostly narrow-faced, made on the thin part of a flake or on plaquettes. Orthogonal cores appeared in moderate quantity, with some polyhedral items. Centripetal and discoidal cores (in the same proportions or c>d) prevail in the middle part (layer VIII or XIV). Levallois cores occur, as well as intentional flakes, in restricted quantity without a clear tendency of increase throughout the MP sequence. Levallois cores in the uppermost layers are as frequent as in the lowermost, but are more numerous in the middle part. Flake Levallois cores are often lineal (fig. 5.2:1-2) and recurrent. Point and blade cores are rare (fig.5.2:3, 6). Fragmented and non-identifiable exhausted cores are common and abundant in the lowermost layers. The majority of chunks
Fig. 5.1. Klissoura. Middle Palaeolithic: *limace* (1, 5), scraper: trapezoidal (2), canted (6, 7), crescent (8), double (9), with distal and back thinning (10), lateral on blade (11), point (3), point on blade (4), Levallois flake (12). Layer X (5), XI (2, 6, 11), XII (7), XIV (1, 3, 8, 9, 10, 12), XIX (4). Chalcedony (1), radiolarite (2, 3, 5, 7-12), flint (4), volcanic rock (6)
are represented by small pieces of raw material. Tested larger items were found only in layers XVII-XIX. Pre-cores are rare and occurred in small numbers in layers X, XV, XVII and XIX.

**FLAKES AND BLADES**

Blades occurred in a small quantity in most MP layers (VII throughout XVII). The blade index is below 5 (except for layer XII). A considerable increase in the blade/bladelet component was recorded in the three lowermost layers: from 9.7 to 16. For the first time, crested blades (fig. 5.2:11) and flakes appear. An increase in unidirectional cores (mostly exhausted) in these layers corresponds to the high blade composition. On the other hand, dominance of these cores in uppermost layers VII and VIIa (even with the presence of some bladelet cores, 1 and 5 respectively) resulted mostly in flake production.

The majority of flakes are ‘non-Levallois’ with prevailing of unidirectional and centripetal dorsal pattern. The Levallois Index is low (between 1 and 7) throughout all MP industries. Levallois blanks occurred in all layers in varying but low proportions without a clear quantitative tendency for change. Blades normally have unidirectional scars (fig. 5.2:10); a centripetal pattern is rare, including Levallois blades (fig. 5.2:5). Blank dorsal patterns show, with rare exceptions (VIII), the same tendency as cores.

Parallel (uni-/bi-directional) cores and corresponding flakes are dominant over the centripetal core/flake group (which also includes discoidal and Levallois flake items) in the upper units and vice versa for the middle part (X-IX). Then, after a relative parity in flake dorsal pattern (although centripetal and discoidal cores remain more numerous), parallel flaking became again common. In layer XVIII, the unidirectional pattern (48.7%) clearly dominated over centripetal (10.8%) in comparison with the uppermost layers. The rarity of primary and partially cortical flakes and blades in all assemblages attests to off-site initialisation of debitage. With respect to platform preparation, plain butts dominate in all Mousterian layers (40-60%), with no clear tendency to decrease. Crudely prepared butts (dihedral and polyhedral) remain stable with a slight increase in polyhedral butts in the assemblages in the middle part of a sequence. Fine faceting shows a sudden increase in layer VIII and especially in X, which does not result in a significant rise in IL in layer VIII (what contrasted with X). Afterwards, a gradual decrease of faceted butts via the oldest layers was documented. The assemblage in layer X (and probably the underlying industry in layer XI) appears to be the most ‘Levallois’ across the Klissoura sequence in terms of platform preparation, Levallois indices, core presence and blank selection. Generally, faceting indices are rather low or medium with the highest value in layer X (IFl=43.1; IFs=28.4). Large faceting, in comparison with strict, displays little change and more stability throughout all layers. The blade and flake butt pattern is usually quite
similar. A significant difference was recorded in the oldest MP assemblages. In layer XVIII, for example, faceting was much higher for flakes (IFss=8.4; IFs=16.5; IFI=32.1) than for blades (IFss=3; IFs=7.5; IFI=20.4), whereas plain (58.3% versus 51.8%), linear (10.6% against 3%) and punctiform (17.5% against 1.9%) butts are more common for blades than for flakes. Blades with parallel scars have mostly plain butts (67.9%) and together with linear and punctiform butts reach 83.4%, when faceted buts are very rare (4.1%). On the other hand, Levallois blanks are well faceted (IFss=45.6; IFs=86.8), although some plain butts are present (10.8%). The technique of blank production is no surprise; well developed bulbs (>70%) and obtuse angles (70-90%) attests to use of a hard hammerstone (whose use slightly increased in comparison with the lower units). Blade production in the lowermost industries was also based on the hard hammer technique: lipping is low (2.9%) and diffuse bulbs are less frequent than in any other layer (5% against 11-24.4%).

