

## “BEAR CAVES” IN UKRAINE

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### B. Ridush: “Bear Caves” in Ukraine

**Abstract:** The majority of Pleistocene cave sites in Ukraine are situated in the main karst-speleological areas of Ukraine: Crimea Mts., Carpathian Mts., North of Black Sea (Odessa region) and Podillja-Bukovyna area. The oldest representatives of the *Ursidae* are known from Pliocene deposits in Odessa catacombs. *Ursus spelaeus* remains were found in 24 caves from all karst regions. The most numerous they are in caves of Odessa region. Since 1998 several new cave sites containing *Ursus spelaeus* and *Ursus arctos* were discovered in each karst region: Binbash-Koba, Kizil-Koba and Lesnika caves in Crimea, Usatovo (Shevchyshyna) near Odessa, Bukovynka, Kryvchanska and Ozerna caves in Podillja-Bukovyna area, Bilykh Stin and Molochnyi Kamin’ in Carpathians. All available data on quantity of bears bone remains and <sup>14</sup>C dating collected into 4 tables.

**Key words:** cave, *Ursus spelaeus*, *Ursus arctos*, Ukraine, Pleistocene, <sup>14</sup>C dating, taphonomy

## INTRODUCTION

There are four main karst cave regions and, accordingly, the same number of cave bear areas in Ukraine. Two of them are of mountain karst: carbonate karsts of Ukrainian Carpathians and Crimean Mountains (Fig. 1). The other two areas represent the plain karst: Podillja-Bukovynian area with prevailing of gypsum karst, and Northern Black Sea area of carbonate karst. At the end of 2008 the total amount of caves in Ukraine was 1690 (Klimchouk et al., 2008). Despite the wide spreading of karst caves, the number of cave bear sites in Ukraine is quite limited comparing to the Central and Western Europe.

The most ancient mention about “bone caves” at the south of Ukraine can be find in notes of Turkish traveler of 17<sup>th</sup> century Evlia Chelebi (Chelebi, 1961). Investigations of so called “bear caves” on the territory of modern Ukraine started as far as the middle of 19<sup>th</sup> century (Nordmann, 1858), but till now *Ursus spelaeus*



Fig. 1. Localisations of the main karst-speleological areas in Ukraine. 1 - Western Ukraine, 2 - Odessa region, 3 - Mountain Crimea.

and other troglomorphic bear's cave sites in Ukraine are unfamiliar for most of European scientists. Moreover during last years new finds of "bear caves" were made in Ukraine.

After A. Nordmann's discoveries the investigation of "bone caves" in Odessa region were reactivated in 1928 by T. Grytsai, who revealed that catacombs - numerous artificial underground quarries under Odessa, expose a net of natural karst cavities, filled with foxy clays of Pliocene, containing abundant bone remains (Grytsai, 1938, 1939, 1958). In 1939 - 1940 he explored the Illinka Cave near Odessa with numerous cave bear remains (Pidoplichko, 1949).

In 1936 - 1937 the Pliocene fauna from Odessa catacombs was investigated by Bogdan Voljanskyi, but he was repressed and executed by Soviet Power at the end of 1937 (Zagorodnjuk, 2009). Later the fauna of Odessa catacombs was investigated by O. Alekseev (1945), D. Tretjakov (1941), N. Burchak-Abramovich (1953), I. Pidoplichko (1954a, b), A. Argiropulo (Argiropulo and Pidoplichko, 1939a, b), A. Tugarinov (1940), E. Gaponov (1954), V. Goretskyi (1942), Ja. Haveson (1950, 1954), I. Yatsko (1940, 1947, 1956, 1962, 1964), V. Zubareva (1939), A. Roshchin (1939, 1941, 1949, 1956), I. Odintsov (1954) et al. The geological and karstological conditions of bones deposition were examined by E. Gaponov (1954), G. Bachinskyi (1965b), I. Odintsov (1954, 1962, and 1966).

During 1958 - 1970 fossil Vertebrates sites were revealed in 33 caves of Ukraine from near 600 of inspected caves. This research was conducted by G. Bachinskyi (Bachinskyi, 1962, 1965, 1965a, 1967, 1970; Bachinskyi et al., 1967), V. Dubljanskyi (Bachinskyi and Dubljanskyi, 1963, 1968), K. Tatarinov (Tatarinov, 1958, 1962a, b, 1965a, b, 1966, 2000; Tatarinov and Bachinskyi, 1968; Tatarinov and Marisova, 1971), I. Chernysh (1966), A. Odintsov (1962, 1966), I. Yatsko (1962, 1964) et al. The bones determination was realized also by G. Baryshnikov (1987, 1995), I. Pidoplichko (1955, 1956b), Y. Krochko (Krochko et al., 1993), I. Marysova (1962), M. Voinstveskyi (1963), T. Krakhmalnaya (1996) et al. Since 1990<sup>th</sup> paleozoological investigations in caves of Ukraine were reactivated by author with international participation (Nagel et al., 2005; Ridush, 1998, 1999, 2004a, b, 2008; Ridush and Vremir, 2003, 2008; Ridush and Pronin, 2009; Vremir et al., 2000; Vremir and Ridush, 2002, 2005).

## MATERIALS AND METHODS

Since 1998 we systematically surveyed karstic and non-karstic caves in Ukraine for presence of fossil evidences of Vertebrates. As well all literature sources were analysed and verbal communications of speleologists were taken into account. Also we tried to inspect some Quaternary Vertebrates cave sites in Ukraine, discovered in 1960<sup>th</sup> and mentioned in publications. On few cave sites, where we carried out field investigations, the remains of *Ursus spelaeus* and other Quaternary predators were found. Only for some samples radiocarbon dates were obtained. For few sites and layers containing cave bear and brown bear remains radiocarbon dates were taken from archaeological and palaeontological publications. The obtained data was brought together in four tables (tab. 1 - 4).

The karst-geological conditions and taphonomic peculiarities of each observed cave site were studied.

## BRIEF DESCRIPTION OF THE SITES

### **Pliocene sites**

**Odessa.** Karst caves under Odessa contain abundant bone accumulations from Middle Pliocene till Late Pleistocene. These caves in the limestone of the Pontic Layer, filled with reddish-brown clay, were exposed during the underground development of the saw-rock in the Odessa catacombs.

The karst caves of Odessa look as net of the horizontal galleries. The cross-cut of galleries mostly has the shape of triangle, the top of which abuts against ceiling of cave. The width of galleries at the foot is approximately self-possessed on all its length and vary from 0.5 - 0.7 to 2.2 - 2.5 m. Height of galleries is also different and vary from 0.6 to 1.8 - 2.2 m. From horizontal galleries the narrow vertical tubes filled with foxy clay branch off upwards. The deposits are represented by a detritus, debris, foxy clay with inclusions of bones and without them, as well as by a loess-like loam (Odintsov, 1966).

According to the modern conceptions of the speleogenesis (Klimchouk, 1997; Klimchouk et al., 2000, 2009), these cavities, which have the tectonic conditioned labyrinth structure, were washed out by artesian water when containing rocks were considerably below level of erosive cut. Later, when territory rose and artesian aquifer was drained there, caves exposed by erosion in one case became traps for theriofauna, and in other - dwellings for its throglophilic species.

In this fauna Mammals are represented by: *Ursus arverensis* Cr. et Job, *Epimachaerodus crenatidens* Fab., *Vulpes praecorsac* Kormos, *Vulpes odessana* sp. n., *Hyaena sivalensis* Bose, *Hyaenarctos* Roscht., *Canis petenyi* Kormos, *Lynx* sp., *Parameles ferus*. Rohtchin., *Putoris* sp., *Hystrix* sp., *Ochotona gigas* Arg. et Pidop., *Ochotona eximia* Chom., *Ochotona pusilla* Pall., *Stenofiber* sp., *Paracamelus alexejevi* Chavesson, *Struthio* sp., *Mastodon arverensis*, *Rhinoceros* sp. (?), *Cervus* sp. et others, and also birds, amphibians and fish (Odintsov, 1966; Roshchin, 1956). The age of the site concerned by different researchers as Middle (Bachynskiy, 1965a) or Late Pliocene (Odintsov, 1966; Roshchin, 1956), and even as Early Quaternary (Aleksieva, 1977). However, the recent data of the microfaunistic and paleomagnetic dating testify to the end of Early Pliocene (Vislobokova et al., 2001).

#### **Eopleistocene and Early Pleistocene Sites**

The most ancient sites in the region *Podillja* were found out in caves of non-karst origin. There are two karst-suffusion grottoes in strata of Miocene sand under a rockshelters of limestone and calcareous sandstone. Both cavities were uncovered by quarries. One of them is situated in *Horishnja Vynanka* village near the town of *Chortkiv*. The remains of 30 species of Mammals and others Vertebrates were revealed there, including those *Hypolagus* sp., *Arctomeles pliocaenicus* Stach., *Ursus* cf. *wenzensis* Stach., *Dicerorhinus etruscus* Falconer. Due to the faunistic complex the site is dated to Eopleistocene (Tatarinov and Bachinskyi, 1968).

