ANTHROPOLOGIE • XLII/3 • pp. 311–322 • 2004

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THE 2002–2003 EXCAVATION IN THE DZERAVÁ SKALA CAVE, WEST SLOVAKIA

ABSTRACT: The new excavations at the Dzeravá skala cave opened a complex stratigraphic section, showing combination of in situ *developed sediments, in-blown loess, and clays, paleosols and clasts removed from elsewhere, most probably from the above cave chimneys. In terms of paleobotany and paleontology, this sequence illustrates the climatic record from the Holocene over the Last Glacial Maximum to the more temperate oscillations of the Interpleniglacial, and, possibly, even before that. Two aspects are of importance: the almost constant presence of cave bears throughout the Pleistocene layers, and the repeated human visits. The archaeological record comprises the Neolithic, probably Late Paleolithic, Gravettian (25–31.7 ka BP), Early Upper Paleolithic (34–37 ka BP), and the Late Middle Paleolithic (50.4 ka BP). The isolated human molar (right lower M2), found by Hillebrand in 1913, may be correlated with the EUP layers.*

KEY WORDS: Late Middle Paleolithic – Upper Paleolithic – Upper Pleistocene – Fauna – Industry – West Slovakia

INTRODUCTION

Dzeravá skala cave (Pálffybarlang) is located in a short but deep-cut karstic valley in the western slopes of the Small Carpathian Mountains (Malé Karpaty), facing the Morava river plain (*Figure 1*). The cave entrance is 18 m broad, 22 m long and 10 m high. It is located 450 m a.s.l., 37 m above the valley floor, and faces to the east. Still higher, on the opposite slope of the same valley, is located a typical cave bear cave, called Tmavá skala.

In 1912–1913, the cave was excavated by Jenö Hillebrand (1913, 1914). During his excavations, E. Bächler found a bone point with probably splittered base at the very base, in the lower gray clays, whereas the above complex of reddish clays yielded asymmetrical lithic leafpoints. Floating of the later sediments for microfauna provided a human tooth, a right lower M2, remarkable in size, but with little possibility of additional determination, especially with respect to the Neandertal or modern human type.

In 1950, the excavation was continued by František Prošek (1951, 1953). In a stratigraphic position comparable to Hillebrand's reddish clays, he found another series of leafpoints, all with heavily worn edges, together with other lithics (endscraper, burin, borer, sidescraper, blades), but also with 20 bone points of the "Aurignacian" (mainly Mladeč) type. Prošek labelled the whole assemblage as Szeletian. However, this author has also shown that these layers were cryoturbated, and, therefore, later researchers doubted about the validity of this association (Valoch 1996).

Recently, the problem of association of the two projectile types – the lithic leafpoints and the polished bone-and-antler points, became intensively discussed at the Vindija cave, Croatia, where the two types of points were found in the same stratigrahic context G1 as late Neandertal fossils (cf. Karavanic, Smith 1998, d'Errico *et al.* 1998, etc.). As in the Dzeravá skala cave, the possibility of mechanic contamination has also been raised at Vindija.

New research in the Dzeravá skala cave was undertaken in 2002–2003 by the present authors.

STRATIGRAPHY AND PALEOPEDOLOGY

The Dzeravá skala profile (*Figures 2* and *3*) is rather complex, showing combination of *in situ* developed sediments (especially in the Holocene part of the section), in-blown loess (upper part of the Pleistocene sequence), and clays, paleosols and debris removed from elsewhere, most probably from the above cave chimneys (middle and lower part of the Pleistocene section). Given the combined character of this deposition, the sections were analysed from viewpoints of sedimentology and granulometry (Slíva 2003), paleopedology, and Quaternary geology (Smolíková, Havlíček 2002).

Description of the profile:

1. Black to grey, clayish, interstratified by fine brownish sediments, by red-burnt horizon, and forming filling of pits. Holocene, with intensive Neolithic and later occupations.
2. Thin, whitish travertine interlayer, covering Late Paleolithic (?) artifacts.
3. Pure loess. At places, interstratification by lenses of finelly layered loess and loessic clays results from redeposition. AMS dating: GrA-22756: 25,050+540–510 BP. Upper Paleolithic (Gravettian) artifacts.
4. Light brown, humous layer, with sharp-edges middle-sized debris. AMS dating: GrA-22758: 24,800±130 BP. Upper Paleolithic (Gravettian) artifacts.

4a. Black to grey, clayish, with chaotically deposited small and middle-sized debris. Rusty spots (Fe3+) and Mn deposits.

4b. Dark brown, clayish, with middle-sized debris. Upper Paleolithic (early Gravettian?) artifacts. AMS dating: GrA-22759: 31,770±190 BP.

5. Loessic interlayers. Upper Paleolithic artifacts.

5a. Grey to green, in the upper part loessic and in the lower part clayish, with chaotically deposited small and middle-sized debris. Rusty spots and Mn deposits.

6. Reddish, clayish, with small-sized debris. Pedologically, it corresponds to terra fusca, with redeposited particles of an earlier terra rosa.
7. Dark brown, clayish, with large-sized and middle-sized debris.

7a. Dark brown, clayish, with debris and small debris.

8. Loessic interlayer with debris.
9. Brown, with debris of large and middle dimensions, partly corroded. AMS dating: Beta 173341: 34,100±320 BP. Upper Paleolithic (Aurignacian?) artifacts.

9a. Brown to dark brown, with a higher proportion of small-sized debris.

10. Black lenses, clay to silt.
11. Light greyish with corroded or rounded middle-sized to small-sized debris (including pebbles). At some places finelly stratified. AMS dating from the upper part of the layer: Beta 173342: 36,920±470 BP. Initial Upper Paleolithic artifact.
    OSL datings from the middle part of the layer, horizon of the leafpoint: 50,400±4,400. Late Middle Paleolithic.
12. Thin, banded sandy-clayish rusty deposits on the rocky subsoil.

Interpretation:

The upper part of the profile (layers 1–3) corresponds to the classical development from the Holocene to the Upper Würmian Pleniglacial, as represented in caves (OIS 1–2).

The middle part of the profile (beginning with layer 4) represents a complex of redeposited limestone debris of various sizes, with clayish fillings of various colorations and particles of earlier paleosols. They originate most probably from the above chimney, redeposited in a chaotic manner, with a low degree of sediment sorting, and, in addition, affected by postdepositional processes such as cryoturbation and mechanical disturbances. Some of these sediments are rich in phosphats (greenish-to-grayish coloration), while others show rusty coloration due to presence of Fe3+ as well as presence of manganese, all of which suggest a moist environment not only during the original formation of the sediments, but also during the redepositions. The final deposition took place most probably during OIS 3.

