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Chapter 19

Eastern and Central Europe before 30 kyr BP: Mousterian, Levallois and Blade Industries

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More than thirty years ago the Crimean Mousterian was compared with assemblages discovered in Zwierzyniec, Kraków in Southern Poland since the 1930s. At this time, several entities were distinguished: “Micoquo-Prondnikian”, “Levalloisian” (Shaitan Koba type), “Pre-Szeletian” and “Late Levalloisian” (Chmielewski 1975b). Typologically, the site of Kraków-Zwierzyniec, Area P resembled Levallois-Mousterian industries from Molodova I and V and from Shaitan Koba. Over the last decade a short chronological scenario has been proposed for a part of these industries throughout this territory, whereby a Late Levallois-Mousterian dating back to OIS 3 has been defined (Chabai 1996; Valladas et al. 2003; Haesaerts et al. 2003). An older, rarely documented, Mousterian also occurred during the penultimate Glacial, and is better documented at the beginning of the last Glacial. The Middle Palaeolithic of Central and Eastern Europe comprises a very distinctive Micoquian techno-complex which has been the subject of a number of modern investigations (e.g. Ronen & Weinstein-Evron, eds. 2000). The Aurignacian, which co-existed with, or followed, different Late Middle Palaeolithic groups, is also rather well studied (e.g. Demidenko, Otte 2000/2001; Demidenko 2000/2001; Zilhao, d’Errico 2003). On the other hand, the Mousterian, including the Levallois-Mousterian, has been less fortunate, and has been somewhat overlooked in the course of modern technological, typological analyses and other studies. However, the transitional period in this region exhibits both important variability, and the co-occurrence of various “cultural” entities, flaking methods and techniques. “Transitional industries” attract a lot of attention and provoke discussions. At the same time, they have yielded unclear definitions as well as a diverse variety of technological and typological characteristics.

Considering the new data collected in different regions of Central and Eastern Europe over the last decades, an inter-regional comparative study of the “non-Micoquian” Middle Palaeolithic is now required. Thus, in the following, an attempt is made to analyse some better dated key sites and selected assemblages. Additionally, some Levallois-based Early Upper Palaeolithic industries, which derive from the local final Mousterian tradition, are included in this review.

EASTERN EUROPE

Sites located between the Eastern Carpathian Mountains and the Don Valley (Ukraine and Russia) have been selected for comparative analyses. Several technological and territorial (geographical) groups have been distinguished across this vast area, covering a time span from the Last Interglacial, Eemian (OIS 5e), to the Denekamp Interstadial (at about 30 kyr BP) for the latest Middle Palaeolithic industry. They are located in several geographical areas in the Western Ukraine, e.g. in Volhynia (Kulichivka, layer III-d), in the Prut and Dneestr valleys (Molodova I and V, Yezupil, Ripiceni-Izvor etc.), as well as in the southeastern part of this country, i.e. in the Crimea (Kabazi II, Shaitan-Koba), Donbass-Azov (Kurdiumovka, Belokuzminovka), and in the Don Valley (Shlyakh) in Russia.

Assemblages are characterised by a Middle Palaeolithic tool-kit (except bifacial ones) and by different levels of Levallois and Upper Palaeolithic blade elements (e.g. Levallois-Mousterian, blade Mousterian). They also display some common features and analogies with Central and Western European “non-Micoquian” Middle Palaeolithic sites.

The chronology of the Western Crimean Mousterian is based, to a certain degree, on results from absolute dating methods (AMS, ESR, etc.) and on newly recovered archaeological remains, both of which have led to the proposal of a model incorporating both the industrial and chronological variability of the Mousterian and Middle to Upper Palaeolithic transition in Eastern Europe (Chabai 2003a, 2004c, Chabai et al. 2004).

Three Middle Palaeolithic entities have been distinguished: Eastern Micoquian, Levallois-Mousterian and blade Mousterian (Chabai 2004c, Chabai et al. 2004). Although the Levallois-Mousterian is subdivided into two groups, the first featuring a developed blade production, and the other only a scarce blade component, neither of the two are of chronological or evolutionary significance.

Crimea, Ukraine

The Levallois-Mousterian is well represented in this region, e.g. at Shaitan-Koba (Kolosov, 1972), at Karabi Tamchin II/2 and III (Yevtushenko, 2004), and especially at Kabazi II with its long sequence of different industries (Chabai et al. 2004; Chabai, 2004c); and as non homogenous industries, such as Kabazi I and Bakchisarayskaya, lower layer. In the Crimea this entity has been termed “Western Crimean Mousterian” (WCM) and has been subdivided into

two chronological and technological stages (Chabai 1996; 2000):

- an early stage (around 45-36 ±3 ky BP) is represented by Shaitan-Koba upper level and Kabazi II, IIA/2 through II/7; and
- a late stage (around 36-30 ky BP), as represented by assemblages from Kabazi II, II/6 through.

The difference between these stages lies solely in core reduction, i.e. in the use of Levallois and/or blade technologies (Chabai 2004c, Chabai et al., 2004, Chabai, Chapter 1 this volume). During the early stage both technologies were used. The Levallois strategy is represented by two parallel methods: linear Levallois (“classical” tortoise cores for a single flake) and recurrent Levallois uni-/bi-directional of Biache type for elongated flake and blade production, after E. Boeda (1988a). Levallois tortoise cores and Levallois recurrent flake / blade cores have faceted platforms. Average faceting indexes are high (IFl=60, IFs=52). Non-Levallois blade production was based on volumetric blade cores (some with crest installation), whereby the average blade index is moderate (I_{lam}=19). During the late stage, Levallois technology is not so pronounced as was the case in the early stage: there is no trace of a tortoise core, though some Levallois flakes and bi-directional Biache recurrent cores do persist. Blank production was based on the reduction of flat parallel blade cores with single or opposed platforms, and on volumetric cores (crested blades and tablets were used for core shaping and re-preparation). The blade index increased considerably (I_{lam}=35), while faceted platforms decreased slightly (IFl=58; IFs=37). Hard hammerstone prevailed for all technologies, including the reduction of Upper Palaeolithic cores. On the other hand, soft hammerstone also occurs in both MP and UP core reduction systems.

Both stages feature an identical toolkit which comprises the dominant simple lateral scrapers (55-70%), sometimes naturally backed, rare convergent scrapers and points (14-25%), as well as denticulates and notches (less than 15%). More than 50% of tools were made on blades and elongated blanks; Upper Palaeolithic tool types are not common and do not occur in most levels. The typological structure of the toolkit is clearly Middle Palaeolithic in all stages of the Western Crimean Mousterian.

Personal observations made in 2003 and 2004 confirmed the general technological conclusions:

I. The early stage of the Kabazi II sequence is characterised by cores at different stages of reduction, e.g. Levallois pre-cores with centripetal preliminary preparation, applied prior to the removal of the desired single preferential blank (linear mode) or a series of blanks (recurrent mode), cores of full debitage step with negative(s) of planned flake(s) or elongated blanks, as well as exhausted cores. Surprisingly, although the latter are rather large, they are also very thin and display heavy repeated reduction of raw material thickness. Additionally, thin pebbles and flakes were used as initial blanks for classical tortoise cores for single flake. In this case the reduction sequence was short (only one cycle), and following the removal of a large preferential flake, the core became too thin for further Levallois reduction and was consequently abandoned.

Some Levallois cores-on-flakes display flaking surfaces located on the ventral face. In such cases the corresponding blank from these cores retains the positive lower part of that core-on-flake. Final flakes of the linear method are large with carefully prepared butts. Only lineal, "tortoise" Levallois cores-on-flakes and thin pebbles document the independent status of this method; the same cores made on nodules with more mass were very probably involved in a dominant Levallois recurrent method, showing different or final steps of reduction of Bache type cores (Chabai 2004c, Chabai this volume).

Preparation of a flaking surface of recurrent cores was achieved by the removal of small flakes around the core periphery (in this case recurrent pre-cores are similar to lineal pre-cores) or by lateral and distal trimming from auxiliary platforms (a local speciality; see also Usik 2003). Uni-/bidirectional exploitation resulted in numerous and various recurrent, always faceted, debitage products (deborant flakes, flakes and blades of primary and secondary order, small preparation removals). A peculiar feature of some debitage products, including final blanks, is an association with faceted butts with diffused bulbs and lips (sandstone soft hammer).

Among exhausted cores, numerous centripetal and some discoidal forms with a high profile occur. Few centripetal cores display full debitage; initial cores of this type are absent. These facts, as well as a number of small deborant flakes, bear evidence to the final steps of core reduction, and probably represent a last technological episode of the Levallois system rather than independent centripetal or discoidal methods.

Reduction of blade volumetric cores was realised in two manners:

1) Direct exploitation of non-prepared nodules,

often with narrow surface, from two opposed platforms, confirmed by numerous narrow faced cores and refittings (Chabai 2004c, p.58). In the debitage process, the flaking surface was maintained by cortically backed blades/flakes. Platforms were prepared initially by single blow or facetting, and, when necessary, core tablets were detached. Elimination of platform edge was common. Debitage proceeded on core laterals and resulted in partially turned cores. Narrow face core-on-flake for the removal of small blades, with further extension of flaking surface on dorsal side, was recorded.

2) Prepared reduction of crested pre-core (lateral or central crest installation with one or two prepared sides versants; preparation of platform by facetting or by single blow; removal of crested blade followed by uni- and bi-directional debitage; rejuvenation of the flaking surface through neo-crests and platforms by means of tablets). Two attributes show the prevalence of this method over direct blade debitage: a) numerous volumetric narrow and wedge-like cores, partially with flaking surfaces extending towards the core flank (with large flaking surface extended to the sides) on different stages of reduction with remnants of crest, as well as b) various crested removals (initially with prepared crest on one or two sides, partially prepared, central, and later in the sequence with lateral and secondary neo-crests). Core flaking resulted in mid-size and small blades (some with bladelet proportions) with prepared and flat butts. Bulbs are pronounced or less developed, lips are frequent (even on crested massive blades), as is butt zone trimming and abrasion. An example of a 14 cm long, secondary central crested blade (prepared on two sides, linear butt, diffused bulb) indicates a considerable elongation of volumetric blade debitage.

In sum, core reduction displays a dual technological structure. Levallois and UP blade methods are clearly independent, representing two parallel technological systems. In the frame of the reduction of Levallois blade cores the detachment of target flakes and blades was confined to the longest dimension of the core and was limited to the large flaking surface. Main platforms were always faceted. Re-using narrow parts of these cores to create additional flaking surfaces was unknown. Refittings realised by V.I. Usik have also shown that there was no fusion or influence between MP and UP production systems.

Thus, the technological “evolution” from flat Levallois towards volumetric blade production cannot be attested. The same technological pattern was observed in the upper levels.

II. The late stage of the WCM at Kabazi II has yielded abundant cores at different stages of reduction and debitage products. Also, it is marked by the absence of Levallois linear tortoise cores; however, a series of Levallois flakes with centripetal scars do occur during this stage (Chabai 2004c). The Levallois linear method seems to have disappeared, whereas, in our opinion, the Levallois recurrent blade option persisted and is represented by a number of Biache type cores, as already noted (Chabai 2004c, fig. II-17, 3 and II-18 and this volume). Normally, these cores were reduced until a rectangular shape displaying final flake / blade negatives, remnants of primary centripetal preparation, and sometimes auxiliary platforms (platforms are faceted) remained. Cores also became flat and thin after reduction, just like their predecessors from the early stage of the WCM. Recurrent debitage products are present. Thus, any differences, i.e. in the frequencies of specific blank types, must be attributed to the ratio of Levallois to UP blade methods. In other words, if blades are more numerous, then volumetric core reduction prevails over MP flat core exploitation (Levallois or non-Levallois according to the personal interpretation of this technology).

Some flat centripetal cores occur; small exhausted ones could represent the final stage of MP core reduction (Levallois), while several initial cores of this type document the parallel usage of non-Levallois centripetal method. Nevertheless, MP flake reduction was additional to the dominant blade manufacturing. The UP volumetric reduction is similar to that of the early stage, i.e. rare direct mode and mostly prepared debitage with crest installation. Single blow cores and corresponding blades are more frequent than before, which has resulted in a decrease in the indexes of faceted butts. Bifacial pre-core on flake in level II/5-6 at Kabazi II is a novelty for WCM blade technologies.

Donbass – Asov – Mid Don

Mousterian sites and workshops in this zone display certain technological and typological similarities which have been attributed to the Belokuzminovka group (Kolesnik 1995; Nehoroshev 1996). Discussion surrounds this taxonomic entity, which features a list of industries all supposed to belong to this unit, and which is based mainly on absence/

presence of particular diagnostic and characteristic tool types, e.g. Proto-Kostienki knives. A.V. Kolesnik (2003) disagreed with P.E. Nehoroshev and proposed, for example, to exclude from this group the site of Kourdiumovka and the Zvanovka workshop, in the face of the typological poverty of these industries. The radical approach of A.E.Matiukhin (2004), based on functional differences of different assemblages, and the scepticism of the author concerning some tool types, suggested abolishing this term altogether, along with any other attempts of this nature; Mousterian *sensu lato* or ordinary Mousterian better suiting these collections.

Stratified Mousterian industries of this region have been recently attributed to the blade Mousterian on the grounds of core reduction sequences and typological features (Chabai et al. 2004; Chabai 2004c). Five assemblages belong to this group: Kurdiumovka (Early Glacial, OIS 4), Zvanovka (Early Pleniglacial), Belokuzminovka, layers 2 and 3 (Early Pleniglacial) in Donbass – Asov region (chronological position according to Kolesnik, 2003) and Shlyakh layer 8c in the mid Don (OIS 3; see Nehoroshev, 2004; Vishnyatsky, Nehoroshev, 2004). Absolute dates are only available for the Shlyakh assemblage, while the Donbass-Asov record is based solely on geochronology and pollen interpretations.

A common technological feature of these industries, according to V. P. Chabai (2004c), is a lack of Levallois reduction and bifacial tool shaping. Blade production is based on volumetric prepared (crest) or non-prepared cores (direct debitage) only. Uni- and bi-directional cores are often volumetric, e.g. with narrow and narrow wedge-like working surfaces, though flat cores are well represented. Some centripetal and discoid cores also occur. Blades account for about 20-30% of all blanks. Butt faceting is high (IF1=60-40; IFs=40-22), but nevertheless lower than in the WCM. The toolkit is slightly different from that of the Crimean Levallois-Mousterian. Narrow elongated points, simple side-scrapers, denticulated and notched tools, often made on blades, are common. A peculiar type is truncated faceted and bi-truncated faceted pieces (Nach Ibrahim technique or Kostienki knives) (Kolesnik 1994) which, although common in this region, rarely occur in other Ukrainian Middle Palaeolithic industries. Even some points and scrapers display truncated faceted bases, as well as different kinds of thinning. Belokuzminovka assemblages have a similar typological structure, though denticulated tools (some of them are pseudo denticulates) dominate over scrapers and backed knives. Upper Palaeolithic tools are present.

A. Kolesnik (2000) sees technological analogies of blade production in the Donbass-Asov region in Western Europe, e.g. in Rocourt (Otte, Boeda, Hae-saerts, 1990) (as did V. Chabai for the WCM) and later (Kolesnik 2003) with Rencourt-les-Bapaume, layer CA (Ameloot-Van der Heijden 1993). After discussions, both investigators came to the conclusion that Mousterian industries of these regions should be separated for several reasons (Chabai 2004c): a) in the Crimea, Levallois methods are well represented, while in the Donbass-Asov region they are unknown; b) the blade method of Rocourt type is better documented in Donbass-Asov, with a simpler reduction model than in the Crimea (even in later stages of the WCM faceting was very high).

Kourdiuovka

The assemblage from Udai loess (OIS 4) differs from the Crimean Mousterian in that the Levallois strategy is absent. The appearance of blade debitage (direct and prepared) through reduction of voluminous nodules (Fig. 19-1, 1, 2, 3, 4, 5, 6, 8, 9) was accompanied by centripetal and discoidal (mostly bifacial modality) methods (Fig. 19-1, 7) Blade production was based entirely on reduction of uni- and bi-directional flat or partially turned cores. Removals from opposed platforms aimed to re-construct the flaking surface and eliminate hinge fractures. A peculiar technological manner, according to Kolesnik (2003), comprises the exploitation of the narrow core part and lateral preparation and platform rejuvenation by single blow / tablet (Fig. 19-1, 1, 4II, 9). As for blade manufacturing, four generalised models have been proposed (Fig. 19-1, 4 - I-IV) which could, theoretically, represent isolated episodes of one technological chain (Kolesnik 2000; 2003). Published debitage products, refits, and Kolesnik's analysis (few crested flakes; absence of crested blades) do not confirm a wide distribution of prepared blade methods similar to those from Rocourt or Rencourt-les-Bapaume, layer CA. Blade direct reduction of naturally voluminous cylindrical nodules appears to have been predominant in Kourdiuovka. Moreover, the Rocourt type of prepared (with lateral crest) debitage was more common in the Western Crimean Mousterian where it and faceting were frequently used together with lateral crest installation. In Kourdiuovka core platform(s) were mostly prepared by single lateral blow. Debitage commenced from the narrow side. Afterwards, the flaking surface was extended to the core flank, which often resulted in partially turned cores. The second narrow part could also be involved in the production of target flakes and the

maintenance of the convexity of the flaking surface (by second crest or mostly by direct lateral removals). In contrast to the crested core shaping in Kolesnik's technological models, recurrent debordant (naturally cortical or bearing previous transversal negatives) or simply unidirectional removals from the narrow part of the core played an important role.

Thus, the main difference between blade volumetric production in the Crimea (or in many Northern-Western blade Mousterian assemblages) on the one hand, and Kourdiuovka on the other, is the use of prepared and unprepared direct core reduction. The latter was a principal concept at Donbass, while in the WCM at Kabazi II or, for example, at Rencourt-les-Bapaume, CA, crested preparation and re-preparation of a fully UP type dominates over an opportunistic non-shaped method (Ameloot-Van der Heijden 1993). Also, UP types of tools are strikingly abundant, especially burins in Rencourt, CA industry of stage 5c (with more recent Ukrainian workshops lacking these tools). Moreover, the wide usage of Levallois flake and blade methods in the western territories differs strongly from the Kourdiuovka non-Levallois technological structure, as previously mentioned.

Classical Levallois flake production, as well as the point convergent method, is evidently uncommon in this region, at least at the Donbass stratified sites. The Levallois linear method is characterised by tortoise cores and corresponding flakes recorded solely from quartzite collections of uncertain age of Derkul type (Kolesnik 2003) or at Kalitvenka (Matiukhin 2004). However, flat recurrent uni- and especially bi-directional reduction does occur in some industries, e.g. at Ozerianovka I, and especially at Belokuzminovka (Kolesnik 2003, fig. 73, 89), and Marieva Gora (Matiukhin 2004).

Belokuzminovka

The complex from Boug loess is the youngest industry from this area, its loess stratigraphy suggesting a date no older than 30 ky (Kolesnik 2003, 213). The assemblage is rich in debitage products and, judging from published illustrations, a group of cores (Fig. 19-2, 4, 6) have remnants of preliminary centripetal preparation similar to the Levallois Biache-type of the WCM. Other cores with opposed (often faceted) platforms for elongated flakes and blades display a predominantly bi-directional pattern which could represent both reduced Biache-type cores (most of the cores were abandoned during advanced and exhausted stages of reduction), as well as other core reduction models by which

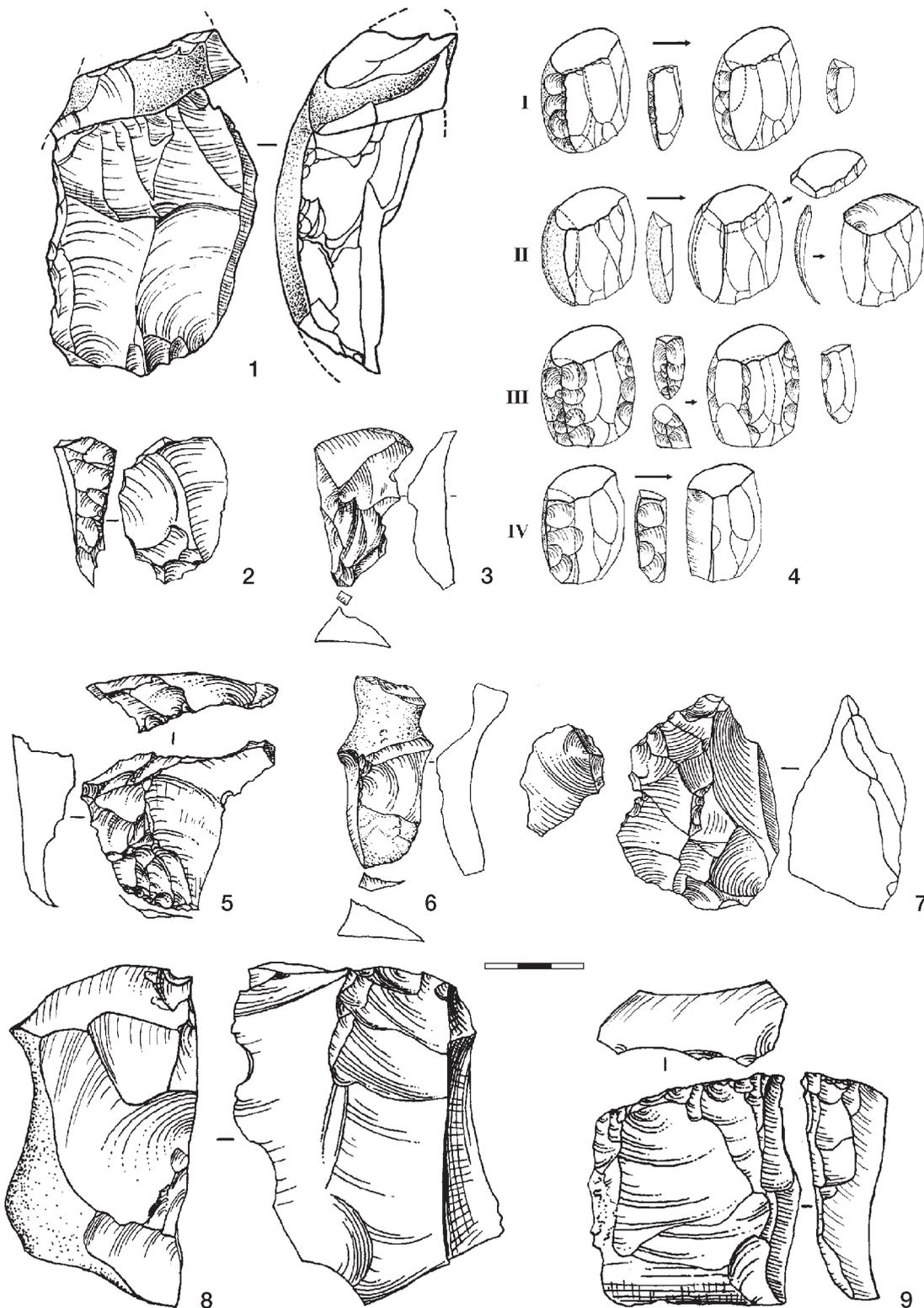


Fig. 19-1 Blade Mousterian. Kourdiumovka (after Kolesnik 2003). Blade production: bidirectional (1) and unidirectional (8, 9) cores; crested flakes (3, 6); tablets (2, 5); models of blade core reduction (4). Flake production: discoidal core with refitted flake (7).

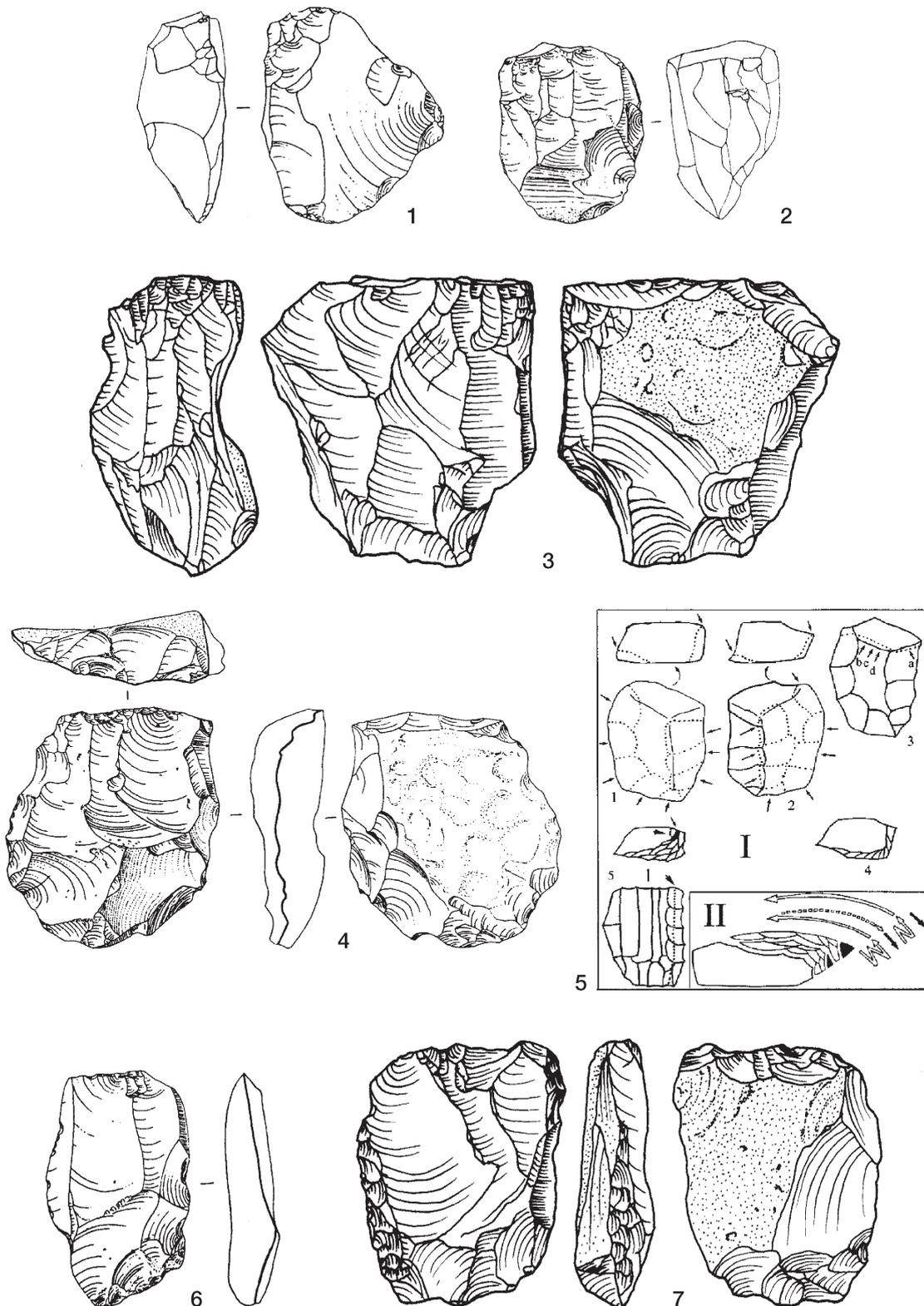


Fig. 19-2 Blade Levallois-Mousterian. Belokuzminovka: 1, 2, 4, 6 (after Kolesnik 2003) and Shlyakh: 3, 5, 7 (after Nehoroshev 2004). Blade production: narrow bidirectional core on flake (1); volumetric unidirectional core (2); wedge-like core (3); models of blade reduction (5): Shlyakh (I) and Roc-de-Combe (II) (after Boeda 1990). Levallois production: uni-/bidirectional cores (4, 6, 7).

deborant removals and debitage products themselves create and maintain the necessary working convexity. The presence of auxiliary platforms (used to prepare transversal convexity of flaking surface on these cores) was also noted by A. Kolesnik (2003, p.186). Thus, many of these cores may be suggestive of the Levallois recurrent bi-directional method, which is not so dramatically different from that of the Crimean Levallois-Mousterian. Blades were also obtained from volumetric prismatic cores: partially turned (Fig. 19-2, 2), sometimes from turned cores and from narrow cores on nodules, and in one case on a flake. If narrow face cores on fragments document the extension of blade debitage (additional flaking surface) after reduction of flat heavily exhausted cores, other initial narrow cores on massive flake slices display this manner from the very beginning (Fig. 19-2, 1). Pre-cores with elongated crests, 5 two-sloped crested blades and 10 flakes, as well as numerous lateral crested removals confirm the usage of prepared blade debitage. Uni- and bi-directional flaking modes were used. Single blow platforms are common. According to A. Kolesnik, the narrow core reduction exhibits reutilisation of flat cores, which was, however, desired and resulted in final blades from this core part. In contrast, in Kourdiumovka narrow flaking plays only an auxiliary role in maintaining blade debitage.

In sum, the high blade component in the Belokuzminovka industry is based on the application of flat uni- and especially bi-directional MP technologies, including a certain participation of Levallois recurrent Biache reduction and UP volumetric direct and prepared (crested pre-cores) methods. Centripetal and discoidal bifacial methods were used independently.

The following Vitachev complex (early OIS 3) of this site yielded a similar industry from both a technological and typological point of view.

Shlyakh

Layer 8c of this site is attributed to OIS 3 on the basis of two non-calibrated AMS radiocarbon dates realised by P. Pettitt (46,300±3100 and 45,700±3000). These directly postdate the Kargopolovo palaeomagnetic excursion at c. 42/44 kyr BP (Nehoroshev 2004; Vishnyatsky, Nehoroshev 2004). In accordance with the new version of the site's chronology, layers 8 and 9 are dated to 41-40 and 44-42 kyr, correspondingly (Nehoroshev et al., 2003). This site yielded a late MP industry with blade production based on several methods: a) direct with no preparation of working surface from single non faceted striking platform;

and b) with crest installation and regularly occurring reduction of narrow wedge-shaped cores (Fig. 19-2, 3). The latter has been compared (Nehoroshev, Vishnyatsky 2000; Nechroshev 2004) with the technological method described by J. Pelegrin (1990) and E. Boeda (1990) for Roc-de-Combe, layer 8 (attributed to the Chatelperronian) (Fig. 2, 5).