The other site is situated in *Synjakove-I* also near *Chortkiv*. The remains of 48 species were found there. Among them there were *Spelaearctos spelaeus* Ros. (small form), *Dicerorhinus* aff. *merki* Jaeger, *Crocuta* cf. *spelaea* Gold., *Cuon* sp., *Canis* sp., *Felis spelaea* Gold., *Capreolus* sp., *Magaceros* sp., *Cervus* cf. *elaphus* L., *Bos* sp., *Equus* cf. *caballus* L. and others. Due to the faunistic complex the site is dated by Early Pleistocene. The researchers believe that predators lived in these cavities and the bone accumulation was formed from the rests of them and of their preys (Tatarinov and Bachinskyi, 1968). The most of remains belongs to the bears and badgers, as obviously they more frequent inhabited this cave, but the presence of coprolites testify about active inhabitation of the cave by hyenas. The fauna is close to Tiraspol faunistic complex (Mindel, Lower Pleistocene) and, after the result of collagen analysis, was formed during long time - from the end of Eopleistocene till the Early Pleistocene (Bachinskyi, 1965a; Tatarinov and Bachinskyi, 1968; Tatarinov, 2000).

#### **Middle and Late Pleistocene Sites**

**Crimea Mountain.** The Late Pleistocene sites in Crimea are concentrated within the limits of the Main and Inner ridges of the Crimea Mountains. Large grottoes and rockshelters prevail within the limits of the Inner Ridge, and the various spelaean forms, including vertical trap-shafts, prevail on the Main Ridge.

The Main Ridge of the Crimea Mountains consists of a few plateau - yailas within the limits of which karst phenomena intensively developed, and, accordingly, caves are widespread. The numerous entrances to the caves are both on the top of these plateaus and in cliffs on the slopes of mountain ranges.

Crimean Mountain, despite the large amount of caves (more than one thousand) and geomorphologic conditions similar to the Western European "cave bear areas", contains only few cave sites with *Ursus spelaeus* remains. There are *Kizil-Koba*, *Emine-Bair-Khosar*, *Binbash-Koba* and Palaeolithic sites: *Chokurcha Grotto* (3 km near Simferopol), *Mamut-Koba*, *Adzhy-Koba*, grottos *Prolom-1* and *Prolom-2* (Fig. 2). Instead remains of *Ursus arctos* are comparatively often.

The Palaeolithic site in *Adzhi-Koba Cave* on **Karabi plateau** (the Main Range) was investigated in 1940<sup>th</sup>. Besides artefacts the subfossil bones of cave bear, cave lion, lynx and wild cat were found (Gromov, 1948; Duljanskyi and Lomaev, 1980).

The palaeontological site in the *Kizil-Koba Cave* (Dolgorukov Yaila, Crimea) contained remains of eight individuals of original form of cave bear (Bachinskyi et al., 1967), which G. Bachinskyi defined as the subspecies of *Ursus spelaeus crimaeus* subsp. n., pointing on its difference from *Ursus spelaeus rossicus*, *Ursus spelaeus spelaeus* and *Ursus deningeri* (Bachinskyi, 1962). Except for bear's bones, the location, which was situated on the fifth level of the cave (totally there are 6 levels), contained also the separate bones of small wolf or ancient dog (*Canis* sp.) [later G. Bachinskyi identified it as *Cuon* sp. (Bachinskyi 1970)], hare (*Lepus* sp.), hamster (*Cricetus cricetus*) and alpine birds - alpine jackdaw (*Pyrrhocorax pyrrhocorax*) and chough (*P. graculus*) (Bachinskyi et al., 1967). G. Bachinskyi dated the site as Early Pleistocene (Mindel), but G. Baryshnikov (1987) called it in question.

In 2006 on the same 5<sup>th</sup> level of the *Kizil-Koba cave*, not deep from the floor, we revealed another location of cave bear of typical *Ursus spelaeus*. This location is full of remains and needs next detailed and complex research. The site looks to be very rich for cave bear and probably other carnivores' remains and perspective for further long-term investigation. The exact dating of the site is necessary.

The *Emine-Bair-Koba Cave* (briefly - Bair Cave) is situated on the Chatyrdag plateau, in the Main Range of Crimean Mountains, at the altitude of 990 m a. s. l. The subfossil bones of *Spelaeartos spelaeus*, *Canis lupus*, *Vulpes corsac*, *Felis spelaea*, *Lynx lynx*, *Equus caballus*, *Cervus elaphus* and *Lepus* sp. were found there under the flowstone cover in 1960<sup>th</sup> (Bachinskyi and Dubljanskii, 1968). In opinion of G. Bachinskyi, the site was formed on the place of large carnivores' den not far from the ancient subhorizontal entrance, which later was closed with collapses and calcite flowstone. He assumed that the 18 meters deep collapse shaft, which now is the only natural entrance to the cave, appeared later (Bachinskyi, 1970). Nevertheless our investigations show that the shaft and side entrance functioned parallel during Late Pleistocene and the shaft was a natural mega-trap for numerous Herbivores (Ridush and Vremir, 2003, 2008; Vremir and Ridush, 2002, 2005). For predators this mega-trap could serve as "free dining-room", which is proved by numerous gnawing marks on Herbivores bones (Ridush and Proskurnjak, 2008).

The Bair Cave is a show-cave and the floor of the gallery, where predators' den was placed now is buried under concrete.

Few separate bones and teeth of *Ursus spelaeus* we found in foxy clay accumulation under flowstone in *Binbash-Koba Cave* ("the cave of thousand heads" - in Tatar), which is situated on the same plateau. It was Medieval and probably Late Antique burial ground in the cave. But in 19<sup>th</sup> century the treasures hunters mixed deposits in the cave and Pleistocene deposits and bones appeared on the surface of the floor. Nevertheless the cave is still perspective for finding of cave predators.

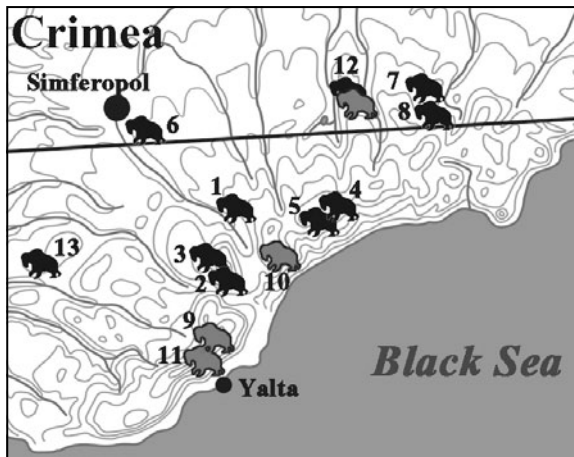


Fig. 2. Localisations of the cave bear sites in the Mountain Crimea. 1 - Kizil-Koba (Red Cave), 2 - Binbash-Koba, 3 - Emine-Bair-Khosar, 4 - Mamat-Koba, 5 - Adzhi-Koba, 6 - Chokurcha, 7 - Prolom-1, 8 - Prolom-2, 9 - Bear Shaft, 10 - MAN, 11 - Lesnika, 12 - Kiik-Koba, 13 - Kanly-Dere.

32 m deep in block accumulation with clay filler a lot of brown bear bones of dwarf race were found. The site was dated as “Middle Quaternary” (Bachinskyi, 1970), but the dating and systematic position also need more precise definition. Bones of three *Ursus arctos* individuals were found in the MAN Cave on Demerdzhi Massif (Dubljaskyi and Lomaev, 1980).

The Lesnika Cave, which is situated on the Yalta Yaila, in the 20 meters deep shaft the remains of at list 3 individuals of *Ursus arctos* were found. One of individuals was dated to 10,155±40 BP (VERA-2544).

Few other grottoes in Crimea contained remains of both species (look at Tab. 1 and 4).

Only some caves at the south of *Odessa region* according to abundance of fossil fauna, in particular to plenty of cave bears remains, remind of the so-called “bears caves” of Alps. Turkish traveler of 17<sup>th</sup> cent Evlia Chelebi being in Akkerman fortress (now it is city of Bilgorod-Dnistrovkyi) on the bank of the Dnister estuary was told about interesting discovery. When Turkish soldiers repaired entrenchment round the fortress, they uncovered a cave containing many “huge human bones”. He mentioned cannon-bones of many hundreds of people 5 - 6 cubits long. All bones were put back to the cave and the cave was immured (Chelebi, 1961). If we’ll make correction on the embellishment and exaggeration typical for the orient stories, in the base of the story we’ll find a report about a bone-bearing cave, which the most likely was a “bear cave”.

The first really rich finds were done by A. Nordmann in Karantinnaja Balka in Odessa (1846) and in Nerubaiskoe Village (1846 - 1847) (Nordman, 1858 - 1860). In Nerubaiskoe Nordmann excavated three sites both in caves and karst sinks. Most of bones belonged to large cave bear (almost 400 individuals), which was defined by Nordmann as *Ursus spelaeus odessanus* (Sapozhnykov, 2003). Later all Nordmann’s finds from different sites were mixed into one collection and now are named as “bones from Odessa”. In modern time B. Kurten obtained radiocarbene date of cave bear from Nordmann’s collection (Kurten, 1969) (Tab. 3). But it isn’t clear from what site exactly (not to mention layers) near Odessa that sample comes from.

