

Cover Page



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## 5 – Comparing the research background and the new results

In the Chapters 3 and 4, the reconstruction of the reduction sequences is organized from the detailed to the broader interpretation (for the methodology, see also Chapter 2). This chapter integrates the result of this analysis in the larger framework of the published material. Generally speaking, the results are in good agreement with previous studies of this material as they suggest the existence of two distinct technological systems corresponding to the early phases of the Upper Paleolithic of Gorny-Altai. However, some interpretations of the data set may differ and result in alternative reconstructions of the reduction sequences.

### 5.1 THE KARA-BOM ASSEMBLAGES

#### 5.1.1 MIDDLE PALEOLITHIC HORIZON 1 (MPH1)

In the published report of the initial excavation at Kara-Bom, Okladnikov mentions that the maximum depth reached in square Z12 is -411 cm below datum (Okladnikov, 1983). According to the results of the second phase of excavation (1987-1993), this altitude would correspond to the top of MPH1 (Derevianko, Petrin, *et al.*, 1998). Down slope (line 14 to 17, squares B-N), the test pit reached a maximum depth of -630 cm. This implies that, in this area, the first test pit would have easily reached the MPH2. MPH1/2 would then be connected with Okladnikov's layer 4 and 5. According to Nikolayev's report, this area is disturbed by water circulation (Derevianko, Petrin, *et al.*, 1998). It is, therefore, difficult to link the Middle Paleolithic assemblage coming from Okladnikov's test pit with the material uncovered during the second phase of excavations.

As mentioned earlier (see Chapter 3), the nature of the assemblage and the sample size make attempts at general constructions rather problematic. Therefore, MPH1 is usually considered together with MPH2 (*e.g.* Rybin, 2004). The material from MPH1 is described by Derevianko *et al.* (Derevianko, Shimkin, *et al.*, 1998) as richer in burins than the lower level, with the occurrence of a few small blades. The figure illustrating the material is, however, wrongly attributed to the Upper Mousterian layer (Derevianko, Shimkin, *et al.*, 1998, Fig. 75) and corresponds instead to the lower one, as illustrated in the monograph (Derevianko, Shimkin, *et al.*, 1998, Fig. 32). A part of the assemblage collected by Petrin during the 1990 campaign is described by Goebel as Kara-Bom Middle Paleolithic 'component 1' (Goebel, 1994). This sample is relatively small (N=54) and judging by the illustrated material, likely corresponds to MPH2. In the original monograph, the assemblage is described as combining a production of flakes on Levallois-like flat-faced cores with the occurrence of blades (Derevianko, Petrin, *et al.*, 1998). Tools are on flake and blade blanks, including some Levallois blades. The most common retouched tools are flakes with irregular retouch and notched tools, and the most common unretouched tools are Levallois points. A single burin is mentioned in the type list. In a more recent study, Shunkov (2005) insists on the importance of Levallois technology in the Kara-Bom assemblage and on the lack of Mousterian features in the toolkit. According to him, the latter is characterized by a rather narrow typological spectrum, with mainly tools on blade blanks and unretouched Levallois points. These features are considered typical of the Kara-Bom variant of the Altai Middle Paleolithic. The reduction sequence is described as a succession of three main stages. Reduction mainly follows a recurrent unipolar strategy switching from parallel to convergent reduction pattern, and then switching back to parallel (Derevianko, Petrin, and

Rybin, 2000). Rybin (2004) placed more emphasis on the Levallois features in MPH1. He also insists on the unidirectional character of blank production. He regards MPH1 and MPH2 assemblages as very similar and as non-faceted, due to a 'moderately high' index of faceting.

As observed in all archeological levels at Kara-Bom, the raw material mainly consists of metamorphic rocks of a local origin, either coming from the Altai River or from its vicinity. The size of the blocks or pebbles collected remains unknown. In contrast to the subsequent OH6 and OH5 assemblages, no fragments of massive blades are associated with the sample. Given the absence of cores, blade production is mainly documented by the data collected on blanks and on retouched blades. The occurrence of technological elements, such as a small neo-crested blade and a small blade with a burin spall morphology, indicate that, at least occasionally, blade reduction takes place either at the intersection of two flaking surfaces or on narrow flaking surface. Two core-like tools have been described. Both are similar to Mode B cores (one of them produced on a side blade). Their atypical morphology suggests, but does not clearly illustrate, a production of small laminar blanks associated with MPH1.

As noted by Rybin (2004), a majority of the dorsal removals on blanks are unidirectional. However, relatively large blades with parallel edges and bidirectional scar patterns are present among the blanks and among the retouched blades. In fact, the MPH1 frequency of unidirectional dorsal patterning is similar to assemblages such as OH6 and OH5. The main differences are the low frequency of bidirectional blanks and the relatively high frequency of undetermined patterning. By contrast, retouched tools on blades are mainly bidirectional. One of the main factors influencing how dorsal patterning is assessed is the high rate of breakage (96% of the blade blanks are fragments), as some bidirectional blanks fragments can appear unidirectional (Bar-Yosef and Van Peer, 2009). In other words, the small sample size, the high frequency of undetermined elements and the rate of breakage could partly explain differences in dorsal scar patterns between MPH1 and the overlying assemblages.

The Levallois character of the MPH1 assemblage is mainly expressed by the occurrence of flake cores, unretouched Levallois points, and retouched or unretouched Levallois flakes. The dorsal scar patterns observed on the points vary with examples of unidirectional cortical to bidirectional and sub-radial patterning. One flake core can be placed in a Levallois recurrent strategy with a sub-triangular flaking surface that may have been oriented toward the production of convergent blanks. The second one falls within a sub-radial strategy though it shows a short sequence of unidirectional convergent removals. The switch from parallel to convergent and then back to parallel flaking proposed by Derevianko *et al.* (Derevianko, Petrin, and Rybin, 2000) would imply that blades and convergent flake blanks are produced from the same nodules and that the shape of the blank is related to one of these alternating steps. This pattern could not be observed on the MPH1 assemblage. The flake cores, in their last stage of reduction, do not exhibit clear traces of parallel or laminar reduction and bear no traces of lateral reduction. Blades have mainly parallel edges and bear previous laminar removals on their dorsal face. Combined with the use of crests, the latter observation suggests a parallel coexistence between a Levallois flake technology and a sub-volumetric blade reduction. In the absence of long refit sequences or of clear reduction patterns, the blade and the flake production are considered here as independent sequences.

Platforms are both plain and faceted and no significant differences could be observed among laminar and flake blanks. No clear diagnostic could be proposed regarding the mode of percussion, although hard hammer use is assumed for the flake production.

Regarding the retouched toolkit, retouched blades and notches are the most common. Among the retouched blades, pointed blade fragments indicate a possible axial use for some of the tools. Although tools on flake blanks are not the focus of this study, some taphonomic features suggest that tool types such as notches should be interpreted carefully. The MPH1 assemblage includes a small number of finds with a significant vertical distribution (Derevianko, Petrin, *et al.*, 1998). In addition to differences in

patina, there is evidence for a certain degree of mechanical reworking. In this situation, edge damage may have artificially increased the number of notches, although it is noted that clear intentional notches are present, including one on a Levallois flake blank. Typical Mousterian features, such as sidescrapers, are absent.

To summarize, the present results on the MPH1 assemblage are consistent with previous studies (Derevianko, Petrin, *et al.*, 1998; Derevianko, Shimkin, *et al.*, 1998; Derevianko, Petrin, and Rybin, 2000; Derevianko and Postnov, 2004; Rybin, 2004; Shunkov, 2005) as they illustrate the coexistence of a Levallois component, mainly expressed in the flake technology, with a rather high blade frequency. It is suggested that the MPH1 assemblage displays a Levallois recurrent flake technology alongside a subvolumetric blade production. Reduction continuity between the two types of blanks cannot be demonstrated. This analysis could not confirm the unidirectional reduction pattern as a typical feature of this assemblage. Based on the studied sample, it appears that both bidirectional and unidirectional blanks coexist. Unidirectional reduction seems to dominate the assemblage; however, this may reflect a bias due to the small sample size, to the high frequency of undetermined patterns and to a high rate of fragmentation. Furthermore, the retouched laminar tool kit is mostly bidirectional. The non-faceted character of MPH1 could not be confirmed as faceted and plain platform frequencies are not significantly different.

### 5.1.2 OH6 AND OH5

Assemblages from OH6 and OH5 are often considered together as they show chronological and techno-typological similarities (*e.g.* Goebel *et al.*, 1993; Goebel, 1994; Derevianko, Petrin, *et al.*, 1998; Derevianko, Petrin, and Rybin, 2000). Originally considered as Mousterian by Okladnikov (1983), these assemblages have been described as illustrating a local transition from Middle to Upper Paleolithic, from a technological and typological point of view (Derevianko, Petrin, *et al.*, 1999; Derevianko and Volkov, 2004; Rybin, 2004; Derevianko and Shunkov, 2005; Derevianko, 2011a). Derevianko and colleagues

(Derevianko, Petrin, and Rybin, 2000), describe a recurrent Levallois blade technology with a parallel bidirectional pattern starting from the early stages of reduction. The flaking surface is generally located on a broad surface. Following the exhaustion of the flaking surface, cores are then reduced from a narrow face, producing series of blanks classified as narrow blades and microblades (Derevianko and Rybin, 2003). Derevianko and Volkov (2004) note a rather low frequency of Levallois cores offset by a high frequency of narrow-face cores. As opposite frequencies are described for the MPH1 and MPH2, they interpret the switch to the narrow face as a consequence of the reduction process. They argue that by transforming the shape of the core, the exhaustion of the broad face facilitated a reduction from the narrow face. More generally speaking, the change in the location of the main flaking surface, from the broad side toward the narrow one, would then represent a transition from a surface to a prismatic conception of blank production. A similar reduction pattern is said to be observed on a single core producing convergent blanks and points.

Heavily reduced cores, massive *débordant* flakes and lateral spalls are then modified into multifaceted burins (Derevianko, Petrin, and Rybin, 2000; Derevianko and Rybin, 2003). Some of them are considered as a type of core specific to Kara-Bom, with a flaking surface on the narrow face. Polyhedral burins are seen as the result of a continuous reduction of the large blade cores, their morphology being related to an advanced stage of exhaustion (Petrin and Chevalkov, 1992; Derevianko, Markin, *et al.*, 2001). The occurrence of wedge-shaped cores is also mentioned with a production of microblades from narrow-face cores (Derevianko, Petrin, and Rybin, 2000).

Compared to MPH2 and MPH1, OH6 and OH5 are said to be characterized by a significant increase in blade production with blades outnumbering flakes. Some of the blades are long and massive and, as opposed to the unidirectional reduction system from MPH2 and MPH1, OH6 and OH5 illustrate a switch to bidirectionality. Levallois points are mentioned in both OH6 and OH5 assemblages with rather laminar proportions, more elongated and thinner than in

Mousterian assemblages (Derevianko, Petrin, and Rybin, 2000).