The lower part of the filling shows similar but more regularly layered deposition of limestone clasts, together with alokhtonne sediments, including particles of earlier interglacial paleosols and phosphate or glauconitic deposits. This deposition reflects either a climatic instability within the interpleniglacial (OIS 3, as suggested by the dating and the archaeological context), or final interglacial and early glacial (OIS 4–5, as suggested by the microfaunal record and OSL dating).

In conclusion, even if the sedimentation processes in the Dzeravá skala cave were chaotic, the profile illustrates relatively well the stratigraphic sequence from the Holocene over the Last Glacial Maximum to the Interpleniglacial, and probably even before that. This is in contrast to caves of the Moravian Karst (for example Kůlna, Švédův stůl), which usually display an important stratigraphic hiatus between the earlier and later glacial stratigraphies. Thus, the stratigraphic and climatic development in the Dzeravá skala may be compared to open-air loess sections covering the same chronological time-span more continuously, such as Willendorf II (Haesaerts *et al.* 1996).

PALEOBOTANY, PALEONTOLOGY, AND LANDSCAPE RECONSTRUCTIONS

Thanks to relatively good organic preservation, the profiles of Dzeravá skala provided evidence of charcoal (analysis by M. Hajnalová in 2003), molluscs (W. P. Alexandrowicz in 2004), smaller and larger vertebrates (I. Horáček in 2003; A. Ďurišová in 2004). Together, this evidence supplies good potential for landscape reconstructions. Two aspects, however, influence the interpretation: the almost constant presence of cave bears in most of the Pleistocene layers, and repeated human visits.

Layer 1 is a complex Holocene sequence, partly of anthropogenic origin, with abundant organic remains. It is

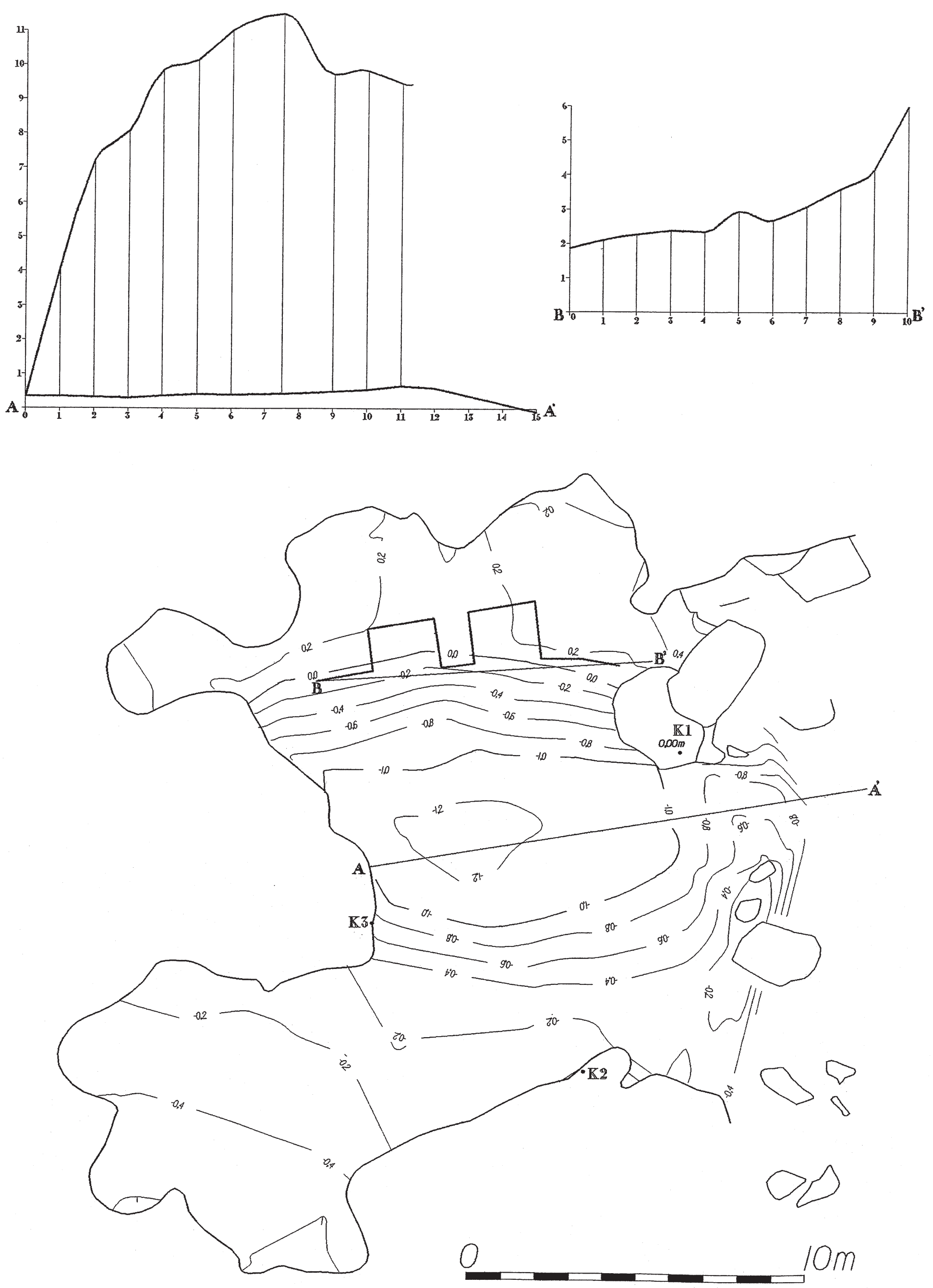

FIGURE 1. Dzeravá skala cave, sections and plan of the cave, showing location of the two trenches PP1 and PP2. Compiled by M. Bartík, 2002.

rich in paleobotanical macroremains of deciduous forest trees, but problematic in what concerns homogeneity of its microfaunal content.

Layer 2, even if still Holocene, already has characteristic patterns of the Late Glacial in its microfauna: a poor spectrum dominated by *Microtus arvalis* and *Microtus gregalis*, with presence of *Dicrostonyx gulielmi* and *Ochotona pusilla*, and an increased representation of *Microtus oeconomus*.

Layer 3 corresponds to the open landscape formation during and around the Upper Pleniglacial, but it also contained a few charcoal fragments of deciduous trees (*Fraxinus*, *Ulmus*). The microfauna is dominated by *Microtus gregalis* and *Dicrostonyx gulielmi*, with a lower representation of *Microtus arvalis*, and absence of all pretendous species. The same picture is provided by the composition of larger mammals.

