

New excavation campaigns in the Upper Pleistocene cave bear site Potocka zijalka, Slovenia - state of investigation

Nuevas campañas de excavación en Potocka zijalka, Eslovenia (Pleistoceno Superior): estado de la investigación

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ABSTRACT

Potocka zijalka is a unique site with rich archaeological and palaeontological remains. From 1997 onward new excavation campaigns were carried out in co-operation with the Institute of Geology in Ljubljana and the Institute of Palaeontology in Vienna. This paper comprises the state of investigation and gives a short overview of major discussion points concerning the role of Palaeolithic man and cave bears at this site.

Key words: Upper Pleistocene, cave bear, Upper Palaeolithic, large mammals, Potocka zijalka

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GEOGRAPHICAL POSITION

Potočka zijalka is situated on the south - western slope of the Olseva (1930m) in the mountain range of the Karawanken in Slovenia, near the Austrian border. The cave is developed in Triassic limestone (Dachsteinkalk). Its large entrance faces southwards and lies at about 1700m above sea level. The whole cave has a length of 115m.

Prior to the excavation of Srečko Brodar the entrance had a width of 17m and a maximum height of 6,20m (S. & M. BRODAR, 1983). Large rocks divide the entrance part into a western and eastern section.

HISTORY OF INVESTIGATION

The cave was well known through the decades by local people from Austria and Slovenia. The history of investigation began with unauthorized excavations. Especially Josef C. Grosz, a student of medicine from the nearby Austrian village of Vellach, collected cave bear bones in the back of this cave from 1926 until 1928 (GROSZ, 1930). His activities led to a dispute with Srečko Brodar. The latter visited Potočka zijalka after coming to know from unauthorized investigations. Josef Bayer a prehistorian from Vienna accompanied him (BAYER & BRODAR, 1928).

Srečko Brodar carried out the first official excavations in Potočka zijalka induced by the Museum of Celje. From 1928 until 1935 about one fourth of the cave sediments became excavated (S. & M. BRODAR, 1983:176). In course of these

campaigns a rich palaeontological material mainly consisting of cave bear bones has been recovered. Of even greater importance are the archaeological remains of Brodar's excavation campaigns. It became clear Potočka zijalka was not only a rich cave bear site but also a unique palaeolithic place.

Unfortunately most of the faunal remains of Potočka zijalka have been destroyed during the Second World War and some artefacts are lost. The Collection Grosz was therefore the only more numerous complex of cave bear bones preserved. This material consists of 935 identifiable specimens (PACHER, 1998a) and of one bone point (BRODAR, 1994). Today this collection is stored at the Regional Museum of Carinthia in Klagenfurt, where more recently another very small complex (collection Gressl) of brown and cave bear remains from Potočka zijalka was found in the depots. Beside climatological and chronological aspects the gap in the fauna material was one of the reasons to start a new excavation campaign in Potočka zijalka.

From 1997 onwards the Institute of Geology in Ljubljana represented by Prof. Dr. Vida Pohar carried out a new series of excavations in co-operation with the Institute of Palaeontology in Vienna under Prof. Dr. G. Rabeder (POHAR & PACHER, 1997, PACHER, 2000a). In order to find undisturbed layers we installed four excavation areas in unexploited parts of the cave. Especially area 2 and 3 yielded a rich material and interesting finds.

Area 1 lies in the western part of the cave and includes 2 square meters. We

recovered only a few identifiable bones and some undistinguishable fragments between large bloc debris. Therefore we stopped excavating in this area.

In front of area 1 we started to clean a SW-NE orientated section of 4 meters length. Therefore it was necessary to excavate an area of 4x2 meters in front of the section. In these squares the border between undisturbed layers and the end of Brodar's excavation trench was retrieved.

We tried to compare the stratigraphy of our section with the sequence of layers described by Brodar. Section 69-70 after S. & M. BRODAR (1983) was used as reference. Layers were less developed and disturbed by large blocs in section SW - NE. Nonetheless stratigraphy corresponds more or less with section 69-70 (POHAR, 1998).

Area 2 was installed at the eastern side of the cave. It comprises nine squares (R/Q 5 to R/Q 8 and R4). This part of the cave is completely dry and also the sediments are different from the western side. S. & M. BRODAR (1983) already described in detail the various sequences of layers in Potocka zijalka. The large rocks between the eastern and western side of this cave might be responsible for this phenomenon. They probably divided the entrance part into two different sedimentation areas.

Another interesting point concerning the sedimentation history is the great amount of small sized gravel ("Kleinkies") in Potocka zijalka. According to S. & M. BRODAR (1983) gravel can be found mostly in the middle of this cave ranging from the entrance part into the inside. It is accompanied by cenozoic molluscs, fossili-

sed wood and remains of fossil crinoids. During our excavation only small lentils of gravel were retrieved in the area around section SW-NE, a fact that coincides with Brodar's distribution pattern. BRODAR (1960:123) discussed a possible input by palaeolithic men but cenozoic gravel is known from other caves in the region, too (PAVLOVEC, 1998) and can be explained by the geological history of this mountain range.

