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PROTO-AURIGNACIAN UNIQUE SITE CLUSTER IN EUROPE

Logistic Settlement Pattern with a Base Camp and a Series of Supply Chain Loci at Raw Material Outcrops in Transcarpathia (Ukraine)*

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The article is dedicated to the good memory of Ladislav 'Laci' Bánesz (1932–2000), who always wanted to see really connected Paleolithic records of Eastern Slovakia and the Ukrainian Transcarpathia.

In the article a group of Berehove and Muzhievo surface find spots situated near in situ Proto-Aurignacian Berehove I site in Transcarpathia (Ukraine) is discussed. The conducted study allow us to take a new look at these loci and their UP lithics. Instead of the before viewed as a group of Middle Aurignacian real sites, the considering actually Proto-Aurignacian loci are now understood as representing a series of various supply chain loci with raw material outcrops, workshops, a site-workshop, and special camps for now Berehove I base camp. All these functionally varying loci and the site situated at raw material outcrops at Berehove Volcanic Shallow Mountain Area do represent a logistic settlement pattern. Accordingly, it is the first case for European Proto-Aurignacian when a complex settlement pattern with a base camp and sites-satellites is recognized for a closely located cluster of loci. Now recognized Proto-Aurignacian site of Tibava in Eastern Slovakia most probably also belongs to Berehove and Muzhievo Proto-Aurignacian site complex.

Keywords: Central Europe, Transcarpathia and Eastern Slovakia, Proto-Aurignacian, raw material outcrops, site cluster, logistic settlement pattern.

INTRODUCTION

Proto-Aurignacian industry type, which term was proposed by *G. Laplace* (e.g. *1966*, 217–229; *1970*) and much later re-introduced again by French colleagues (e.g. *Bon 2002*; *Bordes 2002*; *Teyssandier 2007*; also known among some other names as Périgordian II, Aurignacien à lamelles, Aurignacian 0, Archaic/Primitive Aurignacian, Early Aurignacian of Krems-Dufour industry type – e.g. *Bazile 1983*; *Delporte 1968*; *Demidenko 2000–2001*; *2002*; *Peyrony 1933*; *1936*; *Sonneville-Bordes 1955a*; *1955b*; *1960*), is industrially and chronologically the earliest and initial Aurignacian in Western Eurasia. Geochronologically, it is the only known now Aurignacian industry type in Europe that can be placed into the time period preceding Heinrich Event 4 (HE-4) and Campanian Ignimbrite (CI) eruption, ca. 46 000–40 000 cal BP, GI-12 – GI-9. Such the chronology certainly puts Proto-Aurignacian into European Initial Upper Paleolithic together with Bohunician/Early Emiran, Szeletian, Châtelperronian and Ulizzian. At the same time, there are some data from Italy (Riparo Bombrini site in Liguria, North-Western Italy – *Riel-Salvatore/Negrino 2018*) indicating a possibility that some Proto-Aurignacian artifact bearing tradition humans (*Homo sapiens*) have been able to survive a harsh climate conditions of the HE-4 and CI eruption for a little while. Industrially, Proto-Aurignacian is distinct from other Aurignacian industry types by a clear blade and bladelet debitage character with either a continuous blade and then bladelet reduction within one and the same core reduction system (e.g. *Bon 2002*) or separate blade and blade/bladelet, and bladelet core reductions (e.g. *Demidenko 2012a*, 289, 290).

These technological features are connected to the several presence of blade, blade/bladelet cores and bladelet 'carinated' cores with, at the same time, some occurrence of wide-fronted carinated endscraper – cores, a few nosed/shouldered endscraper – cores and a near-absence of carinated burin-cores, explaining the availability of numerous on-axis and flat and/or slightly incurvate in profile Dufour sub-type bladelets/microblades with alternate and/or ventral retouch. Proto-Aurignacian

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sites are known throughout mainly southern territories in Europe – somewhat above 40° N latitude to around 46° N latitude, from the Iberian Peninsula in the west to North-Western Caucasus in the east (e.g. *Demidenko/Noiret 2012*, 343–352). Some mollusk shell ornaments and various but rather simple types of bone/antler points and awls additionally occur in Proto-Aurignacian assemblages. There is a basic agreement on eastern origin of the European Proto-Aurignacian within Levantine Ahmarian, although there is a variety of opinions on the concrete Ahmarian industry type related to the origin subject with one of the present article's authors preferences in favor of Levantine Aurignacian B/Ksar Akil Phase 4 type (*Demidenko 2012b*, 396–399; *Demidenko/Hauck 2017*). From the chronological point of view, new radiocarbon dates for Ahmarian at Manot Cave (Israel; *Alex et al. 2017*) do strongly support the 'industrial origin roots' of the European Proto-Aurignacian in the East Mediterranean Levant and not *vice versa* way as some colleagues tried to justify before using certainly too young dates for Ahmarian (e.g. *Kadowaki/Omori/Nishiaki 2015*).

All in all, the European Proto-Aurignacian industry type is characterized by a real wealth of numerous data. At the same time, Proto-Aurignacian site settlement pattern variability data are rather limited, being characterized by about exceptional presence of living sites with no known definite, for example, various killing–butchery sites and/or workshops supplementing living sites.

That is indeed one of the major hiatuses in our understanding of Proto-Aurignacian sites, their artifact variability and activities realized by their human groups there.

The present article aims to cover some of the missing settlement pattern data. For this purpose a set of Proto-Aurignacian materials known in Transcarpathia (Ukraine) will be presented to demonstrate a unique for Proto-Aurignacian in Europe a logistic settlement pattern with a base camp supplemented by a series of various loci at raw material outcrops.

TRANSCARPAHIA: A POLITICAL AND GEOGRAPHICAL SETTING OF THE STUDY REGION

Transcarpathian region is the westernmost part of Ukraine. This is a very peculiar Ukrainian region, being the only country's region located not in Eastern Europe as the rest of Ukraine, but in Central Europe. Also, Transcarpathia has one of the known geographical centers of the European Continent, recognized yet in 1887 near Rakhiv town. The region politically belonged to Hungary since early 10th c. when Hungarian tribes settled in the Carpathian Basin of Central Europe. During Hungarian times and later on of the Austro-Hungarian Monarchy, Transcarpathian region was a part of North-Eastern Hungary, comprising parts of its four committees. Geographically, it was also a part of Upper Tisza River region. After the First World War and the collapse of the Austro-Hungarian Monarchy, Transcarpathia became a part of Czechoslovakia as 'Podkarpatská Rus' Autonomous Land region, in 1920–1939. During the Second World War Transcarpathia was again a part of Hungary. Finally, since 1944 the region became part of Ukraine, Soviet Union. Precisely, the name 'Transcarpathia' only originated during first Soviet years in the 1940s due to the geographical position of the region behind the Carpathian Mountains for the position of capital of Soviet Union, Moscow. Since 1991 Transcarpathia is a part of Ukraine, the newly independent state after the disintegration of the USSR.

Such the political history and geographical Central European position of Transcarpathia certainly caused a long-lasting 'multi-cultural' character of many life sides in the region, including scientific investigations that are important for understanding of Paleolithic research too.

Regarding brief geomorphological data, Transcarpathia is located in south-western slopes and foothills of the Eastern Carpathian (Ukrainian Carpathian) Mountains, occupying north-eastern 'corner' of the Carpathian Basin (Fig. 1). It is actually a transitional zone between the Pannonia/Middle Danube Plain and the Eastern Carpathian Mountain Main Range. Also, geologically, Transcarpathia is a chain of intermountain basins of a piedmont deflection and a ridge of various volcanic formations. The most notable features in these so-called Volcanic Carpathians in Transcarpathia were Vihorlat-Gutin Volcanic Range and Berehove Volcanic Shallow Mountain Area. The latter Transcarpathian hilly area will be in the center of the present article's Proto-Aurignacian study and discussion.

TRANSCARPATHIA AND BEREHOVE I PROTO-AURIGNACIAN SITE RESEARCH HISTORY

First Stone Age artifact discoveries in Transcarpathia, at that time in Hungary, were realized yet by a local Hungarian lawyer and district attorney Tivadar Lehoczky (1830–1915), "*the true founder of Podkarpatska Rus Prehistory*" (*Skutil 1938*, 128). Lehoczky's museum in Munkács/Mukacheve town

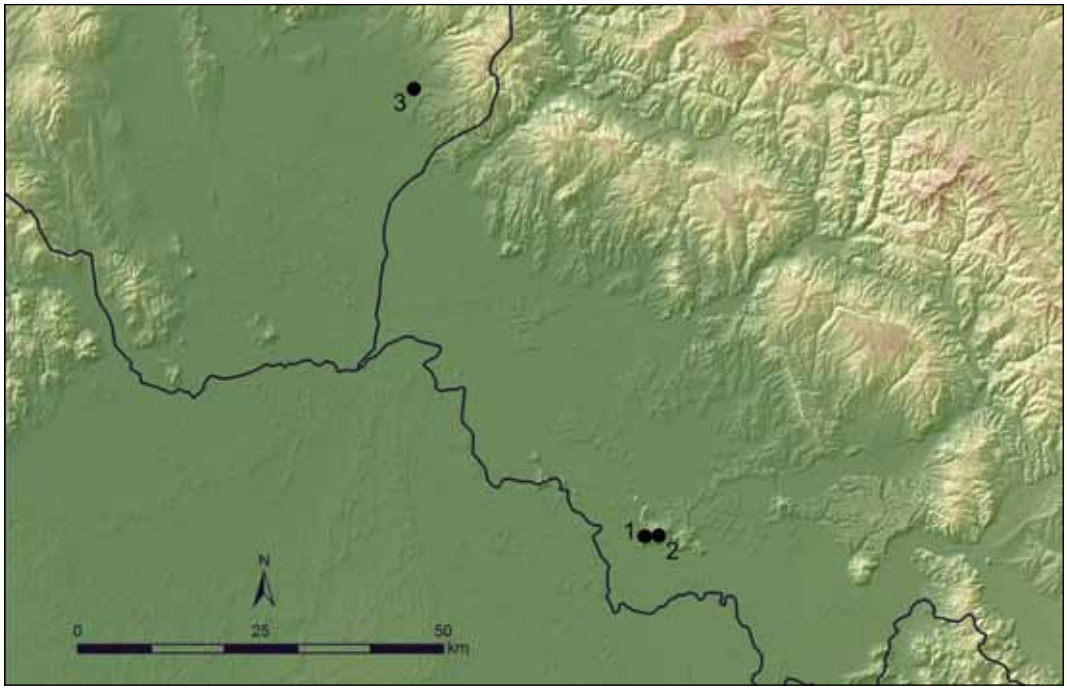

Fig. 1. Location of sites. 1 – Berehove; 2 – Muzhievo; 3 – Tibava.

was the largest private archaeological collection in the Austro-Hungarian Monarchy in the beginning of 20th c. having various archaeological finds from at least Neolithic up to Middle Ages.

However, Paleolithic and particularly Upper Paleolithic (UP) lithic artifacts within the Lehoczky's collection were only properly identified then in 1935 by a Czech archaeologist from Brno Jozef Skutil (1904–1965) for some surface finds from Pálhegy/Pavlova hora near Mukacheve and also for some other lithics collected by a Rusin worker A. Monda in the vicinity of Beregszász/Berehove town and then passed to Lehoczky. It is important to note here that 75 years old retired lawyer Lehoczky collected then recognized first Paleolithic artifacts in Transcarpathia at Pavlova hora in 1906–1908 and that was exactly the time in 1906 when Ottokár Kadić (1876–1957) started first Paleolithic excavations in Hungary at famous now Szeleta Cave. Accordingly, Pavlova hora UP finds in Trasncarpathia also mark the beginning of first Paleolithic research in Hungary.

Moreover, Skutil identified "*first 'in situ' Paleolithic site in Podkarpatska Rus*" in 1935. That was in a rocky quarry at Kishegy/Mala hora loci near Berehove where A. Monda collected lithics before. Skutil visited the quary with Berehove gymnasium Hungarian teacher, geologist and amateur archaeologist V. Jantsky, recognized an *in situ* UP layer within Pleistocene sediments there and described the Kishegy lithic artifacts as a rather primitive Aurignacian, also intriguingly noting the presence of some large-sized (ca. 10 cm long and 5–8 cm wide) items similar to 'hand-axe'/*pěstní klín* tool type (*Skutil 1938*, 133). However, any excavations were not realized then at the site in the 1930s.

The Skutil Paleolithic research was rather limited in Transcarpathia in the 1930s. He moved here for Paleolithic research in the time when Transcarpathia as Podkarpatska Rus was a part of Czechoslovakia. He had been aiming to study Paleolithic *terra incognita* in the east of the country, Paleolithic in Slovakia and Podkarpatska Rus, when some good Paleolithic database had already been established in Czech part of the country. Identifying then several Middle and Upper Paleolithic sites in Slovakia, he understandably concentrated his investigations namely in Slovakia, whereas his work in Podkarpatska Rus was therefore indeed limited for only recognition of some Paleolithic 'signs' and research potential then for this easternmost region in Czechoslovakia.

