

**Research history of Pleistocene faunas in Gombasek quarry (Slovakia),
with comments to the type specimen and the type locality of
Ursus deningeri gombaszogensis Kretzoi, 1938**

J. WAGNER^{1,2} & M. GASPARIK³

¹*National Museum, Department of Palaeontology, Václavské náměstí 68, 115 79 Prague 1,
Czech Republic. E-mail: jan_wagner@nm.cz*

²*Institute of Geology AS CR, v. v. i., Rozvojová 269, 165 00 Prague 6,
Czech Republic. E-mail: wagnerj@gli.cas.cz*

³*Hungarian Natural History Museum, Department of Palaeontology and Geology
H–1083 Budapest, Ludovika tér 2, Hungary. E-mail: gasparik@nhmus.hu*

Abstract – Several fossiliferous sites were studied and material of fossil mammals and molluscs was collected in the Gombasek quarry (Rožňava district, Slovakia) since the 1930's. We have identified 9 independent collections of Late Biharian (latest Early to early Middle Pleistocene) mammals and molluscs from this locality. The nominal taxon *Ursus deningeri gombaszogensis* was described by KRETZOI (1938) on the basis of material collected by Tasnádi-Kubacska in the 1930's. The age of this material, based primarily on the similarity with Fejfar's collection, is supposed to be Late Biharian. KRETZOI (1938) designated as holotype of this taxon an m2 dext. with an original inventory number Fa 21. We recommend identifying this specimen with the m2 dext. housed in the collection of Hungarian Natural History Museum (Budapest) with the inventory number V 59.930. With 2 figures and 1 table.

Key words – Central Europe, Early/Middle Pleistocene, holotype, Late Biharian, Slovakia, type locality, *Ursus deningeri gombaszogensis*

INTRODUCTION

The locality name Gombasek (= Gombaszög) is used for a complex of localities within the area of Gombasek limestone quarry (nowadays operated by the Carmeuse company) in the Slovak Karst (south-east part of Slovak Republic). The quarry is placed circa 1 km southward of the railway station Slavec-jaskyňa (formerly Gombaszög/Gombasek station) on the railway from Plešivec (Pelsőc) to Rožňava (Rozsnyó), on the right bank of Slaná (Sajó) River. The name of the quarry is derived from the name of a settlement Gombasek (= Gombaszög) on the left bank of Slaná River, a part of the Municipality of Slavec (= Szalóc = Szalóc), Rožňava district.

Gombasek was the first Late Biharian (*sensu* FEJFAR & HEINRICH 1983) locality yielding both large and small mammals (BARTOLOMEI *et al.* 1975; FEJFAR & HORÁČEK 1983). Moreover, several new mammalian taxa, later recognised as important members of Early and Middle Pleistocene faunas of Europe (e.g. *Xenocyon lycaonoides* and *Panthera onca gombaszogensis*), were described from this locality for the first time. The Gombasek locality, excavated by several palaeontologists since the 1930's, thus represents one of the key localities for Central European mammalian biostratigraphy and our understanding of faunal development. Although the locality is broadly cited in the literature for these reasons, there is often some ambiguity about the details distinguishing among the collections from different period of excavations or their stratigraphical level. To clarify these issues, we attempt to overview the excavation history of this locality in this paper, with special respect to the record of fossil bears.

One of the most important taxa described from Gombasek is *Ursus deningeri gombaszogensis* Kretzoi, 1938. This form is generally accepted as an early representative of the spelaeoid lineage (e.g. KRETZOI 1938; TORRES 1992; BARYSHNIKOV 2007; WAGNER & ČERMÁK 2012, see the latter for more details), although its exact taxonomic position within early *U. deningeri* is still unclear (see discussion in WAGNER & ČERMÁK 2012). The correct spelling of the species-group name *gombaszogensis* was discussed by WAGNER (2012), but see also PÁLFY *et al.* (2008). However, the controversy about the holotype of this taxon was not discussed in detail till now (compare opinions in PÁLFY *et al.* 2008 and WAGNER & ČERMÁK 2012). For this reason we herein summarise the problem and explain our opinion on this topic.

MATERIAL AND METHODS

The definition and subdivision of the Quaternary period follow GIBBARD & COHEN (2008) and GIBBARD & HEAD (2009*a, b*). The definition and subdivision of the Mammal Ages (*i.e.* Biharian and Toringian) follow FEJFAR & HEINRICH (1983, 1990) and FEJFAR *et al.* (1998). For an alternative biostratigraphical subdivision of Quaternary (Q-zones) see HORÁČEK (1981) and HORÁČEK & LOŽEK (1988*b*), and for the integration of both concepts see FEJFAR & HORÁČEK (1990). In the "History of palaeontological excavation at Gombasek locality" section of the present paper, the terms such as Pliocene, Early Pleistocene, etc. refer to concepts used by particular authors in their time and not to the current official terminology.

For the geographical names we use the present valid names in Slovak with Hungarian equivalents (sometimes used in older papers) in the brackets. The name of taxa described from Gombasek are written in spelling and combination used in the papers of description in "History of palaeontological excavation at

Gombasek locality”, but the correct spelling and, in our opinion, the valid combination or taxonomic determination are used in other parts of the present paper.

Capital and lowercase letters, I/i (incisors), C/c (canines), P/p (premolars), and M/m (molars), refer to upper and lower permanent teeth, respectively. The tooth measurements are defined according to RODE (1935).

Abbreviations: HNHM = Hungarian Natural History Museum; HNM = Hungarian National Museum; inv. no. = inventory number.

HISTORY OF PALAEOLOGICAL EXCAVATIONS AT GOMBASEK LOCALITY

Šuf's collection

The first, who introduced the locality to the scientific community, was ŠUF (1931). He studied the material collected from different places in the quarry during mining and lent to him by A. Müller, director of Rimamuráňsko-Salgótarjáňská Metalworks Company (Rimamurány-Salgótarjáňer Eisenwerk A. G.). After publication, the material was returned to the collection of this company. Šuf reported that several karst fissures and small caves, infilled with red loam containing bones, were exposed during mining. He did not know the exact locality of the studied material, but supposed, based on differences in preservation (yellowish and almost black specimens) and on the identification of the studied mammals that the material originates most probably from different places of different age. He used the name “Gombasek near Rožňava” for this locality. From bears, he mentioned only 2 canines: a large specimen with dark grey preservation determined as *U. spelaeus* and another one, more gracile and yellowish. According to Šuf, this specimen could belong to *U. spelaeus* or *U. arctos*.

Besides the mammals, the material also included some molluscs, whose taxonomy was consulted with J. Petrboľ. This material is discussed by PETRBOľ (1932) in the first paragraph of his paper about the molluscs from Gombasek. According to him, the molluscs represent interglacial elements.

