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MLADEČ IS NOT A DEAD SITE. SUPPLEMENTARY EVIDENCE FROM THE 2009–2011 SURVEY

ABSTRACT: *Mladeč Caves is a complex cave system that includes two key palaeoanthropological findspots of Early Upper Palaeolithic age – Mladeč Ib, Mladeč II, and probably also site Ia, discovered during the 19th and early 20th century. The dynamics of sediment deposition and transport inside the system is still being debated. Here we contribute new field observations from three peripheral locations within the cave system demonstrating various earlier and later cases of redeposition of Pleistocene and Holocene sediments, together with faunal remains, inside vertical fissures or chimneys. Human activity is only evidenced indirectly at these new sites, as probable manipulation with *Helix* shells or as burning of animal bones.*

KEY WORDS: *Mladeč Caves – Malacozoology – Vertebrate palaeontology – Pleistocene – Holocene*

INTRODUCTION

The Mladeč Caves complex is located in the Devonian limestones of the Konice-Mladeč formation, inside Třesín Hill (343 m a.s.l.), a dominant feature of the Upper Moravian Plain. This multi-floor karstic system, at mean elevations of around 250 m a.s.l., includes two key palaeoanthropological findspots of Early Upper Palaeolithic age – Mladeč Ib (the Dome of the Dead) and Mladeč II (the Quarry Cave), and probably also site Ia, discovered during the 19th and early 20th centuries (Szombathy 1925, Teschler-Nicola 2006, with references). Although both limestone quarrying from outside and alterations inside the cave system (to enable public access) have significantly modified the original situation, it is clear that the limestone is penetrated by a complex system of vertical fissures and chimneys interconnecting the horizontal cavities and providing more or less direct access to the surface. Understanding the dynamics of sediment deposition and transport inside the system is still being debated (Horáček, Ložek 1984, various articles in Teschler-Nicola 2006).

Following a systematic survey during 2009–2011, documentation and sampling related to speleological and reconstruction activities inside the caves and the surroundings, supplementary stratigraphic and palaeontological evidence of Pleistocene and Holocene age has recently been collected (*Figure 1*). In spring 2009, A. Komaško reported a new findspot with Pleistocene faunal remains deep inside the Mladeč caves, in the northwestern part of the cave complex, in the interior parts of the Puklinová corridor – site Ia. During 2011, the entrance facilities of the Mladeč cave system, now localised in an abandoned quarry on the southern slope of Třesín Hill, have been reconstructed and rebuilt. This earthwork exposed Pleistocene and Holocene sediments at sites Ia and Iib, as well as redeposited sediments elsewhere on the entrance plateau. All the newly opened sections were sampled and wet-sieved for malacozoological and osteological remains. The results are used as supportive evidence for the interpretation of this key palaeoanthropological site.