Area 3 lies next to area 2 and consists of 6 squares (T9/10 to V9/10). The rich material of this area still needs to be analysed.

RADIOMETRIC DATA

By now seven ^{14}C - data are available (see table 1). The first one is from a cave bear bone of the Collection Grosz and was made in course of the re-examination of this material (PACHER, 1998a). The others are from bones derived during the new excavation campaigns.

Data from cave bears are derived from two samples from the back of the cave and four samples from area 2. The retrieved results indicate a homogenous assemblage of *Ursus spelaeus* in Potocka zijalka of upper Middle Würmian age. This time span coincides with dates obtained from various alpine cave bear sites (see localities in DÖPPES & RABEDER, 1997). Furthermore the dates correspond with the human use of Potocka zijalka, especially the lower Upper Palaeolithic tradition (Aurignacien).

Micro-mammal remains in Potocka zijalka are numerous and revealed a great variety of taxa. According to BRODAR,

Laboratory	age (BP)	number	taxa	area, square	depth
GN 22325	35720±650-600	collection Grosz	<i>Ursus spelaeus</i>	back of cave	440-450cm
GN 23500	29600±1290	PZ 161a	<i>Ursus spelaeus palvix</i>	back of cave	surface collection
GN 23504	29000±570-530	PZ 131a	<i>Ursus spelaeus malopod.</i>	area 2, G6	290-240cm
VERA 0689	29340±1290	PZ 331	<i>Ursus spelaeus ripplegiant</i>	area 2, R7	350-370cm
VERA 0690	30980±390-340	PZ 288	<i>Ursus spelaeus mt3</i>	area 2, R7	340-320cm
VERA 0691	29840±1270	PZ 295	<i>Ursus spelaeus mt4</i>	area 2, G/R7	320-350cm
VERA 1283	32600±1400	-	<i>Microtus mirotus mandible</i>	-	surface collection

GN...Groningen, VERA...Mann Environmental Research Accelerator

Table 1. ^{14}C - data from Potocka zijalka.

S. & M. (1938) their remains could be mainly obtained from the lowermost layer 9 as well as near large blocs. This observation might indicate a transport of small bones into the shadow of blocs. Yet only one radiocarbon date from a mandible of *Microtus mirotus* collected from the surface at the back of the cave is available. Nonetheless this sample gives evidence of an unknown portion of micro-mammals in Potocka zijalka accumulated during the Upper Pleistocene.

STATE OF INVESTIGATIONS - PALAEOLOGICAL AND FAUNAL REMAINS

Potocka zijalka is an important Upper Pleistocene cave site. Various categories of finds revealed many interesting aspects contributing to our knowledge concerning high alpine cave bear and Palaeolithic sites. Brodar's campaigns yielded 305 stone artefacts whereas 80 specimens are determined as tools. The majority of pieces are attributed to the Aurignacien tradition and only some remains revealed characteristics of the Middle Palaeolithic Moustèrien tradition or are untypical pieces (BRODAR, S. & M. 1983). Potocka zijalka yielded also a

great amount of bone points. 130 bone points are described, together with the one of the collection Grosz (BRODAR, 1994) and two finds during the excavation 1997.

Because of certain characteristics revealed by the Palaeolithic remains of this site J. BAYER (1929) defined a distinct Upper Palaeolithic tradition under the term "Olschewien". Only 17km on air line apart lies Mokriská jama, another cave site ascribed to the Aurignacien tradition (M. BRODAR 1960). HAHN (1977:81) and M. BRODAR (1971) explain differences in various assemblages of by a different use of these sites. HAHN (1977:81) classified Potocka zijalka as "kill site", because bone points outweigh the number of stone tools. A definition leading us to the question of possible prey animals determined in the material.

The fauna remains of Potocka zijalka is characterised by the great amount of cave bear bones. BRODAR, S. & M. (1983) assume more than 1500 individuals preserved in the assemblage. In addition to cave bear eight taxa of other carnivores and seven species of herbivores are determined (see table 2). Furthermore molluscs, fishes, amphibians, reptiles, birds and a great diversity of micro-mam-

species	new campaigns	Potocka zijalka									Mokriska jama
		1928-1935, according to layers									
		1	2	3	4	5	6	7	8	9	
<i>Canis lupus</i>	+		+	+	+	+	+	+			+
<i>Vulpes vulpes</i>							+				
<i>Martes martes</i>	+										+
<i>Mustela nivalis</i>										+	
<i>Mustela sp.</i>					+			+			
<i>Gulo gulo</i>	+										
<i>Lynx lynx</i>									+		
<i>Panthera spelaea</i>											+
<i>Ursus arctos</i>		+									+
<i>Ursus spelaeus</i>	+++			+	+	+	+	+	+	+	+++
<i>Cervus elaphus</i>			+					+			
<i>Capreolus capreolus</i>			+								
<i>Bos primigenius f. taurus</i>		+									
<i>Ovis moschatus</i>			+				+				
<i>Rupicapra rupicapra</i>								+			
<i>Capra ibex</i>	+								+		+
Ruminant indet.									+		