Most local varieties of stones are responsible for the “microlithic” aspect of the industries and probably for the presence of small blades (together with the application and adoption of various reduction strategies). Artefacts more than 70 mm in size are rare throughout the Middle Palaeolithic sequence (they are often made from quartz, limestone and sandstone). However, e.g., in layer XVIII, artefacts >50-70 mm are more frequent (n=67) than in layer XVII (4). Cores are usually in the smaller category (max. length 68 mm; average less than 35 mm, mostly in between 25 and 32 mm) and they are heavily reduced or were ‘naturally’ small from the beginning of their reduction. In some cases, unmodified blanks reach 60-70 mm (which is longer than core sizes) but, on average, they are “microlithic” (20-27 mm long) and smaller than retouched tools (average length: 30-35 mm). A few tested blocks, which were found during excavations, also show small sizes. It appears that ‘bigger’ unmodified blades and flakes as well as tools, occurred at the bottom of the sequence (XVIII, XIX).

Numerous assemblages of retouched tools, unmodified blanks and debitage waste were found at this cave site. Primary flaking played an important role in the excavated area. Nevertheless, testing and decortication stages took place unquestionably outside this area as is suggested by the low number of cortical items and pre-cores. Debitage products (i.e., mostly flakes) bearing no cortex become even more common in the middle units (from 60-64% to 70-80%).

Thus, according to the general composition, debitage products and metric data, we can conclude that the reduction sequences are not complete. Initial stages are missing as they took place outside the cave. On the other hand, we can easily identify the full debitage stages of different methods and especially the final phases of core reduction, exhaustion, abandon and transformation of some cores into tools. Also, pre-forming, retouching, re-preparation, accidents (fragmentation) and abandon of tools were recorded.

DEBITAGE METHODS

Several co-existing debitage systems were identified in upper layers VII, VIIa, VIII and X (Koumouzelis et al. 2001b). They were also used for recurrent flake production during the time-span of the rest of the MP industries: 1) unidirectional recurrent method with no preliminary preparation of flaking surface (direct ‘flat’ exploitation) and platform (naturally plain or single-blow); accompanying bi-directional and orthogonal mode; 2) discoidal method or conical/bi-conical centripetal method (Sitlivy 1996) uni- and bifacial with secant exploitation; 3) centripetal non-Levallois method with ‘flat’ non-secant (in a parallel direction with the working surface) exploitation; 4) centripetal recurrent and linear Levallois flake method. The resulting products of the different debitage methods remain the same: broad and some elongated, massive, flakes derived from the unidi-rec talional method; short, rather thick flakes, often debor-dant (fig. 5.2:9) with extended prepared butt (discoidal, centripetal non-Levallois methods); preferential flakes with centripetal preparation (fig. 5.1:12; 5.2:4) as well as secondary flakes (fig. 5.2:8) obtained from Levallois lineal or recurrent cores. Platforms were faceted, some-times prepared by single blow. These are the principal methods used throughout the MP sequence of Klissoura cave. The Levallois strategy, however, was less common than unidirectional or discoidal and centripetal. Several additional technologies were recognised: 5) Levallois unidirectional convergent for broad points: sporadically appearing across the entire sequence e.g. in layers VII, XIV and XIX; 6) Levallois recurrent unidirectional for elongated blanks, e.g., in layer VIII and more frequent in the lowermost layers; 7) non-Levallois blade methods: a) direct (with no preliminary shaping) exploitation of flat and partly turned cores with plain non-faceted platforms (mostly reduced uni- rarely bi-directional, narrow-faced or polyhedral cores); b) prepared flaking surface (lateral or central crests) with plain platform formation (rare volumetric cores with crest remnants, however, there is a series of crested blades: two-sloped and lateral). Both modes of core reduction yielded several final blanks: long blades with straight profile, narrow thin or thick with high triangular and trapezoidal section as well as small blades, including bladelets. Blades occurred in restricted numbers in all MP assemblages, however, the prepared volumetric Upper Palaeolithic method was attested only in the lowermost layers (XVIII, XIX, XX), resulting in their productivity.