Blank platforms are described as presenting a combination of faceted, dihedral, plain and ‘microplatforms’. These platform types occur in roughly similar frequencies, except for the more dihedral ones which are more unusual (Derevianko, Markin, *et al.*, 2001). According to Derevianko and colleagues (Derevianko *et al.*, 2002; Derevianko and Volkov, 2004), Kara-Bom is said to illustrate the origin of pressure flaking, mainly through the production of blades by ‘force-pressure flaking’ (Volkov and Giria, 1990; Volkov, 1999). Specific studies on blank secondary treatments described the retouch as mainly scaled and sub-parallel and mention the occurrence of retouch by pressure flaking (Derevianko, Shunkov, Kolobova, and Petrin, 2005). Endscrapers, burins, points, notches and denticulates are the main types of tools listed together with an infrequent occurrence of specific tools such as ‘sickle-like’ (Goebel *et al.*, 1993) or trimmed blades (Derevianko, Petrin, *et al.*, 1998; Rybin, 2000). Notches are said to be less intensively retouched in OH6 and OH5 than in MPH1 and MPH2.

The OH6-OH3 material coming from 1990 and 1991 campaign is described by Goebel and colleagues (Goebel *et al.*, 1993; Goebel, 1994) as Early Upper Paleolithic or Kara-Bom ‘component II’ and is grouped into a single sample. Most of this material could not be included in the present sample. Flat-faced cores, sub-prismatic cores and a flake core are reported with a majority of single face, uni- and bidirectional cores. The majority of the tool blanks is unidirectional, and the platforms are mostly faceted. Goebel also notes the occurrence of crested blanks. Among the specific tools, endscrapers and points on elongated unidirectional and bidirectional massive blades are recognized. Burins on massive thick blades occur, as well as notched tools on flakes and a single biface (Goebel, 1994: Fig. 7.12; Goebel, 2004: Fig. 12.2, num. 11).

The results of the quantitative and qualitative analysis presented in Chapters 3 and 4 are consistent with most of the previously published observations. From a taphonomic point of view, minor vertical move-

ments between OH4-OH5 and OH5-OH6 are detected downslope and no vertical movements could be observed between MPH1 and OH6. The assemblage from Okladnikov’s test pit could not be correlated with the subsequent excavations and, therefore, was not included in the quantitative analysis. Nevertheless, it is clear from the original publication that most of the material from OH6 and OH5 is somehow included in Okladnikov’s layers 2 and 3.

As shown in Chapter 3, OH6 and OH5 are technologically similar and the main characters of these assemblages can be summarized together.

The raw material is almost identical to that found in MPH1 and consists mainly of fine-grained metamorphic rocks. The production of massive and long blades is characterized by a reduction sequence mainly from cores with two separated flaking surfaces and two opposed platforms (Mode A6). The initial phase of reduction is not well documented. It is assumed that opportunistic or shaped crests can occur along one of the edges of the nodule, although some lateral preparation on the cores could possibly indicate an occasional use of central crests. In spite of a small sample size and of a relatively high degree of core exhaustion, it could be observed through the reduction sequence reconstruction that, in most cases, reduction ends with blade removals from a single narrow face. However, some negatives visible on the narrow face precede further removals on the broad face, and, thus, indicate several switches between flaking surfaces in the course of the reduction. The reduction proceeds by short unidirectional or bidirectional sequences of 3-4 removals followed by the detachment of a thicker blade from the intersection of the two surfaces. This process reshapes the flattened, broad, flaking surface by creating a new convexity. The repeated use of such a method is reflected by the high frequency of *débordant*, naturally backed, naturally crested, crested and neo-crested blades of various sizes. Cores analyzed are assumed to be heavily reduced, as none of them correspond to the numerous massive blades in of the sample.

In Figure 169, the ‘Technical blank’ category groups all crested, naturally backed and *débordant* blanks. Only blade blanks are represented with a cut-off at

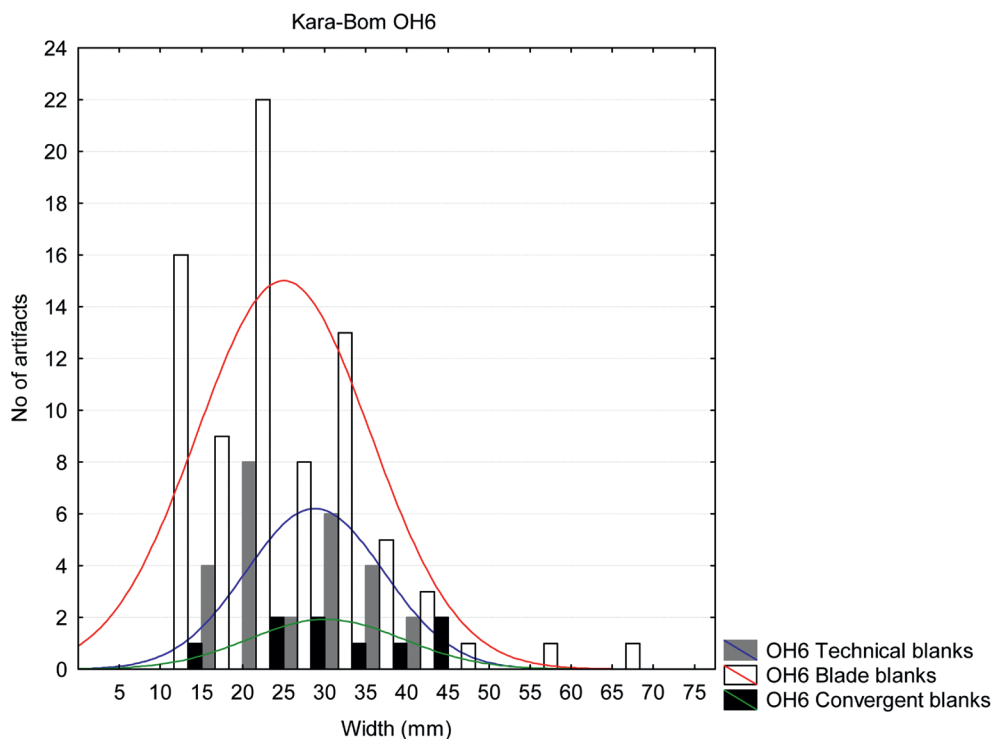


Figure 169: Kara-Bom, OH6. Comparison between the widths of technical blanks, blade blanks with parallel edges, and convergent blanks

12 mm width. All categories have a similar width distribution. The first mode corresponds to blanks of 20-25 mm width. The second mode observed in the blade blank category, spanning from 12 and 15 mm, is related to a distinct reduction sequence. Assuming that large/medium blades illustrate a single reduction process, the histogram suggests that technical and convergent blanks are detached throughout the whole blade core reduction.

The core reduction takes place on two surfaces following a sub-volumetric approach, extending from a broad face to a narrow face (Figure 170). The detachment of blanks from the narrow face, and from the intersection between the two surfaces, provides a form of control on the convexity of the broad face. The sample studied suggests that only one of the narrow faces is flaked, giving the core an asymmetric section. Pelegrin (1995) describes a similar reduction method in layer 8 from Roc-de-Combe that is defined by Boëda as a mixed system (*gestion mixte*), combining a volumetric approach that turn into a sur-

face reduction (Boëda, 1990) (Figure 170). It differs from the definition of Levallois (Boëda, 1995) as it does not represent a surface conception *sensu strictu*.

In the case of Kara-Bom OH6 and OH5, both convergent and parallel blanks are detached from the broad face of the core. Bidirectional reduction offers the possibility to obtain convergent blanks without

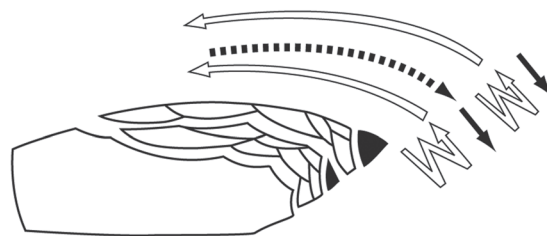


Figure 170: Reduction system of Roc-de-Combe layer 8 type (after Boëda, 1990). Black elements are associated with the initial flaking and the management of convexities

necessarily having a triangular flaking surface or a strictly convergent reduction system on a broad surface. It also facilitates the production of blanks with straight profiles (Pelegrin, 1995). This observation is consistent with the dorsal scar patterning observed on convergent blanks that usually display negatives of divergent opposed removals on their distal end. Some of the chronological reconstructions show successions of 3-4 removals (similar to a Levallois point production) that may illustrate such a process.

As noted by Derevianko and colleagues (Derevianko, Markin, *et al.*, 2001), a single core displays a convergent last removal. Prior to the removal of a pointed blank similar to a first order Levallois point (*pointe de premier ordre*) (Bordes, 1980) a blade was struck from an opposed platform, giving a sub-triangular shape to the flaking surface. This bidirectional scar does not appear on the dorsal face of the refitted last removal. This suggests that, even on complete blanks, the bidirectional reduction system may be underrepresented in the dorsal scar patterning (cf. Bar-Yosef and Van Peer, 2009). On this core, the flaking surface is located on the broad face, but several hinged removals are visible at the intersection one of the narrow face.

A few published cores were not included in the quantitative analysis as they were missing from the collection at the time of the sampling (*e.g.* Derevianko, Petrin, *et al.*, 1998: Fig. 34 num. 2). Some of them

have been analysed afterward (*e.g.* Derevianko, Petrin, *et al.*, 1998: Fig. 34 num. 3)(Figure 171).

It is noted that some of the cores have a narrower flaking surface that could be characterized as semi-turning and volumetric. These cores could be seen as representing an independent reduction sequence exclusively oriented toward a production of blanks with parallel edges following a bidirectional or unidirectional reduction path. They could also be part of the sub-prismatic reduction sequence stopped during a stage of flaking from the narrow face. Therefore, the presence of such type of core does not contradict the propose reconstruction.

It is clear that the cores observed lack convergent negatives, but this does not necessarily imply that the production of convergent blanks corresponds to a specific step in the reduction sequence. The variability observed in blank shape and size is similar to other type of blanks. As shown in Figure 169, the width distribution is statistically similar to technical blanks and regular blade blanks ( $F(2, 111) = 2.115, p = .13$ ). Parallel blades and convergent blades are not always easy to distinguish and the categories sometimes overlap (Figure 172).

