

The First Finding of Asian Black Bear (Carnivora, Ursidae, *Ursus (Euarctos) thibetanus* G. Cuvier, 1823) in the Late Pleistocene of Northern Eurasia

P. A. Kosintsev^{a*}, M. P. Tiunov^b, D. O. Gimranov^a, and V. S. Panov^c

Presented by Academician P. Ya. Baklanov April 22, 2016

Received May 30, 2016

Abstract—An M1 tooth of Asian black bear (*Ursus (Euarctos) thibetanus* G. Cuvier, 1823) was found in deposits of the Tetyukhinskaya cave (Middle Sikhote-Alin, 44°35'N, 135°36'E). This finding is the first reliable evidence of Asian black bear's presence in Pleistocene of Primorye. Its morphological and morphometric descriptions are given. The period of inhabitation of *U. (E.) thibetanus* determined based on the radiocarbon date obtained during the study of the tooth, is 39 874 ± 133 BP (NSK-850, UGAMS-21786), which corresponds to the middle of Marine Isotope Stage 3 (MIS 3) of Late Pleistocene. The composition of ancient theriofauna indicates the existence of wide variety of landscapes in Primorye in the middle of Late Pleistocene. A refugium of forest fauna, in which species of taiga, nemoral, and Central Asian mountain–forest theriocomplexes were present, was located in southern Primorye in Late Pleistocene.

DOI: 10.1134/S0012496616060041

Throughout the most part of Late Pleistocene, the forest zone was absent in northern Eurasia. Faunal complexes of mammals with predominant euritic species and species of open and semi-open landscapes were wide-spread in this region. At the beginning of Holocene, the forest zone and the corresponding faunal complexes rapidly formed over almost the entire area [1]. Therefore, determination of refugia of forest vegetation and forest faunal complexes in northern Eurasia in Late Pleistocene becomes an important goal. Species with obligatory association with woody vegetation, dendrophilous species, are indicators of such refugia. Among mammals, the Asian black bear (*Ursus (Euarctos) thibetanus* G. Cuvier, 1823) is one of these species.

The Asian black bear inhabits tropical and subtropical forests of southern and eastern Asia, Iran, and Himalayas, and broad-leaved and cedar broad-leaved forests of the Korean Peninsula and Russian Primorye. Two subspecies are distinguished within this spe-

cies in the island portion of the distribution range and five subspecies in the mainland portion, among which the largest one is the northern subspecies *U. t. ussuriicus* Heude, 1901, which inhabits Outer Manchuria, Primorye, the Korean Peninsula, and northeastern China [2]. The Asian black bear feeds primarily on vegetation. Animals (invertebrates and small vertebrates) constitute a small portion of its diet. Bears in the northern parts of the distribution range and in mountains spend winters in dens in tree hollows and, in mountain areas, in caves [2].

During the excavation in the Tetyukhinskaya cave located at the eastern slope of Middle Sikhote-Alin (44°35'N, 135°36'E), a complex of mammalian bone remains from Late Pleistocene and Holocene was found. Among them, an isolated right M1 belonging to a bear of the genus *Ursus* was found (figure). A radiocarbon date of 39 874 ± 133 BP (NSK-850, UGAMS-21786) for the tooth was obtained by accelerated mass spectrometry (AMS). This corresponds to the boundary of the stadial Hasselo and interstadial Hengelo or the middle of Marine Isotope Stage 3 (MIS 3) of Late Pleistocene [3].

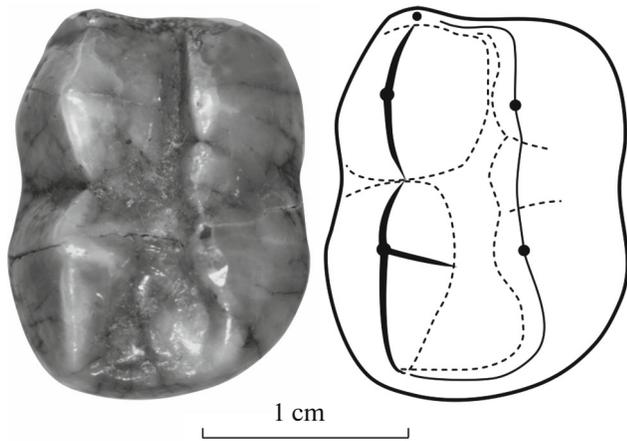
Description. Metacone and mesocone slightly abraded, enamel damaged on the mesial side of the crown (figure). Crown rectangular, anteriointernal angle not pronounced. Front part of the tooth slightly narrower than back part. Length to width ratio of the crown is 75%. Paracone and metacone arranged in line parallel to the tooth longitudinal axis. Main dental

^a Institute of Plant and Animal Ecology, Ural Branch of Russian Academy of Sciences, Yekaterinburg, Russia

^b Institute of Biology and Soil Sciences, Far Eastern Branch of Russian Academy of Sciences, Vladivostok, Russia

^c Geochronology of the Cenozoic Era Center of Collective Use, Siberian Branch of Russian Academy of Sciences, Novosibirsk, Russia

*e-mail: kpa@ipae.uran.ru



The M1 tooth of Asian black bear (*Ursus thibetanus*) from the Tetyukhinskaya cave.

tubercles equally high, significantly higher than tubercles on the lingual tooth side. Metacone slightly narrower but longer than paracone. Paracone with anterior and posterior crests of approximately equal length. Metacone with anterior and posterior crests, the latter being longer. Inner crest present on metacone. Weak parastyle, metastyle absent. Protocone and metaconule rather narrow and nearly equal in length, mesocone clearly defined. Middle vallecule dividing paracone and protocone narrow, noticeably widening between metacone and metaconule. Wrinkled enamel in the widened area. Labial and lingual cingulum not pronounced.

