New excavations at the Middle Paleolithic site Zaskalnaya V, Crimea. The 2012 and 2013 field seasons: a preliminary report

Neue Ausgrabungen an der mittelpaläolithischen Fundstelle Zaskalnaya V auf der Halbinsel Krim. Die Grabungskampagnen der Jahre 2012 und 2013 - ein vorläufiger Bericht

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Abstract - The Middle Paleolithic site of Zaskalnaya V is a buried rock shelter situated in the Eastern part of the Crimean Peninsula. Large-scale excavations conducted by Kolosov between 1969 and 1994 made Zaskalnaya V a reference site for both the definition of the "Ak Kaya culture" of the Crimean Micoquian and regional Middle Paleolithic chronology. Despite their merits, the previous excavations left open questions relating to site formation and the resolution of the archaeological sequence and therefore the relevance of the assemblages, environmental studies and absolute dates published thus far. Here we attempt to resolve these questions by reporting the results of a small-scale excavation conducted in 2012 and 2013 immediately adjacent to the old trench.

Instead of ten lithological layers and eight cultural layers, the recent excavations documented 4.5 m of deposits, 23 lithological layers and 87 archaeological levels. Although the absence of weathering traces on artifacts and bones as well as the excellent preservation of dry-land snails and thin lenses of burnt material interpreted as fireplaces suggest phases of stratigraphic stability and rapid accumulation, other parts of the sequence are characterized by strong effects of both erosion and bioturbation, leading to the presence of several stratigraphic breaks. The *in-situ* archaeological levels contain a number of fireplaces and a complex of nested lenses of dark color originating from burnt material. This "complex of lenses" is a succession of natural depressions that were either filled with burnt and unburnt archaeological material by natural and/or human agency or used as protection for fireplaces. A series of palaeosols overprinting sediments from the lower part of the stratigraphic sequence can be tentatively correlated with OIS 5c. The existing ESR and radiocarbon dates (30 to 40 ka calBP) come from the middle and upper part of the sequence and are best understood as a broad proxy for the chronological boundaries of the rock shelter's use in the middle Paleolithic period. In addition to numerous faunal remains and one Neanderthal tooth, the 2012 and 2013 excavations yielded a total of 355'085 lithic artifacts. Due to the excellent preservation of most of the archaeological levels and careful sieving, chips represent more than 96 % of the artifacts in each level. Faunal remains are yet to be counted. All lithic artifact assemblages demonstrate a high degree of technological and typological uniformity, which permit their classification as Crimean Micoquian. Within this techno-complex, archaeological Units II, IIA, III and IIIA belong to the Ak Kaya facies, which is characterized by tool assemblages with a low degree of reduction and interpreted as being produced near raw material outcrops. This finding is in line with the presence of several raw material sources close to the Zaskalnaya V rock shelter. However, despite this raw material proximity, Units I and IV show all attributes of the Kiik Koba facies, characterized by highly reduced assemblages which in the past were thought to result from large distances from raw material outcrops.

Zusammenfassung - *Zaskalnaya V ist ein Feldschutzdach im östlichen Teil der Krim-Halbinsel. Großflächige Ausgrabungen der Jahre 1969 bis 1994 erbrachten neben einer Abfolge von Inventaren des Crimean Micoquian die Überreste von Neandertaler-Bestattungen und machten Zaskalnaya V nicht nur zur eponymen Fundstelle der „Ak Kaya"-Kultur, sondern gleichzeitig zu einem Fixpunkt der Chronologie des regionalen Mittelpaläolithikums. Nicht zuletzt aufgrund der damaligen Grabungsmethode blieben aber zentrale Fragen zum Prozess der Fundplatzentstehung und damit zur Einheitlichkeit der Inventare sowie ihrer Datierung offen. Zu ihrer Beantwortung wurden in den Jahren 2012 und 2013 Nachgrabungen durchgeführt, die u.a. eine vollkommen neuen Interpretation der Schichtenfolge zum Ergebnis hatten. Anstelle von zehn geologischen Schichten und acht "Kulturschichten" konnten im Rahmen der Neuuntersuchung 23 geologische Horizonte und nicht weniger als 87 archäologische Horizonte unterschieden werden. Zudem erwies sich der Prozess der Fundplatzentstehung als wesentlich komplexer als zuvor angenommen. Während die gute Erhaltung der Artefakte und Faunenreste, die Überlieferung auch kleinster Mikrofaunenreste sowie das Vorliegen von evidenten Strukturen wie Feuerstellen Phasen stabiler Begehungsoberflächen und schneller Sedimentation*

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anzeigen, weisen andere Abschnitte der Stratigraphie deutliche Hinweise auf Erosionsereignisse und Bioturbationen auf, die zu stratigraphischen Hiaten geführt haben. Aus den in-situ erhaltenen archäologischen Horizonten liegen zahlreiche Feuerstellen vor. Daneben ist der sogenannte „Komplex mit Linsen verbrannten Materials" hervorzuheben, der sich während der Ausgrabungen als stratigraphisch und räumlich dicht gepackte Abfolge von natürlichen Vertiefungen zu erkennen gab. Während Verfüllungen mit verbranntem und unverbranntem Material sowohl natürliche als auch anthropogene Ursachen haben können, sind in anderen Fällen die Depressionen intentionell zur geschützten Anlage von Feuerstellen genutzt worden. Der unterste Abschnitt der Schichtenfolge ist durch bodenbildende Prozesse überprägt, für die eine Korrelation mit dem OIS 5c wahrscheinlich gemacht werden kann. Neue ^{14}C-Daten an Holzkohlen bestätigen die bereits vorliegenden absoluten ^{14}C- und ESR-Daten, welche den oberen Teil der Schichtenfolge in einen Zeitraum zwischen 33 und 36 ka calBP stellen. Die neuen Grabungen erbrachten aus einer Fläche von weniger als vier Quadratmetern 355'085 Steinartefakte, von denen dank des Siebens und Schlämmens mit geringen Maschenweiten etwas mehr als 96 % Absplisse sind. Zu den weiteren Funden gehören ein menschlicher Zahn sowie zahlreiche Faunenreste, die allerdings noch nicht ausgezählt wurden. Sämtliche Steingeräteinventare sind technologisch einheitlich und gehören in das Crimean Micoquian. Innerhalb dieses Technokomplexes werden generell drei Fazies unterschieden, von denen zwei auch aus Zaskalnaya V vorliegen. Die Inventare der archäologischen Units II, IIA, III und IIIA können als Ak Kaya-Fazies klassifiziert werden. Sie zeichnen sich durch ein geringes Maß an Reduktion der einflächigen und bifaziellen Werkzeuge aus, was gut zu den lokal verfügbaren Rohmaterialvorkommen passt. Dagegen weichen die Inventare der archäologischen Units I und IV von dem bisher als regelhaft angenommenen Modell der Rohmaterialökomomie des Crimean Micoquian ab und weisen trotz der Nähe zu lokalen Rohmaterialaufschlüssen ein hohes Maß an Reduktion auf. Anhand der geringen Dimensionen der Werkzeuge werden sie der Kiik Koba-Fazies zugewiesen. Die möglichen Gründe für die beobachtete Abweichung des bislang strengen Zusammenhangs von zunehmender Nachschärfung der Werkzeuge bei steigender Distanz zu Rohmaterialaufschlüssen im Crimean Micoquian werden im letzten Teil des Artikels diskutiert.

Keywords - site formation processes, Neanderthal remains, evident structures, Micoquian, Ak Kaya facies, Kiik Koba facies
Prozesse der Fundplatzentstehung, Neandertaler-Überreste, evidente Befunde, Micoquien, Ak Kaya-Fazies, Kiik Koba-Fazies

Introduction

Paleolithic research on the Crimean Peninsula: a brief overview

Systematic research into the Paleolithic in the Crimea began more than 100 years ago with the discovery of the Middle Paleolithic site of Volchi-Grot by K. Merejkowski in 1879, but experienced a substantial boost with the prospections and excavations undertaken by G. A. Bonch-Osmolowksi in the 1920s (for a recent summary see Chabai 1998a). After the Second World War, excavations and artifact analysis carried out by Yu. G. Kolosov, V. N. Gladilin, A. I. Yevtushenko, Yu. Demidenko, V. N. Stepanchuk, A. E. Marks, J. Richter and others accumulated to form the present-day data set. The findings of recent prospections, excavations, artifact analysis, environmental studies and absolute age determinations largely appeared in a number of monographs (e.g. Marks & Chabai 1998; Chabai & Monigal 1999; Chabai et al. 2004; Chabai et al. 2005, 2006, 2007, 2008; Demidenko et al. 2012; Yevtushenko & Chabai 2012; Demidenko & Uthmeier 2013). We are currently aware of more than 100 Middle Paleolithic localities in the Crimea. Thirty of them are multi-layered stratified sites, most of them being rock shelters. Due to the vulnerability of the soft Eocene nummulite limestone in which the rock shelters have formed, sedimentation rates were relatively rapid. In many cases, this meant that the archaeological material, including large and small mammal fauna and pollen, was well preserved. At the same time, several sites, such as Kabazi II, Kabazi V or Zaskalnaya V, preserved long sedimentological sequences and extraordinary large numbers of *in-situ* archeological levels. Local chronostratigraphy is based on various radiometric dating methods combined with environmental studies (for overviews see Chabai, Marks & Monigal 2004; Chabai & Uthmeier 2006; Uthmeier & Chabai 2010). The oldest archaeological levels date back to the Early Glacial (MIS 5d), but most Crimean Middle Paleolithic occupations belong to MIS 3. The transition to the Upper Paleolithic may, on the other hand, be rather late, as indicated by the late appearance of the Aurignacian in the Crimea at around 34 ka calBP (Uthmeier 2012: Fig. 1; the last dating program to include ultrafiltrated bone samples confirmed AMS dates obtained previously without ultrafiltration: Demidenko et al. 2012) and the interstratification of Middle and Upper Paleolithic archaeological levels at Buran-Kaya III (Monigal 2004). In fact, the succession of *in-situ* archaeological levels with palimpsests of Micoquian and Aurignacian artifacts at Siuren I constitutes strong stratigraphic evidence for a chronological overlap of Middle and Upper Paleolithic industries in the Crimea (Demidenko et al. 2012). Research at Zaskalnaya V (Fig. 1) took place in the context of the DFG project "The dispersal of modern humans into an Eastern European refugial area of late Neanderthals: interdisciplinary studies of contemporaneous industries from the Middle to Upper Paleolithic transition in the Crimea (Ukraine)", investigating the exceptionally late regional transition from the Middle to the Upper Paleolithic. The project's principal objectives are to re-evaluate major

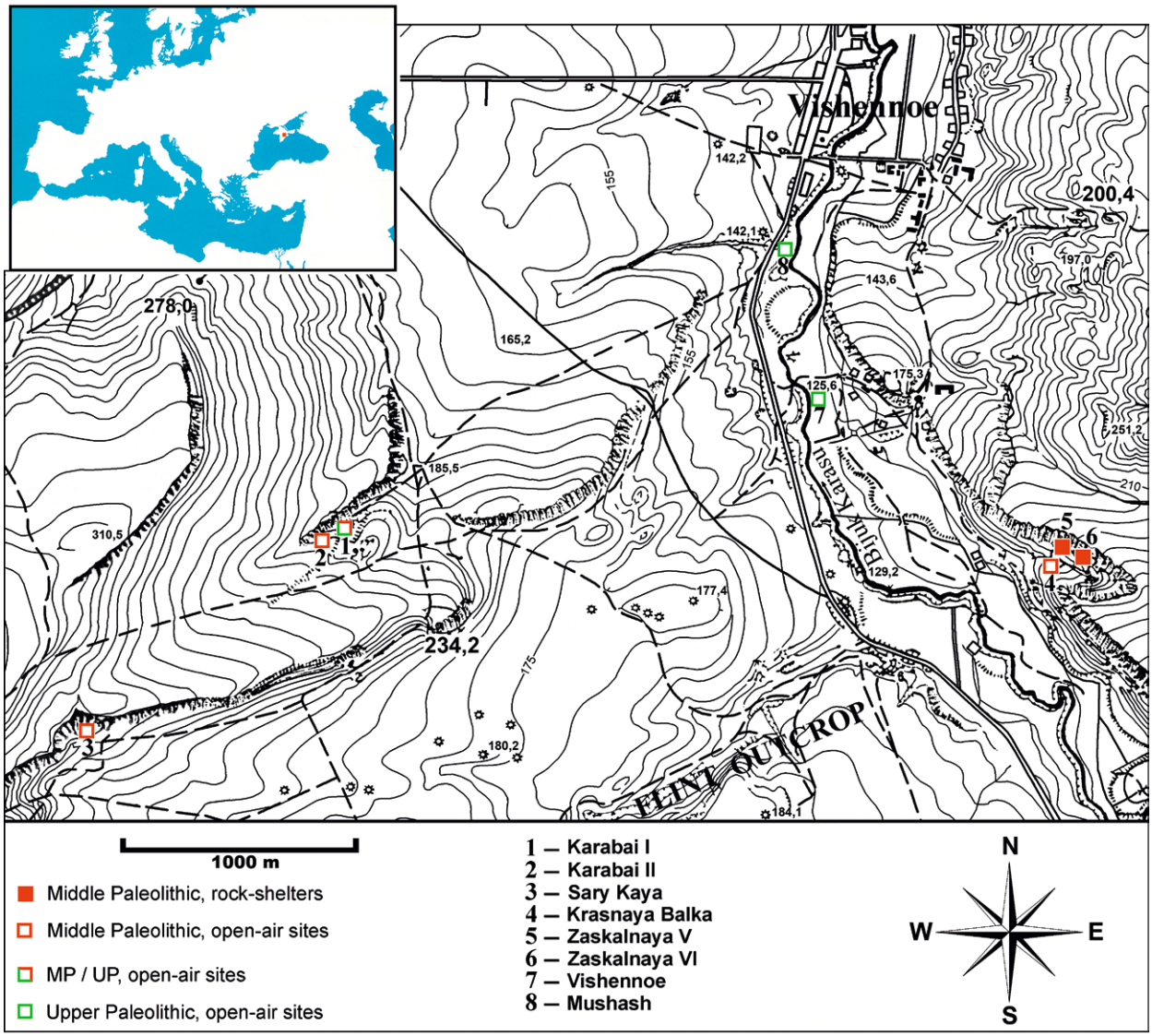


Fig. 1. Map of the Bijuk Karasu valley with the position of Paleolithic sites mentioned in the text.

Abb. 1. *Karte des Bijuk Karasu-Tals mit den im Text erwähnten paläolithischen Fundstellen und Rohmaterial-Aufschlüssen.*

stratigraphical sequences and to collect samples for radiocarbon dating other than those of bone, which has been the predominant material in the past. As the fieldwork was halted due to the annexation of the Crimea in 2014, current investigations focus on the analysis of material and data already available.

Zaskalnya V: Site setting and research history

The Middle Paleolithic site of Zaskalnaya V (N45°06'57.7"; E34°36'42.1") is a buried rock shelter situated at the foot of a limestone cliff in the "Krasnaya Balka" ("Red Valley"), which is an erosive cut into the Ak Kaya cuesta. The floor of the rock shelter is 189 m a.s.l. and 60 m above the floodplain of the present-day Bijuk Karasu River (Fig. 1). The rock shelter was formed in relatively soft Eocene nummulite limestone on the south-facing bank of the Krasnaya Balka valley. Both the blocks of the collapsed roof, which are still visible on the slope below the site (Fig. 2), and the already published lithological sequence (Kolosov 1983) allow an estimation of the rock shelter's original size. Yu. Kolosov (1983) has suggested that it is similar to the present-day size of Siuren I, which is 25 m wide, 8 m deep and 4 m high and one of the largest rock shelters used by Paleolithic humans in the Crimea. However, the visible remains of the Zaskalnaya V buried rock shelter suggest that although its width was indeed close to that of Siuren I, it was less (i.e. approximately 4 - 5 m). Due to continued weathering, no remnants of the former roof can be detected on the limestone cliff above Zaskalnaya V, meaning the original height of the rock shelter remains unknown. Bearing in mind its limited depth, it is considered likely that its filling was less resilient to water erosion, a point that will be important in the discussion of the natural factors of the site formation process.

Zaskalnaya V was discovered by Kolosov in 1969 and excavated in 12 field seasons concluding in 1994. He investigated 32.5 m^2 in the main excavation area (Fig. 3), reaching bedrock at a depth of about 4.5 m

Fig. 2. Zaskalnaya V: view from the South.
Abb. 2. *Zaskalnaya V: Blick auf die Fundstelle von Süden.*

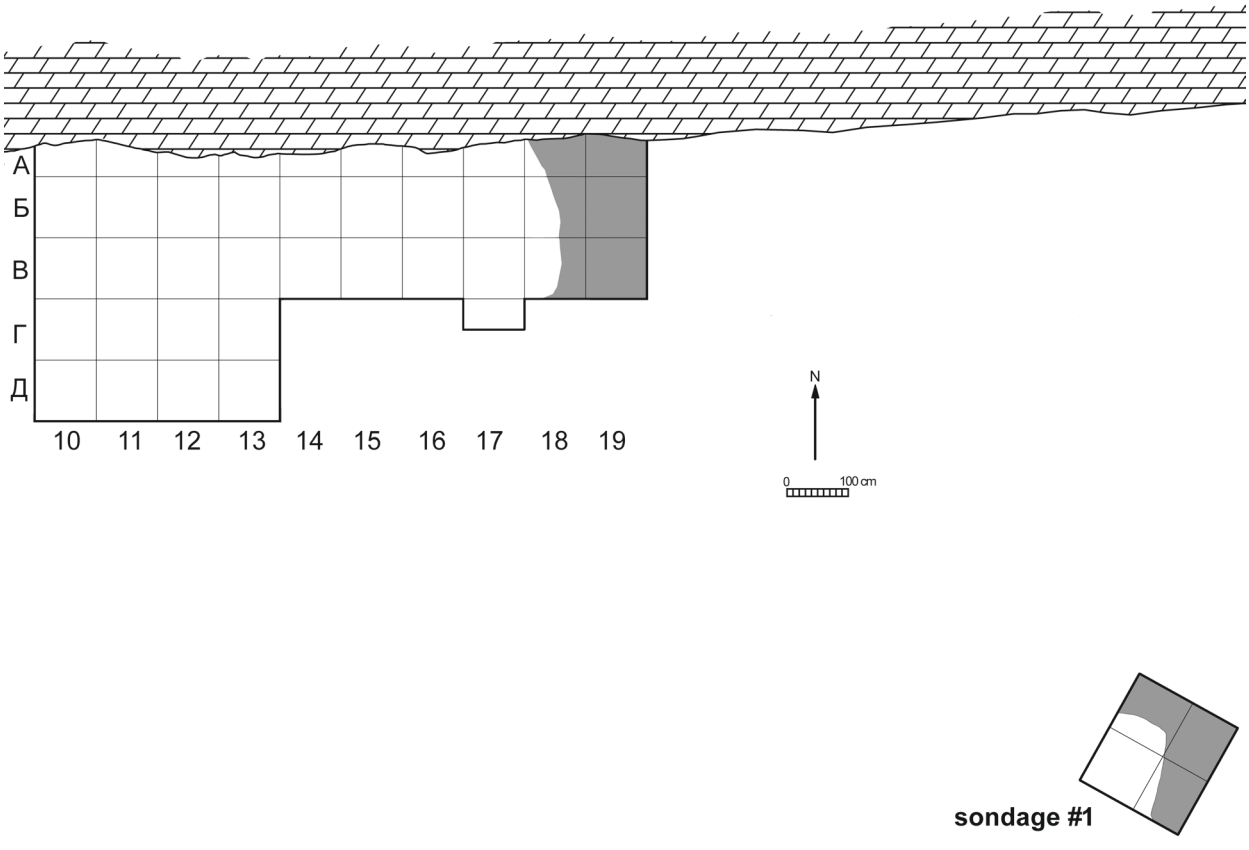


Fig. 3. Zaskalnaya V: map of excavations (the grey color shows the excavated areas of the 2012 and 2013 field campaigns).
Abb. 3. *Zaskalnaya V: Grabungsplan (in grau: Grabungsflächen der Jahre 2012 und 2013).*

(Fig 4). In addition, he dug a number of test pits on the slope below the site (Fig. 3). An initial re-evaluation of the lithological and archaeological sequence by Kolosov and Stepanchuk in 1997 was restricted to the cleaning of the eastern profile and did not lead to major modifications of the original stratigraphic description. Thanks to Kolosov's excavations and a large number of publications (e.g. Kolosov 1979, 1983; Danilova 1979a, 1979b; Gubonina 1985; Kolosov et al. 1993, 1994, 1997; Kolosov & Stepanchuk 2002), Zaskalnaya V became well known not only for its large number of lithic artifacts and faunal remains, but also for the discovery of Neanderthal remains at the site. Zaskalnaya V is part of a local cluster of Paleolithic sites in very close vicinity to one another. The buried rock shelters of Zaskalnaya VI and Karabai II and the open-air sites of Krasnaya Balka, Karabai I, Sary Kaya, Vishennoe and Mushash are all situated within 3 kilometers of the site, as are several outcrops of high-quality flint. Besides the outcrops near to the site of Sary Kaya, located 2.5 kilometers away (Fig. 1), high-quality flint is also available in plaquettes of various sizes a few hundred meters from the site.

The starting point of the present study: Open questions from former investigations

Despite its merits, the former research left a number of questions unanswered. Most of them are related to the site formation process and the findings from the excavation methods employed at the time. Kolosov excavated the site by horizontal, relatively thick, spits (up to 50 cm) that were intended to be equivalent to lithological layers. Excavation methods based on horizontal spits are generally problematic, especially when lithological layers are inclined and/or have wavy boundaries. The latter was the case at Zaskalnaya V, where wavy boundaries between layers are clearly visible in Kolosov's section drawing along the square line 17/18 (Fig. 4). This likely resulted in the mixing of archaeological materials from different levels, hampering the understanding of site formation processes and the recognition of individual archaeological levels. Whereas Kolosov (1983) originally identified ten lithological layers within the 3 m-thick sequence of Pleistocene deposits, later statements claimed that it consists of three lithological layers only (Kolosov et al. 1994, 1997), and two basic types of sediment (Kolosov & Stepanchuk 2002). The archeological sequence was subdivided into eight "cultural layers" (Units I, Ia to VII), each of them 10 to 50 cm thick and separated from one another by sterile sediments of about the same thickness (Kolosov 1983). In other, more recently excavated Crimean Middle Paleolithic sites with comparable sedimentological settings, such as Kabazi V or Chokurcha I, significantly more archaeological levels were detected. Other open questions relate to pollen sampling and the absolute dating of the Zaskalnaya V sequence. Like other Crimean Middle Paleolithic sites such as Kabazi II or Buran-Kaya III, the sediments of Zasklanaya V yielded pollen. However, due perhaps to low pollen content in some of the samples, the published pollen analysis contains only four samples (Gubonina 1985). Despite this low number of samples, the assumption is that the climate fluctuations represented in the analyzed sediments cover the time range from the Last Interglacial to the Denekamp Interstadial (Kolosov 1983; Chabai 2004). Five radiocarbon dates on bone fall into the range of >46 ka BP to 28 ka BP (Stepanchuk et al. 2004). If calibrated (all dates in this article were calibrated with CalPal, Version 2016.2, using the Hulu 2007 CalCurve: Weninger & Jöris 2008), the last date corresponds to an age of 32 ka calBP. Although these dates must be treated with caution as the sample pretreatment did not include ultrafiltration, ESR dating (Fig. 14) confirms them nevertheless (McKinney & Rink 1996). While some of these shortcomings result from methodological advances made in recent decades, it is nevertheless of central importance to resolve them because Zaskalnaya V serves as a flagship site for the definition of the "Ak Kaya culture" (Kolosov 1983; see also Kolosov et al. 1993; Chabai et al. 2004; Chabai & Uthmeier 2006; Stepanchuk 2006). Kolosov assumed that all artifact assemblages from Zaskalnaya V belong to this entity. In contrast to Kolosov, Gladilin (1976) saw a larger variability in the Zaskalnaya V assemblages. He concluded that only the assemblages of "cultural layer II" and "cultural layer III" fit the definition of the "Ak Kaya culture", as it was termed at the time, and assessed the artifacts from "cultural layer I" and "cultural layer IV" as belonging to the "Kiik Koba culture". In general, the dimensions of tools in assemblages from the "Kiik Koba culture" are much smaller than those from the "Ak Kaya culture". At the same time, assemblages from the "Kiik Koba culture" have higher frequencies of points and convergent side scrapers and lower frequencies of bifacial tools. While these differences are still considered valid, the original "cultural" interpretation has been superseded by an interpretation as facies of a single techno-complex, the Crimean Micoquian (Chabai et al. 1995; Chabai & Marks 1998). The current belief is that these differences primarily reflect the intensity of the resharpening processes, which in turn is influenced by the distance of a settlement from raw material sources. To summarize, the problematic points of the previous fieldwork and dating program relate principally to excavation methods, resolution of the archaeological sequence, environmental studies, and absolute dating. The aims of the 2012 and 2013 field campaigns were to fill these gaps by excavating a small area immediately adjacent to Kolosov's trench.