1969 was the crucial year for Paleolithic research in Soviet Ukrainian Transcarpathia. That year 'Transcarpathian Paleolithic Expedition' was organized in Kyiv by Vladislav N. Gladilin (1935–2015) for a purposeful search of Lower and Middle Paleolithic sites in the region. At the same time, as the only *in situ* known site in the region was the UP Mala hora, it has been decided that a part of the expedition members under direction of Stanislav V. Smirnov will excavate the UP site

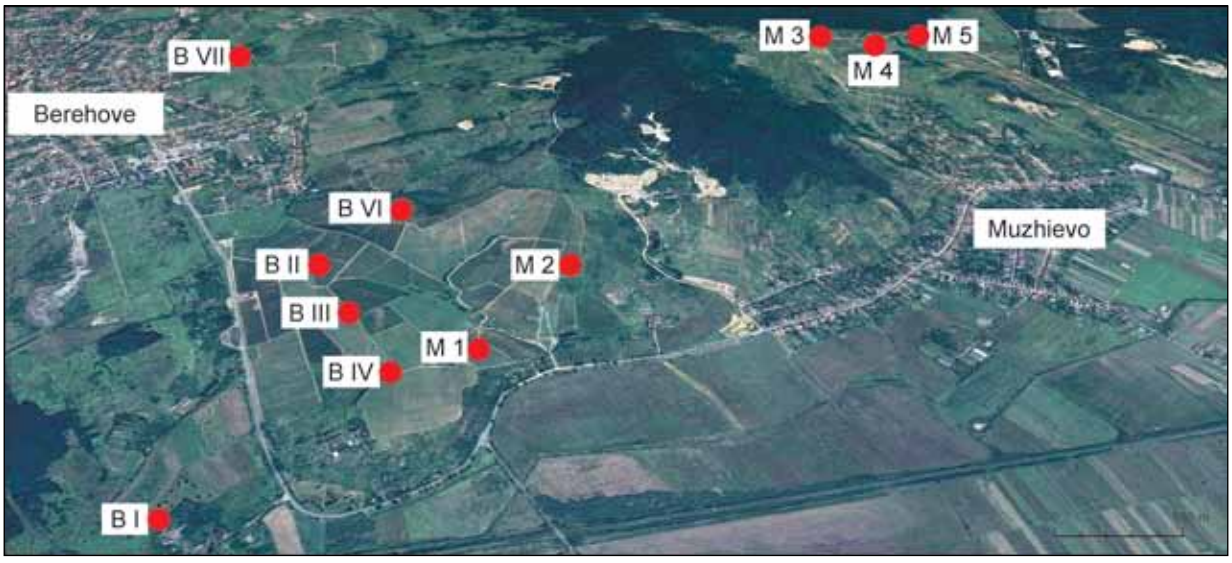

Fig. 2. Berehove shallow mountain area with marked Berehove town and Muzhievo village, Berehove I site (BI), Berehove II–IV, VI, VII (B II–IV, VI, VII) and Muzhievo 1–5 (M1–5) surface find spots.

near Berehove in addition to Gladilin's systematical surveys in various Transcarpathian areas. The site was systematically excavated in 1969 and 1971 for a total area in ca. 240 m^2. Smirnov, like Skutil before, has again attributed the site's lithic artifacts (a little less 1100 pieces in total but no fauna remains have been preserved within the site's sediments) to Aurignacian and namely stated they are "*no less developed than late phase of Eastern Slovakian Aurignacian*" (*Smirnov 1974*, 39). The related Slovakian Aurignacian sites were, first of all, Barca I and II, Seňa I, Tibava and Kechnec (see *Bánesz 1960*; *1961*; *1968*). Thus, since that time the site was usually called 'Beregove I', using english transliteration of Russian Berehove town name (Beregovo), and there were only done then stratigraphy profile cleanings for geological observations in the 1970s–1990s, after the Gladilin's discovery of Korolevo site in 1974 and all subsequent longstanding field investigations at that multi-component Lower Paleolithic through Early UP site complex (*Gladilin 1989*).

Nevertheless, starting from the early 1970s, in addition to the stratified site of Berehove I, a series of surface find spots with no preserved *in situ* archaeological layers (Berehove II–VI, Muzhievo I) with similar to Berehove I site Aurignacian lithics (*Smirnov 1973*; *Tkachenko 1989*; *2003*) were found close to the site at various elevations of western and southern slopes/slope terraces at Berehove shallow mountain area located in between Berehove town and Muzhievo village, covered by numerous vineyards of local vine-making 'Chizay' and 'Côtnar' companies now (Fig. 2). As a result of all the 1960–1990s Berehove area Aurignacian investigations, lithic artifacts of Berehove I site and the nearby surface loci were considered by V. I. Tkachenko (Kyiv) as belonging to 'Beregovo Aurignacian culture' related to Middle Aurignacian in Central Europe (*Tkachenko 1989*; *2003*).

New field studies at Berehove I site were only again realized by V. I. Usik (Kyiv) in 2006–2007. A need for more site research was obvious due to uncertainties of both site geochronology and industrial status of the recovered lithic artifacts. While the Smirnov's early 1970s Berehove I lithic descriptions were underlying some clear Aurignacian types (e.g. *Smirnov 1974*, fig. 1: 3, 4), the later Tkachenko's work, using Gladilin's lithic classification elaborated namely for Lower and Middle Paleolithic artifacts (*Gladilin 1976*), was actually hiding Aurignacian types, why the site's Aurignacian industrial affinity was not really clear then.

Now it is really hard to exaggerate the importance of the realized 2000s Berehove I investigations. Firstly for the site Usik applied wet sieving of artifact bearing sediments during excavations of ca. 8 m^2. As a result, he recovered several Dufour bladelets and microblades of Dufour sub-type bearing mostly alternate and ventral retouch among the sieved micro-debitage items. Usik also was able to refit some lithics connecting artifacts from 1969, 1975, 1990 and 2006–2007 excavation blocks and profile cleanings, proving it was one and the same archaeological layer throughout all the site's excavated areas. Analyzing all recovered Berehove I artifacts (numbering now 13 820 pieces after 1969–2007 works), he also convincingly showed that the site's Aurignacian assemblage belongs not

to Middle Aurignacian but to Proto-Aurignacian (*Usik 2008*).

Some additional excavations with more found lithics and valuable geological observations were additionally done by Usik in collaboration with Ph. Nigst, P. Haesaerts and N. P. Gerasimenko in 2010 and 2012 for another ca. 20 m^2 area at Berehove I. From the geochronological point of view, it was established Last Glacial Interpleniglacial position for the UP layer at the site. Also, a few more details were added to the lithic artifact data features. For example, of a special interest are observations that there was "*bladelet/microblade production from specific cores, including double-platform cores and cores with narrow working surface*" and "*the bladelet/microblade reduction was separated from unidirectional blade production*" (*Usik et al. 2014*, 228). However, the 2010 and 2012 excavation data were only published in two very short articles yet (*Usik et al. 2013*; *2014*). Accordingly, it is hoped to see soon really detailed publications on the new Berehove I studies, although published the 2006–2007 excavation data are still enough detail, understandable and usable.

Used raw material types and lithic artifact techno-typological features for the Berehove I Proto-Aurignacian site can be detected and summarized by us now using the entire site's published data.

Basic raw material types (see below some petrography data for now correct rock names) were local metasomatically transformed tuffs, tuffites and rhyolites added by some pieces on flint, silicified sandstone, siliceous argillite, obsidian and hyalodacite.

Lithic primary treatment processes have been based upon reduction of not numerous at all various cores and endscraper-cores. On-site blade and blade/bladelet reduction is traced through the presence of just some and mainly exhausted single- and double-platform volumetric and semi-volumetric cores, and refitted by Usik blocks of blades and blade/bladelets (Fig. 3), although crested pieces and core tablets (Fig. 3: 1, 2) number only a few pieces. More clearly seen so typical for Proto-Aurignacian so-called bladelet 'carinated' reduction that is well visible on the presence of such reduction objects: some bladelet semi-volumetric cores on nodules, including even bidirectional ones (Fig. 4: 1); carinated (Fig. 4: 2) and thick nosed/shouldered (Fig. 4: 3–5) endscraper-core types where the latter 'narrower' pieces prevail over the former 'wider' specimens. Also, a single found carinated burin-core well corresponds to a near-absence of such carinated bladelet/microblade reduction object type in Proto-Aurignacian. Finally, some specific and namely bladelet wedge-shaped pre-cores and cores occur (Fig. 5: 1–4). The seemingly prevailing and variable on-site bladelet and microblade reductions are still added by a good series of 'imported' to the site Dufour sub-type retouched microliths. The latter microliths were made on still Transcarpathian but not local for the Berehove shallow mountain area black colored siliceous argillite which redeposited pebbles also could be found by Proto-Aurignacian humans in Tisza River alluvium.

Lithic secondary treatment processes can be tracked on the predominance of the above-mentioned Dufour sub-type microliths (Fig. 4: 6–14), the occurrence of some simple endscrapers on both flakes and blades, and simple (non-multifaceted) angle and on truncation burins numerically outnumbering the endscrapers; a few truncated blades and several retouched blades (Fig. 5: 5–7) with no, however, among them of some specimens bearing Aurignacian retouch as was before proposed by Usik (e.g. Fig. 5: 6). Accordingly, by types, the Berehove I tool set can be regarded as representing a typical Proto-Aurugnacian tool-kit.

NEW STUDY APPROACHES FOR SURFACE FIND SPOTS NEAR BEREHOVE I *IN SITU* PROTO-AURIGNACIAN SITE

Raw material type studies: lithic petrography and outcrop data

Alongside with the recent renewed excavations at Berehove I site, one of us (B.R.) also concentrated on new systematic surveys of a series of surface loci near the stratified site since 2007 in order to gain more understanding of rocky types used by UP humans there. This study was initially realized during a PhD. research (*Rácz 2013a*; *2013b*) and since then it still goes on (e.g. *Rácz/Szakmány/Biró 2016*). Namely, the conducted in the PhD petrography study did allow recognition of true raw material types for the known Paleolithic sites in Transcarpathia as, for example, happened to Korolevo site complex 'andesite' that turned out to be in reality a 'hyalodacite'. The previous Paleolithic artifacts on 'quatzite' and 'slate' also became the ones on 'siliceous sandstone' and 'siliceous argillite', respectively. The same 'petrography transformation' happened for Berehove shallow mountain area where local main raw material types were rocks of volcanic origin which have undergone metasomatic processes why these are metasomatically transformed (siliceous, opalised) tuffs, tuffites and rhyolites, instead of the previously and till now non-correctly determined by 'simple archaeologist eyes' as falsely identified flint, chert, siliceous sandstone, silicified tuff, chalcedony and opal.

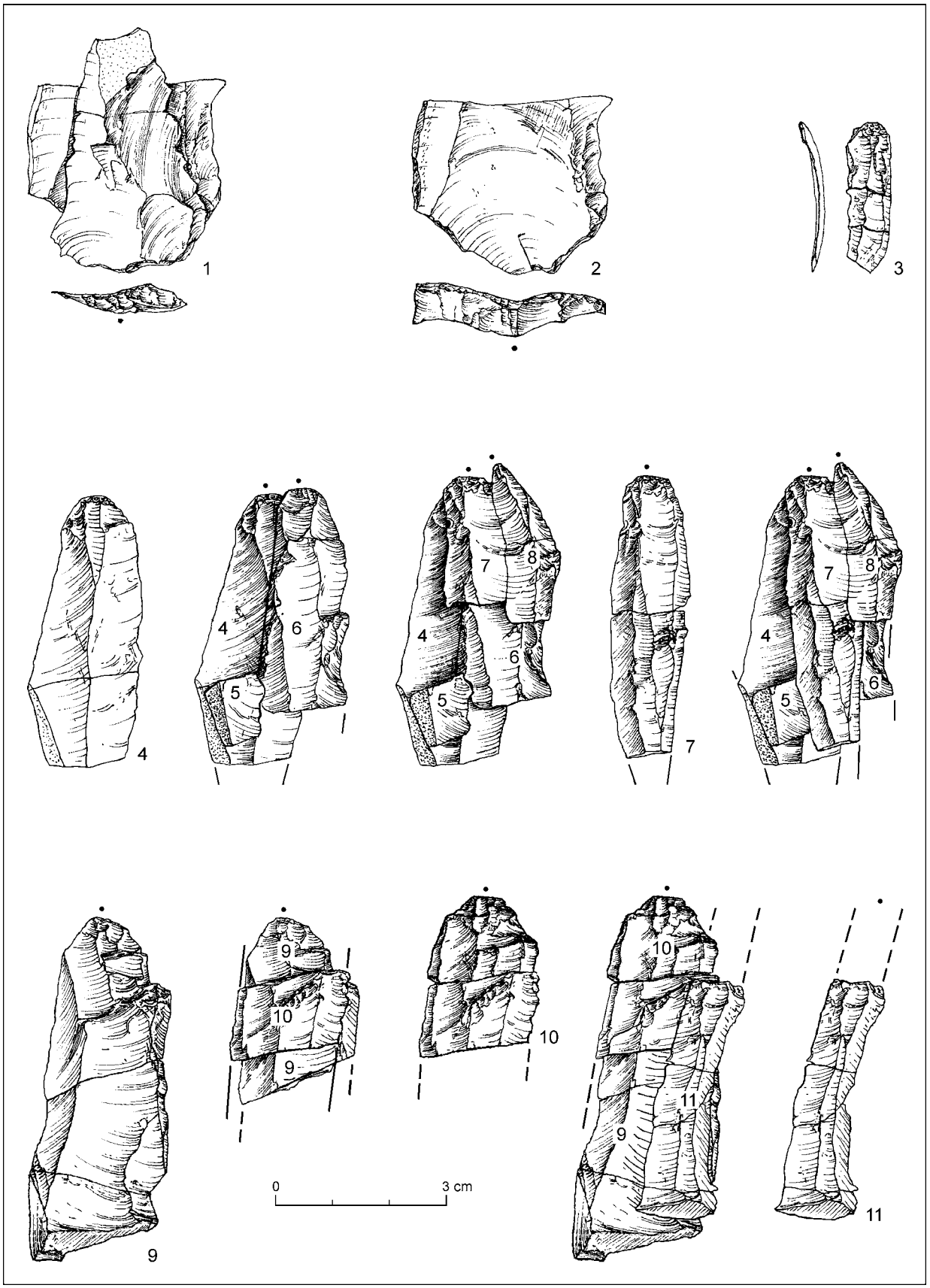

Fig. 3. Berehove I site. 1, 2 – refit of 2 core tablets; 3–11 – conjoins and refits of blades and bladelets (according *Usik 2008*, fig. 5).