Comparison. The tooth from the Tetyukhinskaya cave significantly differs from the M1 of *U. arctos* L., 1758, for which typical features are well-developed parastyle and metastyle, massive protocone and metaconule, well-developed labial and lingual cingulum [2]. The tooth differs from the M1 of *U. minimus* Dejeu de Chabriol et Bouillet, 1827 in its crown lack-

ing a pronounced anterointernal angle and cingulum and having, instead, a middle vallecule noticeably widening towards the back part of the tooth. Most of the features of the crown of the Tetyukhinskaya cave tooth are similar to those of the M1 of *U. thibetanus*. All this evidence indicates that the tooth belongs to an Asian black bear. The sizes of the tooth are large. Most traits exceed the average sizes of the teeth of Pleistocene Asian black bears of Europe [2, 4, 5], China [6], and the modern large subspecies *U. t. ussuricus* (table).

During Early and Middle Pleistocene, the Asian black bear had a wide distribution range, which encompassed the Caucasus, central and southern Europe [2]. In northern Asia, the Asian black bear remains have been found in a cave in the Middle Urals [7], in one cave in the Sayan Mountains, in one cave in Pribaikalie [8], and in a cave on the Yenisei River [9]. In the first article on fauna from Late Pleistocene deposits in the Geographical Society Cave in Primorye, one Asian black bear bone was mentioned under a question mark [10]. Further revision of bear remains from this cave did not confirm this decision [11]. Late Pleistocene remains of Asian black bear were found in China [2].

A radiocarbon date of over 41 000 BP, AA-83719, was obtained for the bone of *U. cf. thibetanus* from Botovskaya Cave in Pribaikalie [12]. Other findings of Asian black bear were not dated using the radiocarbon method. The latest findings of the Asian black bear in Europe and northern Asia were dated to the Mikulinski Interglacial or the beginning of Late Pleistocene (Eemian Interglacial, MIS 5e) [4, 5]. Thus, after the last interglacial (Mikulinski, Eemian), the distribution range of the Asian black bear significantly reduced, and it disappeared from Europe, the Caucasus, and northern Asia. The finding studied is evidence that this species was preserved in northern Asia (southern Primorye) during Late Pleistocene.

Sizes of the M1 of modern and Pleistocene Asian black bears (*Ursus thibetanus*) from Tetyukhinskaya cave

Features	Datasets*							
	1	2 (n = 28)		3		4 (n = 2)		
		Lim	M	n	Lim	M	Lim	
1**	Greatest length	19.8	17.0–21.0	18.8	7	17.2–20.9	19.3	17.2–18.0
2	Length of crown's anterior part	9.5	8.4–10.4	9.4	5	9.2–9.7	9.5	–
3	Length of crown's posterior part	10.0	8.5–10.8	9.6	5	9.5–11.1	9.9	–
4	Length of paracone	7.8	5.8–8.4	7.3	6	6.8–9.3	7.2	–
5	Length of metacone	9.3	5.7–7.8	6.8	5	5.9–8.7	6.9	–
6	Greatest width	14.6	11.9–15.9	13.8	10	12.3–16.8	15.0	13.2–13.1
7	Minimal width	13.5	11.6–15.3	13.0	5	12.0–14.8	13.9	–

* Datasets: 1, Tetyukhinskaya cave; 2, *U. t. ussuricus*; 3, *U. t. mediterraneus*; 4, *U. t. kokeni*. ** Features 1–6 are cited from G.F. Baryshnikov [2]. M, mean value of measurements; Lim, limit of variability for measurements; n, number of measurements; en-dash, data not available.