Beside large blade production, these assemblages can be characterized by the presence of specific reduction sequences oriented toward the production of small blade/bladelets. The Mode B category group-



Figure 171: Kara-Bom, OH6, blade core

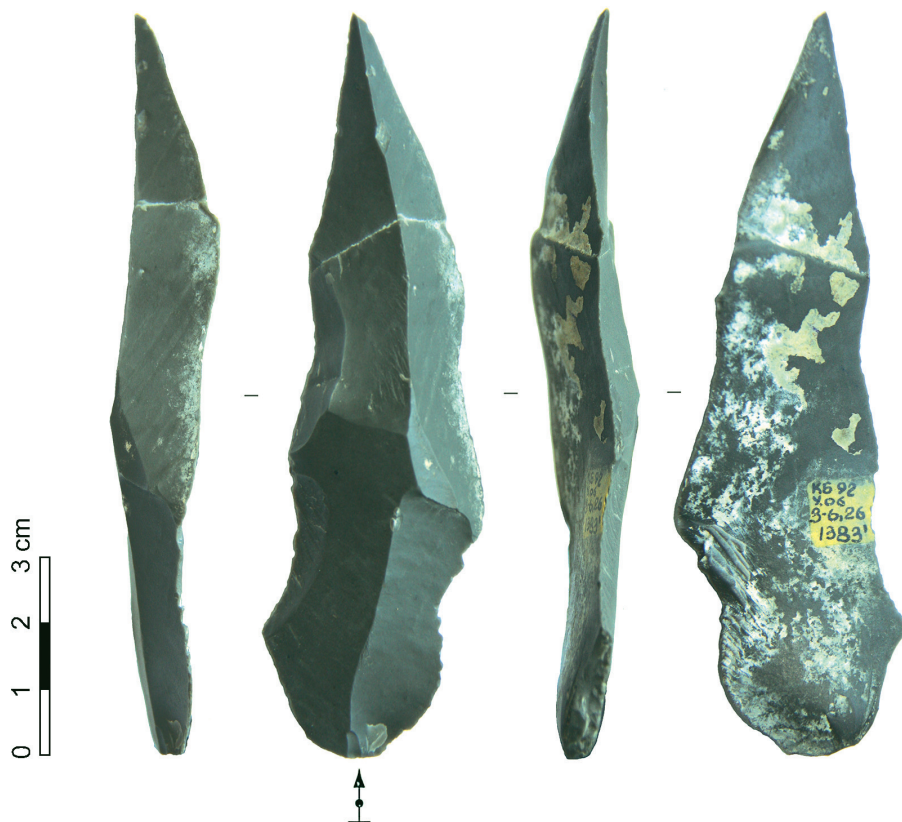


Figure 172: Kara-Bom, OH6. Blade with sub-convergent edges, detached from the lateral end of a flaking surface. Note the crest scar and the *débordant* platform along the left edge.

ing all cores on blade blanks is the most represented in OH5 (80%) and OH6 (74%) of the core sample. The core blanks are selected among the thickest blades, or blade fragments, of the assemblage (with a minimum of circa 10 mm thickness) (Zwyns *et al.*, 2011). These thick blades are mainly *débordant*, naturally backed or crested. According to the impact points visible on some of their sections, it is inferred that blades are occasionally snapped by direct percussion. Fragments are then turned into cores using the edge of the blank as a flaking surface. The reduction starts from the thickest end, either using a natural or a retouched edge as a crest, and proceeds by short unidirectional sequences followed by switches to an opposed platform. Platforms are sometimes prepared by faceting and reshaped by the removal of small core tablets. The morphological variability that covers Mode B1 to B7 is interpreted as reflecting dif-

ferent steps of reduction. B1 and B5-7 are the most numerous. The blanks produced range from small blades down to bladelet size pieces (<12 mm width). Their morphology varies according to their position on the flaking surface and the number of guiding scars they follow. As most of the flaking surfaces are rather narrow, burin spall and *débordant* elements are quite numerous. Some of Mode B5-7 cores, although sometimes reported as polyhedral burins (*e.g.* Derevianko, Petrin, and Rybin, 2000), were also explicitly considered here as cores (Petrin and Chevalkov, 1992; Goebel, 1994; Derevianko, Petrin, *et al.*, 1998; Derevianko and Rybin, 2003; Zwyns *et al.*, 2011).

Besides the Mode B cores, a infrequent occurrence of Mode A cores is associated with small blank production. One example is produced on a slab and shows a semi-turning bidirectional reduction from a flak-

ing surface located on a narrow side. Basically, the reduction pattern is rather similar to a Mode B core except that the flaking surface extends slightly on to the broad side. Some examples of truncated-facetted pieces are technologically analogous to large blade cores as they follow the same reduction sequence, with the alternate use of two flaking surfaces. The fact that Mode B cores are produced on blade or laminar flakes and that truncated-facetted pieces are produced on flakes does not support the idea of continuous reduction, as previously suggested (Petrin and Chevalkov, 1992; Derevianko, Nikolayev, and Petrin, 1993). The production of small laminar blanks is only indirectly related to the production of large blanks as Mode B core blanks are recycled technical blanks. The *débordant* and crested blanks then play a double role: management pieces for large blade production and core blanks for another reduction sequence.

Regarding the blank platforms, a coexistence of facetted and plain platforms is observed with a more limited occurrence of dihedral platforms. Although frequencies are not exactly the same, the general results are consistent with some of the previously published analyses (Derevianko, Markin, *et al.*, 2001). Differences with Goebel's (1994) platform frequencies are likely due to differences in the sampling method. Goebel considers OH6-OH3 as a whole and records technological attributes exclusively on the toolkit. In the present study, it is noted that some of the facetted platforms can be classified into two distinct groups: a classical faceting, covering the whole platform surface, and a partial faceting (Figure 173, Figure 174) located on the external edge of the platform. The latter type of preparation is roughly similar to what Nehorochev defines as a 'striking platform reduction' (Nehorochev, 1999).

In addition, some facetted platforms appear to be *débordant* on one side. Those blanks vary in length and width from the long blades to the short, broad and pointed laminar flakes. This reinforces the idea of an interaction between the broad and narrow flaking surfaces during the whole reduction process.

No thin abrasion is observed on the external edge of the blanks or of the cores. However, some of the

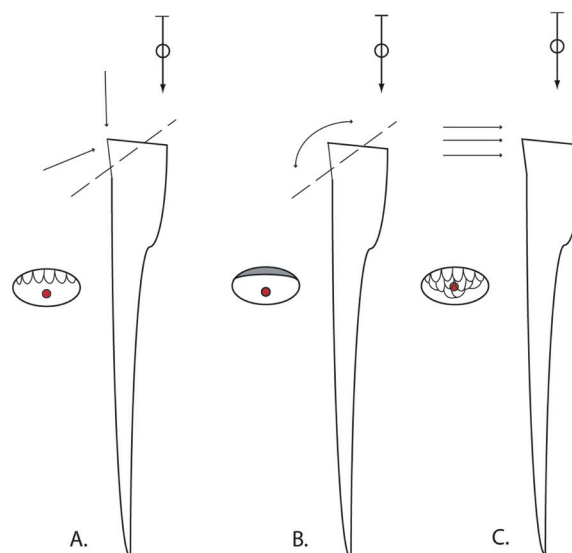


Figure 173: Platform preparation types. Partial faceting; B. Extreme abrasion; C. Faceting

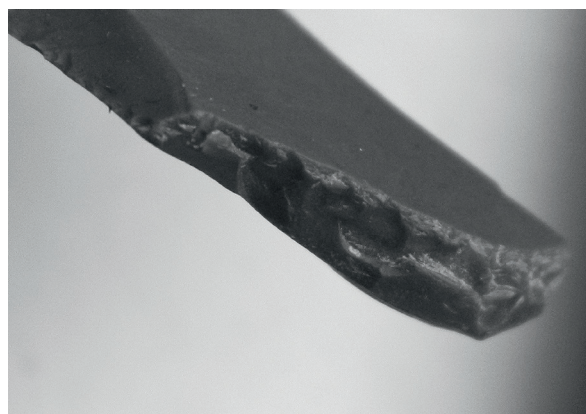


Figure 174: *Débordant* facetted platform (blade illustrated in Figure 172)

blanks bear traces of a strong abrasion smoothing the external edges. Lips, cones of percussion and flaking on the bulb occasionally occur and, generally speaking, the mean platform thickness is higher than 4 mm. The lack of thin abrasion and the platform thickness tend to rule out the use of organic hammers. Considered as a whole, the described features rather indicate a direct percussion with a stone hammer. The lips, the flaking on the bulb and the strong abrasion could indicate the use of a soft stone hammer. The typical features of soft stone hammer, how-

ever, overlap with the organic and the hard hammer (Roussel *et al.*, 2009), and it is, therefore, not possible to determine at what frequency it is used. Following the definition of Tixier (1984), no evidence for pressure flaking is observed in the studied sample. Instead, the irregularity of the removals, the relative thickness of the blanks and of the platforms, and the core morphology suggest a use of direct percussion.

The tool kit included in the studied sample mainly consists of retouched blades. The main types of retouch observed are scalar, semi-steep and thin retouch. Systematic retouch by pressure flaking could not be observed. The identification of such a technique (usually described in the context of a bifacial technology or for the retouched projectile points) is, however, beyond the scope of this analysis. Recent studies (*e.g.* Pelegrin, 2004; Mourre *et al.*, 2010) underline the need for an experimental protocol in order to isolate typical features. These results should be compared with the archeological material using

an attribute analysis. In the present case, the retouch does not appear to differ from direct percussion, and it is assumed that pressure flaking was not the main retouch technique. The tool kit consists of blades with retouch located mainly around the distal and proximal ends. Some of these blades are pointed and others, with a more rounded distal end, can be typed as endscrapers. A refit has turned two blade fragments, that Derevianko and colleagues (Derevianko, Petrin, *et al.*, 1998) typed independently as an endscraper and a retouched blade, into a massive ‘sickle-like blade’. This specific type of blade occurs so far exclusively in OH5. A single trimmed blade is associated with OH6 in the original monograph (Derevianko, Petrin, *et al.*, 1998). The proximal part of the blank displays inverse retouch and the proximal edges show direct marginal retouch. The distal end is pointed by a bilateral semi-steep and steep retouch. This artifact was missing from the collection at the time of the study; it is clearly associated with OH6.

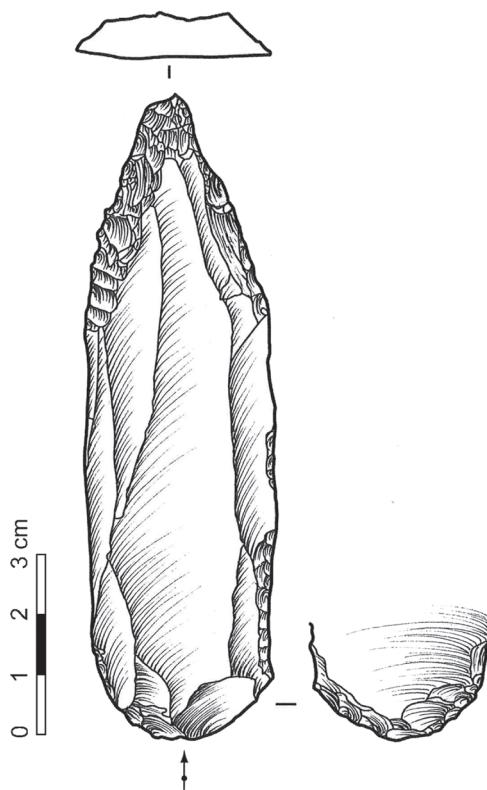


Figure 175: Kara-Bom, OH6, pointed blade with proximal thinning (redrawn after Derevianko, Petrin, *et al.*, 1998)

Generally speaking, small blade/bladelet blanks are rarely retouched. The few elements observed are either on irregular blanks and present a steep or semi-steep retouch or they are on regular blanks with a very thin retouch. The latter category includes a Du-four bladelet.