Layer 4 has isolated fragments of deciduous trees (*Fagus*). The microfaunal record shows an increase in proportion of *Microtus arvalis*, together with more pretendous species of open landscapes (*Microtus oeconomus, Citellus citellus*) and of sunny, limestone debris slopes (*Microtus nivalis*), while the species of the glacial

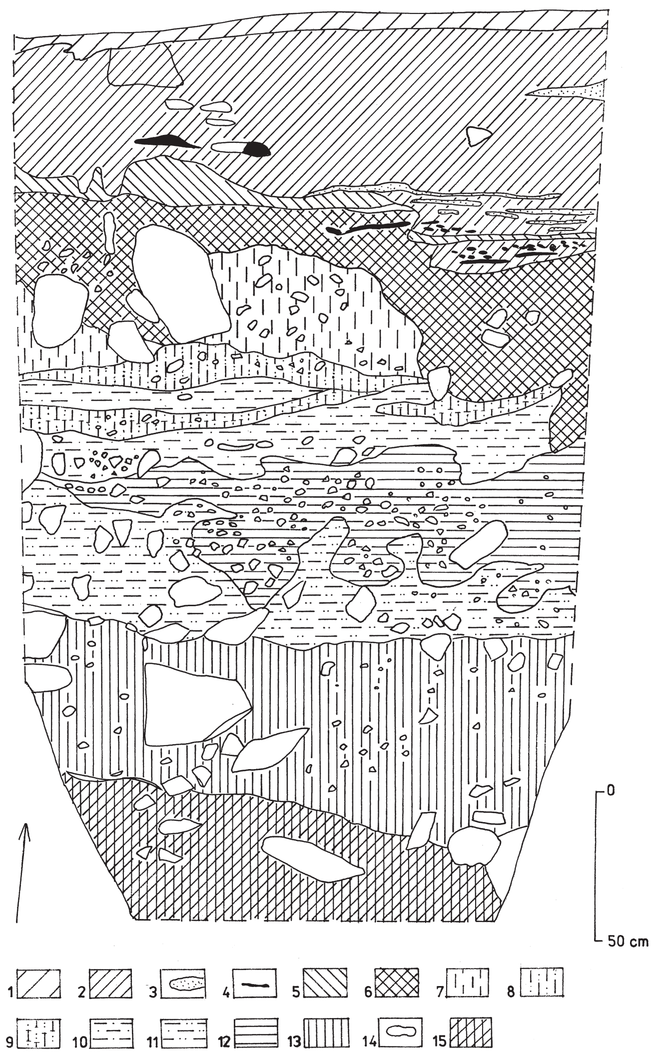

FIGURE 2a. Trench PP1, northern section, stratigraphy. 1 – layer 1o, 2 – layer 1a, 3 – layer 1b (burnt orange layer), 4 – layer 1c (dark, ashy layers), 5 – layer 2 (travertine), 6 – layer 3, 7 – layer 4, 8 – layer 4a', 9 – layer 4a'', 10 – layer 5a, 11 – layer 5a', 12 – layer 9, 13 – layer 11, 14 – stone, 15 – layer 12.

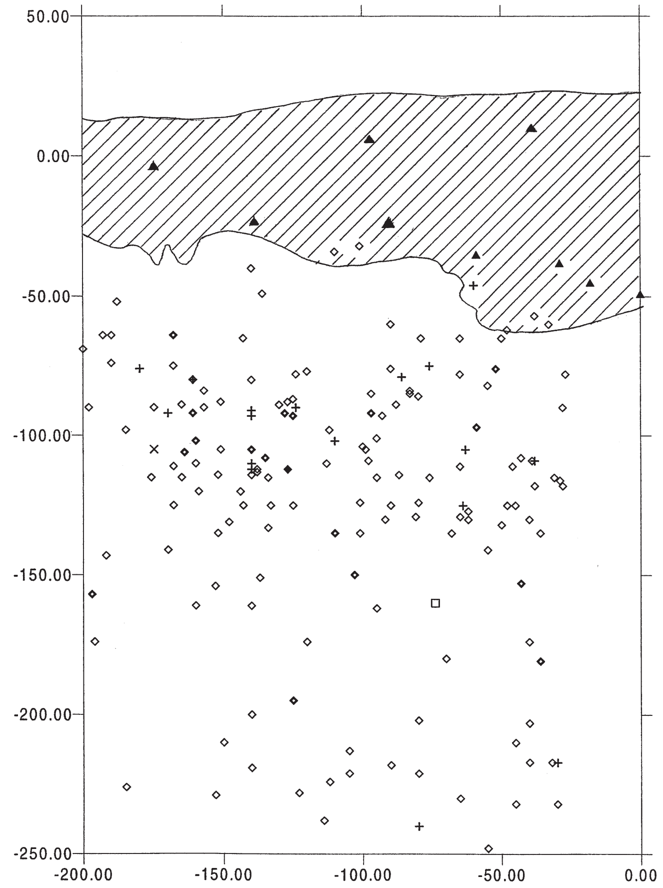

FIGURE 2b. Trench PP1, northern section, projection of objects. ▲ – pottery sherds, + lithic industry, ◊ – animal bones, teeth, ♦ – ivory, x – bone pendant, □ – stone.

peak periods decrease in number. This society is accompanied by a larger representation of small carnivores (*Mustela sp.*) and a presence of *Clerionomys cf. glareolus* and *Microtus agrestis*, indicating a limited forest vegetation and locally elevated surfacial moisture. This mosaic-like landscape reconstruction is supported by the large mammals from layer 4, but layer 5 shows an increase of species of open landscape (reindeer, horse).

Layers 6 and 8 are similar in composition and ecological interpretation to layers 4–4b (cf. the presence of *Fagus* among the trees, and the dominance of *Microtus arvalis, M. oeconomus* and more pretendous elements such as *Clethrionomys cf. glareolus* or *Sorex araneus* in the microfaunal spectrum).

Layer 9 shows return of the fully glacial fauna with leading elements *Microtus gregalis* and *Dicrostonyx gulielmi*, but also a higher diversity with presence of more pretendous species of open landscape (*Ochotona, Citellus sp., Lepus sp.*), moister environments and forest vegetation (*Microtus oeconomus, Arvicola terrestris, M. agrestis, Sorex araneus, Clethrionomys spp.*) and sunny debris slopes (*M. nivalis*). Thus, even if the layer corresponds to a colder event within the last glacial (the Lower Pleniglacial – OIS 4 after I. Horáček), it also suggests that this period was not as open and treeless as OIS 2, but, rather, presented a mosaic of open landscapes with relict moist and taiga-like formations (probably at the valley floors) and larger rocky and debris slopes. The larger mammals from this layer form the most important collection of its kind, but mostly of colder and open landscape. The usually dominating cave bears are here accompanied by hare (two sorts), fox (two sorts), reindeer, wolf, hyena, and horse.