The toolkit from Shlyakh (57/2,6%) is predominantly of a Middle Palaeolithic type, similar to that from Donbass-Asov (less denticulates), and features no real Upper Palaeolithic types (as in the Crimean Mousterian). Mousterian points, side-scrapers (mostly simple), "Proto-Kostienki" knives, typical and naturally backed knives, truncated flakes, notches and denticulates, as well as crude and inexpressive Mousterian end-scrapers (8) and burin-like tools (10) have been listed by P.E. Nehoroshev (2004). The high occurrence of truncating sets this assemblage apart from other MP industries in Eastern Europe, with exception of the Donbass sites. P. Nehoroshev's latest article (2004) has provided additional information about this important site, together with a very different and surprising technological interpretation of its already published scheme. He states that among flat cores, bipolar are the most expressive, though "ordinary" cores still dominate. The volumetric or proto-prismatic concept is represented by wedge-shaped cores, the most numerous category, intended for blade and elongated flake production. The "flattened-proto-prismatic" cores are transitional between previous types. Levallois flakes and flakes with (sub) parallel edges are abundant (nearly a half of potential blank flakes), while blades comprise only 6.3%. According to Nehoroshev, among the technical elements crested flakes (about 10%, 'expressive' crested blades are, however, absent), platform rejuvenation flakes (some are similar to UP tablets), backed blades, wedge-core preparation flakes, and flanks of these cores occurred, and a higher faceting rate and a better quality was observed for fragmented, rather than for intact blanks. Furthermore, it was supposed that, considering the expressive wedge cores, the manufacture of Levallois blades with parallel edges and ridges was a major purpose of primary flaking (they are practically absent in the collection) (idem, p.122). The link between wedge cores and Levallois blade production appears somewhat doubtful. It was also stressed that both hard and soft hammers were used. A generalised technology or 'mental model' was proposed. Flattened fragments or concretions of flint were neither shaped intensively nor carefully, with partial transversal preparation of the crest and distal thinned part (wedge) creating the narrow flaking surface. Debitage started with crest detachment

and the exploitation of the narrow core side, then gradually moved to the left lateral, where on the large side Levallois blades were struck. Narrow and large surfaces could also be flaked independently, though debitage from the narrow part was the first in the core sequence. The successful reduction resulted in a flat bipolar core. Heavily reduced cores could be shaped in a centripetal manner, like tortoise cores for a target Levallois flake (unfortunately illustrations of such pieces are absent). This peculiar theoretical reduction of Levallois blade production based on a narrow wedged core of Upper Palaeolithic type was finally considered as characteristic of Middle Palaeolithic blade technology. Additionally, and in support of this conclusion, the MP character of tool kit is noted.

At the same time this main method was compared with fully UP technologies based on the reduction of wedge-shaped cores, especially with the Chatelperronian industry of Roc-de-Combe, layer 8. Desired blades, like end products at Shlyakh, are very similar to UP blades (*idem*, p.125). To explain this contradiction it was proposed that “wedge-shaped” cores” by themselves cannot be taken as diagnostic of UP blade technology, because they are widely known in many blade MP industries in Western Europe and the Near East. Finally, and in order to keep the technology within the frame of the MP, it is stressed that in Shlyakh there is an absence of deliberate platform reduction, i.e. rejuvenation of overhang (which is truly UP technological feature for investigators of this site). It is interesting to note that P. Nehoroshev mentioned that this generalised schema was in reality “often deviate from this model” (!). Some cores, for example, were reduced from the beginning in a flat bi-directional manner, a mode of debitage that is attested by the existence of pre-cores of this type (*idem* p.124). In this case, we are dealing with independent flat parallel reduction. This reduction, according to illustrations (Nehoroshev, 2004, fig. 2: 2, 4; Fig 2: 7), might be based on Levallois recurrent bi-directional cores similar to the Biache-type cores of the WCM, as well as on a non-prepared direct method. The presence of classical tortoise pieces in layer 8 (Nehoroshev, 2004) as well as the occurrence of typical Levallois preferential flakes from layer 9 of Shlyakh (Vishnyatsky and Nehoroshev 2001, fig.5: 3; 7: 2) reinforce the technological resemblance with the Crimean Levallois-Mousterian. The existence of other blade debitage based on the reduction of crested wedge-shaped narrow cores is well documented in Shlyakh. One can find this method even with a re-preparation of the flaking / striking surface zone by means of rejuvenation of the overhang (Fig. 19-2, 3), which would correspond to Nehoroshev’s concept of UP technology. However,

rejuvenation of overhang is not automatically indicative of UP blade knapping; this technological element also occurs in MP debitage products (e.g. Levallois blanks of the Proniatin or Eemian industry at Yezupil). Moreover, all steps in the core reduction sequence (shaping, crest installation, narrow exploitation and the following extension of debitage surface) are fully UP. This UP pattern was documented in many non-Levallois blade technologies throughout the entire Middle Palaeolithic, and does not differ from core reduction during Upper Palaeolithic, which is usually described as being of a volumetric prismatic mode. Finally, if the reconstructed method in Shlyakh (Fig. 19-2, 5I) is correct, its interpretation differs considerably from that of the Levallois strategy. On the other hand, the comparison of schemas from Shlyakh and Rock-de-Combe can only stress the UP character of both models (Fig. 19-2, 5I and 5II). However, if the generalised model of Levallois reduction was really used (in fact only refitting can prove this theory), then comparisons with Bohunician and Boker Tachtit core reduction sequences would fit better to Shlyakh than analogies with the Chatelperronian. So far this is not the case, and it would seem that this late MP industry has in fact a double technological structure: a Levallois strategy for blades obtained from flat core reduction (against blade Levallois resulting from wedge-shaped core exploitation), and a well-developed independent UP blade methods already documented by P. Nehoroshev and L. Vishnyatsky in previous publications.

Most probably we are dealing with a certain Middle Palaeolithic technological variability in the regions of Donbass – Asov and Middle Don:

- 1) Blade Mousterian (Kourdiunovka) based on volumetric direct and some prepared (crested) core reduction; Levallois methods were not used. Supplementary methods of flake production are centripetal, discoidal and simple uni- / bi-polar exploitation of flat cores.
- 2) Blade Levallois-Mousterian based on recurrent exploitation of mostly bi-directional faceted flat cores for elongated blanks, rarely accompanied by classical lineal cores, as well as by direct or prepared volumetric reduction of narrow or / and wedge-like and partially turned cores (Bielokuzminovka, Shlyakh, layer 8 and, perhaps, layer 9). Centripetal and discoidal reduction represent additional methods in the technological structure of these sites. A second group expresses a technological similarity with the WCM, though the level of Levallois participation was much stronger in Crimea, at least in its early stage.

Thus, our technological comparisons suggest a subdivision of a blade Mousterian (or Belokuzminovka group) on the one hand, and the Kourdiumovka industry on the other. In general, this corresponds to Kolesnik's (2003) opinion based on a complex set of arguments.

To round off the analysis of this area, it is also worth considering the sites Biryuchia Balka 1a and 2 in the Rostov region. Here, systematic blade production based on flat and volumetric core reduction (mostly non-faceted platforms) accompanied by the centripetal flake method has also been documented in Mousterian assemblages (workshops). The latter were found together with some bifacial pieces, which - with an AMS date from layer 41 of 40.750 ± 970 (Matiukhin 2004) - can probably be attributed to OIS 3. These assemblages contain some wedged and narrow cores, as well as Levallois flakes and Levallois cores (Matiukhin 2004, fig. 5: 4). These are more reminiscent of Shlyakh.

Prut-Dnestr

The abundant Levallois-Mousterian record from this region, recently termed "Molodova-Mousterian culture", dates back to second half of Last Interglacial – Wurm I/II. This "culture", which is characterised by Levallois flake and local blade industries, displays a high ratio of knives, points and side-scrapers, and lacks bifacial tools (Sytnik 2000). Such assemblages have so far been observed at the following stratified sites: Yezupil layer III, Proniatin, Molodova I, layers I-IV and Molodova V, layers 11-12, Bougliv V, layer II etc. According to V. Chabai (2004c), Levallois-Mousterian industries from the Prut-Dniestr valleys, as well as from Ripiceni-Izvor, layers I-III (in Romania), and from the Crimea have many common features. These can be summarised as follows:

- 1) a combination of Levallois tortoise flake and blade methods;
- 2) a high level of platform faceting during core reduction and usage of auxiliary platforms;
- 3) domination of simple side-scrapers, insignificant quantities of convergent scrapers and denticulated tools. Upper Palaeolithic tools are uncommon;
- 4) a mostly scalar, non-invasive direct retouching of tools;
- 5) absence of bifacial tool production.

Some industries from the Western Ukraine (e.g. Yezupil, layer III), although much older than the Western Crimean Mousterian, are also very similar.

Mousterian industries occurred in this region probably before the Eemian, and lasted up until the Hengelo Interstadial. They exhibit certain variability, especially in core reduction strategies.

Yezupil

Layer III (Eemian Last Interglacial) as defined by O. S. Sitnyk (2000; Boguckij et al 2001) is characterised by Levallois preferential cores for a single target flake, convergent cores for points, and also by Levallois recurrent parallel cores. Preferential and recurrent parallel cores dominate. The blade component of the assemblage is rather high ($I_{lam} = 25$), and is based on the Levallois recurrent method.

The examination of this collection has shown that there are long core reduction sequences from initial nodules which were used until exhausted. Discarded cores are represented by various types: discoidal, centripetal, convergent on flakes, volumetric with change in orientation, and with rejuvenation of overhang. Cores of full debitage are mostly flat uni- / bi-directional (sometimes with remnants of preliminary centripetal shaping) with prepared faceted platforms (Fig. 19-3, 1, 4). The preparation of some core flaking surfaces was also achieved by means of elongated debitage products (often by debordant removals) which were struck from one or opposed platforms in the same direction as the final flakes and blades. Debitage products contain blades and flakes with uni- and bi-directional scars and faceted butts, debordant removals (including pieces with natural back), as well as several generations of elongated removals and blanks of Biache-type bearing remnants of preliminary centripetal or crossed preparation (Fig. 19-3, 2, 3, 5, 6). Abundant, typical products of the Levallois recurrent method contrast with rare full debitage cores. These blanks were often transformed into tools by light retouch or were used without modification. The Levallois point method is attested by 4 exhausted unidirectional convergent cores on flakes with negatives of short and wide desired points. These cores and one core refit (with preparation removals of first and second cycles, without final point and abandoned core before detachment of last target point) display a repeated production of a single point per working surface. The convergent dorsal pattern is rather frequent in this industry. Points have carefully prepared faceted butts. Elongated points also occur (Fig. 19-3, 7, 8); however, the manner in which they were obtained is not clear (whether from initially Levallois convergent cores or from Levallois blade cores). Evidently some triangular pointed blanks resulted

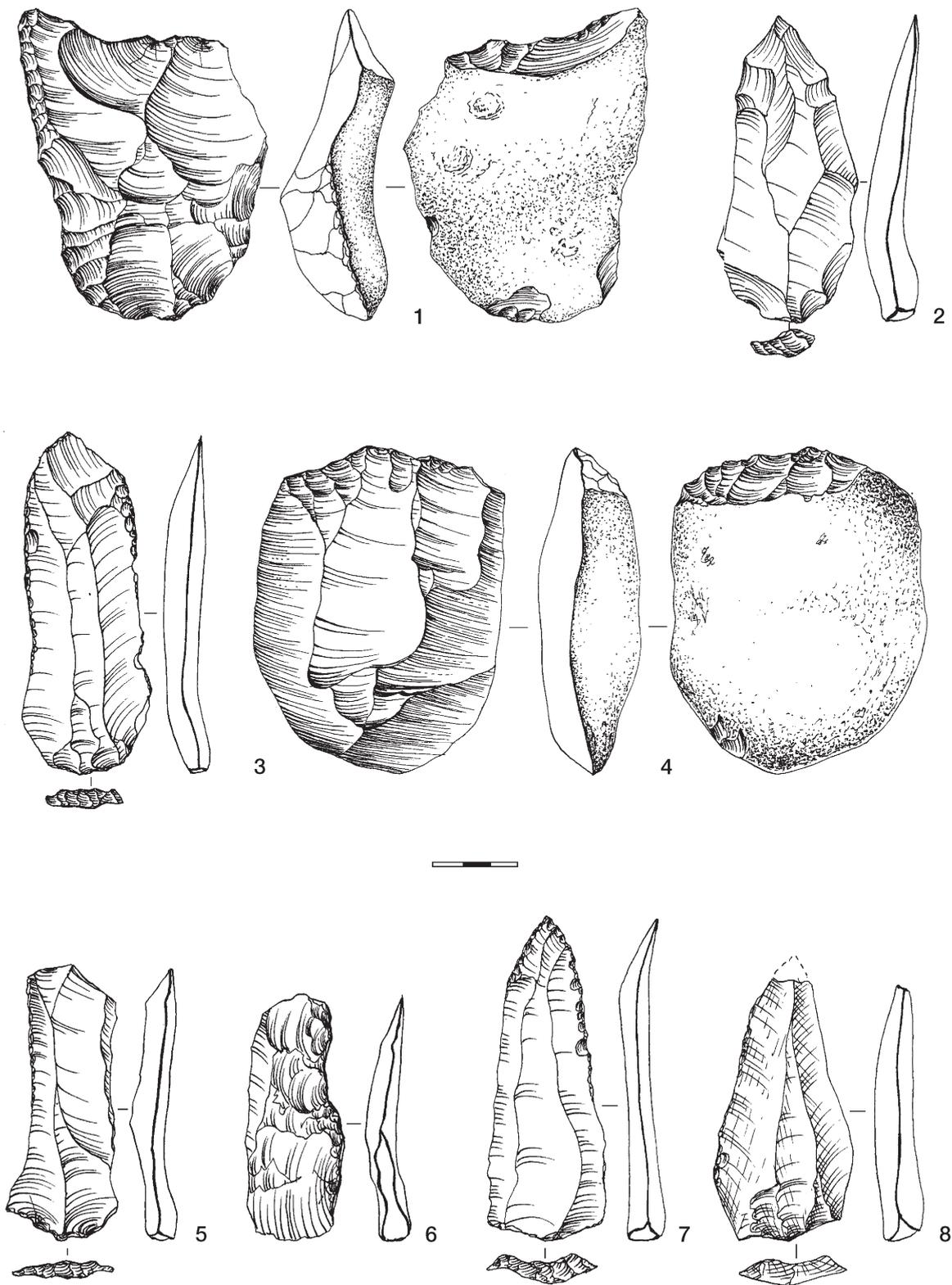


Fig. 19-3 Levallois-Mousterian. Yezupil, layer III (after Sytnik 2000). Levallois production: bidirectional (1), unidirectional cores (4), blades (2, 3), debordant blades (5, 6), elongated points (7, 8). Marginally retouched blanks (3, 5, 7, 8).

from other non-Levallois methods. All these blanks, including elongated pieces and blades, are indicative of a hard hammer technique. Tools were often made on these blanks and mainly were classified as notches and side-scrapers. In addition to Levallois products a series of blades and bladelets with no Levallois features occur. These have unidirectional scars, flat butts, lips and abrasion of the overhang. These blades stand in contrast to Levallois blanks, and some were probably obtained from volumetric cores of UP type (e.g. exhausted cores with change of orientation and traces of overhang rejuvenation). O. Sytnik (2000, fig. 123) provides an illustration of a partially crested blade with refitted cortical flake; unfortunately it is not clear to which layer it belongs: III or II (Micoquian). Nevertheless, the Levallois recurrent reduction for elongated blanks was dominant in this industry; a fact which is also documented by blank selection for further retouching (side-scrapers, retouched / used blanks, Mousterian points). Additional Levallois convergent unidirectional point production is also attested. The use of the Levallois preferential flake method has not been confirmed (no tortoise cores and corresponding preferential flakes), and therefore stands in contrast to many Levallois-Mousterian sites of this region, as well as to the Crimean data.

Curiously, this earliest Eemian site of Eastern European Levallois-Mousterian entity displays a higher level of blade production than the much later WCM (Chabai 2004c). This is indicative of non-linear technological developments throughout the Middle Palaeolithic. However, it would appear that blade production was subject to different levels of priority in each of the different assemblages. The Yezupil blade component was based principally on the Levallois method. Upper Palaeolithic volumetric crested pre-core reduction was much less common, while the latter technology was frequently used in all stages of the WCM.

Proniatin

This industry, which dates back to about 87 kyr BP (TL date on fossil soil), is based on Levallois technology comprising the linear flake method with centripetal and orthogonal shaping (often blade preliminary negatives on blanks and peculiar distal preparation: convergent, oblique, transversal) and repeated technological cycles, as well as recurrent uni- and bi-directional and centripetal methods (Fig. 19-4). Many products are rather elongated and thin (laminar flakes, blades, blade by-products). Butt zone trimming during Levallois

reduction was frequent (Fig. 19-4, 1, 6, 8). Although volumetric flake / blade cores occur, they are rare. Some Kombewa cores were found. Side-scrapers and retouched flakes represent common tool types (Fig. 19-4, 1, 2, 5, 6, 7, 8). About 76% of tools were made on Levallois flakes (Stepanchuk and Sytnik 1999; Sytnik 2000).

Molodova I, layers 1-5, and Molodova V, layers 11-12

These assemblages have been dated by the radiocarbon method to between > 45.6 kyr and > 35 kyr, (Ivanova 1987). P. Haesaerts suggests that the lower complex of Molodova V could date back as late as the first part of OIS 3 (personal communication in Meignen et al. 2004, p. 53). A brief chronological scenario for both sites, as well as for Korman IV, has been proposed (Haesaerts et al. 2003).

In the past, primary flaking has been interpreted in various ways. Based on analysis conducted by Yu. Kolosov, and meanwhile by V. Gladilin, it was originally assumed that the majority of blanks in these assemblages result from Levallois point production. M. Anisiutkin and G. Grigoriev argued against this interpretation owing to the small number of points (see Usik, 2003). O. Sytnik attributed these industries to "blade-flake Levallois", and later to "blade Levallois of Mousterian type". Technological analyses neither confirm the existence of the Levallois point method nor of an Upper Palaeolithic blade mode (Yamada, Sytnik 1997). From a technological perspective the assemblage is characterised by a uni- and bi-directional Levallois strategy with various types of preliminary preparation of working surfaces (parallel by means of debordant removals, centripetal, mixed unidirectional and transversal). In a forthcoming article, O. Sytnik describes the blank production as following a uni- and bipolar Levallois strategy with preparation by means of debordant blades (Bogutskij et al. 1997). Finally, V. Usik (2003) realised several refittings (some of which include artefacts from both layers 12a and 11 from Molodova V, which have given rise to question the homogeneity of the assemblage from layer 12a). His technological analysis between these two layers does not confirm any development via the Upper Palaeolithic. Classical Levallois flake technology was also confirmed, as well as a peculiar kind of preparation of both sides and of distal core part, which induced elongated proportions of pre-cores and of preparation products (Fig. 19-5, 1, 2). In order to shape elongated pre-cores, blades (with unidirectional negatives or with convergent scars) were removed from

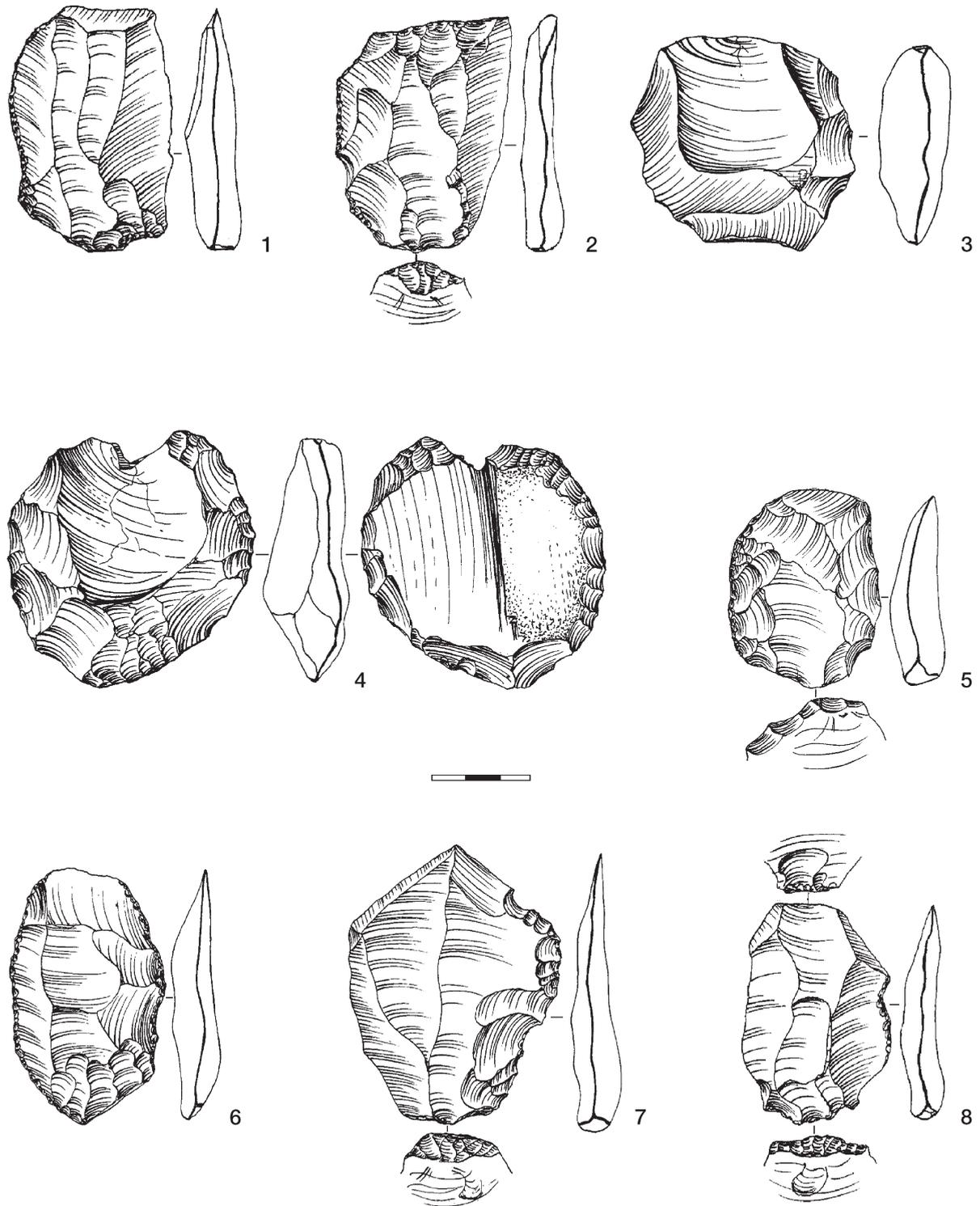


Fig. 19-4 Levallois-Mousterian. Proniatin (after Sytnik 2000). Levallois production: linear flake cores (3, 4), tools on preferential flakes (1, 2, 5-8).

one striking platform in one direction. This could explain the high level of blades and the presence of some points in the assemblages from Molodova, as well as in Proniatin. During core reduction several blanks of second order and debordant blades were obtained, which V. Usik also interpreted as technical (by-)products. However, these might also represent desired products resulting from Levallois core exploitation (this depends on the interpretation of the method involved and on the relation between Levallois typology and technology). Debordant blades were often used as backed knives. Some flakes and blades with convergent negatives, according to V. Usik (2003), resulted from non-Levallois convergent debitage. A refitted block (Fig. 19-5, 3) exhibits an elongated point with a faceted butt obtained from a convergent core, however, lacking a Y-like working surface which is otherwise characteristic of the Levallois concept. Similar refittings with final points were realised in layer III of Ksiecica Jozefa (e.g. Fig. 19-25, 4) and in Bettencourt-Saint-Ouen, layer 3b which has been dated back to OIS 5d (Locht 2002). Apart from technological debates we should note the small number of points (Levallois or non-Levallois) in the Middle Palaeolithic of Molodova. Partially turned blade cores (Chernysh, 1987; Usik, 2003) are also rare.

The results of other technological analysis (Meignen et al. 2004) of the Molodova assemblages do not differ greatly from Usik's study. However, differences in the interpretation and classification of strategies of blank production mainly stem from the view on Levallois recurrent methods (i.e. Levallois *sensu lato*), which does not exist for V.Usik. The classical Levallois method was confirmed in Molodova I, layers 4 and 5, and to a lesser extent in layers 11 and 12 in Molodova V. Apart from this, Levallois technology was oriented toward production of large elongated flakes (and not blades; Yamada and Sytnik 1997), several per flaking surface, i.e. the recurrent principle (as neglected by Usik 2003). Cores were mostly prepared and reduced according to this manner from one or two opposed and well faceted platforms. This Levallois recurrent method (Fig. 19-6) is confirmed by the presence of numerous retouched final blanks, debitage products: debordant and second order target removals, and single or double platform cores.

At the same time we have an opportunity to examine 500 artefacts from layer 4 of Molodova I, which comprise a small "elite" group (selected by Chernysh), as well as Sytnik's selection. The classical Levallois method is documented by several linear cores at the stages of full debitage and exhaustion. These cores have centripetal, crossed,

and sometimes parallel preparation of the flaking surface. Some preferential flakes bear bi-directional scars: unidirectional blade negatives and remnants of distal core preparation from opposed auxiliary platform. The recurrent Levallois method for elongated blanks is represented by full debitage and exhausted single and double platform cores. Preliminary preparation of the working surface was realised in a centripetal manner. Exploitation was often reached via uni-directional detachment only; the bipolar method occurred more often at advanced and final flaking stages. Levallois blades are often massive and rather elongated (some debordant or naturally backed) with faceted butts and developed bulbs. Numerous debordant flakes and other by-products of Levallois reduction also occur. Not one Levallois point core was found; two broad-based short points, however, are present. Although Levallois point production was probably not unknown, it played an insignificant role in the Molodova industries. Apart from the dominant Levallois methods, some cores show evidence of direct (?) volumetric blade reduction (they are partially turned, mostly with narrow faced flaking surfaces, uni- and bi-directional with plain platforms). Although cores exhibit different reduction stages, no traces of crest installation are recognisable. Only one lateral crested blade with one prepared convexity, plain butt and diffused bulb was present. Reduction of these cores resulted in narrow and small blades with flat butts. It should be noted that the majority of cores are exhausted and display a different morphology to the flat centripetal, single or double platform cores and could represent different reduction systems. The tool-kit is typically Middle Palaeolithic, however, it should be noted that Mousterian points with scaled retouch are more numerous than other Levallois-Mousterian assemblages. Tools were very often made on Levallois blanks.

Some Mousterian industries demonstrate rare Levallois features, and differ considerably from previous assemblages in this region.

Bugliv V, trench I

Layer 1 from trench I (Saalian(?) or Early Würm(?) according to Sytnik 2000) is characterised by discoidal cores with a high profile, some tending to a pyramidal shape (with one or two flaking surfaces), producing short and massive debordant and asymmetrical flakes. Discoidal cores show different reduction stages: from initial to exhausted. Some polyhedral, cubic cores were, by the end of their reduction, transferred to a discoidal method. Only a small

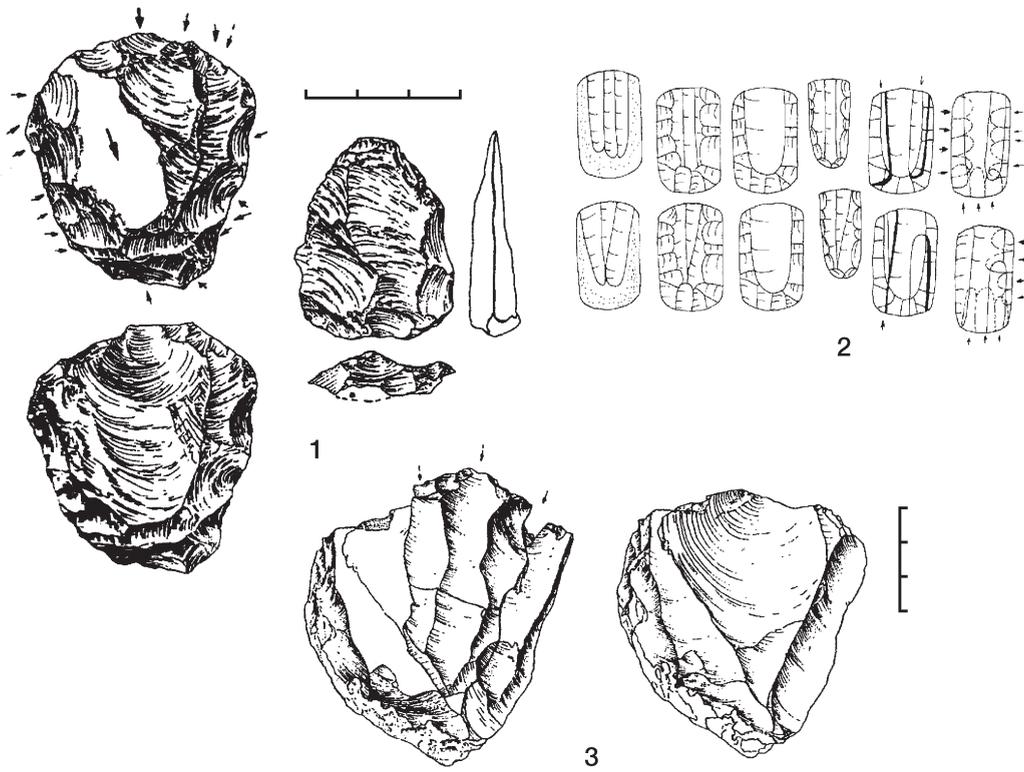


Fig. 19-5 Levallois-Mousterian. Molodova V, layers 11 (1), 12 (3) (after Usik 2003). Levallois production: linear core and refitted preferential flake (1), schemes of cores preparation (2). Convergent core with refitted triangular blank.

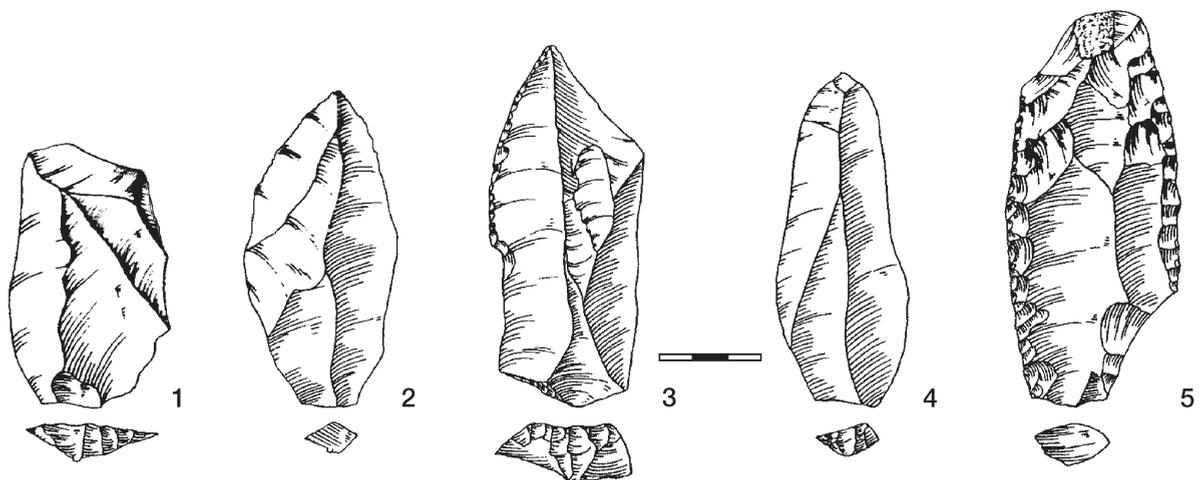


Fig. 19-6 Levallois-Mousterian. Molodova 1, layer 4 (after Meignen et al., 2004). Levallois production: elongated blanks (1-4) and side-scraper on Levallois blank (5).

number of flakes with centripetal scars and faceted butts might result from Levallois reduction or may have occurred by accident during discoidal core exploitation. Levallois cores are scarce. The industry generally exhibits low faceting, with blades being rather rare (6.1%). Unprepared single platform cores on flakes (Kombewa type) also occur. Some debordant flakes showing remnants of several flaking surfaces seem to come from multi-platform cores and therefore might indicate a polyhedral strategy of core reduction. The technique of blank removal was achieved exclusively via hard stone percussion. Strong blows resulted in flakes with very developed bulbs and even cones. The toolkit comprises simple side-scrapers on large massive cortical flakes, retouched flakes (also debordant), racettes, and natural backed knives or atypical backed knives. Retouch is non-invasive. All these characteristics are comparable with Ksiecica Jozefa, layer III (Sitlivy et al 2004), however, the technological variability is much wider in this Late Middle Palaeolithic site (see below). Briefly, no Levallois technology was detected in this collection during its examination. In fact, it is dominated by several flake non-Levallois methods, especially discoidal ones.

