

## **The wolverine *Gulo gulo* LINNAEUS, 1758 from the Late Pleistocene site at Kaniv: a short review of the history of the species in the Ukraine**

Adrian MARCISZAK and Olexandr KOVALCHUK

Received: 21 January 2011

Accepted: 15 June 2011

MARCISZAK A., KOVALCHUK O. 2011. The wolverine *Gulo gulo* LINNAEUS, 1758 from the Late Pleistocene site at Kaniv: a short review of the history of the species in the Ukraine. *Acta zoologica cracoviensia*, **54A**(1-2): 47-53.

**Abstract.** A right fragment of the maxilla of *Gulo gulo* was found in the Late Pleistocene locality of Kaniv in central Ukraine. The specimen is assigned to the Late Pleistocene form because of its large size and morphological characters of teeth. Fossil remains of *Gulo gulo* are known from 10 localities in Ukraine, but most of them are not well dated. Palaeontological and historical records of wolverine from Ukraine are discussed.

**Key words:** Carnivora, Mustelidae, Pleistocene, occurrence, extinction.

Adrian MARCISZAK, Department of Palaeozoology, Zoological Institute, University of Wrocław, Sienkiewicza str. 21, 50-335 Wrocław, Poland.

E-mail: caspian8@wp.pl

Olexandr KOVALCHUK, Department of Zoology, Anatomy and Physiology of Humans and Animals, Makarenko Sumy State Pedagogical University, Romenska str. 87, 40-002 Sumy, Ukraine.

E-mail: Biologist@ukr.net

### I. INTRODUCTION

The wolverine was widespread across the territory of Europe during the Late Pleistocene and is known from many palaeontological sites from this period (DÖPPES 2001), but the fossil evidence for the wolverine in Ukraine is relatively scarce (Fig. 1). Additionally, discoveries are usually regarded as found somewhere in the areas of excavation and in most cases the stratigraphical integrity with other animal remains is doubtful, making determination of their age rather difficult or even impossible. It is unclear when the wolverine became extinct in Ukraine. There is only one (two) zooarchaeological record of the species after the Late Glacial and even that is questionable. The absence of faunal evidence



Fig. 1. Occurrence of wolverine (*Gulo gulo*) in Pleistocene and Holocene in the Ukraine. 1 – Kaniv, 2 – Starosel'e, 3 – Anetovka 2, 4 – Luka-Vrublevetskaya, 5 – Mezhirich, 6 – Kirillovskaya, 7 – Dobranichevka, 8 – Gontsy, 9 – Chulatov, 10 – Mezin (according to KRAKHMALNAYA 1999, changed).

from the archaeological record can however be misleading. Dated instances of wolverine from Ukraine are virtually unknown from historic times, but some hunting records from the last three centuries are known (KUNTZE 1928; ABELTSEV 1968; KRAKHMALNAYA 1999) although no taxidermic specimens exist in any museum (DASZKIEWICZ et al. 2005). In this paper we suggest a possible error in the assignment of the Kaniv specimen to Holocene age and present a short history of this species in the territory of Ukraine.

## II. MATERIAL AND METHODS

A fragment of the right maxilla with P3-P4 (Fig. 2.) of a relatively large specimen of wolverine was found in a channel part of the Dnieper river, Kaniv district, Cherkassy region, Central Ukraine (49°46'00''N, 31°28'30''E). The discovery was made during the digging of a foundation ditch of the Kaniv hydroelectric power station (1968-1969). The colour of the bone is light brown; the colour of the teeth dark-chestnut to black. There are distinct traces of mineralization and a break in the zygomatic arch. The crown of P3 is 11.0 mm long, conical in shape and has a well-developed ridge on its buccal side. A well-visible cingulum at the lingual and posterior part is present; the tooth has two roots. The surface of P4 is partially erupted, but in general the tooth is rather well-preserved. The total length of the crown is 22.4 mm, the width of the crown at the base of the protocone equals 13.7 mm, the width at the base of the metacone is 9.5 mm. The tooth has three massive, well-developed