The next cave with Pleistocene deposits was found in 1938 by T. Grytsai in Illinka Village near Odessa. The geological position of this site was described by K. Pronin (1999). The

The remains of cave bear (*Ursus spelaeus*) and brown bear (*Ursus arctos*), as well as *Crocota spelaea* (also hyena coprolites), *Canis lupus*, *Vulpes corsac*, *Meles meles*, *Putoris eversmanni* are known from the Palaeolithic grotto of *Chokurcha*, only 3 km far from Simferopol. The similar ensemble of trogliphilic fauna is represented in the *Mamut-Koba Cave*, situated in the head of the Bijuk-Karasu River: *Ursus spelaeus*, *Canis lupus*, *Vulpes vulpes*, *Meles meles*, *Ochotona pusilla* (Vereshchagin and Baryshnikov, 1980).

Few caves more contained *Ursus arctos* bones. The *Bear’s Shaft* is situated on the northern slope of the Basman Range - a branch of Yalta massif. On its bottom

Table 1: Quantity of cave bear (*Ursus spelaeus*) bone remains from the Crimea.

site	layers	number of bones	number of individuals	references	<sup>14</sup> C dating
Palaeolithic sites (after Baryshnikov, 1987, completed by the author)					
Mousterian					
Prolom-2	2 - 4	222	24	Baryshnikov (1987)	28,100±350* (Ki-10617) 41,600±800** (Ki-10611)
Mamat-Koba		38	3	Vereshchagin and Baryshnikov (1980)	-
Chokurcha		1	1	Ibid.	-
Kosh-Koba		2	1	Gromova and Gromov (1937)	-
Adzhi-Koba	3	19	2	Ibid.	>46,500 (GrA-11442)*
	2 - 3 (mixed)	22	2	Ibid.	-
Late Palaeolithic					
Adzhi-Koba	2	10	2	Gromova and Gromov (1937)	-
Non-archaeological sites					
Emine-Bair-Khosar		180	24	Dubljanskyi and Lomaev (1980)	-
Kizil-Koba		150	8	Bachynskyi and Dublyanskyi (1963)	-
Kizil-Koba		15	2	this publication	-
Binbash-Koba		5	1	this publication	-

\* for layer 2, \*\* for layer 3.

archaeology of Illinka was investigated by O. Dobrovolskyi (1950) et al. Most of bones in the *Illinka Cave* belonged to cave bear (*Ursus spelaeus*), the amount of individuals of which counted 374. Alongside there were not numerous remains of *Crocota spelaea*, *Canis lupus*, *Vulpes vulpes*, *Vulpes corsak*, *Meles meles*, *Felis spelaea*, *Ochotona pusilla*, *Histryx*, *Spalax leucodon*, *Cricetus cricetus* (Pidoplichko, 1956a). Nearby, in *Kovaleva Balka* a few cavities more filled with a loam with Late Pleistocene faunistic remains of *Ursus spelaeus*, *Vulpes corsak*, *Meles meles*, were found (Pidoplichko, 1956a).

In 2003 near Nerubaiskoe Village another buried cave with *Ursus spelaeus* remains was found. It was partly excavated by international Austrian-Ukrainian team (Nagel et al., 2005). Probably it was the most complete cave bear investigation in Ukraine till now. There were revealed two different time periods of bone accumulation, confirmed by radiocarbon dates - 16,700 BP (VERA-2762, calibrated age) and >52,450 BP (VERA-2761). On the results of DNA analysis the taxonomic position of the bear in time diapason of 50 - 60 ka BP was defined as *Ursus ingressus* (Nagel et al., 2005).



Fig. 3. Localisations of the cave bear sites near Odessa. 1 - Karantinnaja Balka (Odessa), 2 - Usatovo, 3 - Nerubajskoe, 4 - Catacombs, 5 - Bilgorod-Dnistrovskiy (hypothetical "bone cave" of Chelebi).

River basin. Among two dozens of known caves, mainly small (the largest is only 60 m deep and near 1 km long), five of them contains cave bear (*Ursus spelaeus*) remains: Perlyna, Bilykh Stin, Vedmezhe Iklo (Bear's Task), Grebin', Molochnyi Kamin' (Bachinskyi and Chernysh, 1965). The most reach for bone remains are the Perlyna Cave and the Bilykh Stin Cave. The Perlyna Cave contains also *Ursus arctos* remains, probably of Holocene age.

A numerous bone remains, where *Ursus spelaeus* prevailed, were found in 1972 at the Palaeolithic site in Molochnyi Kamin' Cave. The lowest layer of this site was dated after <sup>14</sup>C as 25,550 ± 350 BP (GrN-7761) (Gladilin and Pashkevich, 1977). The bear remains very likely are not concerned with human activity. In 2006 we found some *Ursus spelaeus* teeth in other part of the cave, which surely were not inhabited by the human.

Our paleozoological investigation in the Bilykh Stin Cave was started only in 2006 and brought, besides two individuals of *Ursus spelaeus*, remains of large size cave lion (*Felis spelaea*). Till now it is the only cave in the region containing stratigraphy suitable for complex investigation of Pleistocene deposits and fauna (Ridush, 2008).

The most recent cave bear finds in the region were made by author in 2009 in Usatovo Village (vicinities of Odessa) in Shevchyshyna Cave (Ridush and Pronin, 2009). The karst cavity filled with Pleistocene loam containing some bone remains was found by K. Pronin in 1974. It was exposed by limestone mine. Unfortunately the bone finds of last years were lost. In 2009 we partly excavated this site, looking as cavity 2.2 m long and 2.2 high, filled with Pleistocene loams and loamy sand with inclusions of limestone debris. In filling bones and teeth of *Ursus spelaeus*, *Bison priscus* and unidentified animal and birds remains were revealed. *Ursus spelaeus* teeth belong to young individuals, which evidence den character of the site.

### Ukrainian Carpathians

In Carpathian Range "bear caves" are numerous in karst areas of neighbouring countries like Poland, Slovakia, and Romania. But Ukrainian part of Carpathian Range is built mainly with flysch rock masses and karst rocks are spread there very limited. They are represented by marbled limestone of Jurassic clippens at the Ugol'ka

Table 2: Quantity of cave bear (*Ursus spelaeus*) bone remains from the cave sites of the North of the Black Sea.

site	number of bones	number of individuals	references	<sup>14</sup> C dating (BP)
Illinka	29336	374	Pidoplichko (1956)	27,500 +/-210 (Ki-11681) (Stepanchuk, 2006)
Kovaleva Balka	177	11	Ibid.	-
Odessa-Nerubajskoe	-	400	Sapozhnykov (2003)	26,930+/-980 (Stockholm) (Kurten, 1969)
Nerubajskoe	450	9	Nagel et al. (2005)	>52,450 (VERA-2761)
Shevchyshyna (Usatovo)	9	2	this publication	-

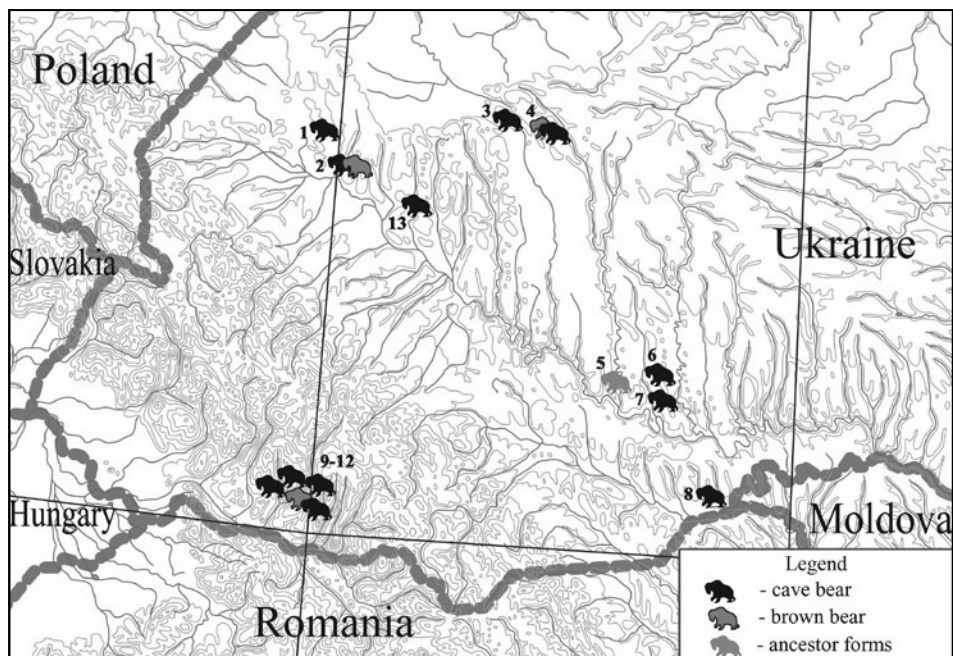


Fig. 4. Localisations of the cave bear sites in the Western Ukraine. 1 - Stradch, 2 - Pryima, 3 - Cave Bear Grotto (Divychi Skeli, Kremenets), 4 - Mount Pustelna, 5 - Horishnja Vynanka, 6 - Ozerna, 7 - Kryvchanska (Krysh-taleva), 8 - Bukovynka, 9 - Perlyna, 10 - Bilykh Stin, 11 - Vedmezhe Iklo, 12 - Molochnyi Kamin, 13 - Melna.