The MP industries from layer XVII to the Initial Upper Palaeolithic do not exhibit major change in priorities for core reduction (combination of unidirectional and centripetal/discoidal flake methods with some Levallois debitage). Blade production became isolated, occasional with low statistical background presence after a stronger presence at the beginning of the MP sequence in the cave.
Fig. 5.2. Klissoura. Levallois cores (1-3, 6), flakes (4, 8), blade (5) and point (7), debordant flake (9), blade (10), crested blade (11). Cores: blade/bladelet (12), unidirectional (13), discoidal (14). Scrapers: lateral (15), transverse, Quina (16), double (17), trapezoidal (18), crescent, bifacial (19), limace (20), angled, Quina (21), canted (22), convergent (23, 38), crescent, resembling a Pradnik knife (24). Points: leaf-shaped (25), elongated (26, 32-34, 37), Tayac (29), bifacial (27-28), proximally thinned (30-31), asymmetric (35). Layer VII (7, 35), VIII (2-3, 5, 34, 36), X (19, 21, 37-38), XI (5, 9, 28, 30), XII (1), XIII (26, 29), XIV (15-16, 22, 30, 33), XV (24, 32), XVI (18), XVII (12), XVIII (10, 20), XIX (27), XX (25), XXc (11, 31), XXg (6)
TOOLS

As for the raw material structure in tool manufacturing, the first role is played by radiolarite in all layers: not less than 50% and up to 82%. Flint was used in proportions from 11-30%. Other stone (quartzite, chalcedony, limestone, volcanic rock) was episodically modified; however, quartz tools occur in all rich layers. The raw material scale for retouched tool production was normally restricted for these three types i.e., not less variable than in Upper Palaeolithic assemblages (Koumouzelis et al. 2001a). Tools of all classes were often produced on small and rather thick flakes. In the case of non-invasive retouch, it is possible to identify the type of blanks selected for tool production. It was usual to choose debordant (e.g. 10-17% in layers XIII-XVI) and asymmetrical (off-axis) short flakes as well as natural backed blanks (fig. 5.2:21) for side-scrapers and backed knives. Primary blanks were used episodically or in restricted quantity (e.g. 2.4% in XI or 7% in XIV and XV). Plaquettes of radiolarite were more rarely selected. Reduced cores were also transformed as scrapers (fig.5.2:3). Modified Levallois blanks occur in small quantities, except in layer X. Blades were selected much more often; the highest level of blade tools (18-23%) was recorded in layers XVIII, XIX and XX as well as gradual decreasing of them via the top. Nevertheless non-Levallois flakes were mostly used for tool production (>77%).