The following species inhabited Primorye at the same time as the Asian black bear: the mountain hare (*Lepus timidus*), Manchurian hare (*L. mandshuricus*), gray wolf (*Canis lupus*), dhole (*Cuon alpinus*), raccoon dog (*Nyctereutes procyonoides*), red fox (*Vulpes vulpes*), brown bear (*Ursus arctos*), Asian badger (*Meles leucurus*), sable (*Martes zibellina*), wolverine (*Gulo gulo*), Eurasian otter (*Lutra lutra*), cave hyena (*Crocuta ultima*), Eurasian lynx (*Lynx lynx*), leopard (*Panthera pardus*), tiger (*P. tigris*), Eurasian cave lion (*P. spelaea*), mammoth (*Mammuthus primigenius*), wild boar (*Sus scrofa*), woolly rhinoceros (*Coelodonta antiquitatis*), sika deer (*Cervus nippon*), red deer (*C. elaphus*), Siberian roe deer (*Capreolus pygargus*), Siberian musk deer (*Moschus moschiferus*), elk (*Alces alces*), steppe bison (*Bison priscus*), long-tailed goral (*Nemorhaedus caudatus*), and sheep (*Ovis* sp.) [10, 11, 13, 14]. Species of various landscape and ecological groups comprise this fauna: taiga and mountain taiga (the sable, Eurasian lynx, elk, Siberian musk deer, and long-tailed goral); deciduous and deciduous–coniferous forests (the raccoon dog, tiger, and sika deer); semi-open landscapes (the Manchurian hare, dhole, leopard, Eurasian cave lion, Asian badger, mammoth, woolly rhinoceros, wild boar, red deer, and Siberian roe deer); open landscapes (the cave hyena, steppe bison, and sheep); and azonal species (the mountain hare, gray wolf, red fox, brown bear, wolverine, and Eurasian otter). This theriofaunal composition indicates the existence of great variety of landscapes in the middle of Late Pleistocene. The presence of a large group of species typical of taiga and coniferous–broad-leaved forests in the faunal composition reflects a wide development of the forest landscape within the region. It is evident that a forest fauna refugium was located in southern Primorye in Late Pleistocene; the composition of this fauna included species of taiga, nemoral, and Central Asian mountain–forest therio-complexes. This is consistent with the results of palynological analysis, which has demonstrated coniferous and parvifoliate forests with broad-leaved tree species to be widespread over this part of Primorye during this period [15].

ACKNOWLEDGMENTS

We are grateful to the employees of the Zoological Museum of Moscow University, members of the Laboratory of Theriology of the Zoological Institute of the Russian Academy of Sciences, and N. G. Erokhin (Museum of the Institute of Plant and Animal Ecology,

Ural Branch of Russian Academy of Sciences) for the assistance in the study.

This study was supported by the Russian Foundation for Basic Research, project nos. 15-04-03882 and 16-34-00364 mol_a.

REFERENCES

1. Baryshnikov, G.F. and Markov, A.K., in *Dinamika landshaftnykh komponentov i vnutrennikh morskikh basseinov Severnoi Evrazii za poslednie 130 000 let* (Changes in the Landscape Components and Inner Sea Basins of Northern Eurasia during the Past 130 000 Years), Moscow: Geos, 2002, pp. 123–138.
2. Baryshnikov, G.F., *Semeistvo medvezh'ikh (Carnivora, Ursidae)* (The Family Ursidae (Carnivora)), St. Petersburg: Nauka, 2007.
3. Blockley, S.P.E., Lane, C.S., Hardiman, M., Rasmussen, S.O., Seierstad, I.K., Steffensen, J.P., Svensson, A., Lotter, A.F., Turney, C.S.M., and Bronk, R.C., *Quat. Sci. Rev.*, 2012, vol. 36, pp. 2–10.
4. Baryshnikov, G.F., *Proc. Zool. Inst. Russ. Acad. Sci.*, 2010, vol. 314, no. 1, pp. 67–79.
5. Crégut-Bonnoure, E., *Acta Zool. Crac.*, 1996, vol. 39, pp. 89–101.
6. Pei, W.C., *Pal. Sin.*, 1934, ser. C, vol. 8, pp. 1–45.
7. Baryshnikov, G.F., *Lynx*, 2001, vol. 32, pp. 33–44.
8. Filippov, A.G., Ovodov, N.D., and Kutuzov, A.V., *Eniseiskaya Provintsiya*, 2009, vol. 4, pp. 193–194.
9. Ovodov, N.D., Klement'ev, A.M., and Martynovich, N.V., *Probl. Arkheol. Etnogr. Antropol. Sibiri Sopred. Terr.*, 2015, vol. 21, pp. 138–141.
10. Ovodov, N.D., *Tr. Biol. Inst.*, 1977, vol. 31, pp. 157–177.
11. Baryshnikov, G.F., *Proc. Zool. Inst. Russ. Acad. Sci.*, 2015, vol. 319, no. 1, pp. 3–22.
12. Ovodov, N.D., Kuzmin, Y.V., and Cruz, R.J., *Curr. Res. Pleist.*, 2010, vol. 27, pp. 181–183.
13. Gasilin, V.V., Panasenko, V.E., Vasil'eva, L.E., and Tatarnikov, V.A., in *Dinamika sovremennykh ekosistem v golotsene* (Changes in Modern Ecosystems during the Holocene) (Proc. III All-Russian Conf.), Kazan: Otechestvo, 2013, pp. 127–130.
14. Baryshnikov, G.F., *Proc. Zool. Inst. Russ. Acad. Sci.*, 2016, vol. 320, no. 1, pp. 84–120.
15. Golubeva, L.V. and Karaulova, L.P., *Rastitel'nost' i klimatostratigrafiya pleistotsena i golotsena yuga Dal'nego Vostoka* (The Vegetation and Climatic Stratigraphy of the Pleistocene and Holocene of the Southern Far East), Moscow: Nauka, 1983.

Translated by A. Lisenkova