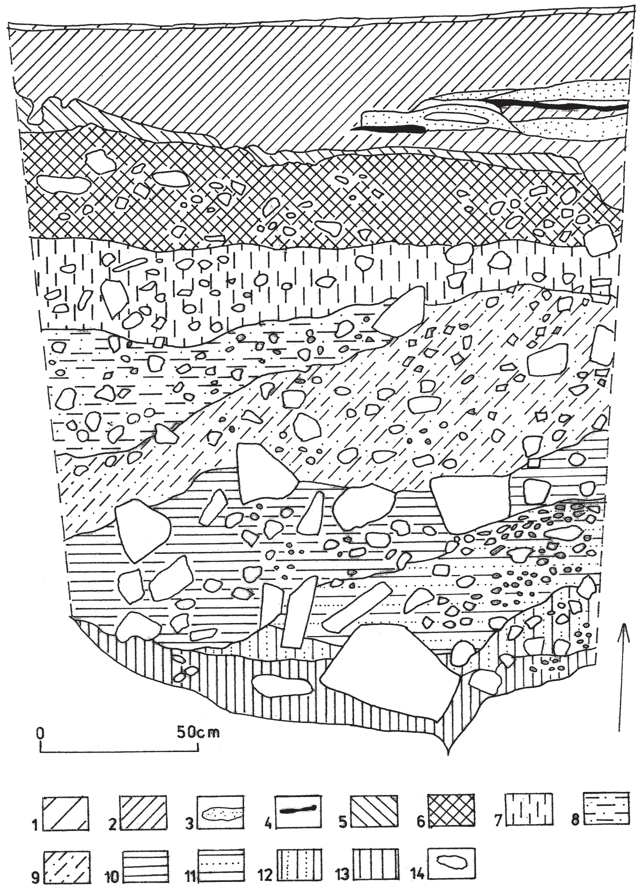

FIGURE 3a. Trench PP2, northern section, stratigraphy. 1 – layer 1o, 2 – layer 1a, 3 – layer 1b (burnt orange layer), 4 – layer 1c (dark, ashy layers), 5 – layer 2, 6 – layer 3, 7 – layer 4, 8 – layer 5a, 9 – layer 7, 10 – layer 9, 11 – layer 9a, 12 – layer 10, 13 – layer 11, 14 – stone.

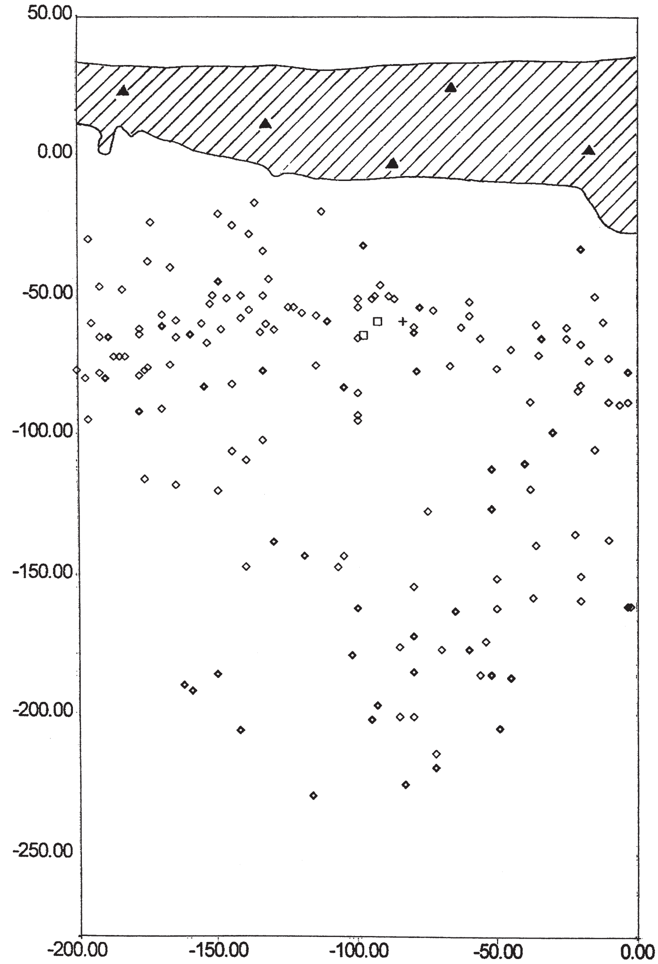

FIGURE 3b. Trench PP2, northern section, projection of objects. ▲ – pottery sherds, + lithic industry, ◊ – animal bones, teeth, □ – stone.

Layer 11 is characterized by very low representation of *Dicrostonyx gulielmi* and a dominance of *Microtus oeconomus* and *M. agrestis*. Both are more pretendous species of open landscape, where they dominate during the marginal stages of the glacial. Especially important is the presence of *Lagurus lagurus*, a pretendous steppic species typical of the initial glacial periods (Heinrich 2001). Thus, following I. Horáček, the society corresponds to the expansion of steppic formation prior to the Würmian Pleniglacial (OIS 5a, cf. Horáček, Ložek 1988). Among the larger mammals the cave bears predominated almost totally.

HUMAN ACTIVITY

If we accept that cave bears were the dominant original occupants of the cave, and most of the other carnivores also occurred naturally, some of the other animal species were more probably brought to the cave by humans (hare, reindeer, horse). Clear separation of the purely paleontological society from the archaeofauna is always problematic at the sites of this kind. Generally, it appears that the cave bears clearly dominate at the base of the section (layer 11), while the archaeofauna is most frequent in layers 4 and 9.

Microscopic observations (L. Smolíková) supply another kind of evidence of human presence. It shows that most of the layers in the middle part of the section include some burnt soil particles which may be relicts of destructed hearths. Fragments of charcoal were scattered through most of these layers, especially in the upper and middle parts of the section. However, no regular hearths were recorded in the Pleistocene part of the section.

THE ARTIFACTS

Layer 2. Small assemblage composed of 3 microblade fragments and 4 small flakes (radiolarite, limnoquartzite, flint, quartzite). Late Paleolithic; *Figure 4:1–4*.