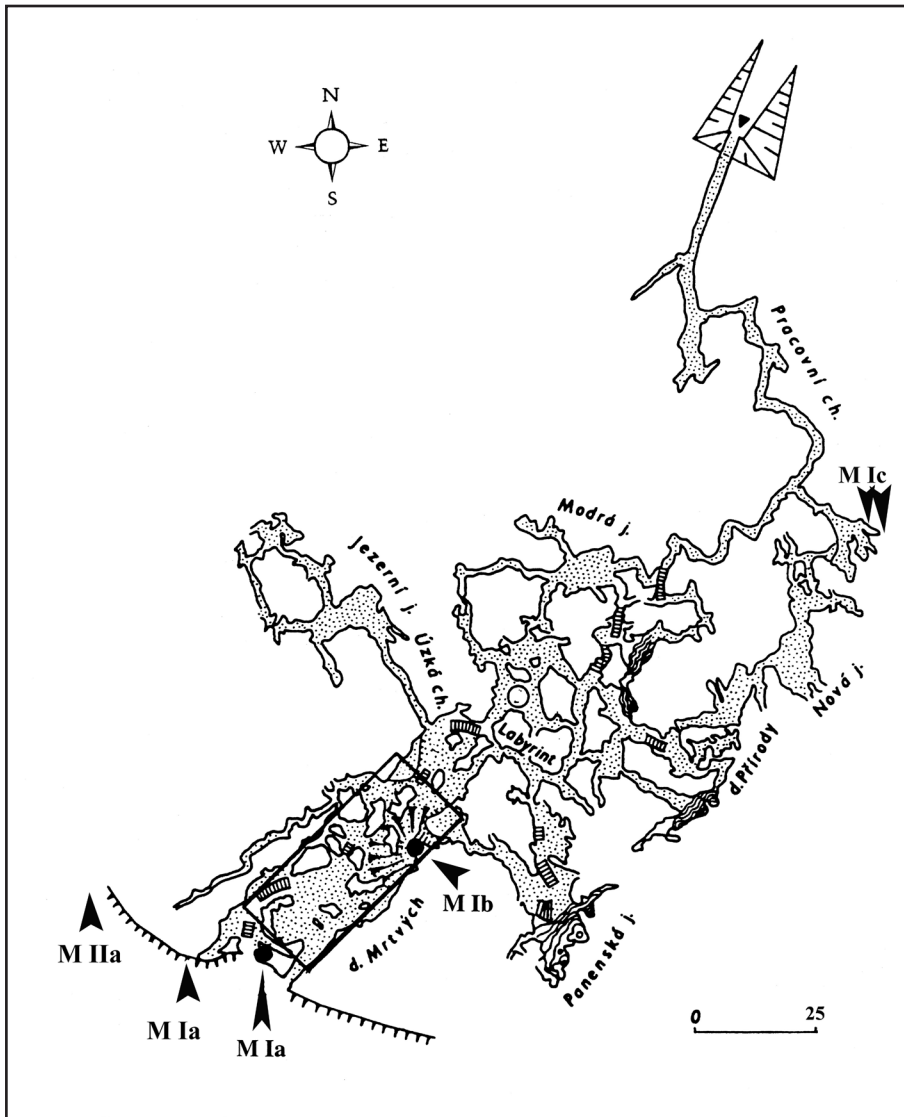


FIGURE 1. Mladeč cave system, general map showing location of sites Ia–c and IIa.



FIGURE 2. Mladeč Ia – exit, section through sediments at the rock wall, layers 1–3.

SITE Ia – CAVE EXIT

Although the existence of underground cavities inside the Třesín Hill has been known since the earliest times and is reflected in the local folklore, the actual entrance was opened by a limestone quarry in the northern slope of the hill either in 1815, 1826 (as reported by G. Wolny) or 1828 (report by J. G. Sommer). In the first hall behind this entrance, skeletal remains of a large ("giant") individual were found, either human or (more likely) carnivore. As a part of the 2011 reconstruction activities, a new exit from the cave system has been built nearby, which exposed relicts of the original cave sediments attached to the cave walls (*Figure 2*). A large part of the deposit was formed by sharp-edged clasts of various sizes, with light-brown filling, 40–50 cm thick (layer 1). The underlying layer was solid sinter (layer 2), followed by a brown-to-rusty clayish layer with small-sized limestone clasts, 30–40 cm thick (layer 3), and light-brown clayish layer with sharp-edged clasts of larger dimensions (layer 4).

Layer 1 included three incomplete shells and a large number of fragments of *Helix* cf. *pomatia* (Linnaeus 1758). The fragments are of varied sizes and usually sharp-edged. This species prefers open landscapes, light forests, bushes, or parklands, especially on limestones. It is typical for moist and temperate periods such as the Holocene. The largest shell displays signs of perforation, perhaps artificial. Direct traces of human activity were not found, but we cannot exclude that the molluscs were collected for food.