The original Šuf's collection was also revised by Tasnádi-Kubacska (TASNÁDI-KUBACSKA & SOÓŠ 1935). He splitted this collection into two groups: dark fossilised specimens with the residue of brown cave loam from Late Pleistocene and yellowish one with the residue of terra rossa, for which he supposed a Pliocene age. He discussed some Šuf's taxa, but made no notes to bear finds.

The present status of this collection is unknown. It cannot be excluded that it was donated to the Hungarian National Museum (Magyar Nemzeti Múzeum) together with other material from this locality (see KRETZOI 1941a).

Petrbok's collection

PETRBOK (1932, 1956) mentioned that he visited the quarry in 1932 and collected fossil molluscs. He distinguished two assemblages (PETRBOK 1932). The locality is referred to as Gombasek.

(a) The first assemblage consists of 3 species and according to PETRBOK (1932) it is probably identical with Šuf's material. This assemblage was found above the layer with bones (and separated from them) partly in terra rossa, partly in contemporary travertine. The fauna represents interglacial taxa, similar to those from Stránská skála locality. Both of these localities are included in the Riss/Würm (= Eemian) interglacial by PETRBOK (1932). PETRBOK (1951) described a new gastropod on the basis of this material: *Chilotrema lapicida* var. *interglacialica* (a name used for the first time in PETRBOK (1946), but as a *nomen nudum*).

(b) The other mollusc assemblage, similar to the first one, consists of only two taxa preliminarily determined at the genus level. The shells were preserved in compact travertine breccia and the material was not easy to collect from the hard breccia. This assemblage was found together with bone fragments in one case and under the bone layer in other one.

PETRBOK (1956) did not distinguish any more between these two assemblages and mentioned that the material (both molluscs and bone fragments) was collected from the travertine blocks remaining after the cave had been damaged by mining. In the National Museum in Prague, there are a few postcranial bone fragments from Gombasek donated by Petrbock to the museum in 1942, but no more data about the origin of this material are available.

First collection of HNM (including Tasnádi-Kubacska's collection)

Tasnádi-Kubacska visited personally the Gombasek quarry and collected the material (mammals and gastropods) from autochthonous sediments. The results were published by TASNÁDI-KUBACSKA & SOÓS (1935) and the locality was called Gombaszög. Except the revision of Šuf's collection, it is mentioned that he also studied a rich material collected during the mining activity in the quarry after Šuf's paper (but no other information was given about this material). Most of the paper deals with the material collected by Tasnádi-Kubacska personally (= Tasnádi-Kubacska's collection). He distinguished 6 fossiliferous localities (numbered 1–6) and showed their position in the quarry on his sketch (TASNÁDI-KUBACSKA & SOÓS 1935, fig. 1). The basic characteristics were given for each locality and its fauna. He distinguished between a Late Pleistocene fauna with dominance of *U. spelaeus* (locality 4) and the other faunas from fissures and smaller cavities infilled with terra rossa, for which he supposed a Pliocene age (localities 1–3, 5–6). The richest one from the old faunas was locality 3. It yielded

bear remains, which were determined as “small bear from *arvernensis-etruscus* group”. Bear remains are not listed in any other locality. Tasnádi-Kubacska mentioned the gnawing marks made by hyenas and other carnivores on several bones. Gastropods were described by Soós, including one new species, *Helicigona goemoerensis* from the localities 2 and 3.

The results from ŠUF (1931) and TASNÁDI-KUBACSKA & SOÓS (1935) are reported by SKUTIL (1938), who even reprinted the sketch with locality positions from TASNÁDI-KUBACSKA & SOÓS (1935). He named the locality Salovec (Szalóc), but added no new information.

The material collected by Tasnádi-Kubacska was subsequently studied by KRETZOI (1938). Since that, the Gombasek locality (called Gombaszög by Kretzoi) became well known to all European palaeomammalogists. In fact, it is not absolutely clear, which particular material was included in this Kretzoi's paper. KRETZOI (1938) mentioned only the material collected by Tasnádi-Kubacska and noted that all the material from his localities 1–3 and 5–6 belongs to the same (Early Pleistocene) level and is studied as one assemblage. Unfortunately, the information about Tasnádi-Kubacska's localities are missing not only in Kretzoi's paper, but also on the labels in the museum, so it is not possible to identify from which particular locality the individual specimens originate. KRETZOI (1938) stated that most of the taxa are from locality 3 and that there are only few additional data from the other localities. Contrary to KRETZOI (1938), KRETZOI (1941a) quoted that the collection was formed by material collected by Tasnádi-Kubacska as well as by material collected between Šuf's and Tasnádi-Kubacska's papers and donated to HNM by the Rimamurány-Salgótarjánér Eisenwerk A. G.

KRETZOI (1938) listed 48 mammalian taxa from Gombasek, seven of them were newly described: *Crocidura obtusa*, *Leo gombaszögensis*, *Pachycrocuta robusta progressa*, “*Canis*” *gigas*, *Xenocyon lycaonoides*, *Ursus etruscus gombaszögensis*, and “*Pliomys*” *progressus*. *Lagotona Lázári* was described by KRETZOI (1941a), but the holotype originates from the material published by KRETZOI (1938). *Archidiskodon* specimen described by KRETZOI (1938) was later designated as paratype by VÖRÖS (1979) for his new subspecies *Archidiskodon meridionalis ürömensis*. MOTTL (1941) mentioned this locality as Gombaszög (Komitat-Gömör; during World War II a part of southern Slovakia, including the Gombasek quarry, was annexed by Hungary), but she only adopted the faunal list from KRETZOI (1938).

The material is deposited at the Department of Palaeontology and Geology, HNHM (former Geological and Palaeontological Department of HNM). We revised the ursid dental material, as well as two fragments of *os penis* studied by Kretzoi (see KRETZOI 1938, p. 138 and Pl. III for list of material) in HNHM (m2 sin., old inv. no. Fa 84 and upper canine Fa 94 were missing). Except this material, few other specimens (especially tooth fragments) were available in the HNHM

collection, but not included in Kretzoi's list. There are no particular data about the origin of these specimens, but it seems probable that, at least part of them, belong to a later collection.

Mottl's collection

KRETZOI (1941*a*, p. 107) mentioned that after his publication in 1938, some other institution from Budapest (i.e. other than Hungarian National Museum) excavated at the Gombasek locality and obtained a rich material (which was not allowed to be studied by Kretzoi). But he did not give any more specific information. This institution was most probably the Hungarian Geological Institute (Magyar Állami Földtani Intézet; nowadays Geological and Geophysical Institute of Hungary – Magyar Földtani és Geofizikai Intézet) and its staff member Mária Mottl. MOTTL (1960) listed Gombaszög among the localities, which were studied by her in years 1939–1940. She mentioned that the manuscript with results of these excavations was submitted in 1944, but it has never been published.