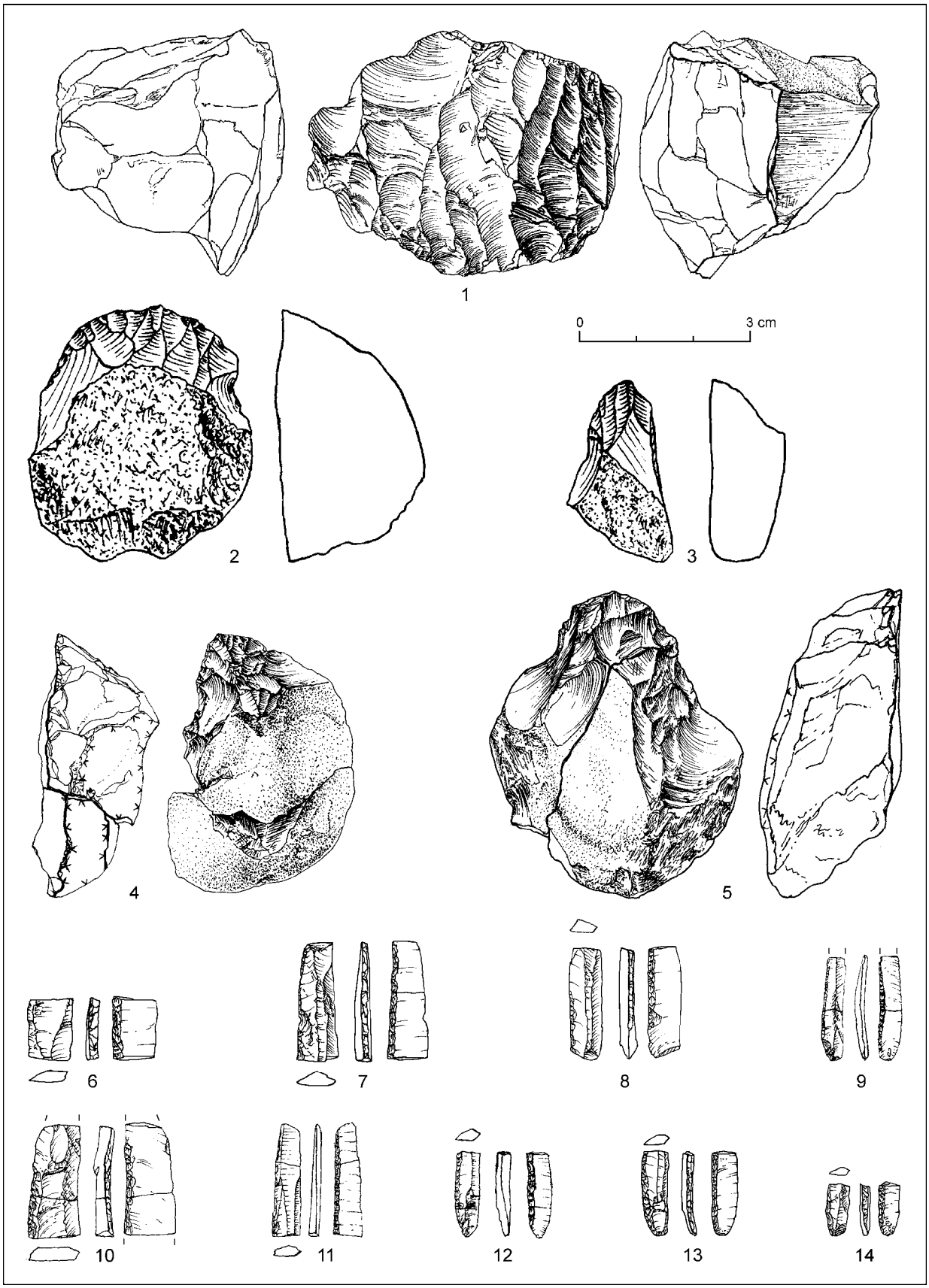

Fig. 4. Berehove I site. 1 – bladelet 'carinated' double-platform core; 2 – carinated endscraper – core; 3–5 – thick nosed/shouldered endscraper – cores; 6–14 – Dufour sub-type microliths (according *Usik 2008*).

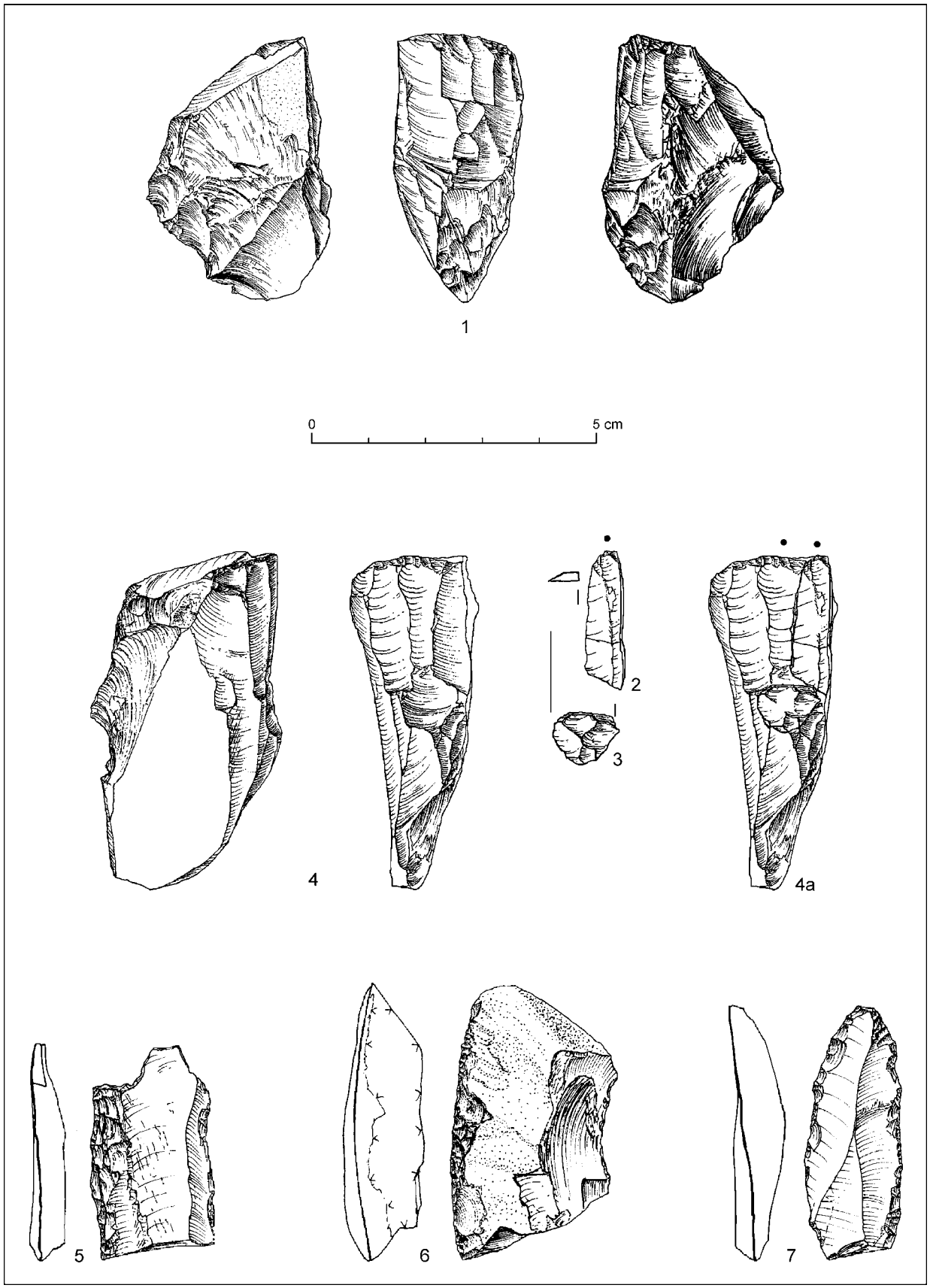

Fig. 5. Berehove I site. 1 – bladelet single-platform unidirectional wedge-shaped core; 2–4 – bladelet single-platform unidirectional wedge-shaped core and refitted to it bladelets; 5–7 – retouched blades (according *Usik 2008*).

Going to some location, outcrop and petrography details, Berehove shallow mountain area and its local raw material types can be summarized as follows. Berehove shallow mountain area has been formed as a result of Late Tertiary volcanism events. Its composing rocks do relate to Lower Sarmatian Dorobratovo Formation. All the Berehove and Muzhievo site and surface find spots are located on the western and southern fringes of the shallow mountain area. The area rises to the west and south ca. 300 m above the wide Tisza River valley lowland with now flowing there small Vérke River. The primary raw material is local volcanic origin acidic rock with metasomatical alteration, having enough good qualities for its reduction by Paleolithic humans. These rocks can be easily collected in great quantity on various spots of the area. They are of conchoidal fracture, highly varied in color and texture. Rhyolite tuffs belong to the above-noted Dorobratovo Formation. Lava rocks are noted close to the surface find spots but they cannot be identified on the surface in the form of outcrops, mainly due to viticulture extended over the hills changing the natural environment. Pieces of the raw material, ranging in shape and size from a few cm to 20–30 cm blocks, angular and plane pieces, can be found in the immediate vicinity of the UP loci as debris. In spite of the macro- and microscopically traced differences for various raw material types, they all belong to the same series of silicified or alunitised tuff or silicified lava rock and may originate from the same outcrop.

Thus, all the discovered Berehove and Muzhievo UP loci are in one way or another situated at raw material outcrops. Their UP human visitors have been understandably using mostly the local tuffs, tuffites and rhyolites, actually 'sitting' right at these rocks. As a result, now it would be reasonably suggesting that at least some of the loci were possibly not real living sites but workshops. The latter possibility was never assumed before when all the loci have been always considering being sites, while the 2000s Usik research was only concentrated on the *in situ* Berehove I site with no paying any attention to the surface find spots' lithic assemblages.

Accordingly, taking into consideration both new Berehove I lithic data and information on the Berehove shallow mountain area's raw material types and outcrops, a novel look at the Berehove and Muzhievo UP surface find spots and their lithic finds is undertaken below.

Berehove and Muzhievo surface find spots and their lithic artifact data

In the 1970s–1990s there were found in total seven surface loci with UP lithic finds near Berehove I *in situ* site, Berehove II–VI and Muzhievo I (*Tkachenko 2003*). Some of them (e.g. Berehove II) had been characterized by numerous finds, almost 2000 pieces, while other loci with just a few finds (e.g. Berehove IV) were of uncertain UP industrial attribution. Conformably, some loci were attributed to 'Beregovo Middle Aurignacian culture' (Berehove II, V, Muzhievo I), whereas the rest of the surface find spots with not many lithic artifacts and a single occurrence in each assemblage of a bifacial leaf point (Berehove III, IV, VI) were thought to be possibly representing an industry "*with some Szeletian component flavor*" (*Tkachenko 2003*, 21).

This century surveys for exploring Berehove shallow mountain area raw material types have brought to light not only new understanding of the real rock types but also have led to finding of both more artifacts at some already known UP loci and a few more newly discovered loci. The latter find spots have been named Muzhievo 2–5 and Berehove VII. Moreover, all Berehove shallow mountain area loci with UP finds, including Berehove I site, have been precisely topographically located using GPS. Using the GPS data, it has been built up a map with all UP Berehove and Muzhievo site and find spot locations (Fig. 2). The only exception is Berehove V, which position is not possible recognizing in a terrain yet. Here it is also important to underline this century's lithic material collecting method at the new and previously known loci. As it was done by one of us (B.R.), the geologist-petrographer having no real good knowledge in Paleolithic artifact precise recognition among also present natural rocks with no human treatment traces, there was actually a collecting process of 'everything lithic' occurring at these loci. It resulted in a specific character of the newly collected assemblages with both natural and human-modified lithics, while the previously 1970s–1990s collected lithic assemblages were gathered by professional Paleolithic archaeologists why containing just real artifacts. During the new lithic assemblage analysis such the 'geologist way' received collections have been understood as being more actually informative in comparison to the previous ones, having additional some direct information on raw material outcrops. One more notion deserves a special attention and it is an industrial/epochal homogeneity of the Berehove/Muzhievo lithic collections, remembering very often archaeologically mixed character of collected on a surface artifacts. The particular Berehove shallow mountain area artifact collections happen to be really striking in this regard. All analyzed this century's collections do contain only UP and namely Proto-Aurignacian artifacts with additionally some Late Neolithic–Bronze Age and then Middle Ages

lithic and pottery pieces, which was not difficult to separate from the UP items. Thus, concerning the Paleolithic time period, the collected and studied assemblages are really homogeneous, allowing us their use for some variable studies.

Our studies have been particularly restricted to this century's materials from the following surface find spots: Berehove II, VI and VII, and Muzhievo 1–5. Briefly, lithic finds of all the loci can be summarized as follows.