Bugliv V, trench III

Layer II of this site bears evidence of blade production of a generally non-Levallois nature. Its chronology is unclear: 140 ± 12 ky TL on sediments or early Würm Glacial (see the same publication Sytnik 2000, p.218 and 329). Several refitted blocks with direct reduction of blade cores, as well as a number of blades/bladelets and their fragments (121 or 13.7%) document the aforementioned methods. One blade core with opposed platforms (plain and dihedral) has an extended working surface. Another is unidirectional with a narrow face flaking surface, and displays a platform prepared by several negatives. Blade debitage was direct (no remnants of crest installation on cores, no crested blades or flakes) and could have resulted from polyhedral cores after the orientation of debitage had changed. Blades are generally small and have more plain, rather than faceted, butts. Centripetal non-Levallois flake debitage and rare Levallois cores with both centripetal and parallel preparation occur. Butt faceting is low (*idem* p.218). Tools are rare (Mousterian point, side-scraper, truncated-faceted-piece, end-scrapers, retouched/used flakes). The site constitutes a small workshop around a hearth, and features an assemblage with a dominant micro-debitage component.

Korman IV

Layer 12 of Korman IV was dated back to >44 ky BP, and is attributed to Brörup? (Chernysh 1977, Sytnik 2002). However, a more recent re-examination (Haesaerts et al. 2004) has shown that its correct age is in fact more recent: OIS 3, Hengelo Interstadial. Industry is characterised by a low Levallois index, few blades, and only six Levallois-like flakes with centripetal scars and low faceting (IFs=0). The modest tool-kit comprises some notched tools, retouched flakes, racettes and side-scrapers. The assemblage is rather small; however, six reconstructed cores, realised by O. Sytnik (2002), clearly display a non-Levallois character of core reduction (this observation contrasts to his own conclusion that this collection is of a Levallois nature). These refittings exhibit three core reduction strategies:

- An unprepared bi-polar exploitation that uses part of the core flank as a flaking surface (a first series of blanks from one striking platform, and the next from the opposite platform); single blow platforms; blanks are elongated, often featuring a cortical or natural back (Fig. 19-7, 1);
- The discoidal method: a) reduction of two opposed flaking surfaces resulting in a core with high section (tending to pyramidal shape) and producing massive asymmetrical flakes, e.g. debordant (Fig. 19-7, 4, 5, 6, 7, 8); b) unifacial core reduction (no refitting);
- Short reduction sequences of cores on flakes (on massive flakes, cortical flakes or Kombewa flakes): a) unidirectional Kombewa; b) centripetal Kombewa; c) alternating removal of flakes, e.g. in proximal parts of the core (Fig. 19-7, 2, 3).

A chopping-like pebble was also observed.

The interpretations of this small collection are surprisingly various. A. Chernysh (1977) has stressed the archaic Clactonian character of this industry. O. Sytnik has lately described in detail the refitted cores, and following a technological analysis, attributed this industry to the Levallois-Mousterian, together with the Molodova Middle Palaeolithic assemblages (Sytnik, 2002 [erroneously, this article was published as Sitlivy, Sytnik, 2002; author's note]). After a second examination of this assemblage we can confirm a lack of "Levalloisian" features in Korman IV, which could support a link with the Molodova Levallois-Mousterian industries. Moreover, all Korman reduction models are present in the non-Levallois industry of Ksiecica Jozefa, layer III in Kraków. The discoidal refitting episode is similar to mixed discoidal

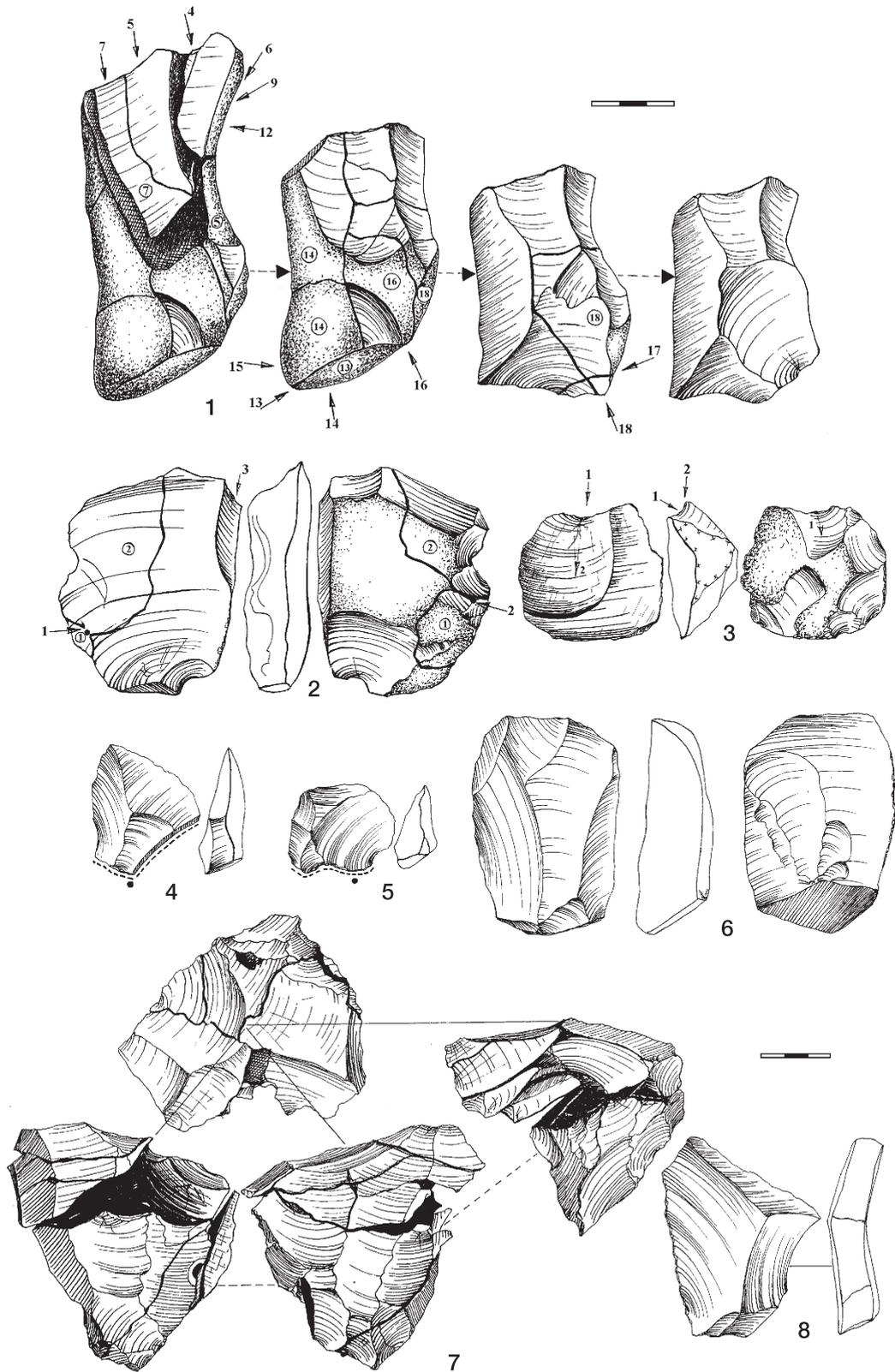


Fig. 19-7 Mousterian. Korman IV, layer 12 (after Sytnik 2002). Blade production: unprepared bidirectional core reduction (1). Flake production: short reduction of core on flake (2, 3); discoidal core reduction (7); debordant (4, 5, 8) and massive flakes (6).

dal / polyhedral refittings at Ksiecia Jozefa. Among the debitage products from both sites, debordant massive flakes which removed several surfaces of a core were characteristic (Fig. 19-7, 7; 19-23, 2), corresponding to the polyhedral method (some of which were modified or used directly). Nevertheless, at Korman complete polyhedral reduction could not be confirmed by refitting. It should be taken into consideration that, in comparison to the Korman IV data, the technological variability is much wider in the rich layer III from Ksiecia Jozefa.

Romania

Ripiceni-Izvor

This site, which has been dated to a time span between 65,000 and 46,000 BP, has yielded three assemblages (layers I, II and III). The lower two layers have been attributed to the Typical Mousterian with Levallois debitage (Păunescu 1993). Radiocarbon dates from layer III of between 44,800 and 37,000 BP indicate the appearance of the Micoquian at the site and therefore give a minimum age for the underlying Levallois-Mousterian. On the basis of the bio-stratigraphy, geological data and absolute dating, the first two layers (I and II) have been attributed to interstadials: Amersfoort, Broerup and Odderade, and Moershoofd. Technological indexes exhibit a rather low level of butt faceting, and low frequencies of blades (in fact, the lowest rates of all similar industries from the Dnestr and Prut regions). Judging from illustrations, Levallois is represented by recurrent cores. A linear removal of Levallois target flakes is not very frequent. This can be seen in the fact that small preferential flakes are rare (Fig. 19-8, 9). On the other hand, the bi-directional blade Levallois method is documented by flat cores with two opposed platforms bearing preliminary centripetal shaping (Fig. 19-8, 5), and corresponding blades and elongated flakes, often modified into tools (Fig. 19-8, 1, 2, 3, 4, 6, 7, 8, 10). During bi-directional reduction elongated pointed blanks with bi-directional dorsal scars were produced. Cores for points are not common (there are no illustrations of these types of cores, and only one piece being attributed to this type in the text). As for broad-base points, these can result from centripetal and discoidal reduction, which is well represented in these assemblages. Listed proto-prismatic (uni-/bi-directional) cores were not illustrated; presence of volumetric non-Levallois blade production is questionable. It is more likely that these cores were involved in Levallois blade reduction. The tool-kit is dominated by simple side-

scrapers (convex and straight) and convergent pieces (scrapers and points). Double scrapers are present, though in only small quantities. Some tools have scaled, rather invasive retouch, more resemblant of the Molodova Levallois-Mousterian than of other industries of this entity. Ripiceni-Izvor, layers I, II, III exhibit a certain variability within the Levallois-Mousterian, sharing partially common features with several sites further to the West, e.g. low level of butt faceting and the implication of discoidal, centripetal methods as in Southern Poland, and to the East, e.g. bi-directional blade debitage, and the scarcity of the Levallois point method as at sites in the Prut-Dnestr region or the WCM). On the other hand, the absence of UP blade manufacturing differentiate these layers from Late MP data from the Kraków region or the WCM, and especially from regular exclusive tortoise or pointed Levallois in the layers III and IIb at the site of Korolevo I in Transcarpathia. Thus, Ripiceni-Izvor Levallois-Mousterian is, both technologically and typologically, closer to the Dnestr assemblages.

Volhynia

Kulychiówka, layer III-d

This industry has often been compared to the Bohunician of Central Europe, it differing from the above mentioned Late Levallois-Mousterian and known Early Upper Palaeolithic industries of the Western Ukraine. Excavated by V. P. Savich (1987), this layer yielded an impressive and abundant collection of flint artefacts. However, the problem of homogeneity (Meignen et al. 2004) as well as of absolute dating (the single, and often cited, radiocarbon date of about 31 ky having no lab number, nor precise reference from which part of the site it was excavated) of this important industry could influence the results of recent studies (Demidenko, Usik 1993a, Stepanchuk, Cohen 2000-2001). According to the latter analysis, the industry is highly laminar (I_{lam}=31) with moderate faceting of blade butts (IF=36, IF_s=28), low general faceting of blanks, and Levallois point presence (6.1%). The proportion of volumetric and flat cores is nearly the same: 54% and 46%, respectively. Unidirectional volumetric cores are more numerous. There are more Upper Palaeolithic tools (burins, retouched blades, end-scrapers) than Levallois laminar points and notches. The dominant blanks for their production are blades. However, Levallois blanks were also modified (18% of tools) (Stepanchuk, Cohen 2000-2001). Several reduction models have been recognised where blade production dominated over flat Levallois reduction. The combination of flat

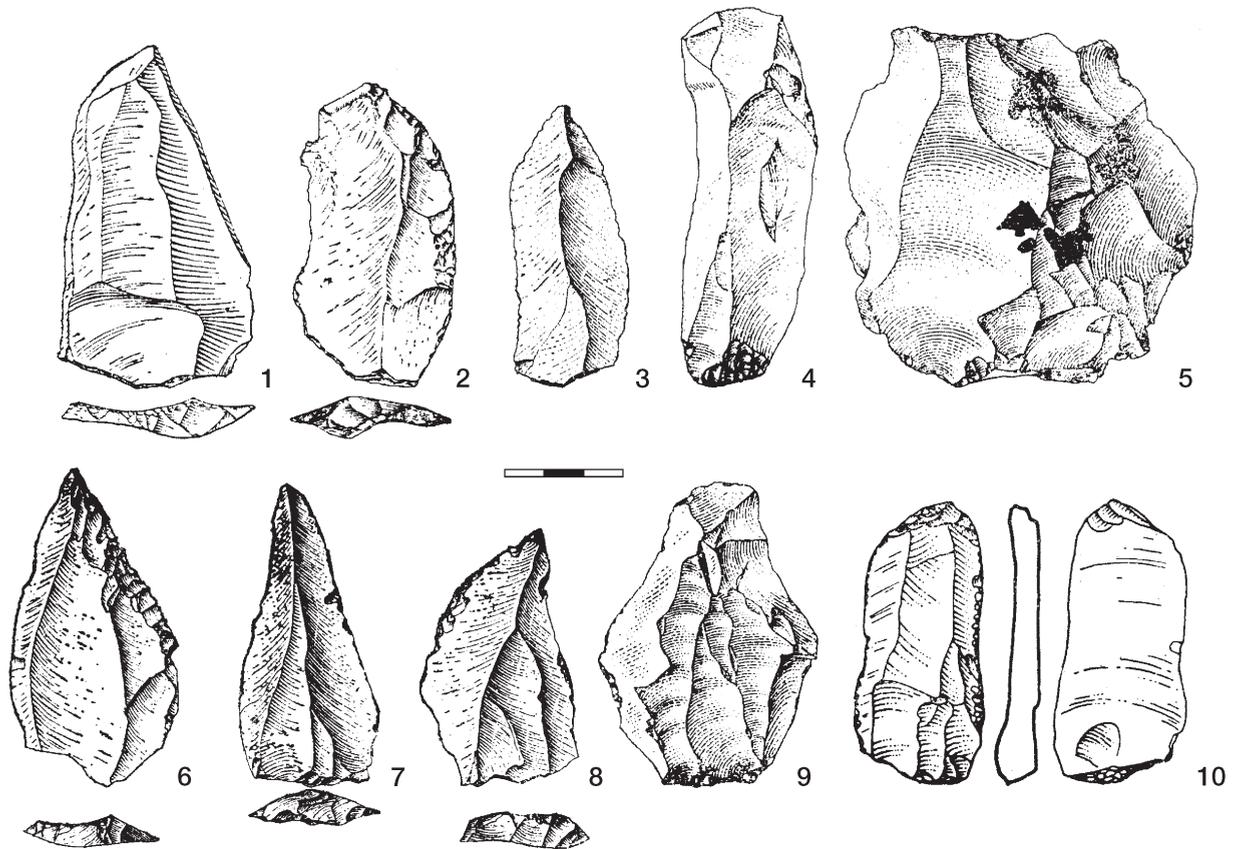


Fig. 19-8 Levallois-Mousterian. Ripiceni-Izvor (after Păunescu 1993). Levallois production: flakes (1, 9), blades (3, 4), point (7), bidirectional core (5) and tools on Levallois blanks (2, 6, 8, 10).

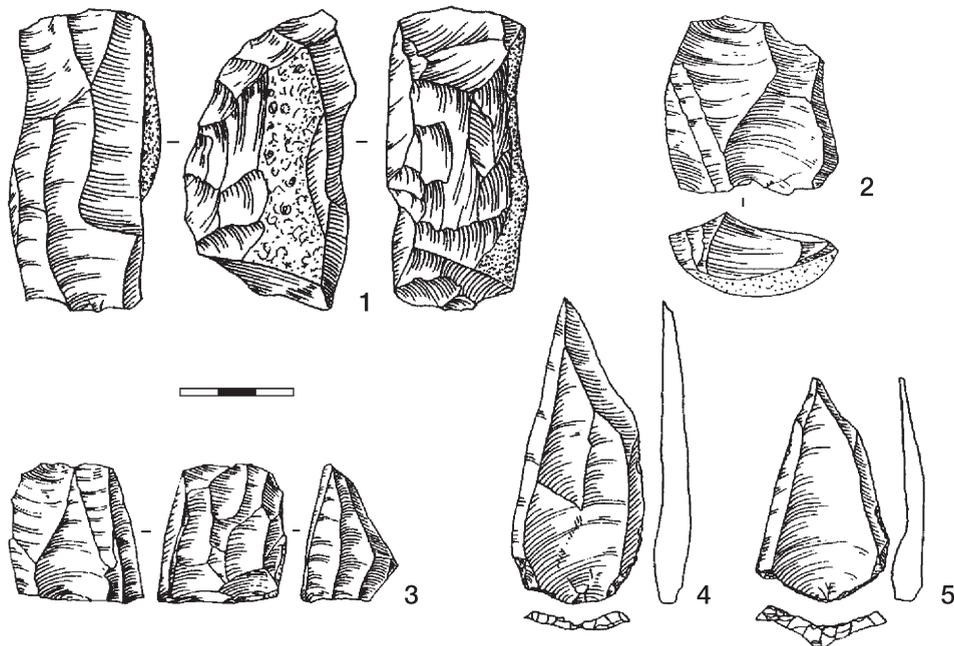


Fig. 19-9 Early Upper Palaeolithic of Bohunician type. Kulychivka, lower layer (after Meignen et al., 2004). Upper Palaeolithic blade production: narrow bidirectional core (1). Levallois point production: core (2), points (4, 5); mixed point/blade core; exploitation of large and narrow surfaces (3).

and volumetric modes of debitage can be observed on some cores, though a Bohunician technological scenario can only be attested by refitting. Thus, flat cores might be interpreted as blade cores exhausted in thickness; and also as the result of an independent Levallois recurrent uni-/bi-directional (more often) reduction, producing laminar points, flakes and blades. The usage of hard hammerstones for flat cores and of soft hammerstones for volumetric cores supports suggestions of the parallel production of Levallois and Upper Palaeolithic type of blanks. As for Upper Palaeolithic blade debitage, two main options were applied: a) direct and b) prepared (crest) unidirectional (less bi-directional) partially turned and turned core exploitation. Crest installation was often partial with cortical remnants, with one or two slopes. Narrow flaking surfaces often occurred during prepared blade reduction. Striking platforms are flat and also faceted. Maintenance of platforms was realised by means of tablets.

According to the blade and laminar point L/W ratio, this industry makes a more "elongated" impression than the Central European Bohunician. On the other hand, if the primary radiocarbon date were to be confirmed, the lower layer at Kulychivka might represent the final stage of the Bohunician entity. Another modern study of the lower layer was based on lithic material supposed to represent an undisturbed area of Kulychivka (Meignen et al. 2004). This part of the site was interpreted as a flint workshop. The results are quite different from those of the previous analysis. Core reduction is described as being predominantly bi-directional (with hard hammer percussion, only) and was aimed at the production of triangular blanks, various points (Fig. 19-9, 4, 5) and blades. Three main core types with intermediate forms were distinguished: 1) Levallois recurrent bi-directional flat cores (Fig. 19-9, 2), the most numerous (contra Stepanchuk, Cohen 2000-2001 with 54% of volumetric cores) and aimed at the production of mostly broad-based points; 2) the same Levallois cores with an additional flaking surface on the narrow part (exploitation started mostly from this narrow edge during blade production) (Fig. 19-9, 3). UP bi-directional cores can be divided in two types: cores with a narrow flaking surfaces (Fig. 19-9, 1), and semi-prismatic cores with partly turning working surfaces. In the latter cases, crested blades are used for the maintenance of the flaking surfaces. Thus, bi-directional reduction is dominant (contra Stepanchuk, Cohen 2000-2001). Desired products of UP core reduction are elongated points and blades. Retouched tools are rare (contra 18% of tools, according to Stepanchuk, Cohen 2000-2001); UP non-Aurignacian types (especially end-scrapers

on large cortical flakes) dominate. In comparison to Boker Tachtit, level 1, MP features in Kulychivka are, however, stronger: more flat cores, short blanks, and Mousterian retouched tools (Meignen et al. 2004). Thus, the basic divergence in opinions concerns mainly the "clearness" of studied samples, whereby the balance of MP/UP features might be influenced by the contamination of an overlying UP industry.

In 2003 about 500 artefacts, which originated from a non-mixed part of the excavated area, were analysed. Cores belong to three main groups: a) Levallois, mostly bi-directional for points (convergent and some with semi-centripetal preparation of working surface and last point removal); b) cores with a combination of flat flaking surface for points, and second supplementary surface for blades located on the narrow part (exploitation could start on narrow or large debitage surfaces; narrow flaking surfaces are elongated rectangle or wedge-like in shape; blades and points were obtained from common prepared platform); one Levallois bi-directional point core displays a lateral crest; c) volumetric UP cores: mostly bi-directional partly turned and nearly turned with remnants of lateral crests, cylindrical and some wedge-like. Platforms are prepared, faceted or combined with plain; elimination of overhang and rejuvenation by tablets have been attested. Levallois points show great diversity: from broad-based small and short, large and short, to narrow and elongated, even very long (L=10cm) and massive. Blades resulted from reduction of different cores: 1) Levallois blade cores (rare?); 2) during preparation of Levallois cores for elongated points (i.e. by-products); 3) UP volumetric cores. Blades have faceted butts and developed bulbs, sometimes reaching lengths of between 10 and 14 cm. Central and lateral crested blades are common and always display well developed bulbs (against Cohen, Stepanchuk 2000-2001, who suggest soft hammer percussion for prismatic cores). Unidirectional blades associated with flat butts and diffused bulbs, which could originate from uppermost UP complex (?), are rare. In sum, the smaller analysed sample gave very similar results as previously proposed by Meignen et al. (2004).

Unfortunately, for the present, the precise chronological affiliation of this very rich Bohunician type industry is not precise (is it the latest manifestation of this unit or older, like other sites of this entity?). Also, we cannot be confident of the technological and typological priorities of this industry, with its complex stratigraphy and partially mixed collection.

Thus, in the Prut - Dnestr region and in Volhynia a certain variability of "non-Micoquian"

industries are documented for the Middle Palaeolithic and Middle-to-Upper transitional periods:

- 1) Levallois-Mousterian with various dominating Levallois strategies, sometimes accompanied by rare UP blade reduction (Yezupil layer III, Proniatin, Molodova I, layers I-IV and Molodova V, layers 11-12, Ripiceni-Izvor);
- 2) Blade Mousterian with non-Levallois and scarce

Levallois flake methods (Bougliv V, trench III, layer II);

- 3) Mousterian based on a number of different non-prepared flake technologies (mostly discoidal, also polyhedral, Kombewa) without or only rarely with a Levallois component (Korman IV, layer 12; Bougliv V, trench I, layer I);
- 4) Early Upper Palaeolithic of Bohunician type (Kulychivka, layer III-d).

CENTRAL EUROPE

The Middle Palaeolithic appeared in Central Europe generally at the same time as in other Western European regions, i.e. at the beginning of the Saalian (OIS 8). Here, lithic industries are characterised by Levallois technology, including blade production, and by Mousterian tools with a high percentage of side-scrapers and some bifacial pieces (points, side-scrapers, knives): for example, Bisnik cave (Cyrek 2002), Bečov (Fridrich 1982), Korolevo I (Gladilin, Sitlivy 1989; 1990). However, in comparison to Western Europe, Central European systematic blade production of UP type had already occurred by the end of Middle Palaeolithic and during the Upper Palaeolithic transition.

Transcarpathian Region, Ukraine

The Levallois-Mousterian pattern has been documented at several open-air sites from the entire Middle Palaeolithic: Korolevo I and II, workshops in Rokossovo and Malyi Rakovets (Sitlivy 1986; Gladilin and Sitlivy 1989; 1990; Soldatenko 1989; Koulakovska 2004; Demidenko and Usik 1995;) display various technological and typological changes, with a rather direct development towards the Upper Palaeolithic. Saalian complexes Va and V at Korolevo I display Levallois reduction mostly of the recurrent type (uni- or bidirectional), which often resulted in elongated blanks (Chabai and Sitlivy 1993). During the early Weichselian, the Levallois strategy was more oriented towards the classical method of production. In complex III of Korolevo I, single preferential flakes dominate, whereas scar patterns on flakes and cores that would indicate the removal of two Levallois target flakes are rare. In general, Levallois flakes are short regular shaped (oval, round quadrangular) (Soldatenko 1989; Koulakovska 2004; Chabai and Sitlivy 1993) (Fig. 19-10). The next, and last, Levallois-Mousterian complex IIIb in Korolevo I with point production (Fig. 19-11) shows no technological continuation to overlying occupations:

complex IIa – Micoquan, Keilmesser type-industry (Koulakovska 2004) and complex II – Mousterian with charentienne tradition which was based on discoidal and Kombewa reduction (Usik 2004b). The Korolevo sequences ended in two Early Upper Palaeolithic industries with non-Levallois blade production: Korolevo II, complex II, and Korolevo I, complex Ia (Gladilin and Demidenko 1989; Usik 1989) showing persistence of some MP tools, techniques or unprepared core-on-flake debitage. However, a clear genesis from a MP background is poorly visible.

During the Saalian and at the beginning of Last Glacial blades were rare (less than 10%) and were obtained from flat cores using both Levallois and non-Levallois techniques. An increasing quantity of blades has been documented in the Levallois-Mousterian industry of Korolevo I, complex IIIb (Ilam of about 30) and in the Early Upper Palaeolithic (EUP) complexes (Ilam =35 and 40,5 respectively for Korolevo II, II and Korolevo I, Ia) where volumetric blade reduction occurred for the first time in this region. Blade debitage was accompanied by a high level of butt faceting already in complex IIIb, which slightly decreased in Korolevo II, II, and finally practically disappeared in the latest complex Ia of Korolevo I. In sum, blades were the result of different core reduction strategies. In complex IIIb numerous blades “were not in themselves a prime objective but rather technological by-products” of the Levallois unidirectional convergent point method (Demidenko and Usik 1995). On the other hand, blade debitage in two EUP industries was based exclusively on volumetric prepared core reduction, typically Upper Palaeolithic. Analysis of these collections conducted by the authors in 2002 and 2003 identified new possibilities to provide inter-assemblage comparisons.

Korolevo I, complex IIIb

This industry (from the early Weichselian(?): Gladilin 1989) is characterised by the dominance of a Levallois

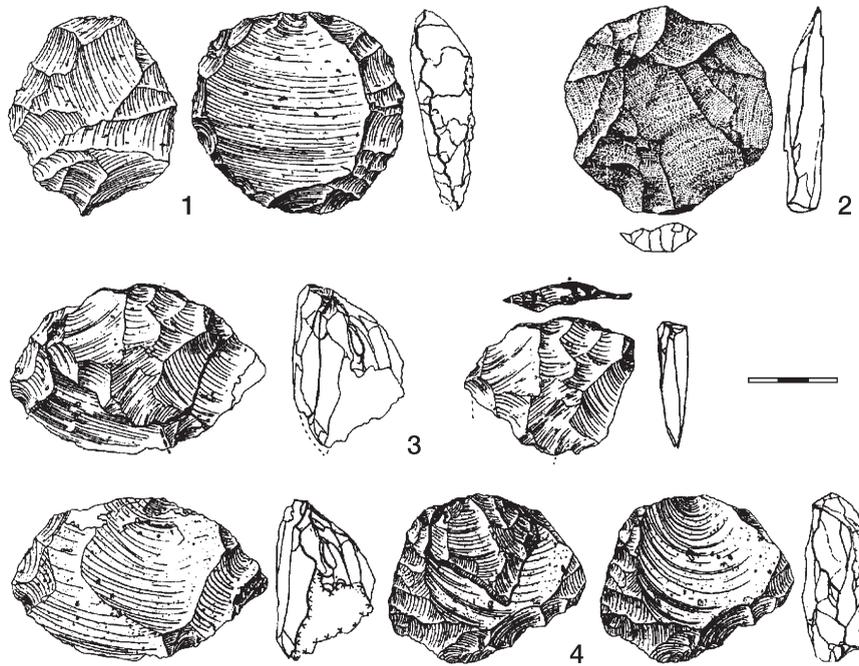


Fig. 19-10 Levallois-Mousterian. Korolevo III (after Koulakovska 2004). Levallois flake production: linear core with refitted preferential flake (1, 3, 4), preferential flake (2).

point method which resulted in the production of short and wide-based triangular target blanks (Fig. 19-11, 1, 2, 3). During one technological cycle one or two points were detached, i.e. we are dealing with a linear method (Fig. 19-11, 4, 5). Blades from preliminary lateral preparation of Levallois pointed core flaking surfaces are often debordant (Fig. 19-11, 4/2, 6). However, numerous blades were rarely modified into tools. This fact, as well as the analysis of abundant debitage products and refits made by V. Usik (1989), serve to confirm the technical status of blades as by-products of Levallois point production. Crested blades with two prepared slopes and Levallois flakes or blades (evidence of other reductions) are absent. Only one blade core on flake with narrow flaking surface was recorded, as well as two cores with opposed platforms bearing flake and blade negatives.

