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THE BEGINNING OF THE UPPER PALEOLITHIC IN TRANSCARPATHIA, UKRAINE

ABSTRACT: Forming the crossroad between western and eastern Europe, the Carpathian Mountains support a wealth of natural diversity otherwise unparalleled in Europe and a rich cultural heritage reflecting millennia of human settlement. Yet relatively little is known of the Paleolithic settlement of Transcarpathian Ukraine, despite the vast potential the area holds for prehistoric research. At present, there are three known Early Upper Paleolithic assemblages in Transcarpathia: Korolevo II level II and Korolevo I level Ia, both discovered at the end of the 1970s, and Sokirnitsa IA level 3, discovered in 2000. Korolevo II/II is technologically Upper Paleolithic with blade production and the use of crested blades for the preparation of the core, along with archaic techniques of platform faceting and hard hammer percussion. Typologically, both Middle and Upper Paleolithic tools appear. This assemblage, furthermore, has been demonstrably linked to earlier occupations at Korolevo, suggesting that this was an indigenous transition, a view supported by other transitional assemblages from neighbouring regions. Korolevo I/Ia and Sokirnitsa IA/3, in both technological and typological aspects, show a refinement of lithic reduction strategies and tool manufacture that is fully Upper Paleolithic in character. All three Transcarpathian assemblages are dated ca 39,000 BP and indicate that the beginning of the Upper Paleolithic in this region is connected with OIS 3. In none of the cases do Aurignacian elements appear, suggesting that the tempo and nature of the transition from the Middle Paleolithic to the Upper Paleolithic was different from that of western Europe.

KEY WORDS: Early Upper Paleolithic – Aurignacian – Middle to Upper Paleolithic transition – Levallois technology – Blade technology – Ukraine

The advent of the Upper Paleolithic is intimately linked with the appearance of anatomically modern humans and their expansion throughout Europe, while, at the same time, the material culture and the manner in which the natural world was confronted were transformed. This phenomenon has long been thought to be associated with the Aurignacian, but the evidence continues to mount in central and eastern Europe for transitional and Early Upper Paleolithic cultures that cannot be considered part of the Aurignacian technocomplex, suggesting that the Aurignacian might not be the original purveyor of modern culture. Problematic assemblages dating between 45,000 to 30,000 years ago include the "transitional" industries in central and eastern Europe with both Middle Paleolithic and Upper Paleolithic traits (e.g. the Moravian Bohunician and the Hungarian Szeletian), as well as the "Early Upper Paleolithic" or "Initial Upper Paleolithic" non-Aurignacian assemblages (e.g. the Streletskaya, Kostienki 14 level IVb, and Kostienki 17 level II in Russia, Buran-Kaya III level C in Crimea). Even sites that have been pointed to for decades as being evidence for proto-Aurignacian development and the initial entry into Europe, such as Bacho Kiro and Temnata in Bulgaria and Istàllóskö in Hungary have recently been jettisoned from the Aurignacian complex based on techno-typological re-evaluation of the lithic material (e.g. Teyssandier 2003) or chrono-stratigraphical inconsistencies (e.g. Zilhão, d'Errico 1999).

The recently discovered Sokirnitsa site in Transcarpathian Ukraine has revealed the presence of a fully Upper Paleolithic culture, and by inference, the presence of modern humans in this region 39,000 years ago. This assemblage appears to be part of the same industry as that

from Level I-a of the nearby site of Korolevo I: a multi-component site inhabited for a substantial period of time during the Paleolithic and which appears to demonstrate an autochthonous transition from the Middle Paleolithic through the Early Upper Paleolithic. These Transcarpathian sites are not only unique for the region in their Upper Paleolithic status, but their investigation might also clarify the questions concerning the origins of those "advanced" eastern European Early Upper Paleolithic industries like those of the Kostienki region (Anikovich 2003).

TRANSCARPATHIA

The Carpathian Mountains form a semi-circle bordering the Danubian Plain, arching from Bratislava in the northwest to the Danube's Iron Gate in the southeast for about 1,500 kilometers. They are folded, young mountains of only moderate height (averaging less than 1,000 m), forming a bridge between Europe's northern, southern, and western forests and acting as a corridor through which plant and animal species disperse throughout Europe. The Carpathians are the source of many of Europe's great rivers, including the Vistula, Dniester, Prut, Bodrog, Seret, and numerous Danube tributaries; their valleys, along with the passes that break the system, have facilitated overland travel by humans and animals between the mountains and wide valleys of central Europe and the low-lying Eastern European Plain. The Ukrainian portion of the Carpathian Mountains, comprising the Transcarpathian (western slopes) and Ivano-Frankivske (or Precarpathian, eastern slopes) administrative oblasts, consists of gentle, broad, and little dissected ridges and parallel valleys and deeply incised transverse valleys with steep slopes. In short, the range of Pleistocene environments, abundance of flora, fauna, fresh water, and raw material within the relatively limited area of Transcarpathia, plus the ease of access to all areas north, west, south, and east would have made the region particularly attractive to Upper Pleistocene hominids.

Until very recently, the only known Early Upper Paleolithic assemblages in the Transcarpathian region were from Korolevo I and Korolevo II. Korolevo is located within the Khust Gate region of Transcarpathia, on the hills (120 m terrace) of Beyvar and Gostriy Verkh Peaks (Korolevo I) and on the adjoining 20 m terrace beneath the Vinnichki Peak (Korolevo II), on the left bank of the Tisza River. Discovered in 1974 by V. N. Gladilin (1978) in an active stone quarry, the site was excavated during the course of 14 field seasons, over a total area of about 1,500 square meters. This open-air site has a very rich and long sequence of Paleolithic deposits dating from before the Brunhes-Matuyuma epoch through the Early Upper Paleolithic (Gladilin 1989, Haesaerts, Koulakovskaya 2006).

Korolevo contains two Upper Paleolithic assemblages–Korolevo II level II and Korolevo I level Ia – both of which are connected to a paleosol correlated to the Vytachiv soil unit in the Ukrainian Pleistocene stratigraphic framework, dating to the Middle Pleniglacial, OIS 3 (Gerasimenko 1999, Gozhik *et al.* 2001, Boguckyj, Lanczont 2002). The recent discovery of the stratified site of Sokirnitsa I provides supporting evidence for geological and palynological investigations carried out at Korolevo, which are relevant for the Middle to the Upper Paleolithic transition and the Early Upper Paleolithic in this part of Ukraine.

The Early Upper Paleolithic levels of Korolevo II/II, Korolevo I–Ia, and Sokirnitsa I level 3 are all within the same pedological formation. This is a Btmgl horizon of a forest soil: brown heavy loam, strongly compacted, prismatic, with thick clay cutans on the ped surfaces. The horizon includes light-gray gley spots, as well as abundant dendrite and small concretions of iron-manganese hydroxides. In the sites, the soil material is dissected by very characteristic "tongues" filled with whitish silt. Based on morphological and micromorphological features, this soil horizon has been correlated with the Vytachiv unit of the Ukraine plain (Veklitch 1984, Adamenko *et al.* 1989, Gerasimenko 2004). The abundance of Fe-Mn concretions and microconcretions throughout the soil profile is a particularly diagnostic feature of the Vytachiv fossil soils. At the same time, the features of intense clay translocation and the build-up of the overlying Holocene soil demonstrate that the Vytachiv material has been secondarily transformed by Holocene forest pedogenesis. Pollen assemblages of this soil horizon belong to an interstadial in both Korolevo (Pashkevich 1984) and in the upper layers of the soil at Sokirnitsa, where the main cultural level occurs. The pollen assemblage of the lower layer of the soil horizon in Sokirnitsa indicates a cold stadial environment of this sediment formation. This gives evidence of a secondary transformation of the material by the later pedogenesis.