Material and methods

The recently excavated area (Fig. 3) measures about 4 m^2 and is an extension of Yu. Kolosov's trench to the

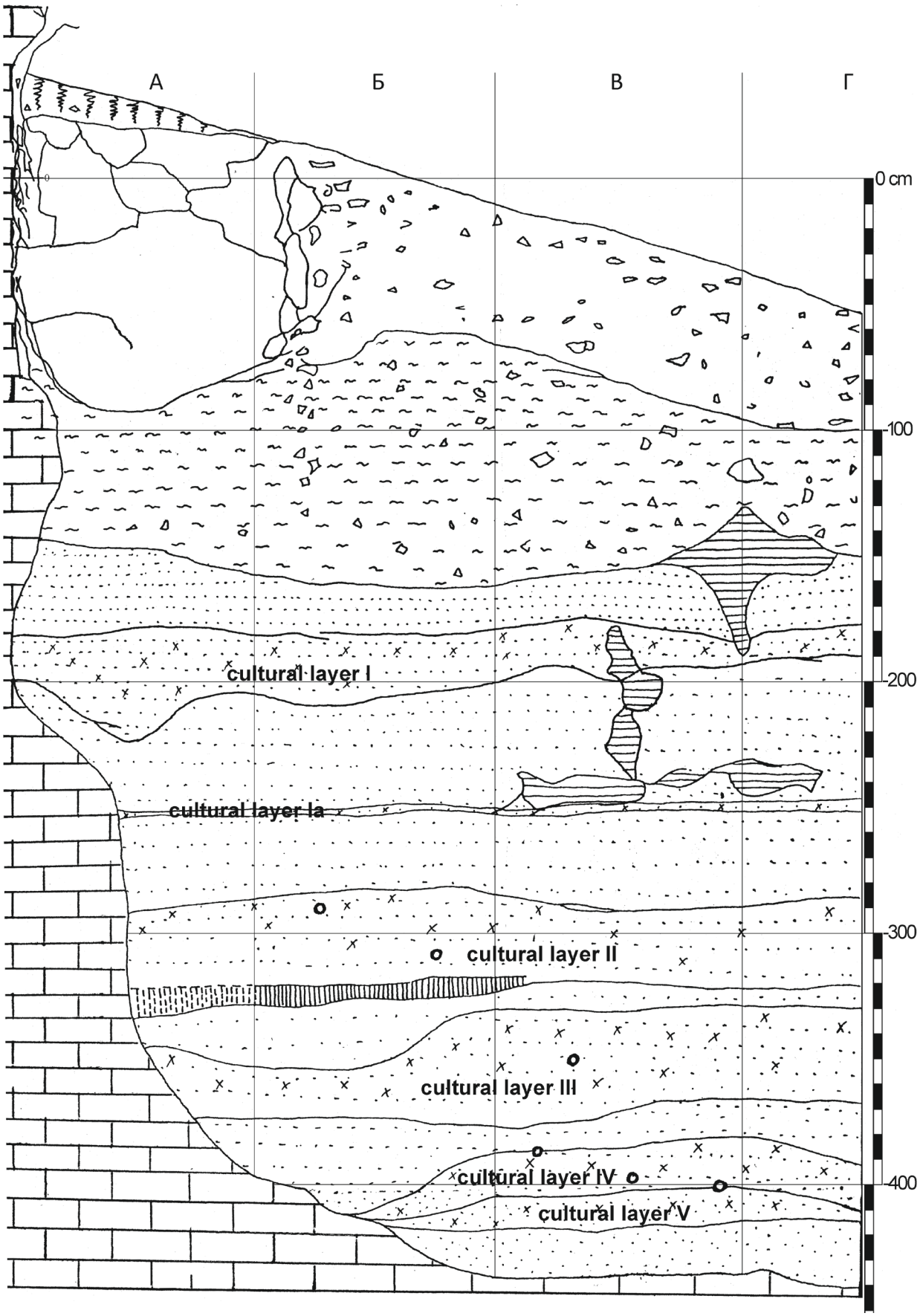


Fig. 4. Zaskalnaya V: drawing of Kolosov´s section along square line 17 and 18 (after Kolosov et al. 1997).

Abb. 4. *Zaskalnaya V: Zeichnung des kombinierten Profils der Grabungen Kolosovs entlang der Quadratmeterlinien 17 und 18 (nach Kolosov et al. 1997).*

East, where large limestone blocks indicate the position of the collapsed ceiling of the former rock shelter. Whereas in this part of the site the present surface is more or less horizontal, it slopes toward the West and the South of Yu. Kolosov´s trench, making further excavations in these areas less promising. The joint excavations of the Crimean Branch of Archaeological Institute of the National Ukrainian Academy of Sciences and the Institute for Pre- and Protohistory of Friedrich-Alexander Universität Erlangen-Nürnberg (FAU) took place in two field campaigns in 2012 and 2013, which lasted two and four months respectively.

Excavation methods follow procedures described by V. P. Chabai (1998b: 177-181). As a rule, the aim is to identify and excavate the surfaces of geological layers and/or occupation surfaces (in contrast to artificial horizontal spits) and to document each archaeological object by mapping and elevation, resulting in three-dimensional documentation of each object. The same is the case for evident structures such as fireplaces or pits. The unit of all excavation activities is the square meter. Once removed, sediments are sieved in two steps: dry sieving on site using 5 mm mesh size, followed by wet sieving using a mesh size of 1.5 mm. The smallest pieces of artifacts and fauna were selected from dried sediments. In many cases, the sedimentation in Crimean rock shelters is caused by continuous gelifraction of the nummulite limestone walls and the roof, resulting in both relatively rapid accumulation of sediments and monotonous layering. Therefore, geological layers are quite thick and – if in situ – often include numerous archaeological levels separated by archaeologically sterile sediments. In cases where burnt material (charcoal, burnt bones, flints, sediments) from fireplaces has been redeposited over larger areas via natural and/or anthropogenic processes, it is possible to identify archaeological levels by color. Another indicator for the presence of archaeological levels is a dense find scatter of bones, artifacts and – if present – burnt materials on intensively occupied surfaces, which also allows for cleaning of the archaeological objects. If the thickness of an archaeological level identified by a find scatter is less than or equal to the thickness of the average bone and, at the same time, that level is separated by archaeologically sterile horizons from the sediments above and below, then it is excavated and documented as one level. Only if the thickness of an occupation level is greater than the average thickness of the faunal remains is it excavated in separate artificial levels, defined by the average size of the largest archaeological items in each case (e.g. bones being 3 cm thick). In cases where find density is low, or sediments are archaeologically sterile, excavations are carried out in 3 cm to 5 cm-thick spits that follow the inclination of the sediments. Accurate excavation of these levels requires the taking of numerous measurements and the observation of the embedding of limestone blocks that indicate the inclination of the original surface.

The excavation method described above includes a distinction between lithological layers and archaeological levels. The term "archaeological levels" is used here as a technical term referring to the identification during the excavations of stratigraphically distinguishable sedimentary units bearing anthropogenetic materials. With the exception of continuous levels, it is also used to refer to spatially clustered patches of sediment different (in color, grain size, texture etc.) from the sediments above and below. Whereas lithological layers are simply counted from top to bottom and labeled with Arabic numerals, the labeling of the archaeological sequence refers to that of Kolosov's excavation (Fig. 5). At that time, no distinctions were made between lithological layers and archaeological levels. To enable correlation with the recent excavations, this study groups the archaeological levels into "Units" which match Kolosov's "cultural layers" (e.g. cultural layer II equals Unit II). The combination of Roman numerals and letters indicates an additional lithological subdivision detected in the present study (e.g. Unit IIA). Within these Units, archaeological levels are indicated by numbers from top to bottom (e.g. II/1, II/2 etc., or IIA/1, IIA/2 etc.) (Fig. 5).

Without the artifacts recovered in Kolosov's back dirt (not used in this study), 355'085 lithic artifacts were documented during the 2012 and 2013 excavations. The generally well-preserved fauna is yet to be counted and includes small mammal fauna as well as one human tooth identified in the field after dry sieving. The present article focuses on a preliminary description of the archaeological sequence, paying special attention to site formation processes and the correlation between the recently documented stratigraphic sequence and that of Kolosov's excavations.

Stratigraphy and chronology

Zaskalnaya V bears the longest Middle Paleolithic stratigraphic sequence reported thus far from a buried rock shelter in Eastern Europe (Fig. 6). Despite the long history of research at this site, the site formation process and the environmental and chronological contexts of the deposits are not yet well understood. The present article, as a discussion of the initial findings of the resumed fieldwork at Zaskalnaya V, aims to clarify the principal stratigraphical problems. However, these are general observations that in part require supplementation by more detailed investigations such as micromorphology, magnetic susceptibility and molecular proxies.

Lithological sequence

In the course of the recent excavations, 23 lithological layers were identified (Fig. 7). The lithological layers are subdivided into Holocene (layers 1 to 6) and Pleistocene (layers 7 to 23) deposits. The colors of the Pleistocene sediments were classified using a MUNSEL soil color chart (2000).

Lithological Layers, 2012-13	Archaeological Units, 2012-13	Archaeological Levels, 2012-13	N Levels (Σ = 87)	Cultural Layers, 1969-94
10a	–	–	-	–
10b	I	I/1, I/2, I/3, I/4, I/5, I/6, I/7, I/8, I/9, I/10, I/11, I/12, I/13, I/14	14	I
10c	–	I/15, I/16, I/17	3	?
11	–	I/11-1	1	I or Ia (?)
12	–			–
13	IAF	IA, IB, IC, ID, IE, IF	6	Ia (?)
14	II	II/1, II/2, II/3, II/4, II/5,	12	II
		II/6, II/6A, II/7		
15	IIA	IIA/1, IIA/2, IIA/3, IIA/4		
16	III	III/1, III/2, III/3, III/4, III/4A, III/5,	34	III
		III/6, III/7-1, III/7-2, III/7-3,		
		III/7-4, III/7-5, III/7-6, III/7-7, III/8,		
		III/9, III/9-1, III/9A, III/10, III/11,		
		III/12, III/13, III/14		
17	IIIA	IIIA/1, IIIA/2, IIIA/3, IIIA/4,IIIA/5,		
		IIIA/6, IIIA/7		
18	IIIB	IIIB/1, IIIB/2, IIIB/3, IIIB/4,		
19a	IV	IV/1	9	IV
19b		IV/2, IV/3		
19c		IV/4, IV/5, IV/5A, IV/6		
19d		IV/7, IV/7-1		
20	V	V/1, V/1A	2	V
20	VI	VI/1	1	VI
21	VIA	VIA/1, VIA/2, VIA/3	3	?
22	VIB	VIB/1	1	?
23	VII	VII/1	1	VII

Fig. 5. Zaskalnaya V: correlation between the cultural and lithological sequences of the 1969-94 and 2012-13 field campaigns.

Abb. 5. *Zaskalnaya V: Korrelation zwischen den archäologischen und geologischen stratigraphischen Einheiten der Grabungskampagnen der Jahre 1969-94 und 2012-2013.*

Holocene deposits are represented by:

1 – modern humus
2 – limestone blocks
3 – humic silt (3)
4 – clay
5 – silt
6 – calcareous breccia

Pleistocene deposits accumulated inside the rock shelter and consist principally of soft sandy limestone sediments:

7 – limestone block fragments of the same origin as the blocks on the slope below the site, resulting from the collapse of the rock shelter's roof;
8 – carbonate crust;
9 – tunnel from bioturbation, originating from root activities of plants;
10a and 10b – granular silt, 10YR, 8/3; hard; contains nummulite debris and medium-grained (10a) to fine-grained (10b) detritus sand;
10c – granular silt, 10YR, 8/3; loose; naturally sorted; contains lenses of rounded small limestone debris alternated with detritus silty sand;
11 – granular silt 2.5Y, 6/3; hard; contains medium to fine-grained detritus sand and a degree of clayey component;
12 – calcareous breccia, 2.5Y, 8/1; very hard; contains eroded limestone debris varying in size, nummulite fragments, carbonate crusts;
13 – granular silt, 2.5Y, 8/2; hard; contains nummulite fragments, medium-grained detritus sand;
14 – granular silt, 2.5Y, 8/3; hard; contains nummulite fragments, medium- to fine-grained detritus sand;
15 – granular silt, 2.5Y, 7/4; the upper part is more yellow in color, 2.5Y, 6/4; hard; contains nummulite fragments, medium-grained

detritus sand, a clayey component and medium-sized (up to 30 by 50 cm) limestone blocks;
16 – granular silt, 10YR, 7/4; the lower part is darker, 10YR, 7/3; hard; contains nummulite fragments, medium- to fine-grained detritus sand and medium-sized (up to 30 by 50 cm) limestone blocks;
16a – granular silt, 2.5Y, 8/2; a lens embedded in the deposits of lithological layer 16; hard; sorted; contains nummulite fragments, medium-grained detritus sand;
17 – granular silt, 10YR, 7/3; contains nummulite fragments, medium-grained detritus sand;
18 – granular silt, 2.5Y, 8/3; loose; naturally sorted; contains nummulite fragments and medium-grained detritus sand;
19a – granular silt, 2.5Y, 7/2; loose; contains nummulite fragments and medium-grained detritus sand;
19b – granular silt, 10YR, 5/3; hard; contains nummulite fragments, medium-grained detritus sand and a low amount of clay;
19c – granular silt, 10YR, 4/2; very hard; contains nummulite fragments, medium-grained detritus sand, carbonate crusts and a low amount of clay;
19d – granular silt, 10YR, 5/3; very hard; contains nummulite fragments, fine-grained detritus sand, carbonate crusts and a low amount of clay;
20 – granular silt, 2.5Y, 6/4; hard; contains nummulite fragments, medium-grained detritus sand, carbonate crusts and a low amount of clay;
21 – granular silt, 10YR, 7/4; hard; contains nummulite fragments, concretions of glauconite, medium-grained detritus sand and carbonate crusts;
22 – granular silt, 2.5Y, 6/3; hard; contains nummulite fragments, glauconite concretions, fine-grained detritus sand, carbonate crusts and a low amount of clay;
23 – granular silt, 5Y, 8/3; hard; contains nummulite fragments, glauconite concretions, fine-grained detritus sand, carbonate crusts and a clay component;
24 – dissolute limestone along the back wall of the rock shelter;
25a – Eocene limestone, back wall of rock shelter;
25b – Cretaceous marl; heavily eroded; contains concretions of glauconite, back wall and step of back wall;
25c – Cretaceous chalky marl; contains concretions of glauconite, step of back wall and floor of rock shelter.

The limited depth of the original rock shelter also implied that the sediments filling the rock shelter were prone to erosion. Evidence of erosion appears in the wavy boundaries between most of the lithological layers (Fig. 8), the presence of size-sorted sediments and cascades of successive depressions (Figs. 9-13). The following section describes the characteristic features of the stratigraphic sequence at Zaskalnaya V from bottom to top.

The surfaces of the lowermost lithological layers (layers 23, 22, 21, 20, 19d, 19c, 19b, 19a and 18) were heavily eroded and correspondingly accumulated on eroded surfaces. Each of them covers an area smaller than the overall excavated area, which is about 4 m^2. Erosional activity is documented by a number of cuts into the sediments of lithological layer 18 and in cascades of depressions on the top of lithological layers 19a, 19b and 19c (Figs. 8, 9, 11). The same erosional features characterize the surfaces of lithological layers 23, 22, 21 and 20 (Figs. 8, 10, 11). Erosional depressions are also found in the marl of a step in the back wall, which correlates with soft deposit in the lower part of lithological layer 17.

The sediments of lithological layers 17, 16, 15, 14, 13 and 12 were distributed throughout the entire excavation area of 4 m^2. They all show signs of erosion. First, the boundaries between all layers were wavy (Fig. 7). Second, layers 17, 16, 15 and 14 were characterized by the presence of erosional depressions. Third, the presence of a lens with size-sorted material in lithological layer 16a is another clear indication of water erosion. Several erosional depressions in lithological layer 16 were filled with burnt and unburnt bones, artifacts and limestone debris (Fig. 7). The total of 13 depressions with burnt infill were spatially distributed on 2 m^2 in the southern part of the excavation area, and partially in stratigraphical contact. Referring to the resulting nested succession of features, these depressions were termed a "complex of burnt lenses". The maximum thickness of the "complex of burnt lenses" is 25 cm (Figs. 12 & 13). The sediments of the burnt lenses contain thin carbonate crusts measuring between 1 cm and 3 cm and including burnt and unburnt bone fragments, artifacts and limestone debris. The current working hypothesis is that the carbonate crusts result from post-depositional processes originating in wet sediments due to evaporation processes (personal communication, M. Händel, Hugo Obermaier Conference, Budapest 2016). Whereas the origin of the filling of most of the depressions from the "complex of burnt lenses" is still unclear, there is at least one case that may indicate the use of a natural depression for the placement of a deepened fireplace. It should be noted here that apart from the "complex of burnt lenses", numerous secure fireplaces in the sense of evident features were excavated in other parts of the sequence as well.

The sediments of lithological layer 10c are water sorted and were deposited in a depression that cuts into the deposits of lithological layers 11 and 12 (Fig. 7). The presence of breccia in lithological layer 12

Fig. 6. Zaskalnaya V: photo of the section along square lines 19/20 and В/Г.
Abb. 6. *Zaskalnaya V: Fotografie der Profile entlang der Quadratmeterlinien 19/20 und В/Г.*

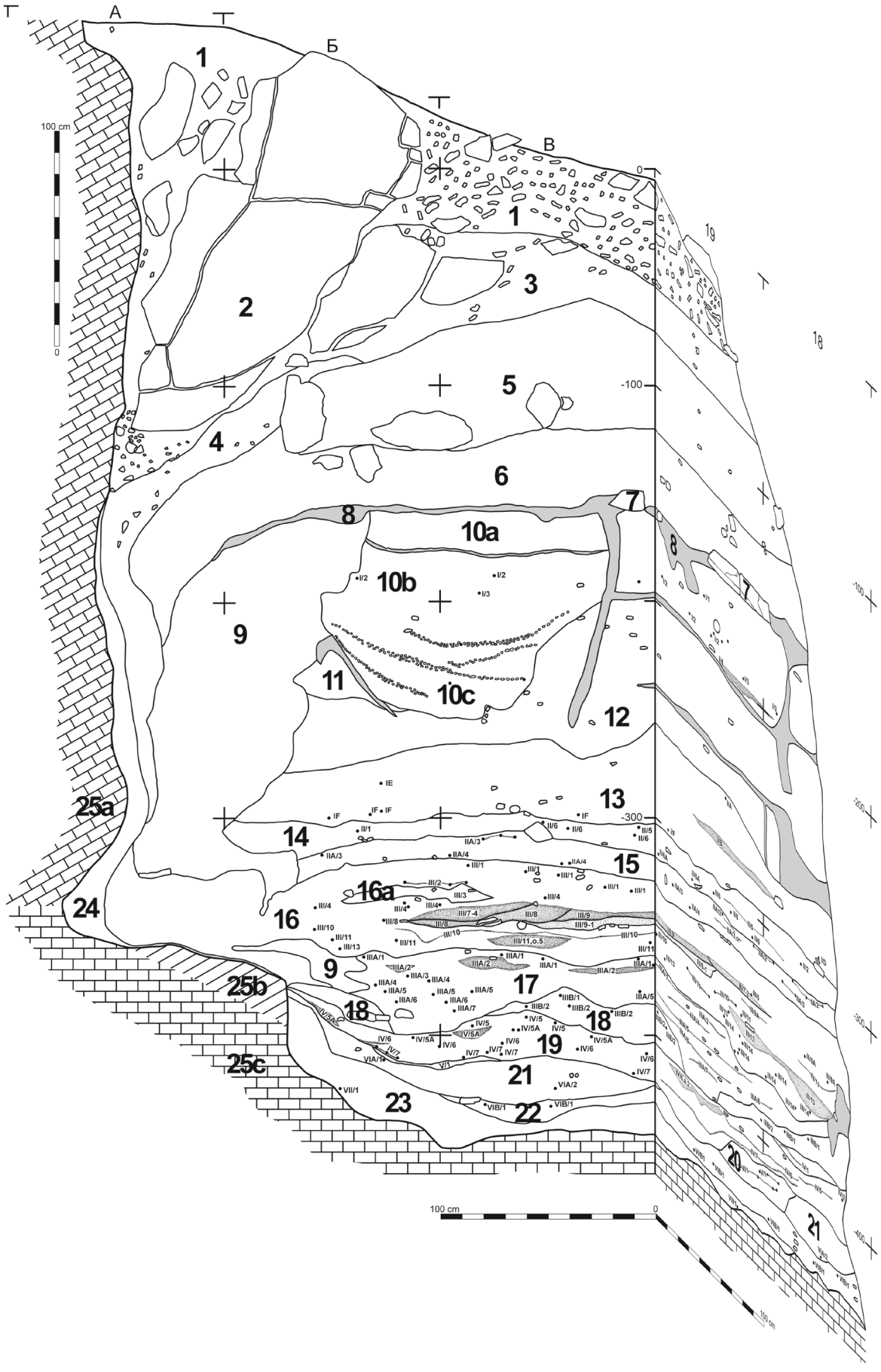


Fig. 7. Zaskalnaya V: section drawing along square lines 19/20 and В/Г.

Abb. 7. *Zaskalnaya V: Perspektivische Zeichnung der Profile entlang der Quadratmeterlinien 19/20 und В/Г.*

Fig. 8. Zaskalnaya V: photo of the lower part of the section along square line 19B/20B, showing lithological layers from layer 16 to bedrock (note: the brownish colors correspond to lithological layers 19a, 19b, 19c and 19d; the sounding lead measures app. 10 cm in length).

Abb. 8. *Zaskalnaya V: Fotografie des unteren Teils des Profils entlang der Quadratmeterlinie 19B/20B ab dem geologischen Horizont 16 (die bräunlichen Sedimente entsprechen den geologischen Horizonten 19a, 19b, 19c und 19d; die Länge des Senklots beträgt ca. 10 cm).*

is a post-depositional effect that resulted from large amounts of moisture in the overlaying deposits. The abrupt end of the Pleistocene sequence is most probably connected to the collapse of the rock-shelter roof, resulting in the large limestone blocks present in lithological layer 7 and the carbonate crust of lithological layer 8. After the roof collapse, the former rock-shelter deposits were without protection against slope erosion. Consequently, traces of Holocene erosion cut a deep channel along the back wall that was filled with lithological layers 6 and 4. It is eminently possible that this erosional activity enabled the formation of the bioturbation tunnel of lithological layer 9. The bioturbation tunnel destroyed parts of the deposits of lithological layers 10a to 18. In this case, the principal agent of the bioturbation was plant roots. The bioturbation tunnel was blocked by limestone boulders from lithological layer 2, which represent the youngest phase of the collapsing rock-shelter ceiling. A number of smaller bioturbation features are krotovinas, present in lithological layers 13, 14, 15, 16, 17 and 19. At the same time, krotovinas represent indirect evidence of the presence of plants. This suggests that plants were present in the rock shelter and supports the assumption that its depth was restricted.

The lower part of the stratigraphical sequence differs in color and clay content from the layers above, indicating pronounced soil formation processes. The brown and somewhat clayish sediments of lithological layers 19a to 22 (Fig. 8) are not homogeneous and most probably reflect one or more phases of soil formation. More detailed studies are in progress, conducted by S. Bussemer, and will be published elsewhere after completion. However, on the basis of previous excavations at Kabazi II, Sary Kaya and Karabai II, it is considered likely that these soil complexes are characteristic of MIS 5 (Chabai 2005; Yevtushenko 2009). Previously, Kolosov (1983) mentioned a high content of carbonates in his "cultural layer IV" (corresponding to lithological layers 19a to 19d) that was interpreted as the result of soil formation processes. The pollen analysis from "cultural layer V" (corresponding to lithological layer 20) demonstrated the presence of beech forest in the surroundings of Zaskalnaya V. According to recent pollen analysis by N. Gerasimenko (2005), the pollen spectra from "cultural layer V" at Zaskalnaya V and from Kabazi II, Stratum 13 are very similar. The latter belongs to the Pryluki pl1b1 Interstadial ("Brörup" or "Saint-Germain I"), which is analogous to sub-stage MIS 5c (Gerasimenko 2005).