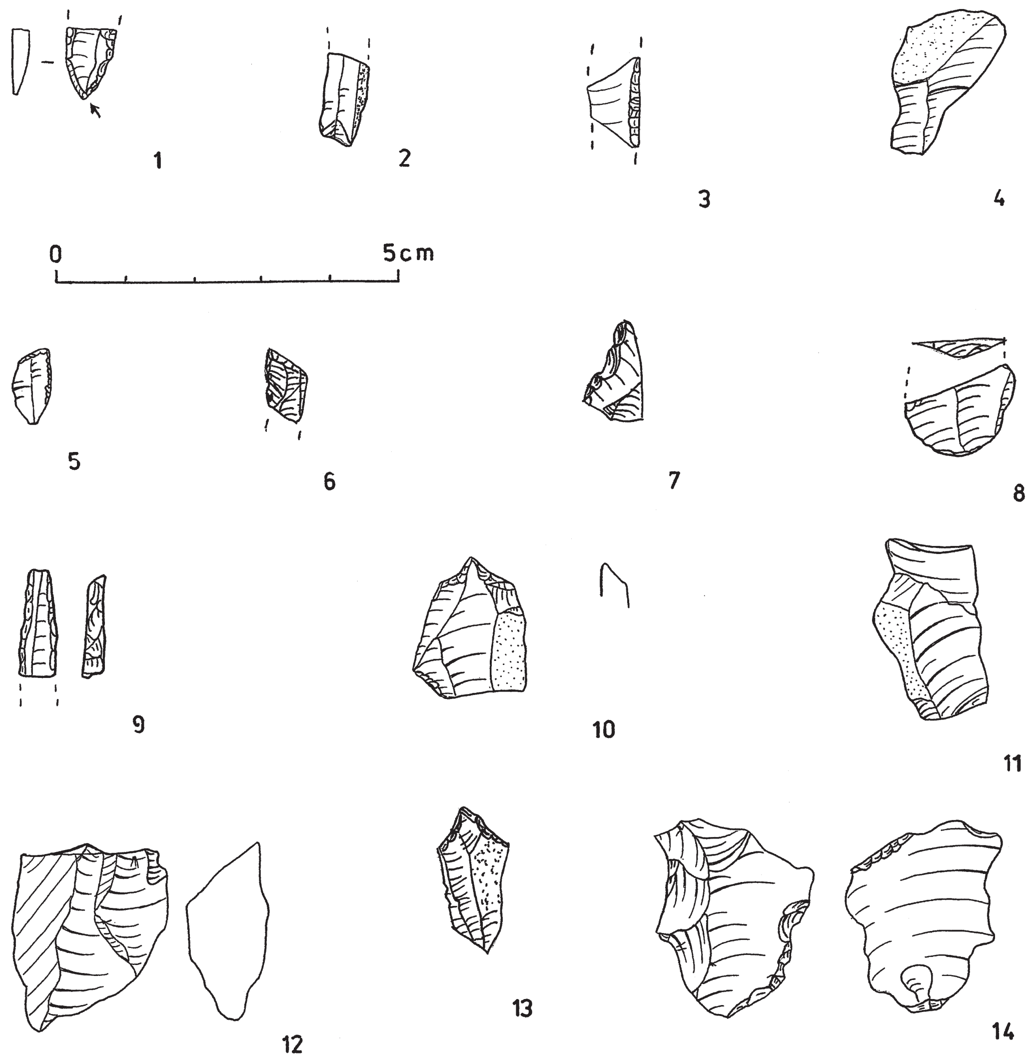

FIGURE 4. Dzeravá skala, lithic industry. 1–4: layer 2, 5–14: layer 3.

Layer 3. A group of retouched tools, comprising a fragment of backed microblade, 2 microblades with oblique truncation, two atypical borers and two denticulates, is accompanied by an initially reduced flake core and 2 flakes, suggesting tool production at place (radiolarite, flint, menilite chert, limnoquartzite). Gravettian; *Figure 4: 5–14*.

Layer 4. This assemblage is strictly blade-dominated. Retouched tools from this layer are represented by a bilaterally retouched microblade, 2 microblades with straight truncation, and 5 blades and microblades with various lateral retouches, accompanied by a borer. The remaining are unretouched blades, microblades, and flakes (radiolarite, menilite chert, flint, possibly including flints from the Dniester region). Gravettian; *Figures 5* and *6*.

Layers 4a–5a. As the section shows, the two layers are interstratified (this is confirmed also by fragments of a bone point dispersed in both layers). The lithic industry is dominated by retouched tools, namely 2 endscrapers, both relatively thick, and made on flakes, a burin made on flake fragment (the fragmented part is thinned by Kostenki-retouche), a microblade with Dufour-retouche, 3 blades or blade fragments with bilateral retouches, 2 retouched flakes or flake fragments, and 3 unretouched flake fragments (radiolarite dominates more strictly than ever before, and is accompanied by flint). In addition, these layers contained an ivory projectile with circular section, found in several fragments, and a cylindrical bead of bone. Early Gravettian; *Figure 6*.

Layer 5. Because of limited extension of this layer, appearing rather as individual lenses of sediment, the number of artifacts was small: 3 blade fragments with various lateral retouches (including a thick, Aurignacoid retouche), an unretouched blade fragment, and 5 small flakes (radiolarite, limnoquartzite, menilite chert). Aurignacian?; *Figure 7:1–5*.

Layers 6–8. These layers only yielded small radiolarite flakes (1 piece in the layer 6, 2 in layer 7, and 3 in layer 8).

Layer 9. This assemblage is characterized by an atypical thick endscraper on retouched blade, a fragment of another