In his first report, Okladnikov (1983) mentioned the discovery of a biface but without mentioning in which layer it was discovered. Goebel first reported 2 bifaces associated with component II (OH6-OH3) (Goebel *et al.*, 1993) but, shortly after, he mentioned a single one (Goebel, 1994). Derevianko and Shunkov attribute a single biface from Kara-Bom (2002) to an unclear provenience that is likely a re-deposited Middle Paleolithic assemblage. In fact, it appears that Okladnikov, Derevianko and Shunkov, but also Goebel mentioned the same artifact, namely a complete biface made of dark grey metamorphic rock with porphyric inclusions. In his dissertation, Goebel deals with a sample of component II from the 1990-91 excavation and does not include this piece but instead includes and draws a biface with a missing distal part (see also Goebel, 2004). Thus, this artifact can be broadly associated with OH6-OH3.

A set of ornaments and pigments has been uncovered from a small depression at the bottom of the OH6. It was filled with more than 88 g. of goethite concretions and powder. A long flat pebble of greenish and white striped raw material (Figure 176 : 4) was found within the reddish pigments (Derevianko and Rybin, 2003). In addition, one perforated ungulate tooth and one piece of unidentified mammal bone were found in the same spot (Figure 176 : 1, 3). These elements were discovered during the 1991 excavation in the vicinity of the I-K/8-9 fireplace. At less than 1 meter away from the cluster of these objects, a BC and three spalls were refitted. One spall was found on a schist slab. The burin and one of the spalls were found at similar depth. A fragment of ungulate bone showing a bi-conique perforation was found outside of the pigment concentration (Figure 176 : 2). One of the surfaces of this object displays parallel incisions. It was found in direct association with the BC refit (Derevianko and Rybin, 2003) (Figure 176 : 5). As the BCs clearly belong to OH5 and OH6, there is no convincing evidence supporting the idea that this

ornament piece is an intrusive element from OH4 or elsewhere (*contra* Zilhao, 2007). In this context, the rest of the ornaments are likely to be connected with either OH5 or OH6. Given the few refitted artifacts between OH4 and OH5, however, this issue cannot be addressed properly.

To summarize, OH6 and OH5 include a systematic and organized laminar technology. The large blade reduction sequence is not representative of Levallois. Previous studies did interpret the reduction as mainly located on the broad face of the cores, a switch to the narrow facilitated by the exhaustion of

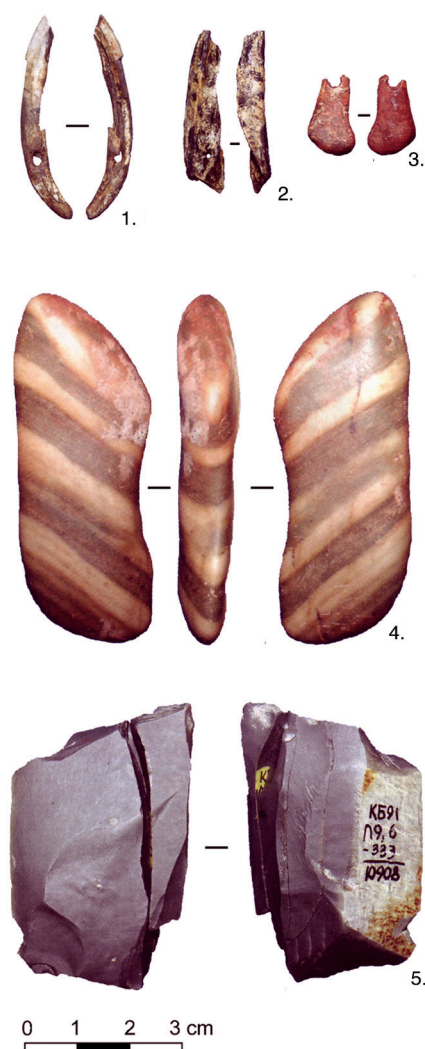


Figure 176: Kara-Bom, ornament (1-3), pebble (4), BC refits (5) (after Derevianko and Rybin, 2003)

the core that ended the reduction process (Derevianko and Volkov, 2004). The two faces were then considered as independent, representing clear-cut steps in the reduction (Derevianko, Markin, *et al.*, 2001; Rybin, 2004). Instead, it appears that a ‘back-and-forward’ interaction between the broad and the narrow face of the core indicates a sub-volumetric conception of the core. In this view, the use of a narrow face is not a consequence of the exhaustion of the core but rather a necessary condition to proceed. The management of the convexities is achieved by the removal of naturally backed and crested elements all along the reduction process as shown by the frequent occurrence of neo-crest, varying in size. The reduction from the broad flaking surface, some of the lateral preparations, the faceting and the morphology of some of the blanks suggest a Levallois background for this technology. A few cores, by their shape, testify to a semi-turning progression. It is still not clear if they illustrate other stages of exhaustion of a sub-prismatic core reduction or an independent reduction system.

Two arbitrary categories of blank have been defined that sometimes overlap: blanks with parallel edges and convergent blanks. They are both generated by the same reduction process using alternatively two opposed platforms but also short unidirectional sequences. The morphology of the convergent blanks, ranging from pointed blades to short laminar flakes, suggests that they are produced during various stages of reduction rather than corresponding to a specific step in the process.

A second reduction sequence is included in the general technical scheme. The thickest technical blanks from the large blade production are transformed into cores following a systematic process. Blades are snapped and reduced along one of their narrow edges from one or two opposed platforms. This reduction, including the use retouch edges as partial crest, corresponds to a volumetric conception of the core. The blanks produced range from the small blades to the bladelet size, mostly with a triangular section. As for the large blades, the use of two opposed platforms allows a production of elongated convergent blanks with a straight profile. Rare truncated-faceted pieces and a single semi-turning core illustrate other facets

of the technological variability associated with OH6 and OH5. This technology is seen as specific and not the result of the intense reduction of a larger core.

### 5.1.3 OH4

As previously noted, OH4 yielded a relatively small sample with, upslope, a stratigraphic position clearly distinct from the underlying assemblages. Downslope, the situation is more problematic due to the proximity between the various layers which are separated in some places by only a few centimeters of sterile sediments. The main concentration of lithic material, burned bones and charcoal is located around squares Z-I/8 (Derevianko, Petrin, *et al.*, 1998). Assemblages from Okladnikov’s early excavations cannot be directly correlated with the subsequent stratigraphic divisions but it is reasonable to assume that the majority of artifacts from OH4 are to be found among the finds from layer 1 (Okladnikov, 1983). The raw material is similar to the one described in the underlying assemblages. Assemblages OH4 to OH1 are usually described as a whole as belonging to a local Upper Paleolithic tradition. The original publications mention a flat-face core described as showing a parallel flaking pattern with a lateral crest and associated with OH4, two unclear narrow-face cores on massive blade blanks, and a preform of Levallois core (Derevianko, Petrin, *et al.*, 1998; Derevianko, Markin, *et al.*, 2001). OH4-OH1 flakes have mainly plain platforms, with a rare occurrence of faceted and dihedral preparations. Blades are said to be elongated and to show a majority of plain and microplatforms, followed by faceted and dihedral. The increase in bidirectional and crested blanks noted, together with a decrease of unidirectional convergent and parallel flaking, is interpreted as reflecting a transition toward a non-Levallois technology (Derevianko, Markin, *et al.*, 2001).

Additional data regarding OH4 blade technology are provided by refits (Slavinsky and Rybin, 2007) (Figure 177). A fragmentary sequence illustrates an initial stage of reduction with the detachment of two cortical flakes on the distal part of the nodule followed by the shaping and detachment of a poste-

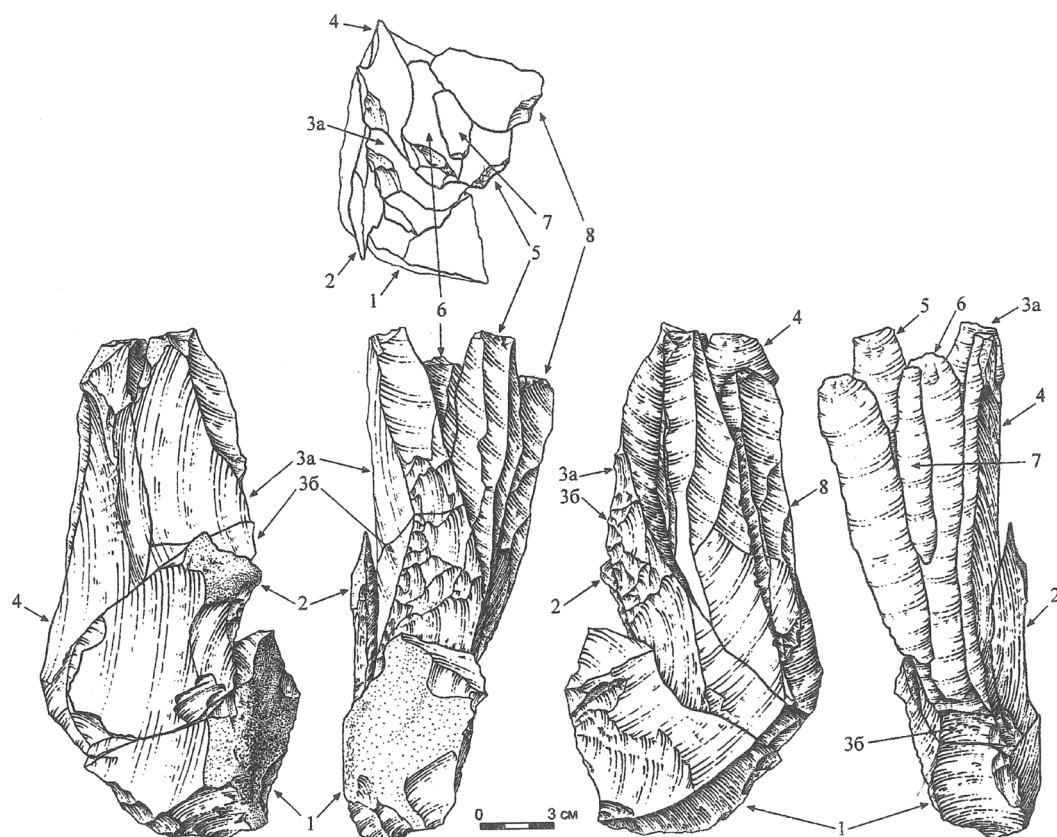


Figure 177: Kara-Bom, OH4 (+OH5 and Okladnikov testpit). Refit of laminar reduction sequence (after Slavinsky and Rybin, 2007)

rior crest (detached by two removals) and of a massive laminar flake. Then, four unidirectional blades with parallel edges are detached. Slavinsky and Rybin (2007) mention that these artifacts were located downslope and this refit includes 2-3 artifacts from OH5 and from Okladnikov's collection.