MP layers are still characterised by a small sized tool-kit (average length 30.5-35.5 mm) with a tendency for bigger blanks, especially blades and tools on blades, in the lowermost unit. Tool production was achieved mainly by semi-steep and steep scalar retouch; other kinds of retouch were less often used, e.g., sub-parallel, flat, Quina, bifacial, sometimes plano-convex (fig. 5.2:19) and irregular. However Quina and semi-Quina retouch occurred sporadically, sculpting massive side-scrapers (fig. 5.2:16, 21), limaces (fig. 5.1:1, 5; 5.2:20) and other convergent tools, but especially in the lowermost layers (e.g., 5.3% of all complete tools and 7.6% of scrapers/points in layer XIX). Retouch is typically neither invasive nor heavy. Many tools show insignificant marginal blank modification. Nevertheless, new rich tool samples display examples of covering, unifacial and heavy retouch as well as bifacial pieces (scrapers, points). Heavy modifications often occurred in the lowermost layers. Direct retouching is dominant (e.g. 89.9% in XVI) in Klissoura inventories. Ventral retouch occurs rarely in all layers (e.g. 5.7% in layer XVI and 8.2% in XV as maximum values). Bifacial retouch reaches about 3% (e.g., layers XV and XVI); alternating mode is not common. Various kinds of truncation and thinning (basal, distal, back) of side-scrapers (fig. 5.1:10; 5.2:23), knives and especially points (fig. 5.1:3; 5.2:30-31) were observed; however, such tool modifications appeared additional in comparison with a big mass of ordinary scrapers. It seems that tool production, their future reduction and re-use varied according to the initial blank. Ordinary flakes and some blades were used directly or were partly modified (retouched, thinned, truncated pieces). The majority of such blanks were transformed by means of scaled and marginal retouch into single scrapers, denticulates, etc. Reduction of these tools via multiple items was not significant and resulted in the dominance of simple lateral scrapers. Also, when it is the case, scrapers (even multiple) have light retouch, which slightly modified the initial blank. On the other hand, large and thick flakes and blades (with high section) were intensively reduced by abrupt, steep and Quina, invasive, covering and bifacial retouch into various scrapers (single and multiple), limaces, points and some retouched blades. Thus, other kind of modification reduced the mass of the initial artefact, changing or not the initial tool type. In cases of heavy reduction, tools are characterised by off-axis symmetry and disproportional pattern: high sections (limaces), extremely wide and short (some canted and transverse scrapers and even points, narrow, elongated with false blade appearance (some double, convergent tools) (fig. 5.2:18, 38).

Side-scrapers are dominant among the retouched tool types; their ratio is very high (from 63% to 84.7% in essential count without fragments). An increase of the side-scraper percentage and the maximum can be seen in the middle part (layer XIII) when the lowest ratio occurred in the top (VII, VIIa) as well as in the bottom (XVIII, XIX) (Table 5.3). This fact is due to the rather high level of Upper Palaeolithic types (18-16.8%) in the uppermost layers and points, retouched flakes and blades in the lowermost layers. Thus, gradual disappearance of Upper Palaeolithic types of tools in layers VII, VIIa and VIII (end-scrapers, burins, perforators and particularly numerous splintered pieces) and their replacement by an exclusively Mousterian tool-kit from Layer XI (by side-scrapers, points) is well documented. UP tools are absent or occurred only as single pieces in lower layers (XIV-XIX) even when retouched blades appeared in large proportions (XVIII, XIX). Mousterian points were found in all layers (except layer VIIa) after extension of a test pit. They remain in low proportions (1.4-3.7%) and become more representative in layers XVIII (4.7%) and XIX (7.5%). Other types, such as denticulates and retouched flakes, occur in moderate and low amounts (2.6-11.9% and 7-17% respectively). Notches and natural-backed knives are less common. The latter reached 4.4-6.5% in some cases (layers XV-XIX with isolated examples of retouched backed knives). Other types are represented by single items and were found in separate layers: raclette, truncated and thinned flakes, bec, composite tools, ‘chopper’. Unidentifiable tool fragments are common (about 10%) and sometimes reach 25% (layer XVI). Together with other broken tools (especially scrapers and tips from convergent pieces), they are very abundant.