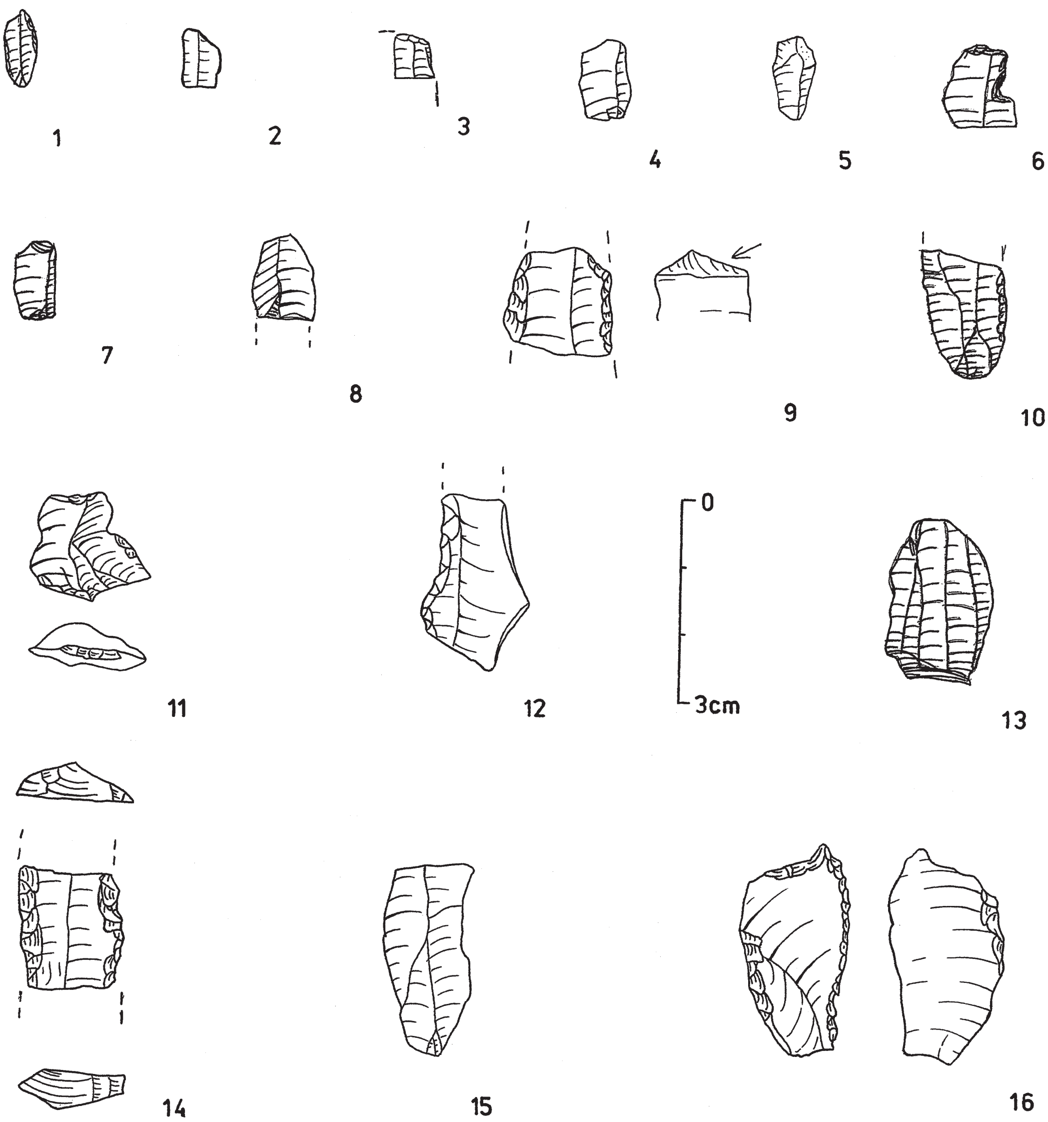

FIGURE 5. Dzeravá skala, lithic industry. 1–16: layer 4.

thick endscraper (combined with a borer), a pointed blade, 2 fragments of laterally and bilaterally retouched blades, and a notched flake (radiolarite, limnoquartzite). This lithic assemblage is accompanied by a distal end of a flat-section projectile, recalling the Mladeè-type. Aurignacian; *Figure 7: 6–14*.

Layer 11. Due to the thickness of the layer, dispersal of artifacts in the various depths, and incertitude in dating, this assemblage appears as culturally unhomogeneous. The upper part yielded a retouched flake (*raclette*) and unretouched flakes (radiolarite, other silicite). The middle part of layer 11 provided a bifacial leafpoint made of red radiolarite, with secondary marginal retouches along the edges. Another leafpoint, also with secondary lateral retouches and also made of red radiolarite, was found in redeposited sediments below the section. With a certain probability, it may be related to the same stratigraphic position. Finally, the basal part of layer 11 included an endscraper made on regular blade from a bipolar core. Marginal damage and/or secondary retouching suggests a redeposition. Probaly Early Upper Paleolithic in the upper part of the layer and Late Middle Paleolithic in the middle part. *Figure 8.*

CONCLUSIONS

Human visits in the cave were episodic, and of various character. The Gravettian is recorded in three layers (3, 4, 4a–5a). The upper and middle layers, both classified as Evolved Pavlovian stage on the basis of their microlithic character and ^{14}C dating (around 25 ka BP), suggest relationship to the South Moravian cultural centers, but also a more active exploitation of nearby radiolarite sources, as well as far-reaching raw material acquisition, possibly as far as the Dniester area. Layers 4a–5a are not as

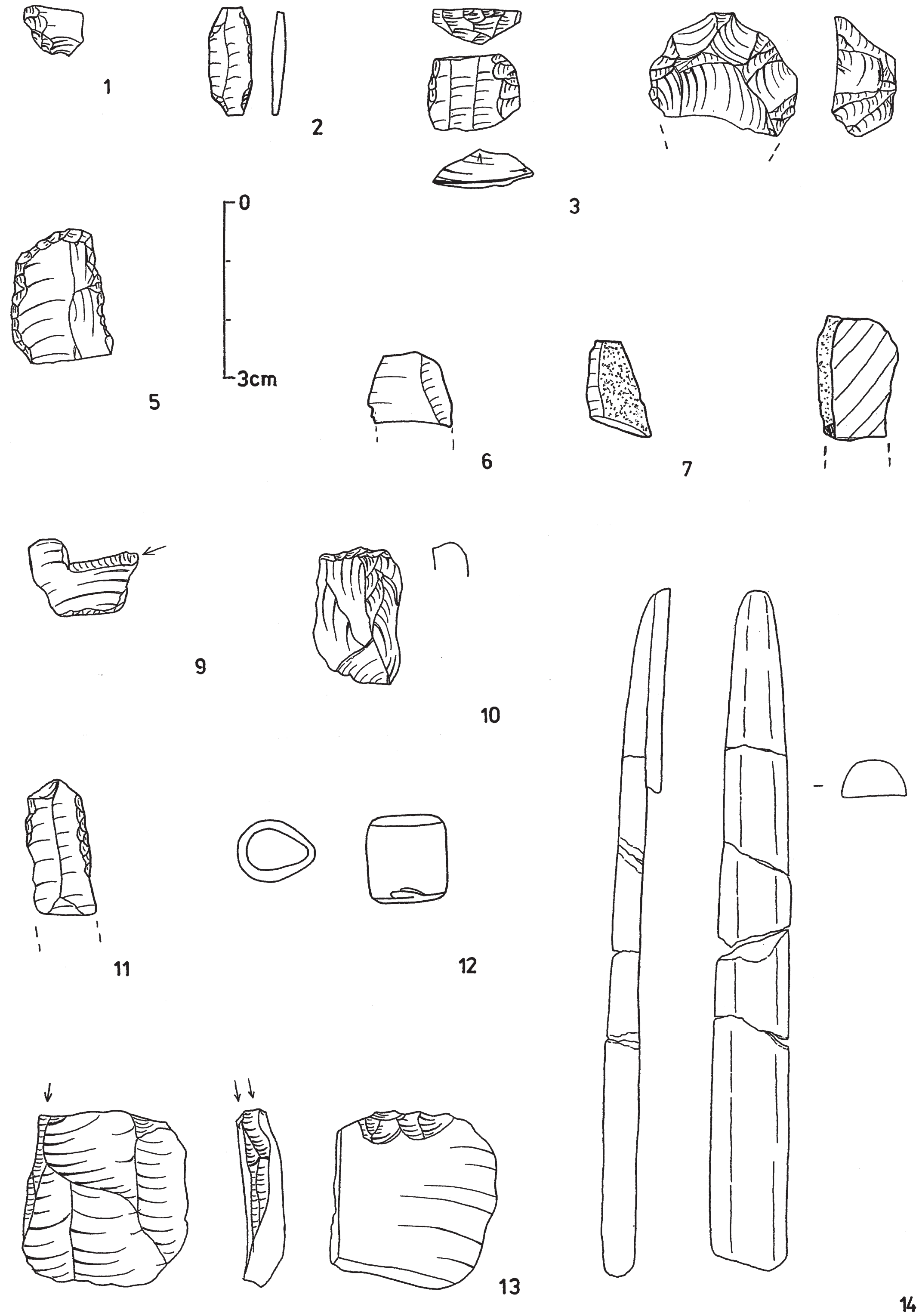

FIGURE 6. Dzeravá skala, lithic and bone industry. 1, 3–5, 8–11, 13: layer 4; 2, 6–7, 12: layer 5a. 14: ivory point composed of particles from layers 4a and 5a.