### ***Podillja - Bukovyna***

As early as 1881 cave bear and cave hyena bones were found in a cave near *Melna* Village (now Rohatyn district of Ivano-Frankivsk region) (Lomnicki, 1881). But the place and geological conditions of this site remain unknown. The sites of Quaternary Vertebrate fauna near Stradch and Vynjava villages were concerned with ancient dens of cave hyenas and cave bears. These dens were found in niches filled with redeposited sand (Goretskyi, 1957; Tatarinov, 1958; Bachinskyi, 1967). Unfortunately the taphonomic conditions were not favourable for preservation of collagen in bones. That is why our attempts of dating of some cave hyena (*Crocota spelaea*) teeth were unsuccessful.

The other Late Pleistocene site was revealed in 1962 by a quarry on the *Mt. Pustelna* near Mala Ilovitsa Village. A buried cave filled with sand, oozy deposits and sandstone fragments was uncovered there. The *Mt. Pustelna* is a part of the Kremenetski Mts. that is built with biohermic deposits and divides the Dnister and the Prypjat rivers basins. The cave was developed in Neogene limestone. It was 1.5 m high. The animal bone fragments and flint tools were found in the cave filling. The bone-bearing lens was 0.8 thick and near 5 - 6 m long. The fauna was represented by: *Spelaeartcos (Ursus) spelaeus* Ros., *Rangifer tarandus* L., *Ursus arctos* L., *Lemmus* cf. *lemmus* L., *Canis lupus* L., *Alopex lagopus* L., *Felis spelaea* Goldfuss, *Equus caballus* L. The archaeological finds of the site (named *Lypa-9* - after other *Lypa* village) belong to the local Late Palaeolithic culture named *Lypska*. This culture was dated by the end of the Mologa-Sheksna interglacial and the beginning of Ostashkov glacial (30 - 20 Ky ago). Due to the fauna this site was formed in Ostashkov time (Würm II). The site explorers supposed that there was a shelter of the cave bear hunters (Ostrovskiy and Grigorjev, 1966; Tatarinov and Bachinskyi, 1968). Unfortunately this site was completely destroyed and its detail geological description is absent. Few other



caves, like *Cave Bear Grotto* in Divychi Skeli (Virgins' Cliffs) (Tatarinov, 1962b, 2000), situated in Kremenetski Mountains, also contain Late Pleistocene fauna but they are very poorly investigated from geological and taphonomical points of view.

Totally 29 fragments of sinister and 300 of dexter mandibles, 1 complete cranium, 6 cranium fragments, 189 separate teeth, 297 cranium bones, 2500 fragments of postcranial skeleton were collected from this two caves in the Kremenetz Mountains. The cave bear mandibles morphometric indexes from these sites were published by K. Tatarinov (2000).

The other bear cave with *Ursus spelaeus* remains, containing also Mousterian and Late Palaeolithic tools – the *Pryima Cave* was found near Lviv (Matzkevych, 1993). It is a small grotto of karst-suffosion genesis developed in residual hill built with Neogene sandstone. *Ursus arctos* remains were revealed there from Late Pleistocene and Holocene deposits (tab. 4).

Before 1990<sup>th</sup> any cave bear or other Pleistocene fauna finds weren't made in gypsum caves of Western Ukraine. An opinion that gypsum caves are too young and unstable for such kind of accumulation existed at that time. Now, besides the Ozerna Cave, we found cave bears remains from the Bukovynka Cave (Middle Prut area) and Kryvchanska (Crystal) Cave. Bear paw trace (probably of *Ursus arctos*) was found in Balamutivska Cave, which contains Mesolithic paintings (Ridush, 2004c).

The Late Pleistocene deposits in *Kryvchanska Cave* were known from 1960<sup>th</sup> (Tatarinov, 1965a, b). But only in 2000 we discovered there *Ursus spelaeus* remains bedded below one meter thick cultural layer.

In Northern Bukovyna (Chernivtsi region) the only cave site with Late Pleistocene fauna is known in the Bukovynka Cave. Numerous crashed bones and coprolithes, as well as *Crocota spelaea* remains are the evidence of cave hyena den in this cave (Ridush, 1998, 1999; Vremir et. al., 2000). Few teeth and mandible fragment of one old and one juvenile individual of *Ursus spelaeus* were found here besides hyena remains. Probably this bears were pray of hyenas. The <sup>14</sup>C data of the site after hyena tooth is 41,300 (+1300/-1100) BP (VERA-2529).



Fig. 5. Section of Late Pleistocene deposits in Kryvchanska Cave. XXX – place of *Ursus spelaeus* bones bedding.



Fig. 6. Section of Late Pleistocene deposits in Bukovynka Cave. 1 – aeolian deposits (“cave less”) (OIS-2); 2 – zoogenic-proluvial layer (“hyena layer”) (OIS-3); 3 – alluvial (in-fluvial) deposits of transit stream.

Table 3: Quantity of cave bear (*Ursus spelaeus*) bone remains from the cave sites of the Western Ukraine.

site	layers	number of bones	number of individuals	references	<sup>14</sup> C dating
Synjakove-1**		61	7	Bachinskyi (1965a); Tatarinov (2000)	-
Perlyna		1031	18	Tatarinov and Bachinskyi (1968); Tatarinov (2000)	45,700 +2500/-1900, (VERA 3736)
Bilykh Stin		56	4	this publication	-
Molochnyi Kamin				Gladilin and Pashkevich (1977)	25,550±350 (GrN-7761)*
Pustelna		2207	14	Tatarinov and Bachinskyi (1968)	-
Divochi Skeli		168	21	Tatarinov (2000)	-
Vynjava		4	1	Ibid.	-
Melna				Lomnicki (1881)	-
Bukovynka		3	2	this publication	41,300+1300/-1.100* (VERA-2529)
Ozerna		12	2	this publication	-
Kryvchanska (Kryshtaleva)		3	1	this publication	-
Pryima-1	EP	56	1	Matzkevyi (1998)	45,600+450 (Ki-4583)*
	LP	3063	22	Matzkevyi (1998); Tatarinov (2000)	13,900+130 (Ki-4145)* 13,600+120 (Ki-4146)* 14,100+105 (Ki-4147)* 14,200+90 (Ki-4163)* 13,800+105 (Ki-4178)*

EP - Early Palaeolithic, LP - Late Palaeolithic, \*\* Data of a layer; \*\* *Ursus spelaeus* cf. *rossicus*.

Table 4: Quantity of brown bear (*Ursus arctos* L.) bone remains from some cave sites in Ukraine.

site	layers	number of bones	number of individuals	references	<sup>14</sup> C dating
Pryima-1 (WU)	LP	47	5	Matzkevyi (1998)	14,200 - 13,600*
	M	23	1		-
	E	27	1		-
Bears Cave (Medvezhia)*		-	11	Bachinskyi (1970)	-
MAN		172	3	Dubljanskyi and Lomaev (1980)	-
Lesnika (Crimea)		10	3	this publication	10,155 -40 (VERA-2544)
Pustelna	LP	281	2	Tatarinov and Bachinskyi (1968)	-
Perlyna		4	2	this publication	-
Prozorykh Stin		1	1	Chernysh (1966)	

LP - Late Palaeolithic, M - Mesolithic, E - Eneolithic (Halcolithic), \* dwarf race of *Ursus arctos*

In 2009 local cavers from Ternopil' caving club found remains of *Ursus spelaeus* in the Ozerna Cave. The site is situated quite far from the modern entrance and surely was connected with one of ancient entrances, which now is closed by slope deposits. The detailed investigation of this site is quite difficult also due to the long-term water table oscillations.

The 12 sites more of *Ursus spelaeus* finds in the Western Ukraine were mentioned by K. Tatarinov (1966), but any additional information about exact location, geological position and taphonomy of these sites is absent.

## DISCUSSION

Because of large individual changeability, the taxonomy of fossil *Ursidae* is not settled finally. In the Soviet and post-Soviet literature it is used to define cave bears in the separate genus *Spelaearctos* Geoffroy, 1836. In the same time Western authors continue to include it to the genus *Ursus* Linnaeus, 1758. That is why, at comparison of publications of different authors and years the names *Spelaearctos spelaeus* and *Ursus spelaeus* should be considered as synonyms. Moreover, recently among the cave bears of Western Europe at least three species (*Ursus ladinicus* n.sp., *Ursus eremus* n. sp., *Ursus ingressus* n.sp.) are defined (Rabeder et al., 2003). Therefore the precise systematic position of the most of cave bears of Ukraine remains uncertain and needs a revision.

Only few publications were dedicated especially to cave bear spreading in Ukraine and the questions of its systematic position. G. Bachinskyi (1962) described subspecies *Ursus spelaeus crimaeus* Bachinskyi from the upper level of the Kizil-Koba (Red Cave). G. Baryshnikov (1987) analysed cave bear remains from archaeological site in the grotto Prodom-2. He confirmed affiliation of the Crimean cave bear population to the separate subspecies. Any radiocarbon data were not given.

The fossil and subfossil faunal remains in caves are an important source of information about troglolytic faunas of the past as well as fossil faunas on the surface. The process of fossil bones site formation contains three successive stages: remains accumulation (formation of tanathocenosis), their burial (formation of taphocenosis) and fossilization (formation of oryctocenosis) (Efremov, 1950). Bone accumulation in caves possesses a number of specific features. So, tanathocenosis doesn't every time transforms into taphocenosis, and the other way fossilization can occur in accelerate way.

The cave taphocenosis formation, and oryctocenosis soon, took place during all geological epochs since caves and teriofauna existed. However, the modern diversity of cave taphocenosis is noticeably limited by especially active denudation, which accompanied the geological development of karst areas and destroy cave-bearing strata. That is why cave sites older than Neogenic (Late Miocene) are not revealed in Ukraine, and only Late Quaternary sites are comparatively numerous.