Aside from geological and palynological investigations, numerous dating programs were conducted during the excavations of Korolevo in the 1970s and 1980s, not always with concordant results. Based on the then-current Pleistocene stratigraphic framework of Ukraine, fossil soils thought to be related to the Hengelo Interstadial were thin, poorly defined humic layers, if they were visible at all, and associated with a steppe landscape. On the other hand, the upper paleosol at Korolevo was up to 40 cm thick and associated with deciduous forest landscape. The single radiocarbon date from Korolevo II/II, immediately below a paleosol, did, in fact, correspond to the Hengelo: 38,500±1000 (GIN-2774). Yet, it was suggested that it was erroneous, based on the geological, morphological, and palynological analyses, as well as on thermoluminescence and paleomagnetic dating (Gladilin 1989: 100, Gladilin, Demidenko 1989: 146). The radiocarbon date from Korolevo I–Ia, from the very base of the paleosol, was also rejected as being too young: 25,700±400 (GIN-2772). The loam underlying the fossil soil was TL dated to 60,000±8000 BP, the horizon above the paleosol was TL dated to 35,000±6000 and by paleomagnetic dating, to more than 44,000 (Gladilin 1989: 99). Gladilin therefore suggested that the Upper Paleolithic layers of Korolevo

corresponded to the pre-Brörup period of Würm I (Gladillin 1989: 101).

The Ukrainian Pleistocene stratigraphic framework has since undergone substantial revision, including how the Vytachiv unit is recognized; dates in the range of 35,000–45,000 have been obtained for the Vytachiv unit of the Ukrainian loess series (Shelkoplyas *et al.* 1986), supporting the C^{14} date obtained in Korolevo I–Ia for the same unit. The numerous radiocarbon dates obtained from Sokirnitsa confirm that the three Upper Paleolithic assemblages, all associated with the same Vytachiv unit, belong to the Middle Pleniglacial (Usik *et al.* 2004).

The two most recent assemblages at Korolevo – from Korolevo II level II and Korolevo I Level I-a – are both Early Upper Paleolithic and non-Aurignacian. Studies of the lithic material from these levels, as well as the underlying Middle Paleolithic levels, which have been conducted since their excavation and include extensive refittings, have documented technological shifts in the repertoires of the Paleolithic inhabitants (Gladilin, Demidenko 1990, Usik 1989).

Korolevo II level II

Stratigraphically, Korolevo II level II is found in the upper part of the loam immediately underneath the Vytachiv paleosol (OIS 3), slightly deeper than the position of Korolevo I/I-a (*Figure 1*). Korolevo II/II has a C^{14} date of 38,500±1000 (GIN-2774) and, based on its stratigraphic position, appears to be slightly older than Korolevo I Level I-a. The core technology used by the inhabitants of Korolevo II/II is completely Upper Paleolithic in nature, using crest preparation and bidirectional parallel and wedge-shaped blade cores with faceted platforms, which resulted in blades with parallel edges and straight profiles (*Figure 2; Figure 3: 4–6*). The assemblage of Korolevo II Level II includes also a series of leaf-points. These are mainly broken pieces and preforms fashioned with bi-convex façonnage (*Figure 3: 7, 10*); their association in the level with bifacial thinning flakes and other debitage characteristics of this technology attest to their being produced on-site. On the sole basis of these leaf-points, Korolevo II level II has been called "Szeletian" and linked to the Middle Paleolithic Micoquian (e.g. Anikovich 1992, Cohen, Stepanchuk 2000–2001). Both these assertions are without merit. It is obvious that the core technology of the assemblage is not at all like the Szeletian seen in the Bukk Mountains (contra Kozlowski 2000), but rather is analogous to the Bohunician-type industries. The technology of Korolevo II/II (and the Bohunician) is based, in our opinion, not on Levallois "flat" cores as it is often characterized, but in core reduction with crest preparation, bidirectional parallel removals, faceted platforms, and hard hammer percussion. The bifacial foliates are merely activity-specific tools fashioned on site for ad hoc usage.