In addition, the sample from layer 1 contained remains of snakes belonging generally to Colubroidea indet. There is a vertebral fragment with a partially preserved zygosphen and a second one with a preserved cotyle. In dorsal view, the cranial margin of the zygosphen shows well developed lobes with a large medial lobe. Processus spinosus is broken at the base. The well developed zygosphen clearly demonstrates that this is a colubroid snake, either a viper or possibly a grass-snake. A more detailed determination is impossible due to inadequate preservation. The second fragment probably represents a partially preserved cotyle of a vertebra of a colubroid snake. The remaining eight fragments could not be determined, but 1–2 fragments probably belong to Amphibia/Anura.

Layer 3, separated by solid sinter, included a left upper M1 from *Rangifer tarandus*, of Pleistocene age.

Several additional fragments of recent and subrecent long bones of larger and middle-sized mammals were collected from this area during the construction works. In these cases, the stratigraphic context is unknown.

SITE IIa – "PROPÁSTKA"

In 1904 quarry workers found and destroyed a small cavity named the Quarry Cave, or Mladeč II, in the southern part of Třesín Hill, 43 m west of the present entrance to the large caves (Knies 1906, Maška 1905, Szombathy 1904,

1925). After Smyčka, this findspot was located about 10 m below original surface, in solid limestone rock, without an entrance; human finds were concentrated in a cavity with a triangular groundplan (after Knies), in a space measuring 2x3 m (after Smyčka). Based on Knies's section sketch, it can be determined that it would have been a relict of a vertical fissure or chimney leading to deeper parts of the cave system. The cave filling was composed of large limestone blocks, smaller gravel and a "yellow earth". Smyčka continued the excavations until 7 m below the findspot and Szombathy (1904) continued to a depth of 13 m, proving the existence of a continuing fissure below the findspot, but without further continuation towards the cave system. In August, Maška (1905) observed the relict of another chimney in the western part of the site, leading to the surface and continuing further to the north, into the hill, with more Pleistocene faunal remains in the upper part. Later, the area was modified as a part of the entrance plateau.

In 2011, construction works on the plateau reopened one of the chimney-like fissures located midway between the cave entrance and site II and numbered site IIa ("Propástka"). The cavity is 46 m long and 18 m deep (*Figure 3*). At a depth of 10 m, the fissure expands into a system of horizontal corridors, partly filled with large blocks. A stratigraphic section remains preserved at the mouth of the chimney. It includes a sequence of sediments redeposited from a higher fissure, which have originally

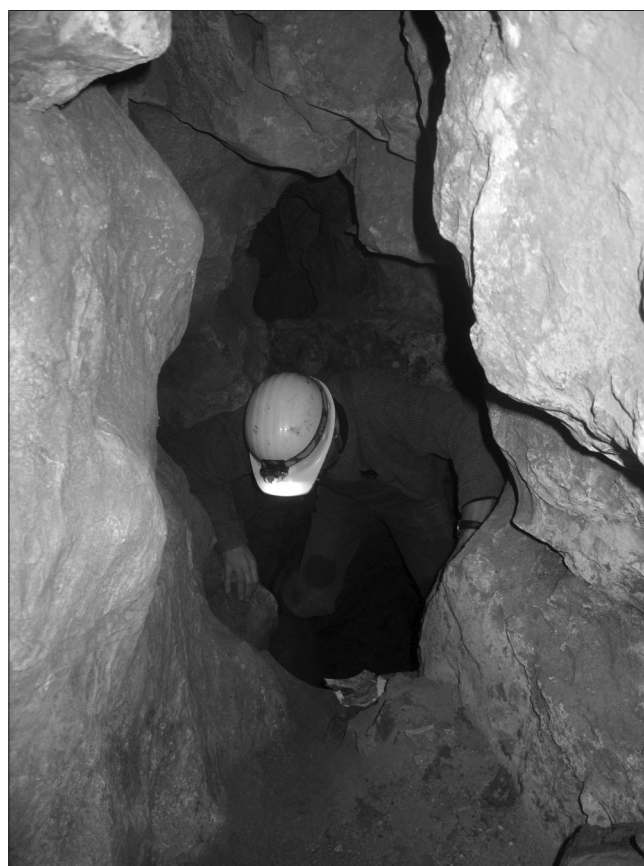


FIGURE 3. Mladeč IIa – "Propástka", a look into the chimney.