In order to detect an evolutionary trend between Levallois and blade production at the Korolevo sites, the principal difference between exclusive point production from unidirectional prepared cores and flake production based on Levallois tortoise-like cores in the preceding complex III should be taken into consideration. The later industry is totally lacking in blades and points. Cores are flat, while in complex IIb they have a characteristic trapeze section reflecting preliminary blade-like preparation of a wide flaking surface and an extension

to the sides. The wasteful linear reduction system with the same raw material accessibility (long preparation aiming at one or two flakes per core) in complex III also differs from the linear point method (one, rarely two points per working surface) but with repeated cycles (several generation of points per reduction until core exhaustion in complex IIb). Cores were made on andesite blocks, fragments, and on some quartzite pebbles. These represent all stages of reduction, though exhausted cores are the most numerous. Many cores were prepared on flakes, sometimes, and when visible, the flaking surface is located on the ventral face of the flake. Most of cores are unidirectional convergent orientated for point production. Some have additional flaking surfaces on second large faces (similar to one of the reduction sequences from Tor Faraj in the Levant, according to Demidenko and Usik 2003). Flaking surface was prepared by means of convergent removals, mostly debordant blades (with natural or cortical back). Lateral preparation was also achieved after fragmentation, cutting the core on its long side. Longitudinal convexities were formed by the removal of plunging blades or by a series of short removals from the opposed auxiliary platform. The main platform was long and carefully faceted; the platform zone was often corrected by trimming (elimination of overhang) (Fig. 19-11, 2, 3, 4).

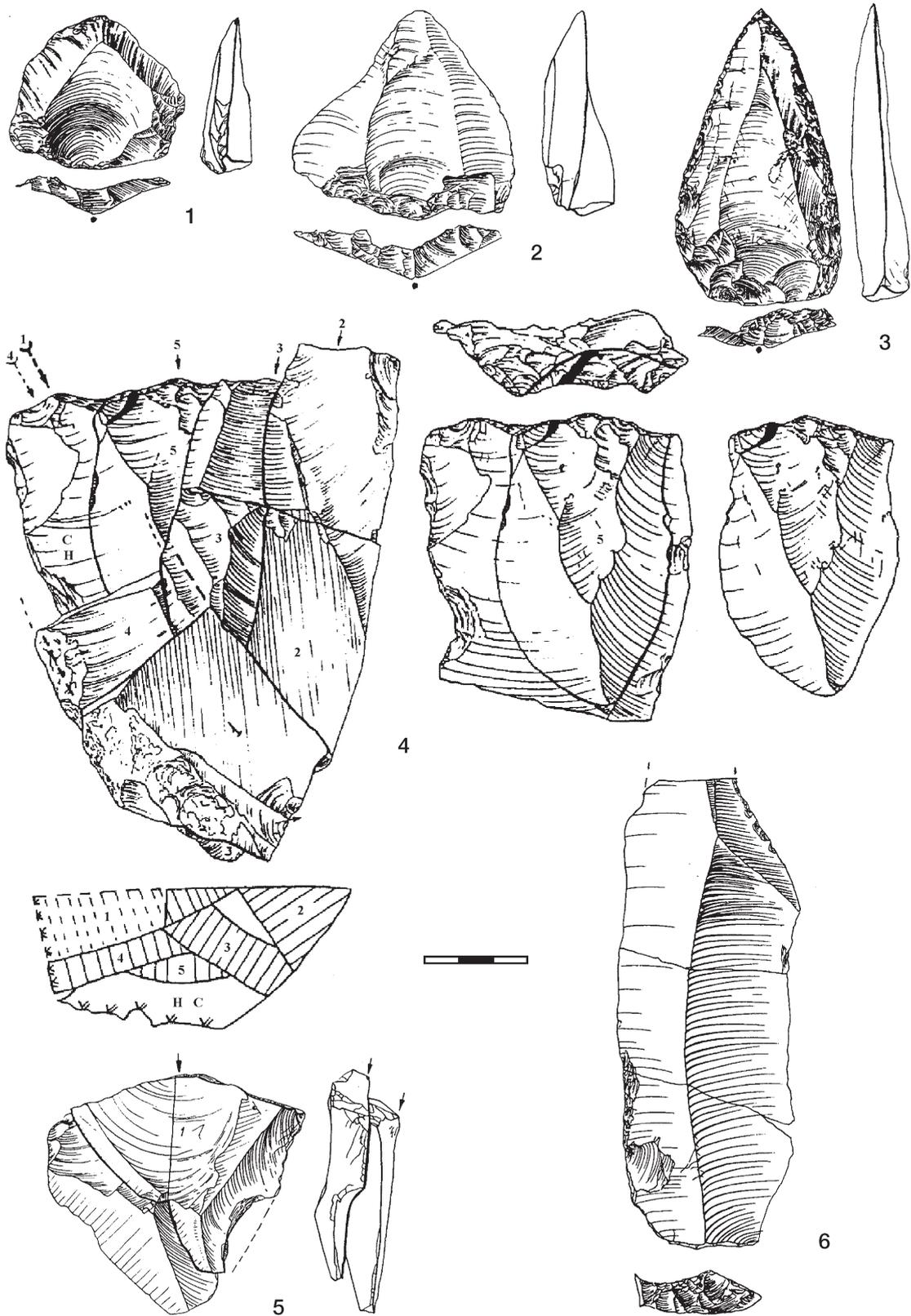


Fig. 19-11 Levallois-Mousterian. Korolevo I, complex IIb (after Usik 1989). Levallois point production: broad-based Levallois points (1, 2); retouched Levallois point (3); convergent unidirectional core with refitted preparation blades and final point (4); refitted points (5), preparation blade (6).

Target point(s) are regular (Fig. 19-11, 3), though after repeated cycles following generations of points tended to become cruder, even atypical (Fig. 19-11, 5). Cores with such reduction sequences display multi-convergent scars, short proportions ($L < W$), and some are close to centripetal types with continuous platforms. A general technological tendency could be summarised as having a good beginning with careless continuation in multiple point production. Centripetal cores are rather numerous and were linked, according to V. Usik, to point production as a final stage. However, a series of centripetal Levallois looking flakes could document other types of reduction, even if this model were used on one blank just after point detachment. Nevertheless, it is possible that this independent flake method played only a minor role. We agree with V. Usik regarding the absence in complex IIb of a Levallois linear flake method, otherwise so well represented in the older complex III. The tool-kit is typically Levallois-Mousterian with a number of lateral side-scrapers on flakes and points; one side scraper is on blade. Notches and retouched flakes often also appear on Levallois debitage products.

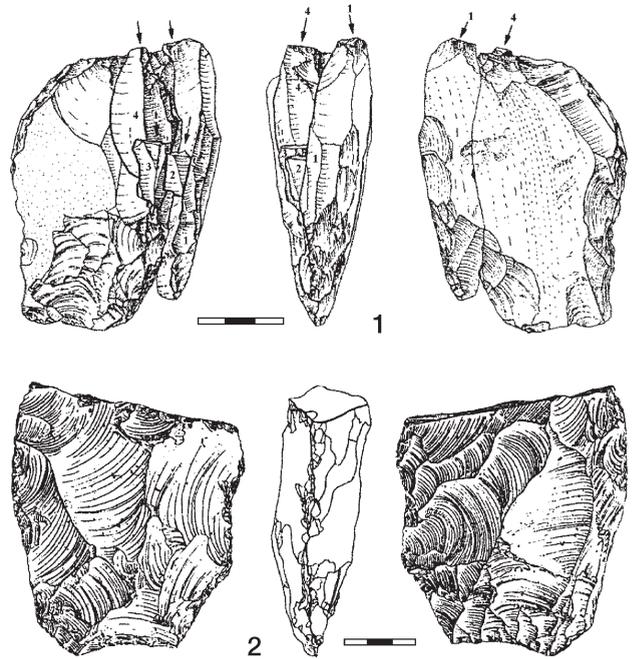


Fig. 19-12 Early Upper Palaeolithic. Korolevo II, complex II (after Usik 1989). Blade production: wedge-like core with refitted blades (1); bifacial pre-form (2).

Korolevo II, complex II

This industry (minimal radiocarbon age > 38.5 ka BP) documents an exclusive blade production of UP type, without additional MP methods. Reduction of narrow wedge-shaped bifacial pre-cores with central crests (carefully prepared from two slopes by faceting and abrasion) was common (Fig. 19-12). During long reduction sequences these volumetric cores resulted in flat exhausted forms with MP morphology. Residual cores are mostly bi-directional with centripetal and orthogonal detachments sometimes featuring a last plunging removal. Part of the exhausted cores still show remnants of the flaking volume which would have allowed further removals if they were flaked as partially turning and even turning pieces. Full debitage cores normally feature two opposed platforms with a narrow flaking surface, often wedge-like in shape. Initial blanks, large andesite blocks, fragments of flakes / blades, as well as river pebbles all served as cores. Neo-crests could be used at any stage of core reduction, and are often visible on residual cores. Regulation of the overhang was very common and is attested by both cores and blanks. Some cores were reduced directly without crest installation (mostly on pebbles). Final blades are regular; some are massive and were used like blanks for the next generation of cores. Generally, blades are thinner and longer than in complex IIb.

Some blades have lips or diffused bulbs associated with plain butts (evidence of soft hammer). Levallois cores are absent. Numerous refitted blocks exhibit not one Levallois or any other additional MP debitage systems. Flakes with centripetal scars are the result of bifacial shaping of UP wedge-like pre-cores. In sum, the occupants of complex II never used Levallois or any other flake methods, as proposed in the first publication (Usik 1989) and re-confirmed recently (Usik 2001; 2002). Only two MP features were observed: platform faceting before blade removals (IF up to 30) and hard hammer percussion technique, which are both usual elements during the Initial Upper Palaeolithic. Upper Palaeolithic tools (mostly end-scrapers and retouched blades) occur nearly twice as frequently as Middle Palaeolithic types. The tool-kit also contains some bifacial leaf points and their pre-forms.

Korolevo I, complex Ia

This Early Upper Palaeolithic industry has yielded just one radiocarbon date (> 25 ka BP) which according to V. N. Gladilin (1989) was contaminated by ash from a Bronze Age burial. This industry appears in the general Korolevo sequence after complex II ($>$

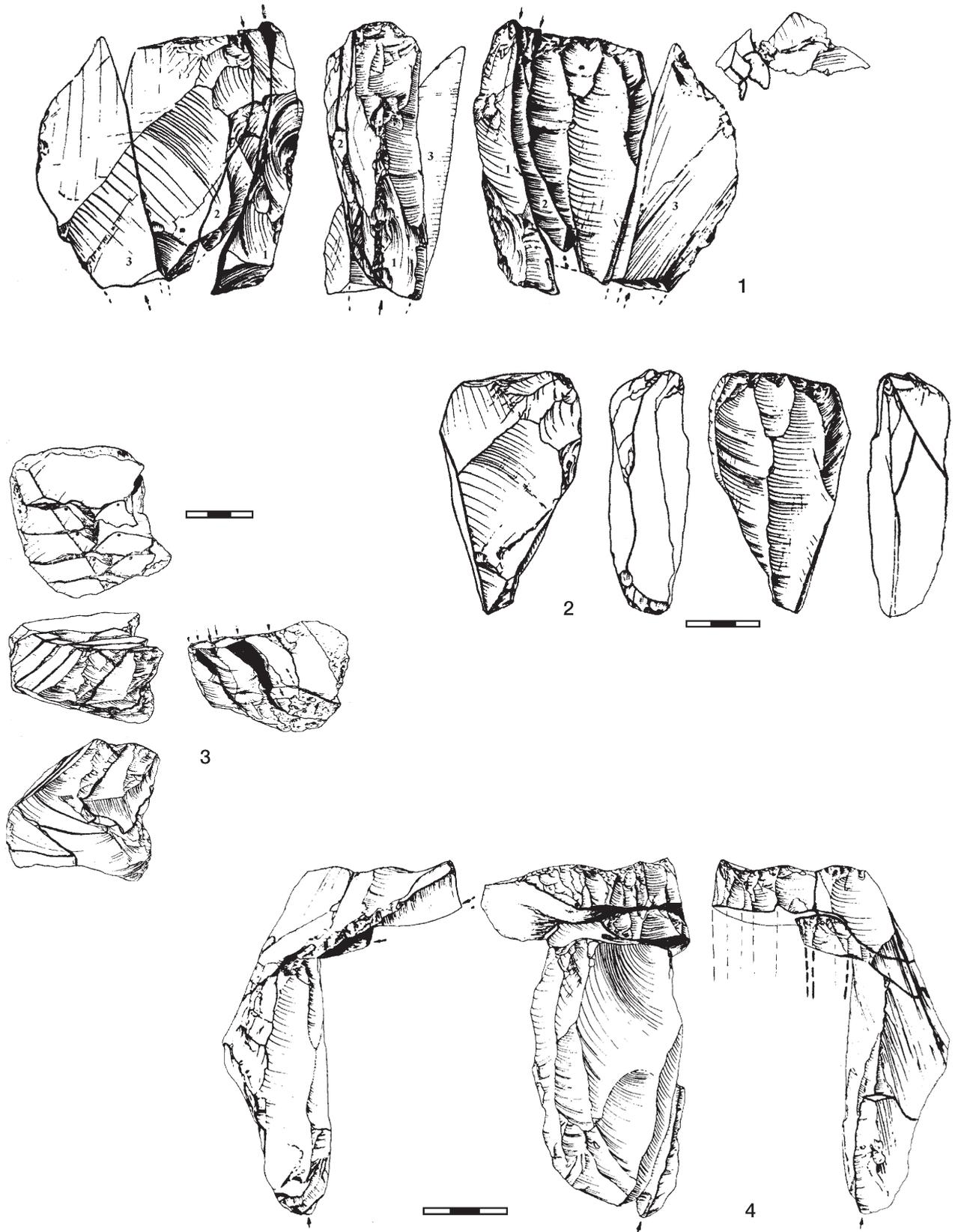


Fig. 19-13 Early Upper Palaeolithic. Korolevo I, complex Ia (after Usik 1989). Blade unidirectional production: core with refitted blades (1); residual core (2); core with refitted tablets (4). Production of short flakes: unidirectional core on flake with refitted flakes (3).

38.5 ka BP). The technological structure of complex Ia is characterised by Upper Palaeolithic blade production. However, the Upper Palaeolithic blade production here is not as dominant as in complex II, but accompanied by MP reduction strategies. This is a non-Levallois direct flake method based on unidirectional transversal reduction of a flake's narrow edge, whereby the flat ventral face was used as a platform (Fig. 19-13, 3). The working surface is transversal and corresponds to the thickness of the initial blank. Desired products are short and thick flakes (Usik 1989). The continuation of core-on-flake reduction resulted in a pyramidal turned short core. Other "archaic" flake methods could be attested on several trifacial cores which we found in this collection. Large thick flakes (the method of their production is unknown) have pronounced or flat bulbs with lips, obtuse flaking angles and large plain butts. These flakes were reduced like cores or were modified into MP type tools: notches, side-scrapers or retouched flakes. Compared with complex II, the blade production concept also changed. The unidirectional mode is dominant (Fig. 19-13, 1, 2, 4), with bi-directional cores occurring only during the final stage of reduction. Rocourt type reduction was also present and represented by partially turned core with two opposed platforms (one refitted sequence). A lateral crest with one slope was usually prepared on the long flake side (Fig. 19-13, 1). Single blow platforms are common; blade butts en eperon (spur) occurred. Tablets were used (Fig. 19-13, 4) instead of eliminating core overhang by means of trimming/facetting. Flaking surfaces are usually large with a slight extension on the side, rarely partially turned or turned. Lip presence documents the frequent use of a soft hammer. Final blades are long with a curved profile. Most cores are exhausted and represented by sub-polyhedral, polyhedral types or feature a change in orientation morphology (only some bear blade negatives). The tool kit is dominated by UP types (ordinary end-scrapers, retouched blades, rare burins) over MP tools, mostly massive retouched flakes, notches and rare side-scrapers (Gladilin, Demidenko 1989). To sum up, this is a fully UP complex in both technological and typological aspects, but with some MP remnants. Common features were recorded with a newly discovered site at nearby Sokyrnitsa (Usik 2001; Usik et al. 2003; 2004).

Bulgaria

Bacho Kiro Cave

This cave has yielded several representative MP assemblages as old as > 47,500 BP (layer 13), as well as

another date (> 43,000 BP) coming from layer 11. It is assumed that layer 12 dates to the first Pleniglacial of the Würmian (Kozłowski 1982). Typologically, layers 12 and 13 are attributed to a typical Mousterian of non-Levallois facies, or a Levallois facies. The illustrations of artefacts from layer 13 (Drobniewicz et al. 1982) indicate the presence of various recurrent Levallois methods. Thus, it seems as if J. Kozłowski's preliminary attribution to the "Mousterio-Levallois", based on a sample from D. Garrod's excavation, was correct (Kozłowski 1975; see also critics in Drobniewicz et al. 1982). The MP assemblages from Bacho Kiro Cave show clear features of this method (Fig. 19-14, 3, 4, 5, 6): in layer 13, short flakes were obtained in the course of recurrent methods, whereas in layer 12/13 large preferential flakes were coming from a linear Levallois method (Fig. 19-14, 5). Elongated points and blades as well as corresponding cores are rare or absent. The production of massive flakes was based on discoidal core reduction (Fig. 19-14, 1, 2). The Pre-Aurignacian or Bachokirian at the site (at least 4 cultural levels within layer 11) show no links to the MP assemblages and evolved during a rather long period (>43,000 till about 34,800) towards the Aurignacian. Thus, the MP record from this cave documents the use of Levallois flake methods, accompanied by additional discoidal core reduction. There are no methods for the production of blades, neither in the frame of a Levallois method, nor in the course of any UP core reduction concept.

Temnata Cave. Trench TD-I, Layer 6

This layer has yielded a MP industry (levels X and XI), which unfortunately still remains unpublished. This assemblage has been dated by TL to about 67000±11000 (Gd-TL-254; Bluszcz et al. 1992) and assigned to OIS 4. There is a distinct scarcity of Levallois blanks and blades obtained accidentally from unprepared cores. Consequently, this material has been excluded from the potential predecessors of the overlaying "transitional industry" in layer VI, trench TD-II (Drobniewicz et al. 2000a, 276).

Temnata Cave. Trench TD-II, Layer VI

This industry has produced some of the very earliest evidence of a "transitional assemblage" with a Levallois background, an UP tool-kit and volumetric core reduction. One radiocarbon date is available: >38 700 BP (Gd-4697). After controversial discussions about this radiocarbon date (Ferrier 2000), it was

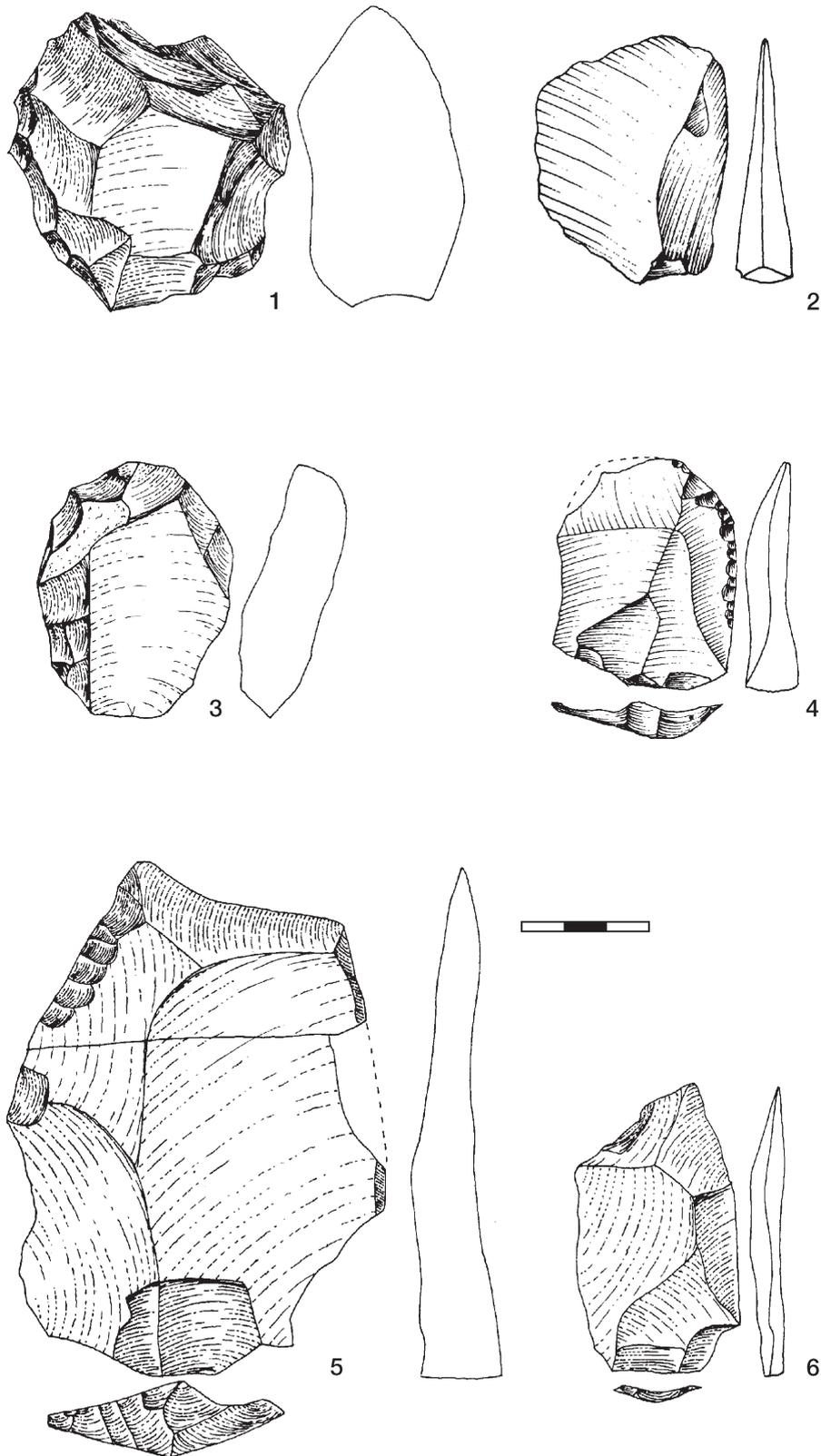


Fig. 19-14 Levallois-Mousterian. Bacho Kiro, layers 13 (1-4) and 12/13 (5, 6) (after Drobniwicz et al., 1982). Flake production: disoidal core (1) and flake (2); Levallois core (3), Levallois retouched/used flakes (4-6).

finally suggested that the date represents a minimal age only. Arguments for this came from a detailed study of the stone artefacts that classified this material as a transitional industry (Ginter et al. 1996). Thus, layer VI from Trench II is thought to date to between 50 and 45 ka BP (Drobniwicz et al. 2000a; Kozłowski 2000b), i.e. corresponding to the Mousterian and the EUP in trenches I and V. Debitage is characterised by some small centripetal Levallois flakes and classical preferential flake cores (Fig. 19-15, 2, 6), as well as by numerous products of Levallois recurrent reduction: uni- and especially bi-directional cores, debordant flakes/blades, and elongated blanks (Fig. 19-15, 4). True Levallois points are rare (n=2). Cores display different stages of reduction: from initial through exhausted (polyhedral-spherical pieces). Blade cores (n=34) prevail slightly over Levallois (including blade double-platform and flake cores account 9 and 13 respectively) and discoidal cores (n=32) (Fig. 19-15, 3). A bi-directional pattern is common to both core types. Some flat cores retain traces of their preliminary centripetal preparation, and, following uni- or bi-directional exploitation, resemble Biache type cores (Fig. 19-15, 1, 7). According to the level of core reduction, negatives of final removals display blade or flake proportions. Other flat double-platform blade cores display only bi-directional patterns which might represent the advanced reduction of Biache type Levallois cores (Fig. 19-15, 8) or cores without preliminary preparation of flaking surface bearing cortical remnants on their sides and back (i.e. flat non-Levallois bi-directional cores) (Fig. 19-15, 5). Flakes have mostly plain butts (>40%); prepared butts are rare (>13%). Flakes removed from discoidal and Levallois cores also display low faceting: dihedral >9% and fine faceted 7.8% (Drobniwicz et al. 2000a). Only 31 flakes were unquestionably associated with Levallois technology. The same pattern was observed for blade butts. Single-blow platforms occurred even on cores typed as Levallois. It should be stressed that blade Levallois cores were often not properly prepared for the production stage (cortex remnants). Core reduction was maintained by the alternation of blade removals from two opposed platforms. Sometimes, the final stage of unidirectional exploitation resulted in triangular blades. Two main reduction strategies resulting in blade production have been identified: 1) Levallois recurrent, with centripetal flaking surface and back preparation, and bi-directional exploitation; 2) volumetric UP type with central crest installation, lateral crest maintenance and bi-directional exploitation of large or narrow sides with extension to cylindrical forms (Kozłowski 2000b) (Fig. 19-16, 1, 2, 3, 4, 5). Among the UP blade methods it should be mentioned that direct reduction of nodules with an

extension of flaking surface on the sides (Fig. 19-16, 4), bi-directional reduction of blade cores on flakes (Fig. 19-16, 3) and narrow wedge-core exploitation of selected triangular blocs without (Fig. 19-16, 2) and with preparation (Fig. 19-16, 5) are all documented. The discoidal method was used independently (Fig. 19-15, 3). Also, two kinds of opposite technological transformations are suggested: 1) from Levallois double-platform cores into UP cores; 2) from UP narrow double-platform cores into flat cores with a broad flaking surface. Unfortunately, there are no refits to support this theory (the only way to confirm these transformations). Existing core transformations in other "transition industries", confirmed by refitting, display only one-way reduction, i.e. from UP crested pre-core via flat core, and producing during, or by the end of this reduction, Levallois or non-Levallois blanks (e.g. Meignen 1994; Svoboda and Skrdla 1995; Usik 1989). A reversed sequence, i.e. from Levallois to crested blade core reduction, would fit best to an evolutionary view on the nature of technological developments. Theoretically we cannot exclude this scenario, but at the same time, cannot prove it by concrete re-constructed reduction sequences. The extension of Levallois wide flaking surfaces onto the narrow side(s) is common to the Middle and Early Upper Palaeolithic both for maintenance of debitage (e.g. the Levallois point method with blade by-products in Korolevo IIb; Demidenko and Usik 1995) or for the re-utilisation of flat residual cores in order to obtain blades from a narrow edge (e.g. Kara Bom or Bohunician technology; Skrdla 2003). Refit data dealing with Levallois and UP blade production also suggests the independent status of these debitage methods in the period of early blade production as well as at the end of Middle Palaeolithic (OIS 8 – OIS 3): for example, the WCM of Kabazi II (Chabai 2004c) with double parallel structure of these strategies showing no influence on one other throughout the long and detailed sequence.

The tool-kit of layer VI comprises numerous simple end-scrapers (n=29), mostly on blades, retouched blades (n=38) and flakes (n=55), side-scrapers (n=22), some burins (n=13) and rare truncations, Mousterian points, denticulates; in sum 38 MP and 93 UP tool types with no Aurignacian features.

Temnata cave. Trench TD-I, Layer 4

This layer contains EUP industries divided into three phases (A, B and C) running from 45 000 ± 7000 TL (GdTL 256) to 31 900 ± 1600 (Gd 2354; radiocarbon), and shows no continuity with the 'transitional' industry from trench II (Drobniwicz et al. 2000b).

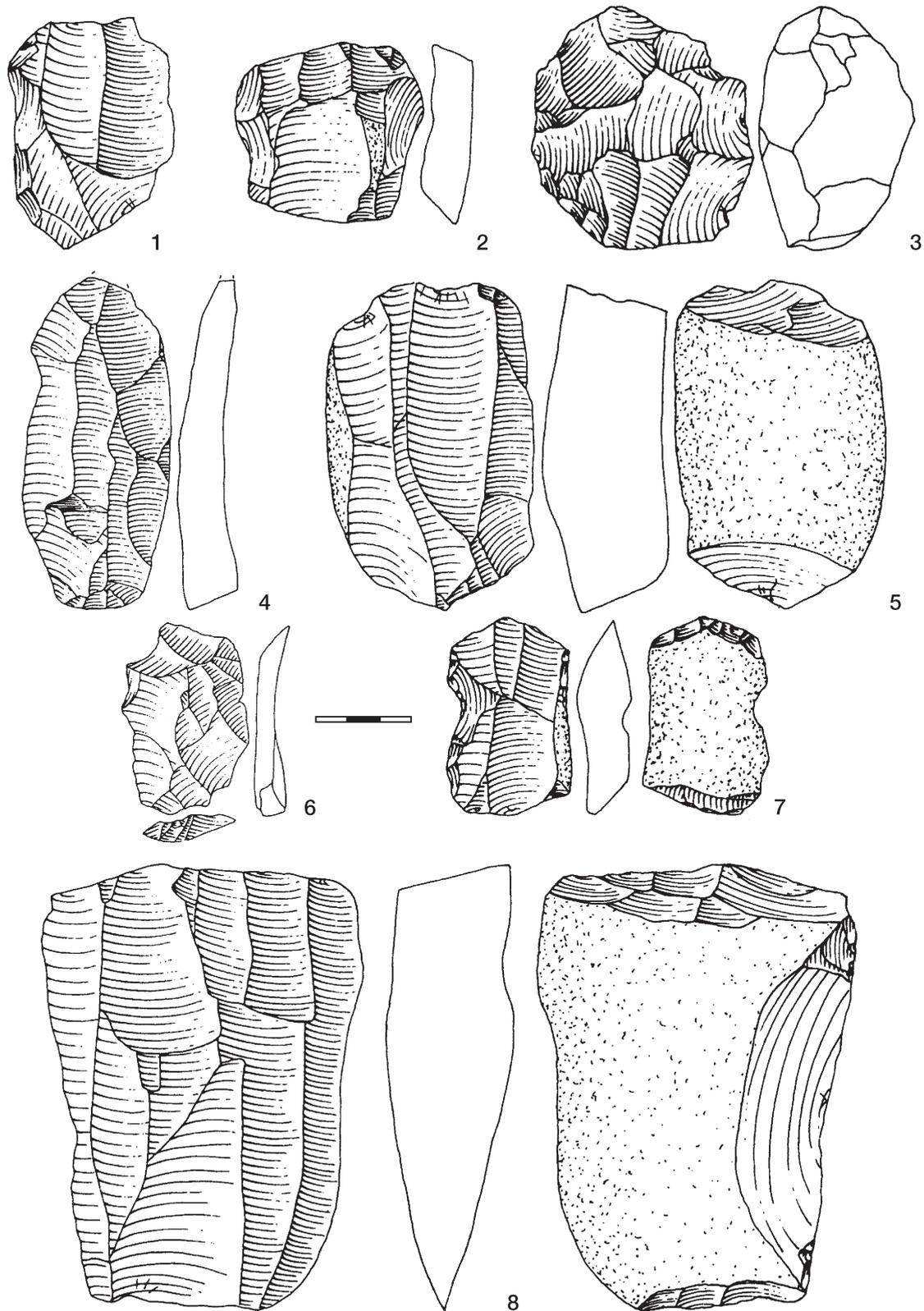


Fig. 19-15 Early Upper Palaeolithic. Temnata Cave, trench TD-II, layer VI (after Drobnowicz et al. 2000a). Middle Palaeolithic methods. Flake production: Levallois core (2) and flake (6); discoidal core (3). Blade production: Levallois unidirectional (1), bidirectional core (7, 8), blade (4); flat non-prepared bidirectional core (5).