The retouched toolkit is said to show a slight increase of blade blanks, a minor frequency of retouched flakes and the absence of Levallois points. Tools display mainly a combination of direct semi-abrupt and scalar retouch. Sidescrapers occasionally occur but with a rather high morphological variability (Derevianko, Petrin, and Rybin, 2000). Notches and notch-denticulate tools are the most represented, representing circa 28% of the toolkit. A single scraper on blade and four retouched points are mentioned (Derevianko, Petrin, *et al.*, 1998).

The additional refits provided by the present study confirm that some occasional mixing between OH5 and OH4 may occur in the lower part of the slope. It is, however, unclear if they reflect post-depositional processes (such as slope erosion) or labeling issues. In the studied sample, a single core could be analyzed. It is a small blade/bladelet core on a *débor-dant* flake that resembles a blade core tablet. The flaking surface is located on a narrow edge and bears bidirectional reduction negatives coming from two opposed platforms. The flat-face core mentioned in the original monograph (Derevianko, Petrin, *et al.*, 1998) could not be observed. Judging by its thickness, it appears more of an overshoot blade blank than a core. Nevertheless, it bears clear bidirectional negatives from two opposed, faceted platforms. The narrow-face cores on thick blades have been considered as blades, as it is not clear if the removals vis-



Figure 178: Kara-Bom, Okladnikov workshop layer 1/2, initial stages of blade reduction

ible on their edges were detached before the blank itself. The occurrence of cortical second crests confirms that initial flaking takes place at the site. In addition, it is worth mentioning a prepared block from the Okladnikov's collection and attributed to one of the two first layers meaning, therefore, likely either OH4 or OH5. It illustrates the initial steps of a blade reduction with negatives of antero-lateral crested blades and at the back of the block, an undetached posterior crest.

Bidirectional removals widely dominate the sample. This observation is consistent with some of the previous analyses (*e.g.* Derevianko, Markin, *et al.*, 2001) but does not match with what is observed on some of the refits (Slavinsky and Rybin, 2007). Thus, this raises questions regarding the representative character of this specific sequence when considering the assemblage as a whole. Although showing some contacts with OH5, the majority of artifacts are, however, associated to OH4. This example of unidirectional reduction may illustrate a facet of the

assemblage variability. Blanks have mainly parallel edges and some are relatively massive.

A single Levallois point with a plain platform is associated with the sample (Derevianko, Petrin, *et al.*, 1998: Fig. 46, num.5). The occurrence of small blanks with natural backs and the only core observed suggest a production of small blanks from narrow-edge cores. Notable is the presence of a refitted, very narrow and long burin spall.

Plain platforms are more numerous than faceted ones, although this difference is not statistically significant. Dihedral platforms are rare, and the platform average thickness is larger than 4 mm with no thin abrasion visible on the external edge. Only one blank displays a strong smoothing of the edge. These features suggest that mainly stone hammers were used, with a possible use of soft-stone hammer.

The majority of the tools analyzed are classified as retouched blades. Some blanks are convergent, but only two artifacts are classified as retouched points. A blade has a continuous retouch ending with a distal truncation along the right edge and single endscraper is noted. Thin marginal retouch is the most common, alone, or combined with a steep or semi-steep retouch. No clear selection among the blanks could be observed.

To summarize, the assemblage from OH4 is difficult to characterize given its reduced sample size and due to a lack of identifiable cores. Initial phases of reduction occur at the site, with the removal of anterior or antero-lateral crests and possibly the shaping of posterior crests. The blade reduction is mainly bidirectional although some unidirectional sequences are illustrated by refits. The assemblage shows a combination of reduction from narrow-face and flat-faced cores testifying to both surface and volumetric core treatments. Due to the lack of analyzed cores, the relationship between these two approaches remains unclear. Mode B cores are absent from the stratified sample, but a production of small laminar element is attested to by the presence of a Mode A narrow-face core and by the presence of naturally backed blanks. The idea that this assemblage represents a transition toward a non-Levallois technology (Derevianko,

Markin, *et al.*, 2001) is hard to test. Indeed, Levallois points are rare but still occur in this small sample. The illustrated blade reduction sequence seems to start from the intersection between two surfaces and to expand toward the broad face, and the blade overshoot mentioned in the monograph as a core (Derevianko, Petrin, *et al.*, 1998) illustrates a reduction from two opposed platforms. Combined with the crested and side-blades, this suggest a sub-volumetric or volumetric core reduction. These technological features are similar to those observed in OH5 and OH6, but in the absence of blade cores, they cannot be linked with each-other. The most striking difference is the absence of convincing Mode B cores even though thick blade blanks are present.

## 5.2 UST-KARAKOL 1 SECTOR 1 (UK1-1)

As described earlier, the Ust-Karakol site is divided in three locations, Ust-Karakol 1 sector 1, Ust-Karakol 1 sector 2 and Ust-Karakol 2. Material from Ust-Karakol 1 sector 1 and 2 is presented here independently.

Originally, the material from UK1-1 cultural level 3 was described as a single assemblage by Derevianko and colleagues (Derevianko *et al.*, 1987). They describe it as a blade assemblage including massive blanks that are considered characteristic of the beginning of UP in Siberia. The cores illustrate parallel flaking on a single flaking surface from one or two striking platforms. They mention the rare occurrence of bifacial cores and several radial cores. One exhausted bifacial core is described as transformed into a side scraper (Derevianko, Shimkin, *et al.*, 1998). Some cores are described as possible preforms for wedge-shaped cores. Although displaying a radial preparation, they show a transfer of the flaking surface toward the 'butt' of the preform (Derevianko, Shimkin, *et al.*, 1998). Genuine wedge-shaped cores are absent and the authors note the lack of microblades. A large blade, of about 262 mm long, 42 mm wide and 20 mm thick stands out as the largest retouched tool in the assemblage (Figure 179). The blank is curved, with a bidirectional dorsal pattern and bears continuous semi-steep and scalar retouch along the right edge and a mesiodistal discontinuous



Figure 179: UK1-1, cultural level III (OH5.4-5.5?), massive retouched blade (redrawn after Derevianko, Shimkin, *et al.*, 1998)

retouch along the left edge. The platform and part of the bulb are missing. Depending on the authors, this artifact is typed either as a retouched blade similar to a ‘dagger’ (Derevianko, Shimkin, *et al.*, 1998) or as a ‘double straight side scraper’ (Goebel, 1994).

Among the tools listed, side scrapers are said to be the most numerous (Goebel, 1994; Derevianko, Shimkin, *et al.*, 1998). They are produced on blade and flake blanks with longitudinal, transversal or inverse steep, semi-steep and scalar retouch. Points

are either atypical Levallois, with bilateral retouch, or are more amorphous. Some of these points are on massive laminar flakes and bear irregular scalar retouch. A series of retouched blades with ventrally flaked proximal ends is reported by Derevianko and colleagues (Derevianko, Shimkin, *et al.*, 1998) and also reported as ‘unilaterally retouched bimarginal blades’ by Goebel (1994). One of these blades is refitted on another fragment with a direct mesio-distal retouch along the right edge and a direct distal retouch on the left edge (Slavinsky, 2007) (Figure

180). The direct retouch is semi-steep and steep. The inverse retouch is a bit more invasive and extends along the right edge. The presence of bifacial tools is considered as rather atypical for the Altai (Derevianko, Shimkin, *et al.*, 1998). One is made on a massive long flake with a plano-convex cross-section and another one is leaf-shaped. Retouched blades are generally not numerous and include denticulate tool types. Some of the irregular retouch likely results from tool-use. Endscrapers are unstandardized, show bifacial treatment, and have lamellar retouch on their distal end. Burins are reported as rather amorphous and mainly produced on blades.

From a general point of view, the first categorizations of the UK1-1 layer 3 assemblages underline the coexistence of Mousterian and Upper Paleolithic forms, with uni- and bidirectional blade reduction, Levallois and discoid cores. This assemblage, for the first time, clearly illustrates the association of bifacial tools and blades with proximal thinning. The occurrence of some 'preforms' are interpreted as representing a possible initial stage in the production of wedge-shaped cores which subsequently occur all across Northeast Asia (Derevianko *et al.*, 1987; Derevianko, Shimkin, *et al.*, 1998). The primary reduction system is oriented mainly toward blades and Goebel (1994) notes that the cores are mainly flat-faced and subprismatic with a rare occurrence of Levallois elements. He characterizes the tool blanks as mainly unidirectional parallel with smooth (plain) platforms and an external edge prepared by trimming.

More recently, based on projections of the piece-plotted artifacts, Slavinsky (2007) proposed subdividing cultural level 3 into several assemblages designated as OH5.1 to OH5.5. He suggests the existence of two different traditions. The first tradition is represented by OH5.4 and OH5.5 and shows similarities with the material from Ust-Karakol 1 sector 2 (UK1-2) strata 11 to 8. According to some of his refits, UK1-2 strata 11 to 8 'do not represent a single habitation horizon' and show some similarities with strata 15/12 (Slavinsky, 2007). The second tradition, although not described in detail, is considered as distinct. A small series of refits from the OH5.4 indicate that the material is practically undisturbed and represents a sin-

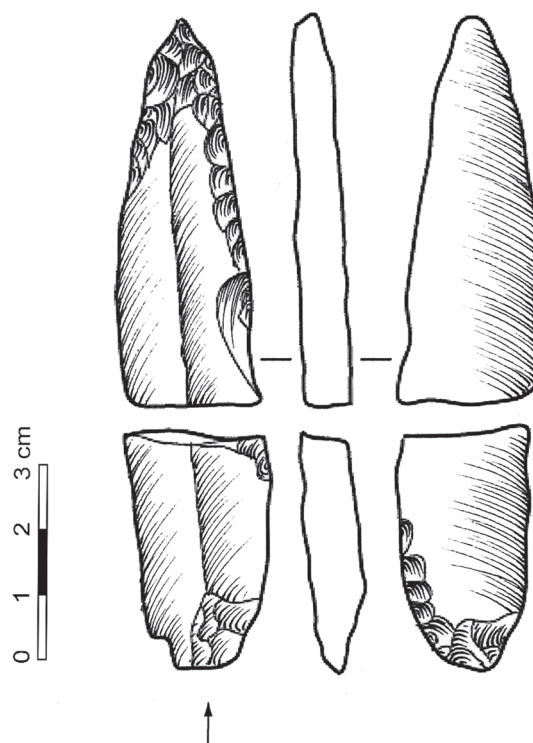


Figure 180: UK1-1, OH5.4-5.5, refit of pointed blade with proximal thinning (redrawn after Slavinsky, 2007)

gle short-term occupation. Bifacial elements, blades with proximal inverse retouch, and most of the blade production belong to OH5.4 and OH5.5.