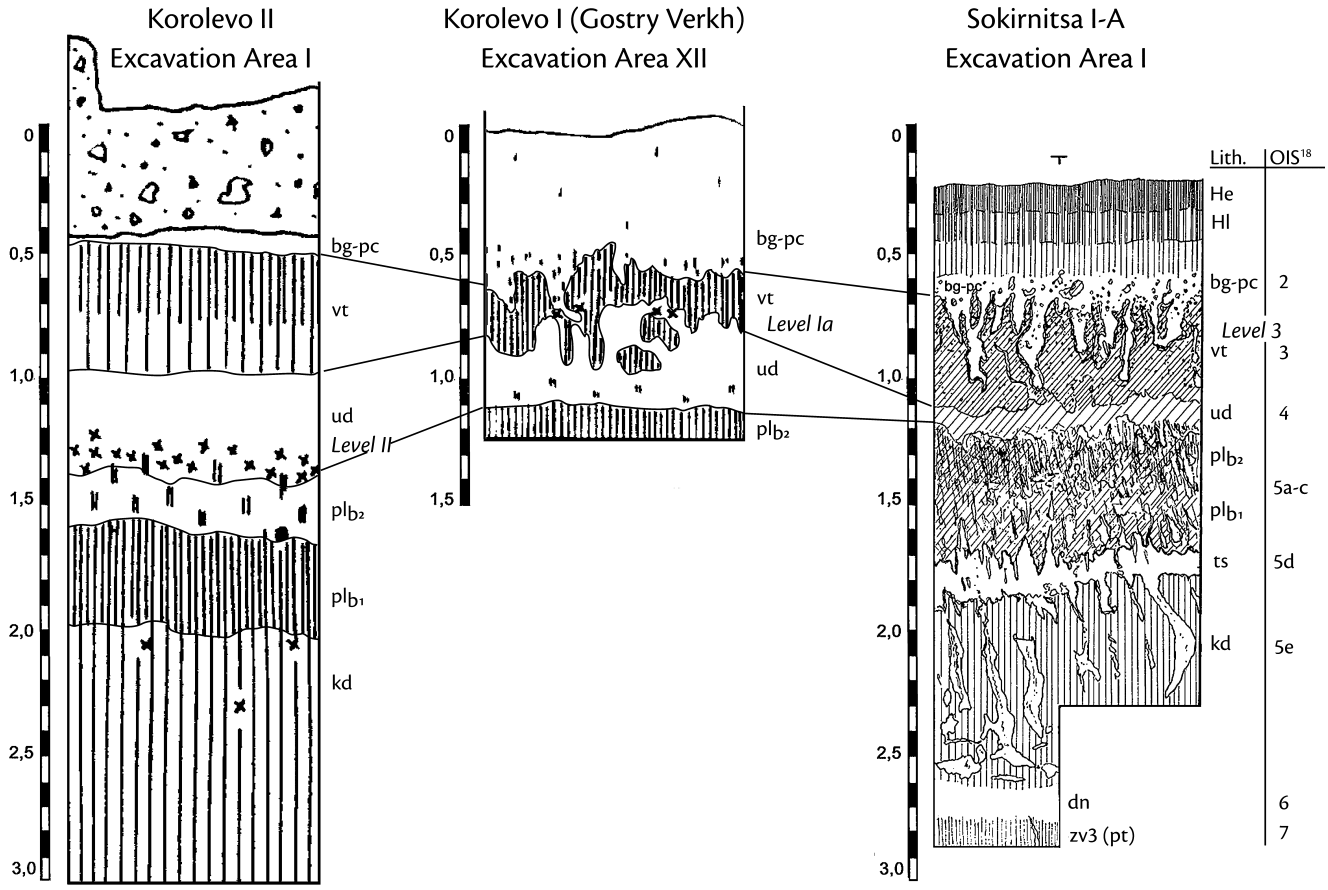

FIGURE 1. Geological profiles of Transcarpathian sites: Korolevo II, Korolevo I, and Sokirnitsa I-A.

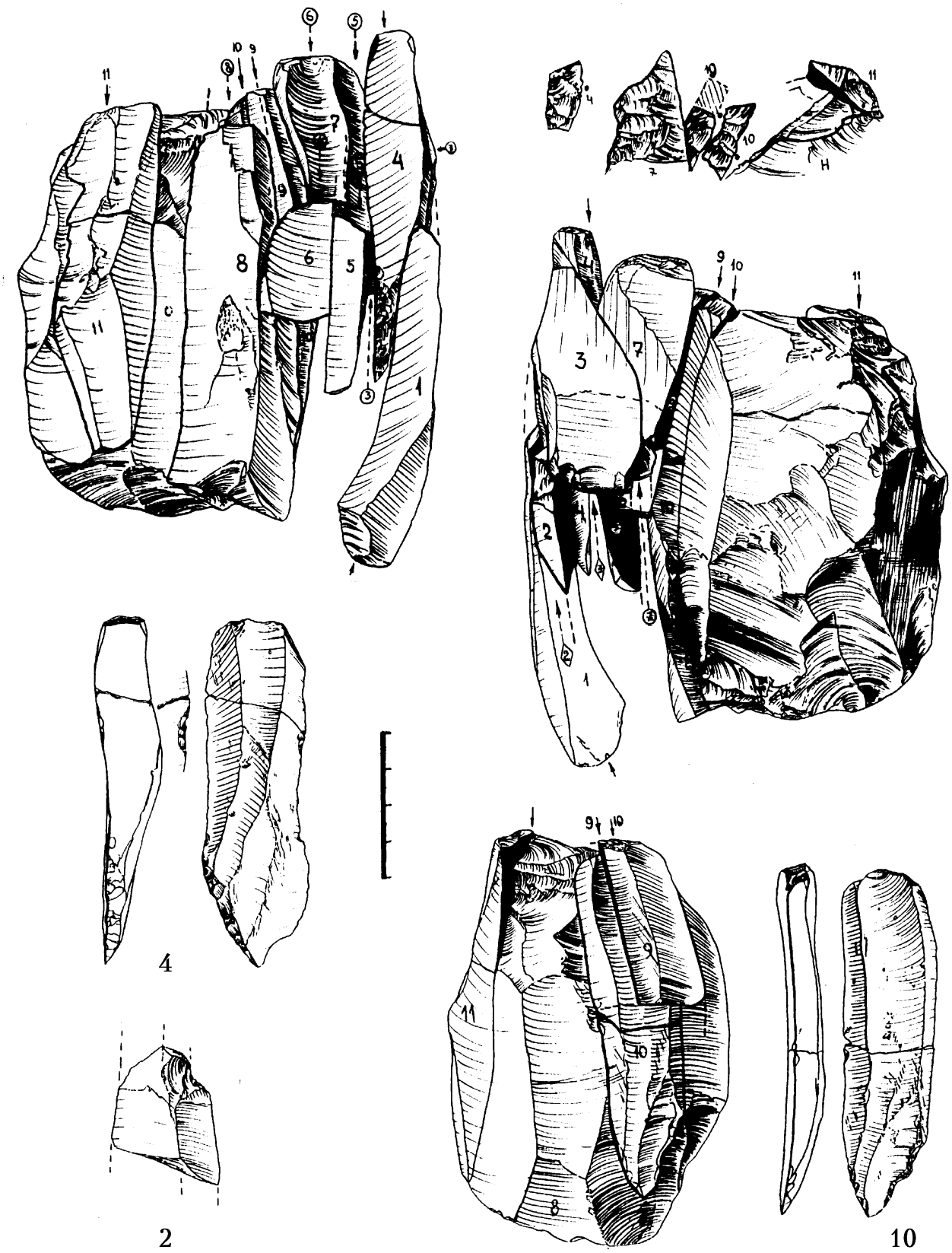

FIGURE 2. Korolevo II/level II: reconstruction of a blade core and the associated tools: 2: notched blade fragment; 4, 10: pointed blades. Note faceting of the striking platform.