Levallois and discoidal reductions are absent. Blade production was the main flaking strategy. Apart from exhausted pieces, uni- and bi-directional blade and flake/blade cores with prepared or single-blow platforms occur in nearly equal proportions (Fig. 19-16, 6, 7, 8, 9, 10). Remnants of lateral preparation (partial or complete) are visible on the cores (Fig. 19-16, 6, 7, 9). Exploitation took place on either the broad (Fig. 19-16, 7, 9, 10) or narrow parts of the cores (Fig. 19-16, 6), with any ensuing extension occurring on the sides, and seldom around the circumference, resulting in turned cores. Interestingly, flakes with dihedral and faceted butts are rather abundant (together =11.9% in phase B), as are blades with prepared (>20-29%) and faceted butts (10-4%), which decrease progressively. Blade butt faceting is in agreement with core platforms (Drobnowicz et al. 2000b, p 355). Thus, platform faceting was higher in EUP industries than in the “transitional” Levallois-based” entity of layer VI. The tool-kit is characterised by a combination, and similar proportions, of generally non-Aurignacian types, such as end-scrapers (throughout three phases: 13-28-28%), retouched blades (28.5-30-26%) and flakes (36-13-11%), rare burins (3.3-1.7-4.8%), truncations, denticulates, notches, side-scrapers, raclettes, perforators. Tools on blades increase considerably over time (from 50 till 60-70%); similarly, side-scrapers are more numerous than in the early phase, increasing from one item to a total of 6.6% of the assemblage, and thus comparable with the transitional industry (10.8%). Nevertheless, authors have pointed out that a majority of these pieces resemble retouched flakes rather than classical MP side-scrapers (Drobnowicz et al. 2000b). An increase of Aurignacian elements during three phases, also observed at Bacho Kiro, layer 11 (Bachokirian), makes it likely that the typical Balkan Aurignacian from both caves evolved from the local EUP in the Temnata Cave, which has no roots in the local MP. Middle Palaeolithic industries (Balkan “Mousterio-Levallois”) are known from Samuilitsa Cave II (e.g. Sirakov 1983). However, lithic collections are without clear stratigraphic context (Krumov 2003). Two main complexes were recorded from the upper portion of the sequence (Sirakov 1983), with a charcoal date of 42,780±1280 BP separating them, and thus marking the border between Middle and Upper Palaeolithic (Krumov 2003). The lower collection comprises mostly MP cores, whereas the upper part of the sequence shows a tendency to an increase in UP cores. Levallois strategy was orientated towards flake production, and less so to the production of blades and points. Recurrent methods are well attested (centripetal, uni- and bi-directional). Also, the “Mousterio-Levallois” industry of Samuilitsa type

was seen as one of several possible sources for the “transitional” assemblage of Temnata, layer VI (Drobnowicz et al. 2000a).

Moravia, Czech Republic

Levallois industries are almost absent in the Middle Palaeolithic of this and Middle Danube region (Svoboda and Bar-Yosef, eds. 2003). In contrast, this region has yielded some wonderful examples of site clusters reflecting a Levallois-based Early Upper Palaeolithic entity known as Bohunician (Valoch 1976; Svoboda, Skrdla 1995; Svoboda and Bar-Yosef, eds. 2003). Numerous radiocarbon dates place two key sites, Bohunice and Stranska skala, within a time interval between 43-36 ka and 41-34.5 ka BP respectively (Svoboda 2004a). The spatial distribution of this entity is restricted to very rare short distance analogies (possibly Dzierzyslaw I and 8 in Silesia, and Hradsko in Bohemia), along with some other more distant comparisons from Koulychivka, via the Near East (especially Boker Tachtit), to Altai, China and Mongolia (Svoboda and Bar-Yosef, eds. 2003).

Stranska Skala III and IIIa

Generally speaking, the Bohunician is characterised by a predominance of UP tool types, and by two particular strategies (Levallois and blade methods of UP character), both of which were recognised at the site Brno-Bohunice and compared with the Emirian of the Near East (Valoch 1976). Following the reconstruction of a core reduction sequence from Stranska Skala, it turns out that these very different technological concepts were not strictly separated, but occur both independently and sometimes fusing together, occurring on one and the same nodule (Svoboda, Skrdla 1995; Skrdla 1996; Skrdla 2003) (Fig. 19-17, 10). Initial preparation of Upper Palaeolithic type pre-core commenced with crest installation, so as to produce blades. In more advanced stages of the operational chain, the Upper Palaeolithic sequence was ‘interrupted’ by the removal of target flakes, their fracture being controlled by Levallois method(s). The latter part of the reduction sequence resulted in the production of MP blades, flakes and especially points (Fig. 19-17, 1, 2, 3, 4, 5). Desired Levallois points can appear during various technological stages, but never during initialisation. Final cores are often flat and represent different MP types, including Levallois (Fig. 19-17, 6, 7). In comparison to classical Levallois

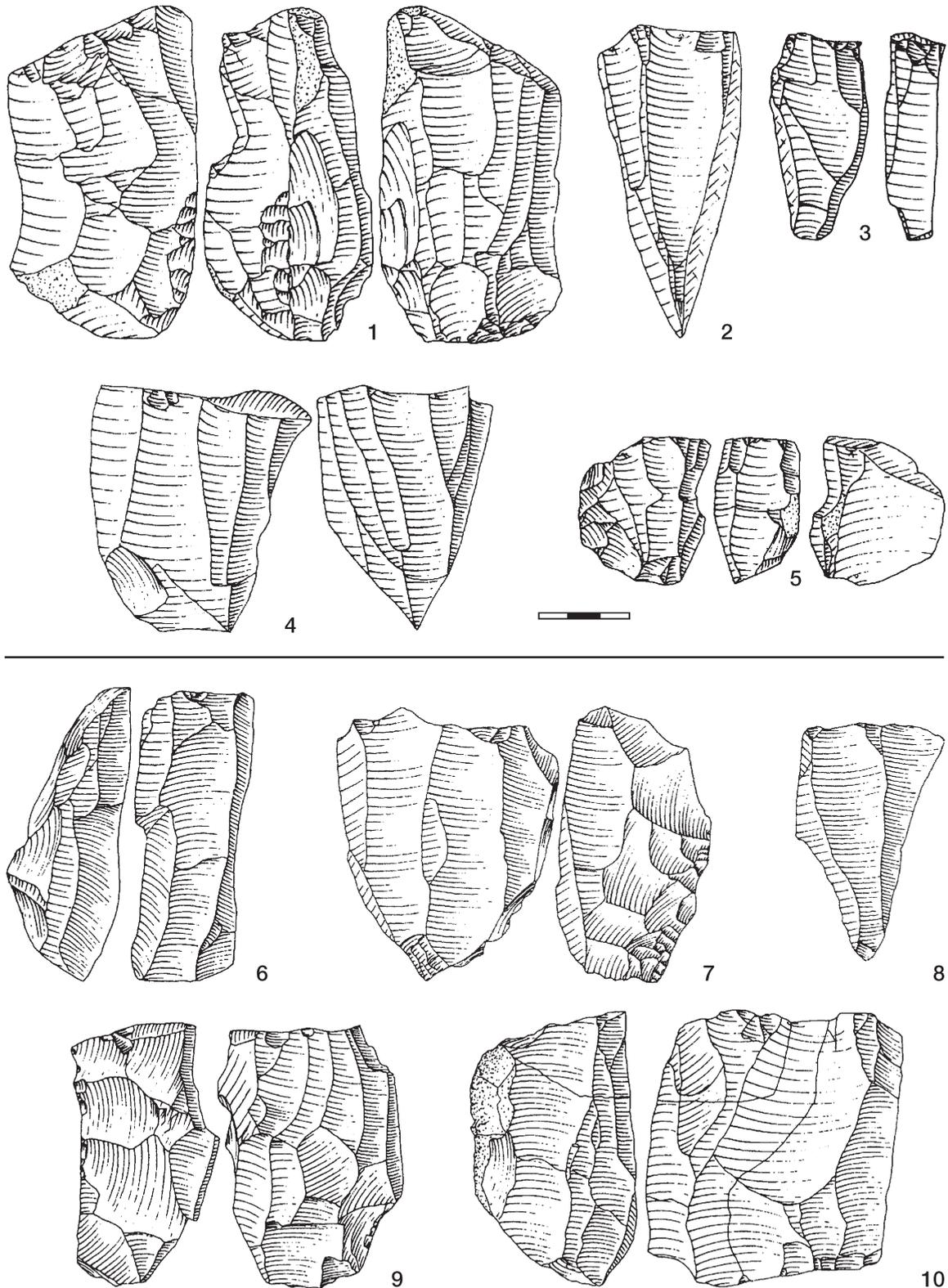


Fig. 19-16 Early Upper Palaeolithic. Temnata Cave, trench TD-II, layer VI: 1-5 (after Drobnowicz et al. 2000a) and trench TD-I, layer 4: 6-10 (after Drobnowicz et al. 2000b). Upper Palaeolithic blade production: bidirectional cores (1, 3, 6, 9, 10); unidirectional cores (2, 4, 5, 7, 8).

cores, Bohunician pre-cores are more voluminous. Consequently, this increased volume and mass of raw material was often exploited in a bi-directional manner (Svoboda 2004a; b). Platforms were prepared by single blow and faceting; hard hammer was used. This principal of the Bohunician chain, however, cannot generalise actual flaking processes, and several individual refits document rather important technological variability (Skrdla 1996). Moreover, other methods, other than Bohunician reduction, were documented by refitting, e.g. discoidal, blade and bladelet debitage based on narrow face and pyramidal cores, as well as direct blade production (bi-directional core without crest) (Fig. 19-17, 8, 9). An effort to produce blades from the narrow edges of flat cores is also attested. One refitted block has revealed a reduced flat Levallois core which was used for direct (non-crest) blade debitage, with the flaking surface located on its narrow part. Some cores from different Bohunician sites (but none from Stranska Skala) exhibit an additional flaking surface on the narrow part (Nerudova 2001, fig. 2:1-3). This is assumed to document a development towards UP methods (idem p.368). However, the order of reduction is unclear. In Kulychivka, for example, Levallois reduction on such cores was normally preceded by blade debitage (Meignen et al. 2004). Numerous refittings from Stranska Skala display an already full-UP blade reduction of crested pre-cores, which means that this method was known, and technological 'transition' (if this was the case) had happened before. Upper Palaeolithic tools are common (end-scrapers, burins) often made on blades, also on Levallois points. Side-scrapers, notches, denticulates and sometimes (Bohunic site) bifacial leaf points appeared. Levallois points are rarely retouched. A large spectrum of Levallois points was found (from elongated to short and wide) (Fig. 19-17, 1, 2, 3, 4, 5), but most display flake proportions with L/W ratios in between 1.8 to 1.5. According to P.Skrdla (1996), most of the short and wide flakes were detached at the end of the core reduction, while at the beginning of the Bohunician core exploitation points, elongated flakes and blades were produced. However, the latter types of blanks are rare. Outside of Moravia and Bohemia the Bohunician trend is known only from more easterly sites, e.g. in the the lower level of the site Dzierzyslaw I in Silesia, Poland (Foltyn, Kozlowski 2003), Kulychivka, layer III-d (Savich 1975), and in the Near East, or even further afield, e.g. at Kara Bom, Altai. However, only at Boker Tachtit, level I (Marks, Volkman 1983; Meignen 1994) has this technological scenario been confirmed by refitting.

Another interpretation of Bohunician technology, proposed by Z. Nerudova (2001), conforms to the 'pre-refitting' state of knowledge on this matter (see also Skrdla 2003 for this discussion). This author states (against Skrdla 1996) that three parallel methods existed in the Bohunician in general, and at Stranska Skala III, these comprise two blade non-Levallois methods (of both the direct and UP type), and the Levallois recurrent (bipolar and rarely unipolar). Thus, Bohunician reduction reflects a co-existence of several methods, even occurring on one core. However, Z. Nerudova (idem p.371; see also Valoch 2003) is convinced that, on the level of flaking sequences, instead of a admixture of different methods only one unique method was applied. Also, the Levallois method was not so dominant in this technology, nor among the final products, which were not usually transformed into tools. Moreover, whereas Levallois roots are not seen in this region, analogies should be sought in nearby Western Europe (with its similar, i.e. parallel, technological structure) rather than in the Near East.

It is seemingly impossible to decide which of the coexistent parallel methods was the predominant, especially when several of them were used at different stages of reduction of one nodule and resulted in various blanks (blades, points, flakes). Of particular importance is the fact that refitting has attested the application by the same craftsmen of different methods, which were planned and passed from one to the other during the reduction of the same core. This technological situation has so far only been observed to the east of the Danube region (e.g. at Boker Tachtit), it not having been documented in Western Europe where both the Levallois and UP blade methods have an independent status. In sum, mixing or fusing of these methods during one core reduction, especially in a reverse chronological sequence, i.e. from a UP crested pre-core via Levallois 'archaic' debitage, stresses this Bohunician speciality, which differs fundamentally from the trivial parallel model of independent technologies of many MP industries. As for the Levallois component, it is evident that this concept (even in recurrent and / or repeated manner), from the point of view of productivity is less effective if compared to regular blade production of UP type. Thus, we cannot expect statistical domination of Levallois final blanks over UP blade production. The number of Levallois blanks, and some tools on them (even in Levallois-Mousterian complexes retouched tools on these blanks are not numerous, often rare), is sufficient to confirm the important role of this strategy in the Bohunician. Thus, Svoboda's and Skrdla's arguments appear to have been confirmed, and explain very well this phenomenon.

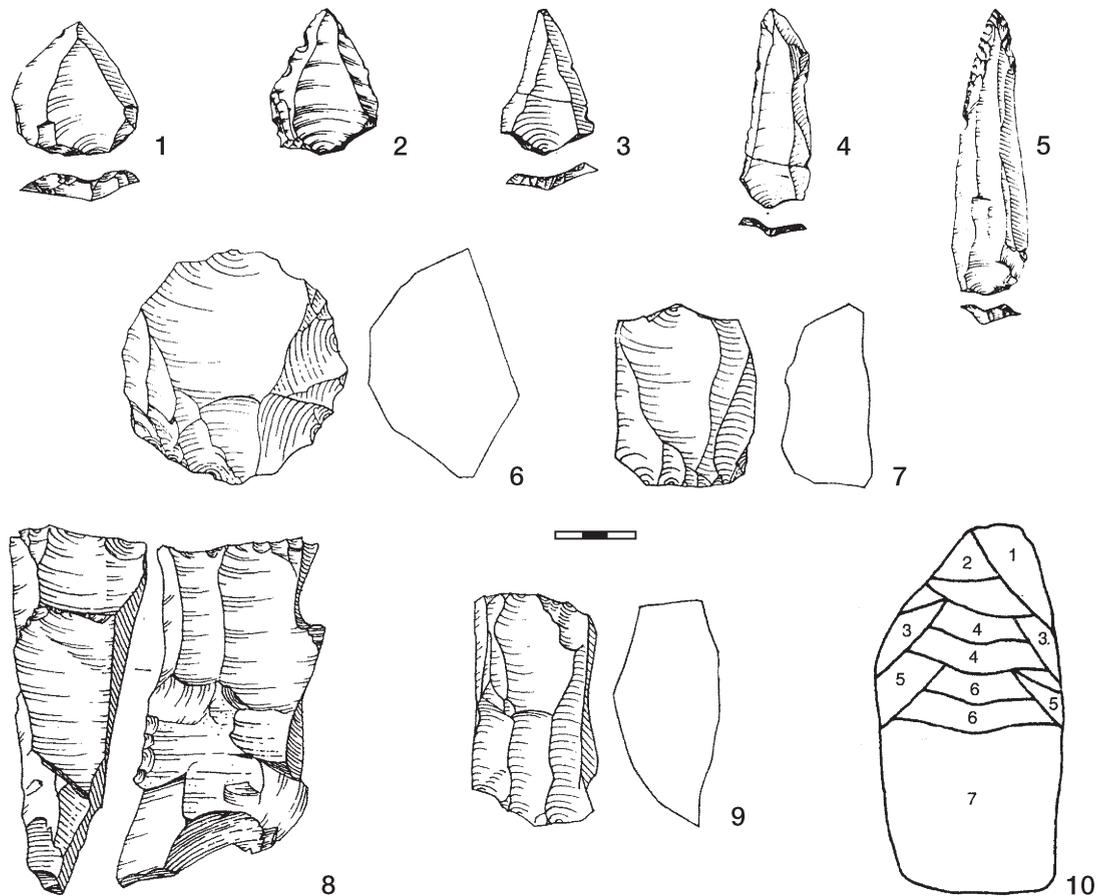


Fig. 19-17 Early Upper Palaeolithic, Bohunician. Stranska Skala III/IIIa (after Svoboda, Skrdla 1995 and Skrdla 2003). Levallois points (1-4), retouched point (5), residual discoidal (6) and point core (7); blade cores (8, 9). Scheme of the Bohunician reduction in cross section (10): crested blades (10/1, 2), lateral shaping (10/3, 5), series of Levallois points (10/4, 6), core (7).

In a recent publication, using previous and newly obtained refitting data, the interpretation of Bohunician technology received a shift concerning the preferential products (Skrdla 2003). Accordingly, the general idea of this technology was the production of Levallois points, whereas blades were nothing more than secondary products which were detached during the preparation of a flaking surface for Levallois target points and pointed products. Three stages of core reduction are distinguished: I – a preparation stage (core shaping) which reflects the UP style with frontal crests and rarely (in case of voluminous block) direct initialisation with a single or two opposed platforms; II – a production stage (blank production) commencing with crest removal and a series of blades, often from opposed platforms, detached in order to form a triangular flaking surface for the detachment of the first series of points from the same striking platform; III – a renewed prepara-

tion of the flaking surface by shaping and narrowing of the wide frontal side by means of blades, so as to enable the production of a next generation of points; IV – the abandonment (intensive core reduction by blade and flake removals often from opposed platforms; final modification of core via various formal types). To sum up, this position stands in direct contrast to previous interpretations: e.g. Svoboda (2004, p.123): "...Bohunician is late Levallois technology producing Levallois blades, flakes and points from crested pre-cores", or Skrdla (1996, p. 103): "... production of whole series of target flakes (Levallois points)... and other blanks such as blades". Thus, the crux of the matter is the status of blades, i.e. are they target products together with points, or are they simply by-products resulting from the Levallois point method? If blades are seen as technological removals only (which is the position of Skrdla), then a coexistence of independent methods (which

is the position of Nerudova) is excluded. However, this position seems problematic to the authors of this paper. Blades as by-products are common to the Levallois point method, e.g. Korolevo I, IIb (Usik 1989; Demidenko, Usik 1995). However, in the Bohunician case, the impact of raw material volume on the chosen strategy is evident: whilst plaques were reduced in UP manner, nodules experienced the Bohunician mixed model (Skrdla 1996). It is evident that, in initial stages, oblong voluminous nodules were better reduced by crested pre-shaping or, more rarely, by blade debitage (deboriant blades) from the narrow edge. Then, following the extension of blade debitage and the flattening of the core, the Levallois concept was applied to the large flaking surface. In our opinion, much speaks for the validity of Svoboda's and Skrdla's original idea of a Bohunician core reduction method with a conceptual fusion of Levallois / UP technologies. Especially the initial stage of the reduction sequence leads to fully UP pre-cores and shows the dual character of the Bohunician production system, with several kinds of desired blanks (Levallois and non-Levallois points, flakes and blades e.g. Skrdla 2003 fig. 9.2.g; 9.3.d). In this case, blades might be considered as both target and supplementary products (see also similar opinion by Kuhn in Skrdla 2003, p. 139). The same technological pattern, documented by refitting, occurred in Boker Tachtit, layer 1 (Marks, Volkman 1983; Meignen 1994). However, even these classically compared technologies display important variability. The Bohunician theoretical scheme, and most of the refitted sequences (Skrdla 2003, fig. 9.27), show initial, relatively short UP blade reduction followed by repetitive production (after re-preparation of the flaking surface) of one or two Levallois point(s) per flaking surface, whereas in the Israeli model (Meignen 1994) a Levallois point was systematically obtained during the last stage, and after intensive (with re-preparation via neo-crests) volumetric blade core reduction (example of consecutive application of two technologies).

Kraków Region, Southern Poland

Chronologically, the Middle Palaeolithic "non-Micoquian" industries in this region are characterized by a marked discontinuity. Their earliest appearance is documented during the Saalian (Bisnik Cave, layers A6, A5, A4, A3), whereas the bulk of material is coming from the end of Middle Palaeolithic and the Transitional period (OIS 3). For this final phase, a number of occupations are known: Piekary IIa, layers 7c, 7b, 7a and 6 and Ksiecica Jozefa, layer III, II

and I. For the time in between, only small collections from Krakow-Zwierzyniec I, layer 2, as well as assemblages from different trenches of this site and from Piekary I, II, III and IV are documented.

Zwierzyniec I (A. Jura's investigations)

Collections comprising Middle Palaeolithic artefacts recovered by amateur A.Jura since 1935 have already been studied and published by several generations of scholars (Jura 1951 a, b; Chmielewski 1975b; Kozłowski, Kozłowski 1996; Poltowicz 1996). Several sites have been recorded.

Area P

This assemblage was the first Levallois-Mousterian industry discovered by A.Jura in this area. W.Chmielewski (1975 b) identified 57 artefacts which may have been associated with a charcoal concentration. All were made of local Jurassic flint, and according to Jura's notes, stem from sands covered by sandy loess and remnants of fossil soil. The artefact bearing horizon was attributed to a significant time interval between the Eemian and the first maximum of the last Glacial (Chmielewski 1975a, b; Kozłowski 1969; Kozłowski, Kozłowski 1996). Studies of this collection in 1998 and 2000 once again confirmed its Levallois status. Judging from this material, it can be confirmed that Levallois flakes and blades were obtained by means of the recurrent Biache method. Uni- and bi-directional scars with remnants of previous centripetal preparation of the core debitage surface are common (Fig. 19-18, 11). Several points, including broad-based triangular blanks, and a convergent linear single platform core might also document the Levallois unidirectional convergent method (Fig. 19-18, 12, 13). Additionally, a number of smaller flakes with centripetal scars, from the preparation of a working surface, were recorded. Faceted butts are most numerous, amongst which the chapeau de gendarme type is common (Poltowicz 1996). Apart from the dominant Levallois technology, non-Levallois debitage products (large massive flakes, often asymmetrical or pseudo-Levallois points) have been distinguished, thus confirming discoidal or/and centripetal reduction. The tool kit is modest: some lateral scrapers, denticulates, burins. Retouch is light. The collection was assigned to the Levallois-Mousterian of Shaitan Koba type (Chmielewski 1977). Comparisons were also provided with Molodova I and V (Chmielewski 1975b), however, Levallois tortoise flake cores and preferential flakes were not found in Jura's collection.

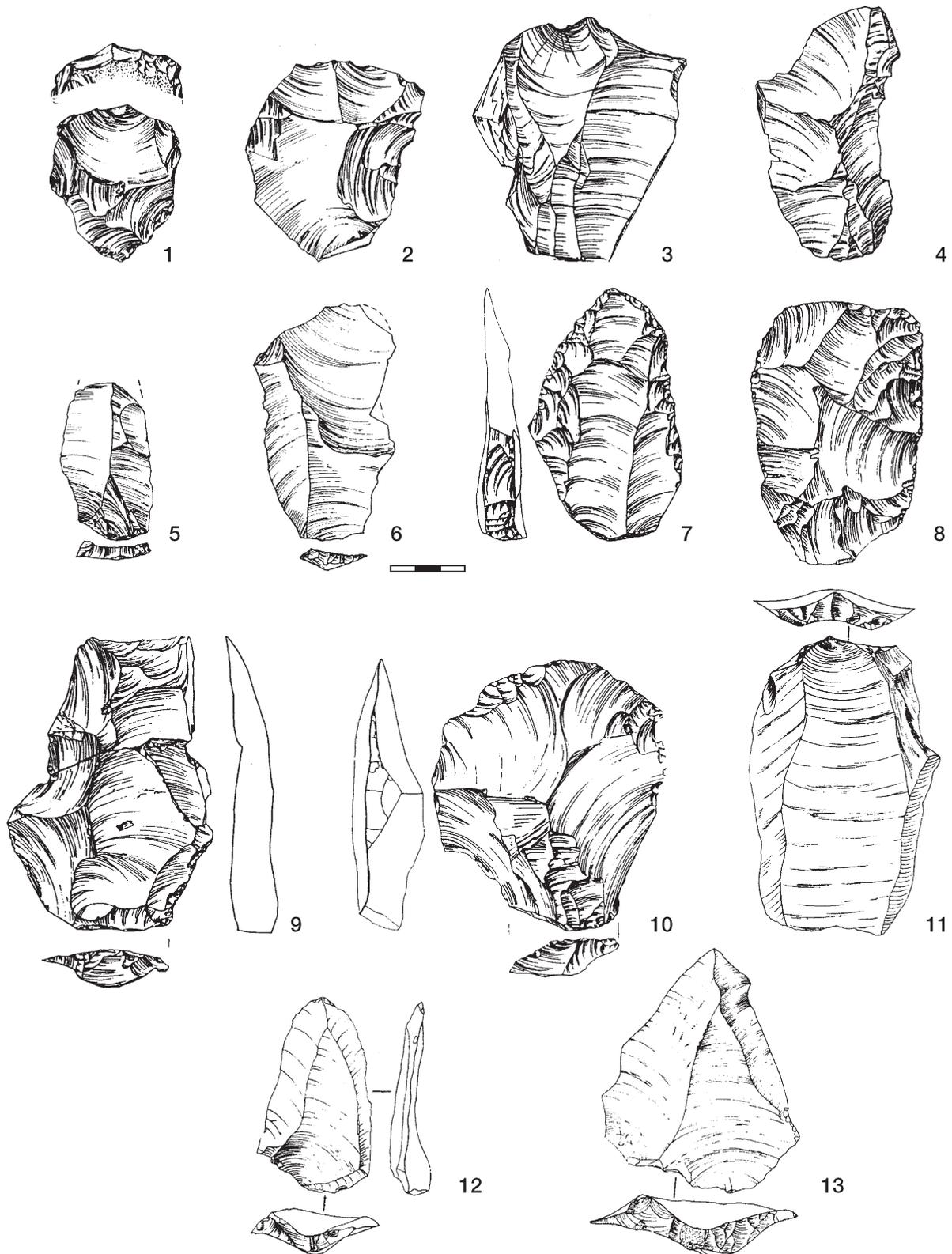


Fig. 19-18 Levallois-Mousterian. Piekary II: 1-6 (after Sachse-Kozłowska, Kozłowski 2004); Piekary III: 7-10 (after Tomaszewski 2004); Zwierzyniec I, Area P: 11-13 (after Chmielewski 1975 b). Levallois production: linear flake core (1), bidirectional core (3), elongated blanks (4-6, 11), preferential flakes (8-10), points (12, 13). Discoidal core on flake (2).

Trench J

Middle Palaeolithic artefacts mixed with artefacts from different periods were recovered by A. Jura, and later separated by W. Chmielewski (1975) from other units (pre-seletien and Aurignacian, as well as possible contamination with Levallois artefacts similar to Area P) using morphological criteria of tools and raw material peculiarities. Heavily disturbed by solifluction, the fossil soil containing these flints was correlated with a time period between the 1st and 2nd Würm Glacial Maximum and tentatively labelled a "supposed late Levalloisian assemblage" (Chmielewski 1975, p. 39-43). Sorted Mousterian artefacts comprise 25 tools with delicate retouch and traces of edge use. The principal tool group encompasses single side-scrapers with marginal retouch, and naturally backed knives. These dominate over retouched flakes, notches and denticulates. Some tools identified as scrapers are, in reality, naturally backed knives, some with back, partially prepared by means of abrupt retouch, and truncation (idem, fig XXI, p.39). Tool blanks are often cortical, naturally backed or massive debordant flakes. To judge from their regular shape and faceted butts, some blanks might have resulted from Levallois reduction. Elongated blanks occur also with finely faceted, but mostly with plain, polyhedral or dihedral butts. Dorsal scar patterns and blank shapes are indicative of Levallois recurrent unidirectional debitage, as well as of the discoidal method. Analogies could be made with Area P, and at the same time with the non-Levallois industry of the newly discovered site of Ksiecia Jozefa, layer III.

Zwierzyniec I (W. Chmielewski's investigations)

This site was excavated by W. Chmielewski between 1972 and 1974, with a small amount of information being published in a preliminary article (1977). Apart from the uppermost Aurignacian (layer 12) and the Micoquian-Prondnikian (layer 11), two older industries were discovered in deeper geological layers: 1) the top of layer 3 (horizon A3 of fossil soil); and 2) layer 2 (the bottom part of horizon B of the same soil). According to the same article (Chmielewski 1977, p. 28) artefacts from layer 2 occur in the upper part of sands "forming the lowest part of the sediments" and which had "formed during the Middle Polish Glaciation" (Saalian). According to T. Madeyska (1981), layers 2 and 3 constitute a complex of fossil soils and were attributed to the lower unit of the Nietulisko soil type which had developed during the Eemian.

Layer 2 (pre-Eemian?)

A modest collection of 48 artefacts comprises mostly debitage products: flakes and blades of medium size. Plain and dihedral butts are common, whereas faceted platforms occur only rarely. Only one flake/blade core with two opposed platforms was found. Tools include side-scrapers (with invasive retouch, bifacially thinned base and distal part) and burins on massive blade fragments (Chmielewski 1977). The technique is characterised by the use of hard hammerstones, and only rarely of soft hammers. Some small flakes may have resulted from the retouch of scrapers. A peculiar feature is the considerable number (20%) of regular blades of UP appearance. The conclusion that the assemblage is of Levallois-Mousterian character with UP tool types contradicts with the description of artefacts presented before in the cited article.

This industry has often been compared to the Blade Levallois-Mousterian from layer 7c at Piekary IIa (Chmielewski 1977; Poltowich 2005). However, new dating of Piekary IIa, 7c (Valladas et al., 2003), as well as considerable technological differences, do not confirm this correlation. Also, the collection from layer 2 is really too small to allow any significant comparative analyses.