Fig. 2. A right fragment of the maxilla of a wolverine (*Gulo gulo*) from Kaniv (scale bar: 5 cm).

roots. The incomplete Kaniv specimen shows clear metric features which exclude its appurtenance to the earlier, smaller Early-Middle Pleistocene form Schlosser's wolverine *Gulo schlosseri* KORMOS, 1914, which has not been found so far in Ukraine. Firstly, the large size of the specimen distinguishes it from its ancestor. The total length of the upper carnassial exceeds values given by DÖPPES (2001) for males from the recent population of Fennoscandia (17.4-21.5 mm, n = 60). It is widely accepted that Upper Pleistocene wolverines were on average 8-20% larger than modern ones (DÖPPES 2001), contrary to Schlosser's wolverine, with maximum dimensions comparable to those of medium-sized modern females of *Gulo gulo* (BONIFAY 1971). Judging from this, the wolverine remains from Kaniv belong at least to very large individual, most probably a male.

The age of the remains, based on biostratigraphic data, is far less clear. The authors were unable to give detailed information about the age of the specimen because precise stratigraphic data on the maxilla from Kaniv are lacking. Some authors who examined palaeontological material from Kaniv dated this locality as early-middle Holocene (PIDOPLICHKO 1956; SVISTUN 1966; SVISTUN & LOMAEV 1967). They provided a list of rich bone material, representing a typical Holocene faunal unit (PIDOPLICHKO 1956). However, other facts exclude assigning the remains of *Gulo* to this period. The state of preservation and colour of the maxilla are different from those of Holocene remains. SVISTUN (1966: 253) gave the following information on the possible mixed fauna: "... preservation of fossil

remains indicates that they are buried in the alluvium Kaniv location asynchronously and the geological age can be divided into 2 groups of expression (...) Pleistocene and Early Holocene". The same point of view was presented by SVISTUN and LOMAEV (1967: 78): "... fossil remains occur throughout the thickness of alluvial sands, eroded jetting. But in some cases, the accumulation of bones were found in the basal horizons of alluvium overlying the black-green alluvium horizon or sand and laminated sandy loam of lake-alluvial origin". In general, the geological age of these remains is based on collagen analysis, which is not very reliable. The associated fauna found recently contains a relatively poor mammalian community in which carnivores occur as poorly preserved and very fragmentary bones, while herbivores are much more numerous and better preserved. The list of mammals includes (the Latin names were changed according to the present nomenclature): *Talpa europaea* LINNAEUS, 1758, *Desmana moschata* LINNAEUS, 1758, *Sorex araneus* LINNAEUS, 1758, *Spalax podolicus* TROUESSART, 1897, *Marmota bobac* MÜLLER, 1776, *Spermophilus suslicus* GÜLDENSTÄDT, 1780, *Spermophilus major* PALLAS, 1778, *Crice-tus cricetus* LINNAEUS, 1758, *Microtus arvalis* PALLAS, 1778, *Microtus oeconomus* PAL-LAS, 1776, *Lagurus lagurus* PALLAS, 1773, *Ellobius talpinus* PALLAS, 1770, *Myodes glareolus* SCHREBER, 1780, *Arvicola amphibious* LINNAEUS, 1758, *Apodemus sylvaticus* LINNAEUS, 1758, *Castor fiber* LINNAEUS, 1758, *Oryctolagus cuniculus* LINNAEUS, 1758, *Lepus europaeus* PALLAS, 1778, *Ochotona pusilla* PALLAS, 1769, *Canis lupus* LINNAEUS, 1758, *Canis* sp., *Canis lupus familiaris* LINNAEUS, 1758, *Vulpes vulpes* LINNAEUS, 1758, *Ursus* cf. *arctos* LINNAEUS, 1758, *Gulo gulo* LINNAEUS, 1758, *Martes* sp., *Mustela puto-rius* LINNAEUS, 1758, *Mustela erminea* LINNAEUS, 1758, *Mustela nivalis* LINNAEUS, 1758, *Felis silvestris catus* LINNAEUS, 1758, *Felis silvestris* SCHREBER, 1775, *Mammut-hus primigenius* BLUMENBACH, 1799, *Equus ferus* LINNAEUS, 1758, *Coelodonta antiqui-tatis* BLUMENBACH, 1807, *Sus scrofa* LINNAEUS, 1758, *Sus scrofa domestica* LINNAEUS, 1758, *Megaloceros giganteus* BLUMENBACH, 1897, *Rangifer tarandus* LINNAEUS, 1758, *Alces alces* LINNAEUS, 1758, *Cervus elaphus* LINNAEUS, 1758, *Capreolus capreolus* LINNAEUS, 1758, *Bos taurus* BOJANUS, 1827 and *Bison priscus* BOJANUS, 1827. Additionally, some fishes (family Cyprinidae, Acinpenseridae, mostly *Esox lucius* LINNAEUS, 1758), and birds (e.g. *Gallus domesticus*) were found and should be added to those listed by PIDOPLICHKO (1956) and SVISTUN (1966). This list of mammals provides evidence for a strongly mixed fauna. Although these species are traditionally regarded as characteristic of the Late Pleistocene, most of them may represent a late Middle Pleistocene as well as Holocene age. The presence of mammoth, woolly rhinoceros, giant deer and steppe bison with similar state of preservation as the wolverine specimen may suggest a Late Pleisto-cene age for the wolverine remains. At least, the assignment of the Kaniv maxilla to Late Pleistocene age is based on two major reasons: the bone colour, different from the other material, and the associated fauna.