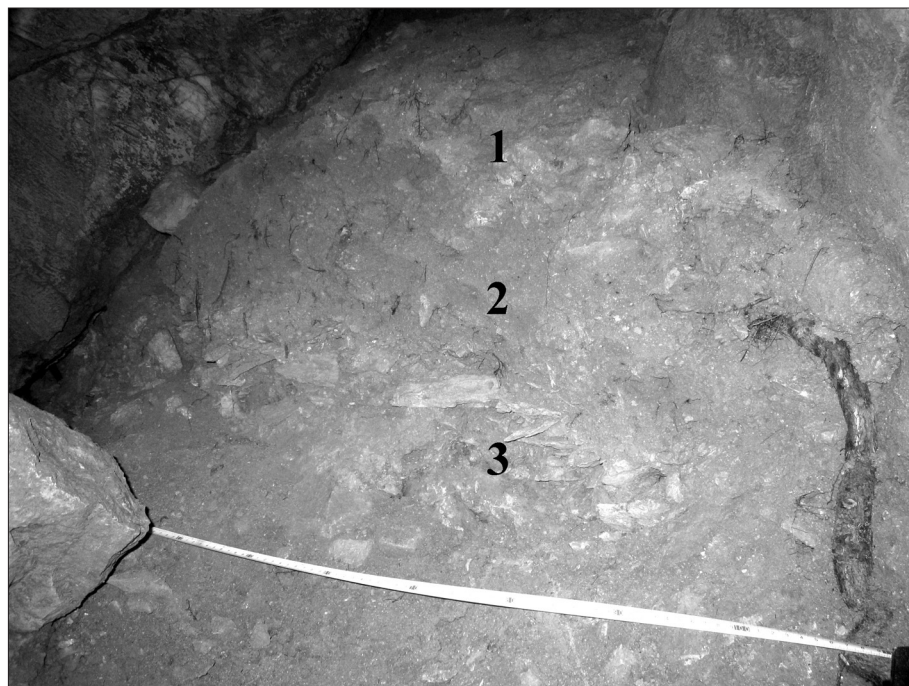


FIGURE 4. Mladeč IIa – "Propástka", section through sediments at the chimney mouth, layers 1–3.

probably filled the whole cavity (Figure 4). The upper part is formed by sharp-edged clasts of larger dimensions with light brownish-grey clayish filling (layer 1), followed by smaller sharp-edged clasts with rusty clayish-sandy filling, 30–40 cm thick (layer 2), and clasts of various dimensions with ochreous clayish filling (layer 3).

Sample from layer 2 included the following malacofauna: one specimen of *Pupilla* cf. *sterrii* (Voith 1840), fragment of a lower part of a shell with aperture; 14 damaged shells and 52 fragments of *Clausilia dubia* (Draparnaud 1805); two incomplete shells and two fragments of *Vallonia* sp.; one specimen of *Discus* cf. *runderatus* (Férussac 1821); six undetermined mollusc fragments. The same sample included fragments of microfauna, a distal part of a tibia and a diaphysis of another long bone, and a canine tooth. Smaller mammals are represented by a fragment of a proximal part of a phalange (of *Vulpes*/*Lepus* size) and its white coloration suggests contact with fire (temperature of 650–800°C caused oxidation of the carbonised organic component – stage VI, after Bosch *et al.* 2012, Cain 2005).

Sample from layer 3 included the following malacofauna: one specimen of *Vallonia tenuilabris* (Braun 1843); eight incomplete shells and five fragments of *Clausilia dubia*; one specimen of *Pupilla* cf. *sterrii*, fragment of a lower part of a shell with an aperture; four fragments of Gastropoda indet. The same sample also included a diaphysis fragment of a long bone of an undetermined microfauna.

On the surface of the rubble, at a depth of 10 m below the chimney mouth, two fragments of a proximal part of the right radius of a bear (*Ursus*, sp.), without proximal epiphysis, were collected. These are of Pleistocene age.