FEJFAR & KOVANDA (1969, p. 52) also quoted that M. Mottl collected the material at Gombasek locality during World War II, which remained unpublished (the director of Gombasek quarry told to Fejfar that he met Mottl personally during her excavations; Fejfar pers. comm. 2014). They supposed that the Mottl's collection is deposited in the Hungarian National Museum. Fejfar (pers. comm. 2013) told to us that he had seen unpublished Gombasek material in HNM, which contained large number of *Canis mosbachensis* specimens. He supposed that this material could represent Mottl's collection. However, because M. Mottl was a staff member of the Hungarian Geological Institute during WWII (and, moreover, Kretzoi mentioned that this collection was not available when he studied material in the Hungarian National Museum), we see it more probable that the Mottl's material could be in the collection of the Geological and Geophysical Institute of Hungary and the material seen by Fejfar could represent, at least in part, the collection studied by Kretzoi for his 1941 paper (see below).

We studied a small collection of unpublished bear teeth in the Geological and Geophysical Institute of Hungary. The labels indicate that this material was determined as *Ursus cf. stehlini* by Kretzoi. In fact, all teeth belong to *U. deningeri*. There is also a note that the material was studied by T. Torres. Unfortunately, there are no additional data concerning the origin of the material (Bodor, written comm. 2013).

Second collection of HNM

After the paper in 1938, the Hungarian National Museum received a new collection of mammalian remains from Gombasek as a donation from the

Rimamurány-Salgótarjánér Eisenwerk A. G. KRETZOI (1941a) mentioned that the fauna is characterised by large number of *C. mosbachensis* specimens. Among others, the new collection also included *Ursus gombaszögensis* (but in fewer specimens than in the previous one) and fragments of a small bear from *arvernensis*-group (KRETZOI 1941a). KRETZOI (1941a) also emphasised the differences in faunal assemblages from the first and second collection in HNM. Although Kretzoi did not visit the locality personally, he had the possibility to wash some small blocks of sediments. The obtained micromammals were partly discussed by KRETZOI (1941a), whereas the arviculids were prepared for a separate publication. Unfortunately, the latter has never been published. KRETZOI (1941a) did not describe all the material, but only the taxa extending data from the previous paper. He described one new species: *Sorex* (?*Drepanosorex* n. g. ?) *Tasnáddii*. According to PÁLFY *et al.* (2008) the holotype of the latter species is lost. There was also described a new species of bear, *U. Stehlini*, but a mandible from the German locality Mauer was designated as the holotype and two small canines from Gombasek were only assigned to this species. HELLER (1949) recommended assigning these specimens to *Plionarctos* sp. (see WAGNER *et al.* 2012 for discussion about small bears in European Biharian). Unfortunately, during the revision of Gombasek ursids, neither these two small canines, nor other ursid material (unambiguously originated) from this collection was found in HNHM, where these should be deposited according to KRETZOI (1941a; HNM in that time). The collection of *C. mosbachensis* seen by Fejfar in HNM (now HNHM) was not found, either. It is possible that this collection was misplaced during the moving of Hungarian Natural History Museum in the new building.

KRETZOI (1941a, b, 1956) supposed that both collections described in 1938 and 1941 represent one assemblage, which he calls Gombaszög-Hauptfauna (KRETZOI 1956, p. 222).

Karst Section's exploration

In 1954, members of Karst Section of Natural History Club (Krasová sekce Přírodovědného klubu) visited Gombasek quarry and mapped the karst phenomena, especially caves and cavities. In the lower part of one of the newly discovered caves (rather high above the bottom of level 0 and near to the bottom of level 1), they discovered green-greyish clayish loam with Mn oxide concretions and bone fragments. They list four ungulate taxa in the collected material, but without any morphological description or stratigraphical details (SKŘIVÁNEK 1956). A Late Biharian age seems probable for the material on the basis of locality and sediment character. The material is lost.

First Fejfar's collection

In 1955 Oldřich Fejfar, a palaeontologist in the Central Geological Survey in Prague (Ústřední ústav geologický; nowadays Česká geologická služba/Czech Geological Survey), started a new epoch in the research of the Gombasek locality, including extensive washing of sediments with the intention to obtain micro-mammals (cf. FEJFAR & KOVANDA 1969; LOŽEK 1958; VLČEK 1996). Between 1955 and 1960 he collected a rich material of both micro- and macromammals (FEJFAR 1961). The material was collected in the remnant of a smaller cave or fissure on the level 0 of the quarry infilled by green clayish loam (FEJFAR 1956*a, b*). He called the locality Gombasek bei Plešivec. According to FEJFAR (1956*b*), his new fauna is identical with that one published by KRETZOI (1938, 1941*a*). The differences in sediment colour are explained as a result of reducing environment. FEJFAR (1958) described the gnawing marks by hyenas and rodents (especially *Hystrix*) on the Gombasek material. FEJFAR (1961) listed bear taxa from his excavation for the first time. He mentioned two species, *U. mediterraneus* and *U. gombaszögensis*. Later he figured several teeth determined as *Ursus deningeri gombaszögensis* (FEJFAR & KOVANDA 1969, Pl. I, figs c-e, g-h). All the available dental material of ursids from Fejfar's collection was revised by the present authors and assigned to *U. deningeri*. JÁNOSSY (1976) published several bird remains from this collection. In addition to the mammals, Fejfar collected also molluscs, which were studied and published by LOŽEK (1958, 1964). After discovering another faunal assemblage in the Gombasek quarry, Fejfar used the name "Gombasek bei Plešivec – Fundstelle 1" for his collection from this cave clay deposit (First Fejfar's collection) together with earlier published material by Šuf, Tasnádi-Kubacska and Soós, and Kretzoi (BARTOLOMEI *et al.* 1975). This name was later simplified to Gombasek 1 and broadly used (e.g. FEJFAR & HEINRICH 1983; HORÁČEK & LOŽEK 1988*b*; MAUL 1990; WOLSAN 1993; KOWALSKI 2001). The Fejfar's collection is the only one, which includes both micro- and macromammals from the same locality. On the basis of arviculids, Fejfar (e.g. in BARTOLOMEI *et al.* 1975, see below for details) determined the age of fauna as Late Biharian, the same as cave C 718 (Bohemian Karst, Czech Republic). The material is deposited in the Slovak National Museum, Bratislava.