In 1960<sup>th</sup> Georgii Bachinskyi developed detail classification of Quaternary and Neogenic sites of the Vertebrate theriofauna in Ukraine (Bachinskyi, 1967, 1970), where cave sites were picked out into separate cave taphonomic type, inside which taphonomic phases were subdivided. Later this subdivision was added (Dublianskyi and Lomaev, 1980). Finally the next taphonomic phases were defined within this type: pits and shafts; ponor-caves and ponor-shafts; unroofed caves; of spring-caves; rockshelters.

Most often the remains of troglolytic Vertebrate species accumulate in caves. But also quit often it could be remains of animals accidentally got into a cave – fell down into vertical trap-cave or were brought as pray by predators and/or by the human.

The modern animals according to their adaptation to cave environment are subdivided into *troglobionts*, *troglophiles* and *trogloxens*. That is why will be logically to subdivide also representatives of fossil faunas into *paleotroglobionts*, *paleotroglophiles* and *paleotrogloxens*. Absolute troglobionts among both fossil and recent Vertebrates are not found up to now in Ukraine.

The most of the species which accidentally got into caves, mostly into trap-caves, is possible to qualify as paleotrogloxens. But at description of Vertebral paleotroglofaunas we are limited to the representatives of knowingly troglolytic genera and families, which troglolyticity is con-

fidently fixed as in the past as at recent species. Among the Quaternary troglomorphic species a triad of so-called cave predators - cave bear, hyena and lion is most popular. But even among them the palm of championship belongs usually to the cave bear and other *Ursidae* as a whole.

## CONCLUSIONS

The majority of Pleistocene cave sites in Ukraine are situated in the main karst-speleological areas of Ukraine: Crimea, North of Black Sea (Odessa region), Podillja-Bukovyna and Carpathians. They differ for karst-geological, as well as for palaeoclimatic and palaeolandscapes conditions.

The oldest representatives of the *Ursidae* family in the caves of Ukraine are certainly Pliocene *Ursus arverensis* and *Hyaenarctos* Roscht. [*Ursus ex.gr. ruscinensis* - *minimus* and *Agrioterium* sp. - after M. Sotnikova's revision (Sotnikova, 1989)] from the Odessa catacombs, as well as small Pliocene bear (*Ursus cf. wenzensis* Stach.) from Horyshnja Vynanka.

Systematic position of *Ursus spelaeus crimaeus*, defined by G. Bachynskyi (1962) and supported by G. Baryshnikov (1987) as subspecies, needs more accurate definition by modern methods, including the DNA analysis. Its age is also to be revised, as its previous dating as Mindel was based on the not quite perfect collagen method. G. Baryshnikov also considers, that such dating is debatable, as for the Mindel of Western Europe more typical is not *Ursus spelaeus*, but its ancestor form of *Ursus deningeri* von Reichenau (Baryshnikov, 1987). The same doubting can be expressed concerning systematic position of small variety of Early Pleistocene cave bear from Synjakove-1, defined as *Spelaearctos spelaeus cf. rossicus* Bor. (Tatarinov, 2000; David et al., 1990), which does not deny its troglomorphy. Small form of cave bear recently found in the Ozerna Cave should be also studied additionally.

Remains of large cave bear (*Ursus spelaeus*) are more numerous in Ukraine (although far not such numerous, as in the caves of Central and Western Europe). Its bones and/or teeth were found in the caves of Crimea: Emine-Bair-Khosar and Binbash-Koba on the Mount Chatyrdag, Mamat-Koba and Adzhi-Koba on the Mount Karabi, in the grottoes Chokurcha, Kanly-Dere, Prolom-1 and Prolom-2 in the Inner Ridge; in caves near Odessa: Nerubaiskoe, Illinka, Usatovo; in the cavities of the Podillja-Bukovyna area: karst caves Crystal (Krychanska), Pustelna, Bukovynka, Pryima-1, Divochi Skeli, and in suffosion niches near Stradch; in karst caves of Carpathians: Bilykh Stin, Perlyna, Prozorykh Stin, Vedmezhe Iklo, Grebin', and Molochnyi Kamin'.

Next to the cave bear the caves of Ukraine long time inhabited brown bear (*Ursus arctos*). Its Pleistocene remains were found in Bear Shaft, MAN, Lesnika, Kii-Koba in Crimea; Pustelna, Pryima, Divochi Skeli in the Dnister Basin; Perlyna, Prozorykh Stin in the Carpathians.

One of the main problems of Pleistocene fauna cave sites investigations in Ukraine is lack of radioisotope dating. The other problem is that the most of collections of past years excavations were lost or were not preserved.

Because karst territories of Ukraine are situated on a half-way from Caucasus and Urals to Western Europe and Balkans, phylogenetic research of bone material from local caves can give answers for some questions about ways of migration and evolution of Pleistocene fossil bears and other large Carnivores systematic groups.

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## REFERENCES

- ALEKSEEV, O. K. 1945. Epimachairodus from Odessa Pliocene. *Dopovidi Akademii Nauk Ukrainskoi RSR. Viddil Fyzyko-Himichnykh ta Matematychnykh Nauk*, 3-4, 35-39. (*in Russian*)
- ALEKSEVA, L. I. 1977. Teriofauna of the Early Quaternary of the Eastern Europe. *Trudy Geologicheskogo Instituta AN SSSR, Moscow*, 300, 1-213. (*in Russian*)
- ARGIROPULO, A. I. - PIDOPlichKO, I. G. 1939a. Find of specimen of *Murinae* in Tertiary deposits of the USSR. *Doklady Akademii nauk SSSR*, 23, 2, 209-212. (*in Russian*)
- ARGIROPULO, A. I. - PIDOPlichKO, I. G. 1939b. Specimens of (*Duplicidentata, Mammalia*) in the Pliocene of the USSR. *Doklady Akademii nauk SSSR*, 24, 7, 723-728. (*in Russian*)
- BACHINSKYI, G. O. 1962. Fossil Homicene Bear from Red Cave in Crimea. *Dopovidi Akademii Nauk Ukrainskoi RSR*, 6, 796-797. (*in Ukrainian*)
- BACHINSKYI, G. O. 1965a. Taphonomical Peculiarities of Synjakivske and Tarkhankutske Cave Sites of Fossil Ground Vertebrates. *Dopovidi Akademii Nauk UkrRSR*, 5, 658-661. (*in Ukrainian*)
- Bachinskyi, G. O. 1965b. Taphonomical Peculiarities of Odessa Cave Site of Middle Pliocene Vertebrates. *Dopovidi Akademii Nauk UkrRSR*, 6, 774-776. (*in Ukrainian*)
- BACHINSKYI, G. O. - CHERNYSH, I. V., 1965. New Cave Site of Fossil Vertebrates in Ukrainian Carpathians. *Dopovidi Akademii Nauk UkrRSR, Kyiv*, 12, 1631-1633. (*in Ukrainian*)
- BACHINSKYI, G. O. 1967. Taphonomy of Quaternary and Neogenic Sites of Ground Vertebrates of Ukraine. *Naukova Dumka, Kyiv*, 1-132. (*in Ukrainian*)
- BACHINSKYI, G. O. 1970. Taphonomic Characteristic of Fossil Vertebrates Sites in Karst Caves of Ukraine. *Fyzychna Geografia i Geomorfologia, Kyiv*, 4, 153-159. (*in Ukrainian*)
- BACHINSKYI, G. O. - DUBLYANSKII, V. N. 1963. New Data about Fossil Vertebrates Sites in Karst Cavities of Mountain Crimea. In *Trudy Kompleksnoi Karstovoi Ekspeditsii AN Ukrainskoi SSR, Kiev*, 1, 93-105. (*in Russian*)
- BACHINSKYI, G. O. - DUBLYANSKII, V. N. - LYSENKO, N. I. 1967. History of Red Cave Formation in the light of Paleozoological Data. *Vestnik Zoologii, Kyiv*, 4, 53-57. (*in Russian*)
- BACHINSKYI, G. O. - DUBLYANSKII, V. N. 1968. About the Time and Palaeogeographical Environment of Formation of Deep Karst Cavities of the Crimea. *Prirodnyaya Obstanovka i Fauna Proshlogo. Naukova Dumka, Kiev*, 4, 79-101. (*in Russian*)
- BARYSHNIKOV, G. F. 1987. Cave Bear in Palaeolithic of Crimea. *Proceedings of the Zoological Institute of the USSR Academy of Science, Leningrad*, 168, 38-65. (*in Russian*)
- BARYSHNIKOV, G. F. 1995. Cave Hyena, *Crocota spelaea* (Carnivora, Hyaenidae) from Palaeolithic Fauna of Crimea. *Issledovania po Pleistotsenovym i Sovremennym Mlekopitajushchim, Trudy Zoologicheskogo Instituta RAN, Sankt-Peterburg*, 263, 3-45. (*in Russian*)
- BURCHAK-ABRAMOVICH, N. I. 1953. Fossil Ostriches of Caucasus and South of Ukraine. *Trudy Estetsvenno-istoricheskogo Muzeja imeni G. Zardabi, Baku*, VII, 1-206. (*in Russian*)
- CHELEBI, E. 1961. *The Book of Travell. Iss. 1. Lands of Ukraine and Moldova* [Translated from Turkish]. *Izdatelstvo Vostochnoi Literatury, Moscow*, 1-338. (*in Russian*)
- CHERNYSH, I. V. 1966. At Stalactite Caves of Transcarpathians. In *Karpatskie Zapovedniki, Karpaty, Uzhgorod*, 36-45. (*in Russian*)
- DAVID, A. I. - TATARINOV, K. A. - SVISTUN V. I. 1990. Carnivora, Proboscidean and Ungulate of Early Pleistocene of South-West of the USSR. *Shtiintsia, Kishinev*, 1-132. (*in Russian*)
- DOBROVOLSKYI, O. V. 1950. The Cave near Illinka Village of Odessa Oblast. *Arheologia, Kyiv*, 4, 152-155. (*in Ukrainian*)
- DUBLJANSKYI, V. N. - LOMAEV, A. A. 1980. Karst Caves of Ukraine. *Naukova Dumka, Kyiv*, 1-180. (*in Russian*)
- EFREMOV, I. A. 1950. Taphonomy and Geological Chronicle, 1. *Trudy Paleontologicheskogo Instituta AN SSSR, Moscow*, 24, 1-177. (*in Russian*)