Fig. 9. Zaskalnaya V: photo of the undulating surface of lithological layers 19a and 19b.
Abb. 9. *Zaskalnaya V: Fotografie der freipräparierten Oberfläche der geologischen Horizonten 19a und 19b.*

Fig. 10. Zaskalnaya V: photo of the surface of lithological layers 20 and 21.
Abb. 10. *Zaskalnaya V: Fotografie der freipräparierten Oberfläche der geologischen Horizonten 20 und 21.*

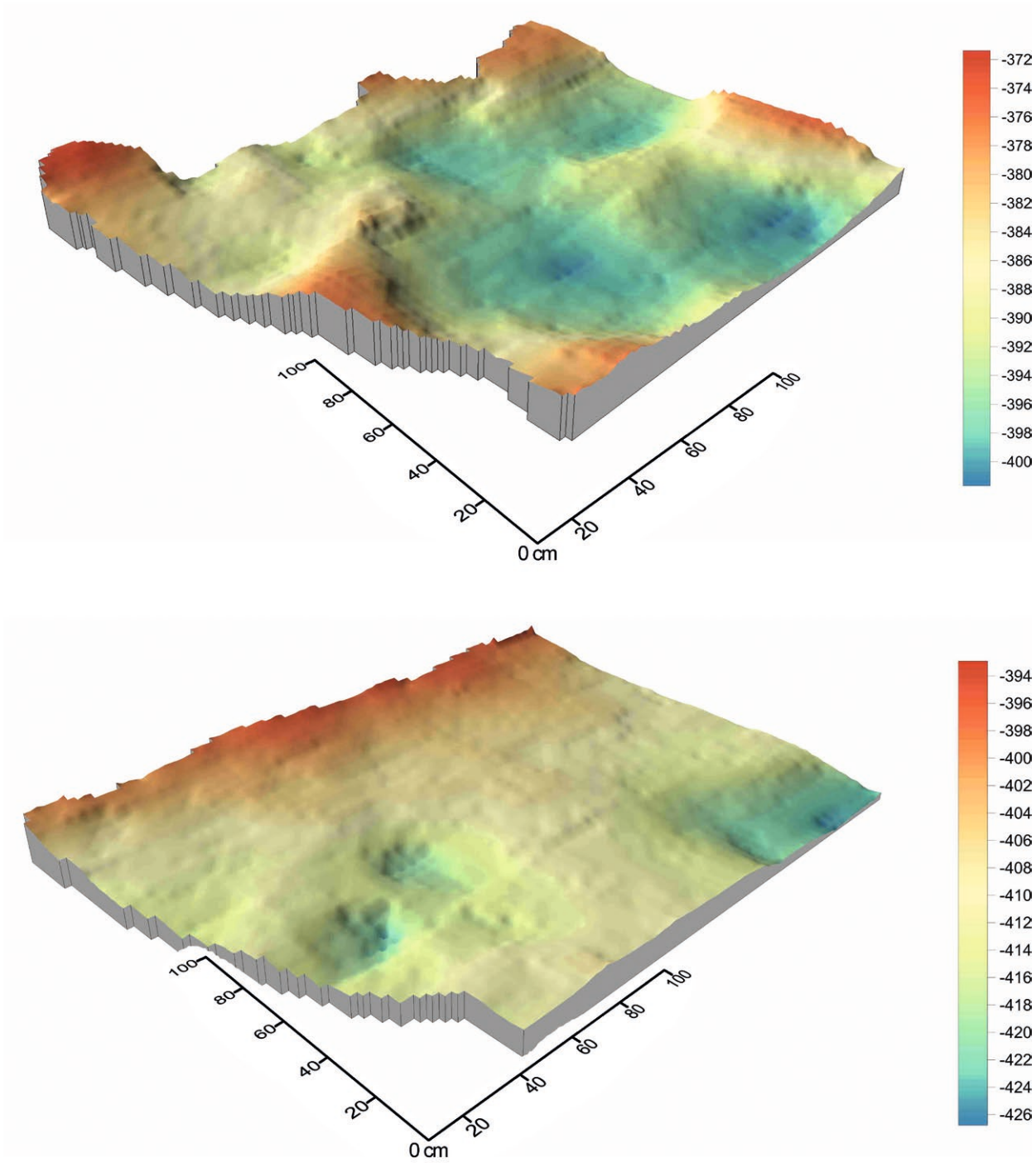


Fig. 11. Zaskalnaya V: 3D model of the undulating surfaces of lithological layers 19a and 19b (above) and layers 20 and 21 (below).

Abb. 11. *Zaskalnaya V: Dreidimensionales digitales Modell der freipräparierten Oberfläche der geologischen Horizonten 19a und 19b (oben) und der geologischen Horizonten 20 und 21 (unten).*

Absolute dating

Two previous studies have attempted to establish absolute dates for the archaeological sequence of Zaskalnaya V (Fig. 14). The first used ESR dating (McKinney & Rink 1996), while the second used bone samples for AMS measurements at Kiev and Groningen (Kolosov & Stepanchuk 2002; Stepanchuk, Kovalukh & Van der Plicht 2004). The main problem affecting these two dating campaigns lies in the lack of documentation of the exact stratigraphical provenance of the submitted samples. With regard to radiocarbon dating, another difficulty occurred in the past at several Crimean Middle Paleolithic sites, namely low collagen content in the bones taken as a sample. In addition, the bulk of dates established thus far for the Crimean Middle Paleolithic were obtained on bone. Therefore, one aim of the renewed fieldwork at Zaskalnaya V was to obtain charcoal samples, which

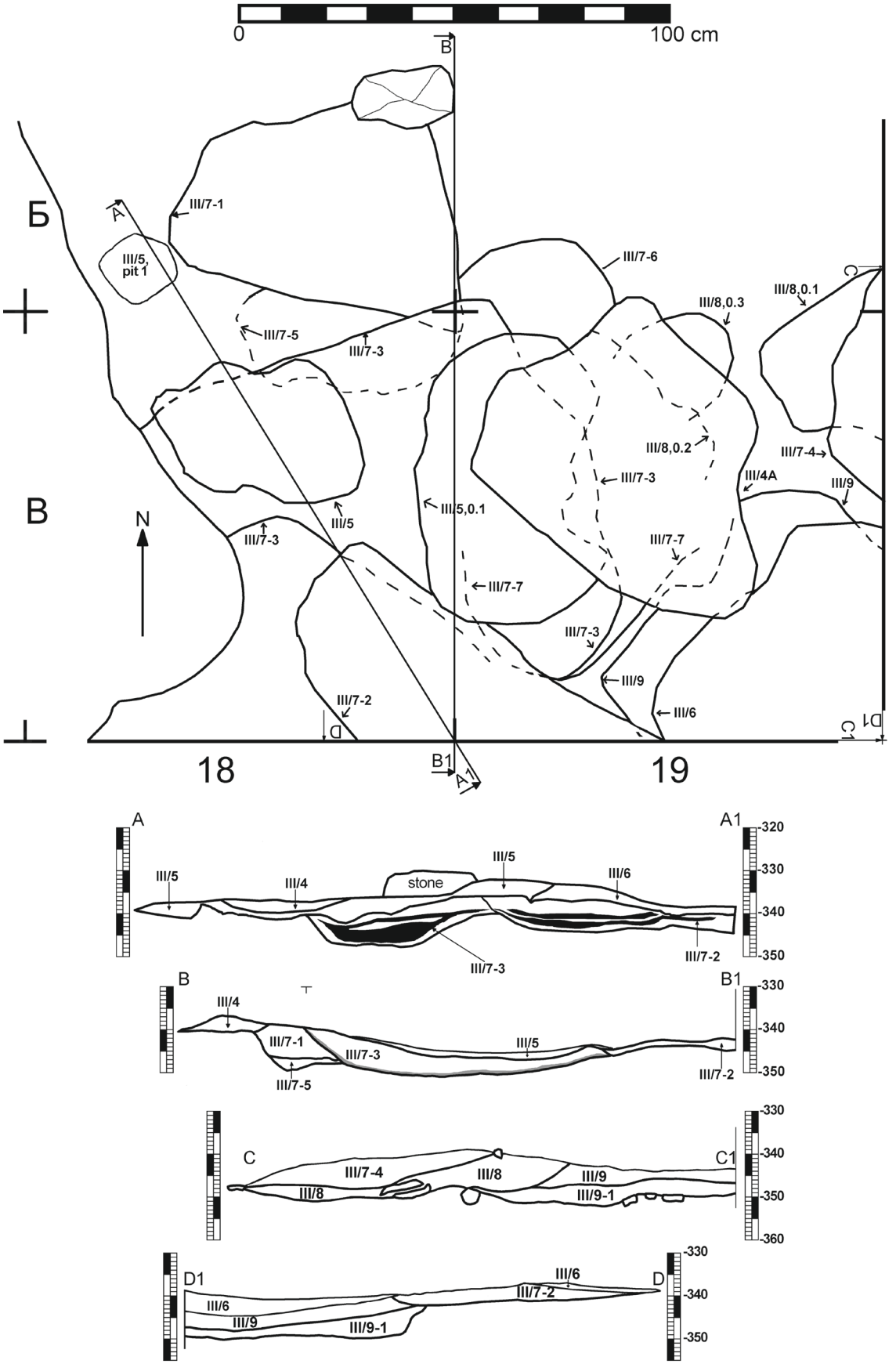


Fig. 12. Zaskalnaya V, levels III/4A through III/9: drawings of the plan (top) and sections (bottom) of the "complex of burnt lenses" (to note: every lens recognized was excavated as a separate archaeological level).

Abb. 12. *Zaskalnaya V, archäologische Horizonte III/4A bis III/9: Zeichnerische Dokumentation der Aufsicht (oben) und der Profile (unten) des „Komplexes mit Linsen verbrannten Materials" (zur Beachtung: jede Linse wurde als separater archäologischer Horizont ausgegraben).*

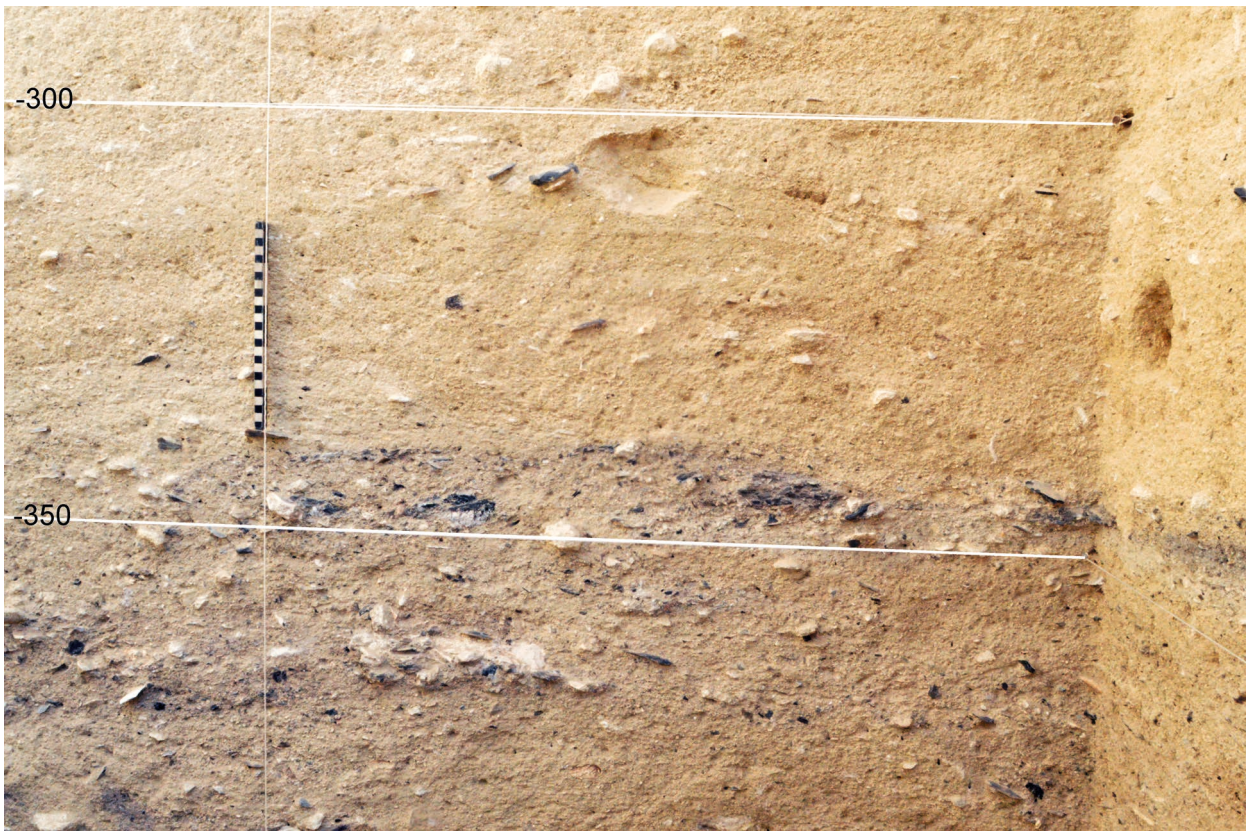


Fig. 13. Zaskalnaya V, "complex of burnt lenses": photo of the section along square line 19B/20B.

Abb. 13. *Zaskalnaya V, "Komplex mit Linsen verbrannten Materials": Foto des Profils entlang der Quadratmeterlinie 19B/20B.*

Lithological layers	Kolosov´s excavation	excavations 2012-13	dated material	ESR dates		radiocarbon dates		
	„Cultural layers"	Arch. levels	Samples	Mean ESR, EU	Mean ESR, LU	AMS, lab.-nr.	AMS dates , uncalBP	AMS dates, calBP*
10b, 10c (?)	I		Bone			Ki-10891	28'850±400	33'301±506
			Bone			Ki-10744	30'080±350	34'291±266
14, 15 (?)	II		Bone			Ki-10743	31'600±350	35'546±526
			Tooth	24'900±2'300	41'800±3'100			
14		II/1	Bone			**OxA-35786**	**41'600±1'400**	**45'235±1'437**
15		IIA/3	Charcoal			**OxA-35253**	**37'350±500**	**42'035±403**
16	III	III/5	Charcoal			**OxA-35602**	**32'000±800**	**36'490±1'214**
16		III/5	Charcoal			**OxA-35526**	**42'700±1'100**	**46'388±1'533**
16, 17, 18 (?)			Tooth	20'900±1'800	32'000±2'100			
			Bones			Ki-10603	39'200±520	43'350±620
19a-d (?)	IV		Tooth	21'000±2'100	32'400±3'400			
			Burnt bone			GrA-13916	>46'000	-
			Bone			Ki-10603(?)	>47'000	-

Fig. 14. Zaskalnaya V: absolute dates (radiocarbon dates in bold are new dates on samples from the 2012-13 field campaigns, radiocarbon dates in black after Kolosov & Stepanchuk 2002 and Stepanchuk, Kovalukh & Van der Plicht 2004, ESR dates after McKinney & Rink 1996; *radiocarbon dates were calibrated with CalPal, Version 2016.2, using the Hulu 2007 CalCurve: Weninger & Jöris 2008; in bold: dates obtained in the frames of the present project).

Abb. 14. *Zaskalnaya V: Absolute Datierungen (^{14}C-Daten in fett: neue AMS-Datierungen an Proben aus den Grabungen 2012-13, ^{14}C-Daten in schwarz nach Kolosov & Stepanchuk 2002 und Stepanchuk, Kovalukh & Van der Plicht 2004, ESR-Daten nach McKinney & Rink 1996; *die Kalibration der ^{14}C-Daten erfolgte mit CalPal, Version 2016.2, Kalibrationskurve: CalPal2007_HULU: Weninger & Jöris 2008; fett: Datierungen aus dem vorliegenden Projekt).*

would act as controls to the existing data using an alternative material that is additionally reputed to be less prone to contamination (Jöris et al. 2003). Control data of this kind is a gap in the research on the absolute chronology of the Crimean Middle Paleolithic; the filling of this gap is desirable due to the questions raised in the past around the AMS dates for the final Crimean Middle Paleolithic (Pean et al. 2013). Prior to the present study, the only radiocarbon date on charcoal in the Crimean Paleolithic originated from a Micoquian occupation at Kabazi V, level III/5-3B2, and gave a date of (OxA-14726) 38'780 ± 360 BP (Housley et al. 2007) or 43'140 ± 600 calBP (Fig. 14). All in all, we were able to recover 36 charcoal samples, which, together with one bone retoucher, were sent to the Oxford Radiocarbon Accelerator Unit (ORAU). The bone collagen underwent ultrafiltration (ORAU pretreatment code AF), whereas the charcoal samples were too small for an ABOx pretreatment and an ABA pretreatment (ORAU pretreatment code ZR) was used (Brock et al. 2010). Unfortunately, 33 of the 36 charcoal samples failed due to no yield during the base stage. We assume that this was principally due to the small size and poor preservation of the samples. In some rare cases from Unit I, we had bagged samples of extremely small pieces of fragmented charcoal. We present here the findings of the three AMS measurements on charcoal and one on bone and compare them briefly to the existing absolute dates (Fig. 14). The bone sample (OxA-35786) was found in square 18B of level II/1 in a depth of -312 cm below datum. One charcoal sample (OxA-35253) stems from dry sieving of sediments from an erosional depression excavated in sq. 19B of level IIA/3. Finally, two charcoal samples (OxA-35602 and OxA-35526) were found at similar depths (-337 cm and -339 cm below datum) in sq. 18B of level III/5 and were recovered from the "complex of burnt lenses". The finite AMS dates obtained in Kiev and Groningen for Kolosov's Units I to III fall within a range between 33.3 ka calBP and 39.2 ka calBP (Fig. 14) and are consistent with stratigraphical sequence. The recently obtained AMS dates come from Unit II/ 1 to Unit III/5 and fall within a time range between 36.4 calBP and 46.3 calBP (Fig. 14). In general, these dates from robustly pretreated samples confirm the late chronology of the upper part of the sequence at Zaskalnaya V. In the light of the dates on charcoal, it seems likely that the dates from Unit I obtained on bone more than 10 years ago are reliable and date this part of the sequence as recently as between 35.5 ka calBP and 33.3 ka calBP. We would emphasize here that such recent absolute AMS measurements for the final Middle Paleolithic are far from being isolated findings in the Crimea record (cf. e.g. Uthmeier 2012) and thus cannot be explained simply by methodical problems at the end of the ^{14}C-scale. However, both the ESR dates and the recently obtained AMS dates are in contradiction with stratigraphic sequence. Because bioturbations were not observed in the parts of the excavation sampled for radiocarbon dating, we explain the inconsistency of the AMS dates from Oxford by erosional activity actually traced in lithological layers 17, 16, 15 and 14. These cut into older levels and led to an admixture of charcoals of different ages, as illustrated by the samples from lithological level 16 (Fig. 14: OxA-35602 and OxA-35526). Despite the difference in the AMS dates of approximately 10'000 years, the horizontal distance between these two samples is 20 cm and the vertical distance measures 2 cm only. Consequently, the more recent date of (OxA-35602) 36'490 ± 1'214 calBP has to be taken as the maximum age for that layer and a *terminus post quem* for the archaeological levels from above. A potential transportation of archaeological items by low-energy processes accounts not only for charcoal, which is represented by very small pieces weighing a few grams, but also for bones, which are - except for a few relatively large pieces of mammoth tusk - fragmented and usually represented by small pieces of tube bones.

With the data at hand, it is possible to formulate a hypothesis on the overall chronology of the sequence. In this regard, it is necessary to keep in mind the fact that the site formation process, as revealed by the new excavations, included not only different degrees of erosion and spatially restricted bioturbation, but also stratigraphic breaks in the lower part. The naturally sorted sediments of lithological layer 18 appear to represent evidence of erosional processes which were responsible for both a stratigraphic and a chronological break between the deposits of lithological layer 19a (being out of the radiocarbon timescale) on the one hand, and the upper part of the section on the other. Generally speaking, the most part of the Pleistocene section – lithological layers 10b down to lithological layer 17 – might be dated to between 33.3 ka calBP and 43 ka calBP. If the absolute dates obtained so far for the uppermost "cultural layer I" and the assumed correlation of the lower part of the sequence with MIS 5 are correct, then a minimum of about 3 m of deposits accumulated during a timespan between late MIS 5 and the end of MIS 3. However, exact sedimentation rates are impossible to estimate, as unknown volumes of sediment have been moved in and out by recurrent erosion. At the same time, the absence of weathering traces on artifacts and bones, which also include micro-fauna, and the excellent preservation of dry-land snails and thin lenses interpreted as fireplaces suggest relatively rapid conservation of occupation surfaces – a point we will discuss in greater detail in the following section.

Archaeological sequence

Primarily on the basis of the presence of "sterile" sediments with thicknesses between 15 cm and 50 cm, Kolosov (1983) subdivided the archaeological sequence of Zaskalnaya V into eight "cultural layers"

with thicknesses varying between 10 cm and 45 cm (Fig. 4). However, no sterile sediments were observed in between "cultural layers" IV, V and VI. Despite the fact that the main section of the 2012 to 2013 excavations is close to that described by Yu. Kolosov (Fig. 4), archaeologically sterile sediments in our excavation rarely reached a maximum thickness of 10 cm and usually measured between 2 cm and 6 cm (Fig. 7). This resulted in a substantially higher stratigraphical resolution of the archaeological sequence. The recent excavations in 2012 and 2013 identified no fewer than 87 archaeological levels (Fig. 5). Whereas most of these were separated by sterile sediment, there were no sterile sediments between the archaeological levels of lithological layer 18, a finding recognized as the result of erosive processes. Therefore, the archaeological materials from lithological layer 18 were excavated in artificial spits with a depth of 2 - 3 cm after initial cleaning of the uppermost items. A similar situation occurred in the "complex of burnt lenses", which again were found superimposed without sterile sediments, but showed differences in the color, density and structure of the burnt materials (Fig. 13) that allowed an excavation by (a total of 13) archaeological levels (Fig. 12). In all cases, the filling was excavated in a minimum of two parts in order to obtain a profile, and the excavation of the filling was oriented toward the preparation of the original lower surface of the feature.

Figure 5 gives an overview of the correlation between the archaeological levels and the lithological layers documented in 2012 and 2013, and between the archaeological sequence of the recent excavation and those of Kolosov. To make correlations easier, archaeological levels from 2012 and 2013 are pooled into units whose Roman numerals correspond to Kolosov's labeling. In accordance with the specificity of their formation process, the archaeological levels are subdivided into groups A to D.

Archaeological levels, group A: thin horizons

The first group is represented by archaeological levels that consist of thin, "carpet"-like horizons of artifacts, faunal remains and concentrations of burnt material. Usually, the average thickness of such archaeological levels is a few centimeters, but may increase to between 5 - 6 cm in concentrations of burnt material. In most cases, the levels are separated by 2 - 6 cm thick sterile sediments. The "carpet"-like preservation is best explained by *in-situ* conditions combined with rapid sedimentation rates. Such favorable conditions of preservation were found in 48 archaeological levels: I/1, I/2, I/3, I/4, I/5, I/8, I/9, I/10, I/11, I/12, I/13, I/14, IA, IB, IC, ID, IE, IF, II/1, II/2, II/3, II/4, II/5, II/6, IIA/2, IIA/3, IIA/4, III/1, III/2, III/3, III/4, III/7-6, III/10, III/11, III/13, IIIA/1, IIIA/2, IIIA/3, IIIA/4, IIIA/5, IIIA/6, IIIA/7, IV/1, IV/5, IV/5A, IV/6, IV/7 and V/1. Stratigraphically, the remarkably thin find scatters are best explained by the preservation of an original surface on which the artifacts and faunal remains were discarded. One important indication of this is the orientation of larger finds. The vertical orientation ("dip" according to Dibble et al. 1997) of the long axis of most of the artifacts (as observed during the excavations) followed the topography of the surface. The horizontal orientation of the long-axis of larger finds ("strike" according to Dibble et al. 1997) was random and not following any dominant direction (for the random horizontal orientation of bones see Figs. 15 & 17). Together with large amounts of chips and micro-debitage and the excellent preservation of lithic tools and faunal remains, all macroscopic features speak against severe post-depositional processes and for the presence of well preserved remnants of former occupation surfaces. While it is desirable to verify this hypothesis, which is based primarily on observations documented during the excavations, through further analysis such as the refitting of artifacts or micro-morphological analysis, we are nevertheless aware that even the preservation of well preserved remnants of former occupation surfaces does not necessarily exclude a palimpsest of archaeological finds discarded on the same surface during different successive occupations. It follows that low-energy post-depositional processes caused by running water, freezing and thawing and/or human activities such as trampling may still occur, in some cases even leading to a spatially different preservation of evident structures such as fireplaces found on the same surface (for numerous examples from Kabazi V see Chabai & Veseslky 2007).