Based on the literature (Horsák *et al.* 2010, Ložek 1955, 1964, Pflieger 1988, Vašátko *et al.* 2006), the malacofauna is interpreted as follows:

Discus cf. *runderatus* (layer 2) is a forest species living on tree trunks, under bark of decaying trunks and stumps, especially in moist mountain forests above 800 m a.s.l. During earlier Holocene it also lived in lowlands. It is typical for intermediary and temperate periods.

Samples from layers 2 and 3 included two typical loess species, namely *Clausilia dubia* and *Pupilla* cf. *sterrii*. Today, *Clausilia dubia* lives on moist rocks (it is a petrophilous species), especially on limestones, and rarely, it also appears on trunks of forest trees. During the Pleistocene it is recorded in various sediments (slope and cave deposits, some travertines). *Pupilla* cf. *sterrii* prefers dry and sunny habitats. It is a dominant species of rock steppes and xerotherm rocks, with a preference for limestones. During the Pleistocene, it is recorded in cold periods, especially in lowlands (where it is absent today). In the sample from layer 3, an important loess species *Vallonia tenuilabris* was recorded. It is a cold-adapted species typical for open landscapes, especially loess steppes (currently absent in Europe).

SITE Ic – "PUKLINOVÁ"

The interior part of the Puklinová corridor separates into two parallel corridors, both originating from enlarged, approximately vertical fissures penetrating the limestone massif (Figure 5). Their sedimentary infill consist of reddish to brownish-grey clayish sediments, originating from above and redeposited at the base of the corridors. The sedimentary samples contained small, darkish gravel (up to 1 cm in size), and small fragments of vertebrate fauna. The largest specimen represents the mesial part of a proboscidian tusk; the species is indeterminate. In addition,



FIGURE 5. Mladeč Ic – "Puklinová", sampling in the interior of the corridor.

there was a crown fragment of premolar/molar and two fragments of a canine of a boar (*Sus scrofa*). Based on the state of fossilisation, the fauna is deemed older than the last glaciation.

In March 2010 sampling in both corridors continued. Apart from small-sized gravel, the new samples contained

about 260 fragments of bones and teeth, including additional tusk fragments. Size of fragments ranged from several mm to 2–3 cm, with the exception of one fragment of 15 cm in size. We determined one left lower P3 of elk (*Alces*, sp.) and a fragment of a tooth crown of a cervid (*Cervidae*). Some of the other fragments belong to large or very large mammals – the size of a horse (*Equus*, sp.) or a proboscidian (*Proboscidae*). One of the larger bone fragments shows traces of gnawing, possibly by a porcupine (*Hystrix*, sp., Figure 6). Porcupines tend to collect dry, defatted and frequently weathered bones, and they gnaw them in order to grind their incisors to manageable size. Moreover, they tend to accumulate these bones in their lairs, so it is possible that a porcupine den was located nearby (cf. Lyman 1994, Potts 2011). Compared to 2009, the number of species is greater and indicates relatively warm periods of the Pleistocene, possibly MIS 5 or earlier (as documented elsewhere in this cave system).

CONCLUSIONS

Mladeč is not a dead site. As mentioned in the introduction, the dynamics of sediment deposition and transport inside the complex system of Mladeč caves is still a matter of debate (see various articles in Teschler-Nicola 2006), and this uncertainty also concerns the unique deposition of human bodies of Early Upper Palaeolithic age at sites Ib (Dome of the Dead) and II (The Quarry Cave). After reconsidering the excavation history combined with a three-dimensional reconstruction of the original surface in the Dome of the Dead, a proposed hypothesis suggests that the palaeoanthropological sites (Ia – entrance, Ib, II) do not represent primary foci of subterranean human activity. Both human and animal fossils were clearly in secondary positions, removed by slope movements over a longer time-span. There is an almost total absence of