- GABUNIA, L. K. – KRAKHMALNAJA T. V. 1993. About Hipparion from Odessa Catecombs. *Izvestia Akademii Nauk Gruzii*, 3, 12–94. (*in Russian*)
- GAPONOV, E. A. 1954. The Tracks of Karst Fenomena in Pontic Limestone of the South of the Ukrainian SSR. *Trudy Odesskogo Gosudarstvennogo Universiteta, Sbornik Geologo-Geograficheskogo*, Odessa, 2, 7–19. (*in Russian*)
- GLADILIN, V. N. – PASHKEVYCH, G. A., 1977. Paleogeography of the Middle and Late Wurm of Transcarpathians after the Data of Investigations in Molochnyi Kamen' Cave. In *Paleoekologia Drevnego Cheloveka, nauka, Moscow*, 106–112. (*in Russian*)
- GORETSKIY, V. A. 1942. The Beaver from Karst Caves of Odessa Catacombs. *Priroda, Moscow*, 2. (*in Russian*)
- GORETSKIY, V. A. 1957. About Find of Pleistocene Vertebrates near Stradch Village of Lvov Oblast. *Bulleten Komissii po Izucheniyu Chetvertichnogo Perioda AN SSSR, Moscow*, 21, 45–49. (*in Russian*)
- GRITSAI, T. G. 1938. Paleontological Excavations in Karst Caves of Odessa Catacombs. *Visti Akademii Nauk Ukrainkoi RSR, Kyiv*, 4, 48–52. (*in Ukrainian*)
- GRITSAI, T. G. 1939. Works of Odessa Paleontological Expedition of Academy of Science of Ukrainian SSR. *Priroda, Moscow*, 3, 90–91. (*in Russian*)
- GRITSAI, T. G. 1958. Fossil Mammalian in Karst Caves of Odessa. *Priroda, Moscow*, 6, 106. (*in Russian*)
- GROMOV, I. M. 1955. About Peculiarities of Bone Remains Accumulation on Cave Sites. *Bulleten Komissii po Izucheniyu Chetvertichnogo Perioda AN SSSR, Moscow*, 20, 88–92. (*in Russian*)
- GROMOV, V. I. 1948. Paleontological and Archaeological Basis of Stratigraphy of Continental Deposits of Quaternary on the Territory of the USSR. *Trudy Instituta Geologicheskikh Nauk (Geologicheskaya Seriya), Moscow*, 64, 17, 1–520. (*in Russian*)
- HAVESON, JA. I. 1950. Camels of Genus *Paracamelus*. *Doklady Akademii Nauk SSSR, Moscow*, 70, 50, 2, 917–920. (*in Russian*)
- HAVESON, JA. I. 1954. Tertiary Camels of the Eastern Hemisphere (Genus *Paracamelus*). *Trudy Paleontologicheskogo Instituta AN SSSR, Moscow*, 47, 2, 100–162. (*in Russian*)
- KLIMCHOUK, A. B. – FORD, D. C. – PALMER, A. N. – DREYBRODT, W. (Eds.) 2000. *Speleogenesis. Evolution of Karst Aquifers*. National Speleological Society, Huntsville, USA, 1–527.
- KLIMCHOUK, A. B. – FORD, D. C. (Eds.) 2009. *Hypogene Speleogenesis and Karst Hydrogeology of Artesian Basins*. Ukrainian Institute of Speleology and Karstology, Special Paper 1, Simferopol, 1–280.
- KLIMCHOUK, A. B. – AMELICHEV, G. N. – ANDRASH, V. – GREBNEV, A. N. – ZIMELS, J. L. – KUPRICH, P. – PRONIN, K. K. – RIDUSH, B. T. 2008. Inventory of caves in Ukraine: methodical materials and list. – *Simferopol*, 1–75. (*in Russian*)
- KRAKHMALNAYA, T. 1996. Hipparions of the Northern Black Sea Coast Area (Ukraine and Moldova): Species Composition and Stratigraphic Distribution. *Acta zool. cracov., Krakow*, 39, 1, 261–267.
- KROCHKO, JU. I. – KORCHYNSKIY, O. I. – VARGOVYCH, R. S. 1993. Quaternary Bone Sites of Vertebrates in Karst Caves of Transcarpathians. In *Fauna Skhidnykh Karpat, Uzhgorod*, 84–85. (*in Ukrainian*)
- KURTEN, B. 1969. A Radiocarbon Date for the Cave Bear Remains (*Ursus spelaeus*) from Odessa. *Commentationes Biologicae (Societas Scientiarum Fennica), Helsinki*, 31, 6, 1–3.
- LOMNICKI, M. 1881. *Zapiski do dyluwialnej fauny ssakow w Galicyi Wschodniej*. Kosmos, Krakow, 13, 6, 1–3.
- MARYSOVA, I. V. 1962. Pleistocene Birds of Kryvchanska Cave. *Naukovi Zapysky Kremenetskogo Pedagogichnogo Instytutu, Kremenets*, 7, 63–75. (*in Ukrainian*)
- MATZKEVYI, L. 1993. Investigations in the Cave Complex Pryima. *Studia Archaeologica, Lviv*, 1, 50–58. (*in Ukrainian*)
- MATZKEVYI, L. 1998. The Questions of the Most Ancient Settlement of. In *Mykolaivshchyna, Instytut Ukrainoznavstva, Lviv*, 1, 8–38. (*in Ukrainian*)
- NAGEL, D. – PRONIN, K. – RABEDER, G. – HOFREITER, M. – HUIJER, W. – KAVCIK, N. – URBANEK, CH., WITHALM, G. – ORLOV, N. 2005. Nerubajskoe, a New Cave Bear Site in the Old Nordmann Territory. *Mitteilungen der Kommission für Quartärforschung Österreichischen Akademie der Wissenschaften, Wien*, 14, 123–134.