Muzhievo 4–5 loci do represent real raw material outcrops with a few and still only questionable artifacts that cannot, however, be identified as absolutely real debitage pieces being perhaps again natural tuff, tuffit and rhyolite particles. These two raw material outcrops with also Muzhievo 3 loci are also notable by the highest elevations for the known loci at Berehove shallow mountain area: Muzhievo 4, at 245 m a.s.l. and 133 m above Tisza River valley; Muzhievo 5, at 200 m a.s.l. and 88 m above Tisza River valley.

Muzhievo 3 loci (at 255 m a.s.l. and 143 m above Tisza River valley) is characterized by less than 5% of all gathered lithics that can be recognized as lithic artifacts. Other much more numerous lithic specimens are unworked raw material pieces. At the same time, the artifacts, just connected to some limited core reduction processes, are of only UP character and possibly of Proto-Aurignacian industrial affinity. Although debitage pieces are again of dubious character, there are definitely recognized two pre-cores, one blade/bladelet single-platform orthogonal core, one core fragment, two burin-cores. These finds testify only some sporadic and occasional visits of Proto-Aurignacian humans of the locality that was again a raw material outcrop.

In total, the three Muzhievo loci are just raw material outcrops and only one of them, Muzhievo 3, evidences very limited (just testing?) core reduction processes performed by Proto-Aurignacian humans there. Probably, it can be explained by the highest elevations of the outcrops and also the farthest their positions in relation to Tisza River valley, whereas other known Muzhievo and Berehove loci are located topographically lower and closer to the river valley. At the same time, no found tools at Muzhievo 3–5 once again indicate very limited raw material exploitation actions at the loci.

Muzhievo 2 locality's (at 174 m a.s.l. and 62 m above Tisza River valley) lithic samples are composed of two assemblages. One assemblage was systematically collected in 2007–2012 by one of us (B.R.), while another assemblage is result of a survey at the loci in 2004 by Josyp B. Kobal', the known Prehistory archaeologist from Uzhgorod, being at that time a lecturer in Berehove at Transcarpathian Hungarian Institute. The 2007–2012 UP assemblage (18 pieces) contains a hard hammer on siliceous sandstone pebble, six pre-cores, two specific wedge-shaped initial blade and blade/bladelet pre-cores, four core fragments and five flakes. Other finds numbering 193 items (91.5%) are just unworked raw material pieces. The 2004 UP assemblage (33 pieces), although Late Neolithic–Bronze Age lithic and pottery pieces do dominate for the entire collection gathered by Kobal', represents one specific wedge-shaped pre-core, one blade single-platform unidirectional narrow-flaked core, four blade/bladelet single platform unidirectional cores and two of them are narrow-flaked ones, one core fragment, one complete core tablet on a flake and two fragmented core trimming elements, one blade and 22 flakes. As the 2004 collection was gathered by a professional archaeologist, there are only 12 unworked raw material items there.

The above-represented lithic data allow us making the following considerations. The Muzhievo 2 locality again represents a raw material outcrop sporadically visited by not just possibly Proto-Aurignacian people, like Muzhievo 3–5 loci, but Proto-Aurignacians definitely have been there due to the indicative presence of both wedge-shaped pre-cores and blade and blade/bladelet single-platform unidirectional narrow-flaked cores (flaked wedge-shaped pre-cores then), representing the already well-known core reduction method at Berehove I *in situ* site. At the same time, the absence of any tools again says about only some exclusive core preparations and reductions there, showing initial workshop characteristics.

Muzhievo 1 loci (at 141 m a.s.l. and 29 m above Tisza River valley) and its UP assemblage, aside of eight unworked raw material pieces, does represents an appearance of 130 lithic specimens. By artifact categories, they are as follows:

– core reduction objects – 20;
– core maintenance products – 10;
– debitage – 60;
– tools – 3;
– debris – 37.

Each of the five categories is separately described below.

Core reduction objects – 20.

These are one tested raw material piece, ten pre-cores and nine cores.

Of the pre-cores, three specimens (1 complete and 2 fragmented – Fig. 6: 1–3) are specific wedge-shaped items, six pieces are just 'initial cores' and

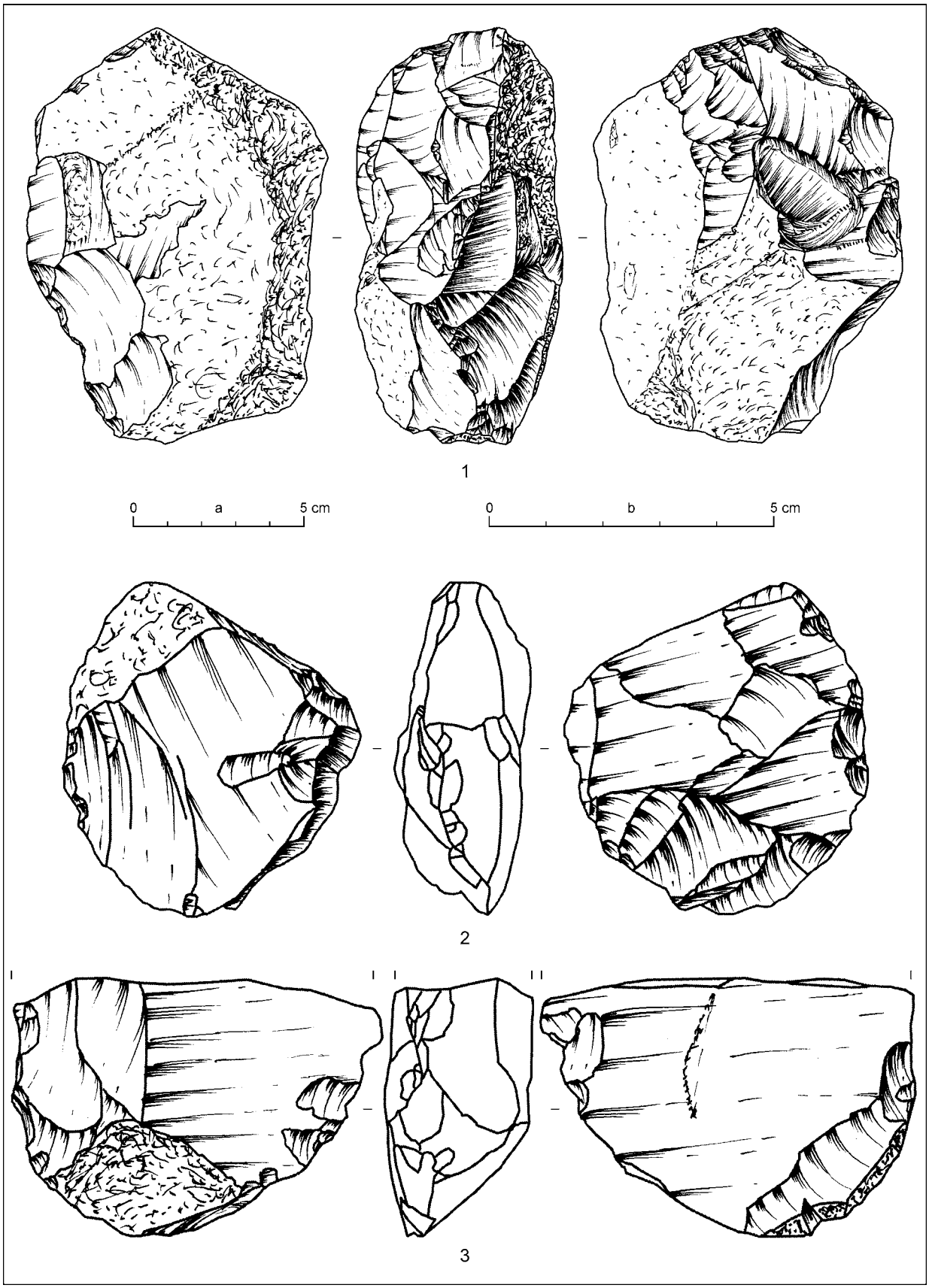

Fig. 6. Muzhievo I workshop. Wedge-shaped pre-cores. Scale: a – 1; b – 2, 3.

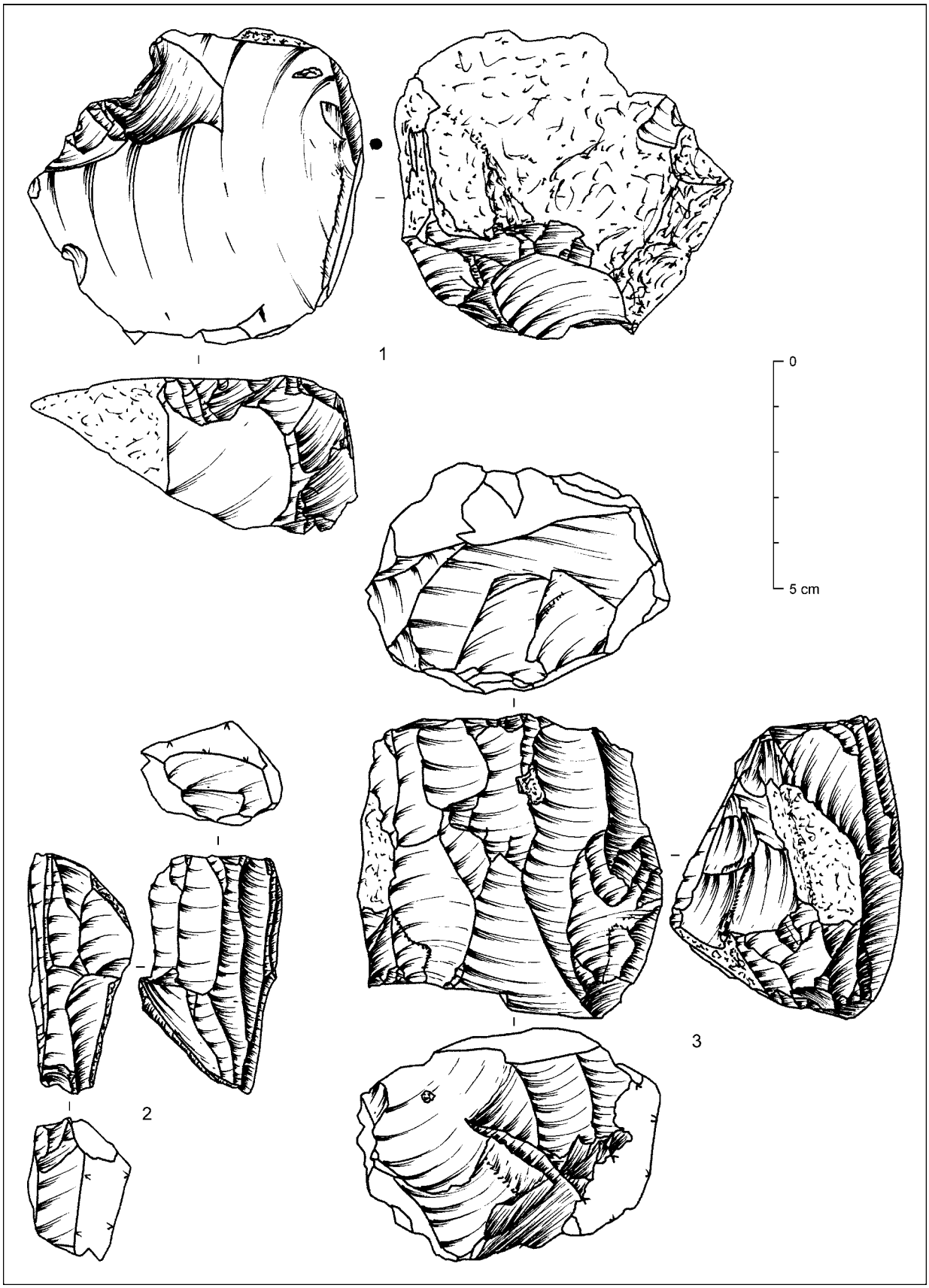

Fig. 7. Muzhievo I workshop. 1 – technological preform of a carinated endscraper – core; 2, 3 – blade/bladelet double-platform bidirectional cores.

the last piece is a peculiar item on a thick flake being a technological preform of a carinated endscraper – core (Fig. 7: 1).

Nine cores are one flake/blade single-platform core of an initial reduction phase, three blade/bladelet double-platform bidirectional cores (Fig. 7: 2, 3), one flake/bladelet double-platform bidirectional core, and four core fragments. Of interest are the four bidirectional cores that are, however, not with true bidirectional flaking demonstrating instead exploiting one striking platform after another for the cores reductions being, therefore, technologically, so-called 'double single platform cores with just one flaking surface'. Such technological peculiarities indicate some intensity of these cores' reduction processes.

The core-like pieces are technologically connected to ten core maintenance products/CMP (4 core tablets on flakes, 2 fragmented core trimming elements, 3 crested flakes, 1 crested blade). It is worth noting that two core tablets could be related to a wide-fronted carinated endscraper – core reduction, although the absence of any lateral/fronto-lateral carinated endscraper – core maintenance flakes evidences no intensity of carinated piece reduction at the loci. Accordingly, there are data for suggesting some initial preparation (specific preform formations on thick flakes) and then some reduction of carinated endscraper-cores at Muzhievo 1 ending with some possible 'export' of the already reduced to some extent such endscraper – cores somewhere else. At the same time, the absence of secondary crested pieces indeed demonstrates no systematical blade core reductions at the loci why it is also possible that many pre-cores and cores were taken to other localities.

60 debitage specimens are represented by a single bladelet, 12 blades (3 with some cortex), 47 flakes (including 5 primary and 15 partially-cortical items). The single and moreover fragmented bladelet hardly found on a large-scale plowing surface of a vineyard allows us, in addition to bladelet reduction core-like piece data, to say about some definite bladelet reduction at the loci. Blades mainly evidence only initial blade and blade/bladelet core reduction. Numerous flakes served for core-like piece preparation. Two present 'Janus/Kombewa' flakes also point out a use of a hard hammer technique during initial core flaking. Two still Transcarpathian but not local for Berehove shallow mountain area flakes on silicified sandstone and siliceous argillite (such non-local for the area raw material types were not recognized for Muzhievo 2–5 localities) add an additional raw material 'tone' for the discussing Muzhievo 1 UP assemblage.