Layer 3 (Eemian/early Weichselian ?)

This layer yielded two loci of artefacts (118 and 43 pieces) associated with a fireplace and a structure described as an "oven" (Chmielewski et al. 1977). The artefacts display clear Levallois characteristics. The first of the two loci delivered debitage products: one Levallois core and 21 tools. Levallois methods were applied to produce flakes and blades. Lateral side-scrapers on blades are common; knives on flakes and blades occur as well as elongated Mousterian points. Fine retouch was used for blank modifications. The second cluster represents a workshop or core reduction area, and features 5 Levallois cores for flakes and blades, debitage products, and one side-scrapers. These clusters, together with A. Jura's Area P industry, may well have been contemporary, forming a single settlement complex (Chmielewski et al. 1977).

Zwierzyniec I, layers 12, 13, 14 (L. Sawicki's investigations), Zwierzyniecian

Another part of a site was excavated by L. Sawicki. Here, "a majority of the UP artefacts were embedded

in the upper part of the lower loess, which contained, without any stratigraphic differentiation, numerous Aurignacian and Szeletian pieces, as well as backed points" (Sachse-Kozłowska, Kozłowski 1975, p.287). Based on tool typology, spatial distribution of artefacts and inter-site comparisons, these authors defined a separate culture featuring backed points, the "Zwierzyniecian". An additional argument for the validity of this hypothesis was found in microscopic differences in the preservation of Szeletian leaf points and Zwierzyniecian arched backed blades (Kozłowski, Kozłowski 1996). However, Kostienki-Avdeevo elements in an overlying solifluction horizon "caused greatest difficulties in the reconstruction of the backed points assemblage" (idem, p. 288). Finally, this new entity accounts for 25 backed points of various types (with crescents dominating) and other UP tools, such as as truncated pieces, end-scrapers, burins and retouched blades. Tools were made mostly on narrow blades. These selected tools came from the solifluction horizon, soil, and lower loess (see also an attempt to separate Szeletian, Aurignacian and Zwierzyniecian artefacts in section ¾: Sachse-Kozłowska, Kozłowski 1975, plates 22-24). This peculiar industry, thus far unknown in Southern Poland, was compared with the Uluzzian, and according to its stratigraphical position has been attributed to an early stage of the UP (idem, 1975; Kozłowski, Kozłowski 1996).

Later interpretations were mostly linked with attempts to clarify the chronological position of this collection. Thus, layers 12 and 13 were attributed to a complex of Interpleniglacial soils (first phase of pedogenesis), and the underlying loess (layer 11) belonging to the Lower Pleniglacial with TL dates between 67.6 and 71.7 ky calendric (Madeyska 1981; Kozłowski 2004). According to J. Kozłowski (2004), a loess slightly affected by soil formation processes (layer 12) could be interpreted as a lower part of the Komorniki soil complex which developed from 37 to 41.2 kyr, i.e. during the Moershoofd and Hengelo warm episodes (Lindner 1992). Thus, the primary deposit of this industry corresponds to this soil, and artefacts might be placed between 37 and 40 kyr. The same artefacts in the overlying humic soil were moved by solifluction (Kozłowski 2004). J. Kozłowski (2004) came to the conclusion that the association of blade end-scrapers and dihedral burins with arched backed blades is less certain than had been originally assumed. Also, it was pointed out that technologically all blades modified into arched backed pieces and other tools were obtained from volumetric single-platform cores. Examination of this material documents the presence

of bi-directional dorsal scars on Zwierzyniecian tools. Unfortunately, no core was associated with this unit. The rich debitage collection recovered cannot be securely separated and correlated with the three different UP cultural entities.

As for analogies, similar industries have been observed in Central and Eastern Europe: Vlckovce in Slovakia (however, lacking a clear stratigraphical position) and more recent complexes in Ripiceni-Izvor, layer IIb, and Korpatch I, layer 4, providing a continuation of this tradition up until around 28.42 – 25.5 ky (Kozłowski 2004). Curiously, these latter assemblages contain leaf points.

Piekary

The Piekary complex of Palaeolithic sites has yielded Micoquian and Levallois-Mousterian industries. The Piekary IIa sequence is the most complete in this area (Morawski's excavations), with more recent investigations documenting Micoquian at the bottom (re-deposited position of rare artefacts) and a sequence of 3 overlaying Mousterian industries (Sitlivy et al. 2004). Unfortunately, other sites in Piekary I (cave), II, III and IV display a complicated, reduced stratigraphy, a lack of absolute dating, and often contaminated or mixed collections. Inter-site correlation is extremely difficult. As a result several chronological scenarios were recently proposed (Sachse-Kozłowska, Kozłowski 2004, Fig. 30) using new absolute dates (direct dating of burnt flints) obtained from other part of this area: Piekary IIa site (Valladas et al 2003). Based on available stratigraphical data, and technological and typological features, different assemblages have been distinguished from a large collection left by G.Ossowski, S. Krukowski and L. Sawicki. Considering the generalised characteristics of these collections, the typological sorting of material and their un-precise chronological position, comparative analyses will be limited.

Piekary I

Judging mainly from illustrations (Sachse-Kozłowska, Kozłowski 2004) the Levallois-Mousterian of this cave site (excavations by G. Ossowski, S. Krukowski and L. Sawicki) is characterised by Levallois recurrent flake (abundant flakes débordant) and Levallois convergent point methods. Levallois blades occurred. Centripetal and discoidal debitage are common. The tool kit is modest: mostly retouched Levallois blanks, simple side-scrapers, and denticulates.

Piekary II

The Levallois strategy remains the same (Levallois convergent unidirectional point cores, also with opposed auxiliary platforms; elongated blanks with faceted butts) (Fig. 19-18, 3, 4, 5, 6). Additionally, Levallois linear cores (Fig. 19-18, 1) and large final flakes occur; and some cores display unidirectional preparation and a transversal appearance ($L < W$) or careless preliminary shaping. Both Kombewa cores with semi-discoidal reduction (Fig. 19-18, 2) and large discoidal cores were found. Among the recovered tools are transversal and *déjéte* side-scrapers and retouched Levallois blanks. Two flakes were truncated, one of them has obverse retouch. Traces of UP blade reduction are absent, which were, however, evident in all MP layers at the nearby site of Piekary IIa.

Piekary III

Levallois technology is attested by large preferential flakes with centripetal scars (Fig. 19-18, 8, 9, 10) and blanks with a uni-/bidirectional and convergent pattern. The tool kit is similar, featuring additional convergent symmetrical (Fig. 19-18, 7) and asymmetrical side-scrapers and naturally backed knives (Tomaszewski 2004).

Piekary IV

This small collection contains Levallois flakes and blades, one point, as well as tools on Levallois blanks.

Piekary IIa site (W. Morawski's investigations)

Analyses of assemblages excavated by W. Morawski (Morawski, 1975, 1992) are also not without their difficulties, primarily due to the fact that during excavations not all artefacts were attributed to definite geological layers. In this case, we have had to refer to artefact co-ordinates registered in field note-books, as well as to geological profiles. The resulting reconstruction of the stratigraphical position of artefacts has been partially successful. Finally, the material was studied according to Morawski's stratigraphic labelling, and an additional portion of artefacts was correlated with various archaeological layers (7c, 7b, 7a and 7a/7b).

Artefacts from Layer 7c

During excavations in the 1960s and 1980s, W. Morawski

(1992) found a flint industry in Layer 7c. Artefacts from his excavations occurred practically in all trenches. However, a cluster of flints was found only in trench XIII.

This industry is characterised by a blade production based on blade cores with installation of crests with two prepared versants (Fig. 19-19, 3, 4, 5, 6). Cores are mostly bidirectional, partially turned, and with faceted or plain platforms. During the debitage process, many cores were reduced far more than other artefacts, they becoming rather flat. Despite their exhausted morphology the crest remnants are still visible. Direct exploitation with no crest installation is rare, and occurred in initial stages of core reduction only. Hard hammerstones were used to detach blades and flakes (developed bulbs). Blade by-products ("technical" blades) were used without retouch. Some blades were modified into tools. The predominant systematic blade reduction was accompanied by Levallois technology, e.g. the Levallois linear method for single preferential flakes (Fig. 19-19, 7). The toolkit comprises lateral and transversal side-scrapers, and some truncated faceted pieces. Upper Palaeolithic tool types also occur in this assemblage, e.g. backed blades (Sitlivy et al. 1999; Valladas et al. 2003; Zięba 2005).

Artefacts from layer 7b

Those artefacts to be definitively attributed to this layer are not very numerous. However, this small assemblage still displays clear Levallois features, with mostly debitage products resulting from the recurrent flake method. Small flakes (e.g. asymmetrical debordant flakes) from preparation and re-preparation of the core working surfaces also occur.

Artefacts from layer 7a

This assemblage expresses less Levallois features than layers 7b and 7c; other flake methods (discoidal, centripetal non-Levallois) being recognised. The level of butt faceting decreases in comparison with layer 7b. This fact complies with Morawski's observation of a less pronounced Levallois character of layer 7a in comparison with layer 7b. However, Morawski did not recognise blade debitage in layer 7a. Non-Levallois blade production is attested by cores and various debitage elements recovered during new excavations (1998-2000) as well as in old samples (Sitlivy et al., 1999). Products of blade core reduction have mainly plain butts, and stem very often from a bidirectional mode of knapping.

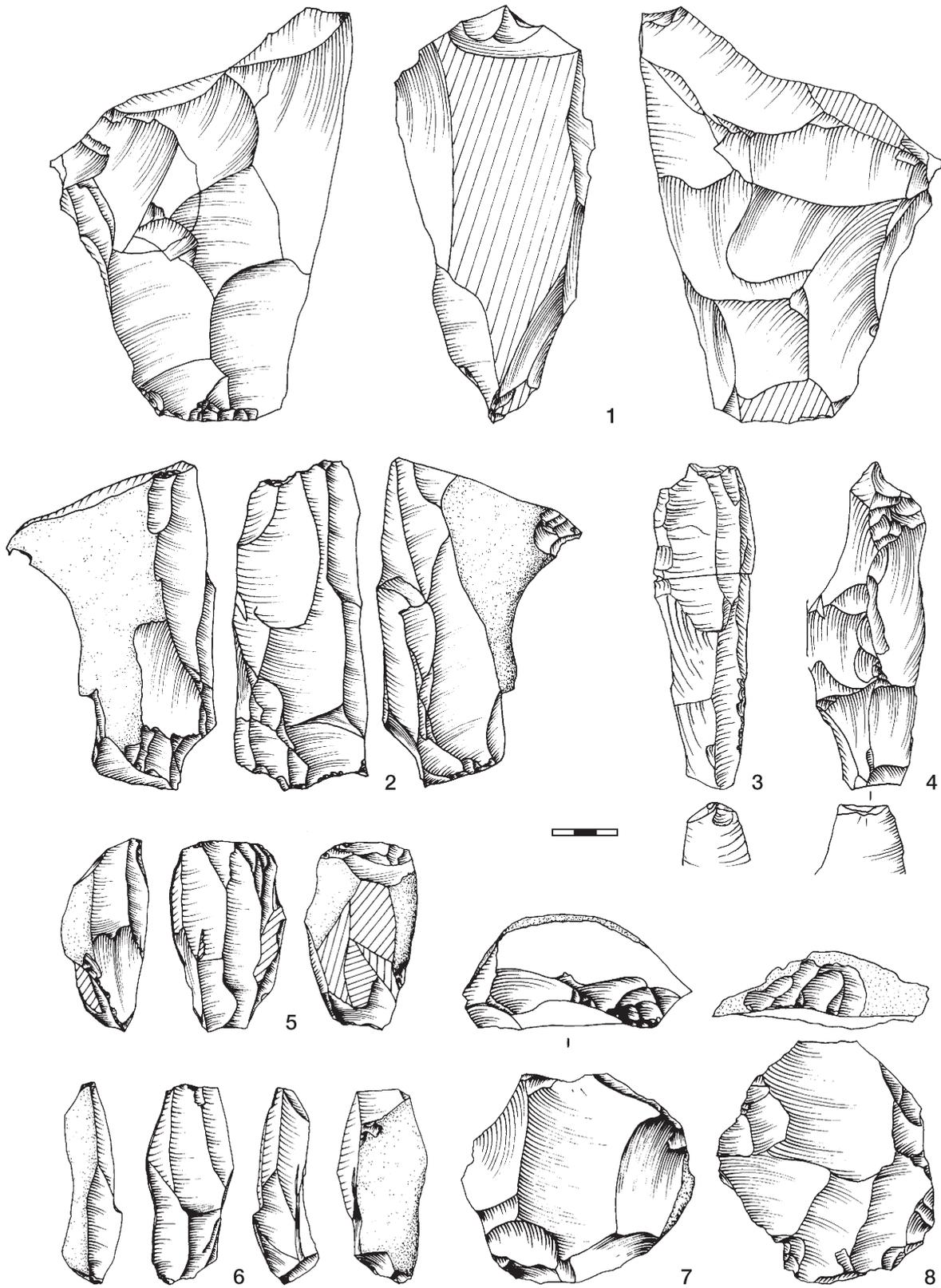


Fig. 19-19 Blade Levallois-Mousterian. Piekary IIa, layer 7c. Blade production: bifacial pre-form (1), bidirectional cores (2, 5, 6), crested blades (3, 4). Levallois flake production: linear cores (7, 8); Morawski's excavations (3-7).

These blade elements could be attributed to layer 7a. However, at first glance they are not as pronounced as they are in new samples. Blade debitage was also recognised during a study of Morawski's mixed sample from 7b/7a.

Among the tools assigned to this layer there are various side-scrappers, mostly with a single working edge.

Generally speaking, the Levallois-Mousterian of Piekary I, II, III and IV differs from Piekary IIa in the following:

- a) in an absence of UP prismatic core reduction.
- b) due to evidence of the of Levallois blade and elongated flake production from prepared (centripetal manner) uni- or bidirectional cores;

Although the Levallois linear method is attested at all sites, very large preferential flakes are still unknown in the MP at Piekary IIa.

Common features are:

- a) the usage of Levallois linear and recurrent flake methods;
- b) the additional production of Levallois points with a large base, removed from single-platform convergent cores, sometimes with an opposed auxiliary platform for maintenance of the flaking surface (similar to layer 7b in Piekary IIa).
- c) non-Levallois flake methods (discoidal, sometimes on Kombewa flakes or reduction on the ventral flake part.
- d) the tool-kit structure and type of retouch.

Latest Investigations in the Kraków Region

Recent investigations at the open-air sites Piekary IIa and Ksiecia Jozefa have yielded abundant stratigraphical, absolute chronological, and typological data relevant to the study of human behaviour during the Late Middle Palaeolithic and Middle-to-Upper transition (Sitlivy et al., 1999a, b, c; Sobczyk et al. 2000; Escutenaire et al. 2002; Valadas et al., 2003; Mercier et al. 2003; Kalicki and Budek 2004; Zięba 2005). An archaeological hiatus from 55/50 kyr to 45/42 kyr BP in Southern Poland (Kozłowski 2000) has now started to fill with newly discovered human occupations and some recently dated old assemblages.

A short chronological scenario has been proposed for both sites (OIS 3) based on TL dates on burnt flints, OSL of loess-like deposits, and AMS dating on charcoal, as well as on geological data and the re-analysed stratigraphy of Piekary II a. At Piekary IIa the early blade production is accompanied by Middle Palaeolithic technologies (from bottom to top, layers 7c, 7b, 7a) and is followed by a local Early Upper Palaeolithic (layer 6) and by an Aurignacian (Piekary II, layer 6), i.e. a time interval stretching from 60 to 32/31 ky. Piekary IIa has yielded assemblages featuring debitage activities and evidence of the most ancient art (two engraved pieces of hematite in EUP layer 6) in Central Europe. The newly discovered site of Ksiecia Jozefa shows a sequence of three in situ occupations: 1) layer III or Lower Complex – very rich, high density site with a large variety of generally non-Levallois flakes and some blade production systems (large camp with different activities); 2) layer II or Middle Complex – industry with a fully Upper Palaeolithic core reduction (specialised non-Aurignacian workshop); 3) layer I or Upper Complex – periphery or ephemeral site with UP blade debitage and some Levallois elements. Numerous individual reduction sequences (cores and tools) have been refitted, often back to the initial nodule or blank with no or few missing pieces (especially in layer III).

Inter-assemblage attributes and technological comparisons between the two sites Piekary IIa and Ksiecia Jozefa allow us to distinguish several Middle and Early Upper Palaeolithic groups:

- 1. A blade/flake group with Levallois elements (Piekary IIa, layer 7c and 7b; Ksiecia Jozefa, layer I?) (Fig. 19-19; 20);
- 2. A blade/flake group with rare Levallois elements (Piekary IIa, layer 7a) (Fig. 19-21);
- 3. A flake group with some blade and rare Levallois elements (Ksiecia Jozefa, layer III) (Fig. 19-23; 19-24; 19-25).
- 4. A blade group with exclusive blade /bladelet production (Ksiecia Jozefa, layer II; Piekary IIa, layer 6) (Fig. 19-22; 19-26; 19-27);

1. Blade/flake group with Levallois elements (Piekary IIa, layer 7c and 7b; Ksiecia Jozefa, layer I?; about 61-48 to 38 ky BP).

The lithic industries from this group are characterised by a medium level of blades (I_{lam}=22) and a

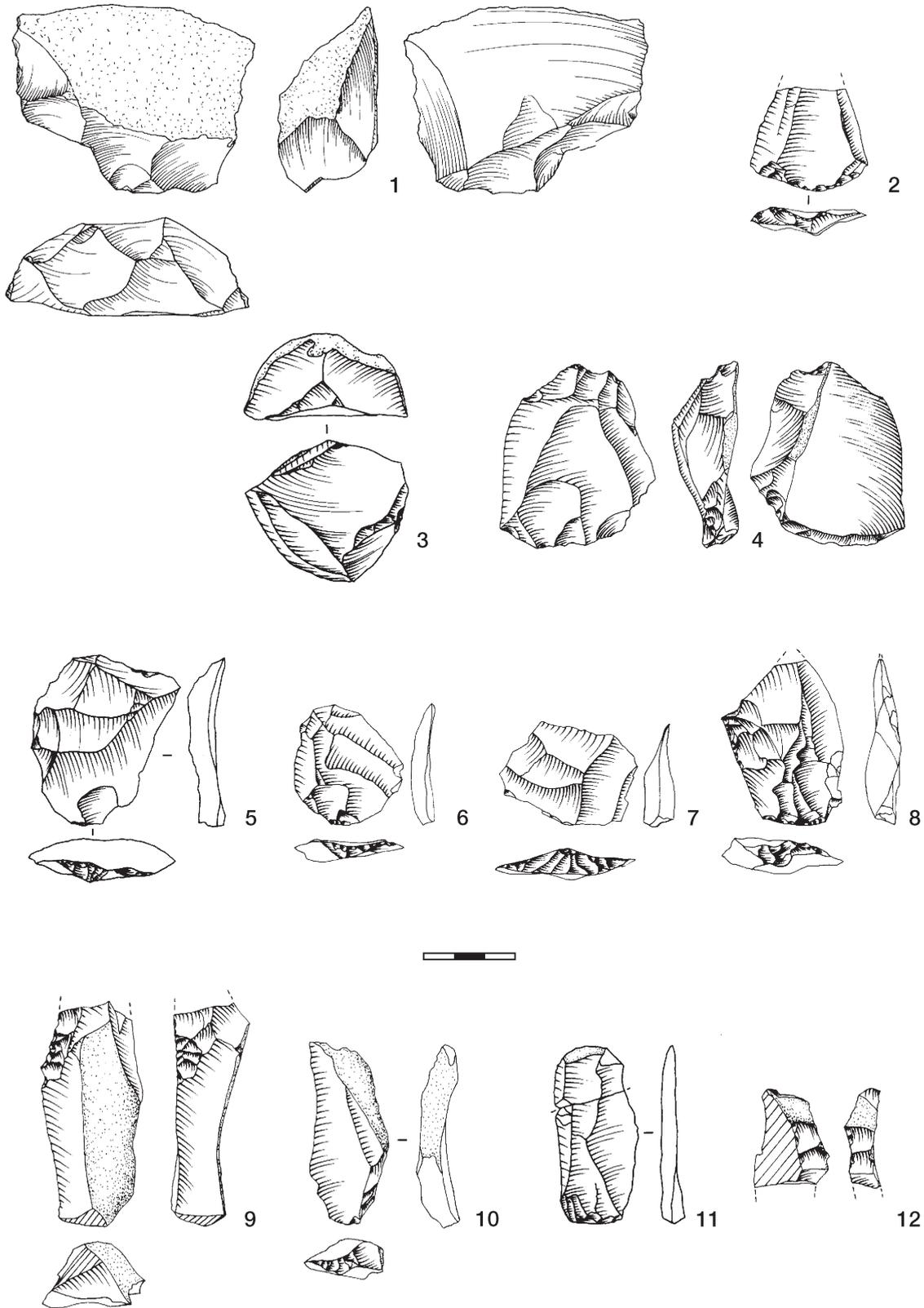


Fig. 19-20 Blade Levallois-Mousterian. Piekary IIa, layer 7b. Discoidal core on flake (1), Levallois point (2), Levallois point core (3), plunging flake/core fragment bearing convergent unidirectional and distal preparation from opposed platform (4), Levallois flakes (5-8), natural backed blades (9, 10), debordant (11), crested blades (12).

high faceting rate (IFI=56-45; the lower rate is from Piekary IIa, layer 7b). Proportions of faceted butts on flakes are identical in layer 7c and layer 7b. The same accounts for the IL in these levels (7c=16 and 7b=14.9).

The technology for flint reduction is represented by several production systems of Middle and Upper Palaeolithic types:

- a) Direct (i.e. with no preparation of debitage surface), non-Levallois uni- and rare bidirectional blade reduction;
- b) Prepared (i.e. crest installation or bifacial preform) non-Levallois uni- and often bidirectional blade reduction (Fig. 19-19, 1, 2, 3, 4, 5, 6). Predominance of well-developed bulbs and open flaking angles attest a direct use of hard hammerstones;
- c) Levallois methods: mainly lineal Levallois cores and preferential circular and triangular flakes (i.e. Levallois for one flake and one point) (Fig. 19-19, 7, 8; 19-20, 2, 3, 4) and Levallois recurrent method for flakes (Fig. 19-20, 5, 6, 7, 8);
- d) Non-Levallois flake production of massive asymmetrical convergent and centripetal debordant flakes with crudely prepared butts based on reduction of discoidal cores (Fig. 19-20, 1).

Some differences in indexes, e.g. Mass Index (Th / L % ratio) or Elongation Index (L / W % ratio) could be influenced by a different age of industries from this group. Crested blades with two prepared versants on blade cores are common in layer 7c (Fig. 19-19, 4). In layer 7b, only laterally crested blades (with just one series of negatives) and debordant, including backed cortical, flakes/blades were found (Fig. 19-20, 9, 10, 11, 12). The origins of blades in layer 7b are unclear. They could result from blade core reduction or from Levallois point reduction (blades are by-products prior to the detachment of the final point) or from both these strategies. The technological pattern of layer 7c displays an independent character of blade production. Levallois core reduction has various priorities: Levallois flake production is dominant in layer 7c, while in layer 7b Levallois points were the desired final products. Non-Levallois flake production in layer 7b was sometimes based on Kombewa core reduction. This method is absent in layer 7c.

The tool-kit is very similar in layer 7c and in layer 7b, i.e. simple side-scrapers dominate, and are accompanied by retouched and used blades and flakes; truncated faceted pieces are rare. However,

Upper Palaeolithic types of tools occur in layer 7c (backed blades), which are absent in 7b. Layer 7b yielded only Middle Palaeolithic tools with more numerous notched and denticulated types.

The probable assignment of layer I from Ksiecica Jozefa to this group is based on the presence of a large Levallois flake. The blade index is higher than in layers 7c and 7b from Piekary IIa; and although it amounts to 28.8, it is less pronounced than in the blade industries of layers 6 of Piekary IIa and II of Ksiecica Jozefa (Ilam >50). The assemblage from layer I of Ksiecica Jozefa is too poor to allow any conclusion.

2. Blade group with rare Levallois elements (Piekary IIa, layer 7a; about 42-36 ky BP)

The blade component is attested through the predominance of blade cores (Fig. 19-21, 1, 2), even if the Ilam is lower (=14) than in the previous group. In comparison to the first group, butt faceting also decreases (from 1.5 to 2 times less). IL is low (< 5). The use of soft hammerstone together with hard hammerstone is evident. Several methods of blade and flake production have been identified:

- a) Direct and prepared uni- and bi-directional exploitation of nodules of Upper Palaeolithic types with central crest installation or bifacial preforms reduction (Fig. 19-21). Bi-directional core reduction with no crest installation is common. The exploitation went on without any crest installation, and taking advantage of natural convexities. Maintenance was insured by the retrieval of lateral crests and debordant flakes/blades. As in in layer 7c, debitage began on the narrow working surface and extended to the large sides (Fig. 19-21, 1). Another variation is also observed: exploitation from the large working surface via the narrow sides (Fig. 19-21, 2). Platforms were prepared mainly by one or several small removals, and were rejuvenated during debitage by partial tablets, faceting and grinding of the platform edge. A dominating blade production was accompanied by flake core reduction.
- b) Discoidal core reduction is common and resulted in short massive and small asymmetrical debordant flakes (Fig. 19-21, 7, 8, 9).
- c) Rare Levallois centripetal recurrent debitage (small debordant flakes with faceted butts).

The toolkit is both scarce and trivial for the Middle Palaeolithic. It is dominated by simple side-scrapers,

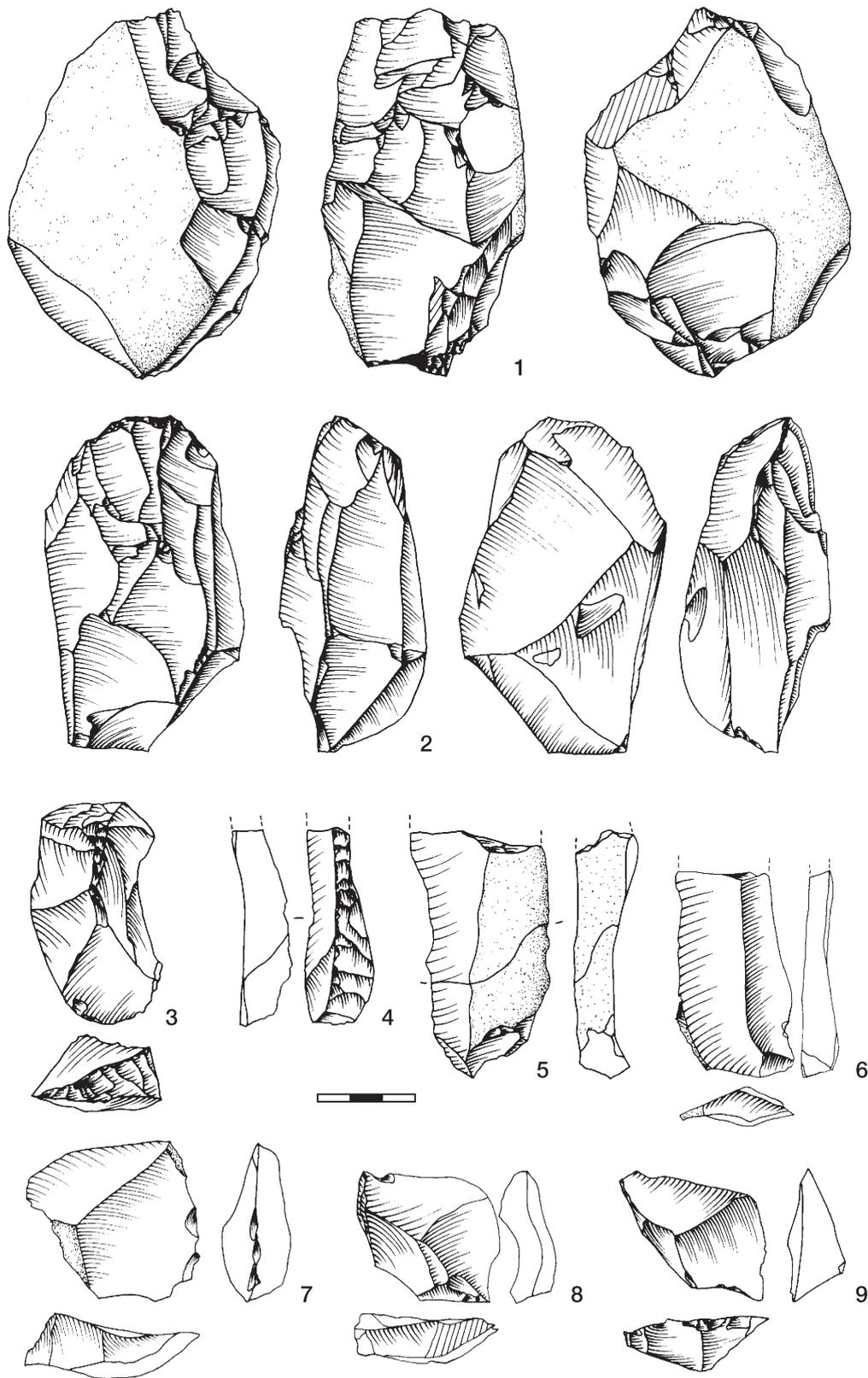


Fig. 19-21 Blade Mousterian. Piekary IIa, layer 7a. Blade production: bidirectional cores (1, 2), crested blades (3, 4), natural backed (5) and full debitage blades (6). Flake production, discoidal method: asymmetric debordant flakes.

less numerous notches, and retouched flakes and knives with a natural or a prepared back. Blades are still nearly unmodified. Upper Palaeolithic tools are absent. Non-invasive retouch prevails.

3. Flake group with some blade and rare Levallois elements (*Ksiecia Jozefa, layer III; about 44 ky BP*)

A low blade component and faceting has been attested in this layer. Levallois elements are rare. The debitage technique used direct percussion by means of a hard hammerstone (pronounced bulbs, double bulbs after very strong blows, large platforms, obtuse platform angles). This industry is characterised by dominant flake production from various "chaînes opératoires", mostly polyhedral (23), accompanied by discoidal debitage (Fig. 19-24, 1) and some others (e.g. unidirectional based on flat cores). Different short reduction sequences of cores on flakes were very popular (including Kombewa or Pucheuil methods) (Fig. 19-24, 2, 3, 4, 5, 6).