## III. DISCUSSION

According to HERNANDEZ FERNANDEZ (2001) the wolverine is restricted to three habitats and is very well adapted to cold, snowy climatic conditions. Traditionally the presence of wolverine in the mammalian fossil assemblage in the Kaniv fauna should be sufficiently diagnostic to indicate conditions of cold climate. However, *Gulo gulo* is not inherently a purely "boreal" or "tundra" species, which is suggested by the extent of its former distribution as far south as southern France and northern Spain in the Late Pleistocene (DÖPPES 2001). The modern distribution of *Gulo gulo* is strongly correlated with that of the reindeer, which constitutes a major part of its diet.

The wolverine is a rather rare component of the mammalian communities of the Late Pleistocene of Ukraine, known from a handful of sites, none of them well dated. The oldest evidence for this species in Ukraine comes from a Middle Palaeolithic site Starosel'e in the Crimean Peninsula, where a single bone was found (VERESHCHAGIN & BARYSHNIKOV 1980). Much more numerous data are known from the Late Pleistocene, with 8 known localities (PIDOPLICHKO 1969, 1976; SHOVKOPLYAS et al. 1981; BIBIKOVA & STARKIN 1989; KRAKHMALNAYA 1999) (Fig. 1). Only two such localities are known from Holocene deposits (BIBIKOVA 1953; PIDOPLICHKO 1956; KRAKHMALNAYA 1999) among which Kaniv is most probably of Late Pleistocene rather than Holocene age, as put forward in this paper. Recently SOMMER and BENECKE (2004) revisited more than 8000 archaeological localities across Europe. The remains of wolverine were known from the Subboreal period from south-eastern Europe, from Ukraine and Hungary, but bones of this species dated to the Middle Ages were found only in the north-eastern part of the continent. Although the modern distribution of the species is restricted to the northern parts of Europe and North America, in the past the wolverine was much more widely distributed, ranging from Spain in the west and south to China in the east. Over the course of time, under the effect of climatic conditions, the wolverine slowly disappeared and retreated to the north and east. At present it is difficult to prove the presence of *Gulo gulo* in Ukraine in the last few centuries. However, a few historical records of killed wolverines are known from the first half of the 18<sup>th</sup> century, in the vicinity of Khmelnytskyi (Polish name: Proskurow) and Kamianets-Podilskyi (Polish name: Kamieniec Podolski). Information on a killed wolverine in the 19<sup>th</sup> century comes from the vicinity of Ovruch (Polish name: Owruć) (the Volyn and Podole regions). The latest records of *Gulo gulo* from Ukraine are known from the same region: one killed just before World War I near Radomyshl (Polish name: Radomyśl), and a second near the vicinity of Jarmolinca (Polish name: Jarmoliniec) in 1924 (KUNTZE 1928; ABELENTSEV 1968; DASZKIEWICZ et al. 2005). However, all of these historical records come from hunters, and the remains of these animals were not preserved in any museum (LUBICZ-NIEZABITOWSKI 1934; TOMIAŁOJĆ 2003).