Points

Two main classes of points occurred: Mousterian elongated and short, often massive (fig.5.1:3). Other types
Tab. 5.3. Tools

are very rare (Tayac, Quinson). Tayac points occurred as single pieces, e.g., in layers XIII and XIV (fig. 5.2:29). Both Mousterian point categories are subdivided into symmetrical and asymmetrical, even with long retouched convergent edges (lateral and distal points are rare or do not exist) forming different shapes: triangular (fig. 5.2:36), scalene, *déjeté* (fig. 5.2:35), perforator-like, beak-like, crescent, leaf-shaped (fig. 5.2:25), including bi-pointed. They also vary according to the selected blanks with respective elongation and mass (blades, flakes and even *plaquettes*), as well as to type of retouching: marginal, scalar and steep invasive, Quina, rarely bifacial (fig. 5.2:27, 28) and flat. Some points show distal or basal thinning, ventral or dorsal. Numerous tips were found; however, their precise identification, as well as for some convergent pieces, is not always clear. Different kinds of points were recognised throughout the MP sequence, but all of this variability could be found only in lowermost layers XVIII, XIX and XX.

Scrapers

Single scrapers prevailed over multiple (60-78%) with one low rate in layer VII (52.2%). The ratio of lateral scrapers is high (normally about 40-50% and about 60% in XIV and XVIII and up to 63% in layer X and XIX) (Table 5.4). Their quantity increases progressively throughout the “Upper” units to layer X, showing after several ‘ups’ and ‘downs’ to the base. Transverse scrapers are less numerous, but are still frequent (usually about 10% to a maximum of 15-16% in VIIa and XVII). Oblique scrapers occurred in proportions of about 5% and 13-16%. Double side-scrapers are steadily represented by a ratio of about 10-14% with several exceptions: min. 4% (XX) and 6% (XVI) and max. 23% in layer VII. Convergent scrapers are represented by proportions between 2-5% and 10% with the highest rate of 22% in layer XX. Canted (*déjeté*) scrapers have a similar tendency: the first rate is ± 5%, the second is between 9-14%. *Limaces* were not present in all layers, but are very characteristic in the middle and especially in the lowermost layers (1%-2%). The highest rate of convergent and canted scrapers is documented in VIII, XI-XIII layers (± 20%) and in XX (36%, incomplete count). Generally, all together, convergent tools (including points) are rather representative in the Klissoura MP sequence comprising 10-25%. Other scrapers, such as angular (fig. 5.2:21), alternate, truncated-faceted, as well as with continuous, peripheral working edge and sometimes with bifacial retouch, e.g., trapezoidal, rectangular, oval and crescent, are scarce and do not occur in all layers (fig. 5.1:2, 8; 5.2:19, 24). Nevertheless, the latter categories, e.g., crescent scrapers are more frequent in the lower part: from layer XIV to XX. Here some scraper and tool pre-forms appeared, especially in layer X. Many layers yielded a high quantity of fragmented scrapers (12-27%) and characteristic re-sharpening flakes. Scraper fragments are absent only in layer XIII (two other tool fragments are, however, present); low proportions (1-5%) are attested in layers VIII, XI, XV and XIX which are
COMPENSATED BY OTHER ABUNDANT TOOL FRAGMENTS. THE TOOL
FRAGMENTATION, WHICH IS RATHER COMMON, CAN EXPRESS THE
HIGH INTENSITY OF THEIR USE, REDUCTION, RE-SHARPENING AND,
IN SOME CASES, SOME POST-DEPOSITIONAL EFFECTS, WHICH
SHOULD BE VERIFIED.