Several fireplaces (also termed "hearths" in the original drawings) were observed in these levels. If unaltered by natural and cultural site formation processes, fireplaces show an internal stratigraphy comprising a minimum of two layers: the upper layer consists of burnt material such as burnt bones, flints, limestone pieces, charcoal and/or ash, whereas the lower layer is indicated by burnt sediments. In addition, fireplaces may be placed on an unaltered surface, then being classified as a "simple fireplace" or – when placed in a depression – as a "deepened fireplace" (Chabai & Veselsky 2007). In the case of depressions, the configuration of the side walls and the base of the feature may serve to distinguish between natural and artificial depressions (e.g. pits). Only if side walls show pronounced angles and bases are more or less flat are depressions considered to represent anthropogenic pits. Completely preserved fireplaces with burnt materials and burnt sediments below were found in five archaeological levels of this group: IIA/3 (simple), III/13 (simple), IIIA/5 (simple and deepened) (Figs. 15, 16), IV/5A (deepened) and IV/6 (simple) (Fig. 17). Ovoid areas of burnt sediments without burnt material on top, interpreted as the lower, better-preserved parts of former fireplaces, were encountered in three archaeological levels: IIA/2, IIIA/4 and V/1. All fireplaces are of ovoid shape. The maximum diameter of the fireplace features varies

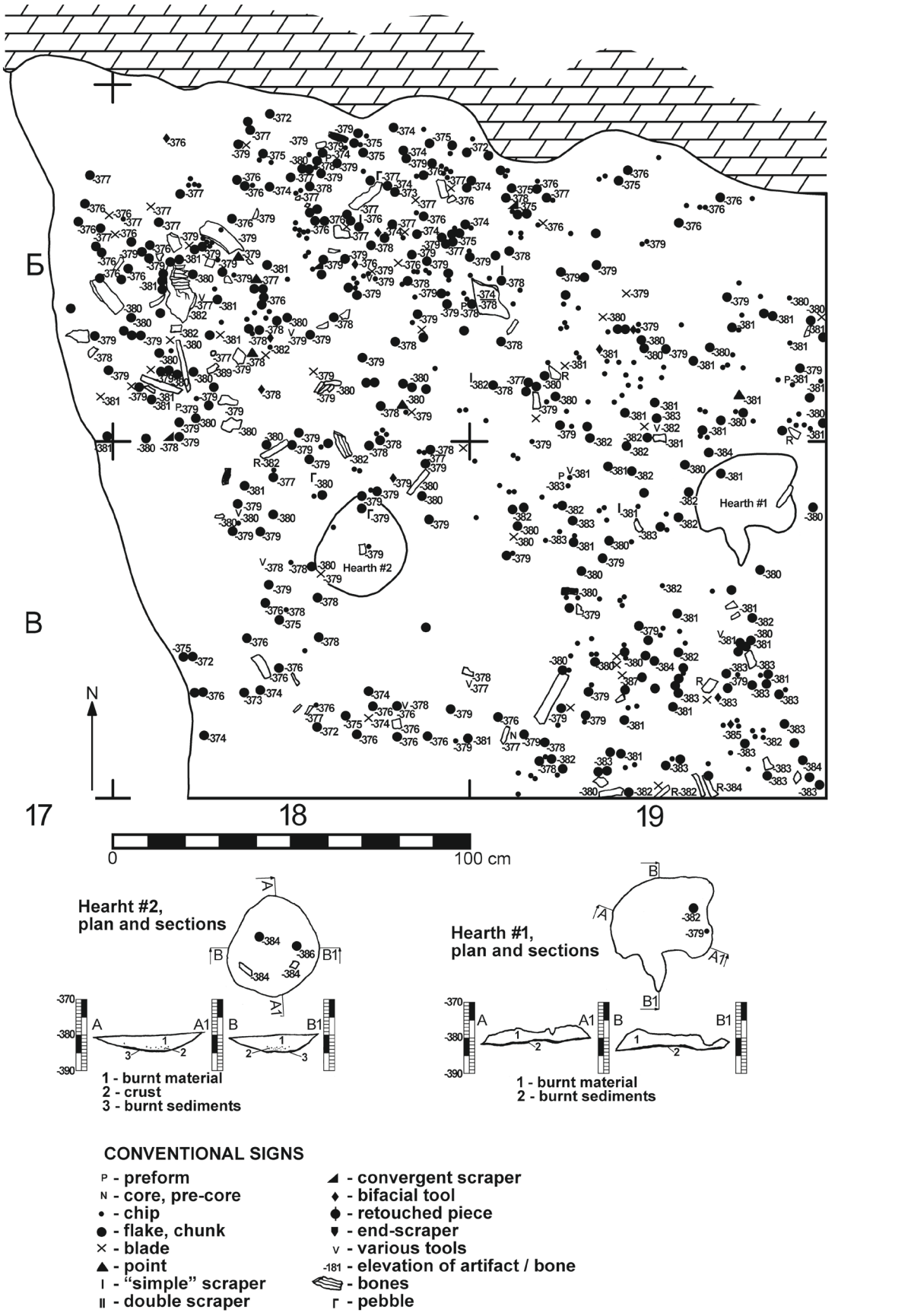


Fig. 15. Zaskalnaya V, level IIIA/5: plan of the archaeological level and sections of hearths #1 and #2 (to note: hearth #1 is a simple fireplace and hearth #2 is a deepened fireplace; both fireplaces have burnt sediments below).

Abb. 15. *Zaskalnaya V, archäologischer Horizont IIIA/5: Verteilung der evidenten Befunde, Knochen und Steinartefakte auf der Begehungsoberfläche sowie Profile der beiden Feuerstellen (Feuerstelle #1 ist eine einfache Feuerstelle, Feuerstelle #2 ist eine eingetiefte Feuerstelle; beide Feuerstellen weisen verbrannte Sedimente unterhalb des Brennmaterials auf).*

Fig. 16. Zaskalnaya V, level IIIA/5, detail: burnt material in hearth #1 (hearth #1 is a completely preserved simple fireplace with burnt sediments below).

Abb. 16. *Zaskalnaya V, archäologischer Horizont IIIA/5, Detailfoto: Feuerstelle #1 nach der Freilegung der Oberfläche des Brennmaterials (an der Basis des Befundes fanden sich nach Abtragen des Brennmaterials verbrannte Sedimente).*

between 21 cm and 43 cm. The depth of deepened fireplaces is 5 - 6 cm. All deepened fireplaces have shallow walls and a rounded floor. This indicates that these "deepened" fireplaces were placed in preexisting natural depressions. In contrast to fireplaces, for which the presence of a distinct area of burnt sediment is the minimum requirement, numerous depressions were observed that lack this attribute, but contained archaeological material. The assumption here is that these are natural depressions in which the archaeological materials were trapped by low energy natural agents and/or deposited by humans. Isolated depressions (in contrast to the densely packed "complex of burnt lenses") filled with archaeological material originate from the following levels: I/5, IIA/3, IIA/4, III/1 and IIIA/6. Depressions featuring the combination of burnt materials and carbonate crusts were found in seven levels: III/7-6, III/10, III/1, III/13, IIIA/1, IIIA/2 and IIIA/3.

Archaeological levels, group B: remnants of eroded and/or spatially restricted occupations

Group B comprises remnants of heavily eroded occupations and/or small parts of occupations that must have been distributed over larger areas of the previous excavations. In our excavations, the area of these levels usually measured less than one square meter. The restricted spatial distribution makes observations concerning the presence or absence of underlying and/or overlying sterile sediments highly problematic. It is probable that some of the levels of group B are in fact unrecognized parts of levels of the first group. However, secure connections between the archaeological materials from levels of this group and those from levels above and below were not detectable. Nineteen small remnants of previously excavated and/or partly eroded archaeological levels were identified: I/6, I/7, I/11-1, II/6A, II/7, IIA/1, III/8, III/9A, III/12, IV/2, IV/3, IV/4, V/1A, VI/1, VIA/1, VIA/2, VIA/3, VIB/1, and VII/1. Of these, archeological level III/8 belongs stratigraphically to the "complex of burnt lenses". It is represented by a remnant of 1 m^2 of the original occupation horizon truncated by the uppermost natural depression (Fig. 12). Due to the restricted spatial extension of these levels, features are rare. In archaeological level V/1A the remnants of a simple fireplace were found near the back wall of the rock shelter (Fig. 18). In level III/9A, an erosional depression with carbonate crusts was unearthed.

Archaeological levels, group C: natural depressions with natural accumulation of cultural remains or intentional anthropogenic filling

Group C is represented by depressions filled with

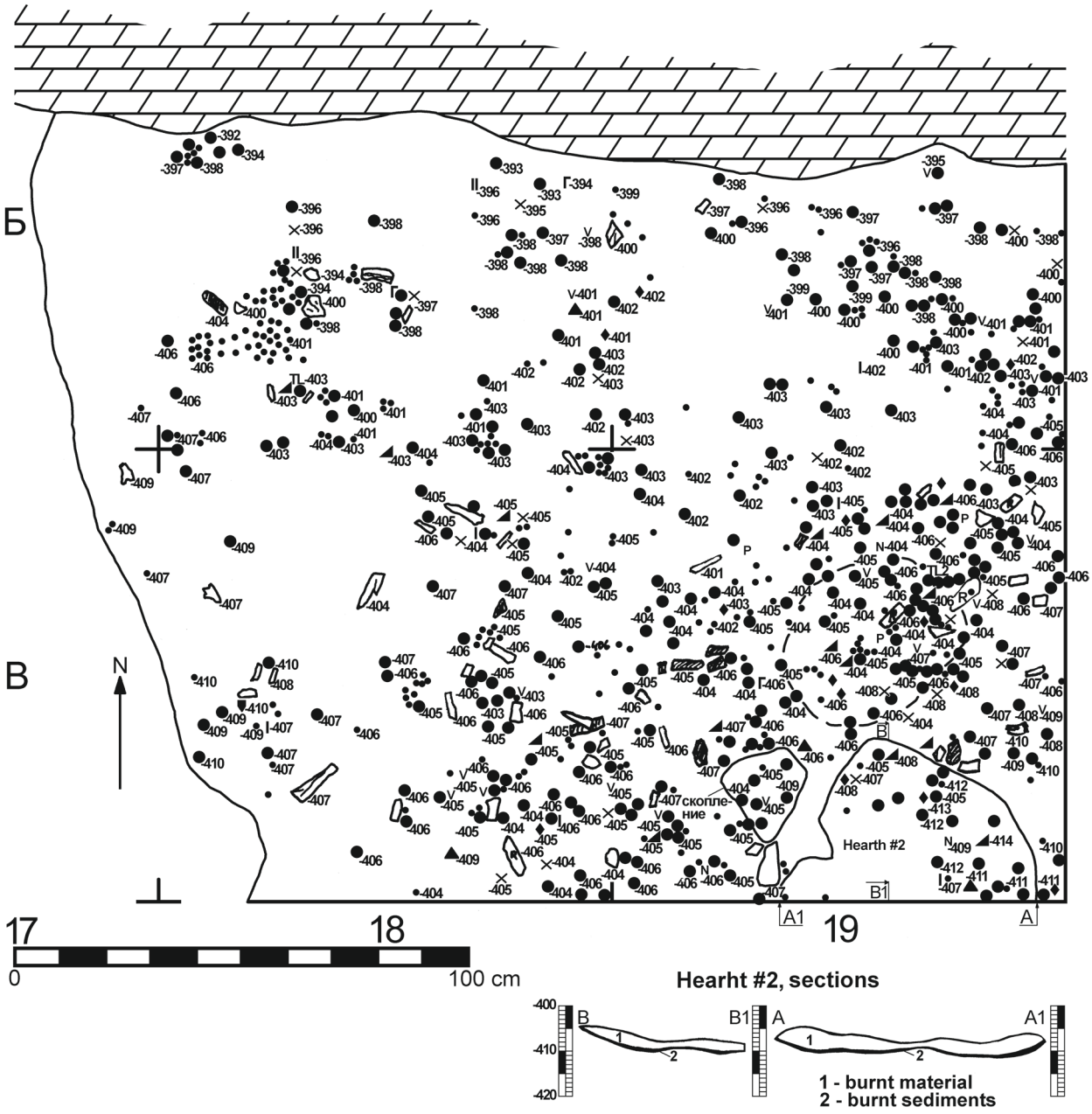


Fig. 17. Zaskalnaya V, level IV/6: plan of the archaeological level and section of hearth #2 (the dotted line shows the provenance of the sediments that contained the human tooth; for conventional signs see Fig. 15).

Abb. 17. *Zaskalnaya V, archäologischer Horizont IV/6: Verteilung der evidenten Befunde, Knochen und Steinartefakte auf der Begehungsoberfläche sowie Profile der Feuerstelle #1 (gestrichelte Linie: Abtrag der Sedimente, die nach dem Sieben den Neandertalerzahn ergaben; für alle anderen Signaturen siehe Abb. 15).*

artifacts, faunal remains and burnt material. They were excavated in lithological layers that were otherwise found in primary context. Each of these depressions is smaller than 1 m^2, of ovoid or irregular shape and no more than 10 cm thick. Because it was not possible to define a clear stratigraphic connection between the depressions and the archeological levels studied in larger areas, the depressions were excavated separately and thus formally treated as "archeological levels". The total number of levels that constitute a depression is 13. Six of them are filled by archeological material only: III/6, III/7-4, III/7-5, III/9-1, III/14 and IV/7-1. Another six contain both archeological material and carbonate crusts: III/4A, III/7-1, III/7-2, III/7-3, III/7-7 and III/9. One of the depressions in level III/5 contains traces of burnt sediments on the floor, suggesting that it represents the remnants of a fireplace in a natural depression. With the exception of III/14 and IV/7-1, which come from other parts of the sequence, all archaeological levels of group C belong to the "complex of burnt lenses" (Figs. 12 & 13). What can be said with some certainty is that the artifacts and bone fragments in the archaeological levels of group C accumulated in natural depressions.

Fig. 18. Zaskalnaya V, level V/1A, hearth: 1 – plan, 2 – section (the orange color of the sediment visible at the base of the fireplace is the result of burning).

Abb. 18. *Zaskalnaya V, archäologischer Horizont V/1A, Feuerstelle: 1 – Aufsicht nach Freilegung, 2 – Profil und Unterkante des Befundes (die Rotfärbung des liegendes Sedimentes ist einer Folge der Hitzeeinwirkung durch die Feuerstelle).*

The origin of these depressions is – apart from the one from level III/5 – more uncertain and is as likely to be connected to animal activity as to erosion. However, naturally sorted detritus sand, as the main attribute of water erosion, was not found in these depressions, excluding any hypothesis that might argue for distant transportation of both sediments and archaeological material. The possibility, therefore, that the archaeological material was moved into these depressions by Neanderthals cannot be excluded. Due to the unspecific character of the archaeological finds in the depressions, it will most probably remain impossible to conclude with certainty whether these accumulations were caused by movements of human agents on the surface or by intentional removal of material in the close surroundings that was perceived as being disruptive. Kolosov (1983: 48), who found similar burnt lenses in the deposits of "cultural layer II", hypothesized that Neanderthals would rake the hot material out of the fireplaces to increase the heated area of the rock shelter. It is certain that the comparable depressions in group A, at least, demonstrate a clear stratigraphic connection to occupational surfaces and therefore the potential that humans had filled the natural depressions.

Archaeological levels, group D: sediments indicative of water erosion

Group D is represented by archaeological levels found in naturally sorted sediments of lithological layers 10c (I/15, I/16, I/17) and 18 (IIIB/1, IIIB/2, IIIB/3, IIIB/4). Artifacts and bones in these levels show clear signs of transport by water.

Archaeological finds

Archaeological finds include lithic artifacts, faunal remains and one human tooth. The preservation of archaeological materials from levels of group A to C is good, speaking for rapid coverage of the occupation surfaces and against severe post-depositional processes. In addition, these levels bear all size classes, with a clear preponderance of small and very small objects; this again points to no, or low-energy, transportation of the finds, leading to no sorting. Previous publications had already demonstrated that Zaskalnaya V is a site rich in finds. The number of lithic artifacts which were washed, labeled and inventoried during our excavations confirms this. The total number of lithic artifacts excavated in 2012 and 2013 comes to 355'085 pieces. Due to careful sieving and their excellent preservation, more than 96 % of artifacts in each level are represented by chips smaller than 3 cm in maximum dimensions (Fig. 19). Faunal remains are yet to be counted. The sheer number of artifacts, however, is an impressive finding in and of itself. Including the sterile sediments, the excavated cubature accounts for 12 cubic meters, resulting in an average density of 29'590.4 artifacts per cubic meter. A more detailed discussion of find densities is useful only for archaeological levels in Group A (Fig. 20), which were distributed throughout the entire excavation area and each represent the *in-situ* discard of one or several occupations on the same occupation surface. The values for the density of artifacts per m^3 in these levels range between 132 (archaeological level IC) and 6'267 (archaeological level IV/1). The arithmetic mean is 2'365.9 artifacts per m^3, with a large standard deviation of 1'739.1. A more informative value is the median of 1'777.0 artifacts per m^3, which shows that the statistical spread of values is left-skewed, that is, there are more cases with higher artifact density than the median. A comparison of the densities from our fieldwork at Zaskalnaya V with existing data from other Crimean Middle Paleolithic sites can only detect tendencies due to the small size of the excavated area, which increases the risk that only a non-representative part of the former discard was recorded. However, even with this limitation, it is clear that the density of artifacts in many levels of Zaskalnaya V is extraordinarily high. In the most recent synoptic comparative study of 80 *in-situ* archaeological levels from 16 multi-layered Middle Paleolithic sites in the Crimea (Chabai & Uthmeier 2006), the range of artifact densities per m^3 is from 8.3 artifacts per m^3 (Kabazi II, archaeological level III/7; Crimean Micoquian: Chabai & Uthmeier 2006, Tab. 18-7) to 1'834.5 (Kabazi V, archaeological level III/1A, Crimean Micoquian: Chabai & Uthmeier 2006, Tab. 18-9). In the light of the new excavations, the values calculated for Zaskalnaya V on the basis of the data given by Kolosov (1986), of between 261.8 and 975.9 (Chabai & Uthmeier 2006, Tab. 18-99), are clearly an underestimate.

Hominin remains

One Neanderthal tooth was found during dry sieving (5 mm sieve) of sediments excavated from the central part of square 19B in elevations from -404 to -406 cm. Stratigraphically, the find belongs to level IV/6 (Fig. 17). According to a preliminary classification (personal communication, J.-J. Hublin, Max Planck Institute for Evolutionary Anthropology, Leipzig), it is a worn first upper deciduous molar. The tooth was given to the Max Planck Institute in Leipzig for further analysis.

Lithic artifacts

To facilitate comparison with the existing assemblages from Kolosov's excavation, lithic artifact assemblages from the 2012 and 2013 excavations are grouped in accordance with his "cultural layers" (Fig. 5). The classification of lithic artifacts follows Chabai & Demidenko (1998).

Nearly all lithic artifacts are made on high quality grey to black flint plaquettes from outcrops in chalk or marl deposits. The nearest source is a secondary one at the banks of the Bijuk Karasu River, only 500 m from the site. There is also one known primary outcrop at a distance of approximately 2.5 km to Zaskalnaya V near

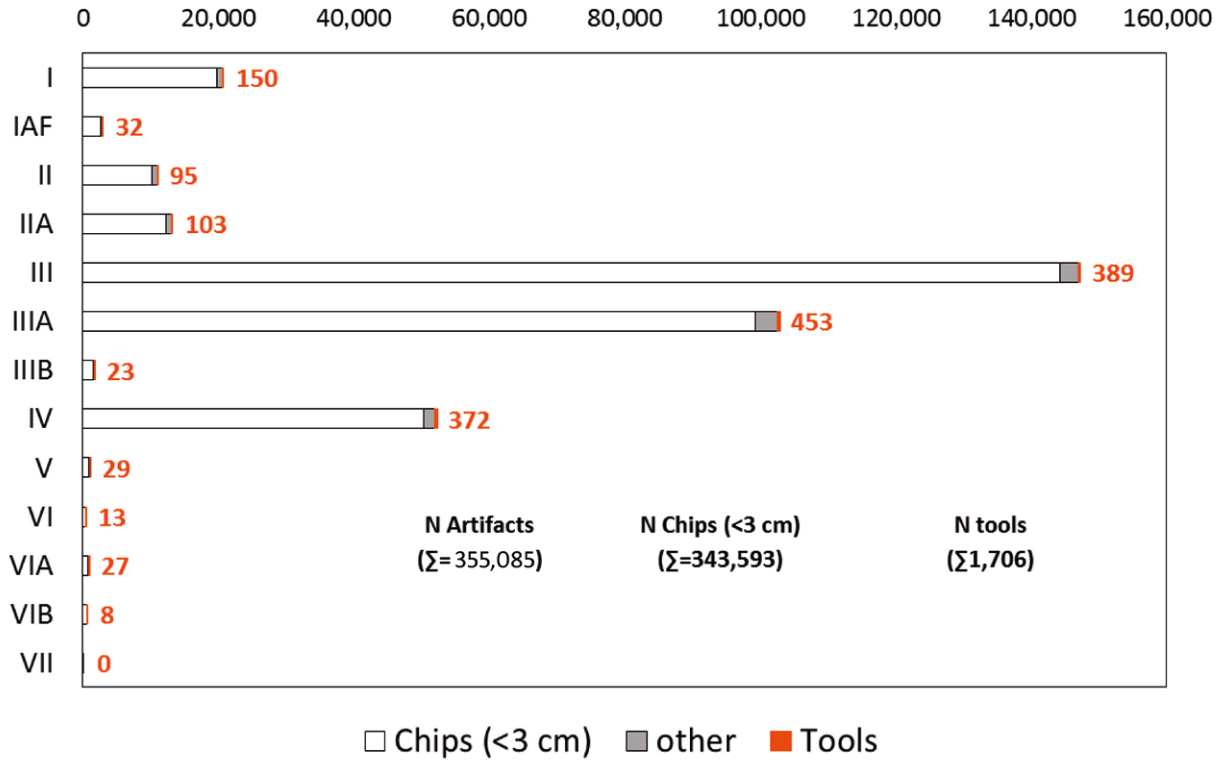


Fig. 19. Zaskalnaya V: general composition of the lithic assemblages by archaeological Units. White: absolute numbers of chips smaller than 3 cm, grey: absolute numbers of unmodified blanks larger than 3 cm, red: absolute numbers of modified pieces; the red numerals relate to the absolute numbers of modified pieces.

Abb. 19. *Zaskalnaya V: absolute Häufigkeiten von Artefaktkategorien nach zusammengefassten archäologischen Einheiten. Weiß: absolute Häufigkeiten von Absplissen kleiner 3 cm, grau: absolute Häufigkeiten der unmodifizierten Grundformen größer 3 cm, rot: absolute Häufigkeiten der modifizierten Stücke; rote Zahlen gegen die absoluten Häufigkeiten der modifizierten Stücke an.*

to the Middle Paleolithic site of Sary Kaya (Fig. 1). There are, however, descriptions of similar raw materials from other, more distant outcrops, such as outcrops cut by the Alma and Bodrack Rivers in the Western part of Crimea. It is evident that the question of the provenance of the lithic raw material flaked at Zaskalnaya V is best tackled with the help of petrographic analysis. This notwithstanding, the current working hypothesis is that the raw material was locally available. The presence of relatively large (maximum dimensions of >5 cm) unmodified raw material – classified as chunks or fragments of unworked flint plaquettes (Fig. 21) and interpreted as a raw material reserve – support the argument that this was indeed the case.

In all archaeological levels of Zaskalnaya V, except for those from Units IAF and IVB, the frequencies of preforms for bifacial tools are higher than those of cores and pre-cores (Figs. 21 & 22). Cores occur as radial (Levallois centripetal) and unidirectional types. Blades are rare and irregular. There is no evidence for the application of Levallois preferential or Levallois convergent methods, nor were any volumetric blade concepts identified. The low frequency of cores and the structure of the core assemblages are both characteristic of the Crimean Micoquian. 75 % of the debitage consists of blanks with cortex on the dorsal surface, while no less than 20 % of all flakes come from bifacial surface shaping, such as thinning and trimming. Bifacial thinning flakes were widely used for the production of formal tools. The bifacial tools were made by plano-convex and plano-convex-alternate surface shaping. It follows that, technologically speaking, all studied assemblages belong to the Crimean Micoquian (Chabai et al. 2004). Despite these similarities, differences can be found within the tool assemblages (Fig. 23). First, the frequency of tools is higher in Units I, IV and V than in Units II, III and IIIA. In addition, the frequency of tool types is variable. Finally, the average dimensions of tools, which is an important attribute in the subdivision of the Crimean Micoquian into facies (Chabai et al. 2004), are smaller in Units I and IV than in Units II, IIA, III and IIIA. On average, more than 50 % of tools from Units II, IIA, III and IIIA are longer and/or wider than 5 cm, while tools longer and/or wider than 5 cm in Units I and IV account for no more than 15 to 20 % of the total number of tools.