In the present study, Slavinsky's views on the cultural level 3 are tested using vertical projections of the same spatial dataset. The results are in agreement with his suggestion to divide the cultural level 3 into five sub-units. Thus, assemblages were studied here independently in order to test Slavinsky's second suggestion regarding the existence of two distinct techno-cultural units. The results are presented with OH5.1, 5.2 and 5.3 grouped into one sample, and OH5.4 and OH5.5 grouped into another.

#### 5.2.1 OH5.4-5.5

Although the assemblage was sometimes described as produced mostly on chert (*e.g.* Goebel, 1994),

the material appears to be metamorphic, some with porphyria inclusions. Large blade reduction is documented by two main types of cores on blocks or on large flakes: cores with a main flaking surface located on a narrow face (Mode A1 and A2) and cores with two separated flaking surfaces (A6 and A7). Both show uni- and bidirectional reduction systems. The largest blocks are Mode A1 cores with a single flaking surface located on the narrow face and showing some unidirectional negatives. These cores show a significant amount of cortical or natural surfaces and represent an initial stage of reduction. Mode A2 is represented by an atypical small size cortical flake, with two platforms and a single removal. The idea that strict unidirectional removals correspond to the early stages of reduction is reinforced by the absence of bidirectional cortical blanks. The Mode A6 and A7 illustrate an advanced stage of reduction and some of them appear rather exhausted. They show a bidirectional reduction on a broad face from two opposed platforms but also a second flaking surface on a narrow face. Reconstruction of the reduction stages shows that, at least occasionally, the two flaking surfaces interact. Blanks are detached from the broad face, extending to the narrow face and going back to the broad face. Other examples show attempts to remove a crested blade from the narrow face at the end of the reduction. One example appears unidirectional, but the median part of its flaking surface has been removed by an overshoot. The second narrow face, opposed to the flaking surface, is sometimes prepared as a posterior crest. Thus, the core morphology illustrates a volumetric or sub-volumetric approach consistent with the occurrence of specific technical blanks such as crested, neo-crested, *débordant* and naturally backed blades. These blanks are removed from the intersection between two surfaces and range from 50 to 100 mm long and 25 to 40 mm wide. This, together with the sequences of removals observed on the cores, may indicate that lateral management of convexities happens during several stages of core reduction. Thus, it is assumed that reduction starts with unidirectional removals, using naturally shaped crests, then extends to the broad face of the core and proceeds by bidirectional removals from two opposed platforms. The convexities are managed by removing a thick crested or *débordant* blade from the intersection of the broad and narrow

face. Then, reduction continues on the broad flaking surface. The narrow flaking surface visible on the core corresponds to the last attempts to resume the process before the reduction ends. Most of the cores show the use of a single narrow face, but in one case small hinged negatives and the shaping of an anterior crest could indicate that a second narrow face was tested for similar purposes. In sum, the large blade production is based on an interdependence between surfaces and indicates a sub-volumetric conception of the core morphology. The presence of a radial Levallois core is also noted.

Blanks are classified as convergent or parallel according to the orientation of their edges. Convergent blanks, although not numerous, show a high degree of variability in terms of size and shape. Some examples are massive and elongated, others are relatively small. Both bidirectional and unidirectional dorsal scar patterns are observed and the direction of removal does not seem to be correlated with the size of the blank. It is assumed, therefore, that bidirectional reduction is adopted rather early in the reduction process. These observations partly contradict Goebel (1994) who, although noting the coexistence of uni- and bidirectional scars, retained unidirectional as clearly dominant. Some of the blanks are typologically Levallois points. Most of the blanks with parallel edges are fragmented; however, some of them appear remarkably massive. Both unidirectional and bidirectional dorsal scar patterns coexist in roughly equal proportions and the occurrence of massive blade fragments with bidirectional patterns seems to confirm a rather early use of two opposed platforms in the course of the reduction.

Two cores on thick blades occur in the sample and are classified as Mode B5 and Mode B7. From their asymmetrical section and from their thickness, it appears that the core blanks are *débordant* blades struck from a large blade core. The Mode B5 core shows a rather intense reduction along the left edge that proceeds from two opposed platforms. Some discontinuous retouch could be seen as a posterior crest, although its technological relevance remains unclear. Striking platforms are plain with a marginal faceting. The Mode B7 core is made on a thick asymmetric blade with a proximal truncation. It shows

several opportunistic attempts to initiate a reduction process using the available natural edges. Some of the removals extending on the broad face of the core blank are posterior to the truncation. In this context, and following a technological approach, the alternate retouch along the edges could be seen as a posterior crest. These cores produce small laminar blanks and some of which may be naturally backed.

The platforms are faceted and plain, with the notable occurrence of partial faceting. The proportions reported here are significantly different from those collected by Goebel (1994) based on the retouched toolkit. For the most part, the external edge bears no evidence of thin abrasion, but a few blanks show a strong abrasion combined with a lip. Trimming (Goebel, 1994) is not counted here as platform preparation as its role in the blank removals is not clearly defined. The mean of platform thickness is higher than 4 mm. Considered as a whole; these features indicate the use of hard hammer percussion with a possible use of soft stone hammer.

Among the distinctive features of the retouched toolkit are blades with proximal inverse retouch. The examples included in the sample are all mesio-proximal fragments and represent one of the most recognizable typological components of the retouched toolkit. The refitted point, although it could not be included in the studied sample, is of great importance as it indicates that these blades were likely pointed. The massive blade mentioned earlier could not be included in the studied sample as its provenience could not be assessed. It is not clear if it this artifact is associated with OH5.4-5.5, but the dorsal scar pattern and the massive aspect of the blade are consistent with such an attribution. As described below, technological features of OH5.1-5.3 are different (unidirectional reduction, absence of blade cores, quasi-absence of blades) and do not match with the production of such blanks. Bifacial elements are also part of the retouched toolkit. They show a high degree of variability in shape and in technology. One is typed here as a Keilmesser and is produced on a slab. The two others can be typed as bifacial leaf-points, one of which is on an unknown blank and the other on a blade blank. The largest biface is not included

in the studied sample but is clearly associated with OH5.4-5.5.

### 5.2.2 OH5.1-5.3

The remaining part of the material attributed to OH5 is mainly characterized by a series of microblade cores. They are produced on small river pebbles and oriented exclusively toward the production of very small blanks. These pieces have been previously interpreted as wedge-shaped core preforms (Derevianko *et al.*, 1987; Derevianko, Shimkin, *et al.*, 1998) due to the extension of the cortex visible on some of them which may indicate a rather low degree of reduction. Others show at least two distinct flaking surfaces related to orientation changes in the course of reduction. This could indicate a more intense exploitation of the cores or an opportunistic exploitation of the shape of the nodule. The reduction is volumetric and semi-turning, unidirectional, and with lateral preparations. The bifacial preparation and the 'counterstrike' mentioned by Derevianko (1998) probably correspond to a combination of lateral preparation and tablet removals. More generally, and as suggested previously, these cores share some similarities with wedge-shaped cores (Derevianko 1998) or prismatic cores (Goebel, 1994) based on their volumetric form and the fact that their flaking surfaces are primarily located on a narrow face. Typologically, some of them are close to carinated endscrapers cores (Demars and Laurent, 1992).

Derevianko and colleagues (Derevianko, Shimkin, *et al.*, 1998) also notes that, in this assemblage, the actual microblades are lacking. One would expect to find the spalls detached from these cores; however, their small size would have required a systematic screening of the sediment with a 2 mm mesh. No precise mention regarding the screening procedure could be found, and the lack of screening may partly explain the absence of such artifact class. Although in the European record such a technology is usually assumed to be linked with the use of an organic hammer, the absence of abrasion does not allow any clear identification of the percussion technique.

The blade production is rather poorly represented in the assemblage, but the blades observed show unidirectional dorsal patterning and a curved profile. A pronounced oblique angle combined with the general morphology observed on blank overshots indicates, at least occasionally, the occurrence of a volumetric core reduction. Platforms are small (< 4mm thick) and bear a pronounced lip. A few examples display thin abrasion on their external platform edge.

To summarize, the main characters previously noted on the UK1-1 assemblage when treated as a whole also occur in the results of this analysis (Derevianko *et al.*, 1987; Goebel, 1994; Derevianko, Shimkin, *et al.*, 1998). The main differences are expressed in the blank analysis with regard to the dorsal patterning and the platform preparation. These differences are possibly due to the fact that the assemblages studied are different; Goebel considered OH5.1/5.5 as a whole and recorded technological attributes exclusively on the retouched toolkit. Moreover, some methodological differences concerning the definition of attributes (faceting, trimming) could result in the observed differences. The present analysis finds its best match with the Slavinsky's study (2007) both in terms of the taphonomy and technology. First, the taphonomic reassessment of the assemblage underlines the necessity of recognizing five archeological occupations within cultural level 3. Second, the technological approach suggests the existence of two distinct technological traditions belonging respectively to OH5.1-5.3 and to OH5.4-5.5. The first is characterized by a microblade component, as illustrated by a series of small prismatic and sub-prismatic unidirectional cores on small-size pebble blanks. These cores show an opportunistic volumetric approach oriented toward a frontal and semi-turning reduction from a narrow face. Orientation changes are frequently observed and likely correspond to an adaptive strategy that uses available angles and convexities offered by a small size blank to a strict volumetric reduction. These cores have been identified in previous studies and were considered either as wedge-shape cores preforms (Derevianko, Shimkin, *et al.*, 1998) or as sub-prismatic cores (Goebel, 1994). The few blades available indicate a fully developed volumetric technology. By contrast, OH5.4-5.5 shows a production from massive down to medium-size blades,

convergent or parallel, and by a sub-volumetric, bi-directional reduction sequence. The cores illustrate an interaction between two surfaces and the repeated use of crested and *débordant* blades. The bidirectional reduction includes short unidirectional sequences. In addition, some of the thickest technical blades are turned into cores for the production of small blades/bladelets. The most notable retouched tools belong to the OH5.4-5.5 assemblage. These confirm the coexistence of various bifacial tools and points on blades with basal thinning as suggested by Derevianko (1998). Some specific technological features such as partial faceting and *débordant* platforms are noted. As reported by previous authors (Goebel, 1994; Derevianko, Shimkin, *et al.*, 1998), the Levallois component is poorly expressed and consists mainly in the occurrence of Levallois points among the convergent blanks and of a Levallois radial core. Other type of tools, such as naturally backed knives, awls, angle burins and notches are mentioned. Notable too is the mention of foliated bifaces (Derevianko *et al.*, 2003).