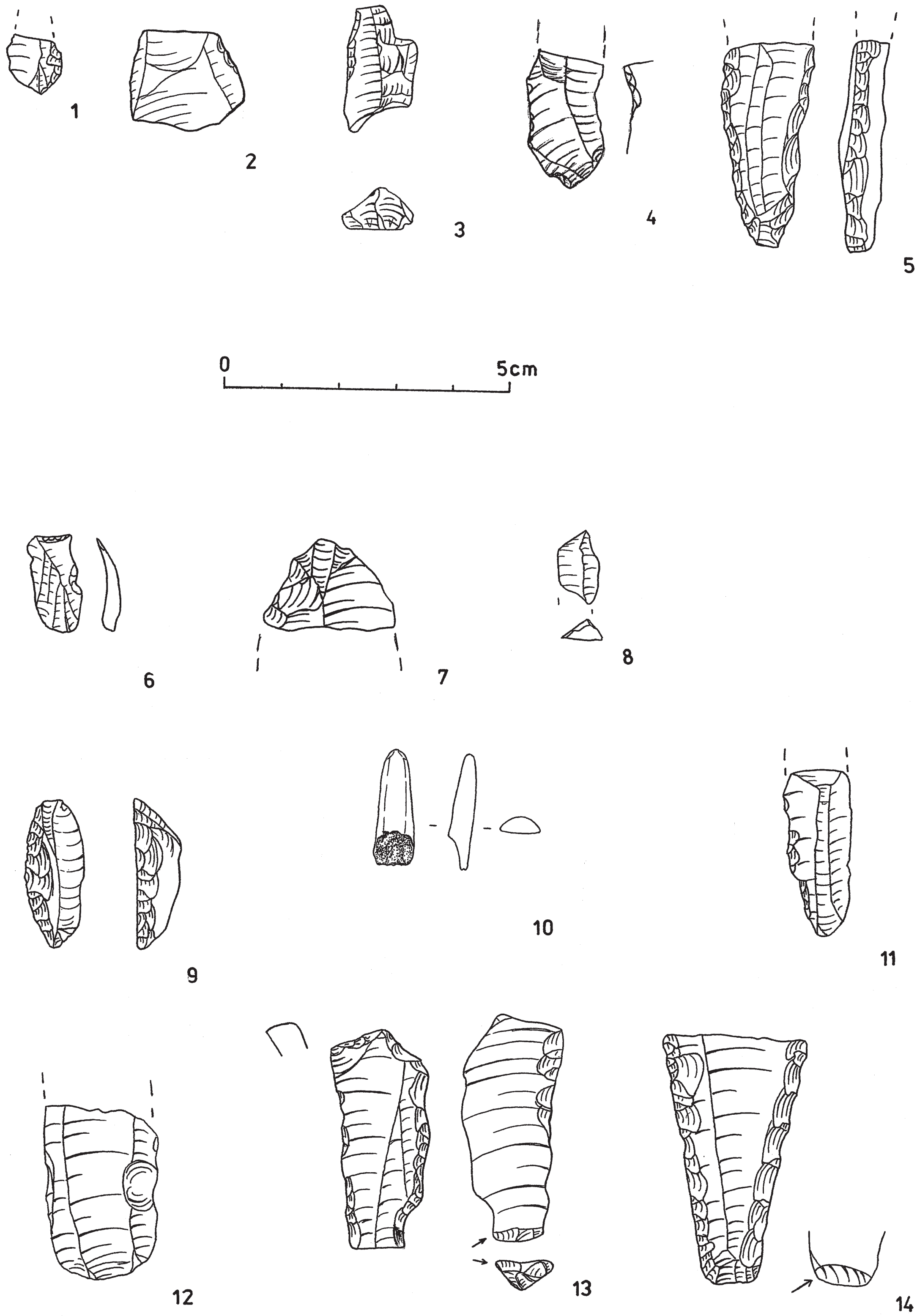

FIGURE 7. Dzeravá skala, lithic and bone industry. 1–5: layer 5; 6–14: layer 9.