Units I and IAF: assemblages of Kolosov's "cultural layers I and Ia"

During the excavations in 2012 and 2013, it was possible to subdivide Kolosov's "cultural layer I" into five lithological layers (layers 10a to 13), which contained 24 archaeological levels. Fourteen (Unit I) of

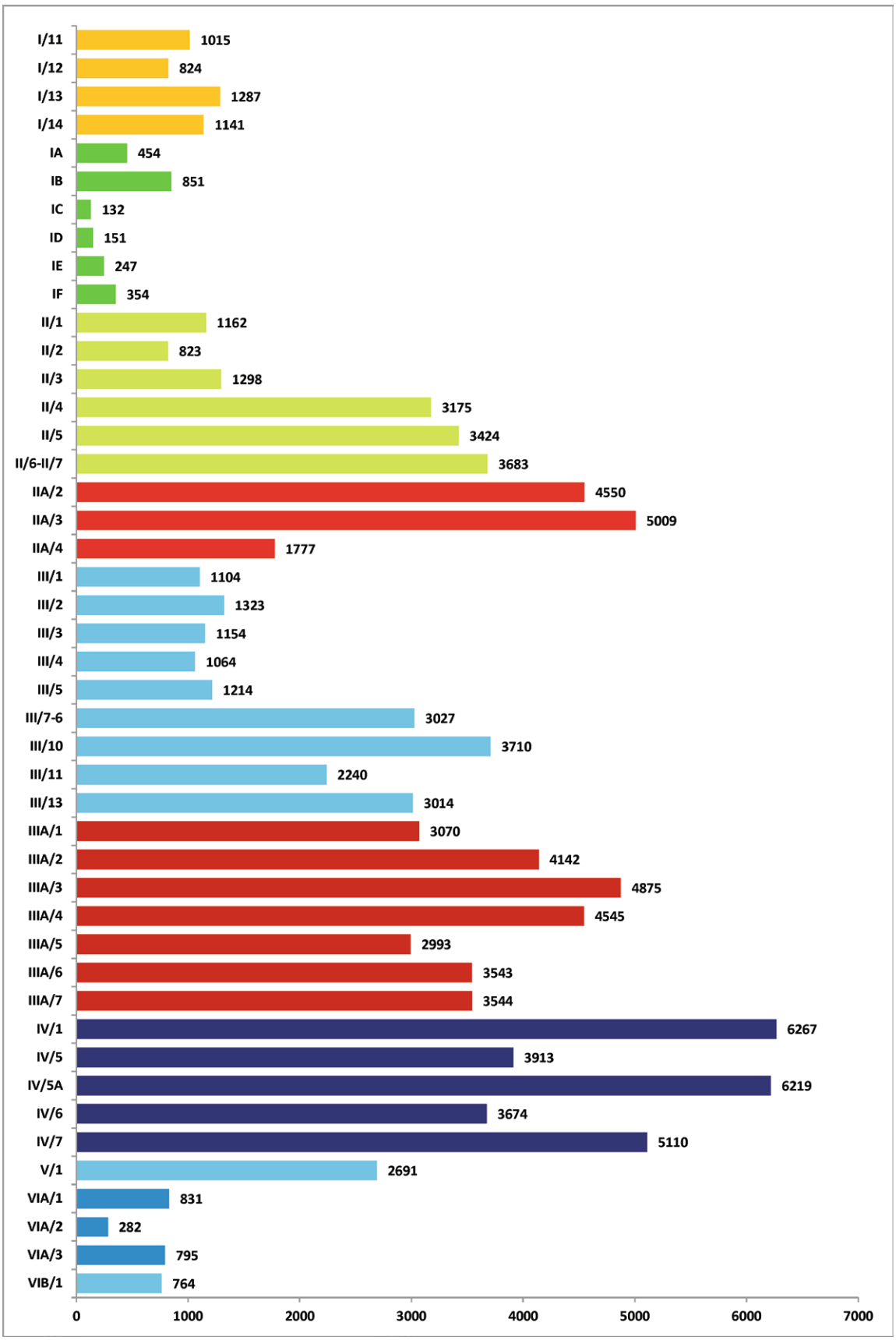


Fig. 20. Zaskalnaya V: average artifact densities per cubic meter in archaeological levels of group A of the 2012-13 field campaigns. Different colors indicate the correlation of the newly excavated archaeological levels with the Units of the previous excavations by Kolosov (1983).

Abb. 20. *Zaskalnaya V: Durchschnittliche Fundhäufikeiten pro Kubikmeter in archäologischen Horizonten der Gruppe A der Grabungen 2012-13. Die unterschiedlichen Farben geben die Korrelation der archäologischen Horizonte der neuen Grabungen mit den Kulturschichten der Grabungen Kolosovs (1983) an.*

discard from...	artifact class	Unit I	Unit IAF	Unit II	Unit IIA	Unit III	Unit IIIA	Unit IIIB	Unit IV	Unit V
acquisiation of raw material	Chunks	101	3	40	37	219	250	21	250	10
preparation of raw nodules	Pre-cores	3	–	3	3	2	3	–	3	–
	Preforms	14	2	17	17	38	50	3	37	4
production of unifacial and bifacial blanks	Cores	4	3	14	16	16	10	1	7	–
	Flakes	505	107	567	580	2'087	2'511	125	1'192	70
	Blades	105	16	52	79	216	293	8	125	8
preparation and modification	Chips	19'853	2'693	10'212	12'256	144'336	99'373	1'490	50'385	950
use	Tools	150	32	95	103	389	453	23	372	29
flaking instruments	Retouchers / hammer stones on pebbles	–	7	26	44	51	49	–	17	2
	Total	**20'735**	**2'863**	**11'026**	**13'135**	**147'354**	**102'992**	**1'671**	**52'388**	**1'073**

discard from...	artifact class	Unit VI	Unit VIA	Unit VIB	Unit VII
acquisiation of raw material	Chunks	6	20	8	–
preparation of raw nodules	Pre-cores	–	–	–	–
	Preforms	2	5	1	–
production of unifacial and bifacial blanks	Cores	–	–	1	–
	Flakes	25	55	31	–
	Blades	1	4	1	–
preparation and modification	Chips	338	736	556	10
use	Tools	13	27	8	–
flaking instruments	Retouchers / hammer stones on pebbles	–	–	–	–
	Total	**385**	**847**	**606**	**10**

Fig. 21. Zaskalnaya V: overview over the absolute frequencies of artifact classes in archaeological levels of the field campaigns 2012-13 merged to archaeological Units, according to their position in a schematic reduction sequence.

Abb. 21. *Zaskalnaya V: Übersicht über die absoluten Häufigkeiten von Artefaktklassen in – zu archäologischen Einheiten zusammenfassten – archäologischen Horizonten der Grabungen 2012-13, geordnet nach ihrer Zugehörigkeit zu Abschnitten der Operationskette.*

them were recognized as correlating with "cultural layer I" of the previous counting, and six (Unit IAF) as most probably being the equivalent of Kolosov's "cultural layer Ia". Four levels were excluded from analysis because they were either redeposited (levels I/15 to I/17) or occupied an excavated area too small for any correlations (level I/11-1) (see sections Archaeological levels: group B and Archaeological levels: group D). The following description takes place separately for the two Units involved, that is, Unit I and Unit IAF.

The typologically identifiable tools in the assemblages of Unit I amount to 73 pieces (Fig. 23). As far as tool classes are concerned, scrapers are dominant, numbering 36 (50.7 %); there are 15 points (21.1 %), followed by 8 bifacial scrapers (8.5 %) and 5 bifacial points (7 %). There are only a few pieces each in the categories of truncations, burins, end-scrapers and notches. The points are distally retouched and have sub-triangular and sub-leaf shapes (Appendix, Plate 1: 1.3.5). One third of all scrapers feature semi-trapezoidal and sub-trapezoidal shapes (Appendix, Plate 1: 4.6.9.10.11.12), while another third are single-side scrapers with straight, convex, concave and wavy edges. The remaining scrapers show triangular (Appendix, Plate 1: 7.8), semi-crescent and semi-leaf shapes. There are few double scrapers. The most specific feature of both scrapers and points is the application of different kinds of ventral thinning (Appendix, Plate 1: 1.2.6), with 20 % of all scrapers demonstrating traces of ventral thinning: a thinned base, a thinned back or distal thinning. Among the bifacial scrapers and bifacial points, a variety of leaf shapes prevails (Appendix, Plate 2: 1.2), including backed pieces, *Klausennischemesser* (Appendix, Plate 2: 3). All bifacial tools are made in a plano-convex or plano-convex-alternate manner. The combined tool assemblage from Unit IAF contains 14 identifiable pieces (Fig. 23). Three of them are bifacial plano-convex scrapers, seven are side scrapers, two are points and one item is a notched piece.

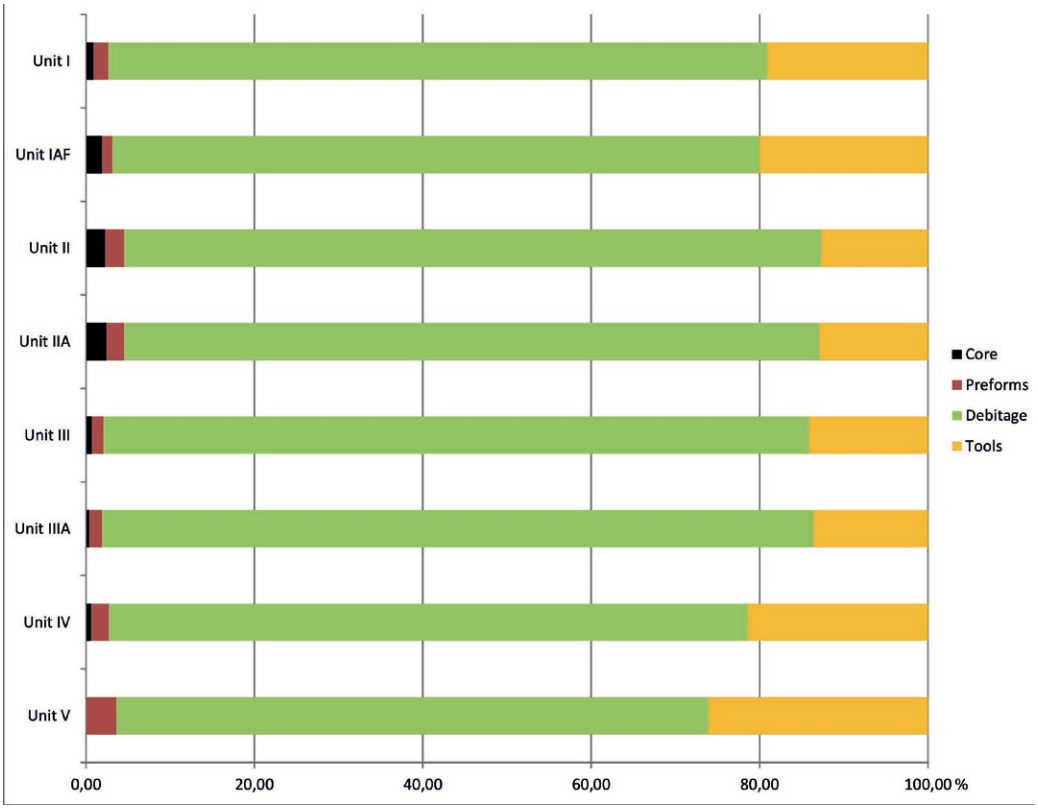


Fig. 22. Zaskalnaya V: comparison of the percentages of debitage (flakes, blades, bladelets), cores (cores and pre-cores), preforms (for bifacial tools) and modified pieces in archaeological levels of the field campaigns 2012-13 merged to archaeological Units.

Abb. 22. *Zaskalnaya V: Vergleich der prozentualen Häufigkeiten der Abschlaggrundformen (Abschläge, Klingen, Lamellen), Kerne und Vollkernen, Vorformen (für formüberarbeitete bifazielle Geräte) und retuschierten Werkzeuge in – zu archäologischen Einheiten zusammenfassten – archäologischen Horizonten der Grabungen 2012-13.*

		Unit I	Unit IAF	Unit II	Unit IIA	Unit III	Unit IIIA	Unit IIIB	Unit IV	Unit V	Unit VI	Unit VIA	Unit VIB
unifacial formal tools	Points	15	2	1	5	25	32	–	16	–	2	1	–
	Scrapers: transversal, diagonal, simple, double	16	6	18	27	80	70	1	42	1	1	3	1
	Scrapers: canted, convergent	20	1	14	16	33	43	3	52	4	5	1	–
	Denticulates, notches, burins, truncations	9	1	4	2	6	15	2	11	1	1	1	–
bifacial formal tools	Bifacial Points	5	–	2	1	35	21	–	11	1	–	–	–
	Bifacial Scrapers	8	4	14	12	42	33	4	15	2	–	2	1
Total identifiable tools		**73**	**14**	**53**	**63**	**221**	**214**	**10**	**147**	**9**	**9**	**8**	**2**
modified or fragmented pieces	Retouched & Thinned Pieces	28	12	24	21	65	84	6	108	2	4	9	4
	Unidentifiable	49	6	18	19	103	155	7	117	18	–	10	2
Total		**150**	**32**	**95**	**103**	**389**	**453**	**23**	**372**	**29**	**13**	**27**	**8**

Fig. 23. Zaskalnaya V: overview over the absolute frequencies of classes of modified pieces in archaeological levels of the field campaigns 2012-13 merged to archaeological Units, according to their position in a schematic reduction sequence.

Abb. 23. *Zaskalnaya V: Übersicht über die absoluten Häufigkeiten von Klassen modifizierter Stücke in – zu archäologischen Einheiten zusammenfassten – archäologischen Horizonten der Grabungen 2012-13.*

Units II and IIA: assemblages of Kolosov's "cultural layer II"

According to our reading of the stratigraphy, Kolosov's "cultural layer II" comprises two lithological layers (layers 14 and 15) with a total of 12 archaeological levels. We summarized these, in accordance with their categorization in lithological layers, as Unit II (layer 14) and Unit IIA (layer 15).

Unit II includes a total of 53 identifiable tools (Fig. 23). Due to the low total number, we give the frequencies of tool classes in absolute numbers only. At 32 items, scrapers are by far the most numerous tool class among the unifacial tools. Other tool classes reach absolute frequencies of two items, such as denticulates, or one item only, such as points, burins and notches. There are 16 bifacial pieces, 14 of these being bifacial scrapers and two being bifacial points. Single-side scrapers (14 pieces) are mainly represented by straight and convex types (Appendix, Plate 3: 2). There is an equivalent number of convergent scrapers. One half of these feature semi- and sub-trapezoidal shapes; triangular and semi-leaf scrapers were also observed (Appendix, Plate 3: 1.3). The remainder are double scrapers. Five scrapers show different kinds of ventral thinning (Appendix, Plate 3: 1). Seven out of 16 bifacial tools belong to the semi- and sub-leaf shapes, including two backed pieces of *Klausennische* type (Appendix, Plate 3: 4). In addition, bifacial scrapers with sub-trapezoidal and semi-crescent shapes were found.

There were 63 identifiable tools among all lithic artifacts of Unit IIA (Fig. 23). Scrapers are the most frequently represented tool class, with 43 items. Bifacial scrapers account for 12 pieces; there are 5 points, and one each of bifacial points, denticulates and notches. The points feature sub-triangular and sub-crescent shapes, which are distally and laterally retouched. Single side scrapers (25 pieces) dominate the scraper assemblage (Appendix, Plate 4: 2.5), followed by convergent scrapers. Of the 16 convergent scrapers found, 12 are semi- or sub-trapezoidal types (Appendix, Plate 4: 1.3.6). There are two double scrapers (Appendix, Plate 4: 4). Four scrapers were additionally modified by ventral thinning. Bifacial points and bifacial scrapers can be subdivided into sub-leaf, semi-trapezoidal, semi-crescent and one-edge convex shapes (Appendix, Plate 4: 7.8). All of them, including a few pieces of *Klausennischemesser* type (Appendix, Plate 4: 7), were made by plano-convex and plano-convex-alternate surface shaping.

Units III, IIIA and IIIB: assemblages of Kolosov's "cultural layer III"

Most archaeological levels identified in the 2012 and 2013 excavations come from the part of the stratigraphical sequence that Kolosov designated "Cultural layer III". The latter includes our lithological layers 16 to 18, comprising a total of 34 archaeological levels. In accordance with their correlation to lithological layers, they were summarized as Unit III, IIIA and IIIB. Unit III also contains the "complex of burnt lenses" described above.

The combined tool-kit of assemblages from Unit III is made up of 221 identifiable pieces (Fig. 23). Tool classes are dominated by scrapers, numbering 113 (51.1 %), followed by 42 bifacial scrapers (19 %), 35 bifacial points (15.8 %) and 25 points (11.3 %). Six tools comprising denticulates, notches and truncations attain combined frequency of 2.7 %. The most frequent point types are points with semi- and sub-leaf shapes (Appendix, Plate 5: 1.2.3). Other tool types present in significant numbers are laterally retouched points, sub-triangular points and sub-trapezoidal points. About two thirds (64.6 %) of the scrapers are single side scrapers (Appendix, Plate 5: 4.5.6), and a little less than one-third (29.2 %) are convergent scrapers. Half of the latter are convergent scrapers featuring semi- and sub-trapezoidal shapes (Appendix, Plate 5: 7.8). Double scrapers figure at a frequency of 6.2 %. Ventral thinning is evident in 16.8 % of the side scrapers. The bifacial points fall equally into the categories of semi- and sub-leaf shapes (Appendix, Plate 6: 1) on the one hand and sub-triangular, semi-crescent and semi-trapezoidal shapes on the other. Bifacial scrapers are dominated by semi- and sub-leaf shapes, which constitute one third of all items in this tool class. Other types present in the assemblage from Unit III are bifacial scrapers with semi-crescent, semi-trapezoidal (Appendix, Plate 6: 2) and sub-triangular shapes. Backed bifacial knives of *Klausennische* type are common among both bifacial scrapers and bifacial points (Appendix, Plate 6: 1.2).

The summarized tool-kit of Unit IIIA encompasses 214 identifiable items (Fig. 23). The following tool classes were identified, in descending order of frequency: 113 scrapers (52.8 %), 33 bifacial scrapers (15.4 %), 32 points (15 %), 21 bifacial points (9.8 %), and 15 others, comprising denticulates, notches, end scrapers, burins and truncations (7 % altogether). More than half of the points feature semi- and sub-leaf shapes (Appendix, Plate 7: 1.2). Less frequent are laterally retouched points and points with sub-triangular, semi- and sub-crescent shapes. Approximately one third of all points were modified by terminal and lateral thinning on the ventral side. The class of scrapers is dominated by single side scrapers (57.5 %) (Appendix, Plate 7: 3.7.8), followed by convergent types (38.1 %) and double scrapers (4.4 %). One third of the convergent scrapers have semi-, sub- or trapezoidal shapes (Appendix, Plate 7: 4.5.6), whereas those with semi-leaf, sub-leaf, semi-crescent and sub-crescent scrapers add up to about 40 % of all convergent scrapers. The remainder of the convergent scrapers have sub-triangular, triangular, semi-rectangular and sub-rectangular shapes. A specific feature of the scrapers from Unit IIIA is the classification of pieces with all perimeters covered by retouch as triangular scrapers and trapezoidal scrapers

(Appendix, Plate 7: 4.5.6). In Unit IIIA, nearly 16 % of the scrapers show different kinds of ventral thinning. Among the bifacial points, semi- and sub-leaf shapes are most frequent (Appendix, Plate 8: 1.2). Other types of bifacial points present in Unit IIIA are sub-triangular and semi-crescent bifacial points, including backed pieces. Bifacial scrapers with semi-crescent, sub-crescent, semi-leaf and sub-leaf shapes comprise, in sum, two thirds of all bifacial scrapers. One-edge bifacial scrapers, as well as triangular, semi-crescent and sub-crescent bifacial scrapers, number a few pieces each. Five bifacial tools belong to the *Klausennischemesser* type. Bifacial scrapers and bifacial points were produced in a plano-convex and plano-convex-alternate manner.

The merged tool assemblage of Unit IIIB consists of 10 identifiable pieces (Fig. 23). These can be subdivided into side scrapers (including convergent types), denticulates, end scrapers and bifacial scrapers (including backed pieces of *Klausennische* type).

Unit IV: assemblages of Kolosov's "cultural layer IV"

"Cultural layer IV" includes lithological layers 19a to 19d of the 2012 and 2013 excavations. Instead of one continuous layer, the new investigations identified nine archaeological levels which we summarize here, for the sake of correlation, as archaeological Unit IV. The lithological layer 19a marks the beginning of the part of the sequence that is characterized by pronounced soil formation processes, tentatively correlated with OIS 5 (see section Stratigraphy and chronology).

The combined tool assemblage of Unit IV includes 147 identifiable pieces (Fig. 23). Scrapers (64 %) are the most frequently found tool class, numbering 94, followed by almost identical numbers of points (16 pieces, 10.9 %) and bifacial scrapers (15 pieces, 10.2 %). Bifacial points are another tool class worth mentioning (11 pieces, 7.5 %), and whilst there is a total of 11 denticulates, notches, end scrapers, burins and truncations (7.5 % in total) there are fewer of each individual item. The category of points is dominated by sub-triangular shapes, but semi-crescent, semi-trapezoidal and sub-trapezoidal side scrapers also occur (Appendix, Plate 9: 1-5.7). If scrapers are viewed separately, then convergent scrapers (55.3 %) prevail numerically over single side scrapers with one working edge (35.1 %) and double scrapers (9.6 %). More than half of the convergent scrapers feature semi-, sub- and trapezoidal shapes (Appendix, Plate 9: 8-12). One third of the single side scrapers with one edge belong to transversal types (Appendix, Plate 10: 6). The rest of the scrapers show sub-triangular, triangular (Appendix, Plate 9: 13), semi-leaf and semi-rectangular shapes. About half of the convergent scrapers have additional ventral thinning of different kinds; by contrast, ventral thinning was identified on only five of a total of 33 one-edge side scrapers. Among the bifacial points and bifacial scrapers, sub-triangular, triangular, semi-leaf and semi-trapezoidal shapes were counted in almost equal numbers (Appendix, Plate 10: 1-3). Bifacial scrapers and bifacial points were made by plano-convex and plano-convex-alternate surface shaping. Three bifacial scrapers of semi-leaf and semi-trapezoidal shapes belong to the *Klausennischemesser* type. One of the most specific features of the Unit IV assemblage is the small size of the tools, only a small minority (about 15 %) of which exceed 5 cm in maximum dimensions.

Units V, VI, VIA, VIB and VII: assemblages of Kolosov's "cultural layers V to VII"

At the base of the sedimentological filling of Zaskalnaya V, we detected eight archaeological levels (lithological layers 20 to 23) rather than four "cultural layers". However, the number of lithic artifacts was, in all cases, very low. The integrated tool-kit of Unit V encompasses nine identified pieces only; they are scrapers, denticulates, bifacial points and bifacial scrapers (Fig. 23). Nine identifiable tools originate from Unit VI. In Units VIA and VIB, only eight and six identifiable tools respectively were found. Nothing, except chips, came from Unit VII (Fig. 23).

Discussion

It is evident that each of the assemblages retrieved from the excavations in 2012 and 2013 represents only a "cut-out" of the original occupations. Kolosov excavated an area of 32.5 m^2, whereas the new excavations measured 4 m^2, little more than 10 % of the previous excavation area. At the same time, it is difficult to estimate what part of the area originally occupied by Neanderthals was covered by the small trench of the 2012 and 2013 field campaigns. In fact, this is even difficult to estimate for Kolosov's much larger trench. The limestone blocks excavated at some distance from the back wall (Fig. 2) indicate that the rock shelter was not very deep, but stretched parallel to the limestone cliff further to the south-east of the excavation area in the direction of Zaskalnaya VI. It may well be the case that Neanderthals placed a series of occupations along the back wall of the cliff, with perhaps central parts under the rock shelter(s) and more ephemerally used parts in the open. In such a scenario, the distinction between the different Zaskalnaya sites would be arbitrary, and the find scatter would represent a spatially more or less continuous palimpsest of recurrent occupations. Although these considerations would need testing via refits and archaeozoological analysis, they may still urge us to exercise caution when we seek to estimate what part(s) of the original occupation are represented by the archaeological levels of the 2012 and 2013 excavations. It may be central or lateral parts, or both.

We can, on the basis of the 2012 and 2013 excavations, state without doubt that, analogous settings

provided, Kolosov's excavations resulted in mixed assemblages. The original descriptions show that at least in areas adjacent to the recent trench, the previous excavations recognized neither the thin archaeological levels nor the not very pronounced sterile sediments in between them, and instead excavated in much larger "cultural layers". In addition, the wavy boundaries between the layers were cut by the artificial spits, due again to non-recognition or underestimation of erosional dynamics. It is difficult to judge whether this applies to the entire area excavated by Kolosov, but given the wavy boundaries between the lithological layers in the entire investigated area (Fig. 4), it seems highly probable that the observations of the recent excavations are representative for a large part of the rock shelter.

Notwithstanding the small excavation area and the relatively low overall number of artifacts larger than chips (10'736 pieces), we are still confident that the assemblages of the 2012 and 2013 excavations are representative enough to make some basic statements on techno-typological attributes and some general observations concerning the mode and intensity of raw material procurement and reduction. It goes without saying that the following statements are preliminary and need to be treated with caution, primarily because the data from the archaeological levels were merged into Units for the sake of clarity, and in part due to low frequencies of informative artifact classes. On the other hand, the assumptions below are not made on the basis of quantitative attributes (frequency of tools, convergent scrapers, blanks with cortex, tool dimensions) alone; reliance solely on these attributes tends to be problematic with regard to excavation size and total number of items per level. Instead, we complement these observations by additionally considering the presence or absence of qualitative attributes (e.g. bifacial tools, pre-cores, preforms, chunks). The principal aim of the following section is a comparison of the initial results from the renewed excavations at Zaskalnaya V with existing diachronic models for the Crimean Middle Paleolithic in relation to the classification of lithic artifact assemblages into techno-complexes and facies on the one hand, and the distinction of site use within land use patterns on the other (Chabai & Uthmeier 2006). The development of these models using 80 *in-situ* archaeological levels from 16 multi-layered sites gives us confidence in the robustness of their base lines. The classification scheme is based on the presence or absence of steps of the reduction sequence (core reduction, tool production, rejuvenation, import of tools), the intensity of raw material exploitation (density of artifacts) and tool use (reduction sequences), the mode of faunal exploitation (ranging from kill and butchering to import and consumption), and the distance from known raw material outcrops. Where possible, we attempt to track these attributes in the archaeological Units of Zaskalnaya V.

We have already mentioned that all assemblages demonstrate a high degree of technological and typological uniformity. Technologically, the blank production of all assemblages is based on the reduction of radial (Levallois centripetal) and unipolar cores as well as plano-convex and plano-convex-alternate shaping of bifacial tools with subsequent use of the resulting flakes. Typologically, semi-trapezoidal and sub-trapezoidal shapes dominate among scrapers; in most cases, bifacial points and bifacial scrapers have semi- and sub-leaf shapes in both collections. Other characteristic, albeit not dominant, tool types are triangular and trapezoidal scrapers (retouched along the entire perimeter) and backed bifacial points and backed bifacial scrapers of *Klausennische* type. In sum, the newly excavated Zaskalnaya V assemblages show all attributes characteristic of the Crimean Micoquian.