### 5.3 UST-KARAKOL 1 SECTOR 2 (UK1-2)

Derevianko and Volkov (2004) described the blade technology in UK1-2 as the gradual development of two main trends (Figure 181). Trend 1 is a deeply rooted process that illustrates in five stages a continuous transition from the earliest level of occupation (stratum 18) to the Upper Paleolithic (stratum 9). It is described as a shift from a preferential Levallois flake production with radial preparations to a blade production with preparations occurring only on the distal end of the flaking surface. Until stage 3, the sub-radial opposed removals visible on the distal part of the flaking surface are interpreted as distal preparations. Starting from stage 4, an additional striking platform appears, but it is considered by Derevianko and Volkov (2004) as strictly devoted to rejuvenation. The final stage shows a narrowing of the flaking surface.

The second trend is described in 4 stages as a gradual transfer of the core flaking surface from the broad face to the narrow face. This trend has a less deep time depth as it develops only from strata 11 to 9. Trend 2 does not include the use of an auxiliary plat-

form. The shift from flake production on the broad face of the core (stratum 11) to the narrow face (stratum 9) is proposed to be mainly driven by the exhaustion of the core. The exploitation of the narrow face is then considered as a technological response allowing a longer reduction by switching flaking surfaces. The trend 2 is described by Derevianko and Volkov (2004) as a rather basic technological system mainly adapted to raw material nodules of tabular shape and producing poorly standardized elongated flakes. The shift of flaking surface is considered as an evolutionary development, representing a possible origin of microblade production (Derevianko and

Volkov, 2004). Furthermore, the same authors say that these methods are associated with a generalized use of pressure flaking.

Recently, taphonomic issues have been raised regarding the material from UK1-2. Refitted artifacts show vertical movement between strata 15/12 to strata 8/11 (Slavinsky, 2007). This situation is particularly problematic as strata 15/12 assemblages are attributed to the MP of Levallois-Mousterian tradition. When looking at the published UP material (e.g. Derevianko *et al.*, 2003), it clearly appears that the majority of Levallois elements occur between strata

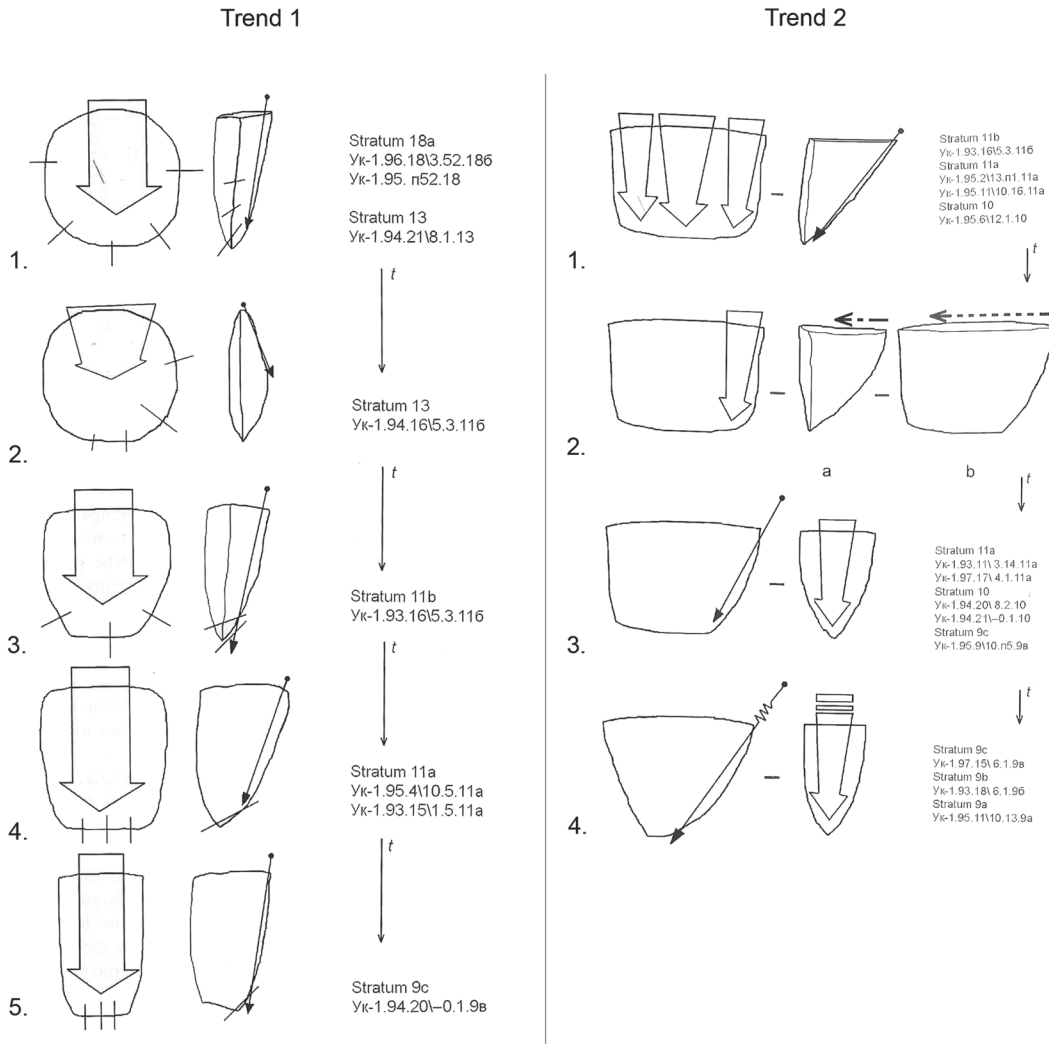


Figure 181: UK1-2, Evolutionary trends of the Ust-Karakol laminar production as proposed by Derevianko and Volkov (2004)

11 and 10. Furthermore, the majority of the microblade cores are concentrated in strata 10 and 9, although they occur sporadically within strata 11 and 10. Although this situation has been interpreted as illustrating a transitional process, vertical movement of artifacts could play a role in creating these assemblages. For these reasons, the assemblages from UK1-2 are treated here as a whole and mainly qualitatively.

The technological features of blade reduction in strata 11 to 8 display an association between uni- and bidirectional cores. One blade core displays two striking platforms and clear hinged removals up to the middle part of the flaking surface. Although described by Derevianko and Volkov (2004) as showing an auxiliary opposed platform, this specific case illustrates a convincing bidirectional reduction. Indeed, on some of the cores the removals are rather short or fragmentary, which could indicate the dominance of one striking platform over the other. This strategy could facilitate the production of blades with a straight profile and a series of short blade removals. At least a third of the complete blanks and byproducts show opposed negatives on the distal part of their dorsal face (Pelegrin, 1995). The dorsal patterning seems, however, mostly unidirectional, and the few bidirectional blanks in the assemblage are mainly fragments of all kinds. Generally speaking, the discrepancies between the cores and the blank dorsal patterning could be explained by the high rate of fragmentation and undetermined dorsal patterns. Moreover, cores seem reduced following rather long unidirectional sequences before a platform switch and, therefore, produce mainly unidirectional blanks. As suggested by Derevianko and Volkov, (2004), opposed removals may also represent management of the flaking surface distal convexities.

Beside the blade production, artifacts linked with a production of microblade blanks are among the most representative of this assemblage. This includes a series of cores, unretouched blanks, technical pieces and a few retouched artifacts. In other words, most of the elements of the reduction sequence are identified. Core blanks are mainly on slabs, small size pebbles or cortical flakes. For the most part they display a triangular flaking surface located on a narrow edge. The pattern of reduction is unidirectional with crest-

ed elements used to initialize or resume the reduction process still visible on the core flaking surfaces. Lateral flakes are removed from the striking platform or from a provisional opposed platform in order to keep the flaking surface narrow and triangular. This type of core corresponds to the wedge-shaped cores previously mentioned (*e.g.* Derevianko *et al.*, 2003). A few fronto-lateral flakes occur in the set, indicating that removals are detached from the corner between the flaking surface and the side of the core. This form of core management may be linked with the presence of cores with nosed or shouldered endscraper morphology, as they create a notch narrowing the flaking surface. Carinated endscraper core forms occur in small numbers with some of them showing orientation changes in the course of reduction. Carinated and nosed endscraper forms are listed as an Aurignacian feature based on analogies with the European record (Otte and Derevianko, 2001). These types are, however, not frequent in the UK1-2 set and are often combined with a reduction from the narrow face. This suggests that they may represent an opportunistic adaptation of UP microblade technologies to the shape of small pebble core blanks (Zwyns and Flas, 2010).

Carinated burins are absent with the exception of an antero-lateral neocrested blade that bears a few mi-

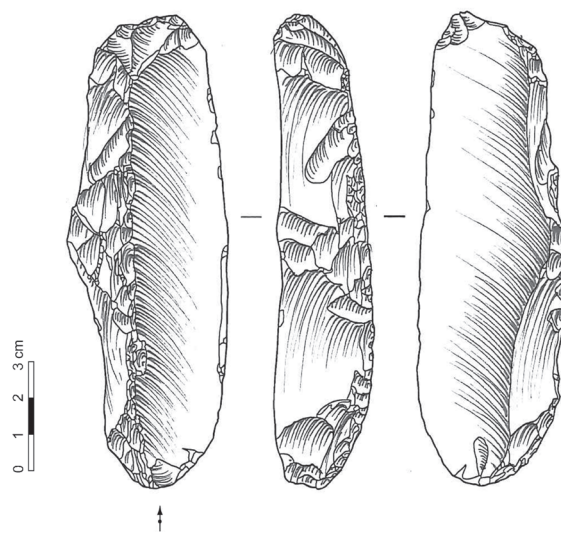


Figure 182: UK1-2, stratum 9, carinated burin on neocrested blanks (redrawn after Derevianko *et al.*, 2003)

croblade removals on its distal end, opposed to small platform preparations (Figure 182). Notable is the presence of a truncated-faceted core produced on a flake.

From a general point of view, the good representation of small platforms (<2 mm thick) and of thin abrasion suggests the use of organic hammers with an occasional use of stone hammers. Cores do not display a grooved flaking surface. Microblade negatives do not show clear parallel edges and are too irregular to be convincingly associated with pressure flaking as defined by Tixier (1984).