- NORDMANN, A. VON. 1858. Palaeontologie Sued Russland. Pt. I-IV, Helsingfors, 2, 1-248.
- ODINTSOV, I. A. 1954. Fauna of Karst Caves in Odessa and Conditions of its Bedding. Trudy Odesskogo Gosuniversiteta imeni Mechnikova. Sbornik Studencheskykh Rabot, Odessa, 3, 217-223. (*in Russian*)
- ODINTSOV, I. A. 1962. Odessa Site of Pliocene Fauna in Karst Caves. Trudy Odesskogo Gosuniversiteta imeni Mechnikova. Geologo-geograficheskie Nauki, 98, 152, 8, 100-110. (*in Russian*)
- ODINTSOV, I. A. 1966. Geological Peculiarities of Bedding and Paleogeographical Significance of Pliocene Canids from Odessa Karst Caves. Abstract of Thesis of Candidate of Geological-Mineralogical Science, Odessa, 1-20. (*in Russian*)
- OSTROVSKYI, M. I. - GRIGORJEV, G. P. 1966. Lipskaya Palaeolithic Culture. Sovetskaya Arheologia, Moscow, 4, 3-13. (*in Russian*)
- PIDOPLICHKO, I. G. 1949. Excavations of Palaeolithic Site Illinka-1 in 1946. Arheologichni Pamjatky Ukrainskoi RSRS, Kyiv, 2, 323-325.
- PIDOPLICHKO, I. G. 1954a. About Glacial Period. Iss. 3. The History of Quaternary Fauna of European Part of the USSR, Izdatelstvo AN UkrSSR, Kyiv, 1-220. (*in Russian*)
- PIDOPLICHKO, I. G. 1954b. Paleontological Excavations in Odessa Catacombs. Priroda, Moscow, 9, 110-111. (*in Russian*)
- PIDOPLICHKO, I. G. 1955. New Data about Vertebrate Fauna of Quaternary Deposits of Ternopil Oblast. Doklady Akademii Nauk SSSR, 100, 5, 989-991. (*in Russian*)
- PIDOPLICHKO, I. G. 1956a. Materials for Investigation of Past Faunas of UkrSSR, Vydavnytsvo AN UkrSSR, 2, 1-236. (*in Ukrainian*)
- PIDOPLICHKO, I. G. 1956b. To the Study of Quaternary Vertebrates of Ternopil Oblast. Naukovi Zapysky Pryrodnoznavchogo Muzeju Lvivskogo Filialu AN UkrSSR, Lviv, V, 45-52. (*in Ukrainian*)
- PRONIN, K. K. 1999. The Illinka Cave. Svet: International Speleological Magazin of CIS, Kyiv, 1, 20, 30-32. (*in Russian*)
- RABEDER, G. - HOFREITER, M. - NAGEL, D. - PÄÄBO, S. - WITHALM, G. 2003. New Taxa of Alpine Cave Bears (Ursidae, Carnivora). In 9<sup>th</sup> International Cave Bear Symposium, 25<sup>th</sup>-27<sup>th</sup> September 2003. Abstracts of lectures and posters, Institut Dolomieu, Grenoble, 96.
- RIDUSH, B. 1998. Taphonomical Sites in the Bukovynka Cave. Svet: International Speleological Magazine of CIS, Kyiv, 1, 18, 30-31. (*in Russian*)
- RIDUSH, B. 1999. Traces of Palaeolithic Culture in the Bukovynka Cave (the Preliminary Report). Pytannja Starodavnjoi ta Serednjovichnoi Istorii, Arheologii i Etnologii, Chernivtsi, 3, 118-132. (*in Ukrainian*)
- RIDUSH, B. 2000. To the Question about Age of Drawings in Balamutivska Cave. Pytannja Starodavnjoi ta Serednjovichnoi Istorii, Arheologii i Etnologii, Chernivtsi, 2, 76-80. (*in Ukrainian*)
- RIDUSH, B. 2004a. Vertebrates in Structure of Fossil Troglodfaunas. In Zagorodnjuk I. (Ed.): Cave Fauna of Ukraine, Kyiv, 102-116. (*in Ukrainian*)
- RIDUSH, B. 2004b. Quaternary Deposits of Bukovynka Cave and their Paleogeographic Significance. Naukovi Visnyk Chernivetskogo Universitetu. Vyp. 199: Geografia, Chernivtsi, 105-115. (*in Ukrainian*)
- RIDUSH, B. 2004c. Paleokarstological Reconstructions and Rock Art of the Middle Dnister Area (on Example of Balamutivska Cave). In Materialy V Kongresu Mizhnarodnoi Asotsiatsii Ukrainistiv: Sotsialno-Humanitri Nauky, Chernivtsi, 369-372. (*in Ukrainian*)
- RIDUSH, B. 2008. Karst morphogenesis of the Strimchak karst area (Ukrainian Carpathians). In Kravchuk J. (Ed.): Problemy Geomorfologii i Paleogeografii Ukrainskykh Karpat i Pryleglykh Terytorii, Materialy of 3<sup>rd</sup> International Seminar (Vorohta, September 11-14, 2008), Lviv, 59-67. (*in Ukrainian*)
- RIDUSH, B. T. - PROSKURNJAK, Y. M. 2008. New results of palaeontological research from megatrap Emine-Bair-Khosar. Krymskie karstovye chtenia: Sostojanie I problemy karstologo-speleologicheskikh issledovani: Abstracts of International Conference (April 11-13, 2008), Simferopol, 63-64. (*in Ukrainian*)

- RIDUSH, B. T. – PRONIN, K. K. 2009. Paleontological Expedition in Caves of Odessa. *Speleologia i Karstologia*, Simferopol, 2. (in print) (*in Ukrainian*)
- RIDUSH, B. – VREMIR, M. 2003. Bone Remains Accumulation in Karst Cavities of Mountain Crimea. *Naukovyi Visnyk Chernivetskogo Universitetu*. Vyp. 167: Geografia, Chernivtsi, 16–28. (*in Ukrainian*)
- RIDUSH, B. – VREMIR, R. 2008. Results and Prospects of Palaeontological Study of Caves of Crimea. *Speleologia i Karstologia*, Simferopol, 1, 85–93. (*in Ukrainian*)
- ROSHCHIN, A. D. 1939. New Sites of Cave Bear Bones with Palaeolithic Remains. *Visti Akademii Nauk Ukrainiskoi RSR*, Kyiv, 9–10, 68–71. (*in Ukrainian*)
- ROSHCHIN, A. D. 1941. Fossil Mammals from Illinka Village. *Naukova Sessia Odesskogo Pedinstytutu*. *Tezy Dopovidei*, Odesa, 79–80. (*in Ukrainian*)
- ROSHCHIN, A. D. 1949. New Fossil Genus of Mustelidae from Pliocene of Odessa. *Trudy Odesskogo Gosuniversiteta*, 7, 60, 97–110. (*in Russian*)
- ROSHCHIN, A. D. 1956. Upper Pliocene Fauna of South of Ukraine. *Pratsi Odesskogo Derzhavnogo Pedagogichnogo Instytutu Imeni Ushynskogo*, Odesa, 14, 33–83. (*in Russian*)
- SAPOZHNYKOV, I. V. – SAPOZHNYKOVA, G. V. 1989. New about Illinka Cave. In *Chetvertichniy Period, Paleontologia i Arheologia*, Shtiintsa, Kishinev, 179–187. (*in Russian*)
- SAPOZHNYKOV, I. V. 2003. From a History of Researches of Stone Age of Ukraine: The Palaeolithic Karst Caves to North of the Black Sea. *Kamiana Doba Ukrainy*, Kyiv – Poltava, 4, 43–52. (*in Russian*)
- SOTNIKOVA, M. V. 1989. Late Pliocene – Early Pleistocene Carnivora. Stratigraphic Significance. *Transactions of Geological Institute of Academy of Science of the USSR*, Moscow, 440, 1–124. (*in Russian*)
- STEPANCHUK, V. N. 2006. Lower and Middle Palaeolithic of Ukraine, Zelena Bukovyna, Chernovtsy, 1–463. (*in Russian*)
- TATARINOV, K. A. 1958. Cave Hyenas from Quaternary Deposits of Opillya. *Dopovidi Akademii Nauk Ukrainiskoi RSR*, Kyiv, 7, 797–800. (*in Ukrainian*)
- TATARINOV, K. A. 1962a. Caves of Podolia, their Fauna and Protection. *Ohrana Prirody i Zapovednoe Delo v SSSR*, *Bulleten*, Moscow, 7, 88–101. (*in Russian*)
- TATARINOV, K. A. 1962b. Pleistocene and Holocene Mammals of Kremenets Mountain. *Naukovi Zapysky Kremenetskogo Pedagogichnogo Instytutu*, 7, 34–51. (*in Ukrainian*)
- TATARINOV, K. A. 1965a. Pleistocene Mammals from Nyzhnjokryvchanska Cave (Podolia). *Paleontologicheskii Sbornik Lvovskogo Gosudarstvennogo Universiteta*, Lviv, 1, 2, 30–37. (*in Russian*)
- TATARINOV, K. A. 1965b. Some Cave Sites of Fossil Vertebrates in Western Areas of Ukraine. *Bulleten Moscovskogo obshchestva ispytatelei prirody, Otdel Geologicheskii*, Moscow, 60, 6, 158–159. (*in Russian*)
- TATARINOV, K. A. 1966. Cave Fauna of the Middle Dnister Basin. In *Voprosy Izuchenia Karsta Ruskoj Ravniny*, Moscow, 110–114. (*in Russian*)
- TATARINOV, K. A. 2000. Late Cainozoic Vertebrates of the West of Ukraine. *Nadstyrja*, Lutsk, 1–254. (*in Russian*)
- TATARINOV, K. A. – BACHYNSKYI, G. O. 1968. Cave Sites of Pliocene and Quaternary Vertebrates in the Western Regions of Ukraine. *Bulleten Moskovskogo Obshchestva Ispytatelei Prirody. Otdel Biologicheskij*, Moscow, 73, 5, 114–121. (*in Russian*)
- TATARINOV, K. A. – MARISOVA I. V. 1971. Fossil Quaternary Birds of Western Regions of Ukraine. *Vestnik Zoologii*, Kyiv, 6, 67–75. (*in Russian*)
- TRETJAKOV, D. K. 1941. Tertiary Fauna of Odessa Catacombs. *Sovetskaya Nauka*, Moscow, 1, 104. (*in Russian*)
- TUGARINO, V. A. JA. 1940. New Find of Pliocene Ornithofauna from Odessa. *Doklady Akademii Nauk SSSR*, Moscow, 26, 2, 311–313. (*in Russian*)
- VERESHCHAGIN, N. K. – BARYSHNIKOV, G. F. 1980. Mammals of Foothill Northern Crimea in Epoch of Palaeolithic (after Kitchen Remains from Caves Chokurcha, Staroselje and Mamat-Koba). *Mlekovpitayushchie Vostochnoi Evropy v Antropogene*, *Trudy Zoologicheskogo Instituta AN SSSR*, Leningrad, 93, 26–49. (*in Russian*)