Despite the fact that each of the assemblages is a cut-out of the original occupation and, in addition, the total of artifacts per level is low in each case, the assemblages also give clear indications on the predominating mode of raw material exploitation. While the mode of faunal exploitation awaits further study, all levels studied for the lithic artifacts can be described as "on-site-workshops"; in other words, the entire reduction sequence, from decortication of raw nodules to modification and use of blanks/bifacial preforms, was executed within the limits of the excavated area. This is proven by the presence of artifacts from all phases of the reduction sequence, and a high proportion of blanks with cortex on the dorsal surface. Initial stages of the reduction sequence are represented by pre-cores, preforms of bifacial tools (Fig. 21) and flakes with dorsal surfaces completely and partly covered by a cortex. Final phases of use and discard are indicated by cores and modified unifacial and bifacial tools (Figs. 21 & 23). The fact that raw nodules (Fig. 21: "chunks") were transported to the site corresponds to the hypothesis of short distances from high-quality flint plaquettes from local sources.

In contrast to the generally uniform techno-typological structure of the assemblages based on qualitative criteria, the various archaeological Units show differences with regard to quantitative data such as the dimensions of the formal tools and the frequency of tool types (Figs. 23 & 24), which allow for a further attribution of the larger assemblages to the different facies known from the Crimean Micoquian. However, the rarity of artifacts from lithological layer 18 (Unit IIIB) does not allow for a more detailed classification than "Crimean Micoquian". Assemblages from Units IAF, V, VI, VIA, VIB and VII are not suitable for any classification, because the total numbers of artifacts are too low.

Assemblages of the Kiik Koba facies of the Crimean Micoquian: Zaskalnaya V, Units I and IV

Distance from raw material sources is an important

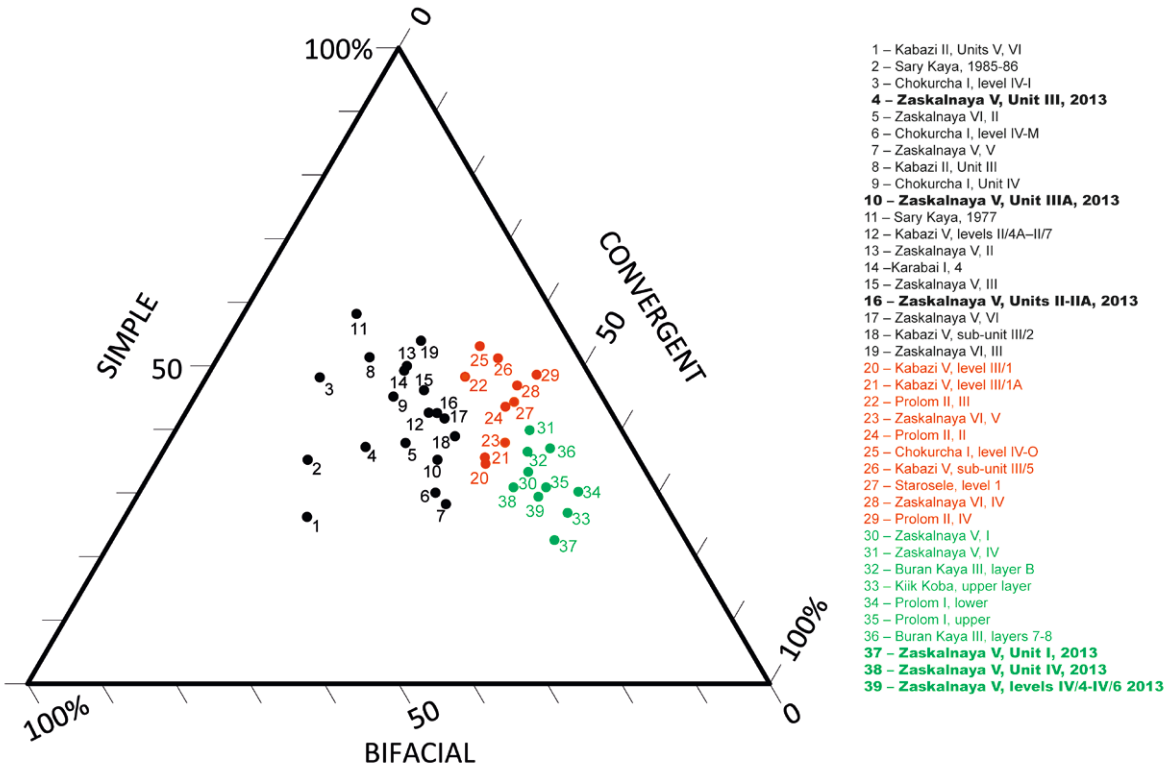


Fig. 24. Triangle diagram of combined relative frequencies of major tool classes in Crimean Micoquian assemblages, (simple: sum of all types of single side scrapers and all types of double side scrapers; convergent: sum of all types of points and all types of convergent side scrapers; bifacial: sum of all types of bifacial points and all types of bifacial scrapers). Black dots: Ak Kaya facies, red dots: Starosele facies, green dots: Kiik Koba facies; assemblages from the 2012 and 2013 excavations at Zaskalnaya V are indicated in bold in the assemblage list below.

Abb. 24. *Dreiecksdiagramm der kombinierten prozentualen Häufigkeiten der wichtigsten Werkzeugklassen in Inventaren des Crimean Micoquian, ("simple": Summe aus Schabertypen mit einer Arbeitskante und allen Doppelschaber-Typen; "convergent": Summe aus allen Spitzen-Typen und allen Typen der Konvergenzschaber, „bifacial": Summe aus allen bifaziell flächenretuschierten Spitzen-Typen und allen Typen für bifaziell flächenretuchierte Schaber). Schwarze Punkte: Ak Kaya-Fazies, rote Punkte: Starosele-Fazies, grüne Punkte: Kiik Koba-Fazies; Inventare der Grabungen 2012 und 2013 in Zaskalnaya V sind in fett gedruckt.*

element in previous interpretations of the Micoquian record in Crimea. It is assumed that with growing distance from the raw material sources used, re-sharpening intensified, leading to a decrease in both tool size and relative frequency of bifacial tools, and an increase in modified pieces in general and pointed/convergent tool types in particular (Chabai & Marks 1998; Chabai & Uthmeier 2006). In this interpretative scheme, based on a large dataset from the Crimea, assemblages of the Ak Kaya facies are the least reduced, assemblages of the Starosele facies occupy an intermediate position, while assemblages of the Kiik Koba facies are the most reduced. Sites with archaeological levels of the Kiik Koba facies are a minimum of 15 km away from the nearest known flint-sources. It cannot be ruled out that, in order to solve the problem of a pronounced raw material deficit, the scavenging of lithic artifacts left behind after previous occupations was applied as an opportunistic strategy in addition to the well-documented re-sharpening of imported items. The starting point of this assumption is the fact that these sites usually have low sedimentation rates, leading to thick, yet intense palimpsests.

To this day, all known well-preserved (e.g. stratified) Middle Paleolithic sites from the Crimea fit this model (Chabai et al. 1995; Chabai & Marks 1998; Chabai 2004; Chabai et al. 2004; Chabai & Uthmeier 2006; Demidenko 2004; Demidenko & Uthmeier 2013). However, parts of the newly excavated assemblages from Zaskalanya V represent an exception to the recognized pattern, and this discrepancy calls for explanation. Despite the proximity to raw material outcrops, Unit I and Unit IV show all attributes of the Kiik Koba facies of the Micoquian. Compared to other Units from Zaskalnaya V (Fig. 24), the proportion of tools is higher; the frequency of points and convergent scrapers is higher as well, and bifacial tools occur in lower percentages. In addition, average tool size is markedly smaller.

The closest analogies are Kiik Koba, upper layer, Prolom I and Buran Kaya III, layer B, which are typical representatives of the Kiik Koba facies. All other assemblages from Zaskalnaya V, namely those from Units II, IIA, III and IIIA, fit the expectation of less reduced lithic tools discarded near raw material outcrops. They belong to the Ak Kaya facies, which is

characterized by a high amount of bifacial tools, the dominant role of one-edge scrapers and relatively large tools.

The anomaly of the presence of Kiik Koba assemblages at Zaskalnaya V merits discussion centering on the following three issues: (1) distance from raw material sources, (2) sedimentation rate, and (3) the possible interpretation of the Crimean Micoquian facies as "cultural" entities.

(1) Distance from raw material sources. It is important to establish a chronologically differentiated view on this issue. As a matter of fact, a raw material deficit may be correct in relation to Unit IV. According to the preliminary pedological reading of the Zaskalnaya V sequence, Unit IV accumulated under warm climatic conditions that enabled the development of more or less deep-reaching soils. We are relatively sure that this happened during OIS 5 and further assume that the soil formation(s) at Zaskalnaya V correlate to OIS 5c. According to pollen analysis from Zaskalnaya V and sites with analogous soil formations, such as Kabazi II, the vegetation cover at the times of Unit IV was that of a beech forest (Gerasimenko 2005). In the first instance, it is slope erosion that increases the number of raw material outcrops able to be recognized and reached from the surface. Pollen analysis shows that in the Crimea, a decline of forest vegetation leading to noticeable slope erosion did not occur before OIS 4 and OIS 3. This was accompanied by an increasing incision of the river systems, caused by lower water tables after a drop in global (and Black Sea) sea levels. In sum, the availability of lithic raw material during OIS 5 must have been much lower compared to the present-day situation. It is highly probable that this also accounts for Zaskalnaya V, as it is situated at low altitude. The area with the known outcrops is located below the site in a protected, more or less flat landscape, which is eminently suitable for the spread of forest vegetation given sufficient available humidity.

(2) Sedimentation rate. The overall thickness of Middle Paleolithic deposits at sites of the Kiik Koba facies such as Prolom I and Kiik Koba is less than 1 m, despite the fact that the stratigraphical sequences accumulated under existing rock shelters and thus were protected against severe erosion. It seems as if the actual sedimentation rates at these sites were very low (Chabai & Uthmeier 2006; Demidenko & Uthmeier 2013). This was not the case at Zaskalnaya V, Units I and IV, which supposedly had a high rate of sediment accumulation. The assignation of Zaskalnaya V, Unit I to the Kiik Koba facies, which is technologically and typologically secure, is even more problematic due to the ephemeral character of the occupations. Unlike all known Kiik Koba facies occupations, which are characterized by relatively thick archaeological levels densely packed with artifacts and bones, Zaskalnaya V, Unit I comprises 14 thin archaeological levels separated by sterile sediments. In fact, it appears rather to be an aggregation of distinct short-term (?) occupations than thick palimpsests from recurrent, yet longer stays. The closest analogy for Zaskalnaya V, Unit I is the Kiik Koba assemblages within the Aurignacian archaeological levels of Siuren I, Units G and H (Demidenko 2000). Being discarded on the same occupation surface as the Aurignacian artifacts, the Kiik Koba assemblages in Siuren I, which contain only tools, are presumed to be the result of short-term visits with already reduced "pocket tool-kits". However, the structure of the assemblages from Unit I of Zaskalnaya V clearly show on-site core reduction and tool production (Fig. 21). Theoretically, it is conceivable that the lithics from Unit I represent "arrival" assemblages after long-distance moves, with tool reduction conducted on the move or at previous sites and blank production only started. If this is correct, it must be assumed that the occupations were either continued in other parts of the (large) rock shelter (with a discard typical of the Ak Kaya facies), or abandoned for unknown reasons (which is less probable given their recurrent character). A more detailed study of the raw materials from Unit I, were it to find that the Kiik Koba component was made from non-local flint, would verify this hypothesis.

(3) Crimean Micoquian facies as "cultural" entities. In contrast to the functional approach favored in this paper, there has also been a "stylistic approach" to the interpretation of the variability observed in the Crimean Micoquian. This approach regards all Crimean Micoquian facies mentioned above as the material relicts of distinct "cultures" (Stepanchuk 2006). One argument in support of this view was the late and simultaneously short radiocarbon chronology of the Kiik Koba sites from Prolom I, Buran Kaya III and Kiik Koba (29 to 36 ka BP: Chabai & Uthmeier 2006, Tab. 18-1, equaling dates between 33 to 41 ka calBP if calibrated). Whereas the radiocarbon dates obtained so far for Unit I of Zaskalnaya V may be in the proposed range, the chronological position of Unit IV is obviously much earlier, thus weakening the chronological argument put forward within the cultural approach.

In sum, the discrepancies between the expectations deduced from the functional interpretation of the previous data on the on hand and the characteristics of Unit I and IV of Zaskalnaya V on the other still leave questions open, which the future pursuit of the following testable hypothesis might answer: (1) during the formation of Unit IV, the vicinity of the rock shelter was covered by forest vegetation, leading to a deficit in local to regional raw material outcrops; and (2) occupations of Unit I commenced in Zaskalnaya V after long-distance moves with a set of imported tools, but were abandoned before "a regular on-site-workshop" was established.

It is also worth mentioning that V. N. Gladilin's view on the industrial variability of "cultural layer I" and

"cultural layer IV" as "Kiik Koba culture" remains correct (Gladilin 1976). The presence of sizeable numbers of relatively large bifacial tools in the "cultural layer IV" assemblage, which corrupted Yu. Kolosov's otherwise detailed typological analysis, is best explained by the excavation methods he applied at Zaskalnaya V. As detailed above, the site was excavated by horizontal, relatively thick layers, starting with the horizontal removal of excavated sediments. It is obvious that the wavy boundaries between lithological layers led to a mixing of materials, especially from lithological layers 17, 18, 19, 20 and 21 (or Units IIIA, IIIB, IV and V, correspondingly).

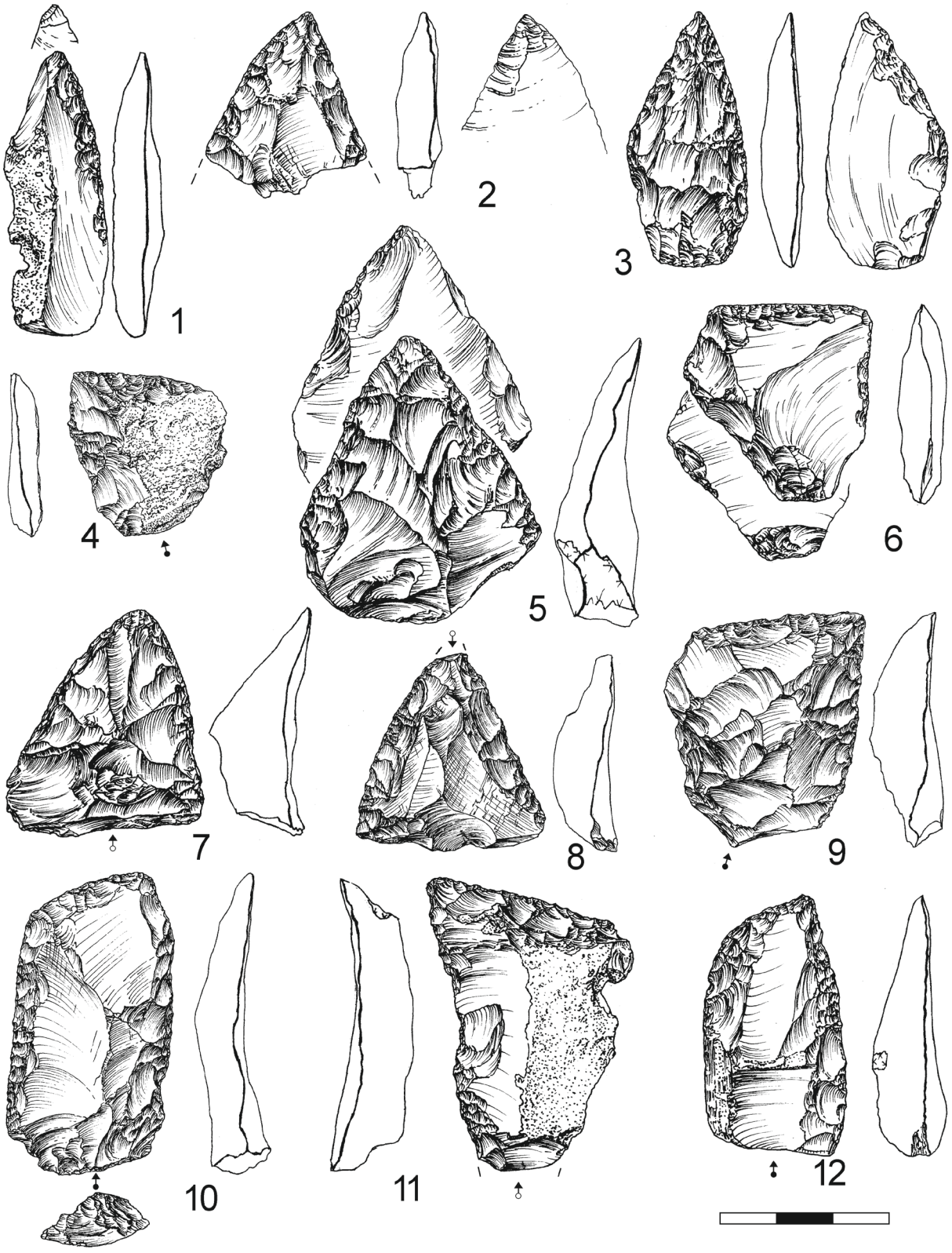
Assemblages of the Ak Kaya facies of the Crimean Micoquian: Zaskalnaya V, Units II, IIA, III and IIIA

The structure of the assemblages from Zaskalnaya V, Units II, IIA, III and IIIA meet the definition for the Ak Kaya facies (Fig. 24). Units II, IIA, III and IIIA of the 2012 and 2013 excavations are the stratigraphical analogies of Kolosov's "cultural layer II" and "cultural layer III", which Gladilin (1976) defined as the eponymous *étalon* complexes of the "Ak Kaya culture". They are characterized by high numbers of bifacial tools, a preponderance of one-edge scrapers and a relatively large size of all tools. This is in good agreement with the assumptions of the existing land use model for the Crimean Micoquian, which predicts an *on-site* workshop as well as a low amount of tool reduction at sites near local raw material sources. Assemblages of the Ak Kaya facies originate from numerous archaeological levels excavated in lithological layers 14, 15, 16 and 17. The accumulation of each of these lithological layers was interrupted by erosion. In addition, several erosional (e.g. the "complex of burnt lenses") and/or animal disturbances were identified during the accumulation of lithological layer 17. Each archeological level of Units II, IIA, III and IIIA represents the remnant of one short visit or the palimpsest of several short visits accumulated on the same surface. Apart from the thinness of the levels, the simple construction of the fireplaces may be another argument for a restricted duration of these occupations.

Conclusion

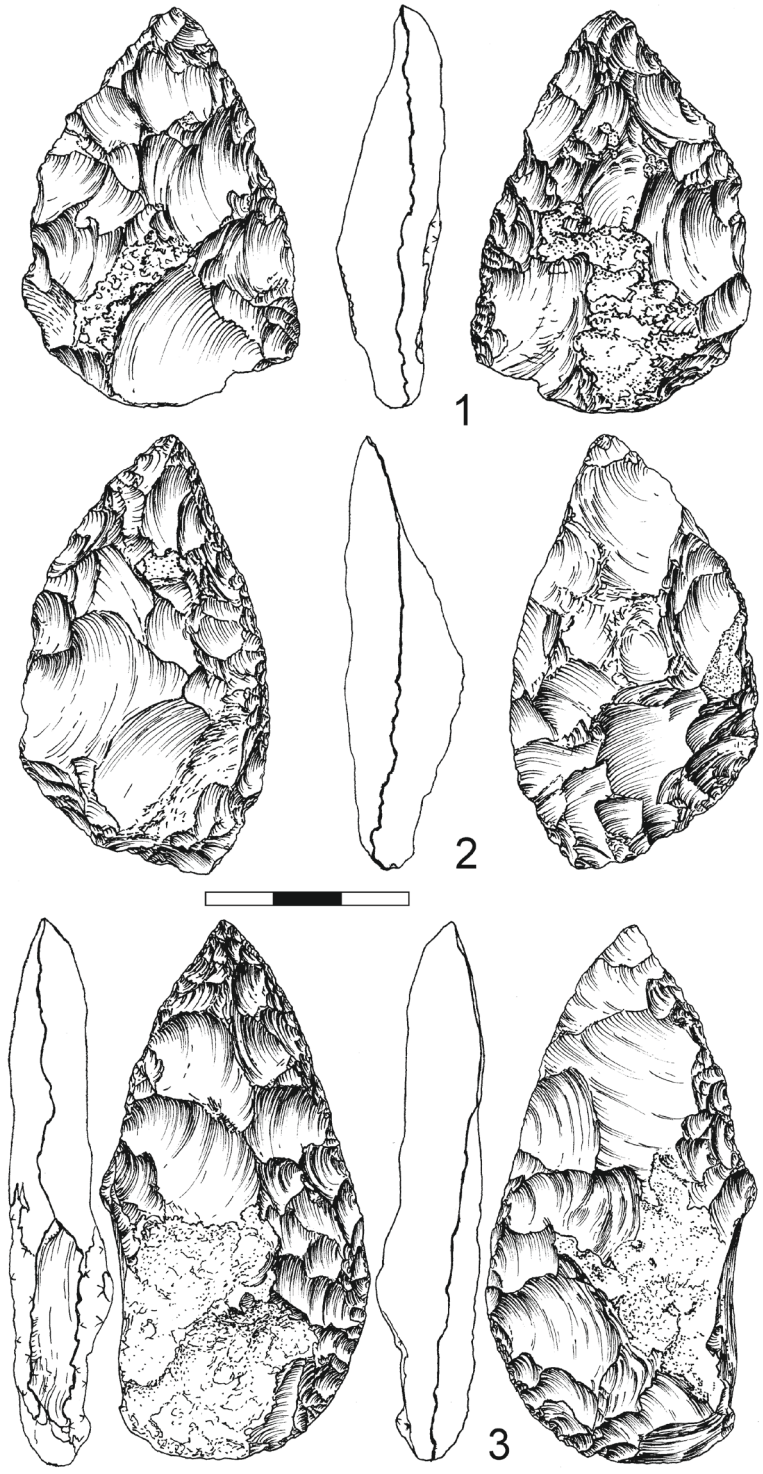
The archaeological sequence in Zaskalnaya V is one of the longest Micoquian sequences in Eastern Europe. From a sedimentological point of view, it is characterized by repeated erosional breaks, which have affected the completeness of the archaeological sequence. This sequence is characterized by repeated short-term occupations based on on-site raw material exploitation and tool production. Whereas the presence of assemblages of the Ak Kaya facies in Units II, IIA, III and IIIA is in good accordance with existing data, the occurrence of assemblages of the Kiik Koba facies in Units I and IV is unexpected and merits further investigation. We expect that the planned environmental, zooarcheological and anthropological studies currently in progress will help to answer unresolved questions.

Acknowledgments: The investigations at Zaskalnaya V described in this paper were conducted as part of the DFG project "The dispersal of modern humans into an Eastern European refugial area of late Neanderthals: interdisciplinary studies of contemporaneous industries from the Middle to Upper Paleolithic transition in the Crimea (Ukraine)" (UT 41/2-1). The authors wish to express their sincere gratitude to the following colleagues and friends, who participated in the 2012 and 2013 field campaigns at Zaskalnaya V: A. Veselsky, Dr. V. Manko, Dr. S. Telizhenko, Dr. D. Kushtan, Dr. S. Bussemer, L. Geyer, I. Hohenester, O. Votiakova, I. Manko, A. Kalitskaya, N. Yatsishin, L. Yatsishina, O. Ignatenko, E. Kastrygina, A. Tihomirov, A. Maiko, A. Petsko. The authors would also like to thank the responsible editor, Philip Nigst, and two reviewers for they gentle support, instructive suggestions and help.