Second Fejfar's collection

FEJFAR (1964) mentioned a new locality within the Gombasek quarry, which was sampled after 1960 (only one sample was taken from this locality; Fejfar pers. comm. 2014). This locality was discovered during a road construction, east from the former quarry during quarry expansion (FEJFAR 1964). The locality was formed by a circa 8–10 m thick series of debris, consisting of 10 layers

divided into 3 sections by two travertine horizons. FEJFAR (1964) distinguished two faunal assemblages, the upper one above the upper flowstone horizon and the lower one under it. Based on the preliminary study of fauna and the lithological characters of sediment, FEJFAR (1964) supposed that the lower assemblage is of Late Villanyian age (similar to the nearby locality of Plešivec). But later, after studying the fauna in detail (BARTOLOMEI *et al.* 1975), Fejfar stated that the fauna from all the profile represents one faunal assemblage of the same age. He determined this assemblage as Late Biharian, i.e. of the same age as his first Gombasek locality, and calls it “Gombasek bei Plešivec – Fundstelle 2”, later used as Gombasek 2 (e.g. FEJFAR & HEINRICH 1983; HORÁČEK & LOŽEK 1988*b*; MAUL 1990; KOWALSKI 2001). The arvicolid assemblage from Gombasek 2 was studied by HORÁČEK (1990). This locality yielded micromammal and mollusc fossils. The material is deposited in the Slovak National Museum, Bratislava.

Horáček and Ložek’s collection

A repeated search for fossiliferous deposits in Gombasek quarry was undertaken in the frame of a complex study of Quaternary biostratigraphy of Slovak Karst in 1981–1990 by Horáček and Ložek (Horáček pers. comm. 2014). No remains of the sites sampled in previous stages were found, but two new sites were discovered, both yielding only fossil molluscs, first reported by LOŽEK (1985), who stressed the early Pleistocene age of them supporting a hypothesis on the relatively old age of the adjacent valley of the Slaná river. One of the localities (Gombasek 3 in LOŽEK & HORÁČEK 1992, tab. 2 = locality with *Cochlostoma* cf. *scalarinum* in LOŽEK 1985, HORÁČEK & LOŽEK 1988*a*), an infilling of a sub-surface karst cavity cut by a road at the northern margin of the quarry, provided a rare record of *Cochlostoma* cf. *scalarinum saueri* (LOŽEK 1985; HORÁČEK & LOŽEK 1988*a*). The lithological characters of the deposit (slope deposits formed by partly lithified reddish breccia with terra rossa-like sediment) correspond quite well to the massive slope breccia discovered in several neighbouring sites, all with faunas of the age around the Early/Late Biharian boundary (HORÁČEK & LOŽEK 1987, 1988*a*; LOŽEK & HORÁČEK 1984, 1987, 1992). The other site (Gombasek-south in LOŽEK & HORÁČEK 1992, tab. 2, Gombasek-north erroneously in HORÁČEK & LOŽEK 1988*b*) represented an extensive exposure of loess deposits of a considerable thickness (over 10 m) with a complicated sequence of buried slope deposits and palaeosol colluvia, obviously including several cycles of loess deposition (see also LOŽEK 1985; HORÁČEK & LOŽEK 1988*a*). A fauna with *Helicigona banatica* and *Chilostoma capeki*, suggesting a Late Biharian age, was obtained from the upper layers of the series, whereas the basal breccias underlying the loess series were particularly rich in the fauna with *Helicigona*

lapicida and *Granaria frumentum*, obviously identical with the assemblages of the surface breccia in neighbouring sites (see above and LOŽEK & HORÁČEK 1992), supposed to represent the earliest part of the Late Biharian, i.e. biozone Q2₁ (resp. Q1/Q2) *sensu* HORÁČEK & LOŽEK (1988b) and therefore, pre-dating the Matuyama/Brunhes boundary.

Late Pleistocene

The previous history of excavations concerns the Middle (or possibly even Early) Pleistocene faunas discovered in Gombasek quarry. However, it was mentioned that a Late Pleistocene fauna was also present, at least in one cave (Tasnádi-Kubacska's Collection), in this quarry. Except this occurrence, a scarce Late Pleistocene fauna was also noted from the Leontína cave (= Ludmila cave/Ludmilla-barlang), which is located also within the quarry area (SOJÁK 2007; see reference therein for details). This locality is known especially for its post-Pleistocene archaeological record (BÁRTA 1958).

THE AGE OF GOMBASEK FAUNAS

As demonstrated by the short review given above, the material from Gombasek locality is less homogenous than usually reflected in literature. The exact biostratigraphical data are available only for Fejfar's and Horáček and Ložek's collections. The arvicolids from the second collection of HNM were not published and are now lost. But even if they were available, their relationship to macromammals from other respective collection is not clear. The age of fossils collected before Fejfar especially that of macromammals, can thus be determined only approximately.

The question about the age of the first and second collections of HNM is especially important, because these include the new taxa described by Kretzoi. KRETZOI (1941a) clearly stated the differences between the first and second collection, which are, at least, partly taphonomical (see also the description of characters of particular localities by TASNÁDI-KUBACSKA & SOÓS 1935 for the first collection of HNM). But he also mentioned the difference in character of insectivore assemblages. It implies that the supposed homogeneity in the age for all samples is not unambiguous. JÁNOSSY (1963) explicitly said that Gombasek material originates from several karst fissures of different age. He suggested that at least several bear teeth from material published in 1938 are less evolved than in typical *U. deningeri* (for Jánossy e.g. bears from Kövesvárad). He also noted that specimens of typical *U. deningeri* (but not only these) are present in the Gombasek material collected after Kretzoi's paper. In general, the Gombasek

ursid material (published by KRETZOI 1938) is too small to allow unambiguous results about the evolutionary position of these bears (apart from our limited knowledge about variability within early spelaeoid bears, for which mosaic evolution should be supposed). On the other hand, it is true that both unworn m1s bear very simply built entoconid complex compared to the Late Biharian bears from OIS 17 (e.g. C 718 cave; see WAGNER & ČERMÁK 2012 for details).

Fejfar determined the age of the faunal assemblage from his first collection, on the basis of arvicolids, as Late Biharian (BARTOLOMEI *et al.* 1975). Later FEJFAR & HEINRICH (1983) specified that this fauna belongs to the second Late Biharian phase, i.e. the Templomhegy phase (Q₂₃ *sensu* Horáček), which corresponds to OIS 17. This determination is also accepted by KOWALSKI (2001). The same age is supposed also for Kretzoi's material, which is included into Gombasek 1 assemblage, together with the first Fejfar's collection. This correlation is mostly based on similar characters of localities and on the general similarities in macromammals in Fejfar's and Kretzoi's material, including almost identical character (colour) of fossilisation (Fejfar pers. comm. 2014). However, the number of macromammals in Fejfar's collection (and in fact also in the more abundant Kretzoi's material) is too low to allow detailed biostratigraphical correlation (e.g. comparison of morphotype frequencies) within the Late Biharian period.