The only three found tools are just retouched pieces, flakes with a marginal and/or irregular retouch. Accordingly, the tool data indicate either a very limited (*ad hoc*) tool use or no tool appearance for the loci at all, taking into consideration a possibility that the three items could be just damaged pieces during their redeposition.

Finally, the recognized 37 debris items are composed of five chips and 32 uncharacteristic (too fragmented) debitage pieces.

One more additional thing deserves to be mentioned about the Muzhievo 1 this century collection is the absence of any burnt lithic artifacts that can be associated with UP occupation(s) of the loci. It is also the true for all the above-discussed Muzhievo 2–5 loci.

Summarizing the Muzhievo 1 UP lithics, we can make the following conclusions. This locality represents not just rare human visits with very restricted lithic treatment actions on mainly rock testing as at it was already observed for Muzhievo 2 and especially Muzhievo 3–5 but it really demonstrates primary flaking data coming from a real workshop. There are seen several both prepared wedge-shaped pre-cores and some initial reduction cores, and associated with them CMP, blades and flakes; some intensively flaked blade/bladelet and flake/bladelet bidirectional cores; some indications on carinated endscraper – core separate bladelet/microblade reduction. Also, the near-absence of tools and any burnt lithics once again confirm a workshop character for the discussing locality. It is also worth noting the Muzhievo 1 lower topographical position in comparison to the elevations of Muzhievo 2–5 loci. Finally, the only found eight unworked raw material pieces at Muzhievo 1 deserve some attention. Comparing their quantity to the UP lithic artifacts (130 items), it is seen the presence of just 5.8% of the unworked items for the entire collection in 138 specimens that is different from the respective data known for Muzhievo 2–5 localities.

As a result of all the listed data and considerations, it is possible to suppose that the particular Muzhievo 1 loci was not strictly speaking a raw material outcrop place but has been rather serving as a workshop where some already tested raw material pieces and prepared pre-cores have been brought from localities like Muzhievo 2–5 for further preparation and reduction. Moreover, all the available data also allowing a suggestion on an 'export' from Muzhievo 1 then of some wedge-shaped pre-cores, only initially flaked blade cores, several blades and bladelets themselves due to the intensive reduction of some blade/bladelet bidirectional cores, as well as of some carinated endscraper – cores and their preforms.

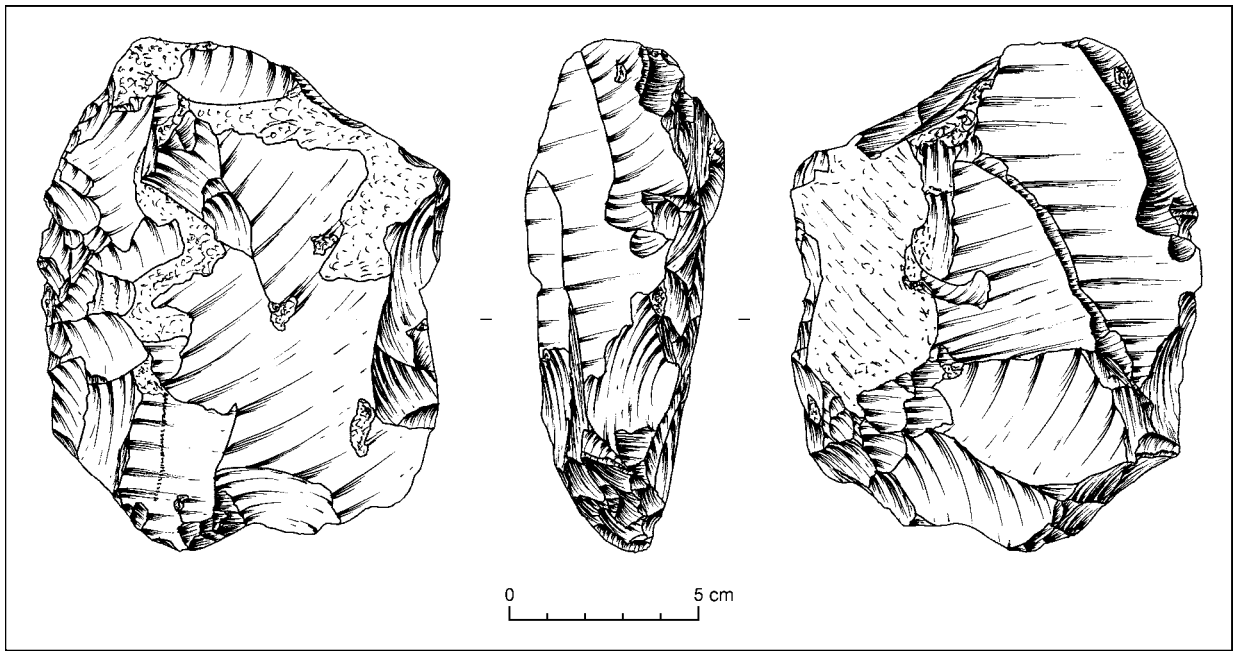

Fig. 8. Berehove II site-workshop. Wedge-shaped pre-core.

Berehove II loci (at 174 m a.s.l. and 62 m above Tisza River valley) demonstrates for this century collection the occurrence of 222 UP lithic finds and 33 unworked raw material pieces. The artifacts can be listed in such the order below:

- core reduction objects – 33;
- core maintenance products – 19;
- debitage – 94;
- tools – 13;
- waste from production and rejuvenation of tools – 1;
- debris – 62.

Pieces of the six artifact categories are analyzed as follows.

Core reduction objects (33) are composed of six tested raw material pieces, six pre-cores and 21 cores.

The pre-cores are represented by one initially flaked specimen, four specific wedge-shaped items (Fig. 8: 1; 9: 1, 2) and one technological preform of a carinated endscraper – core (Fig. 10: 1).

Cores are technologically and morphologically variable. There are recognized four flake cores: two of them being radial ovoid ones (Fig. 10: 2, 3) when also one piece is on siliceous argillite (Fig. 10: 3), and two other flake specimens are multi-platform cubical ones with one of them on hyalodacite; two blade double-platform bidirectional cores being still on an initial reduction stage; one blade/bladelet single-platform core; eight bladelet cores of the following types: one double-platform orthogonal, one multi-platform cubical, one truncated-faceted-like piece on a flake; one thick nosed endscraper-core; four bladelet fragmented cores; and, finally, six core fragments. Thus, the Berehove II core variability is similar to the respective Muzhievo 1 data, although it is really worth noting some newly appeared types like flake cores, bladelet truncated-faceted-like and thick nosed endscraper cores, as well as really more intensive character of the bladelet cores.

19 CMP are subdivided into the following type pieces: three core tablets on flakes; three fragmented core trimming elements; two crested and namely re-crested flakes; seven crested blades (6 initial and 1 re-crested items); one initial crested bladelets; three lateral/fronto-lateral carinated endscraper – core maintenance flakes. They allow us to say on a peculiar initial reduction of blade and blade/bladelet cores at the site through the presence of both initial and re-crested pieces, although the absence of secondary crested pieces demonstrates no deep crest preparation on pre-cores, why removing a crested piece then did not leave any crested treatment lower negatives on cores' flaking surfaces; the fact of presence of lateral/fronto-lateral carinated endscraper – core maintenance flakes, which are very characteristic technological elements for flaking surface rejuvenation of carinated endscraper – cores, evidences some on-site intensive carinated piece reduction; like in Muzhievo 1, the absence of core tablets on blades and bladelets indicates no carinated burin-core reduction.

94 debitage item set is composed of 28 blades (1 primary, 5 partially-cortical and 22 non-cortical

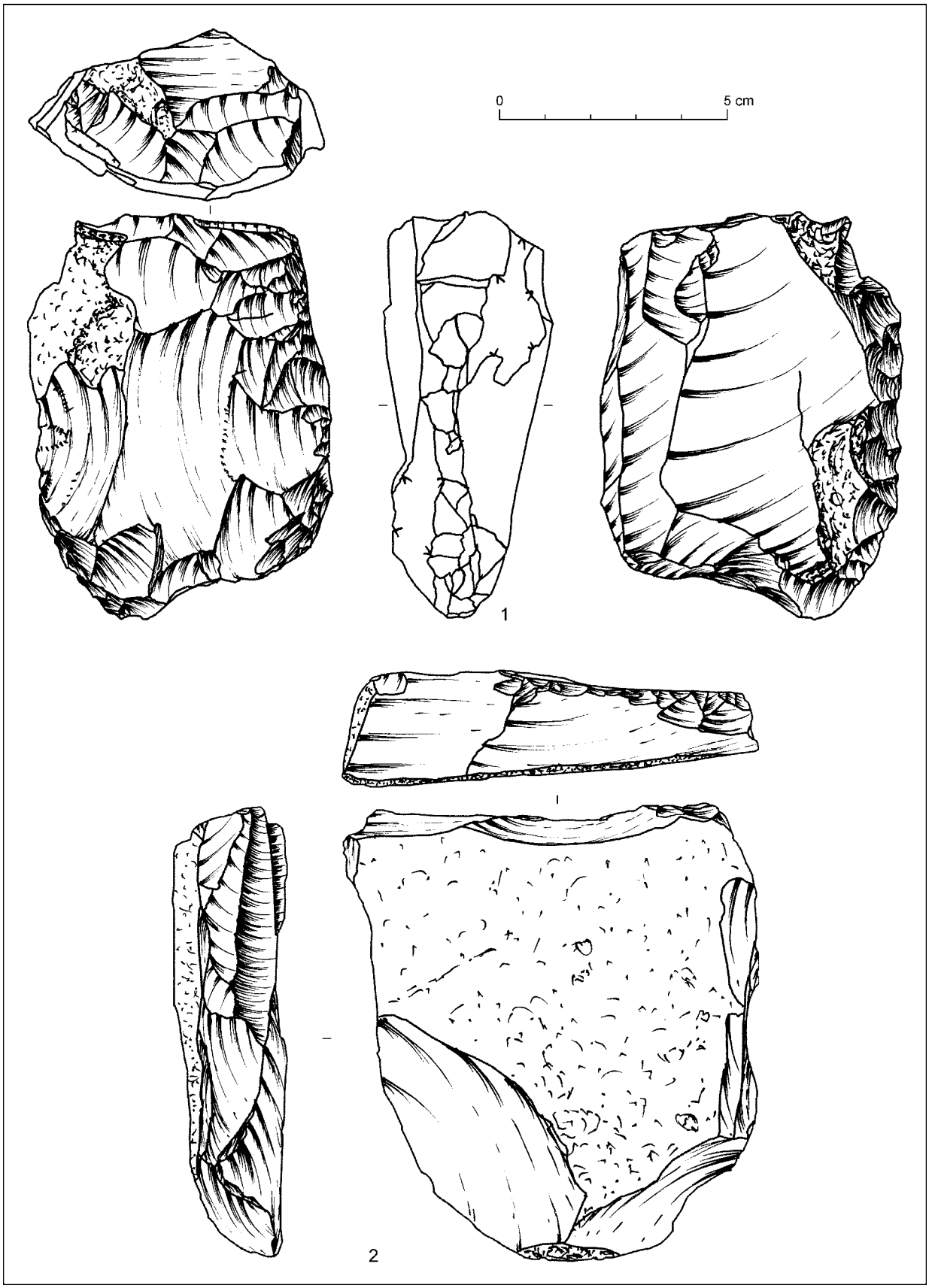

Fig. 9. Berehove II site-workshop. Wedge-shaped pre-cores.