*Gulo gulo* is usually a lone walker able to travel long distances. Daily movements longer than 30 km (KROTT 1959; HAGLUND 1966; PULLIAINEN 1968; PASITSCHNIAK-ARTS & LARIVIERE 1995), straight-line distances covered in 3 days equal to 64 km for males and 38 km for females (HORNOCKER & HASH 1981) and straight-line distances longer than 300-350 km (GARDNER et al. 1986) are known for this species. In general

males are more mobile than females, and food availability and sexual maturity are the two major factors responsible for this behavior (PASITSCHNIAK-ARTS & LARIVIERE 1995).

Although the existence of a small, relict population of wolverine in Ukraine at that time is not excluded, it is rather unlikely. It is more probable that these incidental appearances were migrant individuals.

**A c k n o w l e d g e m e n t s.** The authors are very grateful to Prof. Beata POKRYSZKO, Ph. D. for linguistic improvements of the manuscript.

## REFERENCES

- ABELENTSEV V. I. 1968. Fauna Ukraini. [The fauna of Ukraine.] Naukova Dumka, Kiev, 1(3): 91-128. [In Ukrainian].
- BIBIKOVA V. I. 1953. Fauna rannetripolskogo poseleniia Luka-Vrublevetskaya. [The fauna of the early Tripolye settlement Luka-Vrublevetskaya]. *Materialy i issledovaniia po archeologii SSSR*, **38**: 411-458.
- BIBIKOVA V. I., STARKIN A. V. 1989. Charakteristika osteologicheskogo materiala iz raskopok pozdnepaleoliticheskogo poseleniia Anetovka II. [Characteristics of the osteological materials from the excavations of the late Paleolithic site Anetovka II]. [In:] V. N. STANKO, G. V. GRIGORIEVA, T. N. SHVAIKO (eds) – The late Paleolithic site Anetovka II. Naukova Dumka, Kiev, Pp: 127-131. [In Russian].
- BONIFAY M.-F. 1971. Carnivores Quaternaires du Sud-Est de la France. *Mémoires du Muséum National d'Histoire Naturelle, serie C*, **21**: 1-377.
- DASZKIEWICZ P., JEDRZEJEWSKA B., SAMOLIK T. 2005. Rosomak w Rzeczypospolitej w dawnych źródłach. *Przegląd Zoologiczny*, **159**: 167-172.
- DÖPPES D. 2001. *Gulo gulo* (Mustelidae, Mammalia) im Jungpleistozän Mitteleuropas. *Beiträge zur Paläontologie*, **26**: 1-95.
- GARDNER C. L., BALLARD W. B., JESSUP H. 1986. Long distance movement by an adult wolverine. *Journal of Mammalogy*, **67**: 603.
- HAGLUND B. 1966. Winter habits of the lynx (*Lynx lynx* L.) and wolverine (*Gulo gulo* L.) as revealed by tracking in the snow. *Viltrevy*, **4**: 81-310.
- HERNÁNDEZ- FERNÁNDEZ M. 2001. Análisis paleoecológico y paleoclimático de las sucesiones de mamíferos del Plio-Pleistoceno ibérico. Ph.D. Thesis. Universidad Complutense de Madrid, Madrid, 368 pp.
- HORNOCKER M. G., HASH H. S. 1981. Ecology of the wolverine in northwestern Montana. *Canadian Journal of Zoology*, **59**: 1286-1301.