According to typological and statistical data, this industry could be typed as "non-blade" and "non-Levallois". However, after refitting, both core reduction strategies were recorded (i.e. blade and Levallois point production). The Levallois convergent method for points displays both uni- and bi-directional modes of working-surface preparation (Fig. 19-25, 4). Final products (points), however, have an "atypical" appearance due to knapping mistakes, which occurred during the preparation of working convexity or during the last removal of a point (e.g. hinged fracture). The Levallois character of the preliminary core preparation contrasts with failed atypical results. Point production was based on cores with convergent preparation; but could also result in triangular points during mixed (with blade) core reduction on initial or final stages of technological chains (similar to Bohunician or Boker Tachtit trend) (Fig. 19-25, 3, 5).

Blade production is represented by various methods:

- Direct exploitation (without core preparation) based on one-platform unidirectional partially turned cores (debitage extended from a narrow to a large working surface) and platform rejuvenation by means of tablets (Fig. 19-25, 1, 2);
- Direct exploitation based on cores with two opposed platforms and bi-directional successive series of blades (from one platform and then from the other one); partially turning debitage

(from the narrow side via a large working surface or vice-versa);

- Prepared unidirectional exploitation of narrow part of a flake;
- Prepared (with crest installation) bi-directional exploitation on a narrow working surface or two large sides. During a phase of large surface reduction a point was produced (Fig. 19-25, 5).

Core platforms were restored by elimination of the overhang at the platform edge (retouching or / and abrasion) as has been attested by some cores and proximal blank parts. Such maintenance was observed on all debitage products of the above-mentioned blade methods.

The tool-kit is represented in nearly the same proportions by simple lateral scrapers, notches, and retouched flakes which were accompanied by raclettes, natural and retouched backed knives, denticulates and rare end-scrapers. Retouch is non-invasive, light, often marginal or marginal abrupt, and of "raclette" type.

4. Blade group (*Ksiecia Jozefa, layer II; Piekary IIa, layer 6; about 40 till 32/25 ky BP*)

The characteristic features of this group are, on the one hand, the high level of blades and bladelets (I_{lam} is up to 58) and, on the other, the complete absence of Levallois technology. There is no Middle Palaeolithic core reduction in these industries. Exclusive blade/some bladelet production based on volumetric core reduction (with crest installation or direct debitage) and on partially turned debitage extension is well documented. All cores are devoted to blade production (Fig. 19-22; 19-26). In both assemblages, cores and blade proximal parts evidence intensive grinding (twice to three times more than in Piekary IIa, layer 7a). A large number of various crested blades (14-15%) and tablets (13-15%) were recovered in contrast to rare debordant blades and flakes. However, platform preparation is different in both these industries: un-faceted platforms are more numerous in Piekary IIa, layer 6 (Fig. 19-22), while faceted platforms occur more commonly in Ksiecia Jozefa, layer II (IF₁= 30, IF_s= 24.2).

The use of soft hammerstone percussion is well documented. However, there are some differences in the technique of blank procurement. Soft hammerstones were common for blade production in Piekary IIa, layer 6, while hard hammerstones were

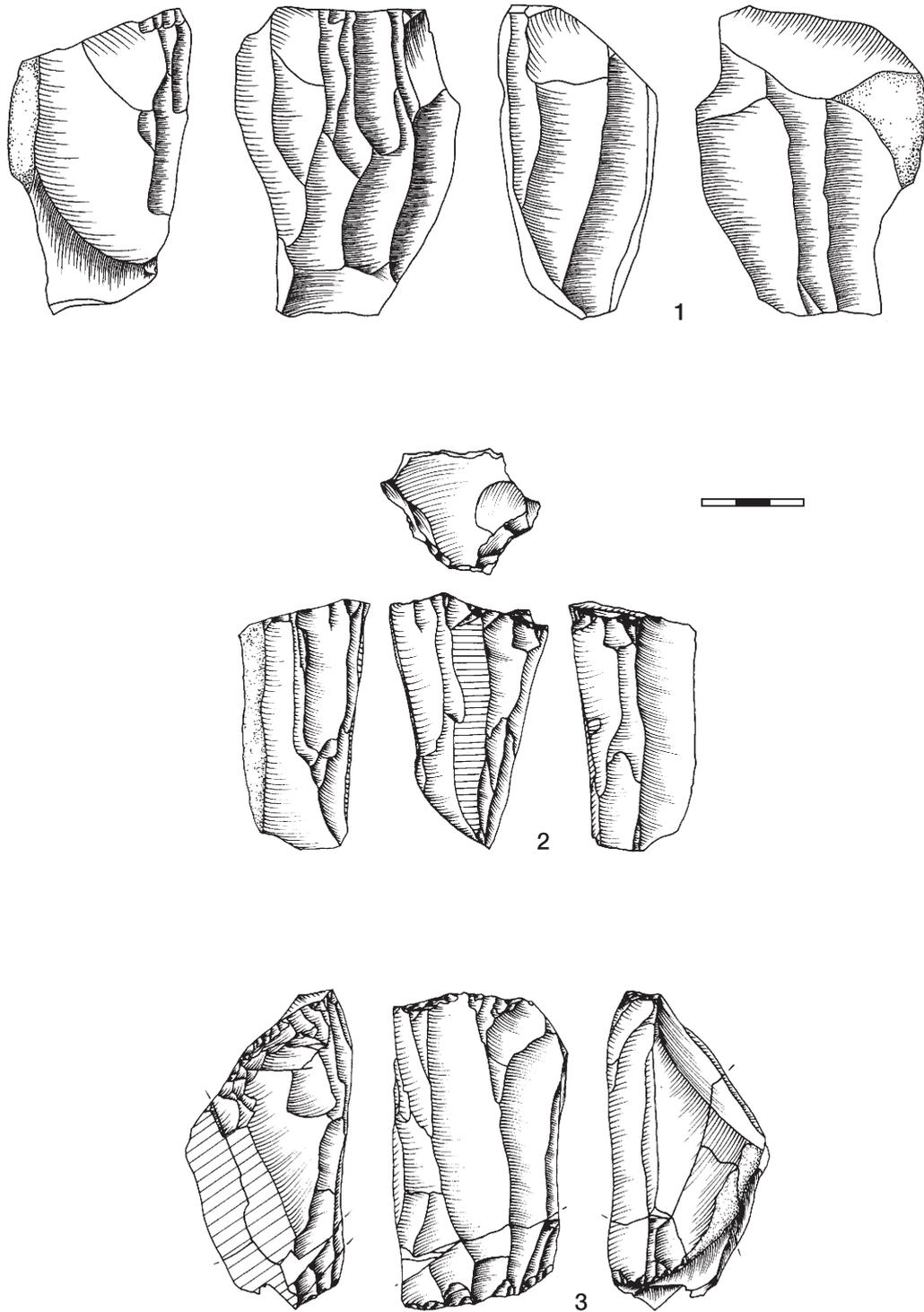


Fig. 19-22 Early Upper Palaeolithic. Piekary IIa, layer 6. Blade production: bidirectional (1, 3) and unidirectional (2) cores.

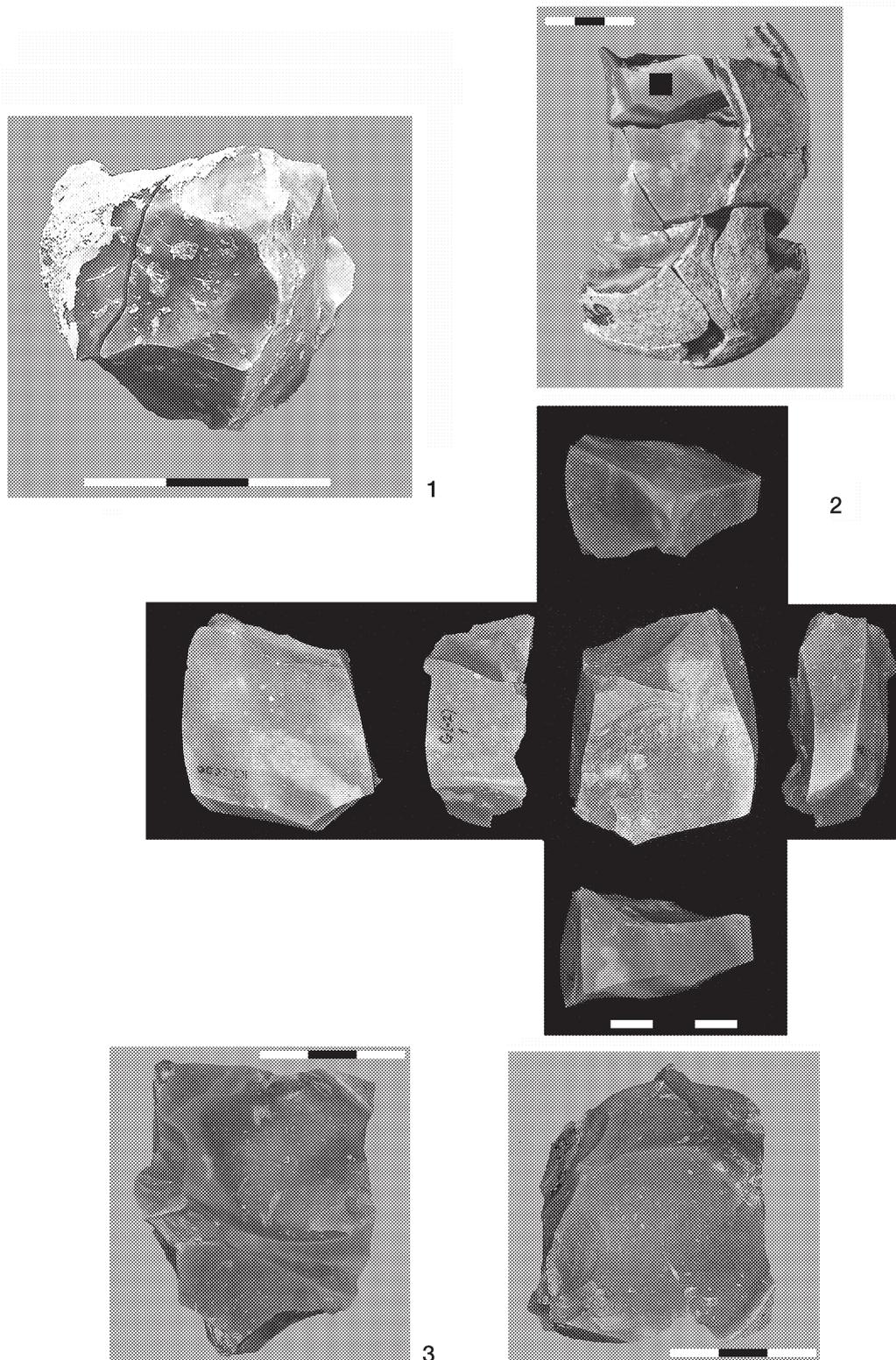


Fig. 19-23 Mousterian. Ksiecica Jozefa, layer III. Flake production: polyhedral core with refitted crested flake, exploitation of ridges (1), polyhedral reduction, exploitation of surfaces and refitted peculiar debordant flake bearing 4 sides corresponding to 4 surfaces/platforms (2), polyhedral core (3).

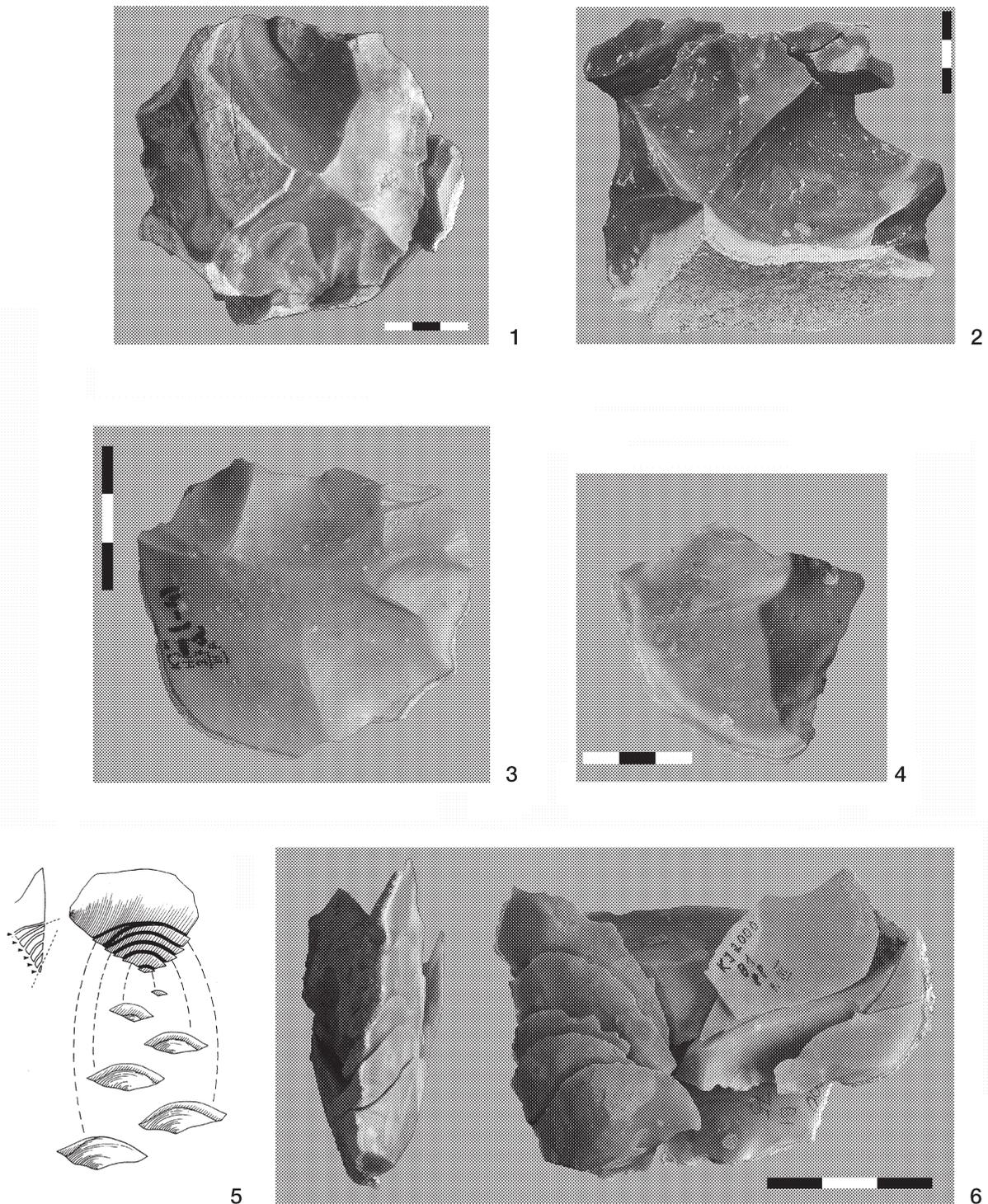


Fig. 19-24 Mousterian. Ksiecica Jozefa, layer III. Flake production. Discoidal core (1); Kombewa type reduction: discoidal core on flake (2), centripetal core on flake (3), convergent core on flake (4), schema of Pucueil type reduction after Delagnes, 1996 (5) and the same method in Ksiecica Jozefa, layer III (6).

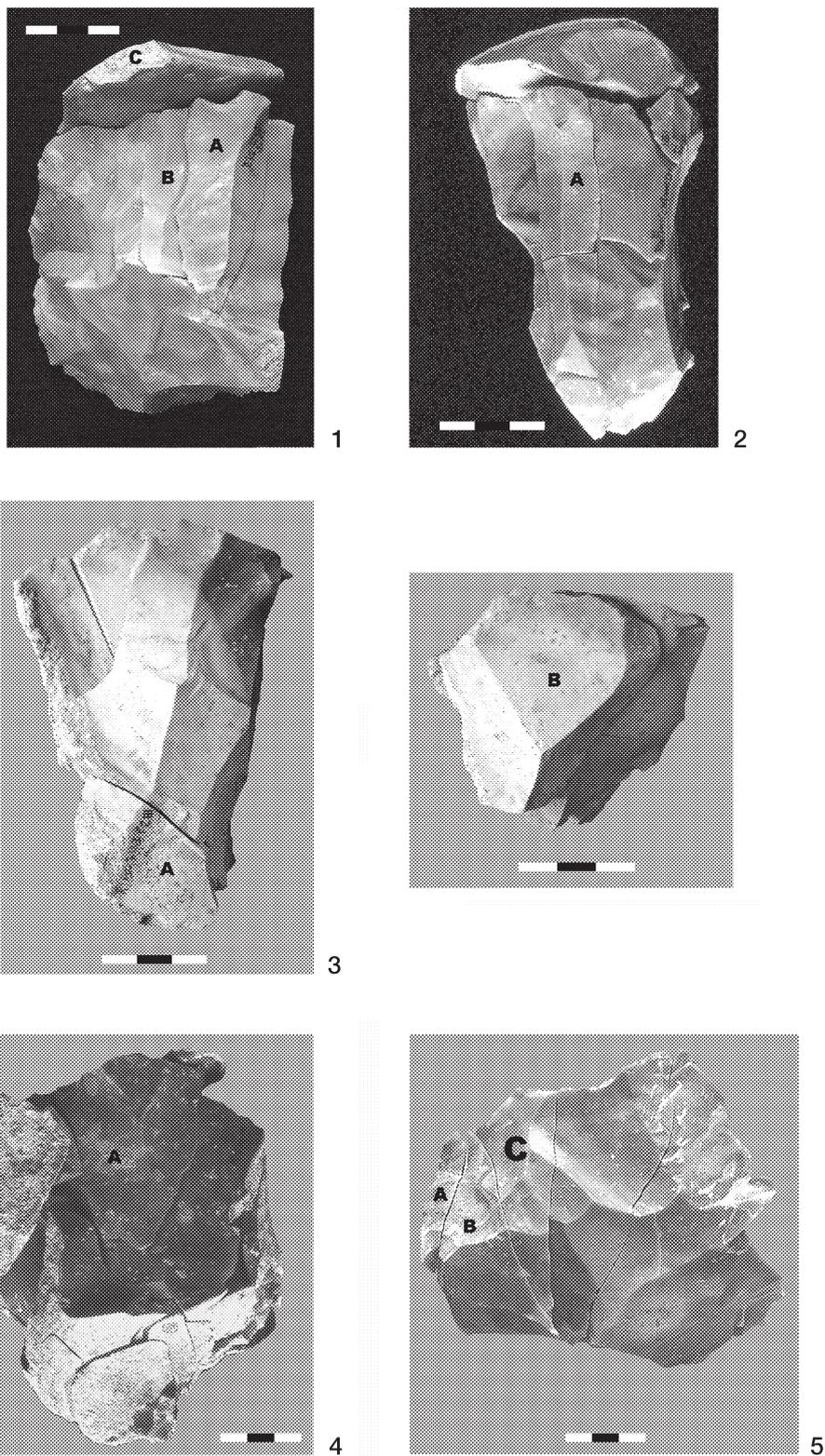


Fig. 19-25 Mousterian. Ksiecica Jozefa, layer III. Blade direct production: semi-volumetric core exploitation (1, 2) with refitted retouched blades (1 a, b) and large raclette on tablet (1 c) and with refitted retouched blade (2 a). Mixed core reduction: blade direct episode (3) following by point production; denticulated tool on flake (a) and broad-based point (b); prepared blade beginning (5) with crested blades (a, b) and point (c). Point production: unidirectional convergent method (4) with final point.

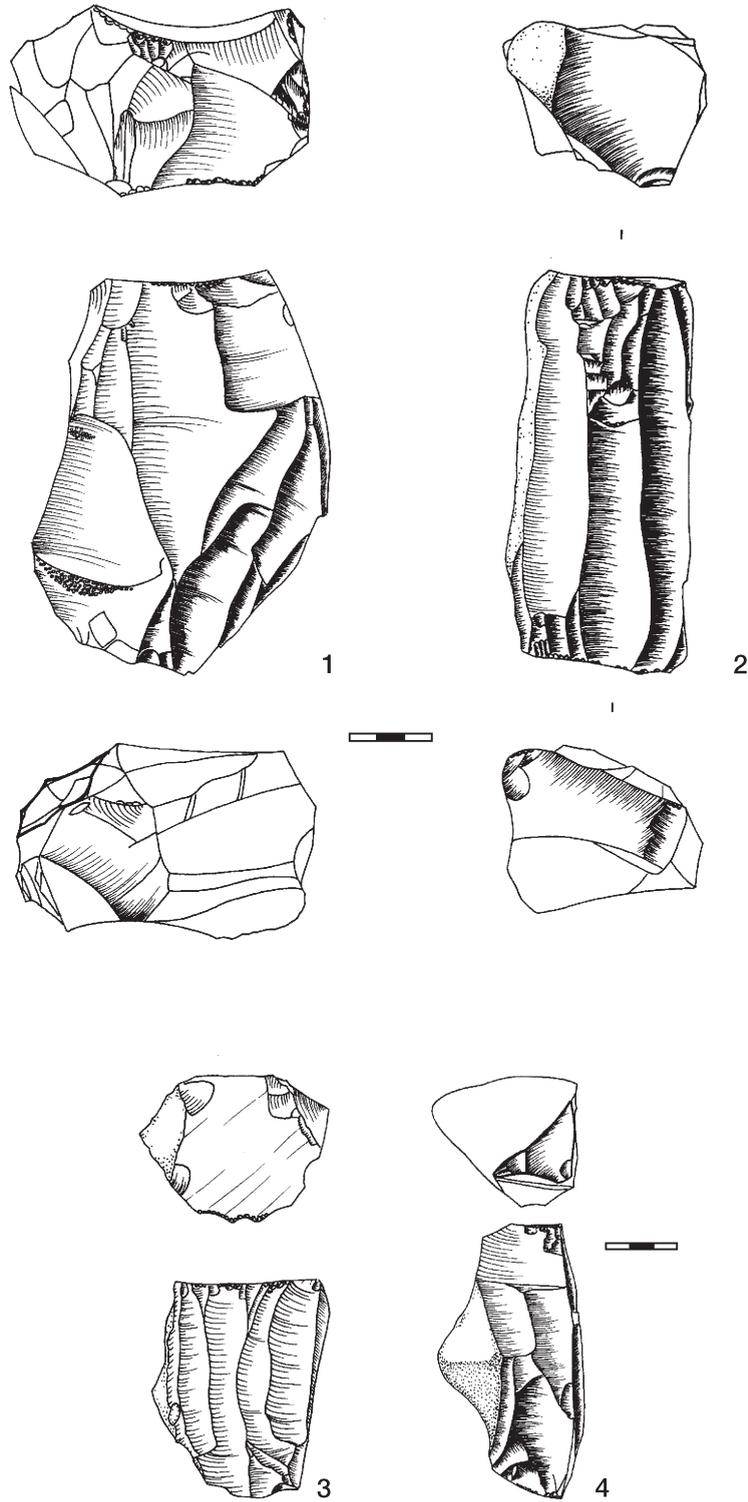


Fig. 19-26 Early Upper Palaeolithic. Ksiecica Jozefa, layer II. Blade production: volumetric bidirectional (1, 2, 4) and unidirectional (3) cores.

used more often in Ksiecica Jozefa, layer II. The use of a hard hammerstone and faceting of core platforms are the only Middle Palaeolithic technological traits in the Ksiecica Jozefa, layer II industry.

As for technology, prepared blade production based on the reduction of cores with two opposed platforms is dominant. The bidirectional mode was common. Intentional bladelet procurement occurred. Layer II in Ksiecica Jozefa yielded a bidirectional blade/bladelet core made on a flake, with both a crest on one narrow part, and bidirectional reduction which emanated from 'burin spall' blade removal (Fig. 19-27, 2). This method has also been attested in the Chatelperronian industry of Roc-de-Combe, layer 8 (Pelegrin 1990) (Fig. 19-27, 1), but is absent at Piekary IIa, layer 6. In both Polish industries, cores are mostly partially turned. The working surface is located on the narrow part of the initial nodule or flake, and extends to the large sides. The exploitation of large debitage surfaces and the extension from the large side to the narrow part also occur. In layer 6, both directions and extension of debitage are represented; however, in layer II exploitation of narrow cores dominates. A few completely turned cores were found in layer 6.

The tool-kit is modest. There is neither a characteristic Middle Palaeolithic nor Aurignacian tool. Unspecific isolated types are present in layer II – specialised blade workshop (lack of end-scrapers and burins). On the other hand, layer 6 is characterised by indisputable Upper Palaeolithic tools, with a dominance of retouched flakes and blades over end-scrapers, burins and backed pieces. Up to 50% of tools are made on blades.

The newly recovered and analysed industries vary chronologically, functionally and stylistically. However, they do display a "compact" chronological sequence of assemblages in the frame of the OIS 3, covering the transitional period from the Late Middle to the Early Upper Palaeolithic. The rich debitage composition, the workshop character of sites, and tool kits lacking bifacial pieces is typical. Middle Palaeolithic industries belong to a "non-Micoquian" entity, generally to the Levallois-Mousterian or Mousterian. Assemblages with Upper Palaeolithic features are clearly non-Aurignacian and attest to a local blade Early Upper Palaeolithic. Layer II of Ksiecica Jozefa documents a fully UP blade reduction (exportation of good blades) with unspecific tools, and for the present could represent: 1) Blade Mousterian; 2) Early Upper Palaeolithic unit (more probable).

The oldest MP record in the Kraków region (i.e. > OIS 3), based only on geological interpretations, comprises predominantly a Levallois-Mousterian

with the following features:

- Levallois debitage stemming from different methods (linear for single preferential flake or rarely point and recurrent centripetal, and especially uni- bidirectional of Biache type for elongated flakes/blades).
- Non-Levallois flake debitage: mostly recurrent with flat (centripetal) and secant (discoïdal) exploitation of cores, resulting in thick asymmetrical short flakes.
- Absence of UP blade production systems (except layer 2 in Krakow-Zwierzyniec I)
- Monotonous tool kit without clear domination: simple side-scrapers, retouched flakes, raclettes, naturally backed knives, denticulates, notches, rarity or absence of UP tools; few convergent pieces, including Mousterian points.
- Light non-invasive retouch is common.

Typologically, the oldest Levallois-Mousterian is similar to Late Middle Palaeolithic industries, especially in relation to tool composition and morphology. However, technologically they differ from the recent MP due to an absence of fully UP prismatic core reduction, as well as to some peculiarities in flake production demonstrating the presence of other technological groups:

- Flake group with Levallois debitage for preferential flake or point and recurrent often for elongated blanks, as well as Levallois blades (Area P; layer 3 of Krakow-Zwierzyniec I; Piekary I, II, III, IV). Kraków-Zwierzyniec, Trench J seems to resemble Ksiecica Jozefa, layer III (Flake group with rare blade and Levallois elements).
- Only one small collection from Krakow-Zwierzyniec I, layer 2 could be the oldest candidate (final Saalien?) for a separate unit: A blade/flake non-Levallois group with UP blade debitage based on bi-directional core reduction without platform faceting (mostly flat butts).

The LMP documents Levallois-Mousterian, Mousterian and Blade Mousterian industries lacking bifacial tools, but displaying some new features. Generally, they differ considerably from their predecessors in a number of technological points:

- Existence of several independent parallel core reduction systems, i.e. blade strategy of Upper

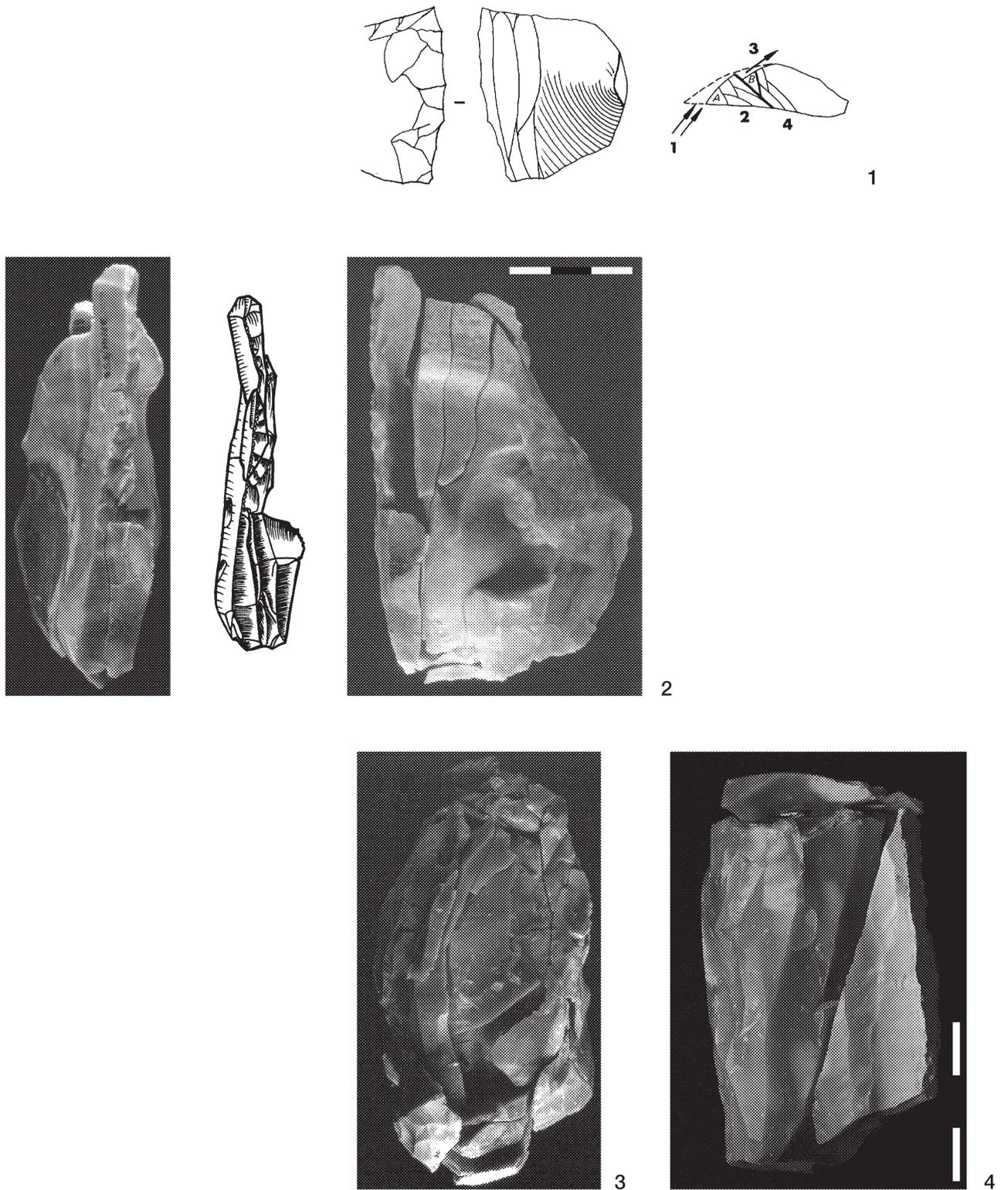


Fig. 19-27 Early Upper Palaeolithic. Ksiecica Jozefa, layer II. Blade production: bidirectional mode (2, 3) and unidirectional (4). Schema of narrow core on flake/burin-like reduction in Roc-de-Combe, layer 8 after Pelegrin 1990 (1) and similar refitted bloc (2).