CONCLUSIONS

THE OVERALL IMPRESSION, WHICH RELIES ON STATISTICS,
technology and tool morphology, IS THE HOMOGENEITY
AND MANY COMMON FEATURES BETWEEN THE MP INDUSTRIES:
SELECTION AND RAW MATERIAL PROCUREMENT, “MICROLITHIC”
SIZES, INCOMPLETE REDUCTION SEQUENCES (OFF-SITE TESTING
AND DECORTICATION STAGE), HEAVY CORE AND SOME TOOL
REDUCTION, FLAT PARALLEL/DISCOIDAL/CENTRIPETAL DEBITAGE
STRATEGIES ACCOMPANIED BY LEVALLOIS TECHNOLOGIES
(PREFERENTIAL FLAKE AND RECURRENT, SOMETIMES POINT AND
BLADE METHODS), MEDIUM/LOW FACETING RATES IN FAVOUR
OF SINGLE-BLOW PLATFORMS, DOMINANCE OF THE MOUSTERIAN
TOOL-KIT (SIMPLE LATERAL SCRAPERS WITH A RATHER IMPORTANT
FREQUENCY OF MULTIPLE SCRAPERS AND CONVERGENT TOOLS,
INCLUDING POINTS), DIRECT SCALAR SEMI-STEEP AND STEEP
RETOUCH COMPLEMENTED BY SOME QUINA, INVASIVE,
BIFACIAL MODIFICATIONS ON ONE HAND AND THIN MARGINAL
RETOUCH ON THE OTHER. SIGNIFICANT DIFFERENCES AND CHANGE
CAN BE OBSERVED IN: 1) THE PRESENCE IN CONSIDERABLE
QUANTITY OF UPPER PALAEOLETHIC TOOLS, MOSTLY SPLINTERED
PIECES, IN THE UPPERMOST LAYERS (VI – VIIa AND THEIR
DISAPPEARANCE AFTER LAYER X); 2) THE ADDITIONAL PARALLEL
USE OF UP BLADE/BLADELET VOLUMETRIC PREPARED (BY CREST)
METHODS IN THE LOWERMOST LAYERS (XVIII – XX) TOGETHER
WITH SEVERAL FLAKE CORE REDUCTION STRATEGIES, INCLUDING
LEVALLOIS. BLADE DEBITAGE DID NOT RESULT IN A REAL UP
TOOL-KIT, EXCEPT FOR RETOUCHE D BLADES/MP TOOLS ON
BLADES. OTHER TECHNOCOMPATICAL PATTERNS VARY SLIGHTLY
FROM LAYER TO LAYER, AND ARE LESS VISIBLE OR PRONOUNCED.

Thus, the uppermost fully MP layers differ from the rest
MOSTLY TYPOLOGICALLY (BY A HIGH UP COMPONENT:
SPLINTERED PIECES), AND THE LOWERMOST TECHNOLOGICALLY
(BY UP BLADE PRODUCTION). LEVALLOIS DEBITAGE PERSISTs
THROUGHOUT THE SEQUENCE, BEING STATISTICALLY MORE
SIGNIFICANT IN SOME INDUSTRIES IN THE MIDDLE PART OF THE
MOUSTERIAN SEQUENCE. THESE FACTS, APART FROM MANY
SIMILARITIES, AND TAKING INTO CONSIDERATION RECENT STUDIES
(E.G., PAPAGIANNI 2000), DO NOT FIT WELL WITH THE ASPRO-
CHALIKO SCHEMA, WHERE “MICRO-MOUSTERIAN” COVERS
LEVALLOIS-MOUSTERIAN. ALSO, THE ABSENCE OF BIFACIAL
PIECES AT THE TOP OF THE KLISSOURA MP SEQUENCE AND THEIR
EVIDENCE (EVEN RARE) IN THE LOWER UNITS CONTRADICT THE
GENERAL LINE OF LOCAL EVOLUTION. IN SUM, NEW DATA
RECORDED FROM KLISSOURA CAVE 1 AND PRELIMINARY INTER-
ASSEMBLAGE COMPARISONS DEMONSTRATE SIGNIFICANT TECH-
NOLOGICAL VARIABILITY, THE HOMOGENEITY OF MANY INDU-
STRIES, SOME COMMON FEATURES WITH REGIONAL IN SITU MP
OCCUPATIONS AS WELL AS UNIQUE TECHNOLOGICAL AND
TYPOLOGICAL FEATURES, SPECIFIC TENDENCIES AND CHANGES
THROUGHOUT THE LONG KLISSOURA SEQUENCE.

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References