Table 2. Large mammals of Potocka zijalka and Mokriska jama.

mals are reported. Many of these small animal remains were probably brought in by owls (S. & M. BRODAR 1983) or could have been hunting game of the small carnivores evident in the fauna.

In this discussion special attention is given to the large mammal remains, although fishes, small mammals like hare or marmot or birds are also possible prey animals of Palaeolithic man.

Among large mammals carnivores outweigh herbivores. According to BRODAR S. & M. (1983) beside cave bear 5 taxa of carnivores are reported from layer 3 to 9, ascribed to the Pleistocene by the authors. This list has to be completed by wolverine (DÖPPES, 2000), first determined during the new campaigns. Brown bear is only obtained from the Holocene layer 1. In general carnivore remains in alpine cave bear sites are often mentioned but seldom numerous. Their occurrence is explained by a common use

of caves by various carnivores leading to natural episodic input. In contrary to our first impression (PACHER, 1998b) there is no certain evidence for *Panthera spelaea* in Potocka zijalka until today. Only wolves are quite abundant in the fauna material. Up to now 16 remains of 2 or 3 individuals are derived during the new campaigns in the area around section SW – NE, area 2 and 3. These animals are probably responsible for typical gnawing marks on numerous cave bear bones and the origin of pseudo-artefacts discussed by various authors (KOS, 1931; M. BRODAR, 1985). The most famous piece among these controversial specimens is certainly a mandible of cave bear described as bone flute (S. BRODAR, 1938: 153).

Herbivore remains are less frequent in Potocka zijalka. The new campaigns revealed only few fragments of small bones until today. Omitting the remains of

domestic cattle and roe deer of Holocene layer 2 leaves 4 taxa ascribed to the Pleistocene by BRODAR, S. & M. (1983). *Ovibos moschatus* is evident by nine teeth of one individual (RAKOVEC, 1938) making it impossible to decide whether humans or carnivores were responsible for the input. The remains are described from a layer without Palaeolithic artefacts. Nonetheless the importance of this find lies in the second evidence of musk ox in the southern alpine region (RATHGEBER, 1994: 30). The three other taxa of herbivores are red deer, chamois and an unidentified ruminant. The first two are also evident in the Holocene layer 2 and still belong to the modern fauna of the region.

Unfortunately the majority of fauna remains of Brodar's excavation are lost, thus it is not possible to calculate precise numbers of elements preserved or to examine bones for modifications due to human activity. Taking into account a transport of finds after deposition the evidence of artefacts and fauna remains in the same layer are yet not enough to prove hunting game.

A comparison with the nearby cave site Mokriská jama shows a similar fauna distribution with a majority of cave bear remains and few bones of other taxa (RAKOVEC, 1967). In contrary to Potocka zijalka the diversity in the fauna material is low. Among other carnivores *Canis lupus* is again most abundant. Pine marten, brown bear and cave lion yielded fewer elements. Herbivores are represented by one species, only. Therefore *Capra ibex* is the only possible hunting game among Ungulates at Mokriská jama.

Palaeolithic man is also evident by fewer artefacts than in Potocka zijalka. Three stone tools and 24 chips as well as nine bone points were retrieved from this site (M. BRODAR, 1960).

CAVE BEAR REMAINS OF AREA 2

The cave bear remains of area 2 consist of 9630 identified specimen (NISP), whereas 3017 bones are derived from adult bears (31,33%), 3571 from juvenile individuals of various ontogenetic stages (37,08%) and 1208 remains are obtained from neonates (12,54%). Furthermore 1834 isolated teeth (19,05%) comprising 878 permanent and 956 milk teeth belong to the assemblage. The material studied up to now revealed a minimum number of 21 adult individuals (MNI) as well as 51 juvenile and 63 neonate animals.

The overall preservation of bear bones in Potocka zijalka is quite good, although various observations indicate a secondary deposition of cave bears in area 2. In the uppermost layers small skeletal elements like metapodials, rib-fragments and teeth are frequent. Many specimen were vertically orientated in the sediment (PACHER, 1998b). Beginning with layer 3 and 4 the density of finds increased in squares near to the middle of the cave, indicating a transport of bones from the back and middle of the cave towards the side.