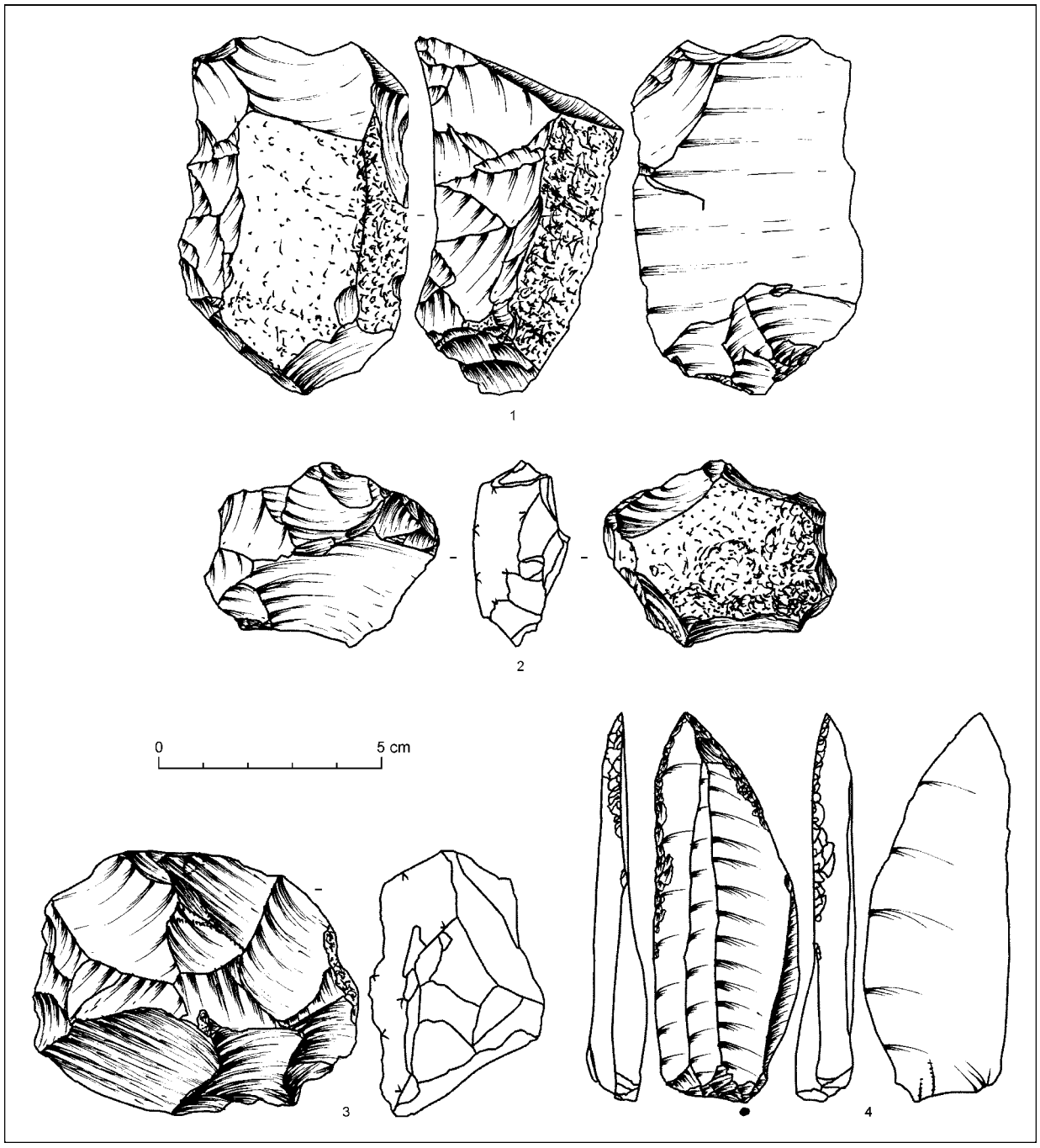

Fig. 10. Berehove II site-workshop. 1 – technological preform of a carinated endscraper-core; 2, 3 – flake radial ovoid cores; 4 – pointed blade.

items), five bladelets (1 partially-cortical and 4 non-cortical ones), 61 flakes (12 primary, 26 partially-cortical and 23 non-cortical specimens). Shortly, the debitage data permit us such the considerations. The flake data indicate the most cases of their removal during a decortification and initial preparation of core surfaces. Like in Muzhievo 1, a single recognized 'Janus/Kombewa' flake witness a hard hammer use during core preparation processes. Blades, mostly detached by a soft hammer, indicate a rather intensive 'target' blade and even more often blade/bladelet primary reduction actions. The few bladelets (butts of 3 complete and 2 proximal parts show a soft hammer application technique), which presence is valuable in themselves, still, most likely, indicate their detachment from blade/bladelet cores, while a thick nosed endscraper-core and lateral/fronto-lateral carinated endscraper – core mainte-

nance flakes have to be technologically associated with microblades that are, unfortunately, objectively missing in the discussing surface collection.

13 recognized tools are the following classes and types: two endscrapers (a simple one on a non-cortical fragmented uncharacteristic debitage piece and an ogival one on a non-cortical complete flake); two true burins with very narrow burin spall removal negatives (an angle one on a non-cortical flake fragment and a dihedral one on a non-cortical fragmented uncharacteristic debitage piece); one pointed blade (a non-cortical complete blade with a soft hammer flaked butt, 8.4 cm long, 3.2 cm wide and 0.9 cm thick), which distal part was convergently treated by a scalar and semi-steep bilateral dorsal retouch from ca. middle length of the of the blade's lateral edges why the tool can also be classified as a terminal point (Fig. 10: 4); four retouched blades (non-cortical 2 complete and 2 distal parts where one complete item is an initial crested piece) bearing various modifications of scalar dorsal retouch; four non-cortical retouched pieces (1 complete flake, 1 complete blade and 2 fragmented blades) with a marginal and/or irregular retouch.

The single waste from production and rejuvenation of tools is a primary burin spall with a crest detached from a burin on truncation.

The above-described tool set, not forgetting objective reasons for *Dufour lamelles* absence, well corresponds to Berehove I Proto-Aurignacian tools.

62 debris items are three chips, 51 uncharacteristic (too fragmented) debitage pieces and eight heavily burnt pieces.

Summing up the above-represented Berehove II lithic artifact set discovered this century, there are seen some clear differences between the discussing assemblage and all the Muzhievo 1–5 loci lithics. Berehove II can be considered as a one more locality where Proto-Aurignacian humans have been bringing some already tested raw material pieces, prepared pre-cores, especially including the wedge-shaped ones, and only initially flaked blade and blade/bladelet cores from so-called 'primary workshops' like Muzhievo 1 and 2. The brought lithic pieces were more intensively primary treated then at Berehove II for both preparing more pre-cores and initial cores, and getting several 'target products', blades and bladelets. Accordingly, some of the pre-cores, cores and debitage pieces have been already processed at Berehove II, including some tool preparation and probably on-site use and even rejuvenation, not forgetting here the found burin spall. At the same time, the traced not really deep reduction of some cores might also indicate an 'export' of such sort reduction objects somewhere else. Also, the occurrence of a series of definite flake cores at Berehove II allows us to suggest the on-site 'targeted' primary production of thick flakes used then at the locality as debitage blanks for carinated and shouldered/nosed endscraper-core preparation/re-preparation and some reduction as both a thick nosed endscraper-core and lateral/fronto-lateral carinated endscraper – core maintenance flakes witness. However, the presence of four flake cores and a single thick nosed endscraper – core in the considering assemblage again permits us one more 'export supposition' on thick flakes transfer to other loci for a carinated reduction there. Finally, the presence of the heavily burnt eight lithics on local raw materials still indicates a fireplace/hearth functioning at Berehove II loci and this is not a workshop feature at all, although 33 unworked raw material pieces (12.9% of all collected this century lithics at the loci) do not allow us to forget that Proto-Aurignacian humans have been again 'sitting' at a raw material outcrop place.

Thus, by its lithic artifacts, Berehove II loci, still combining some of the Muzhievo workshop features, do also demonstrate some living site data. Such the Berehove II lithic data settlement feature combination leaves us no other solution than to consider the particular locality a site-workshop, probably representing a sort of transshipment camp between workshops and a base camp. Adding here the loci's elevation data (174 m a.s.l. and 62 m above Tisza River valley), it is also seen that Berehove II is comparable to Muzhievo 1 and 2 workshops, being, however, closer to Tisza River valley by its location. Here it is interesting to note that topographically, Muzhievo and Berehove loci are situated at two different slopes of the Berehove shallow mountain area, with Muzhievo loci at southern slopes and Berehove loci at western slopes.

There are, however, two more localities, which lithics do not fit into the above-represented UP/Proto-Aurignacian variability and loci use.

Berehove VI and VII are these surface find spots. While Berehove VI (at 170 m a.s.l. and 58 m above Tisza River valley) loci was found yet in 1984 by Tkachenko, Berehove VII spot (at 140 m a.s.l. and 28 m above Tisza River valley) was recently discovered in 2019 by one of us (B.R). Being located at different elevations of the shallow mountain area western slopes, the two loci are characterized by strikingly similar artifacts. First of all, the found this century lithic assemblages are not numerous (less than 100 lithics for each collection) and archaeologically clearly heterogeneous, representing pieces starting from UP Proto-Aurignacian to Late Neolithic–Bronze Age and up to Middle

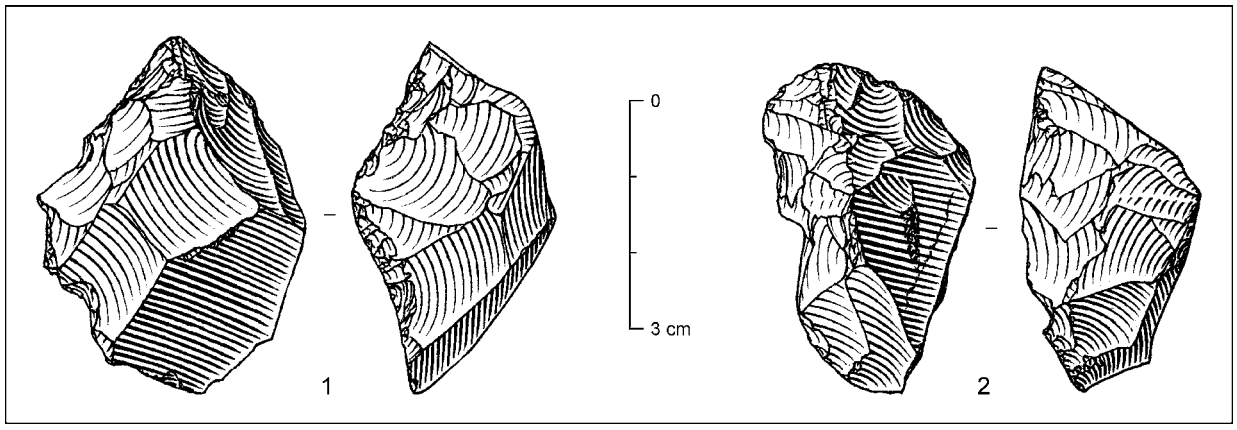

Fig. 11. Berehove VII special camp. Thick shouldered endscraper-cores.

Ages and Modern Times. Second, the selected then Proto-Aurignacian pieces are again similar. Both collections do not evidence any systematic 'regular' pre-core preparation/core reduction processes with no core-like pieces at Berehove VI and the presence of a single flake/blade multi-platform core at Berehove VII. At the same time, there are series of tools *sensu stricto* and carinated pieces at the both loci. Berehove VI is characterized by the occurrence of a simple endscraper on a complete primary flake, a double burin (dihedral symmetrical and on concave truncation combination), a retouched blade with a bilateral dorsal partial scalar retouch, and, finally a wide-fronted carinated endscraper – core with several lamellar removal negatives on a complete non-cortical thick flake. Berehove VII features the presence of three simple endscrapers on partially retouched blade fragments, a retouched blade with a lateral dorsal partial scalar retouch, and, two thick shouldered endscraper-cores with several lamellar removal negatives on tuff/rhyolite thick natural fragments (Fig. 11: 1, 2).

Thus, although the two localities are traditionally situated for the Berehove/Muzhievo loci at raw material outcrops (the presence of different unworked raw material pieces testifies it), the collected Proto-Aurignacian artifacts indicate no workshop features for both Berehove VI and VII at all. Instead, it is seen the availability of some real tools (endscrapers, burins, retouched blades) and a couple carinated pieces. Such lithic artifact structures can be only be associated with human activities at some special ephemeral camps where Proto-Aurignacian people have been realizing some particular tasks, different from activities at a base camp, site-workshop and/or workshop.

Now, having a good set of data for a series of loci at Berehove shallow mountain area with raw material outcrop, workshop, site-workshop and special camp characteristics, it is necessary to come back to the only yet known *in situ* Proto-Aurignacian site in the area, and try to put it into the complex lithic exploitation system used by Early UP humans at the discussing large-sized outcrop area in Transcarpathia.

Berehove I site in the context of the Berehove and Muzhievo raw material outcrops, workshops, site-workshops and special camps

The following data do differentiate Berehove I from all the above-represented Berehove and Muzhievo locis.

By primary flaking methods, the differences are as follows:

- Berehove I has more cores than pre-cores, as also does Berehove II site-workshop, whereas Muzhievo 3 raw material outcrop and Muzhievo 1–2 workshops contain more pre-cores.
- Berehove I still has wedge-shaped items but only a few such pre-cores and, at the same time, several bladelet wedge-shaped cores, while the workshops and the site-workshop have mainly of such type pre-cores, some blade and blade/bladelet wedge-shaped cores (only known yet at Muzhievo 2) and no one true bladelet wedge-shaped core.
- Regarding carinated reduction technology that is only represented at all the discussing localities by carinated endscraper – cores *sensu lato* (both wide-fronted carinated *sensu stricto* and thick nosed/shouldered endscraper – cores) and no carinated burin-core technology, which is a feature of Late/Evolved Aurignacian, Berehove I definitely has more occurring 'narrow

variety' of the type (thick nosed/shouldered endscraper-cores), while when the carinated pieces occur at the workshops and the site-workshop, there are more common the 'wider variety' of the type, and the known special camps have either only 'wider' (Berehove VI) or only 'narrow' (Berehove VII) such reduction items.
- At the same time, Berehove II site-workshop is the only locality with flake cores and the core type is even represented by a series of pieces there.
- Berehove I site, Berehove II site-workshop and Muzhievo 1 workshop have several and various bidirectional cores being, however, not true bidirectional but "*double single-platform cores with just one flaking surface*".

By tool category and type occurrences, the localities are in such the situation:
- Berehove I site does demonstrate about the entire Proto-Aurignacian tool set with several simple (flat) endscrapers, simple (non-multifaceted) burins with no dihedral type pieces and finding of burins on truncation and angle ones, a good number of well-retouched blades with no, however, items bearing true invasive stepped Early Aurignacian/Aurignacian I-like retouch, and, of course, numerous Dufour *lamelles* basically having alternate and ventral retouch. Aside of the objective reasons on the absence of Dufour *lamelles* within the Berehove and Muzhievo surface find spots, these localities have real and the above-enumerated Berehove I-like tools only for the Berehove site-workshop and special camps, being absent at pure workshops and raw material outcrops, not taking into account here burin-cores and retouched pieces.