The same age (Late Biharian, Templomhegy phase) is supposed also for the Gombasek 2 locality (FEJFAR & HEINRICH 1983). KOWALSKI (2001) supposed that Gombasek 2 could be slightly younger than Gombasek 1. It is noteworthy that in the Gombasek 2 assemblage *Beremendia fissidens* is present (see BARTOLOMEI *et al.* 1975), which is missing in Gombasek 1. According to Fejfar (pers. comm. 2014) the presence of this species is more typical for older faunas than for the Templomhegy phase. HORÁČEK (1990) studied the small mammals (especially arvicolid) community development during the Quaternary in Central Europe and included also the Gombasek 2 sample in his analysis. He found that Gombasek 2 clusters most closely with Skalka near Nové Mesto nad Váhom (Q₂₂ in HORÁČEK & LOŽEK 1988b), but there are also some affinities to other faunas such as Honce or Žirany (see fig. 6 in HORÁČEK 1990), which represent faunas around the Early/Late Biharian boundary (Q₁/Q₂ *sensu* Horáček).

HORÁČEK & LOŽEK (1988b) and LOŽEK & HORÁČEK (1992) also supposed that all the Gombasek localities (Gombasek 1–3, Gombasek-south) are approximately of the same age (see LOŽEK & HORÁČEK 1992, tab. 2 and fig. 4), but contrary to Fejfar they assumed an earliest Late Biharian age, i.e. Q₂₁ or Q₁/Q₂, which slightly predates the Matuyama/Brunhes boundary. But they did not discuss the arvicolids from the first Fejfar's collection, which were studied in detail by Fejfar and compared directly with those from cave C 718. It is possible that Gombasek 2 and 1 are therefore of little different age.

Consensus exists that the Gombasek faunas are of Late Biharian age, but even for the new collections there is no consensus about their exact position within this period. It is thus also not sure, whether these faunas represent latest Early or early Middle Pleistocene. From this perspective, the age of older collection (first and second collection of HNM) is very probably also Late Biharian, but a more precise determination would be speculative at the moment.

HOLOTYPE CONTROVERSY

KRETZOI (1938, p. 138) designated an m2 dext. (old inv. no. Fa 21) as the holotype for his new subspecies *Ursus etruscus gombaszogensis* (now *U. deningeri*). He also figured another m2 dext. from occlusal and lingual view (KRETZOI 1938, Pl. III, figs 15, 16). He wrote in the explanations for tables that both figures represent the specimen with old inv. no. V 883. He gave neither a figure of the holotype nor a description or measurements for particular teeth (he only listed minimum, maximum, and average values for maximal length and maximal width for all m2 together and general characters for all m2). Except these two m2 dext., KRETZOI (1938, p. 138) listed two other complete m2 dext. with old inv. no. Fa 38 and Fa 85 and one anterior fragment of m2 dext. (old inv. no. Fa 86).

The old inventory numbers are not written directly on the teeth, but only on the labels. Old labels are preserved in the boxes with respective teeth and new labels with new (currently valid) inventory numbers (the new inventory numbers are usually glued on the respective teeth, if possible). One new inventory number can belong to more than one specimen. Sometimes, there are more specimens in one box.

The old label with inv. no. Fa 21 is marked as a label for a type specimen. It is associated in one box with several later labels (all of them are marked as labels for type), including the newest one with inv. no. V 59.930 (Fig. 1) and the respective tooth are marked with this valid inventory number. The lot with new inventory number V 59.1048 includes 4 specimens in one box: 2 complete m2 dext. (one of them glued from 2 parts), one almost complete m2 dext. with damaged mesial margin, and mesial fragment of m2 dext. Together with these teeth and the new label there are also some old labels with inv. no. Fa 38, Fa 86, and V 883. It is not possible to connect unambiguously these labels with respective teeth. The m2 dext. with old inv. no. Fa 85 (new inv. no. V 59.932) is a hardly worn and slightly damaged tooth in a separate box. We think that it has no relevance for the question about holotype.

WAGNER & ČERMÁK (2012) followed this arrangement and listed tooth V 59.930 as a holotype. But PÁLFIY *et al.* (2008) pointed out that the specimen V 59.930 is figured by KRETZOI (1938) and therefore, it cannot be the holotype,

because Kretzoi clearly declared that the figured specimen is not the holotype. They subsequently deduced that specimen V 59.930 was erroneously placed in one box with old label for Fa 21 and its correct old inv. no. is V 883. They conclude: “Well-preserved, unfigured M2 under inventory number V 59.1048 suspect as possible holotype, but cannot be proven as no original inventory number marked on specimen”. They did not specify which particular m2 dext. with this inv. no. they mean (the other one is listed within paratypes), but most probable the unglued one (as “well-preserved”).

But, in fact, the situation is still more complicated. The occlusal view (KRETZOI 1938, Pl. III, fig. 15) represents the best preserved (unglued) m2 dext. under inventory number V 59.1048, while only the lingual view (KRETZOI 1938, Pl. III, fig. 16) represents the specimen V 59.930. Of course, such situation rules out to identify unambiguously the holotype on the basis of published information. But we believe that the opinion of PÁLFY *et al.* (2008) – that the specimen V 59.930 was associated with label for Fa 21 only by mistake and that it is identical with tooth V 883 in KRETZOI (1938) – under these circumstances also lacks direct support.



Fig. 1. Labels for specimen Fa 21 and V 59.930 marked as type specimen. Labels are in chronological order from oldest to the latest. Note by pencil on the last label was made during preparation of type catalogue by PÁLFY *et al.* (2008)

Although we realise that we cannot identify specimen Fa 21, designated by Kretzoi as holotype, with certainty, we believe that the tradition of HNM curators, who identified specimen V 59.930 with Fa 21 and marked it as holotype is an adequate source of information. Therefore, we recommend to accept the specimen V 59.930 (Fig. 2.1) as a holotype (Fa 21) of *U. deningeri gombaszogensis* Kretzoi, 1938 and to identify specimen V 59.1048 (Fig. 2.3), which is figured by KRETZOI (1938, Pl. III, fig. 15), with specimen V 883. The glued specimen V 59.1048 (Fig. 2.4) can probably be identical with Fa 38. But it is less certain, because there is another almost complete m2 dext. under this new inventory number and it is not possible to decide, which one was studied by KRETZOI (1938). The mesial fragment of m2 dext. under inv. no. V 59.1048 is most probably identical with Fa 86. We give the basic measurements for m2s dext. discussed in this section in Table 1.