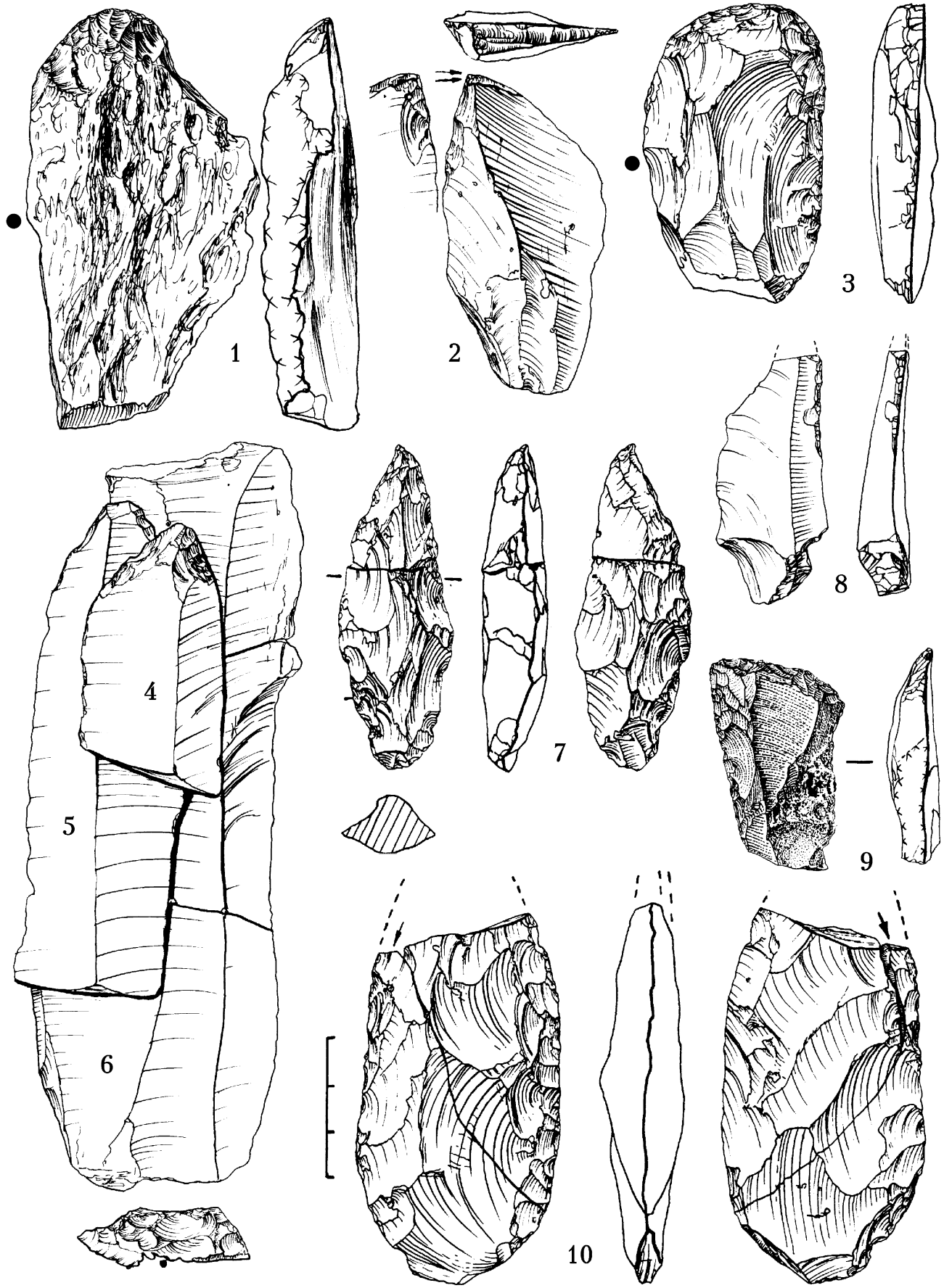

FIGURE 3. Korolevo II/level II: tools – 1, 3, 9: endscrapers; 2: transversal burin; 4–5: pointed blades; 6: inversely retouched blade; 7, 10: leaf-points; 8: retouched and notched blade.

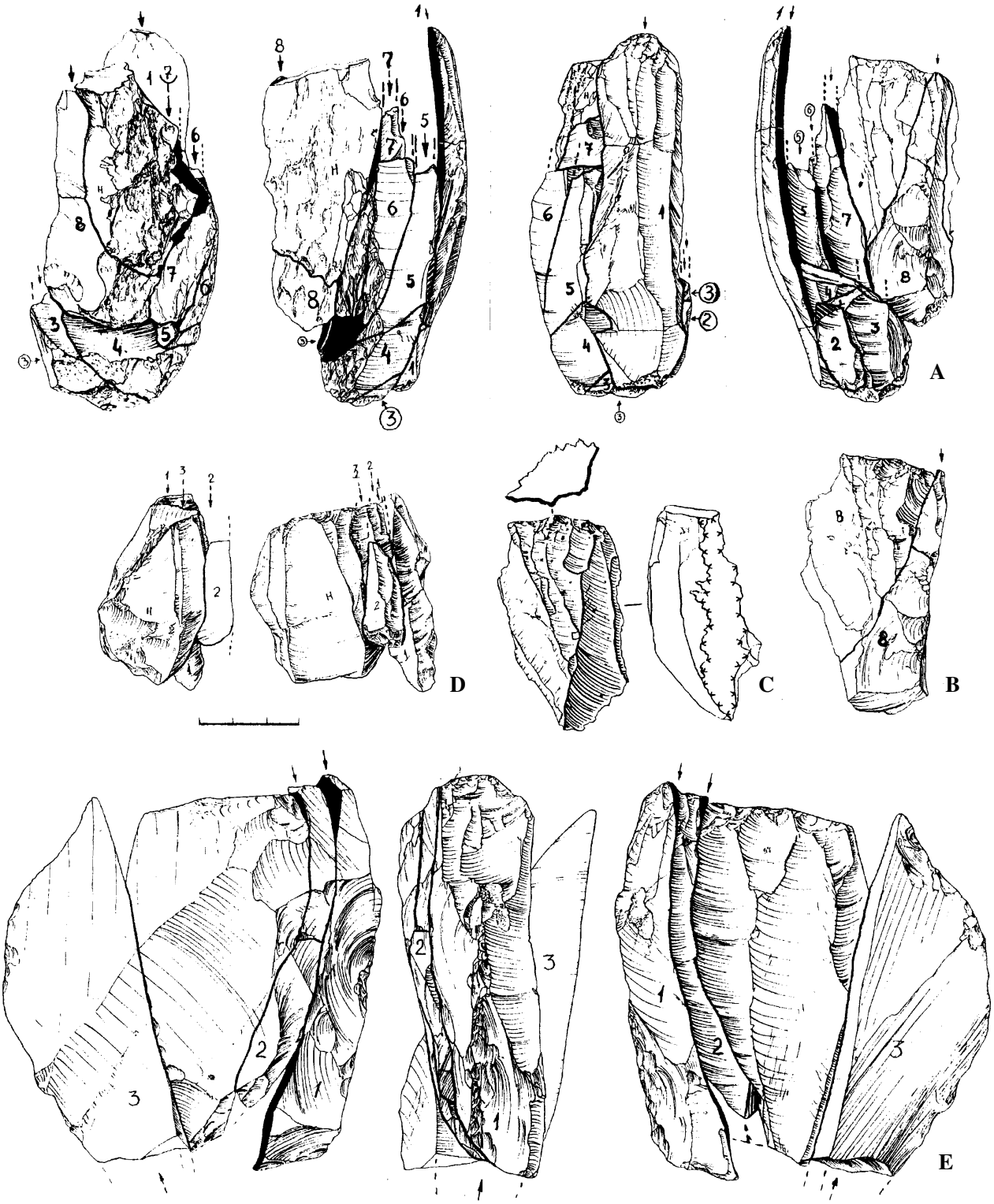

FIGURE 4. Korolevo I/level 1-a: reconstructed cores.