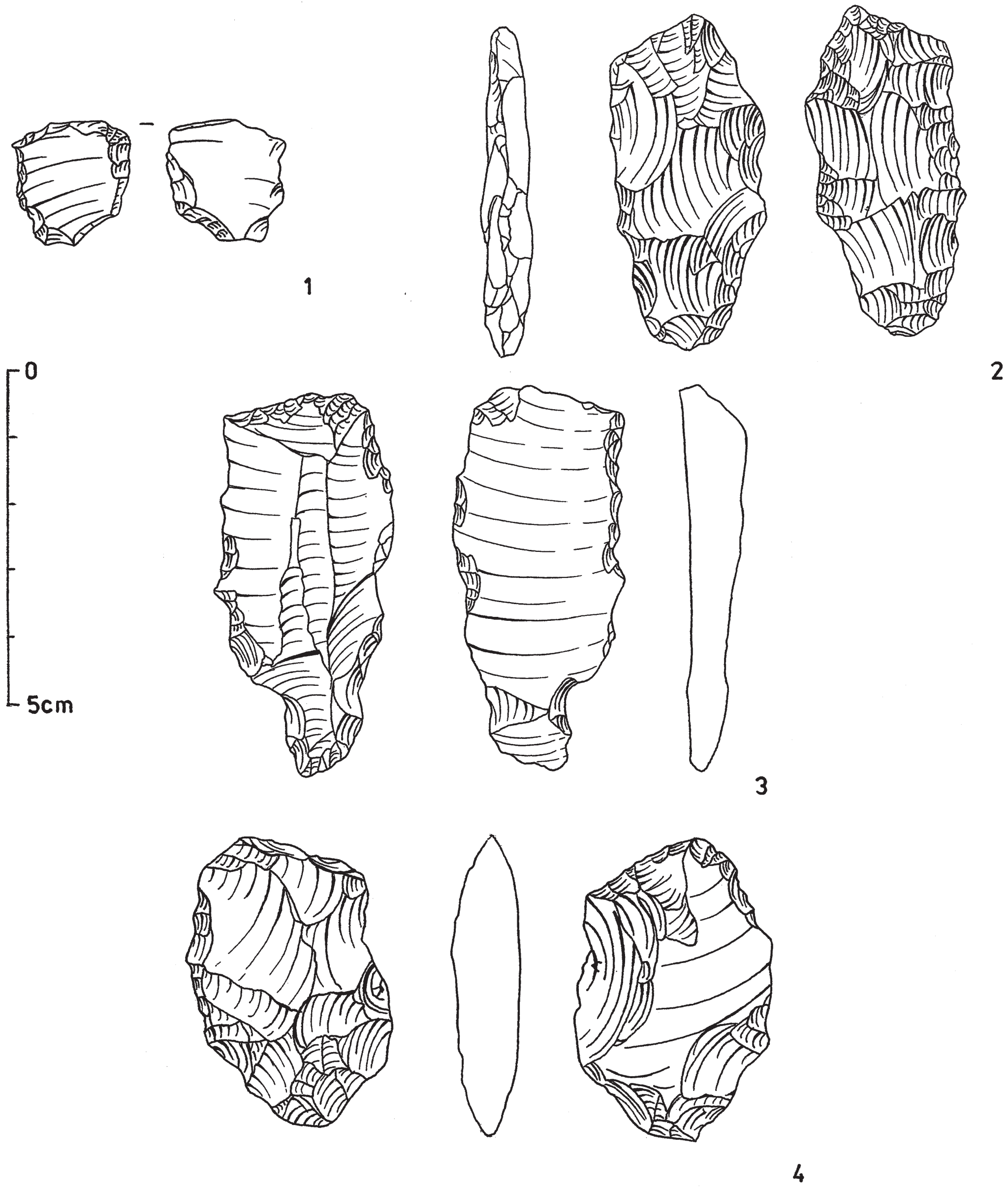

FIGURE 8. Dzeravá skala, lithic industry. 1–3: layer 11, 4: non-stratified.

microlithic, with more emphasis on middle-sized tools made of materials from the nearby radiolarite sources, but again, showing certain relationship to the classical Pavlovian sites. Especially the cylindrical bone bead demonstrates clear parallels to Dolní Věstonice and Pavlov, where we may even reconstruct the manufacture of such artefacts by sawing hollow bones. The relatively high AMS date, 31.8 ka BP, is either uncorrect, or it indicates an early origin of the Gravettian in this region.

TABLE 1. Summary of the ^{14}C datings.

Layer	Lab. number	Value BP
3	GrA-22756	25,050+540–510
4	GrA-22758	24,800±130
4b	GrA-22759	31,770±190
9	Beta 173341	34,100±320
11	Beta 173342	36,920±470

Layers 5 and 9 most probably belong the the Aurignacian. Should we add the finds of J. Hillebrand and F. Prošek to ours, the bone industry would strongly dominate over the lithics. This accords with the situation in other Carpathian and east Alpine caves of similar character (Istállóskő, Potočka zijalka, Mokriška jama). The AMS date of 34.1 ka BP for the layer 9a supports these observations.

The bifacial leafpoint and the blade endscraper from layer 11 are both earlier than 36.9 ka BP (AMS date from the upper part of layer 11), but the age of the very base of the cave deposits remains unknown.

Thus, the 2002–2003 excavation brought no support either to the theory of J. Hillebrand, placing the Aurignacian

TABLE 2. Summary representation of small mammals (species names abbreviated) in the layers 1–11, MNI. SUM: total MNI of all small mammals from the individual layers. After I. Horáček.

Layer	Sara	Talpa	Citel	Cleth	Mgre	Marv	Magr	Moec	Mniv	Dicr	Arvic	Lagur	Sicis	Ochot	Lepus	Muni	Muer	SUM
1	1	1	0	5	10	14	0	1	2	5	1	0	0	2	3	0	1	51
2	1	0	1	0	8	8	0	4	0	4	0	0	1	1	2	0	0	33
3	0	1	0	3	37	19	0	0	1	21	1	0	0	5	8	0	0	125
4	0	1	1	1	21	24	1	7	6	14	2	0	0	5	5	3	2	113
6	0	0	0	0	2	9	0	0	0	2	0	0	0	1	2	0	0	18
8	1	0	0	1	3	4	0	3	1	0	0	0	0	1	1	0	0	18
9	5	1	3	6	31	17	4	7	6	11	4	0	0	8	7	0	1	127
11	1	1	2	0	7	12	6	5	0	2	1	1	0	2	1	2	0	59
Total	9	5	7	16	119	107	11	27	16	59	9	1	1	25	29	5	4	544

TABLE 3. Summary representation of larger mammals (species names abbreviated) in the layers 1–11, MNI. SUM: total MNI of all small mammals from the individual layers. After I. Horáček.

Layer	Ursus	Vul/Alo	Gulo	Canis	Lynx	Crocuta	Meles	Rangifer	Rupicapra	Equus	Lepus	Pc.	%
3	32	13						5			56	106	9.9
4	71	17	2		2		1	16	2	5	75	191	17.8
4a	46	7			1			6	1		37	98	9.1
4b	5	4						1	1		9	20	1.9
5	17	1?						6		1	9	33	3.1
5a	31	2								2	24	59	5.5
6	7							1?			1	8	0.7
7	25	2									21	48	4.5
8	9	1									4	14	1.3
9	234	9		1		1		29	1	1	71	347	32.4
11	139	1		2				1?		1?	6	148	13.8
pc	616	56	2	3	3	1	1	63	5	9	313	1072	
%	57.4	5.2	0.2	0.3	0.3	0.1	0.1	5.9	0.5	0.8	29.2		

below the Szeletian ("Protosolutrean"), nor the the theory of F. Prošek, who understood the bone projectiles and the Szeletian leafpoints as contemporary.

The paleontological record (analysis by I. Horáček) suggests a cold oscillation, prior to 36.9 ka BP, and preceding another warmer period at the very base of the cave filling. Similar cold oscillations were recorded by V. Gábori-Csánk (1993) who placed the Jankovichian sites in her sense – including Dzeravá skala – to the earlier Würmian (Lower Pleniglacial, OIS stage 4). The OSL dating relative to the middle part of layer 11, including the leafpoint find, to 50.4 ka BP, corresponds well with dates from the Kůlna Cave in Moravia. The layer 7a of this cave, with Neandertal fossil fragments associated to Micoquian industry (Valoch 1988) was recently dated by ESR to 50±5 ka and 53±6 ka (Rink *et al.* 1996). As the Micoquian type-set includes leafpoints, the specimens from Dzeravá skala may not be Szeletian, as was hitherto expected, but Micoquian.

ACKNOWLEDGEMENTS

The excavation was supported by the L. S. B. Leakey Foundation project "Dzeravá skala. Early Upper Paleolithic in the Middle Danube Region". We are especially thankful to colleagues who contributed to the complex picture by expertises in their specific disciplines: Anna Ďurišová and Zora Miklíková (paleontology of larger vertebrates), Zdenek Farkaš (Postpaleolithic archaeology), Mária Hajnalová (paleobotany), Pavel Havlíček (Quaternary geology), Ivan Horáček (paleontology of the microfauna), Ľubomír Slíva (sedimentology), Libuše Smolíková (soil micromorphology), and Alena Šefčáková (physical anthropology).

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