By raw material types, Berehove I site significantly differs from all other localities:
- Berehove I, aside of the understandably much prevailing artifacts on local metasomatically transformed tuffs, tuffites and rhyolites, is also characterized by several pieces on still Transcarpathian but not local for the Berehove shallow mountain area silicified sandstone, siliceous argillite, obsidian and hyalodacite, as well as Western Ukrainian flint.
- All the rest Berehove and Muzhievo localities are, however, known by an absolute dominance of the local tuffs, tuffites and rhyolites with only, if ever, single occurrences of the non-local Transcarpathian raw material types. Herewith the found Late Neolithic–Bronze Age artifacts at Berehove II and Muzhievo 1–2 localities are mainly on the above-listed non-local Transcarpathian and Western Ukrainian raw materials. Accordingly, Proto-Aurignacian humans staying at Berehove I site have been involved into a regional Transcarpathian and even possible outside Transcarpathia network on receiving/exchanging of various raw materials, whereas all other known Proto-Aurignacian Berehove and Muzhievo localities were indeed based on only local raw material type exploitation.

By elevation data and topography position, Berehove I site is also distinct:
- It is at 130 m a.s.l. and 18 m above Tisza River valley. These elevation data put Berehove I at the lowest topography position among all the Berehove and Muzhievo loci, permitting the site's human visitors a closest access to Tisza River bed and its surrounding valley with good hunting possibilities on various ungulate herds coming to the river for water drinking. Moreover, the site is located at a low and namely lean terrace within the Berehove shallow mountain area that lithologically promoted a good sediment accumulation there, why the Proto-Aurignacian layer is covered by ca. 2–2.5 m thick sequence of loams and paleosoils from the now modern surface why it well preserved *in situ* to date. The Proto-Aurignacian layer is separated from the site's Tertiary base with tuffs, tuffites and rhyolites by more than 2 m thick another loam and paleosoil deposit sequence, too. Accordingly, although the site is also located at a raw material outcrop, Proto-Aurignacian humans definitely had problems in getting raw materials at the spot that was already well-covered by Quaternary sediments. Finally, the site is located at a lower ridge area between western (with Berehove loci) and southern (with Muzhievo loci) slopes of the shallow mountain area, allowing the site's human visitors an easy access to the two slope areas' variable lithic sources.

All in all, all the above-represented distinct data for Berehove I site indeed make the site of a specific character within all the Berehove and Muzhievo Proto-Aurignacian raw material outcrops, workshops and special camps. The most plausible suggestion here is to consider Berehove I site being a base camp with all the following basic and easy accessible vital resources for Proto-Aurignacian human groups nearby: the Tisza River with its water supply and ungulate herds for hunting and all the Berehove shallow mountain area slopes with its different raw material outcrops. Accordingly,

the analyzed in the article lithic materials from the Berehove and Muzhievo surface find spots do actually represent a series of various supply chain loci ('site-satellites') for the Berehove I base camp. The loci are particularly considered as follows: raw material outcrops with weak traces of some testing lithic pieces there notably located at highest topographic elevation marks (Muzhievo 3–5), workshops (Muzhievo 1–2), a site-workshop (Berehove II), and special camps (Berehove VI–VII). Actually, it is a good example of logistic/foraging/radiating mobility system (e.g. *Binford 1980*; *Marks/Freidel 1977*). Studying it now and then with some more details indeed 'sprinkles with living water' the rather static with no yet defined site function variability for Proto-Aurignacian techno-complex in Europe.

The Berehove and Muzhievo Proto-Aurignacian raw material exploitation pattern worked in this logistic mobility system in the following basic way.

Bifacial wedge-shaped pre-cores have been preparing at workshops, like Muzhievo 1–2 and were transported then to both site-workshops, like Berehove II, and Berehove I base camp, although some of the pre-cores were a little flaked at site-workshops resulting in the appearance of initially reduced blade and blade/bladelet wedge shaped cores with a narrow-flaked flaking surface where a crested blade and a couple blades or blades/bladelets have been detached. The latter Berehove II initially reduced blade and blade/bladelet wedge shaped cores were most likely also brought to the base camp. At the same time, aside of a few bifacial wedge-shaped pre-cores, Berehove I base camp features the only presence of bladelet wedge-shaped cores, the core type never noted at the workshops and site-workshop. It actually demonstrates the well-known for Proto-Aurignacian continuous blade and bladelet reduction for one and the same cores but here it is traced for the specific wedge-shaped cores starting from the pre-core technological stage. The several presence of bifacial wedge-shaped pre-cores and then blade, blade/bladelet and bladelet wedge-shaped cores at Berehove and Muzhievo Proto-Aurignacian, which is an unusual technological trait for European Proto-Aurignacian assemblages, is explained by various sized and shape flakes, angular and rather flat natural fragments of local metasomatically transformed tuffs, tuffites and rhyolites, why it was technologically necessary to well prepare, actually make (sic!), pre-cores for then systematical core reduction and the wedge-shaped core technology the best fitted to the available and easily accessible raw material types at the considering localities.

Carinated endscraper – cores *sensu lato* (wide-fronted carinated endscraper – cores and narrow thick nosed/shouldered endscraper – cores), as was above-shown, also variably occur at the Berehove and Muzhievo loci. Most probably, the prevalence of the 'narrow' endscraper-core type at the base camp should be understood through both reduction in size brought to the base camp wide-fronted carinated endscraper – cores into then more narrow thick nosed/shouldered endscraper – cores and a better reduction control of namely thick nosed/shouldered endscraper – cores during a long and continuous their primary flaking.

The appearance of several flake cores, technologically aiming thick flake production, at only Berehove II site-workshop once again supports flaking of blanks for carinated endscraper – cores *sensu lato* at just workshop-like sites. On the other hand, the absence of flake cores at Berehove I indicate systematical and intensive bladelet/microblade reduction of the carinated endscraper – cores *sensu lato* about exclusively at the base camp on the brought there already detached at the site-workshop thick flakes.

Bladelet carinated cores *sensu stricto* (on non-flake, natural lithic piece-blanks) are again similarly present at only Berehove I site and some of them are even double-platform bidirectional ones. Similar bidirectional cores but for blade and blade/bladelet reductions are known for both Berehove I site and the site-workshop – primary workshops. The unusual presence of bidirectional cores at the Berehove and Muzhievo Proto-Aurignacian loci are again, like in the case with wedge-shaped pre-cores and cores, connected to peculiarities of raw material reduction objects when items with good flaking qualities were indeed intensively flaked in a bidirectional-looking, but in reality double single-platform reduction manner.

The rather few number of blade and blade/bladelet cores at Berehove I does not correspond to the quantity of blades and blade-tool blanks at the base camp why it is also suggested that a part of blades and tools were brought from the site-workshop and workshops to the base camp.

Finally, Berehove VI and VII special camps, being probably some task-oriented loci, having no systematic pre-core preparation and core reduction processes but with carinated pieces and tools *sensu stricto*, make the Berehove and Muzhievo Proto-Aurignacian loci settlement pattern of real and complex logistic/foraging/radiating character.

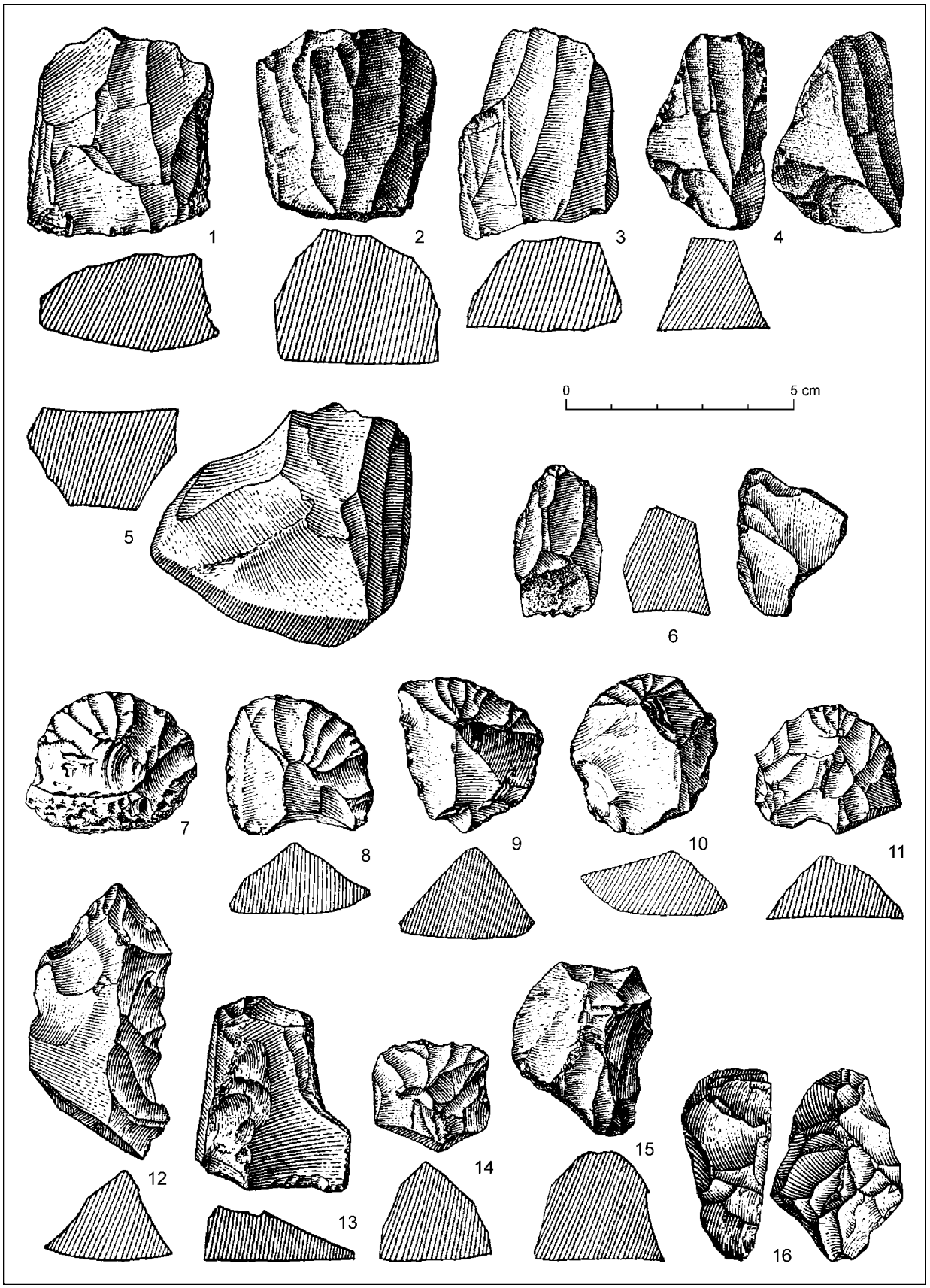

Fig. 12. Tibava site. 1–6 – bladelet 'carinated' cores; 7–16 – carinated and thick nosed/shouldered endscraper-cores (according *Bánesz 1960*).

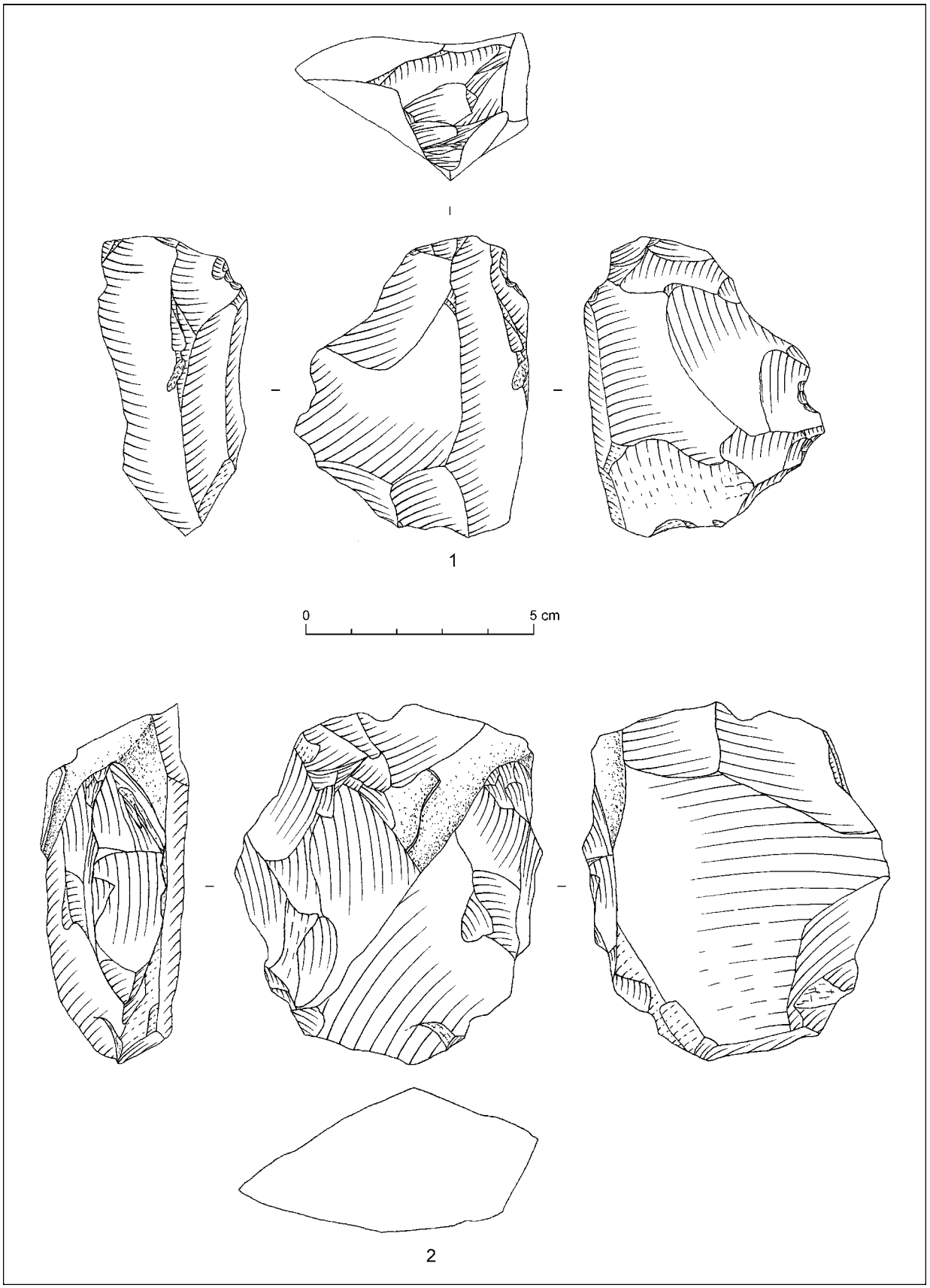

Fig. 13. Tibava site. 1 – blade single-platform unidirectional wedge-shaped core; 2 – wedge-shaped pre-core.