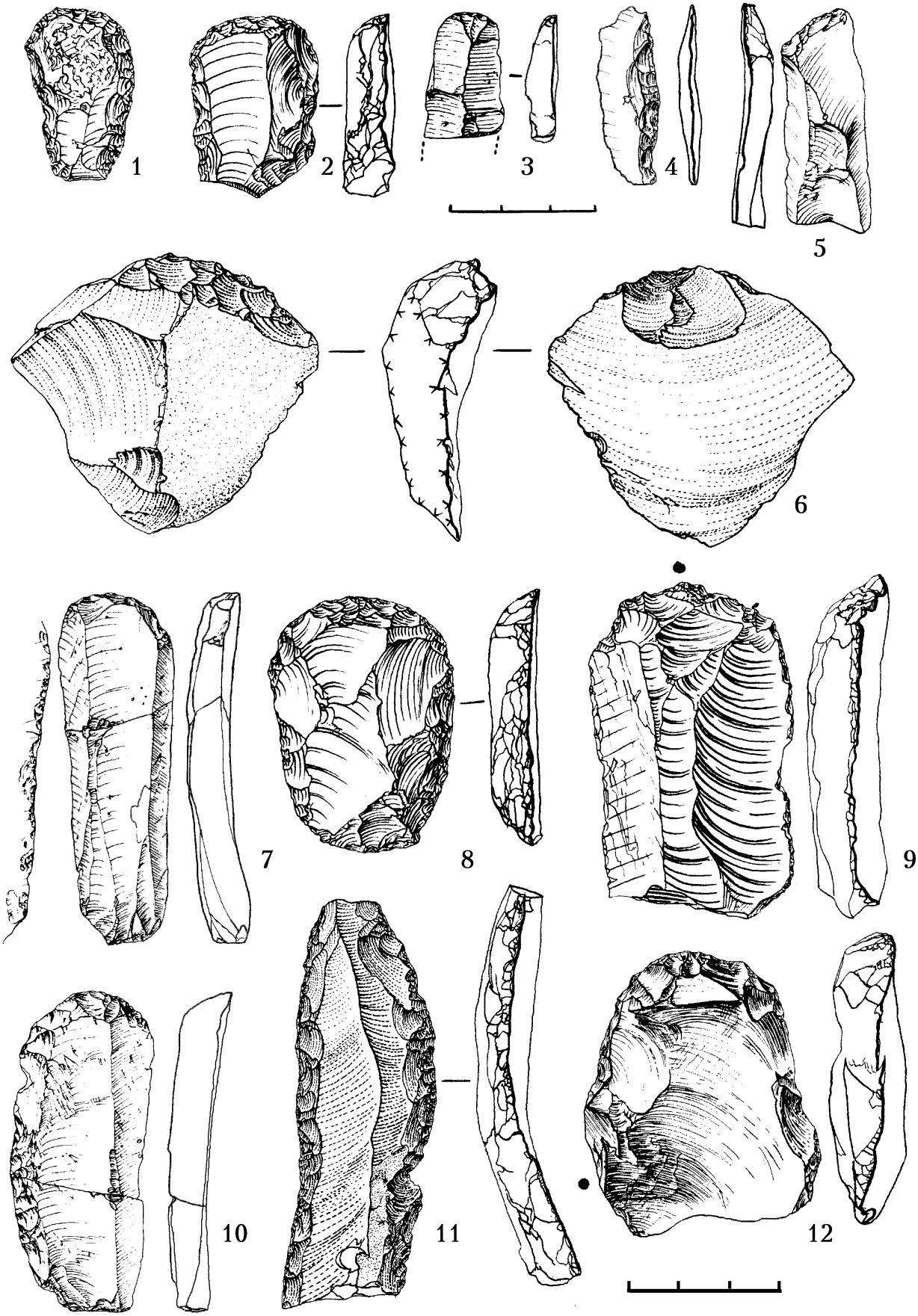

FIGURE 5. Korolevo I/ level 1-a: tools – 1, 2, 6, 8, 9, 12: endscrapers on flakes; 3, 7, 10: endscrapers on blades; 4, 11: retouched blades; 5: truncation.

The toolkit of this level has roughly equal percentages of typically Middle Paleolithic and typically Upper Paleolithic tools (Gladilin, Demidenko 1989). Blades that have been distally modified into points are most characteristic of the assemblage (*Figure 2: 4, 10, Figure 3: 4, 5*). Sidescrapers, notches, and denticulates are common. Roughly equal but low percentages of endscrapers and burins occur. Endscrapers are usually on retouched flakes (*Figure 3: 1, 3, 9*). Burins are on both flake and blade blanks, with flat (plan) burins most typical. There is only one transversal burin (*Figure 3: 2*) in the entire assemblage. There are no tools in the assemblage that may be construed as typical of the Aurignacian.

Korolevo I level I-a

Korolevo I level I-a was found in the lower portion of the first paleosol and is, on the basis of stratigraphic, geological and palynological data, plus relative weathering of andesite materials, slightly more recent than Korolevo II level II. It has been linked by palynological and geological evidence to an extremely cold and dry oscillation between 39,000 and 37,500 BP (Usik *et al.* 2003). Core reduction in level I-a was predominantly from single platform cores using a soft hammer and was geared to the production of blades (*Figure 4: A–E*). Crested blades were used in preparing the core's flaking surface and core tablets in rejuvenating the striking platform. Level I-a has no bifacial technology or bifacial tools. The toolkit of this level is notable for its very high proportion of endscrapers (51%). These are made on both flake and blade blanks in about equal proportions (*Figure 5: 1–3, 6–10, 12*); while these blanks tend to be fairly thick, there are no steep scrapers or carinated forms. Burins are rare in the assemblage (7%) and atypical in form. Points and pointed blade tools are absent, there is only a single truncated blade (*Figure 5: 5*), and only a single retouched bladelet that does not resemble Dufour bladelets (*Figure 5: 4*). Sidescrapers are present in low numbers, and notches and denticulates are infrequent. While the toolkit is clearly Upper Paleolithic then, there are practically no tools typical of the Aurignacian, with the exception of one twisted blade with semi-steep retouch (*Figure 5: 11*).

Sokirnitsa I

Sokirnitsa I was discovered in 2001 at the top of a northeast to southwest-trending hill on the southwest edge of the village of Sokirnitsa, about 7 km southeast of Khust and 30 km east of Korolevo. This hill is a 60–70 m terrace on the right bank of the Tisza River, presently being quarried for limestone at it north-westernmost edge. Limited excavations have already been conducted within an area designated "A". The main cultural level in Area A, Level 3, is found within the Vytachiv polygenetic horizon (OIS 3), below the manganese of the paleosol at a depth of 80–90 cm in *Figure 1*. A series of 11 radiocarbon dates on charcoal in this level were highly consistent, providing an average date of 38,880±110 (Ki-10837) (Usik *et al.* 2004).

Based on the limited collection obtained so far, Sokirnitsa I level 3 contains a lithic industry that is fully Upper Paleolithic in nature; yet, it is not Aurignacian as typically defined in western Europe. Technologically, the reduction strategy at Sokirnitsa appears to have been geared to the production of blade blanks from unidirectional and bidirectional cores (*Figure 6: 12, 15, 16*). The initial flaking surfaces on these cores were always formed by crested blades, while striking platforms were rejuvenated by core tablets. Analysis of the morphology of core and blank striking platforms indicates that both soft and hard hammer percussion were utilized.

About 70% of the tools in level 3 are made on blade blanks. Among the tools, burins far outnumber endscrapers. Burins are most often dihedral (*Figure 7: 1, 3, 4, 9, 10*), followed by burins on truncation. Dihedral burins are usually asymmetrical multifaceted and made on thick blanks. Burins on truncation are formed by a heavy concave truncation or deep notch (*Figure 7: 5–8*). Endscrapers, accounting for less than 10% of the assemblage, are usually simple forms on blade *blanks* (*Figure 6: 2, 9, 10, 13, 14*) and on flakes (*Figure 6: 6*), with only rare and atypical carinated or thick types (*Figure 6: 6*). Combined tools (*Figure 6: 1, 5*), "pièces esquillées", and truncated pieces are present as well. Retouched pieces, especially retouched blades, are prominent in the assemblage: retouch ranges from marginal to semi-steep, sometimes inverse and flat, but it is never Aurignacian retouch. There are no Aurignacian blades. Bladelets are present in low numbers; these have straight, rather than twisted, profiles suggesting production from blade/bladelet cores, not from carinated cores (of which there are only a few atypical forms, none with characteristic bladelet negatives). When bladelets are retouched, it tends to be with either bilateral dorsal semi-steep retouch or lateral marginal retouch (*Figure 6: 3, 4, 7, 8*). There are no Dufour bladelets. Due to sedimentological conditions of the site, shared with other open-air Paleolithic sites in the region, there are no osteological remains present at all at Sokirnitsa (this is also true of Korolevo) so it is unknown if any bone tools originally were part of this assemblage.