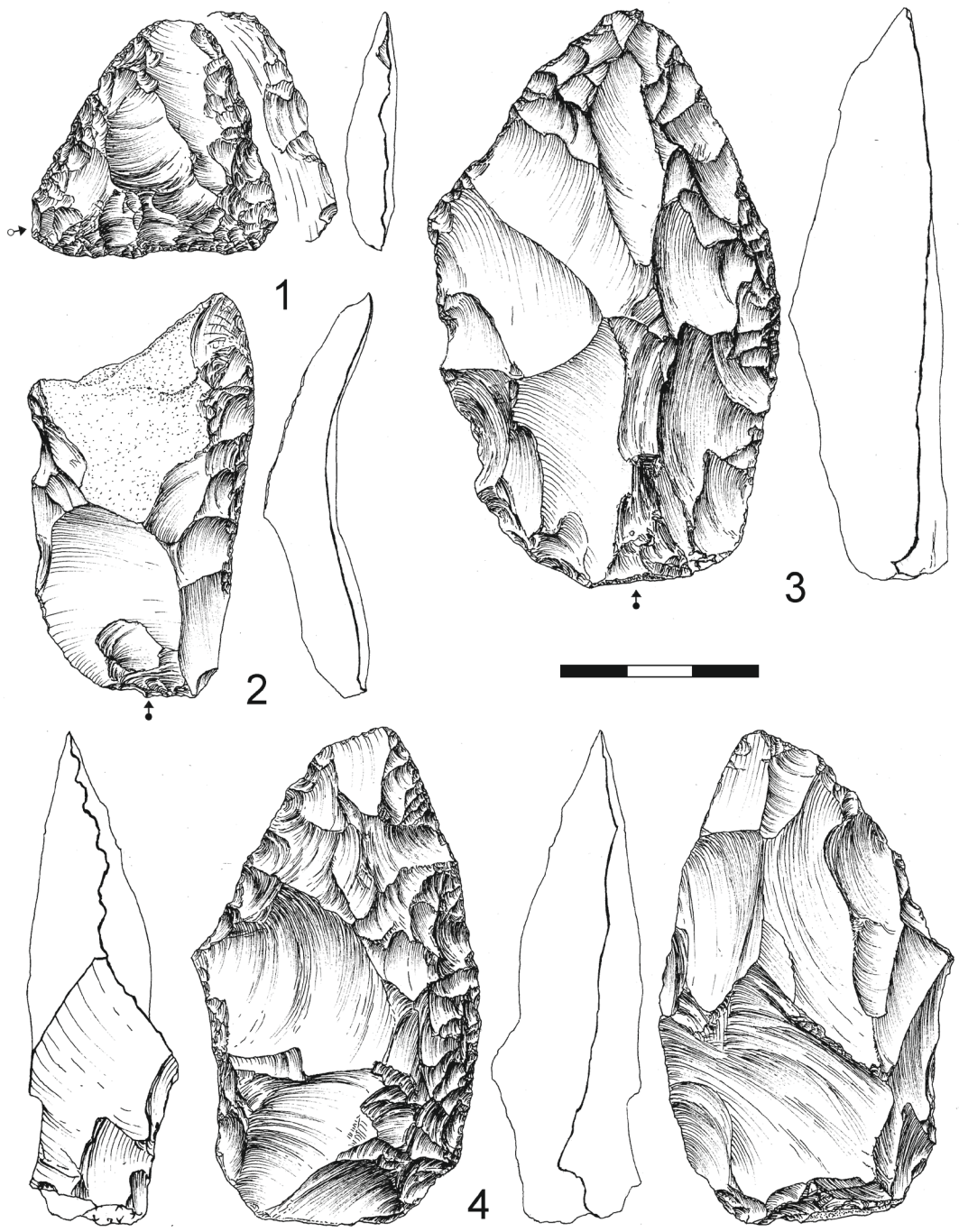
Appendix, Plate 1. Zaskalnaya V, Unit I, levels I/2 (2.6), I/3 (1.5), I/6 (9), I/9 (3.7.11.12), I/11 (4.10), I/12 (8). Points: 1 lateral, distally thinned; 2 unidentifiable, distally thinned; 3 sub-leaf, bifacially retouched; 5 sub-triangular, bifacially retouched. Scrapers: 4.9.11 semi-trapezoidal; 6 sub-trapezoidal, thinned base; 7-8 triangular; 10.12 sub-trapezoidal.

Appendix, Tafel 1. *Zaskalnaya V, Unit I, Archäologische Horizonte I/2 (2.6), I/3 (1.5), I/6 (9), I/9 (3.7.11.12), I/11 (4.10), I/12 (8). Spitzen: 1 lateral, mit ventraler Verdünnung der Spitze; 2 unbestimmt, mit ventraler Verdünnung der Spitze; 3 semi-blattförmig, bifaziell kantenretuschiert; 5 sub-dreieckig, bifaziell kantenretuschiert. Schaber: 4.9.11 semi-trapezförmig; 6 sub-trapezförmig, mit ventraler Verdünnung der Basis; 7-8 dreieckig; 10.12 sub-trapezförmig.*



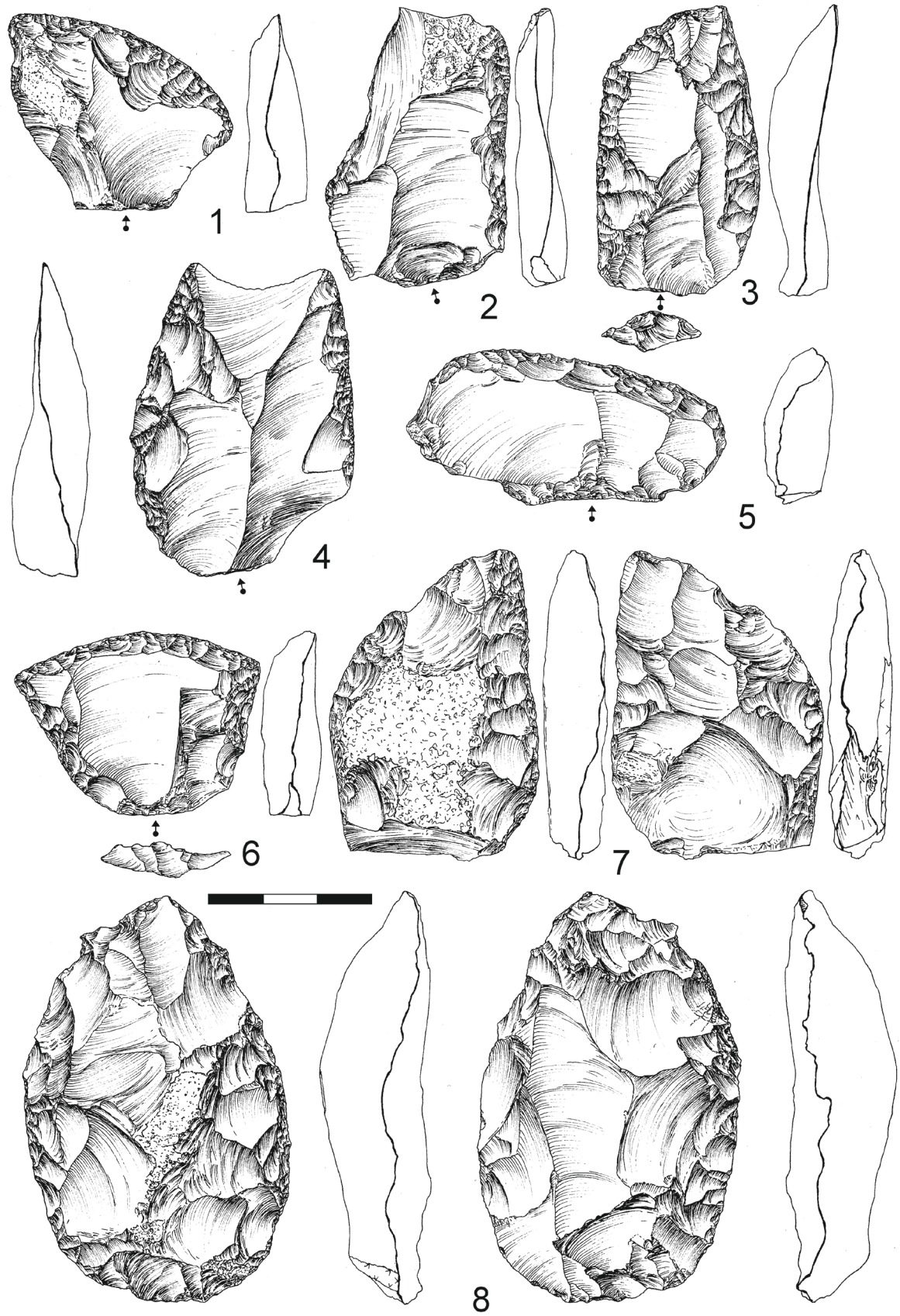
Appendix, Plate 2. Zaskalnaya V, Unit I, levels I/1 (1), I/4 (3), I/5 (2). Bifacial scrapers: 1 semi-leaf. Bifacial points: 2 sub-leaf; 3 sub-leaf, backed (*Klausennischemesser*).

Appendix, Tafel 2. *Zaskalnaya V, Unit I, Archäologische Horizonte I/1 (1), I/4 (3), I/5 (2). Bifazielle Schaber: 1 semi-blattförmig. Bifazielle Spitzen: 2 sub-blattförmig; 3 sub-blattförmig, mit Rücken (Klausennischemesser).*



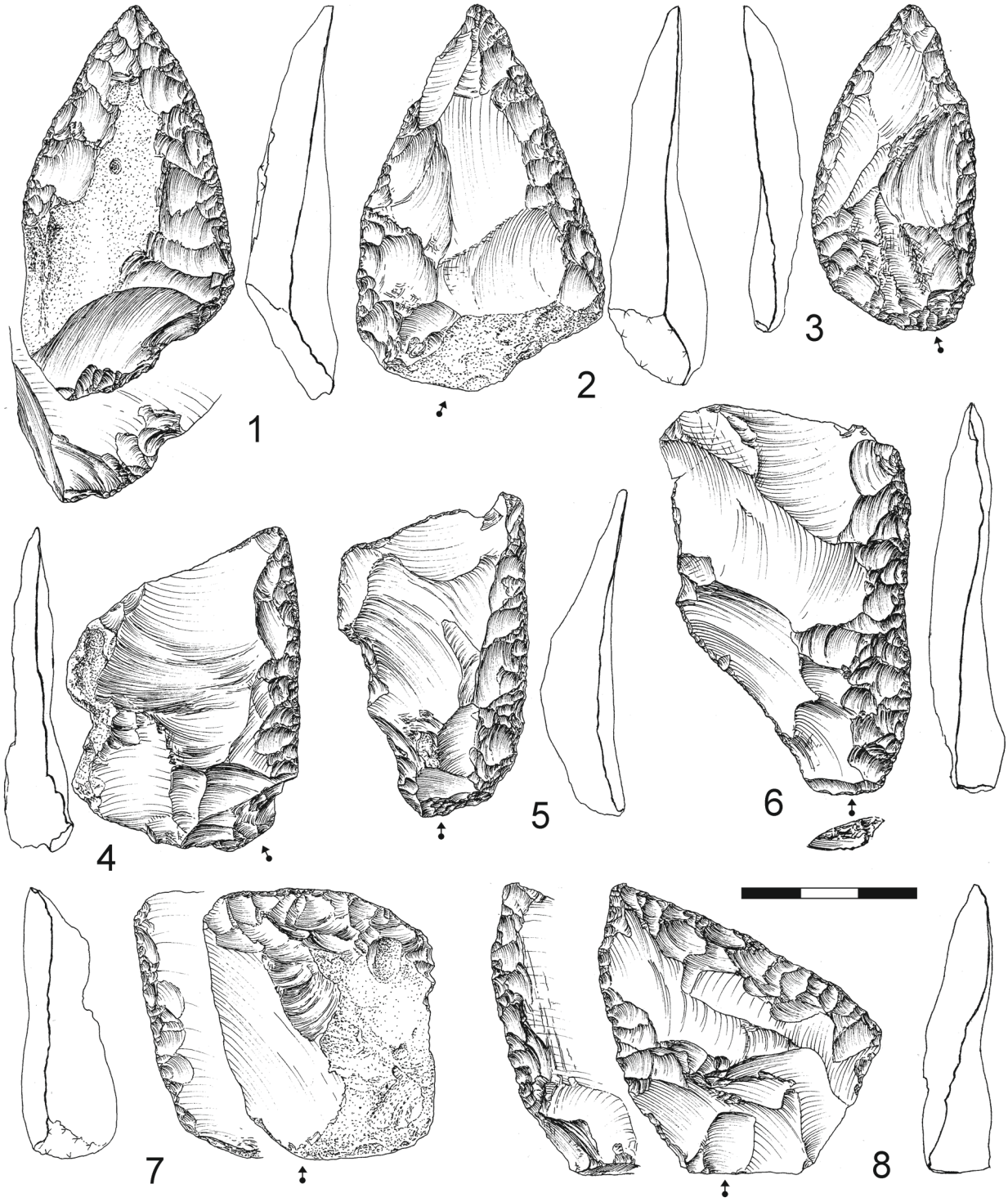
Appendix, Plate 3. Zaskalnaya V, Unit II, levels II/1 (1), II/2 (3), II/3 (4), II/4 (2). Scrapers: 1 triangular, distally thinned; 2 convex; 3 semi-leaf. Bifacial scraper: 4 semi-leaf, backed (*Klausennischemesser*).

Appendix, Tafel 3. *Zaskalnaya V, Unit II, Archäologische Horizonte II/1 (1), II/2 (3), II/3 (4), II/4 (2). Schaber: 1 dreieckig, mit ventraler Verdünnung der Spitze; 2 konvex; 3 semi-blattförmig. Bifazielle Schaber: 4 semi-blattfömig, mit Rücken (Klausennischemesser).*



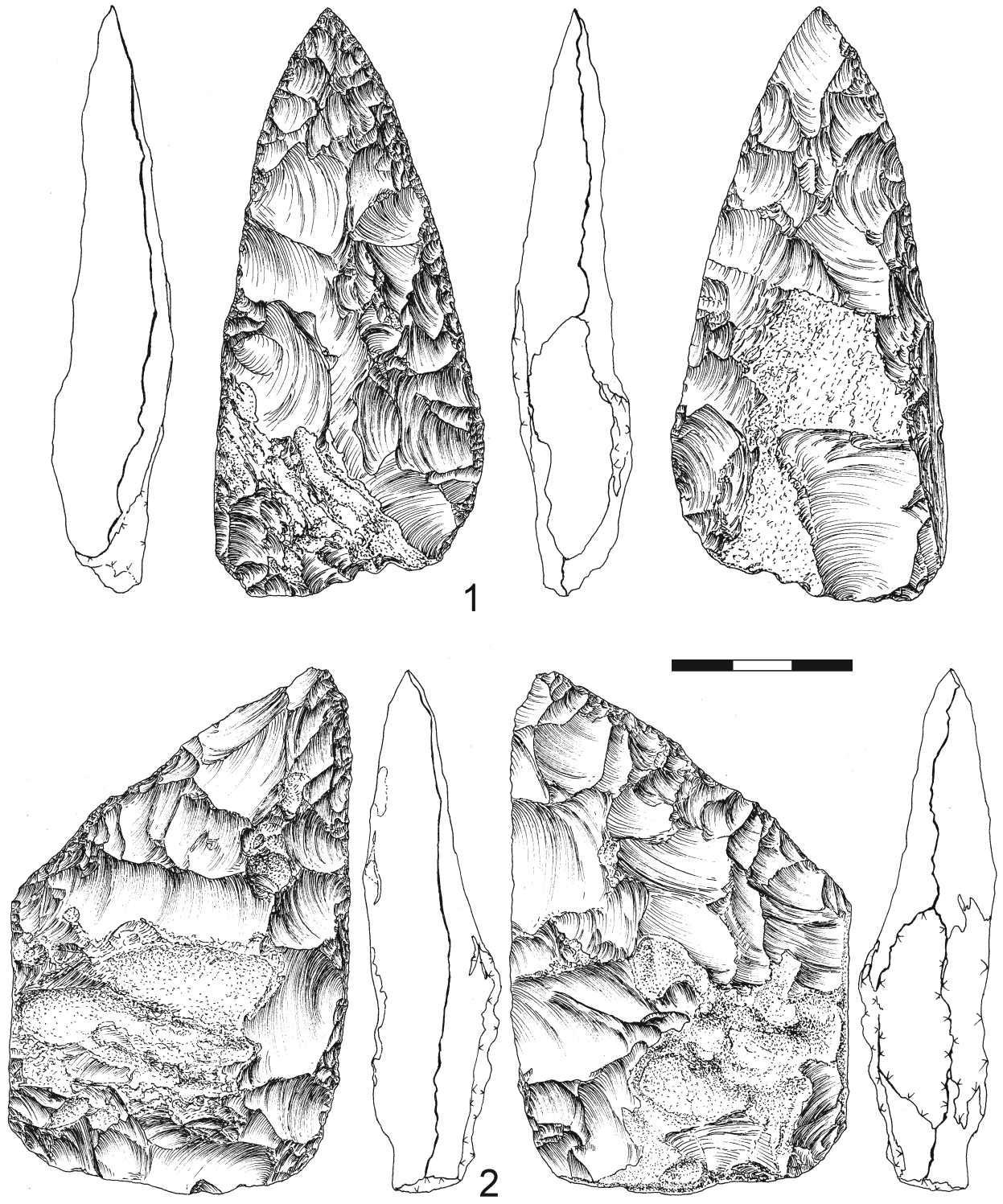
Appendix, Plate 4. Zaskalnaya V, Unit IIA, levels IIA/3 (1-5), IIA/4 (6.7.8). Scrapers: 1 semi-trapezoidal; 2 straight; 3.6 sub-trapezoidal; 4 straight-convex; 5 transverse-convex. Bifacial scrapers: 7 semi-crescent, backed (*Klausennischemesser*); 8 sub-leaf.

Appendix, Tafel 4. *Zaskalnaya V, Unit IIA, Archäologische Horizonte IIA/3 (1-5), IIA/4 (6.7.8). Schaber: 1 semi-trapezförmig; 2 gerade; 3.6 sub-trapezförmig; 4 gerade-konvex; 5 transversal-konvex. Bifazielle Schaber: 7 semi-sichelförmig, mit Rücken (Klausennischemesser); 8 sub-blattförmig.*



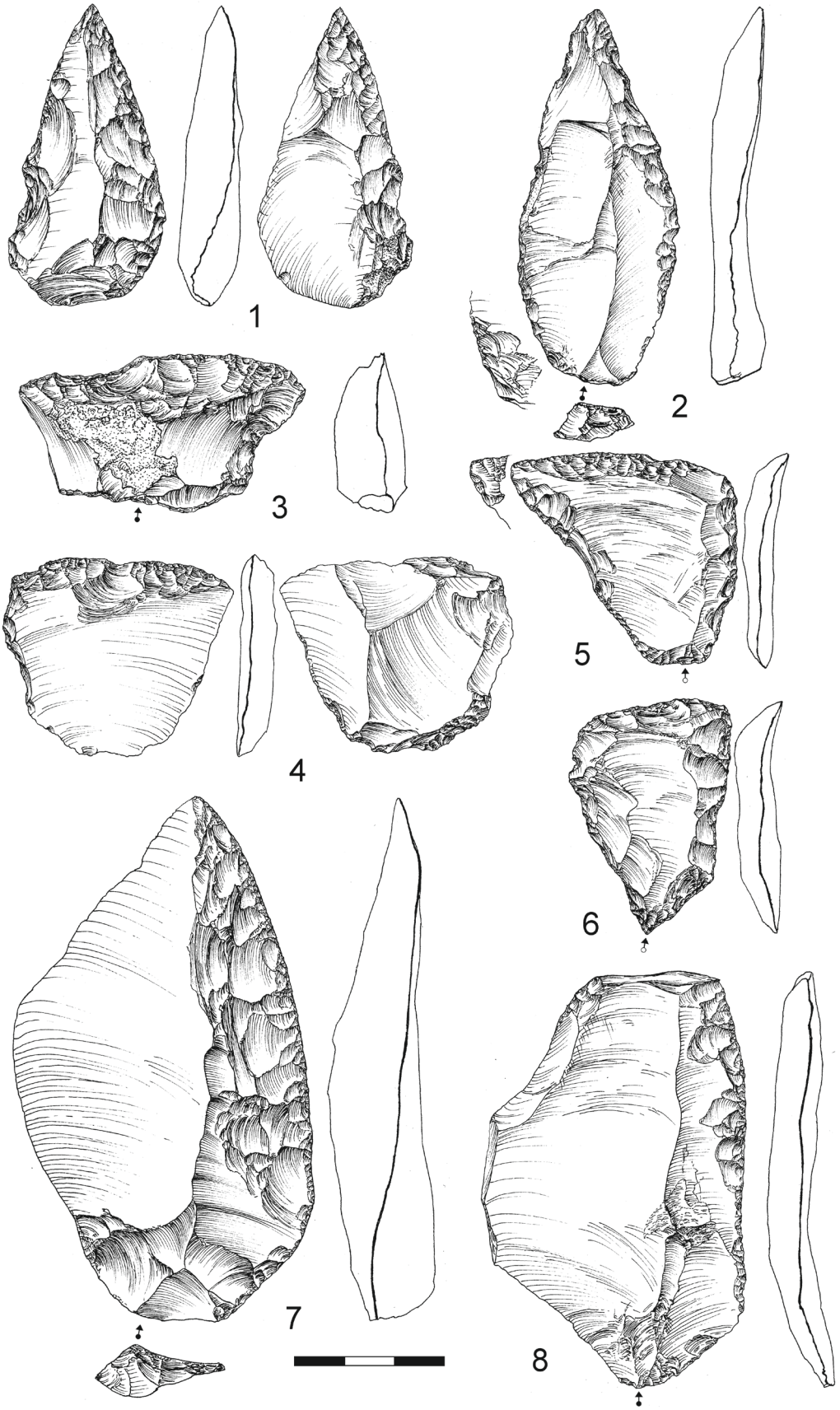
Appendix, Plate 5. Zaskalnaya V, Unit III, levels III/2 (6), III/7-1 (4), III/7-6 (3), III/8 (8), III/10 (2.7), III/11 (1.5). Points: 1 semi-leaf, thinned base; 2 semi-leaf; 3 sub-leaf. Scrapers: 4, 5, 6 convex; 7, 8 semi-trapezoidal, alternate.

Appendix, Tafel 5. *Zaskalnaya V, Unit III, Archäologische Horizonte III/2 (6), III/7-1 (4), III/7-6 (3), III/8 (8), III/10 (2.7), III/11 (1.5). Spitzen: 1 semi-blattförmig, mit ventraler Verdünnung der Basis; 2 semi-blattförmig; 3 sub-blattförmig. Schaber: 4, 5, 6 konvex; 7, 8 semi-trapezförmig, wechselseitig kantenretuschiert.*



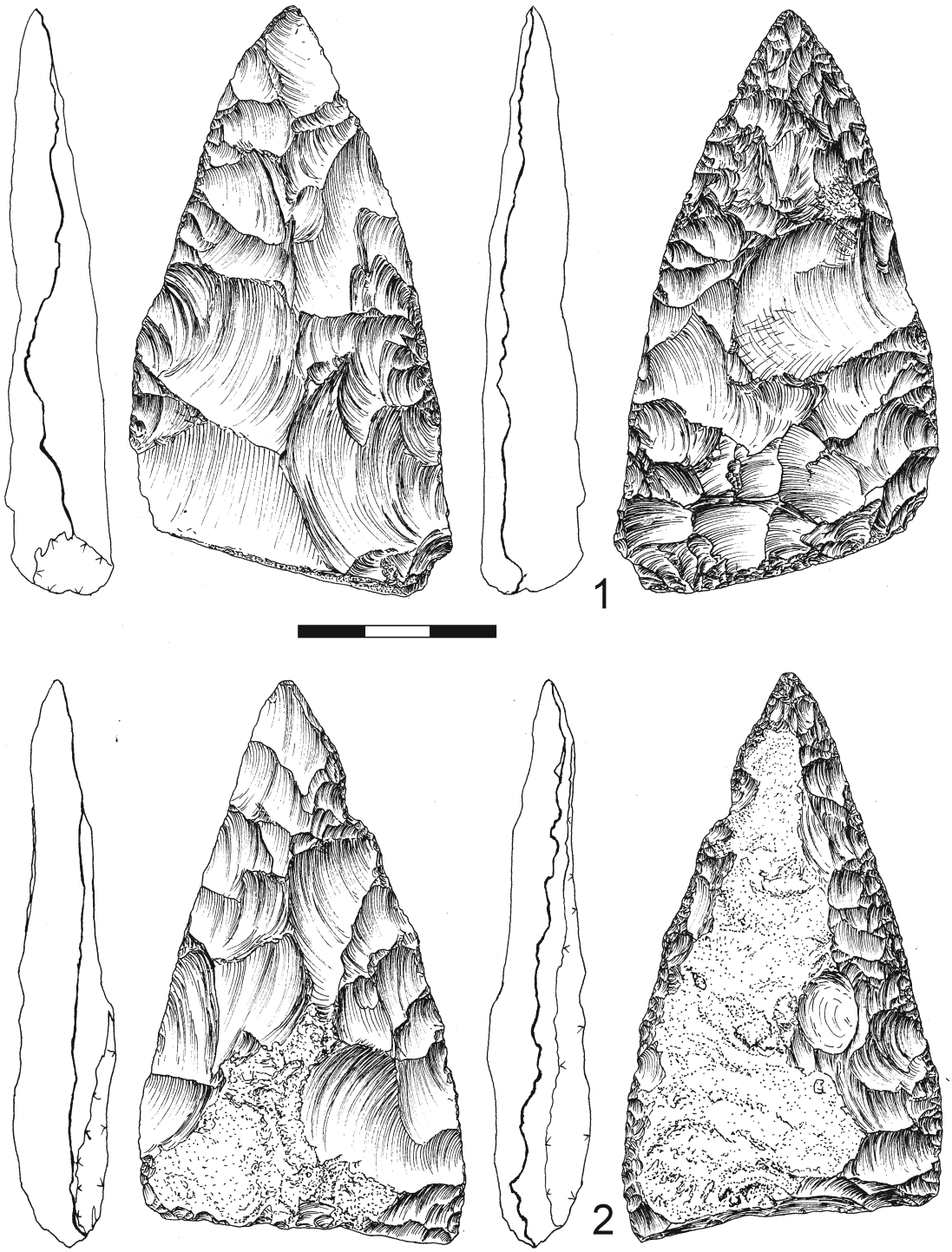
Appendix, Plate. 6. Zaskalnaya V, Unit III, levels III/9A (1), III/10 (2). Bifacial point: 1 semi-leaf, backed, Klausennischemesser. Bifacial scraper: 2 semi-trapezoidal, backed (*Klausennischemesser*).