- KRAKHMALNAYA T. V. 1999. Carnivore remains from Late Pleistocene and Holocene deposits in the Ukraine. [In:] N. BENECKE (ed.) – The Holocene History of the European Vertebrate Fauna. Modern Aspects of Research. *Archäologie in Eurasien*, **6**: 223-235.
- KROTT P. 1959. Der Vielfraß. Zur Kenntnis seiner Naturgeschichte und seiner Bedeutung für der Menschen. *Monographien Wildsäugetiere*, **13**: 1-159.
- KUNTZE R. 1928. Obecny stan wiadomości o stanie ssaków i ptaków wschodniego Podola. *Kosmos*, **53**: 683-698.
- LUBICZ-NIEZABITOWSKI E. L. 1934. Bericht über die Säugetiere Polens und ihre geographische Verbreitung. *Zeitschrift für Säugetierkunde*, **9**: 188-197.
- PASITSCHNIAK-ARTS M., LARIVIERE S. 1995. *Gulo gulo*. *Mammalian Species*, **499**: 1-10.
- PIDOPLICHKO I. G. 1956. Materiali do vivcheniia minulich faun *URSR*. [Materials on the investigation of extinct faunas of the Ukrainian SSR]. Izdatelstvo AN USSR, Kiev, 225 pp. [In Ukrainian].
- PIDOPLICHKO I. G. 1969. Pozdnepaleoliticheskiie zhilishcha iz kostei mamonta. [Late Paleolithic dwellings of mammoth bones in the Ukraine]. Naukova Dumka, Kiev, 163 pp. [In Ukrainian with English summary].
- PIDOPLICHKO I. G. 1976. Mezhirichskie zhilishcha iz kostei mamonta [Mezhirich dwellings of mammoth bones]. Naukova Dumka, Kiev, 239 pp. [In Ukrainian].
- PULLIAINEN E. 1968. Breeding biology of the wolverine (*Gulo gulo* L.) in Finland. *Annales Zoologici Fennici*, **47**: 13-15.
- SHOVKOPLYAS I. G., KORNIETS N. L., PASHKEVITCH G. A. 1981. Dobranichevskaia stoianka. [The site Dobranichevka]. [In:] A. A. VELICHKO (ed.) – Arkheologii i paleogeografiia Pozdnego Paleolita Russkoi Ravnini. [Archaeology and Palaeogeography of the Late Palaeolithic of the Russian Plain]. Nauka, Moscow, Pp: 97-106.
- SOMMER R., BENECKE N. 2004. Late- and post-glacial history of the Mustelidae in Europe. *Mammal Review*, **34**: 249-284.

- SVISTUN V. I. 1966. Mistse znakhozhdeniya antropogenovykh hrebetnykh w raioni budivnitstva Kanivskoi GES. [Locality of the Antropogene vertebrates in the place of building of the Kaniv hydroelectric power station]. *Reports of the Academy of Sciences of the USSR*, **2**: 253-256. [In Ukrainian].
- SVISTUN V. I., LOMAEV A. A. 1967. O geologicheskome vozraste iskopayemykh kostei mlekopitayushchikh iz raiona Kanevskoi GES [About geological age of fossil bones of mammals from the place of Kaniv hydroelectric power station]. *Vestnik zoologii*, **3**: 77-80. [In Russian].
- TOMIAŁOJC L. 2003. Fakty i mity dotyczące występowania paru gatunków zwierząt w Puszczy Białowieskiej. *Przegląd Zoologiczny*, **158**: 137-147.
- VERESHCHAGIN N. K., BARYSHNIKOV G. F. 1980. Mlekopitayushchie predgornogo severnogo Kryma v epokhu paleolita. [Mammals from the foothills of the Northern Crimea in the Palaeolithic period]. *Trudy Zoologicheskogo Instituta, Russian Academy of Science*, **93**: 26-48. [In Russian].