CONCLUSIONS

KRETZOI (1938) described a new subspecies of large-size bear under the name *U. etruscus gombaszogensis* from Gombasek locality. This taxon represents

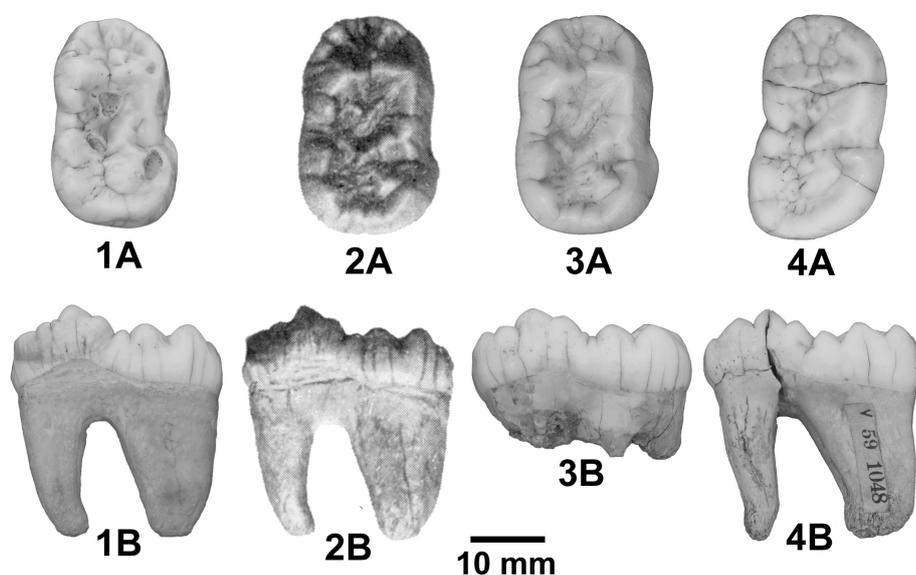


Fig. 2. m2s dext. of *Ursus deningeri* from Gombasek discussed with respect to the holotype of *U. deningeri gombaszogensis*. 1A, B = occlusal and lingual view of specimen V 59.930; 2A = reproduction of fig. 15 from KRETZOI 1938, Pl. III; 2B = reproduction of fig. 16 from KRETZOI 1938, Pl. III; 3A, B = occlusal and lingual view of specimen V 59.1048; 4A, B = occlusal and lingual view of specimen V 59.1048 (glued one)

Table 1. Basic measurements for selected m2 dext. of *Ursus deningeri gombaszogensis* in HNHM collection

inv. no.	old inv. no. (according to present paper)	type status	maximal length (mm)	width of trig- onid (mm)	width of talonid (mm)	width of con- striction (mm)	fig. 2 this paper
V 59.930	Fa 21	holotype	28.5	16.2	17.5	15.2	1
V 59.1048	V 883	paratype	29.6	18.2	19.3	17.8	3
V 59.1048	?Fa 38	?paratype	30.4	16.2	17.5	15	4
V 59.1048	?no	?no type	27.1	15.4	16.8	15.4	
V 59.932	Fa 85	paratype	29.3	16.7	18.2	–	

early spelaeoid bears and was later assigned to *U. deningeri* (e.g. TORRES 1992; BARYSHNIKOV 2007; WAGNER & ČERMÁK 2012). From a morphometrical viewpoint, the dental material is most similar to the Late Biharian representatives of this species (WAGNER & ČERMÁK 2012). The population from latest Biharian (OIS 17) seems to be somewhat more evolved so far as possible to deduce from the small size of Gombasek material, but there are almost no differences to bears from OIS 19. We have only very limited knowledge about the detailed dental morphology of deningeroid bear populations immediately predating the Matuyama/Brunhes boundary, so it is impossible to compare them with Gombasek material. But spelaeoid bears from somewhat older localities (e.g. Untermaßfeld or Vallonet Cave) are significantly less evolved than the Gombasek bear. At the moment, the subspecific subdivision of Late Biharian *U. deningeri* is not known in detail. Usually only one subspecies, if any, is used for these bear – *U. deningeri suessenbornensis* Soergel, 1926 (BARYSHNIKOV 2007; but see also alternative taxonomic model for *suessenbornensis* in RABEDER *et al.* 2010 and discussion in WAGNER & ČERMÁK 2012). So at the moment, it seems to be most probable that *U. deningeri gombaszogensis* is a subjective junior synonym for *U. deningeri suessenbornensis*. But even under these circumstances, we saw it reasonable to clarify some formal aspects of nominal taxon *U. deningeri gombaszogensis*. Therefore, we analysed the problem of its type locality, its age, and the status of the holotype of this taxon. The main results are the following:

- Type locality: Gombasek quarry – First collection of HNM (most probably locality 3 in TASNÁDI-KUBACSKA & SOÓS 1935);
- Age: Late Biharian;
- Holotype: m2 dext. inv. no. V 59.930 (Hungarian Natural History Museum, Budapest).

*

Acknowledgements – We would like to express our thanks to Oldřich Fejfar and Ivan Horáček (both from Charles University, Prague) for the inspiring discussion and valuable comments on the topic. We are also indebted to Emese Bodor (Geological and Geophysical Institute of Hungary) for information about Gombasek material under her care. This work was financially supported by Ministry of Culture of the Czech Republic (DKRVO 2014/05, National Museum, 00023272) and by Synthesys Project (<http://www.synthesys.info/>), which is the European Union-funded Integrated Activities grant, creating an integrated European infrastructure for natural history collections.