Palaeolithic type and Middle Palaeolithic flake technologies (Levallois and non-Levallois).

- Absence of Levallois flake/blade uni- bidirectional recurrent method of Biache type. Employed Levallois methods resulted in non-elongated debitage products (short flakes or points).
- Larger variety of flake non-Levallois methods (polyhedral, discoidal, centripetal, uni- bidirectional, convergent, short reduction sequences of cores-on-flakes, including Kombewa type as well as the exploitation of the dorsal face or thick remnants of the flaking surface).
- Systematic UP volumetric blade reduction strategies based on various modes of exploitation (direct or prepared with different crest position, or bifacial pre-core shaping) from often opposed platforms (faceted or prepared by single or several large blows); maintenance by neo-crests, platform rejuvenation often by tablets and platform zone trimming, and grinding.
- Appearance of the soft hammer percussion technique; however, with dominant hard hammers.
- In the tool kit, types of retouch do not show significant changes (increase in the abrupt light retouch in some industries, and consequently of raclettes, backed knives, e.g. Ksiecia Jozefa, layer III). Convergent pieces are still rare or absent.

Thus, the TL and OSR dated UP volumetric concept of blade production, which was widely applied in Levallois-Mousterien industry of Piekary IIa, layer 7c (episodically probably earlier in Krakow-Zwierzyniec, layer 2), coexisted with several MP flake methods during the Later MP (Piekary IIa, 7b, 7a and Ksiecia Jozefa, III), re-appeared and/or developed into a unique standardised blade production during the transitional period and EUP (Ksiecia Jozefa II, I and Piekary IIa, 6).

EUP industries of the Cracow region are characterised by:

- Absence of flake methods in core reduction, including Levallois (except layer I of Ksiecia Jozefa which features one Levallois flake and several failed efforts of blade point removals). Evidently, the Levallois heritage was not strong, and the Bohunician influence is attested only by failed attempts of point removals, as well as by several refits in industries from the site Ksiecia Jozefa (layer III and probably layer I).

- Fully UP prismatic blade reduction, as well as intentional bladelet debitage based on the reduction of narrow part of the core-on-flake.
- Employment of both hard and soft hammers.
- The tool kit is non-Aurignacian, unspecific or modest, and without clear MP types. There is an absence of invasive retouch and bifacial pieces.

The EUP documents the emergence of some traditions which might reflect evolution from local Mousterian and Levallois-Mousterian: 1) a local EUP with bidirectional prismatic reduction, simple end-scrapers, some burins and retouched blades, flakes and artistic production (Piekary IIa, layer 6); 2) A Zwierzyniecian based on blade production (in fact, a kind of Uluzzian as known from Italy or Klissoura layer 5 type industry in Greece); 3) Bohunician? (Dzierzyslaw I, lower layer; Foltyn, Kozłowski 2000) In this industry Upper Palaeolithic blade production is accompanied by the discoidal method, some Levallois flake reduction, rare points, and examples of re-utilisation of Levallois flake cores on their narrow parts to produce blades. Bohunician technology with UP/MP technological fusion and special order of nodule reduction (from UP via MP method) in sense of Svoboda and Skrdla is less evident: a lack of refitted reduction sequences and few characteristic debitage products. The employment of several parallel and independent reduction processes might be an alternative for this industry. Additionally, some technological traces attests a Bohunician episode (several preparation stages for elongated point removals on volumetric crested cores) in Ksiecia Jozefa, layer I.

As for the specialised blade workshop from layer II in Ksiecia Jozefa, which displays only two “archaic” features, i.e. high butt faceting and predominant hard hammer usage (which are common for EUP or Initial Upper Palaeolithic), two solutions can be proposed. A complete absence of MP flake reduction and convergent mode in core preparation excludes any Levallois influence including Bohunician. The tool kit lacks fossil directors. Thus, this industry could belong to a) a Blade Mousterian similar to the technological pattern of Kabazi II upper units (however, the Crimean sequence has produced evidence for some Levallois reduction) or b) a local EUP workshop. This second solution seems more probable, particularly taking into account the nearby, and probably contemporary, Zwierzyniecian with its exclusive blade background, specific arched backed tool kit, and also the local evidence of EUP at Piekary IIa, layer 6, and the non-Aurignacian complexes in

Transcarpathia (Korolevo II, II) or Bulgaria (Temnata cave, layer 4, trench TD-I).

As for the origin of Zwierzyniecian, a local scenario based on the Blade Levallois-Mousterian industry of Piekary IIa, layer 7c is very probable (see also Kozłowski 2004). Moreover, the reconstructed blade reduction in layer III at Ksiecia Jozefa, and especially the frequency of marginal abrupt retouching of raclettes, side-scrapers, notches and backed knives confirms this hypothesis. If the most recent chronological interpretation of the Zwierzyniecian

is correct, then the coexistence of the Blade Mousterian from Piekary IIa, 7a and the exclusive blade industry at Ksiecia Jozefa II will provide further opportunities for us to observe the Zwierzyniecian. It might be that the specialised production of narrow mid-size and small blades with mostly straight profile (many complete blades are missing in the reconstructed refitted sequences) which originates from bidirectional and some unidirectional cores in layer II of Ksiecia Jozefa, was connected with the arched backed blade entity of the nearby Zwierzyniec site.

CONCLUSION

In the following, brief comparisons are proposed which show the typological, and especially technological, variability of some Mousterian industries in several parts of Eastern and Central Europe, as well as similarities and differences in core reduction sequences throughout the Middle Palaeolithic and the transitional period.

Several production systems in primary flaking, with the aim of detaching blanks (flakes/blades) for tool production, have been identified in various Mousterian complexes. Debitage methods were used either independently, coexisted in one industry, or represent one dominant system in which a second sometimes occurs, even in one single reduction sequence. There is no particular and clear spatial or chronological clustering of these technologies, even though we are dealing with an evolutionary trend from "archaic" to more "developed" methods. Blade manufacture during the Middle Palaeolithic is well-known in the Near East, Africa and Northwestern Europe. The Upper Palaeolithic volumetric concept of systematic blade production, accompanied by mostly Levallois methods and a combination of Middle and Upper Palaeolithic tools (e.g. backed blades, burins) has been recorded in Western Europe from the Saalian (OIS 8-6), and has been documented on several occasions at the beginning of Weichselian and during OIS 3, both here and in other regions of Europe. Several Levallois and non-Levallois methods of flake, blade and point production were documented in Eastern and Central Europe.

Flake and Blade MP Methods

Levallois linear method for a single preferential flake, or repetitive, with "simple" and regular centripetal, orthogonal, rare unidirectional preliminary preparation

This method was seldom used alone and without repetition (rare example: Korolevo, complex III) and could be linked to the recurrent Levallois methods (representative of different stages of core reduction) or accompanied other technologies. This method occurred throughout all Middle Palaeolithic industries of the regions studied. Careful preparation of the flaking surface and main platform was attested in older industries in the Western Ukraine, as well as in recent units in the Crimea. A certain variability in shaping, platform preparation, blank usage, and sizes of final flakes is recognised. Apart from the prevalence of the classical centripetal tortoise preparation in most of cases (e.g. the Korolevo, layer III complex displays a high level of shaping and often only one cycle, in comparison to often semi-centripetal or careless preparation) several variations were recorded: a combination of unidirectional / opposite distal trimming, multi-convergent/distal trimming or oblique, transversal distal preparation (e.g. Proniatin) or by means of elongated parallel or slightly convergent removals with distal preparation in Molodova (Usik 2003; Meignen et al. 2004) or by lateral and distal trimming from auxiliary platforms in the early WCM at Kabazi II (Usik 2003). Generally, platform faceting is lower in sites from the Kraków region, large flakes are rare (e.g. Piekary III), and reduction displays a repetitive character. Cores on flakes and soft hammerstone techniques were used (early stage of WCM).

Levallois linear (one or two points per prepared surface) and some recurrent (?) repetitive (several point generations per core) unidirectional and rare bi-directional methods for point production

Rare cases of in which point method(s) were dominant (Korolevo, complex IIb; probably Bohunićian). Normally, points occurred together with

other Levallois debitage or are represented by occasional pieces. Levallois points are scarce in eastern regions. Except for the Bohunician points are mostly short, wide-based, and with flake proportions. Generally speaking, they date to after the last Interglacial. The unidirectional method was common; sometimes preparation and maintenance of flaking convexity was achieved via an opposed supplementary platform (or without) resulting in distal traces. Debordant blades or lateral fragmentation of the core led to the formation of rather convex flaking surfaces (core tends to be partially turned) as have been recorded in Korolevo IIb and Piekary 7b. Only the Bohunician displays a systematic bi-directional reduction in order to obtain desired points, often elongated at the beginning of technological cycle. Platforms were mostly finely faceted and re-prepared prior to the last removal, and varied according to point proportions from very long to narrow; butt zone trimming was used often. Some points lacking a Y-shape working surface could deviate from the Levallois point concept (Molodova: see Usik 2003) and / or represent failed attempts (Ksiecica Jozefa, layer III).

The Levallois recurrent uni- and bi-directional method of Biache type for production of elongated flakes and blades

Centripetal or lateral transversal shaping from auxiliary platforms was used. During reduction, from one or opposed faceted platforms, several desired blanks and by-products were obtained, bestowing the flaking surface with an exclusive parallel pattern. Typologically, such cores are not Levallois, and in some cases indicate the employment of another model: simple direct non-prepared parallel non-Levallois reduction resulted in flakes or blades. In contrast to the wide geographical and chronological distribution of Biache-type technology, Late MP knappers in several regions of Central Europe (e.g. Transcarpatia or Poland) never used this reduction model.

The Levallois recurrent centripetal method

This was, however, recorded at Piekary IIa Levallois-Mousterian. Centripetal shaping following the production of several small, short blanks from a faceted peripheral platform and re-preparation of flaking surface resulted in a repetitive production of several generations of flakes per core blank.

Thus, generally speaking, the Levallois blade

method, based on the reduction of preliminary shaped pre-cores from one or two opposed platforms was a wide spread technology both temporally as well as spatially. It can either have appeared together with other Levallois methods, have co-existed with them, or even be technologically mixed in one chain or be the dominant method (Yezupil, layer III, late WCM). A domination of other Levallois methods within this strategy is the exception.

A peculiar feature of some removals, including final blanks in the Levallois-Mousterian of the Crimea is an association with faceted butts with diffused bulbs and lips. Soft hammer was of sandstone.

Non-Levallois flake debitage

This was mostly recurrent with flat (centripetal) and secant (discoidal) exploitation of cores resulted in thick asymmetrical short flakes, often debordant. Platform faceting is uncommon. Centripetal reduction was based on the reduction of a block or a flake, displaying a Kombewa pattern at an initial stage. The discoidal method is represented by unifacial and bifacial models, with several sequences based on the reduction of cores with a high section: conical/biconical and even with a tendency to a pyramidal shape (Korman IV). In many Mousterian industries these methods were independent from other technologies, and display all reduction stages (except discoidal/polyhedral fusion in Bougliv V, layer I or Ksiecica Jozefa, Layer III). A clear domination of these methods is attested in non-Levallois industries (Bugliv V, layer I, Korman IV, layer 12) or occurring together with the polyhedral method (Ksiecica Josefa, layer III). Discoidal and centripetal methods accompanied blade production (Piekary IIa, layer 7a; Belokuzminovka or Kourdiumovka). In Levallois-based industries they occurred also, i.e. as parallel, supplementary technological methods.

A number of various, independent non-Levallois methods resulted in flakes and some blades: polyhedral, direct simple parallel, Kombewa with short reduction sequence of ventral face, including re-usage of tools as cores (transformation of side-scrapers into Kombewa cores) and other variants of reduction of cores-on-flakes (flaking of dorsal surface or narrow part in transversal direction from ventral face/platform, and even exotic sequence of Pucheuil type, see Delaigne 1996). These technologies can dominate (polyhedral in Ksiecica Jozefa, III), but more often co-existed with other methods or played a supplementary role in the technological structures of analysed industries. A similar technological pattern

was documented in the Charentian complex II in Korolevo by V.Usik (2004b) where thick blank production was based on non-Levallois centripetal, Kombeva methods, as well as on the secondary usage of tools as cores. Evidence for all these methods and technological episodes stems from numerous refitted sequences in chronologically divergent Korolevo and Ksiecica Jozefa industries in a non-Levallois context.

Direct percussion with a hard stone was used in all cases. Very strong percussion (several bulbs on one removal or even cones) were common in Ksiecica Jozefa, layer III, as well as in Bugliv V, layer I.

UP Blade Methods

A direct (with no preliminary shaping of debitage surfaces), uni- and bidirectional exploitation of voluminous and flat nodules, blocks, flakes or blades

Preparation comprises only the formation of platforms, mostly via a single-blow (faceted are less frequent) and sometimes by a partial cortex removal. Exploitation continued with neither crest installation nor bifacial pre-forming, taking advantage of the natural convexities of the initial core blank. Maintenance was insured by the retrieval of lateral cortical/natural and full debitage debordant removals (blades, flakes), by plunging blades, by bi-directional reduction (with different order of detachments on one or several alternating surfaces), and, finally, by a change in the debitage orientation. Flaking from large surface with expenditure on a narrow side(s) or from narrow side(s) via a large surface was recognised. Blade production was based on volumetric reduction and resulted in partially turned cores with a large and narrow working surface (including wedge-like cores). Initial raw material peculiarities often determined the mode of core exploitation. Narrow and wedge-like core reduction was based normally on flat blocks and flakes, while turned and partially turned cores with large surface are linked to voluminous oblong nodules, pebbles or blocks. During debitage, platforms were rejuvenated, often by means of tablets; the platform/working surface zone was also rearranged via trimming or abrasion. Various models of direct blade production were confirmed in analysed industries, however, they never occurred alone in blade Mousterian, and are associated with other methods of UP blade manufacturing. In Kourdiunovka the direct debitage based on unidirectional cores with extended flaking surface is dominant, a rare case in Central and Eastern

Europe. Also, direct blade reduction sequences were reconstructed in non-Levallois and non-laminar industries of Ksiecica Jozefa, layer III and Korman IV, layer 12. Direct blade debitage should also be mentioned: starting with initial blade removals and then exploiting the large surface in an MP manner. In some cases, already abandoned cores were re-utilised by using additional flaking surface, a strategy only rarely recorded in the Late MP (Belokuzminovka) and some EUP industries (mostly Bohunician). Narrow blade debitage could be primary to Levallois (Koulychivka) or ended a mixed reduction sequence (Stranska Skala).

A prepared flaking with crest installation (central and lateral) or preliminary bifacial shaping

Numerous crested blades with two prepared versants document UP type of core shaping and the beginning of debitage. Bifacial shaping (large pre-forms with residual cortical surface) was recorded in Piekary IIa, layer 7c and 7a, thus providing evidence of this method in a fully Mousterian typological context, while in the EUP complex II in Korolevo II this model was prevailing. However, lateral transversal and centripetal preparation of a crest with the remaining volume being still covered by cortex was typical. A two-sloped crest installation was common on narrow part(s), resulting in narrow and wedge-like cores. Lateral and partial crest preparation (from back to frontal face and visa versa, or on a flaking surface on the edge) was very often used for initialisation of blade debitage and the continuation of blade production. In the last case, neo-crests could be prepared on different parts of the core (e.g. the postero-lateral crest). Sometimes the beginnings of core reduction passed in a direct manner; crest installation appeared in the following stages. Platforms were prepared by single-blow, with several removals and so were often faceted (no difference with butts of Levallois blades) and restored by full or partial tablets. Elimination of the platform edge by trimming or abrasion was common practice. The bi-directional mode of core exploitation occurred very often and prevailed over unidirectional parallel debitage. In EUP industries the exploitation of two-platforms cores contrasted with Aurignacian reduction, and stresses the link with MP blade technologies. The localisation of working surfaces and debitage order can be summarised in several main models: a) on the large side; initiation from a lateral edge (rare two edges) via a large surface (similar to the Rocourt method); b) from a large flaking surface on one or two narrow parts; c) on a narrow edge

with or without extension onto the side(s). A model recognised in Roc-de-Combe, layer 8 (core on flake with repetitive crest installation and debitage on the narrow part, with further extension on the large side and back) was documented so far in one refitted sequence in the full blade industry from Ksiecia Jozefa, layer II. During reduction, narrow cores (including wedge-like) were partially turned. Fully turned cores with working surface around the entire perimeter are rare, as are cores with back crests and upright preparation (in the case of the Bohunician and some EUP assemblages).

The technique is characterised by the use of both hard and soft hammerstones.

Combined Methods

A combination, mixing or fusion of blade UP and Levallois point, blade, flake production in Europe has been recorded and documented by numerous refitted reduction sequences at Bohunice and Stranska Skala (Svoboda, Skrdla 1995). This peculiar technology was probably used in other Bohunician assemblages. So far, no data exists to confirm this trend in another “transitional” or EUP industries.

In sum, core reduction has a dual technological structure. Levallois, non-Levallois, and UP blade methods are clearly independent, representing parallel technological systems. Levallois blade cores were reduced without extension on the sides, resting strictly on the large surface. Both the re-use of narrow parts of these cores, as well as the creation of additional flaking surfaces was rare (Belokuzminovka, Bohunician). A technological “evolution” from flat blade Levallois towards volumetric blade production cannot be attested. On the other hand, Levallois unidirectional convergent linear method for point production in Korolevo I, IIb (Usik 1989) documents the extension of a large flaking surface on the sides due to lateral removals of debordant blades. The change of core geometrical structure (obliqueness of the lateral removals to the plane of intersection with flaking surface) in recurrent modes of point production was also attested in the Near East (Meignen 1995).

As for a geographical pattern of Mousterian and blade technologies, roughly we can stress its existence nearly everywhere with Levallois debitage and accompanying blade volumetric reduction. Generally recurrent of Biache type, linear flake debitage dominates in Northern-Western Europe. In Central Europe, the production of Levallois point is more important. While centripetal Levallois, discoidal

and non-Levallois methods persist, blade and tortoise Levallois methods decrease or disappear during the Late MP. At the end of this development, the production of Levallois points is combined with the manufacture of blades and / or linear Levallois target flake. Thus, the amount of variability within the Levallois system in Western and Eastern Europe is rather comparable.

Volumetric blade production rarely occurred together with non-Levallois methods, and seldom without Levallois methods in all parts of Europe, e.g. Rheindahlen B1, Piekary IIa, layer 7a or Kourdiumovka. In contrast to the considerable variability of flake (Levallois and non-Levallois) methods, blade volumetric technology is rather homogeneous and displays no particular differences throughout Europe. Blade debitage in the European frame has a clearly chronological pattern, from the earliest in the west to the youngest towards the east. Technological evolution is hardly seen. Representative of possible post-Saalian innovation is direct or prepared blade reduction of narrow parts of flakes. A decrease in butt faceting was attested in some cases (e.g. in the long sequence of Kabazi II). The use of soft hammers became more regular during the Late MP and Early UP. Nevertheless, many LMP industries with a developed blade production remain clearly within the Mousterian frame, both technologically (persistence of various flake methods, e.g. Levallois, discoidal or polyhedral) and typologically (absence or scarcity of UP fossil directors).

Typology

The nature of many Mousterian and Early Upper Palaeolithic industries is reflected in their typological structure. A workshop character of sites is a very common event. Lithic material often stems from site-workshops and rarely from specialised workshops (blade/bladelet workshop in Ksiecia Jozefa, layer II). Pronounced debitage activity occurred in many cases, from ephemeral sites to small camps or large settlements. Only in the Crimean Levallois-Mousterian, and at some open-air sites in other regions, is there a large tool component. The tool-kit of “non-Micoquian” assemblages is rather stable and monotonous: characteristic are simple side-scrapers with retouched flakes, raclettes, notches, denticulates, and backed (mostly naturally backed) knives. Convergent pieces (scrapers and points) are present, sometimes very effective and elongated (e.g. Kourdiumovka), but, with the exception of the WCM and the Molodova Levallois-Mousterian, these are not so representative. Upper Palaeolithic

tool types are rare, atypical or absent. UP blade debitage did not inspire the production of grattoirs or burins. Invasive, bifacial or Quina-type retouch are either scarce or were never used. Retouch ranged from scaled to marginal abrupt, flat, ordinary, and was mainly direct. The usage of blanks (Levallois or non-Levallois) without modification was common. Bifacial (Micoquian) tools are not characteristic of Mousterian industries with blade or Levallois debitage, as in some cases in Western Europe. On the other hand, some bifacial leaf points appeared in several Early Upper Palaeolithic units stemming from the local Middle Palaeolithic (Levallois-based or not, e.g. Bohunice, Korolevo II, complex II or Biryuchia Balka 2).

Certain typological variability, however, can be seen as providing inter-regional comparisons. The best example is the Donbass-mid Don pattern with a series of truncated-faceted pieces in Belokuzminovka and Shlyakh (Kolesnik 2003; Nehoroshhev 2004). This differs considerably from the other analysed territories, including the nearby Crimea (Chabai 2004c). These pieces occurred in many industries (e.g. Blade Levallois-Mousterian in Piekary IIa, layer 7c or EUP in Temnata cave, trench TD-I, layer 4), but never exhibit such pronounced collections as in above-mentioned sites. An additional feature of these industries is the systematic thinning of various tools.

Typological variations are manifest throughout the Middle Palaeolithic. Some recent MP industries, dated back to about 30,000 BP, and therefore co-existent with fully UP sites, do not show any signs of “progress” or transition (e.g. the tool-kits of the WCM, from Molodova, Korman or Piekary IIa, layer 7a) and remain unquestionably within the MP frame. Tool morphology displays no development throughout the entire MP. Of particular note is the appearance of some backed knives or raclettes, and marginal abrupt retouch, though backed pieces are rare (Piekary IIa, layer 7c or WCM), or remain within the general MP techno-typological context (Ksiecica Jozefa, layer III). Retouched (typical and atypical) backed knives and backed blades occur in various Mousterian and blade Mousterian industries throughout the continent during the entire Middle Palaeolithic. Backed blades, for example, are common in Rencourt-lès-Bapaume, sèrie CA (Ameloot-Van der Heijden 1994) in Piekary IIa, layer 7c (Valladas et al. 2003) or at Kabazi II, in a Late Stage of the WCM (Chabai 2004c). Over a long period of approximately 70,000 years, from OIS 5c to early OIS 3 - Denekamp Interstadial, these complexes show no “typological evolution”, even an opposite tendency, i.e. a pronounced UP tool-kit

with rare UP tools, or a lack of them in more recent industries.

In Eastern and Central Europe, following the Last Glacial and up until the Denekamp Interstadial, several different units can be recognised on the basis of technological and typological features: these are the “non-Micoquian” Late Middle Palaeolithic industries of the Mousterian, Levallois-Mousterian, Blade Levallois-Mousterian, Blade Mousterian and Early Upper Palaeolithic.

Technological analyses of core reduction sequences provide a means by which these generalised entities can be better differentiated.

Mousterian

- Middle Palaeolithic non-Levallois flake debitage (e.g. Bugliv V, layer I, Temnata TD-1/layer 6?); seldom with traces of Levallois and / or rare Upper Palaeolithic blade methods (e.g. Ksiecica Jozefa, layer III, Korman IV, layer 12); time span: OIS 5? – OIS 3).

Levallois-Mousterian

- Levallois flake debitage with an exclusive linear method (Korolevo I, layer III) or recurrent flake method (Bacho Kiro, layer 13); time span: > OIS 3.
- Levallois point debitage (Korolevo I, layer IIb, Piekary IIa, layer 7b?); time span: OIS 5? – OIS 3.
- Levallois recurrent blade/flake uni-/bidirectional debitage with some points (Yezupil, layer III, Zwierzyniec, Area P?) or with clear elongated preferential flakes (Molodova I, layers 4 and 5, Proniatin); time span: OIS 5? – OIS 3.

Blade Mousterian

- Upper Palaeolithic blade debitage with non-Levallois flake and rare Levallois methods (Kourdiumovka, Bougliv V, trench III, layer II, Piekary IIa, layer 7a, Zwierzyniec I, layer 2?): Saalien? – OIS 3

Blade Levallois-Mousterian

- Upper Palaeolithic blade debitage with non-Levallois flake (discoidal, centripetal) and Levallois flake lineal (Piekary IIa, layer 7c) or recurrent (Shlyakh) methods
- Or with additional well developed Levallois blade methods (Western Crimean Mousterian): OIS 3.

Early Upper Palaeolithic (Ois 3)

- Upper Palaeolithic blade debitage with Levallois blade and rare flake methods (Temnata TD-II/VI)
- Fusion of Upper Palaeolithic blade debitage with Levallois point, blade, flake production (Bohunician)
- Upper Palaeolithic blade debitage with non-Levallois flake method (Korolevo I, complex Ia)
- Exclusive Upper Palaeolithic blade debitage (Ksiecica Jozefa, layer II, Korolevo II, complex II, Sokyrrnitsa, Temnata TD-I/4, Piekary IIa, layer 6).
- Co-existence of Aurignacian and Szeletian

Thus, prior to 30 ky, Mousterian as well as UP assemblages of Eastern and Central Europe were characterised more by their complex technological structure than by their typological variability. They cannot be described only in terms of 'Mousterian'/'Micoquian', 'Aurignacian'/'Early Upper Palaeolithic' or 'Transitional unit'. Interesting in this respect is an attempt to analyse the Middle-to-Upper transition by comparing an "Bohunician Behavioral Package" and a "Aurignacian Behavioral Package" (Tostevin 2003). However, in the first package, one

can find assemblages markedly different from the Bohunician: Korolevo II, layer II does not produce any Levallois point or other Levallois blanks, Temnata Cave, layer VI, Sector TD-II is characterised by rare and atypical Levallois points and an absence of the Bohunician core reduction method, and Korolevo I, IIb is a fully Levallois-Mousterian complex in which cores with prepared crest so typical for the volumetric blade production of the Bohunician are absent. Detailed attribute analyses suggest similarities between the "Bohunician Behavioral Package" and Early Upper Palaeolithic or even Mousterian assemblages, and evidently contrast with the Aurignacian. The hypothesis of a diffusion of both behavioral Packages (as might be proposed for Boker Tachtit 1 and 2 via Moravia, i.e. Bohunician sensu stricto) is not in accordance with the in situ development of various Palaeolithic industries and knapping methods (including the "BBP" after G.Tostevin) in some regions of Eastern and Central Europe (Southern Poland, Dnestr or Carpathian mountains); in some cases, i.e. in the Don valley (e.g. Matiukhin 2004), even local evolutions of UP industries are proposed. In other words, diffusion, as suggested by Tostevin, seems to be less plausible rather than in situ developments that led to the present picture of a mosaic of industries and knapping behaviours.

АБСТРАКТ

ВОСТОЧНАЯ И ЦЕНТРАЛЬНАЯ ЕВРОПА ДО 30000 ЛЕТ НАЗАД: МУСТЬЕРСКИЕ, ЛЕВАЛЛУАЗСКИЕ И ПЛАСТИНЧАТЫЕ ИНДУСТРИИ

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На основании анализа технологических и типологических характеристик многочисленных «немикокских» коллекций Центральной и Восточной Европы предлагается вариabельность поздних среднепалеолитических и ранних верхнепалеолитических индустрий, которая представлена мустьерскими, леваллуа-мустьерскими, пластинчатыми леваллуа-мустьерскими, пластинчатыми мустьерскими и верхнепалеолитическими комплексами. Хронологические рамки данных комплексов охватывают время от последнего интергляциала до интерстадиала Денекамп.

Мустьерские комплексы основаны на использовании среднепалеолитического отщепового, нелеваллуазского расщепления (Буглив V, слой I, Темната TD-1/слой 6?) с некоторыми чертами леваллуазского и / или верхнепалеолитического пластинчатого методов (Кшенча Джозефа, слой III, Кормань IV, слой 12). Время существования мустьерских комплексов: OIS 5? – OIS 3.

Леваллуа-мустьерские комплексы подразделяются на три варианта. Во-первых, леваллуа-мустьерские индустрии, базирующиеся на эксплуатации черепаховидных (Королево I, слой III) и рекуррентных (Бачо Киро, слой 13) нуклеусов для отщепов, датируются временем древнее OIS 3. Во-вторых, к острейному леваллуа-мустье относятся индустрии Королево I, слой IIb и, возможно, Пекары IIa, слой 7b. Время бытования леваллуа-мустьерских острейных индустрий определено в пределах OIS 5? – OIS 3. В-третьих, леваллуа-мустье, основанное на расщеплении продольных и бипродольных отщеповых / пластинчатых нуклеусов, представлено коллекциями Езупиль, слой III и, возможно, Звержинец, пункт 5. К этому же варианту относятся индустрии Молодова I, слои 4, 5 и Пронятин, в которых продольное и бипродольное леваллуазское расщепление дополнено скальванием с preferential нуклеусов. Хронологические рамки данного варианта леваллуа-мустье, впрочем, как и предыдущего, достаточно широки: OIS 5? – OIS 3.

Пластинчатое мустье Центральной и Восточной Европы представлено следующими коллекциями: Курдюмовка; Буглив V, раскоп III, слой II; Пекары IIa, слой 7a; Звержинец I, слой 2. Основной отличительной технологической особенностью данных коллекций является использования верхнепалеолитического пластинчатого расщепления в сочетании с леваллуазскими и нелеваллуазскими отщеповыми методами скальвания. Предполагаемая хронология данных индустрий охватывает время от Saalien до OIS 3.

Пластинчатое леваллуа-мустье представлено двумя вариантами. К первому относятся коллекции основанные на верхнепалеолитической пластинчатой, нелеваллуазской отщеповой и леваллуазской отщеповой (Пекары IIa, слой 7c) или рекуррентной (Шлях) технологиях. Второй вариант пластинчатого леваллуа-мустье представлен коллекциями западнокрымского мустье, для которых характерно сочетание верхнепалеолитических и леваллуазских отщеповых и пластинчатых технологий. Время бытования западнокрымского пластинчатого леваллуа-мустье не выходит за рамки OIS 3.

Также в хронологических рамках OIS 3 предполагается существование трех вариантов раннего верхнего палеолита, для которых в той или иной степени характерно использование леваллуазских и нелеваллуазских среднепалеолитических методов расщепления камня. Технология расщепления индустрии Темната, TD-II/VI базируется на использовании верхнепалеолитических пластинчатых, леваллуазских пластинчатых и реже отщеповых методов. Для индустрии Богунице характерен синтез верхнепалеолитического пластинчатого расщепления с леваллуазскими острейным, пластинчатым и отщеповым методами. Для Королево I, Ia характерно использование верхнепалеолитического пластинчатого и нелеваллуазского отщепового методов.