BEREHOVE AND MUZHIEVO PROTO-AURIGNACIAN BEYOND THE UKRAINIAN TRANSCARPATHIAN REGION

The long lasting comparisons of the Berehove I assemblage with lithics from a series of Aurignacian sites in Eastern Slovakia did force us to look again at the Slovakian respective data. While now some of the sites can be considered as being either with very much likely heterogeneous character of finds, like Barca I and II (Late Aurignacian and Gravettian), or of certain Late Aurignacian chronology, like Seňa I (*Chu 2018*), the only yet site and its lithic artifacts that looks similar to Berehove I is Tibava (*Bánesz 1960*). Our first 'similarity impression' based on the 1960 article reading was also then reinforced by checking actual lithics in Nitra in October of 2019.

Now the following techno-typological data of Tibava lithic artifact collection with ca. 800 items (no fauna preserved at the site) can be clearly distinguished that well correspond to the respective Berehove I lithic characteristics:

- bladely character of the assemblage, although microliths (retouched bladelets and microblades – *Bánesz 1960*, fig. 12: 1–4) are poorly represented by very few specimens due to 1956 understandably gross excavation techniques;
- particular blade and bladelet core reductions seen through the availability of such cores and debitage pieces (*Bánesz 1960*, fig. 11–13);
- the several occurrence of well-retouched but no Early Aurignacian/Aurignacian I-like blades (*Bánesz 1960*, fig. 12: 10–13; 15);
- the presence of both bladelet 'carinated' cores (Fig. 12: 1–6) and carinated and thick nosed/shouldered endscraper-cores (Fig. 12: 7–16) but no carinated burin-cores;
- finally, the availability of defined by us in the assemblage of wedge-shaped bifacial pre-cores (Fig. 13: 2) and cores (Fig. 13: 1).

The above-enumerated industrial data are also added by some more data connecting the Ukrainain Transcarpathian and Eastern Slovakian sites. First, by raw material types, the most dominant rock type is brownish silicified sandstone (ca. 37%) of Transcarpathian origin. Here it can be also added that some artifacts were also produced on some other Transcarpathian rocks: black siliceous argillite, radiolarite, ungvarite, and even possibly Berehove metasomatically transformed tuffs, tuffites and rhyolites. Second, Tibava site, like Berehove I, is located at low elevation (at 123 m a.s.l. and 7–8 m above the nearby Breznický stream) at a lean terrace of 'Za Cintorínom' Hill. Here it is worth noting that Tibava site elevation marks are the lowest ones for all the known yet Aurignacian sites in Eastern Slovakia. Third, Tibava site is the nearest Slovak site to Berehove I site with only ca. 65 km straight distance between them.

All in all, now it seems reasonable not only to continue studies on the Berehove and Muzhievo Proto-Aurignacian logistically organized settlement pattern with the base camp and a series of various supply chain loci in Transcarpathia but also to investigate it in the neighboring regions, potentially recognizing a larger-scale Proto-Aurignacian network with some sites in both Ukrainian Transcarpathia and Eastern Slovakia, as well as maybe in North-Eastern Hungary, too.

SHORT CONCLUDING REMARKS

Our results on the new study of Berehove and Muzhievo surface find spots in Ukrainian Transcarpathia allow us to take a new look at these loci and their UP lithics. Instead of the before viewed as a group of Middle Aurignacian real living but destroyed sites, the considering actually Proto-Aurignacian loci are now understood as representing a series of various supply chain loci ('site-satellites') with raw material outcrops (Muzhievo 3–5), workshops (Muzhievo 1–2), a site-workshop (Berehove II), and special camps (Berehove VI–VII) for the Berehove I base camp. All these functionally varying loci and the site situated at raw material outcrops at Berehove Volcanic Shallow Mountain Area do represent a special settlement pattern of logistic/foraging/radiating mobility system. Accordingly, it is the first case for European Proto-Aurignacian when a complex settlement pattern with a base camp and sites-satellites is recognized for a closely located cluster of loci. Now recognized Proto-Aurignacian site of Tibava in Eastern Slovakia most probably belongs to Berehove and Muzhievo Proto-Aurignacian site complex, too. It opens a gate for more studies of a Proto-Aurignacian network not only in Transcarpathia (Ukraine) but also in the neighboring areas in Slovakia and possibly Hungary.

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Unikátny sídelný areál proto-aurignacienu v Európe

Logistický koncept základného tábora a jeho podpory dodávateľským reťazcom primárnych zdrojov surovín v Zakarpatskej Ukrajine

Yuri E. Demidenko – Béla Rácz – Adrián Nemergut

SÚHRN

Prvé objavy paleolitických lokalít v Zakarpatskej oblasti na Ukrajine boli uskutočnené ešte koncom 19. stor. miestnym maďarským právnikom a okresným prokurátorom T. Lehoczkym. Kamenné artefakty z jeho zbierky zaradil do staršej doby kamennej, presnejšie do mladého paleolitu až *J. Skutil* (*1938*) v roku 1935. Išlo predovšetkým o nálezy z okolia Mukačeva a Berehova. V tom istom roku *J. Skutil* (*1938*) identifikoval aj prvú *in situ* paleolitickú lokalitu Mala hora pri Berehove a zaradil ju do tzv. primitívneho aurignacienu. Prvý systematický výskum sa na tejto lokalite (odvtedy nazývanej bádateľmi píšucimi po rusky ako Beregovo I) realizoval pod vedením S. V. Smirnova

v rokoch 1969 a 1971. Súbor štiepanej kamennej industrie z výskumu zaradil, rovnako ako J. Skutil, do aurignacienu, avšak s poznámkou, že nie je menej rozvinutý ako neskorá fáza východoslovenského aurignacienu (*Smirnov 1974*, 39). Začiatkom 70. rokov boli povrchovým prieskumom rozpoznané ďalšie lokality (Berehove II–VI, Muzhievo I) s kolekciami kamennej industrie podobnými ako z Berehova I (*Smirnov 1973*; *Tkachenko 1989*; *2003*). Všetky boli *V. I. Tkachenkom* (*1989*; *2003*) zaradené do strednej fázy stredoeurópskeho aurignacienu. Mimoriadne dôležité výsledky získal počas revízneho výskumu V. I. Usik v rokoch 2006 a 2007. Prostredníctvom preplavovania sedimentov získal niekoľko čepieľok typu Dufour, spoločne s variantom mikročepelí Dufour so striedavou a spodnou (ventrálnou) retušou. Podarilo sa mu spätne zložiť úlomky artefaktov z výskumov z rokov 1969, 1975, 1990 spolu s úlomkami z jeho výskumu, čím dokázal, že nálezy pochádzajú z jednej a tej istej vrstvy. Po analýze všetkých doteraz získaných kamenných artefaktov z lokality (celkovo 13 820 ks) skonštatoval, že neprislúchajú strednej fáze aurignacienu, ale proto-aurignacienu (*Usik 2008*). Z hľadiska využívania surovín štiepanej kamennej industrie je v predmetnom regióne prínosný systematický prieskum primárnych zdrojov, ktorému sa od roku 2007 venuje *B. Rácz* (*2013a*; *2013b*; *Rácz/Szakmány/Biró 2016*). Zistil, že objavené lokality v Berehove a Muzhiyeve sa nachádzajú na odkryvoch surovín, ktoré zároveň využívali a ďalej distribuovali.

Osobitnú pozornosť si uvedené kolekcie vyslúžili z toho dôvodu, že ide o homogénne zbierky, s výnimkou mladších prímesí z neskorého neolitu, doby bronzovej a stredoveku, čo umožňuje ich využitie pri rôznych štúdiách v regionálnom kontexte. Pri porovnaní všetkých súborov medzi sebou sa Berehove I výrazne líši od ostatných z Berehova a Muzhiyeva. Z hľadiska technológie ťažby štiepanej industrie sa odlišujú:

- v Berehove I bolo identifikovaných viac jadier z pokročilej fázy ťažby, rovnako ako v Berehove II, oproti rôznym predjadrovým formám a jadrám z počiatočnej fázy, vyskytujúcich sa najmä v Muzhiyeve 1–3;
- kolekcia z Berehova I obsahuje v porovnaní s ostatnými prevažne ihlanovité jadrá;
- čo sa týka techniky karenoidnej ťažby reprezentovanej na všetkých lokalitách karenoidnými škrabadlami – jadrami *sensu lato* a absenciou karenoidných rydiel – jadier (typických pre neskorý/vyvinutý aurignacien) sa v Berehove I objavuje užšia variabilita týchto typov.

V súvislosti s výskytom kategórií a typov nástrojov sa líšia:

- Berehove I obsahuje celý rad nástrojov prislúchajúcich proto-aurignacienu s jednoduchými (plochými) škrabadlami, jednoduchými rydlami, s absenciou klinových typov a nálezmi hranových rydiel. Ďalej sú zastúpené hojným počtom retušovaných čepelí, avšak s absenciou invazívnej stupňovitej retuše (typickej pre včasný aurignacien/aurignacien I) a samozrejme čepieľkami a mikročepeľami typu Dufour, zväčša upravenými striedavou a spodnou (ventrálnou) retušou, ktoré na povrchových lokalitách v regióne, naopak, prítomné nie sú.

Pri surovinovom spektre je možné pozorovať tieto rozdiely:

- v Berehove I sa okrem prevládajúcich lokálnych surovín, ktoré reprezentujú miestne metamorfované tufy, tufyty a ryolity, vyskytujú aj suroviny zo vzdialenejších primárnych zdrojov ako silicifikovaný pieskovec, silicifikovaný argilit, obsidián, hyalodacit a západoukrajinský silicit;
- na zvyšných lokalitách v Berehove a Muzhiyeve absolútne dominovali miestne metamorfované tufy, tufyty a ryolity, len výnimočne sa objavili importované suroviny.

V rámci nadmorských výšok a topografickej polohy je situácia nasledovná:

- Berehove I leží v nadmorskej výške 130 m a zároveň 18 m nad údolím rieky Tisa. Ide tak o najnižšie položenú lokalitu proto-aurignacienu v študovanej oblasti s najbližším prístupom k údoliu Tisy. Tá mohla zohrávať dôležitú úlohu v rámci loveckej stratégie, keď stáda lovnej zveri prichádzali k rieke za pitnou vodou.

Uvedené odlišnosti poukazujú na špecifický charakter Berehova I, v kontraste s ostatnými lokalitami. Na základe súčasných dát ho možno interpretovať ako základný tábor (*base camp*) so všetkými základnými, ľahko dostupnými zdrojmi nevyhnutnými pre život, ako boli prístup k vodnému zdroju, lovnej zveri a surovinám na výrobu kamennej industrie. Ostatné lokality predstavujú ťažobné polia, dielne a špeciálne tábory, ktorých úlohou bolo zásobovať základný tábor v Berehove I.

Pri porovnaní zakarpatských kolekcií s kolekciami z východného Slovenska sa na industriu z Berehova I nápadne podobá jedine súbor z Tibavy (*Bánesz 1960*). V kolekcii (približne 800 ks) bolo rozpoznaných viacero identických znakov. Jednou z hlavných čŕt bol čepeľovitý charakter industrie so slabo zastúpenými mikrolitmi, čo iste súvisí s metodikou výskumu realizovaného ešte v roku 1956. Ďalšou je podobnosť čepeľovej a čepieľkovej ťažby rozpoznanej na jadrách a debitáži, prítomnosť typických retušovaných čepelí, karenoidných škrabadiel – jadier, absencia karenoidných rydiel – jadier a v neposlednom rade zastúpenie klinových jadier (obr. 13). O kontaktoch medzi východným Slovenskom a západnou Ukrajinou svedčí aj využívanie najmä silicifikovaného pieskovca, zrejme západoukrajinského pôvodu, ojedinele aj silicifikovaného argilitu, rádiolaritu či metamorfovaných tufov, tufytov a ryolitov v Tibave. Topografické údaje s nadmorskou výškou 123 m a prevýšením nad neďalekým Breznickým potokom 7–8 m vymedzujú Tibavu ako najnižšie položenú lokalitu aurignacienu na východnom Slovensku, s údajmi podobnými s Berehovom I. Navyše, nálezisko v Tibave sa od Berehova I nachádza vzdušnou čiarou iba 65 km. Uvedené skutočnosti otvárajú množstvo ďalších otázok a perspektívy výskumu tejto problematiky v uvedených regiónoch Zakarpatskej Ukrajiny, východného Slovenska, ako aj potrebu preskúmať ďalší susedný región, severovýchodné Maďarsko.