In Sokirnitsa, none of the raw materials exploited was of immediate local origin. The nearest source for quartzite and slate, which are the most common materials used, is the Rika River, 20 km to the west, where these two materials are available as pebbles. The sources for flint and chalcedony have not been identified, but are not of local origin. The presence of andesite (0.4% of the assemblage) is especially important: it comes from Korolevo and displays nearly the same level of leeching destruction as seen in the early Upper Paleolithic levels of that site.

Early Upper Paleolithic evidence in Transcarpathia and the Russian Plain

In central and eastern Europe between 43–30 ka BP there were a myriad of diverse industries, often referred to as "transitional," Initial Upper Paleolithic, or Early Upper Paleolithic, such as the Bohunician, Szeletian, Streletskaya, and Proto-Aurignacian. The earliest purported Aurignacian

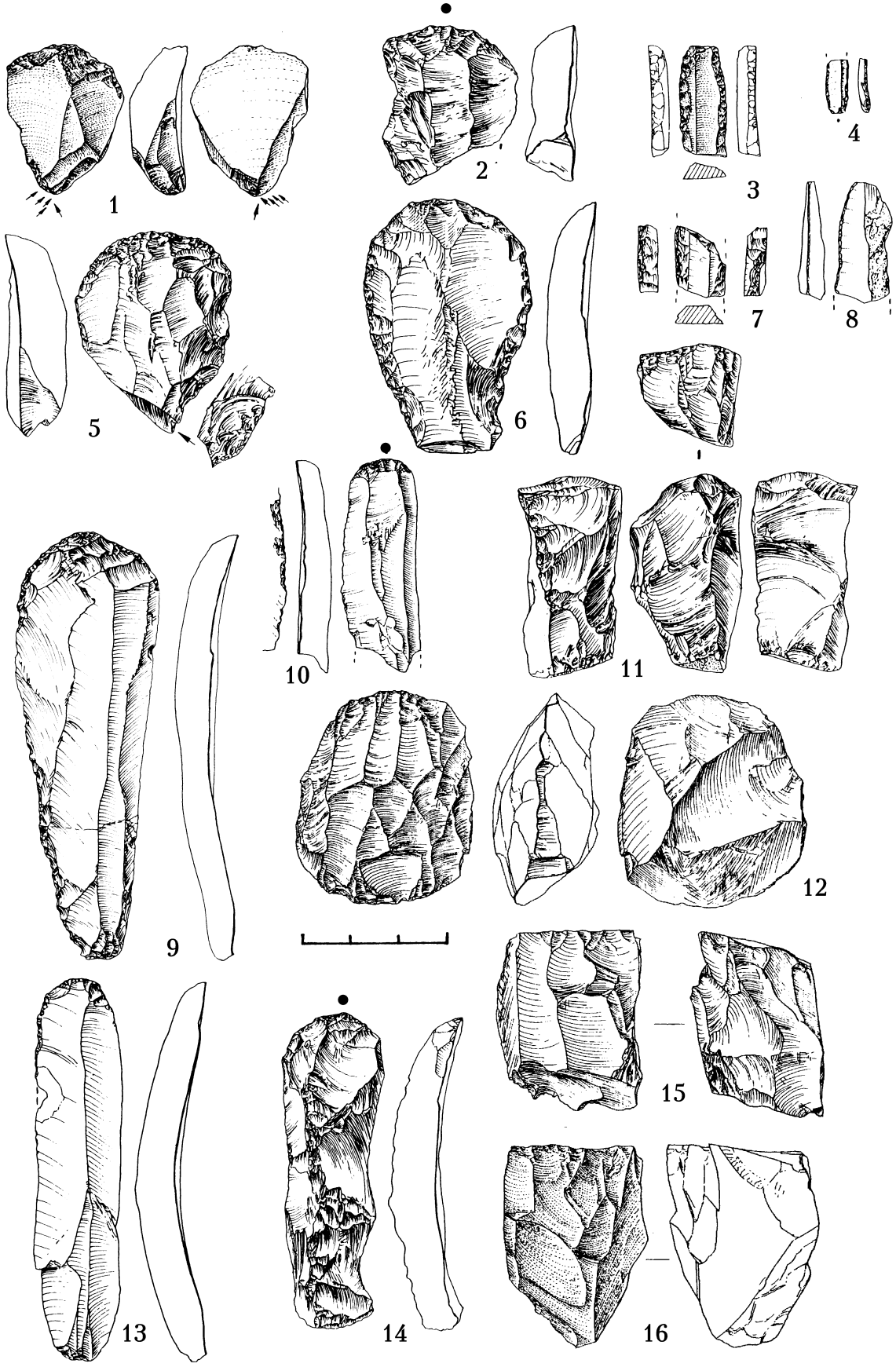

FIGURE 6. Sokirnitsa I-A/ level 3: tools – 1, 5: endscraper-burins; 2, 9, 10, 13, 14: endscrapers on blades; 3, 4, 7, 8: retouched bladelets; 6, 11: endscrapers on flakes. 12, 15, 16: cores.