REFERENCES

- BÁRTA J. 1958: Jaskyňa Ludmila v Juhoslovenskom krase pred zánikom. [Ludmila cave in Slovak Karst faces destruction]. – *Krásy Slovenska* 35: 156–157. (in Slovak)
- BARTOLOMEI G., CHALINE J., FEJFAR O., JÁNOSSY D., JEANNET M., KOENIGSWALD W. v. & KOWALSKI K. 1975: *Pliomys lenki* (Heller 1930) (Rodentia, Mammalia) en Europe. – *Acta Zoologica Cracoviensia* 20: 393–467.
- BARYSHNIKOV G. F. 2007: *Fauna of Russia and neighbouring countries. Mammals. Ursidae*. – Nauka, Saint Petersburg, 541 pp. (in Russian)
- FEJFAR O. 1956a: Nové druhy hrabošů (Microtinae) v českém pleistocénu a jejich význam pro detailní stratigrafii. (The new species of voles (Microtinae) in the Bohemian Pleistocene and their importance for the detailed stratigraphy). – *Časopis pro mineralogii a geologii* 2: 93–101. (in Czech with English abstract)
- FEJFAR O. 1956b: První dva nálezy primáta rodu *Macaca* Lacépède, 1799 na území ČSR. (The first two finds of the primate of the genus *Macaca* Lacépède 1799 on the territory of the Czechoslovak Republic). – *Věstník Ústředního ústavu geologického* 31: 243–245. (in Czech with English abstract)
- FEJFAR O. 1958: Einige Beispiele der Benagung fossiler Knochen. – *Anthropozoikum* 7 (1957): 145–149.
- FEJFAR O. 1961: Review of Quaternary Vertebrata in Czechoslovakia. – *Prace, Instytut Geologiczny* 34: 108–118.
- FEJFAR O. 1964: Výzkum fosilních obratlovců ČSSR v roce 1963. [Research on fossil vertebrates in Czechoslovakia in 1963]. – *Zprávy o geologických výzkumech v roce 1963*: 350–352. (in Czech)
- FEJFAR O. & HEINRICH W.-D. 1983: Arvicoliden-Sukzession und Biostratigraphie des Oberpliozäns und Quartärs in Europa. – *Schriftenreihe für Geologische Wissenschaften* 19/20: 61–109.
- FEJFAR O. & HEINRICH W.-D. 1990: Proposed biostratigraphical division of the European continental Neogene and Quaternary based on muroid rodents (Rodentia: Mammalia). – In: FEJFAR O. & HEINRICH W.-D. (eds): *International Symposium Evolution, Phylogeny and Biostratigraphy of Arvicolids (Rodentia, Mammalia)*. Geological Survey, Prague and Verlag Dr. Friedrich Pfeil, Prague and Munich, pp. 115–124.
- FEJFAR O., HEINRICH W.-D. & LINDSAY E. H. 1998: Updating the Neogene rodent biochronology in Europe. – *Mededelingen Nederlands Instituut voor Toegepaste Geowetenschappen TNO* 60: 533–554.
- FEJFAR O. & HORÁČEK I. 1983: Zur Entwicklung der Kleinsäugerfaunen im Villányium and Alt-Biharium auf dem Gebiet der ČSSR. – *Schriftenreihe für Geologische Wissenschaften* 19/20: 111–207.
- FEJFAR O. & HORÁČEK I. 1990: Review of fossil arvicolids (Mammalia, Rodentia) of the Pliocene and Quaternary of Czechoslovakia. – In: FEJFAR O. & HEINRICH W.-D. (eds): *International*

- Symposium Evolution, Phylogeny and Biostratigraphy of Arvicolids (Rodentia, Mammalia)*. Geological Survey, Prague and Verlag Dr. Friedrich Pfeil, Prague and Munich, pp. 125–132.
- FEJFAR O. & KOVANDA J. 1969: Zoopaleontologic investigation of the Quaternary in Czechoslovakia. – In: ŽEBERA K. (ed.): *Quaternary in Czechoslovakia (History of investigations between 1919–1969)*. Ústřední ústav geologický – Geofond and Academia, Prague, pp. 49–67.
- GIBBARD P. & COHEN K. M. 2008: Global chronostratigraphical correlation table for the last 2.7 million years. – *Episodes* **31**: 243–247.
- GIBBARD P. & HEAD M. J. 2009a: The Definition of the Quaternary System/Period and the Pleistocene Series/Epoch. – *Quaternaire* **20**: 125–133. <http://dx.doi.org/10.4000/quaternaire.5086>
- GIBBARD P. & HEAD M. J. 2009b: IUGS ratification of the Quaternary System/Period and the Pleistocene Series/Epoch with a base at 2.58 MA. – *Quaternaire* **20**: 411–412. <http://dx.doi.org/10.4000/quaternaire.5289>
- HELLER F. 1949: *Ursus (Plionarctos) stehlini* Kretzoi, der kleine Bär aus den altdiluvialen Sanden von Mauer-Bammal und Mainz-Wiesbaden. – *Sitzungsberichte der Heidelberger Akademie der Wissenschaften, Mathematisch-Wissenschaften, Mathematisch-Naturwissenschaftliche Klasse* **1949**: 449–508.
- HORÁČEK I. 1981: Comments on the lithostratigraphic context of the Early Pleistocene mammal biozones of central Europe. – In: ŠIBRAVA V. & SHOTTON F. W. (eds): *Project 73/1/24. Quaternary Glaciations in the Northern Hemisphere, Report No. 6*. IUGS-UNESCO IGCP, Prague, pp. 99–117.
- HORÁČEK I. 1990: On the context of Quaternary arvicolid evolution: changes in community development. – In: FEJFAR O. & HEINRICH W.-D. (eds): *International Symposium Evolution, Phylogeny and Biostratigraphy of Arvicolids (Rodentia, Mammalia)*. Geological Survey, Prague and Verlag Dr. Friedrich Pfeil, Prague and Munich, pp. 201–222.
- HORÁČEK I. & LOŽEK V. 1987: Staropleistocenní fauna z Honců v Slovenském krasu. [Early Pleistocene fauna from Honce, Slovak Karst]. – *Československý kras* **37**: 133–134. (in Czech)
- HORÁČEK I. & LOŽEK V. 1988a: Přehled nových výzkumů v kvartéru biosférické rezervace Slovenský kras. (Review of recent investigations in the Quaternary of the Biospheric Reserve Slovenský kras). – *Slovenský kras* **39**: 61–68. (in Czech with English abstract)
- HORÁČEK I. & LOŽEK V. 1988b: Palaeozoology and the Mid-European Quaternary past: scope of the approach and selected results. – *Rozpravy Československé akademie věd, Řada matematických a přírodních věd* **98**: 1–102.
- JÁNOSSY D. 1963: Die altpleistozäne Wirbeltierfauna von Kövesvárad bei Répáshuta (Bükk-Gebirge). – *Annales historico-naturales Musei nationalis hungarici, pars Mineralogica et Palaeontologica* **55**: 109–141.
- JÁNOSSY D. 1976: Plio-Pleistocene bird remains from the Carpathian basin. I. Galliformes. 1. Tetraonidae. – *Aquila* **82**: 13–36.
- KOWALSKI K. 2001: Pleistocene Rodents of Europe. – *Folia Quaternaria* **72**: 3–389.
- KRETZOI M. 1938: Die Raubtiere von Gombaszög nebst einer Übersicht der Gesamtfauuna. – *Annales Musei nationalis Hungarici, Pars Mineralogica, Geologica et Palaeontologica* **31**: 88–157.
- KRETZOI M. 1941a: Weitere Beiträge zur Kenntnis der Fauna von Gombaszög. – *Annales Musei nationalis Hungarici, Pars Mineralogica, Geologica et Palaeontologica* **34**: 105–139.
- KRETZOI M. 1941b: Die unterpleistozäne Säugetierfauna von Betfia bei Nagyvárad. – *Földtani Közlöny* **71**: 308–335.
- KRETZOI M. 1956: Die altpleistozänen Wirbeltierfaunen des Villányer Gebirges. – *Geologica Hungarica, series Palaeontologica* **27**: 1–264.
- LOŽEK V. 1958: Nové interglaciální malakofauny ze Slovenska. (Neue interglaziale Molluskenfaunen in der Slowakei). – *Anthropozoikum* **7(1957)**: 37–45. (in Czech with German abstract)