On the other hand area 2 revealed several vertebrae in correct anatomical position (see figure 1). As in the case of Schwabenreith – cave these finds are no proof of bear remains on primary deposi-

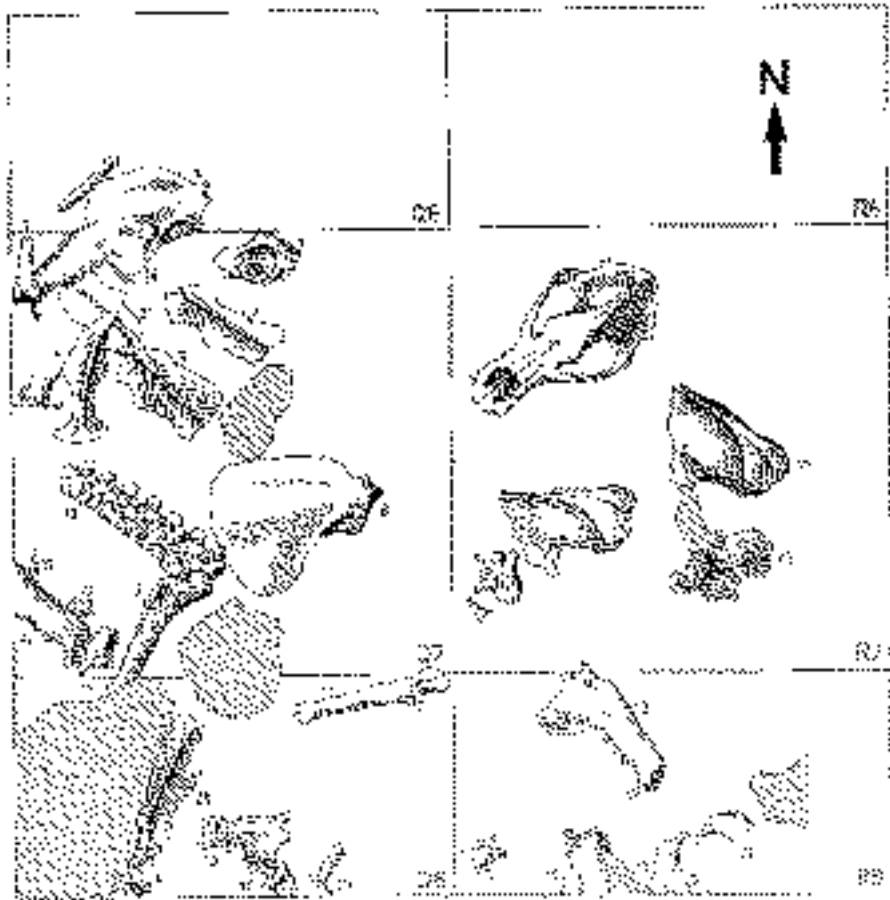


Figure 1. One layer of cave bear bones of area 2 (graphik: N. Frotzler).

tion (PACHER, 2000b) in regard to the excavation area. Transport in Potocka zijalka is also indicated by a dense pattern of scratches on the surface of many bones. Some of these scratches as well as rounded edges might also be due to trampling.

Gnawing marks are evident on various kinds of cave bear bones. The percentage of gnawed bones is especially high in ribs, vertebrates, scapulae, femora and calcanei. A high degree of modified bones is also evident in pelvis, ulnae radii and

tibiae. According to studies on the behaviour of recent carnivores long bones and elements of the shoulder- and pelvic-girdle are often exposed to extensive gnawing (HAYNES, 1983). Gnawing marks on cave bear remains from Potocka zijalka are mainly attributed to *Canis lupus*. Wolves probably also produced bone fragments revealing spiral fractures and cones, a type of bone modification also attributed to human activity. In general hunting of cave bear by Palaeolithic man cannot be gene-

rally excluded but has to be proved by thorough investigations.

In contrary to the assemblage from Hohle Fels in Germany (MÜNDEL & LANNGUTH, 2001) the fauna material from Potocka zijalka studied so far by the author revealed no evidence for cave bear hunting or butchering by Palaeolithic man. As in many alpine cave bear sites the influence of Palaeolithic man on cave bear assemblages has long been overestimated in course of the theory of specialised cave bear hunters during the Middle and Upper Palaeolithic (for a detailed discussion see JEQUIÈRE, 1975; PACHER, 1997; PACHER, 2000c). The great amount of bone points in Potocka zijalka led also to the idea of cave bear bones as raw material for the production of these artefacts (S. BRODAR, 1957; MOTTL, 1966).

The material of Potocka zijalka revealed many interesting aspect. Only with a

detailed taphonomic analyses in combination with other investigations is it possible find out more about site formation processes, the role of various categories of finds or to distinguish between human versus carnivore influence on the assemblage (MIRACLE, 1991: 208). One of the most controversial aspects at this site is certainly the role of Palaeolithic man and cave bears.

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