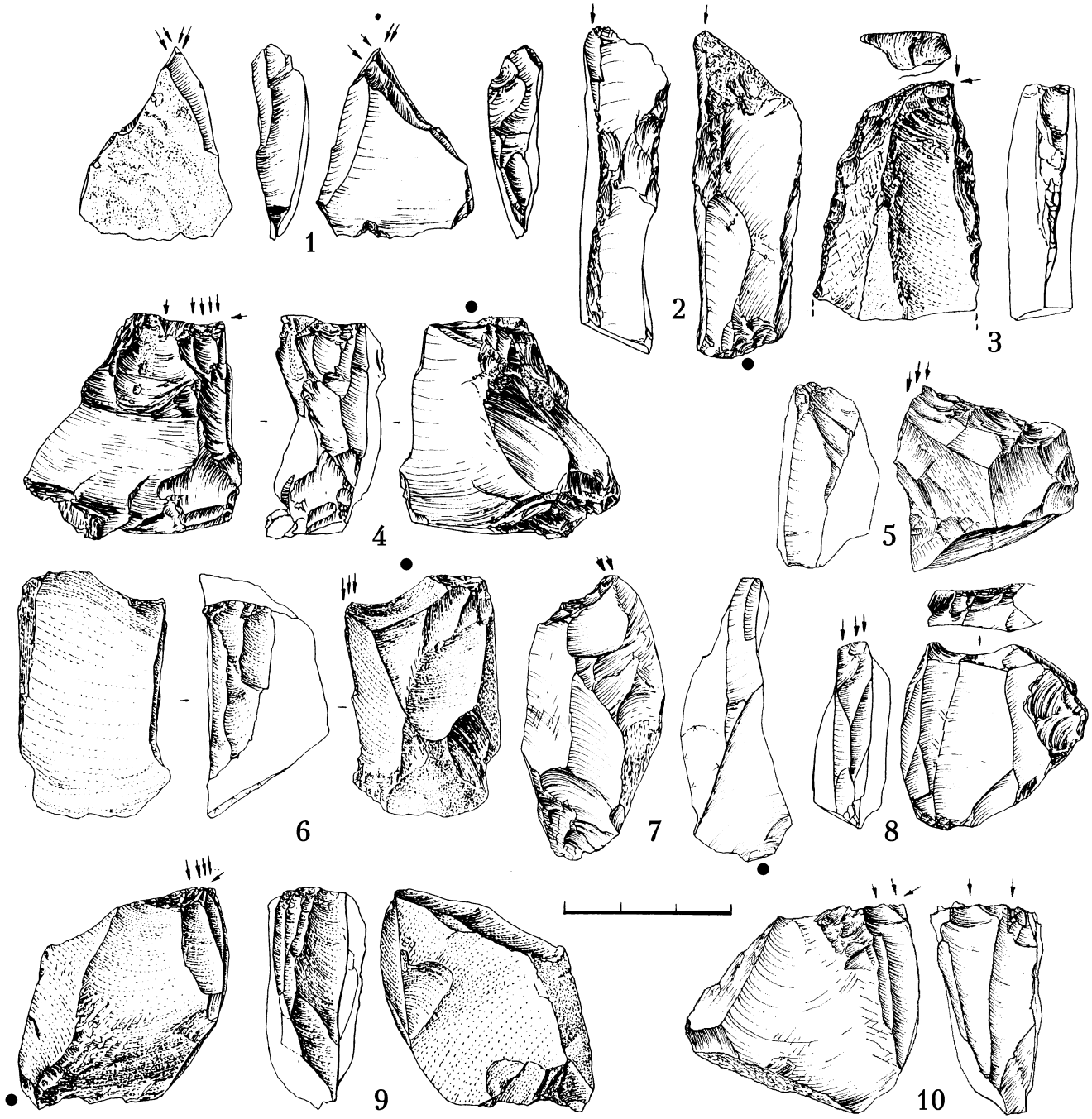

FIGURE 7. Sokirnitsa I-A/ level 3: tools – 1, 3, 4, 9, 10: dihedral burins; 5–8: burins on truncation.

assemblages have been the focus of a number of recent studies (e.g. Bon 2002, Teyssandier 2003, Tsanova, Bordes 2003), all concerned with pinpointing the origin or entry point into western Europe of the Aurignacian. The Aurignacian is a broad technocomplex and obviously variable in time and space, but despite this, it has some techno-typological constants. These are split-based bone points, nosed and carinated endscrapers, busked burins, lamelles Dufour, and blades with Aurignacian retouch as type fossils. Core reduction focused on blade and bladelet production; the former from single platform cores using a "lame à crête" preparation, abrasion, fine faceting, and core tablets as platform management, and soft hammer extraction. Bladelets were produced from thick scraper and burin types and, to a lesser extent, by pyramidal unipolar bladelet cores. The relative uniformity and recognizability of these traits for the Aurignacian *sensu stricto*, along with absolute dating, forms the basis with which to evaluate the proto- or archaic Aurignacian assemblages, and those that appear to date to the transition and Early Upper Paleolithic. Numerous assemblages are now known, however, that do not fit into any of these groups, but which are patently

Upper Paleolithic in technology and typology. This is the case in Transcarpathia for Korolevo I level I-a and Sokirnitsa IA level 3 (39–38 ka BP) and in the Kostenki-Borshevo region of Russia for Kostenki 17 level II and Kostenki 14 level IVb (38–36 ka BP) (Sinitsyn 2000, 2004, Anikovich 2003).

Also referred to as the Spitsyn Culture, the assemblage from Kostienki 17 level II is particularly rich in lithic artifacts as well as in many bone, shell, coral, and stone tools and personal adornments (Boriskovski *et al.* 1982). Cores in the assemblage are restricted to prismatic blade cores and there is no evidence for bladelet reduction from steep scrapers or carinated pieces. Burins are the dominant tool group in the assemblage (48%), comprising types such as burins on oblique truncation, double opposed burins on oblique truncation (parallelograms), dihedral burins and angle burins. Endscrapers only make up about 7% of the toolkit and are usually simple forms on flakes and blades. Pointed blades, retouched blades, "pièces esquillées", and non-geometric microliths round out the lithic assemblage. Despite the richness and variety of the non-lithic portion of the assemblage, there are no split based bone points (Boriskovski *et al.* 1982).

While the assemblages in each region contain specific individual technological and typological features, the Transcarpathian and Kostienki sites share a series of identifying technological and typological attributes. These are: serial blade production from unidirectionally reduced cores using a soft hammer technique, Upper Paleolithic tools, but a lack of those tool types considered typical of the Aurignacian (e.g. steep or nosed endscrapers, Dufour bladelets, Aurignacian blades), no distinctive tool types or varieties that could be considered as "fossiles directeurs", and no "archaic" features such as Middle Paleolithic tool types or bifacial technology.

The term "Aurignacoid Technocomplex" and its criteria offered by Anikovich for Kostienki 17/II (Anikovich 2000, 2003) is a misnomer for the assemblage, as it lacks those traits normally associated with the Aurignacian (see also Sinitsyn 2000, Vishnyatsky, Nehoroshev 2004, Chabai *et al.* 2004). Nor does the assemblage display anything in its technology or typology that might characterize it as an incipient form of the Aurignacian. In fact, rather than being an embryonic form, it appears to be a fully developed Upper Paleolithic industry. This is also the case for Korolevo I Level I-a and Sokirnitsa I A-3. On the other hand, since these assemblages do not contain "peculiar tool types" (Vishnyatsky, Nehoroshev 2004: 87) or *fossiles directeurs* that might determine their "culture", it is, as Vishnyatsky and Nehoroshev (2004: 87) point out, difficult to assign other assemblages to the Spitsynskaya, because it simply resembles a generic, albeit relatively early, Upper Paleolithic culture.

Although these Early Upper Paleolithic assemblages from Kostienki 17/II, Kostienki 14/IVb, Korolevo I/I-a, and Sokirnitsa IA-3 appear to be a unique culture unassimilable to other Middle Pleniglacial industries, it is highly doubtful that it was the product of a single migratory group. Rather, on both the Russian Plain and in Transcarpathia, one may see a foreshadowing of it in the Middle Paleolithic. Middle Paleolithic assemblages are not plentiful on the Russian Plain, nor are they particularly well dated, but at sites such as Kurdomovka, Belokuzminovka layers 2 and 3, and Shlyakh, the presence of Blade Mousterian (Chabai *et al.* 2004) assemblages exclusively utilizing single and bidirectional cores with a convex working surface and cylindrical, semi-cylindrical, and pyramidal in shape for the production of flakes and blades signals the early presence of blade technology in this region. The toolkit for Blade Mousterian sites is fairly simple, with points, simple and double sidescrapers, retouched blades, and truncated-faceted pieces. Backed blades and atypical endscrapers have also been reported from Shlyakh (Vishnyatsky, Nehoroshev 2004). Bifacial technology and tools are absent from this Middle Paleolithic industry.

The situation is similar in Transcarpathia, where this Early Upper Paleolithic does not appear at all intrusive, but instead the product of accretionary changes in core reduction techniques and concomitant shifts in typology. For example, Korolevo II/II represents a typological and technological bridge between the more recent Upper Paleolithic of level Ia and Sokirnitsa I-A/level 3 and the Middle Paleolithic level IIb of Korolevo I.