- VISLOBOKOVA, I. – SOTNIKOVA, M. – DODONOV, A. 2001. Late Miocene – Pliocene mammalian faunas of Russia and neighbouring countries. *Bollettino della Società Paleontologica Italiana*, 40, 2, 307–313. (in Russian)
- VOINSTVESKYI, M. A. 1963. Fossil Ornithofauna of the Crimea. *Trudy Kompleksnoi Karstovoi Ekspeditsii AN Ukrainskoi SSR*, Kiev, 1, 106–122. (in Russian)
- VREMIR, M. – RIDUSH, B. – CODREA, V. 2000. The Late Pleistocene Vertebrate Taphocenosis of Bukovinka Cave (Western Ukraine): Preliminary Results. In *Karst Studies and Problems: 2000 and Beyond: Proceedings of the joint meeting of Friends of Karst, Theoretical and Applied Karstology and International Geological Correlation Programm*, Cluj-Napoca, 158–161.
- VREMIR, M. – RIDUSH, B. 2002. Recent Paleontological Investigations in some Caves of the Crimean Mountain-range (SE Ukraine). *Theoretical and Applied Karstology*, Bucarest, 15, 125–132.
- VREMIR, M. – RIDUSH, B. 2005. The Emine-Bair-Khosar “Mega-Trap” (Ukraine). *Mitteilungen der Kommission für Quartärforschung Österreichischen Akademie der Wissenschaften*, Wien, 14, 235–239.
- YATSKO, I. Y. 1940. Excavations. Finds. Communications. Paleontological Review. *Prilozhenie k “Trudam Paleontologicheskogo Instituta AN SSSR”*, Moscow, 2, 76–77. (in Russian)
- YATSKO, I. Y. 1947. About finds of hyenas in karst caves in Ponthic limestone in Odessa. In *Odesskii Universitet. Tezisy Dokladov Nauchnoi Sessii*, Odessa, 126–127. (in Russian)
- YATSKO, I. Y. 1956. About finds of hyenas in ancient karst caves of Odessa. *Ezhegodnik Vsesoyuznogo Paleontologicheskogo Obschestva*, 15, 335–340. (in Russian)
- YATSKO, I. Y. 1962. Traces of Diseases on the Fossil Skeletons of Pliocene Camels from Karst Caves in Vicinities of Odessa. *Trudy Odesskogo Gosudarstvennogo Universiteta imeni Mechnikova*, 152, *Seriya Geogicheskikh i Geograficheskikh Nauk*, 8, 34–45. (in Russian)
- YATSKO, I. Y. 1964. About Finds of Bone Fragments with Traces of Unusual Development in Pliocene Karst Caves in Odessa. *Pratsi Odesskogo Universytetu*, Odessa, 149, 99–109. (in Ukrainian)
- ZAGORODNJUK, I. 2009. Bogdan Voljanskyi. Biography. (in print)
- ZUBAREVA, V. I. 1939. New Form of Bird from Pliocene of Odessa. *Doklady Akademii Nauk SSSR*, Moscow, 23, 6, 606–608. (in Russian)

## «ВЕДМЕЖІ ПЕЧЕРИ» В УКРАЇНІ

### Резюме

Більшість печерних пліоцен-плейстоценових місцезнаходжень хребетних в Україні знаходяться в чотирьох основних карстово-спелеологічних регіонах України: Гірський Крим, Північне Причорномор'я (Одещина), Подільсько-Буковинський регіон та Карпати. Вони відрізняються за карстово-геологічними, а також за палеокліматичними та палеоландшафтними умовами. Найдавніші представники родини *Ursidae* в печерах України – це пліоценові *Ursus arverensis* та *Hyaenarctos* з одеських катакомб, та малий пліоценовий ведмідь *Ursus cf. wenzensis* Stach. з Горішньої Вигнанки. Потребує подальшого уточнення сучасними методами, в т.ч. через аналіз ДНК, систематичне положення *Ursus spelaeus crimaeus*, виділеного Г.Бачинським в окремий підвид, так само як і його датування. Також неясним залишається систематичне положення ранньоплейстоценового печерного ведмеда з Синяково-1, визначеного як *Spelae-arctos spelaeus cf. rossicus* Вор. Мала форма печерного ведмеда, виявлена нещодавно в печері Озерній, також буде додатково досліджуватись.

Рештки великого печерного ведмеда (*Ursus spelaeus*) в Україні є найбільш численними (хоча й не такими численними, як у печерах Центральної та Західної Європи). Їхні кістки та/або зуби знайдені в печерах Криму: Еміне-Баїр-Хосар та Бінбаш-Коба на плато Чатир-Даг, Мамат-Коба та Аджи-Коба на плато Карабі, у гротах Чокурча, Канли-Дере, Пролом-1 та Пролом-2 у Внутрішньому пасмі; у печерах біля Одеси: у Нерубайському, Іллінці, Усатовому; у по-

rožninaх Подільсько-Буковинського регіону: карстові печери Кришталева (Кривченська), Пустельна (Мала Іловиця), Буковинка, Прийма-1, Дівочі Скелі, та у суфозійних нішах біля с. Страдч; у карстових печерах Карпат: Білих Стін, Перліні, Прозорих Стін, Ведмеже Ікло, Гребінь та Молочний Камінь.

Іншим видом ведмедів, що тривалий час замешкували печери України, є бурий ведмідь (*Ursus arctos*). Його плейстоценові рештки знайдені у шахті Ведмежій, печерах МАН, Лісника, Кіік-Коба в Криму; Пустельна, Прийма, Дівочі Скелі в Подністров'ї; печери Перлина та Прозорих Стін в Карпатах.

Однією з найголовніших проблем дослідження печерних місцезнаходжень плейстоценової фауни в Україні є брак радіоізотопних датувань. Іншою проблемою є те, що більшість колекцій з досліджень минулих років були або втрачені, або зберігаються незадовільно.

Через те що карстові території України знаходяться на півдорозі від Кавказу та Уралу до Західної Європи та Балкан, подальші філогенетичні дослідження викопних кісткових матеріалів з місцевих печер допоможуть пролити світло на ряд питань щодо шляхів міграції та еволюції викопних плейстоценових ведмедів та систематичних груп великих хижаків.

## „MEDVEDIE JASKYNE” NA UKRAJINE

### Zhrnutie

Väčšina pliocénno-pleistocénnych lokalít s nálezmi fosilnych zvyškov stavovcov na Ukrajině sa nachádza v hlavných krasových, a teda aj speleologicky významných územiach Ukrajiny – na polostrove Krym, v okolí Odesy na severe Čierneho mora, v regióne Podillja-Bukovyna a v Karpatoch. Jednotlivé územia sa vzájomne odlišujú tak krasovou geológiou, ako aj paleoklimatickými a paleogeografickými podmienkami. Najstaršími reprezentantmi ursidov (*Ursidae*) v jaskyniach na Ukrajině sú rozhodne *Ursus arverensis* a *Hyaenarctos*, nájdené v odeských katakombách, spolu s malým pliocénnym medveďom (*Ursus cf. wenzensis* Stach.) z lokality Horyshnja Vygnanka v regióne Podillja. Pozícia poddruhu *Ursus spelaeus crimaes*, definovaného G. Bachynským, v paleontologickom systéme by potrebovala podrobnejšie definovanie na základe moderných metód zahrnujúcich analýzu DNA a stanovenie veku na základe rádiometrickej analýzy. Podobné pochybnosti sa týkajú systémovej pozície malej formy spodnopleistocénneho medveďa jaskynného z lokality Synjakove-1 na Podillji, definovaného ako *Spelaearctos spelaeus cf. rossicus* Bor. Malá forma medveďa jaskynného z jaskyne Ozerna v regióne Podillja – Bukovyna je v štádiu výskumu.

Nálezy pozostatkov veľkých medveďov jaskynných (*Ursus spelaeus*) sú na Ukrajině pomerne časté, i keď nie také početné ako nálezy zo strednej či západnej Európy. Ich kosti a/alebo zuby sa našli na Kryme: v jaskyniach Emine-Bair-Chasar a Binbaš-Koba na planine Čtyr-Dag, Mamat-Koba a Adzhi-Koba v pohorí Karabi, v jaskyniach Chokurcha, Kanly-Dere, Prolom-1 and Prolom-2 Vnútorného Krymského chrbta; v jaskyniach v blízkosti Odesy: Nerubaiskoe, Illinka, Usatovo; v kavernách oblasti Podillja-Bukovyna: krasových jaskyniach Kryvchanska, Pustelna, Bukovynka, Pryma-1, Divochi Skeli a v sufózných výklenkoch (nikách) blízko dediny Stradch; v krasových jaskyniach Karpát: Bilykh Stin, Perlyna, Prozorykh Stin, Vedmezhe Iklo, Grebin' a Molochnyi Kamin'.

Popri medveďovi jaskynnóm obýval po dlhú dobu jaskyne Ukrajiny aj medveď hnedý (*Ursus arctos*). Jeho pleistocénne pozostatky sa našli na lokalitách Medvedia priapasť, МАН, Lesnika, Kiik-Koba na Kryme; Pustelna, Pryma, Divochi Skeli v Dnesterskej panve a Perlyna, Prozorykh Stin v Karpatoch.

Jeden z hlavných problémov výskumu lokalít nálezov pleistocénnej jaskynnej fauny na Ukrajině je nedostatok materiálu analyzovaného metódami rádiometrickeho datovania. Ďalší problém spočíva v tom, že veľká časť zbierok z vykopávok realizovaných v minulosti sa stratila alebo nebola dostatočne uchránená.

Pretože krasové územia Ukrajiny sa nachádzajú na polceste medzi Kaukazom a Uralom na Balkán a do západnej Európy, fylogenetický výskum kostového materiálu z miestnych jaskýň môže priniesť významné odpovede na niektoré dôležité otázky týkajúce sa evolúcie, vln migrácie a rozšírenia pliocénno-pleistocénnych fosilných medveďov i iných skupín veľkých mäsožravcov v čase a priestore.