- LOŽEK V. 1964: Quartärmollusken der Tschechoslowakei. – *Rozpravy Ústředního ústavu geologického* 31: 1–374.
- LOŽEK V. 1985: Příspěvek k poznání vývoje údolí Slané ve Slovenském krasu. [Contribution to the knowledge of development of Slaná valley, Slovak Karst]. – *Československý kras* 36: 101–102. (in Czech)
- LOŽEK V. & HORÁČEK I. 1984: Staropleistocénní fauna z jeskyně na Skalce u Nového Města nad Váhom. (Early Pleistocene fauna from the Skalka Cave near Nové Město nad Váhom). – *Československý kras* 35: 65–75. (in Czech with English abstract)
- LOŽEK V. & HORÁČEK I. 1987: K otázce stáří suťových brekcií u Slavce ve Slovenském krasu. [About the age of slope breccia near Slavec in Slovak Karst]. – *Československý kras* 37: 132–133. (in Czech)
- LOŽEK V. & HORÁČEK I. 1992: Slovenský kras ve světle kvartérní geologie. (Slovak Karst in the light of Quaternary geology). – *Slovenský kras* 30: 29–58. (in Czech with English abstract)
- MAUL L. 1990: Überblick über die unterpleistozänen Kleisäugerfaunen Europas. – *Quartärpaläontologie* 8: 153–191.
- MOTTL M. 1941: Die Interglazial- und Interstadialzeiten im Lichte der ungarischen Säugetierfauna. – *Mitteilungen aus dem Jahrbuche der Königlich Ungarischen Geologischen Anstalt* 35: 75–105.
- MOTTL M. 1960: Einige Bemerkungen zu L. Vértés: Das Moustérien in Ungarn. – *Eiszeitalter und Gegenwart* 11: 186–189.
- PÁLFY J., DULAI A., GASPARIK M., OZSVÁRT P., PAZONYI P. & SZIVES O. 2008: *Catalogue of Invertebrate and Vertebrate Paleontological Type Specimens of the Hungarian Natural History Museum*. – Hungarian Natural History Museum, Budapest, 209 pp.
- PETRBOK J. 1932: Eine Mollusken-Fauna von Gombasek (Slowakei) aus der Riss-Würm-Zeit. – *Archiv für Molluskenkunde* 64: 112–116.
- PETRBOK J. 1946: Stratigrafické chronologie některých vrstev a společenstev slovenského pleistocénu. [Stratigraphic chronology of selected layers and assemblages of Slovak Pleistocene]. – *Příroda* 38: 99–104. (in Czech)
- PETRBOK J. 1951: Monograph of the Bohemian Molluscs of the Genera *Monacha*, *Isognomostoma*, *Helicodonta*, *Euomphalia*, *Petasia*, *Campylaea*, *Chilotrema* and *Perfortella*. – *Bulletin international de l'Académie tchèque des Sciences* 1950: 1–39.
- PETRBOK J. 1956: [Note to Skřivánek: Jeskyně v Gombaseckém kamenolomu v Jihoslovenském krasu]. – *Časopis Národního muzea, oddíl přírodovědný* 125: 208. (in Czech)
- RABEDER G., PACHER M. & WITHALM G. 2010: Early Pleistocene bear remains from Deutsch-Altenburg (Lower Austria). – *Mitteilungen der Kommission für Quartärforschung der Österreichischen Akademie der Wissenschaften* 17: 1–135.
- RODE K. (1935): Untersuchungen über das Gebiß der Bären. – *Monographien zur Geologie und Palaeontologie, ser. 2, 7*: 1–162.
- SKŘIVÁNEK F. 1956: Jeskyně v Gombaseckém kamenolomu v Jihoslovenském krasu. [Caves in Gombasek quarry in Slovak Karst]. – *Časopis Národního muzea, oddíl přírodovědný* 125: 205–207. (in Czech)
- SKUTIL J. 1938: Paleolitikum Slovenska a Podkarpatskej Rusi. (Das Paläolithikum der Slowakei und der Pokarpatiská Rus). – *Spisy Historického odboru Matice Slovenskej* 4: 1–251. (in Slovak with German abstract)
- SOJÁK M. 2007: Jaskyňa Leontína (Ludmila) v archeologických prameňoch. (Leontína (Ludmila) Cave in archaeological sources). – *Aragonit* 12: 62–67. (in Slovak with English abstract)
- ŠUF J. 1931: Diluviální zvířena od Gombaseku u Rožňavy na Slovensku. (La faune quaternaire de Gombasek aus environs de Rožňava en Slovaquie). – *Věstník Státního geologického ústavu ČSR* 7: 161–172. (in Czech with French abstract)

- TASNÁDI-KUBACSKA A. & SOÓS L. 1935: Die Mollusken und Wirbeltierfauna des Pleistozän und Ober-Pliozän von Gombaszög. – *Annales Musei nationalis Hungarici, Pars Mineralogica, Geologica et Palaeontologica* **29**: 9–20.
- TORRES T. 1992: The European descendants of *Ursus etruscus* C. Cuvier (Mammalia, Carnivora, Ursidae). – *Boletín Geológico y Minero* **103**: 12–22.
- VLČEK E. 1996: Z dob českých a slovenských opic. Opičí zkameněliny z Koněprus, Děvína, Ivanovců, Hajnáčky, Včelárů a Gombaseku. [On the age of Czech and Slovak monkeys. Monkey fossils from Koněprusy, Děvín, Ivanovce, Hajnáčka, Včeláre, and Gombasek]. – *Vesmír* **75**: 516–521. (in Czech)
- VÖRÖS I. 1979: *Archidiskodon meridionalis ürömensis* n. ssp. from the Lower Pleistocene of the Carpathian basin. – *Fragmenta Mineralogica et Palaeontologica* **9**: 5–8.
- WAGNER J. 2012: A short nomenclatural note to correct spelling of the species-group name “*gombaszögensis*”. – *Quaternaire, Hors-série* **2011**, **4**: 245.
- WAGNER J. & ČERMÁK S. 2012: Revision of the early Middle Pleistocene bears (Ursidae, Mammalia) of Central Europe, with special respect to possible co-occurrence of spelaeoid and arctoid lineages. – *Bulletin of Geosciences* **87**: 461–496.
<http://dx.doi.org/10.3140/bull.geosci.1354>
- WAGNER J., ČERMÁK S. & HORÁČEK I. 2012: The presence of *Ursus ex gr. minimus-thibetanus* in the Late Villányian and its position among the Pliocene and Pleistocene black bears in Europe. – *Quaternaire, Hors-série* **2011**, **4**: 39–58.
- WOLSAN M. 1993: Évolution des carnivores quaternaires en Europe Centrale dans leur contexte stratigraphique et paléoclimatique. – *L'Anthropologie* **97**: 203–222.