Appendix, Tafel 6. *Zaskalnaya V, Unit III, Archäologische Horizonte III/9A (1), III/10 (2). Bifazielle Spitze: 1 semi-blattförmig, mit Rücken, Klausennischemesser. Bifazieller Schaber: 2 semi-trapezförmig, mit Rücken (Klausennischemesser).*

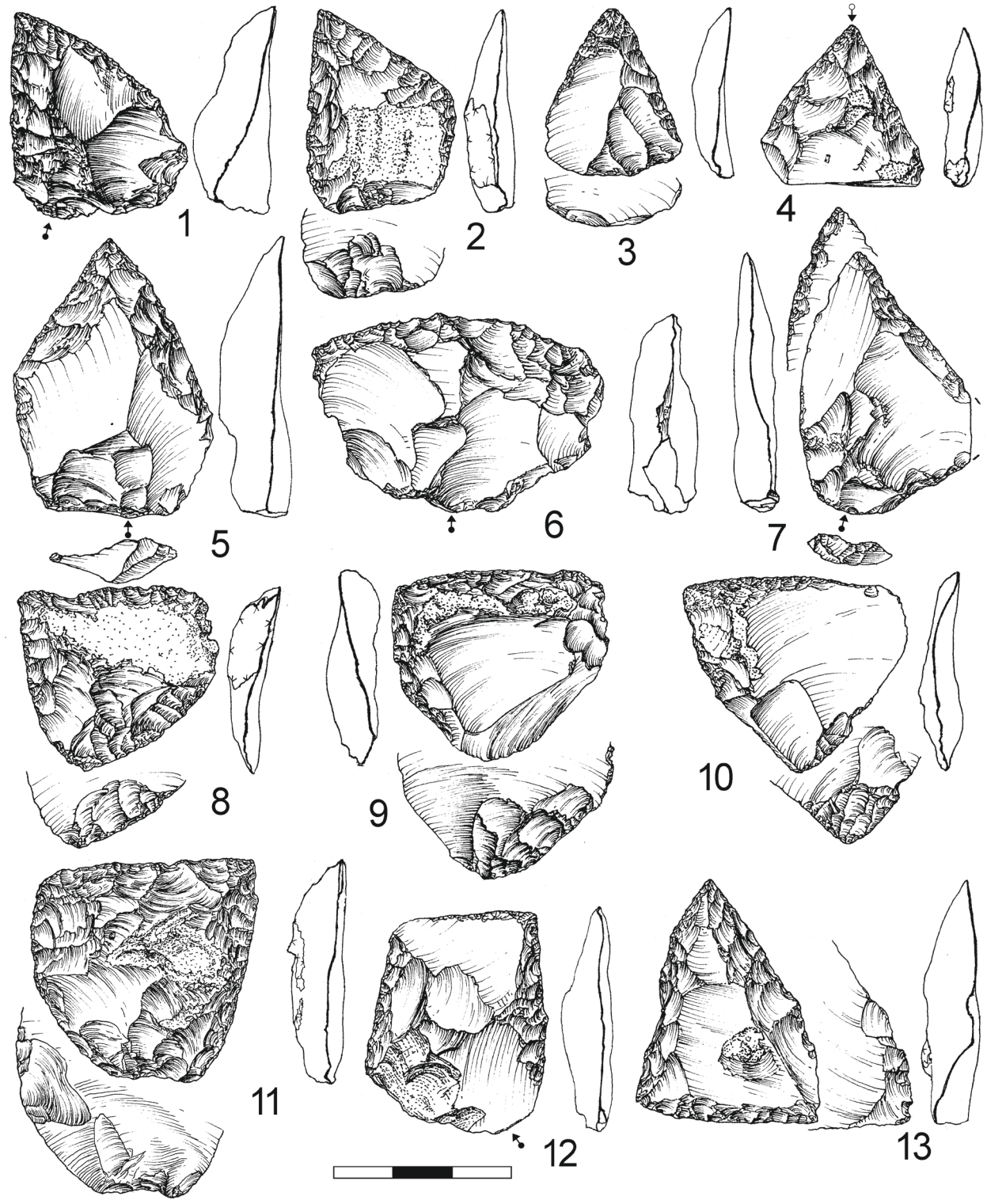


Appendix, Plate 7. Zaskalnaya V, Unit IIIA, levels IIIA/1 (1.7), IIIA/2 (3.8), IIIA/3 (2), IIIA/4 (4-6). Points: 1 sub-leaf, bifacially retouched; 2 sub-leaf, thinned back. Scrapers: 3 transverse-wavy; 4 trapezoidal alternate; 5 trapezoidal, distally thinned; 6 trapezoidal; 7 convex; 8 straight.

Appendix, Tafel 7. *Zaskalnaya V, Unit IIIA, Archäologische Horizonte IIIA/1 (1.7), IIIA/2 (3.8), IIIA/3 (2), IIIA/4 (4-6). Spitzen: 1 sub-blattförmig, bifaziell kantenretuschiert; 2 sub-blattförmig, mit verdünntem Rücken. Schaber: 3 transversal-wellenförmig; 4 trapezförmig wechselseitig; 5 trapezförmig, mit ventraler Verdünnung der Spitze; 6 trapezförmig; 7 konvex; 8 gerade.*

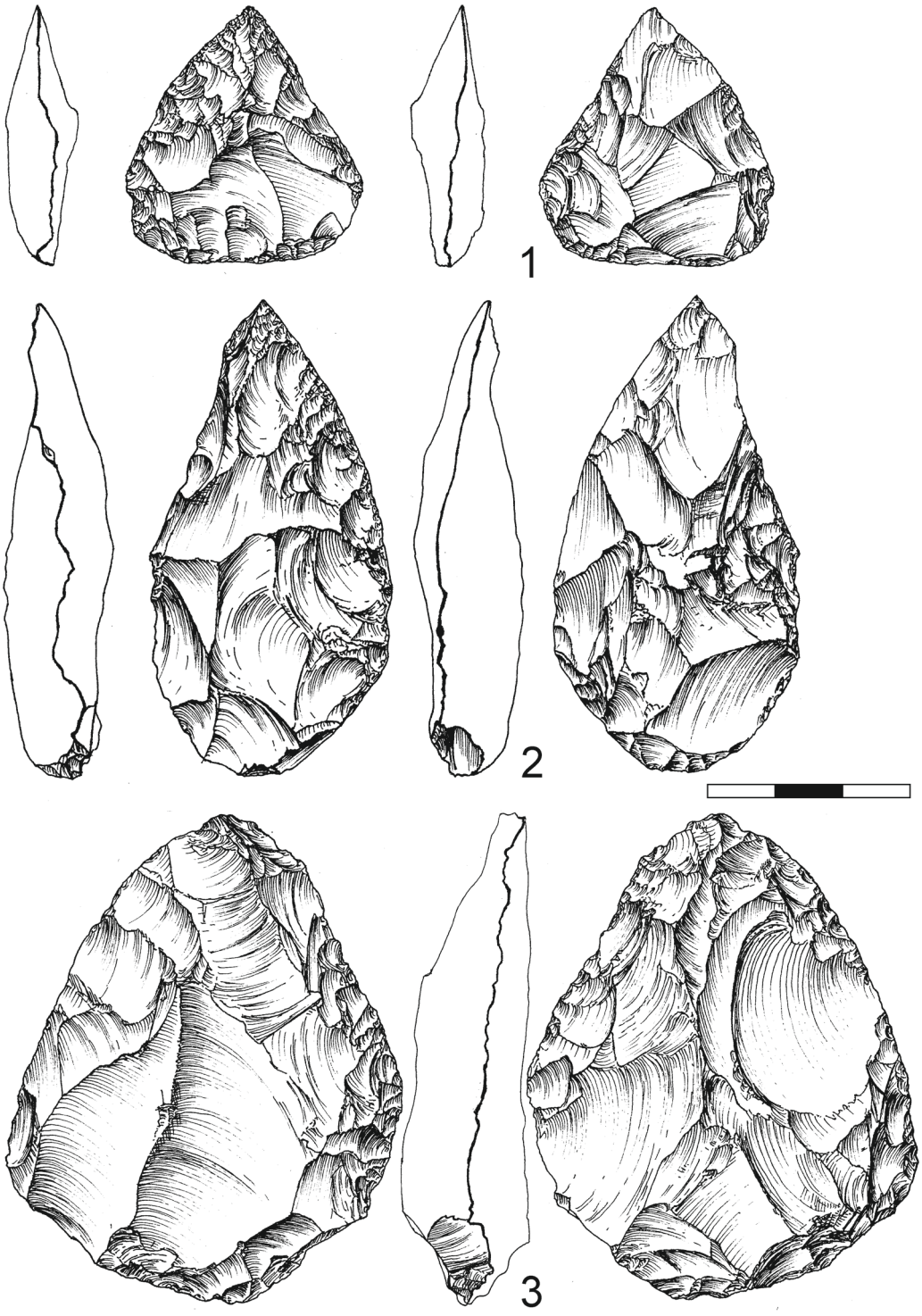


Appendix, Plate 8. Zaskalnaya V, Unit IIIA, levels IIIA/5 (2), IIIA/6 (1). Bifacial points: 1-2 semi-leaf.
Appendix, Tafel 8. *Zaskalnaya V, Unit IIIA, Archäologische Horizonte IIIA/5 (2), IIIA/6 (1). Bifazielle Spitzen: 1-2 semi-blattförmig.*



Appendix, Plate 9. Zaskalnaya V, Unit IV, levels IV/5 (8.13), IV/5A (6-7,10.12), IV/6 (1.9), IV/7 (2-5,11). Points: 1 semi-crescent; 2 semi-trapezoidal, thinned base; 3 sub-triangular, thinned base; 4-5 sub-triangular; 7 sub-triangular, alternate. Scrapers: 6 transverse-convex; 8-10 semi-trapezoidal, thinned base; 11 sub-trapezoidal, thinned base / back; 12 sub-trapezoidal; 13 triangular, thinned back.

Appendix, Tafel 9. *Zaskalnaya V, Unit IV, Archäologische Horizonte IV/5 (8.13), IV/5A (6-7,10.12), IV/6 (1.9), IV/7 (2-5,11). Spitzen: 1 semi-sichelförmig; 2 semi-trapezförmig, ventral Verdünnung der Basis; 3 sub-dreieckig, mit ventraler Verdünnung der Basis; 4-5 sub-dreieckig; 7 sub-dreieckig, wechselseitig kantenretuschiert. Schaber: 6 transveral-konvex; 8-10 semi-trapezförmig, mit ventraler Verdünnung der Basis; 11 sub-trapezförmig, mit ventraler Verdünnung der Basis und des Rückens; 12 sub-trapezförmig; 13 dreieckig, mit verdünntem Rücken.*



Appendix, Plate 10. Zaskalnaya V, Unit IV, levels IV/1 (1), IV/6 (2), IV/7 (3). Bifacial points: 1 triangular; 2 sub-leaf. Bifacial scraper: 3 semi-leaf.

Appendix, Tafel 10. *Zaskalnaya V, Unit IV, Archäologische Horizonte IV/1 (1), IV/6 (2), IV/7 (3). Bifazielle Spitzen: 1 dreieckig; 2 sub-blattförmig. Bifazielle Schaber: 3 semi-blattförmig.*

Literatur cited

Brock, F., Higham, Th., Ditchfield, P. & Bronk Ramsey, C. (2010). Current pretreatment methods for AMS radiocarbon dating at the Oxford Radiocarbon Accelerator Unit (ORAU). *Radiocarbon* 52: 103-112.

Chabai, V. P. (1998a). The history of Crimean Middle Paleolithic studies. *In*: A. E. Marks & V. P. Chabai (Eds.) *The Middle Paleolithic of Western Crimea, Volume 1.* Études et Recherches Archéologiques de l'Université de Liège 84. Presses Universitaires, Liège, 1-16.

Chabai, V. P. (1998b). Kabazi II: introduction. *In*: A. E. Marks & V. P. Chabai (Eds.) *The Middle Paleolithic of Western Crimea, Volume 1.* Études et Recherches Archéologiques de l'Université de Liège 84. Presses Universitaires, Liège, 167-200.

Chabai, V. P. (2004). *The Middle Paleolithic of Crimea.* Slyakh, Simferopol (in Russian).

Chabai, V. P. (2005). Kabazi II: stratigraphy and archaeological sequence. *In:* V. P. Chabai, J. Richter & Th. Uthmeier (Eds.) *Kabazi II: Last Interglacial Occupations, Environment & Subsistence.* Palaeolithic Sites of Crimea 1. Shlyakh, Simferopol & Cologne, 1-24.

Chabai, V. P. & Demidenko, Yu. E. (1998). The classification of flint artifacts. *In*: A. E. Marks & V. P. Chabai (Eds.) *The Middle Paleolithic of Western Crimea, Volume 1.* Études et Recherches Archéologiques de l'Université de Liège 84, Liège, 31-51.

Chabai, V. P. & Marks, A. E. (1998). Preliminary synthesis: Middle Paleolithic assemblage variability in western Crimea. *In:* A. E. Marks & V. P. Chabai (Eds.) *The Middle Paleolithic of western Crimea, Volume 1.* Études et Recherches Archéologiques de l'Université de Liège 84. Presses Universitaires, Liège, 355-368.

Chabai, V. P., Marks, A. E. & Monigal, K. (2004). Crimea in the Context of the Eastern European Middle Paleolithic and Early Upper Paleolithic. *In*: V. P. Chabai, K. Monigal & A. E. Marks (Eds.) *The Middle Paleolithic and Early Upper Paleolithic of Eastern Crimea, Volume 3.* Études et Recherches Archéologiques de l'Université de Liège 104. Presses Universitaires, Liège, 419-460.

Chabai, V. P., Marks, A. E. & Yevtushenko, A. I. (1995). Views of the Crimean Middle Paleolithic: past and present. *Préhistoire Européenne* 7: 59-79.

Chabai, V. P. & Monigal, K. (Eds.) (1999). *The Middle Paleolithic of Western Crimea, Volume 2.* ERAUL 87, Liège.

Chabai, V. P., Richter, J. & Uthmeier, Th. (Eds.) (2005). *Kabazi II: Last Interglacial Occupations, Environment & Subsistence.* Palaeolithic Sites of Crimea 1. Shlyakh, Simferopol & Cologne.

Chabai, V. P., Richter, J. & Uthmeier, Th. (Eds.) (2006). *Kabazi II: The 70.000 years since the Last Interglacial.* Palaeolithic Sites of Crimea 2. Shlyakh, Simferopol & Cologne.

Chabai, V. P., Richter, J. & Uthmeier, Th. (Eds.) (2007). *Kabazi V: interstratification of Micoquian and Levallois-Mousterian campsites.* Palaeolithic Sites of Crimea 3, Part 1. Shlyakh, Simferopol & Cologne.

Chabai, V. P., Richter, J. & Uthmeier, Th. (Eds.) (2008). *Kabazi V: interstratification of Micoquian and Levallois-Mousterian campsites.* Palaeolithic Sites of Crimea 3, Part 2. Shlyakh, Simferopol & Cologne.

Chabai, V. P. & Uthmeier, Th. (2006). Settlement Systems in the Crimean Middle Palaeolithic. *In*: V. P. Chabai, J. Richter & Th. Uthmeier (Eds.) *Kabazi II: 70000 years since the Last Interglacial.* Palaeolithic sites of Crimea 2. Shlyakh, Simferopol & Cologne, 297-359.

Chabai, V. P. & Veselsky, A. P. (2007). Kabazi V: hearths and pits. *In*: V. P. Chabai, J. Richter & Th. Uthmeier (Eds.) *Kabazi V: interstratification of Micoquian and Levallois-Mousterian campsites.* Palaeolithic Sites of Crimea 3, Part 1. Shlyakh, Simferopol & Cologne, 27-49.

Danilova, E. I. (1979a). The occipital bone of Neanderthal from Zaskalnaya V trench, near Ak Kaya. *In*: Yu. G. Kolosov (Ed.) *Investigations of the Paleolithic in Crimea.* Naukova dumka, Kiev, 76-83 (in Russian).

Danilova, E. I. (1979b). The Neanderthal metacarpal fragment. *In*: Yu. G. Kolosov (Ed.) *Investigations of the Paleolithic in Crimea.* Naukova dumka, Kiev, 84-85 (in Russian).

Demidenko, Yu. E. & Uthmeier, Th. (2013). Kiik Koba Grotto, Micoquian layer IV re-analysis: an overview. *In*: Yu. E. Demidenko & Th. Uthmeier (Ed.), *Kiik Koba Grotto, Crimea (Ukraine). Re-Analysis of a Key Site of the Crimean Micoquian.* Kölner Studien zur Prähistorischen Archäologie 3. Maria Leidorf Verlag, Rahden/Westf., 173-181.

Demidenko, Yu. E. & Uthmeier, Th. (Eds.) (2013). *Kiik Koba Grotto, Crimea (Ukraine). Re-Analysis of a Key Site of the Crimean Micoquian.* Kölner Studien zur Prähistorischen Archäologie 3. Maria Leidorf Verlag, Rahden/Westf.

Demidenko, Yu. E., Otte, M. & Noiret, P. (Eds.) (2012). *Siuren I rock-shelter. From Late Middle Paleolithic and Early Upper Paleolithic to Epi-Paleolithic in Crimea.* Études et Recherches Archéologiques de l'Université de Liège 129. Presses Universitaires, Liège.

Demidenko, Yu. E. (2000). "The Crimean Enigma" - Middle Paleolithic artifacts within Early Aurignacian of Krems-Dufour type complexes at Siuren I: alternative hypothesis for solution of the problem. *Stratum plus* 1: 97-124 (in Russian).

Demidenko, Yu. E. (2004). Buran-Kaya III Layer B: The Lithic Assemblage. *In*: V. P. Chabai, K. Monigal, & A. E. Marks (Eds.) *The Middle Paleolithic and Early Upper Paleolithic of Eastern Crimea, Volume 3.* Études et Recherches Archéologiques de l'Université de Liège no. 104. Presses Universitaires, Liège, 113-149.

Dibble, H. L., Chase, P. G., McPherron, S. P. & Tuffreau, A. (1997). Testing the Reality of a "Living Floor" with Archaeological Data. *American Antiquity* 62: 629-651.

Gerasimenko, N. P. (2005). Vegetation evolution of the Kabazi II site. *In*: V. P. Chabai, J. Richter & Th. Uthmeier (Eds.) *Kabazi II: Last Interglacial Occupations, Environment & Subsistence.* Palaeolithic Sites of Crimea 1. Shlyakh, Simferopol & Cologne, 25-49.

Gladilin, V. N. (1976). *The problems of the Early Paleolithic of Eastern Europe.* Naukova Dumka, Kiev (in Russian).

Gubonina, Z. P. (1985). Environmental conditions of the Paleolithic in the Crimean foothills. *In*: *Palynology of the Quaternary.* Nauka, Moscow, 95-103 (in Russian).

Housley, R. A., Sanderson D. C. W., Burbidge Ch. I., Richter D. & Higham, T. F. G. (2007). Luminescence Analyses (OSL and TL) and AMS Radiocrabon Determinations from Kabazi V. *In*: V. P. Chabai, J. Richter & Th. Uthmeier (eds.) *Kabazi V: Interstratification of Micoquian & Levallois-Mousterian Camp Sites. Palaeolithic Sites of Crimea. Vol. 3, Part 1.* Shlyakh, Simferopol-Cologne, 51-67.

Jöris, O., Street, M., Terberger, T. & Weninger, B. (2011). Radiocarbon Dating the Middle to Upper Palaeolithic Transition: The Demise of the Last Neanderthals and the First Appearance of Anatomically Modern Humans in Europe. *In*: S. Condemi & G.-Chr. Weniger (Eds.), *Continuity and Discontinuity in the Peopling of Europe: One Hundred Fifty Years of Neanderthal Study.* "Neanderthals and Modern Humans" Session, Neanderthal Symposium Bonn, 21st-26th July 2006. Vertebrate Paleobiology and Paleoanthropology Series XXII. Springer, New York, 239-298.

Kolosov, Yu. G. (1979). The Ak Kaya Mousterian sites and some results of its investigations. *In*: Yu. G. Kolosov (Ed.) *The investigation into the Paleolithic in the Crimea.* Naukova Dumka, Kiev 33-56 (in Russian).

Kolosov, Yu. G. (1983). *The Mousterian sites of the Belogorsk district.* Naukova Dumka, Kiev (in Russian).

Kolosov, Yu. G. & Stepanchuk, V. N. (2002). New radiocarbon dates of Crimean Paleolithic sites. *In*: L. L. Zalizniak (Ed.) *Stone age of Ukraine*. Shlyakh, Kiev, 18-29 (in Ukrainian).

Kolosov, Yu. G., Stepanchuk, V. N. & Chabai, V. P. (1993). *The Early Paleolithic of Crimea.* Naukova Dumka, Kiev (in Russian.)

Kolosov, Yu. G., Kuharchuk, Yu. V. & Ryzhov, S. N. (1994). The investigations nearby the Ak Kaya Rock. *In*: V.A. Kutaisov (Ed.) *The archaeological investigations in Crimea, 1993*. Tavria, Simferopol, 146-150 (in Russian).

Kolosov, Yu. G., Kuharchuk, Yu. V. & Ryzhov, S. N. (1997). The investigations nearby the Ak Kaya Rock. In V.A. Kutaisov (Ed.) *The archaeological investigations in Crimea, 1994*. Tavria, Simferopol, 143-150 (in Russian).

Marks, A. & Chabai, V. P. (Eds.) (1998). *The Middle Paleolithic of Western Crimea, Volume 1*. Études et Recherches Archéologiques de l'Université de Liège 84. Presses Universitaires, Liège.

McKinney, C. & Rink, R. (1996). *The absolute chronology of the Middle Paleolithic of the Crimea*. The paper presented on the 61st Annual Meeting of the Society of American Archaeology. – New Orleans, April, 11th, 1996.

Monigal, K. (2004). Introduction to the site of Buran-Kaya III. *In*: V. P. Chabai, K. Monigal & A. E. Marks (Eds.) *The Paleolithic of Crimea. The Middle Paleolithic and Early Upper Paleolithic of Eastern Crimea, Volume 3*. Études et Recherches Archéologiques de l'Université de Liège 104. Presses Universitaires, Liège 3-18.

Péan, S., Puaud, S., Crépin, L., Prat, S., Quiles, A., van der Plicht, J., Valladas, H., Stuart, A. J., Drucker, D., Patou-Mathis, M., Lanoë, F. & Yanevich, A. (2013). The Middle to Upper Paleolithic sequence of Buran Kaya III (Crimea, Ukraine): New stratigraphical, paleoenvironmental, and chronological results. *Radiocarbon* 55, 1454–1469.

Stepanchuk, V. M., Kovalukh, V. M. & Van der Plicht, J. (2004). The radiocarbon age of the Upper Pleistocene Paleolithic sites in Crimea. *The Stone Age of Ukraine* 5: 34-61 (in Ukrainian).

Stepanchuk, V. N. (2006). *The Lower and Middle Palaeolithic of Ukraine*. Zelena Bukovyna, Chernivtsi (in Russian).

Uthmeier, Th. (2012). The Transition from Middle- to Upper Palaeolithic at Buran Kaya III, Crimea (Ukraine): a case of conceptual continuity of lithic artefact manufacture? *In*: A. Pastoors & M. Peresani (Eds.) *Flakes not Blades: The Role of Flake Production at the Onset of the Upper Palaeolithic*. Wissenschaftliche Schriften des Neanderthal Museums 5. Neanderthal Museum, Mettmann, 239-260.

Uthmeier, Th. & Chabai, V. P. (2010). Neanderthal subsistence tactics in the Crimean Micoquian. *In*: N. J. Connard & A. Delagnes (Eds.) *Settlement Dynamics of the Middle Paleolithic and Middle Stone Age, Volume III*. Kerns Verlag, Tübingen, 195-234.

Uthmeier, Th., Ickler, S. & Kurbjuhn, M. (2008). Site Catchment Analysis in the Late Crimean Middle Palaeolithic: a GIS Based Approach. *In*: V. P. Chabai, J. Richter & Th. Uthmeier (eds.) *Kabazi V: Interstratification of Micoquian & Levallois-Mousterian Camp Sites*. Palaeolithic Sites of Crimea 3, Part 2. Shlyakh, Simferopol-Cologne, 481-508.

Weninger, B. & Jöris, O. (2008). A ^{14}C age calibration curve for the last 60 ka: the Greenland-Hulu U/Th timescale and its impact on understanding the Middle to Upper Paleolithic transition in Western Eurasia. *Journal of Human Evolution* 55, 772-781.

Yevtushenko, A. I. (2009). The Palaeolithic sites Karabai I and Karabai II: the preliminary results of investigations. *In*: V. P. Chabai (Ed.) *Archaeological Almanac* 20. Donbass, Donetsk, 77-88 (in Russian).

Yevtushenko, A. I. & Chabai, V. P. (Eds.) (2012). *Karabai I, the Paleolithic site in Eastern Crimea*. Archaeological Almanac 26. Donbass, Donetsk.