Unretouched blanks are poorly standardized and highly fragmented. Although retouched microblades are described as backed (Derevianko *et al.*, 2003), no abrupt retouch could be observed. Instead, retouch is rather thin, or semi-steep. One retouched microblade corresponds to a small-sized Font-Yves point (Demars and Laurent, 1992). This type of retouched element is quite common in Upper Paleolithic assemblages. More diagnostic are the Dufour bladelets (Demars and Laurent, 1992) which occur mainly in Aurignacian or Proto-Aurignacian contexts in Europe (*e.g.* Demidenko, 2001; Bon, 2002; Sinitsyn, 2003; Broglio *et al.*, 2005; Bordes, 2006; Teyssandier, 2006; Zwyns, in press) or the Near-East (*e.g.* Bergman, 1987, 2003; Chazan, 2001; Fox, 2003; Monigal, 2003; Soriano and Ploux, 2003; Goring-Morris and Belfer-Cohen, 2006) but also in the Zagros Aurignacian (Otte and Kozłowski, 2007; Otte *et al.*, 2007, 2011; Tsanova *et al.*, 2012) and in other assemblages from Central Asia (Derevianko, Islamov, Kolobova, *et al.*, 2008; Kolobova *et al.*, 2008; Flas *et al.*, 2010; Zwyns and Flas, 2010). The two examples here are fragments and present some atypical features. One is on the distal end of a rather thick blank with alternate retouch. The second is a mesial segment with an inverse retouch located along the left edge, a feature which is rather atypical in Aurignacian context. Some of the retouched blades appear similar to Aurignacian blades including a slightly strangled (*étranglée*) blade. The *lame Aurignacienne* type of tool was recognized in southwest France and is described as massive blades with continuous scalar retouch (Demars and Laurent, 1992). Although this broad definition implies a certain ubiquity, only

a few blades in the UK1-2 assemblage could correspond to it. A fragment of bifacial tool produced on an unknown blank type is worth mentioning (Figure 183). In addition to the described material, various UP types of retouched tools were recognized, including a fragment of blade with bifacial retouch.

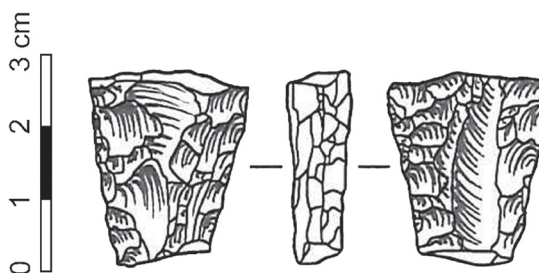


Figure 183: UK1-2 stratum 9 (redrawn after Derevianko *et al.*, 2003)

To summarize, the present analysis is in agreement with the view of the UK1-2 assemblage as mainly Upper Paleolithic. The laminar technology shows a general volumetric conception with unidirectional reduction and the use of crested elements. In addition, a separate reduction sequence oriented exclusively on small bladelet/ microblade blanks reinforces the idea of a fully developed Upper Paleolithic technology. This technology uses direct percussion, and no evidence for pressure flaking occurs in the assemblage. The elusive presence of Levallois elements, of faceted platforms, of bidirectional blade reduction (including one Mode B core) has to be interpreted carefully given the taphonomic issues suggested by the refits. In spite of the fact that, in the present analysis, the material from strata 11-8 is treated as a whole; it appears quite clear that the Levallois technological component is concentrated between strata 11 and 10. Vertical movement of artifacts coming from the Levallois-based strata 15-12 cannot be excluded. Moreover, the lack of connections between the excavation areas from UK1-1 and UK1-2 make attempts to correlate the sequences rather difficult. The evolutionary reconstruction proposed by Derevianko and Volkov (2004) will be discussed in the next chapter.

#### 5.4 ANUY II

Taphonomic analyses have not yet been performed on this rich collection. Previously published work on the material underlines the existence of sterile horizons between the OH, and the preservation of combustion features seems to indicate that high energy post-depositional processes did not rework the sequence (Derevianko *et al.*, 2003). The apparent truncation of some strata (strata 7 to 11; OH1 to OH7) could indicate erosional processes affecting the upper part of the archeological sequence.

As mentioned earlier, the lithic assemblages from Anuy II OH6-12 are attributed to a single tradition typical of the middle part of the Upper Paleolithic (Derevianko, Markin, *et al.*, 2001; Derevianko *et al.*, 2003). The blade reduction is described as quite variable but dominated by a parallel pattern of reduction, including prismatic and narrow-faced cores. In addition, wedge-shaped, narrow-face, and prismatic cores are associated with a microblade production. All microblade cores have a plain platform and display parallel microblade removals on their flaking surface. The blanks bear parallel removals on their dorsal face. Derevianko and colleagues (Derevianko *et al.*, 2003) consider the ‘micro-tool’ category as the most characteristic for the Anuy II assemblage. It includes tools on microblade and bladelet blanks, (described as ‘Gravettian micro-points’) with converging edges, displaying marginal abrupt retouch but also micro-endscrapers, retouched microblades and angle borers. Endscrapers, backed knives, dihedral and angle burins are also mentioned.

The results of the qualitative analysis are in good agreement with these descriptions of the assemblage. Large blade cores are not numerous, but show a minor occurrence of bidirectional reduction, either on volumetric or flat-faced cores. The frequency of platform switches is not clear, and according the dorsal patterning observed, bidirectionality could appear as rather marginal. Platforms are mainly plain, with lips and traces of thin abrasion. Indeed, the production of bladelets and microblades is the most typical feature observed. Cores are produced on nodules and slabs of metamorphic rocks selected among the pebbles brought by the Anuy and the Karakol rivers.

The first type of reduction takes place mainly on a triangular flaking surface located on the narrow face of the core. Removals are detached from plain platforms with an occasional sub-convergent orientation. Some of the cores show traces of posterior crests on the distal part of the flaking surface or opposed lateral removals maintaining the triangular shape of the flaking surface. Some the cores have their lateral surface shaped by a crest. These cores are categorized as narrow-faced cores, and according to the size of the removals, mainly produced small blade/bladelet blanks. Among other features, the lack of parallelism in the negatives and the smooth external edge of the cores (with thin abrasion), however, rules out the use of pressure flaking. More rarely, cores are reduced on a broad surface, adopting a carinated endscrapers form or show a morphology between carinated and narrow-fronted. The latter illustrates a change of orientation in the reduction with the two flaking surfaces being perpendicular. Two atypical Mode B cores occur at the bottom of the sequence. Also, the occurrence of a flat-faced core in OH9 (Derevianko *et al.*, 2003, Fig.: 177, num. 5) and of a sub-volumetric core in OH11 (Derevianko *et al.*, 2003, Fig.: 178, num. 9) are noted, but these artifacts could not be studied.

Retouched blades include endscrapers, burins and sidescrapers (Derevianko *et al.*, 2003, Fig.: 179, num.2) types but also a rather massive blade with a curved profile and continuous retouch (Derevianko *et al.*, 2003, Fig.: 179, num.7). Burins are mainly angle burins on retouched blades. One example is an axial dihedral burin on an oblique truncation (Derevianko *et al.*, 2003, Fig.: 184, num. 11), and one is a multiple burin. Burins usually show a relatively narrow chisel. One reported burin is a *burin plan* with removals perpendicular to the blank axis (Mode B4) (Derevianko *et al.*, 2003, Fig.: 184, num. 10).

The retouched tool kit includes a small series of retouched bladelets and microblades. Among the types observed, pointed small blades with a distal oblique truncation have been previously typed as ‘Gravettian micro-points’ (Derevianko, Markin, *et al.*, 2001; Derevianko *et al.*, 2003). They differ significantly from *microgravette* points as they do not display a straight back made of continuous abrupt retouch but rather a

combination of semi-steep and steep retouch localized mainly on the distal part. Furthermore, they are produced on a small blade blank rather than on a microblade. Micro-endscrapers are produced on rather irregular bladelet blanks. One fragment of Dufour microblade of Dufour sub-type is documented on a straight unidirectional blank. It displays an alternate, thin, marginal retouch with the inverse retouch along the right edge. Bilaterally retouched small blades and microblade fragments are also present. Among the retouched tools, a series of endscrapers, including nosed endscrapers, show small bladelet removals on their front. Whether these artifacts are cores or tools is not clear (*e.g.* Derevianko *et al.*, 2003, Fig.: 179, num.2; 22). The presence of micro-endscrapers suggests a reduced size for this type of tool, but it could also imply a production of small bladelets comparable to the ones described for endscrapers of Caminade type (Morala *et al.*, 2005).

The collection from Anuy II clearly shows a majority of Upper Paleolithic features. The collection observed suggests a fully developed blade and microblade technology obtained by direct percussion. The volumetric conception of the cores is generalized, even though a certain degree of variability is observed. The results of this study are almost in full agreement with the previously published work. A thorough attribute analysis describing each OH independently could bring some additional insight on the assemblage's variability.

### 5.5 ANUY III

The small assemblage from the level 12 of Anuy III has been described as providing evidence of a well-developed parallel reduction from prismatic cores together with a significant proportion of microblades (Derevianko, Shunkov, *et al.*, 2000; Derevianko and Shunkov, 2002). The tool kit is dominated by Upper Paleolithic tools with only a few notch-denticulates as isolated Middle Paleolithic types. Upper Paleolithic types are described as carinated endscrapers, asymmetrical points on retouched blades and backed microblades (Derevianko and Shunkov, 2002).

In spite of a fairly reduced sample size, the Anuy III assemblage includes a series of retouched microblades. These artifacts illustrate a significant variability in terms of retouch types. The microblades are exclusively unidirectional blanks and display direct retouch, on the right or left edge with thin, semi-steep or steep retouch. Two of them have straight backs and are typed as backed bladelets. The blanks are likely detached from cores with carinated endscraper morphology. Notable is the occurrence of a small sub-volumetric bidirectional core.

### 5.6 SUMMARY

After comparing the results of this study with the general framework, several observations can be formulated. First, the existence of two UP traditions as proposed by Derevianko, (2011a; see also chapter 1) seems reinforced by the present reconstruction of the laminar reduction sequences. Two technological systems are present with deep structural differences in 1) blank production techniques, 2) in tool typology and 3) in technical systems. Second, even if this study is in a general agreement with the previously published material, technological interpretation may differ, leading to alternative proposals for the definitions of each tradition and for the assemblages associated with each. A first technological trend is fully expressed among the assemblages of Kara-Bom OH6-OH5 and UK1-1 OH5.4-5.5 and is characterized by the coexistence of Levallois points and volumetric blade technology. In the following Chapters, this variant is referred to as Initial Upper Paleolithic (IUP) (Kuhn *et al.*, 1999; Kuhn, 2003). Kara-Bom MPH1, although originally described as Mousterian of Levallois tradition, finds its best fit within the IUP. The small sample size, the lack of diagnostic features and reliable chronological landmarks do not allow further assignments. In fact, the occurrence of Levallois flake cores and of MP tool types is not exclusively a Mousterian feature and are, meanwhile, parts of the variability observed among IUP assemblages. From a techno-typological point of view, Kara-Bom OH4 is considered as much closer to IUP than to any other described assemblages. Of course, MPH1 and OH4 lack some of the typical IUP markers, but this is not surprising given

their reduced sample size. The second technological trend is recognized in UK1-1 OH5.1-OH5.3, UK1-2 strata 11-8, Anuy II strata 6-12 and Anuy III stratum 12. Technological and typological characters of this trend indicate a developed Early Upper Paleolithic (EUP) technology. None of the IUP and EUP assemblages studied can be associated with the use of pressure flaking technique.