Suggestions of an autochthonous development between the Middle Paleolithic and Upper Paleolithic at Korolevo have always been based, on the one hand, by the very close technological analysis of the lithic material, aided by the extensive refitting, and, on the other hand, by the presumption that the assemblages were not contemporaneous nor were they very far apart in time based on the stratigraphic relationships among them. The few absolute dates available from Korolevo (see above and Gladilin 1989) say nothing about these relationships. The new radiocarbon dates from Sokirnitsa IA level 3 then, can merely confirm the age of the Vytachiv unit (about which there had been some confusion) as belonging to OIS 3. Based on the relative stratigraphic positions of the three Early Upper Paleolithic Transcarpathian assemblages within and below the paleosol, it appears that their order, from the most recent, is Korolevo I-Ia, Sokirnitsa 1A-3, Korolevo II/II. The Middle Paleolithic Korolevo I level IIB is found deeper in the sequence, immediately above the Pryluky paleosol. While we readily admit that the case for continuity would be more compelling if supported by absolute dating, this is impossible for the Korolevo assemblages, at least at this time. The evidence that we do have to assert continuity is limited then to relative stratigraphic positioning and the characteristics of the lithic assemblages.

The blade technology from bidirectionally reduced cores using a crest preparation seen in Korolevo II/level II (and which is nearly the same technology seen in the "transitional" Bohunician assemblages further west) had its origin in Korolevo I level IIb: a Middle Paleolithic Levallois point (non-elongated) technology using unidirectional

convergent core reduction. Refits in Level IIb (Usik 1989) have demonstrated that in the process of knapping the unidirectional convergent cores, short removals from the distal end of the core were made to correct the configuration of the core's flaking surface. In Level IIb, these distal removals served merely as corrective measures. But, such distal removals could easily have been taken a step further to a fully fledged bidirectional reduction for Levallois points. We believe this was the case and this is how the unidirectional convergent reduction for points (seen in IIb) mutated into a bidirectional reduction for points (seen in the Bohunician) then into a bidirectional reduction for blades (seen in Korolevo II/II).

This change from point production by unidirectional convergent cores into bidirectional cores (still geared to Levallois point production) is characterized by a technique referred to as "Upper Paleolithic, bidirectional (pointed) Levallois blade producing technique" (Demidenko, Usik 1993a: 242). The technique has the following technological features: the use of a "lame à crête" to initialize the core flaking surface, bidirectional parallel reduction of blades to prepare the core's surface for Levallois point removal, and the production of elongated Levallois points as the ultimate goal (Demidenko, Usik 1993a, 1993b). While not present in Transcarpathia, the technique characterizes the Bohunician assemblages found in the Moravian sites of Stránská skála III and IIIa, lower layer, Bohunice, Brno-Líšeň I, and Ondratice, which have been the subject of extensive study, including core reconstructions (e.g. Škrdla 1996, Oliva 1984, Svoboda 1993, Svoboda, Škrdla 1995). This industry is generally thought to date between 43–38 kyr BP and its melding of both Middle Paleolithic and Upper Paleolithic technological traits is widely accepted.

The Bohunician assemblages display some variability in their typological content, but all Bohunician assemblages display technological homogeneity: reduction from opposed platform cores, the use of crested blades to set up the initial flaking surface, blade removals to further prepare the flaking surface, hard hammer percussion, faceting of platforms, and the production of Levallois points as the main goal of core reduction. When viewed in the light of the presumably earlier Korolevo I/IIb (based on it being linked to the Pryluky paleosol, and based on its Middle Paleolithic typological and technological features) the technological shifts as well as the commonalities seem evident: both Korolevo I/IIb and the Bohunician share the goal of producing Levallois points, both use hard hammer percussion, both rely on faceted striking platforms, and both use elongated removals to prepare the surface configuration to remove pointed blanks. The short distal removals used in IIb to correct the flaking surface were instead elongated and used assiduously to prepare the core surface in the Bohunician. Refittings at Korolevo I/II-b (Usik 1989) have demonstrated a consistent practice of removing débordant or lateral naturally crested blades to set up the initial flaking surface; in the Bohunician this was done using a crested blade technique. We do not presume a genetic link between the Moravian and Transcarpathian assemblages, nor do we have any way of refining their relative chronology; but if one does presume that core reduction techniques are mutable over time, it appears more likely that we are dealing with technological change rather than independent invention.

The Bohunician could also be viewed as the link, or transitional stage, to the Upper Paleolithic assemblages using Upper Paleolithic parallel bidirectional core exploitation. Korolevo II/level II shares with the Bohunician the same features of bidirectional reduction, but without Levallois point production. Crest preparation for the core initialisation, striking platform modification with faceting, and the use of a hard hammer were also used in level II. Based on the numerous refittings done for this level, the purported "flat" cores, taken as evidence here and in the Bohunician for a Levallois linéal conception of the core surface (Svoboda, Škrdla 1995, Kozlowski 2000), are merely a stage of reduction, not an archaic remnant or melding of Middle Paleolithic and Upper Paleolithic technologies (Usik 1989). The only technological difference between the Bohunician and level II is that the former used the parallel bidirectional technique for core surface preparation, while the latter used it as a technique of direct reduction. Based on these commonalities, Korolevo II/II could represent a separate Upper Paleolithic industry with traces of Levallois technology (facetted striking platforms) or be an adaptation of the technology seen in the Bohunician: in the absence of more absolute dates or any other concrete links between them, this seems open to question.

The non-Aurignacian, "developed" or "advanced" industries of Level 1a Korolevo and Level 3 of Sokirnitsa I-A, more likely than not chronologically follow the Bohunician and Korolevo II/II. They represent fully Upper Paleolithic lithic assemblages where some of the technological shifts seen in earlier transitional or Middle Paleolithic industries are culminated: the change from bidirectional to unidirectional core exploitation, the use of soft hammer percussion, core tablet platform rejuvenation, and the serial production of gracile blades with lipped platforms.

CONCLUSION

Since their discovery 30 years ago, Korolevo II/II and Korolevo I/Ia have frequently been interpreted as "transitional" like the Bohunician, and transitional industries are often claimed to have disappeared, without issue, by about 36 ka BP (e.g. Kozlowski 2000). In part, this is a question of semantics and whether the Aurignacian is "considered to be the "real" Upper Paleolithic" (Kozlowski 2000: 95). Yet nothing in the conventional definition of Upper Paleolithic restricts the placement of Sokirnitsa IA/3, Korolevo I/Ia, Kostienki 17/II, and Kostienki 14/IVb into this category. These have no specific indicators for what we tend to think of as Middle Paleolithic culture, but when

viewed in the light of assemblages that are immediately antecedent, such as Korolevo II/II, the Bohunician sites, and Korolevo I/IIb, they indicate that there was no abrupt break in lithic strategies, that an allochthonous Upper Paleolithic population did not suddenly appear in Transcarpathia with a new and innovative culture, and that the simplest explanation for the appearance of the Upper Paleolithic here is that it developed in place. What happened afterwards, however, is open to question: whether a different population swept in with an Aurignacian culture or whether the technological shifts documented here continue into something recognizably Aurignacian and therefore homegrown.

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