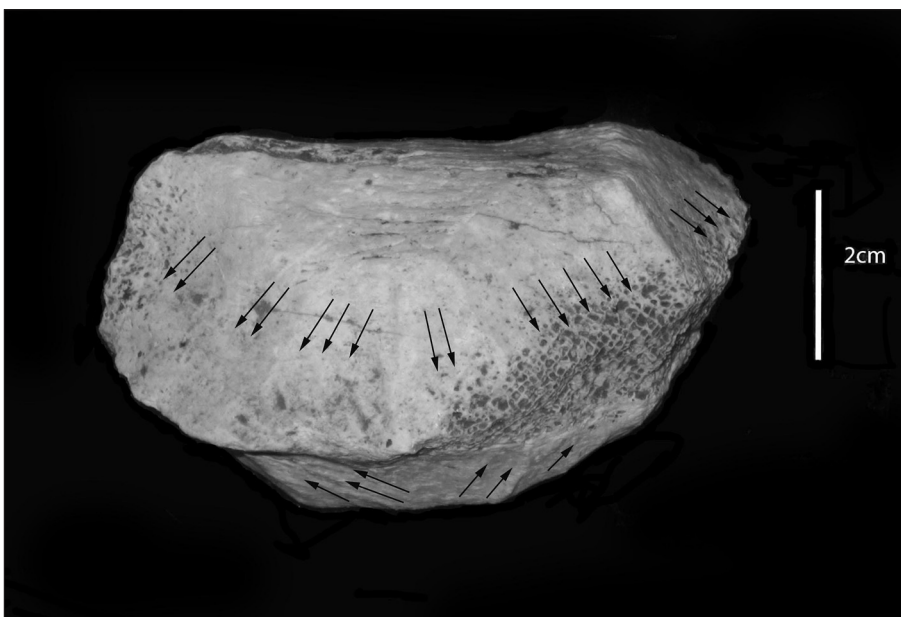


FIGURE 6. Mladeč Ic – "Puklinová", a bone fragment showing traces of gnawing, possibly by a porcupine (*Hystrix*, sp.). The arrows indicate gnawing directions.

reliable activity traces, serious doubts about the hearths and the rock art, lithic implements are very few in number, but there is a relative abundance of mobile decorative items, bone projectiles, and other bone artifacts. The evidence of input of complete animal skeletons inside the cave and the scarcity of cave bear and other carnivore remains in general complete the picture (Pacher 2006). These situations are best interpreted as secondary accumulations through chimneys or fissures.

The 2009–2011 research does not address these focal areas of palaeoanthropological interest and the three new locations are rather peripheral. Nevertheless, the new fossiliferous sites (Ia – exit, Ic, IIa), with faunal material of Pleistocene and Holocene ages, illustrate the above mentioned model in terms of analogy.

A section preserved at the cave exit (site Ia) contains a sequence of Pleistocene/Holocene layers (1–3). A rediscovered cavity "Propáštka" (site IIa) represents one of the typical chimney caves in the southern part of the system; originally, such cavities were filled by redeposited loessic and clayish sediments with limestone scree, mostly of Pleistocene age. The "Propáštka" cavity is reminiscent of the earlier descriptions of the quarried-off cave Mladeč II which included anthropological and archaeological materials and which was located further west from the main entrance. Finally, site Ic located in two adjacent rock fissures deep inside the cave system, is probably older than the Last Glaciation (based on bone preservation) and it corresponds to a warm Pleistocene period, minimally MIS 5 (based on faunal composition).

In sum, the new field observations demonstrate redeposition of sediments together with faunal fragments along vertical fissures or chimneys at all examined sites, a typical and long-term phenomenon recorded previously in other places within the cave complex. In the entrance area, the malacofauna, redeposited in these cavities from the surface, indicates the existence of previously existing entrances nearby. Some animals could have used cave entrances for hibernation and porcupine activities can be assumed deeper in the cave. Human activity is evidenced rather indirectly, as probable manipulation with *Helix* shells (site Ia, layer 1) or as burning of one of the animal bones (site IIa, layer 2); in both cases, these specimens may have been redeposited from the surface.

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