

## *Alces alces* and *Rangifer tarandus* in the Pleistocene of Bulgaria (Artiodactyla: Cervidae)

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**Abstract.** An analysis of the past geographical and altitudinal distribution of bone remains of the elk (*Alces alces*) and reindeer (*Rangifer tarandus*) in Bulgaria is given. The data from seven fossil localities (Early–Late Pleistocene) from four provinces in the country are presented. The fossil record in Bulgaria shows the wide distribution of both deer species in the plain and hilly landscapes in the Danubian Plain in northern Bulgaria. No record of the two species has been known from Bulgaria south of the Stara Planina Mts. The localities of both species are spread over 250–750 m a. s. l., but majority of the findings are located at 335–390 m a. s. l. of the open steppe habitats. All data originate from the prehistoric cave dwellings of the Paleolithic people.

**Key words.** Pleistocene megafauna, deer, Quaternary mammals, Balkan fossil fauna, Pleistocene environment.

### INTRODUCTION

The elk, *Alces alces* (Linnaeus, 1758) is the largest extant species of the family Cervidae, while the reindeer, *Rangifer tarandus* (Linnaeus, 1758) is the species with the largest distribution range, northernmost distribution and most numerous seasonal migrations of the family. The nearest limits of their present distribution are now as far as 900–1000 km for *A. alces* and 1900–2000 km for *R. tarandus* from their former Pleistocene localities in Bulgaria. Such a range restriction has almost a transcontinental scale – from the southern parts of Europe to the Far North of the continent. *Alces alces* appeared in Europe in the Middle Pleistocene, ca. 150,000–100,000 BP. It is supposed that it was not present in the Balkans in the Late Pleistocene (FILONOV 1983). The Pleistocene range of *A. alces* reached the Caucasus (Kuban region), but never spread to Crimea, a region neighbouring the Balkans.

In eastern Europe, *Rangifer tarandus* extended its range southward to Romania and Crimea according to GROMOV & BARANOVA (1981). Obviously the latter authors had no data from Bulgaria; however, according to PIDOPLIČKO & TOPAČEVSKIJ (1953), *A. alces* reached the Black Sea coasts in the Pleistocene through forested river valleys. In the Upper Paleolithic, *R. tarandus* was a common prey for hunters in the central parts of Romania. The species has been recorded at more than ten localities in this country and the southernmost of them is located in Dobrogea (La Adam Cave), an area bordering Bulgaria (DIMITRASCU & VASILIE 2019).

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The distribution of *A. alces* and *R. tarandus* in Bulgaria has not been a subject of special research. Thus, any data on their occurrence in the country have a value for elucidating their history in southern Europe, a periphery of their former range in the Pleistocene.

## MATERIAL AND METHODS

Scattered published data from over the last hundred years on the former distribution of *Alces alces* and *Rangifer tarandus* throughout the present territory of Bulgaria were gathered. For each locality (site), as complete data as possible on the age, years and leaders of excavations and the reference to the original published information are presented (Tables 1, 2). All findings come from the excavated archeological localities of prehistoric human cave dwellings. Thus, many of them were published in less accessible scattered (often regional or semi-popular) archaeological or wide-scoped editions, remaining unknown to the zoological community.

The chronostratigraphy follows COHEN et al. (2013): (1) Chibanian (Middle Pleistocene, 770,000–129,000 BP); (2) Late Pleistocene (129,000–11,700 BP; Table 1).

Abbreviations: BP – before present, P. – province; v. – village.

## RESULTS AND DISCUSSION

The profound literature search shows that the first published data on the past presence of the reindeer in Bulgaria come from 1911, while the first data on the elk were published in 1931.

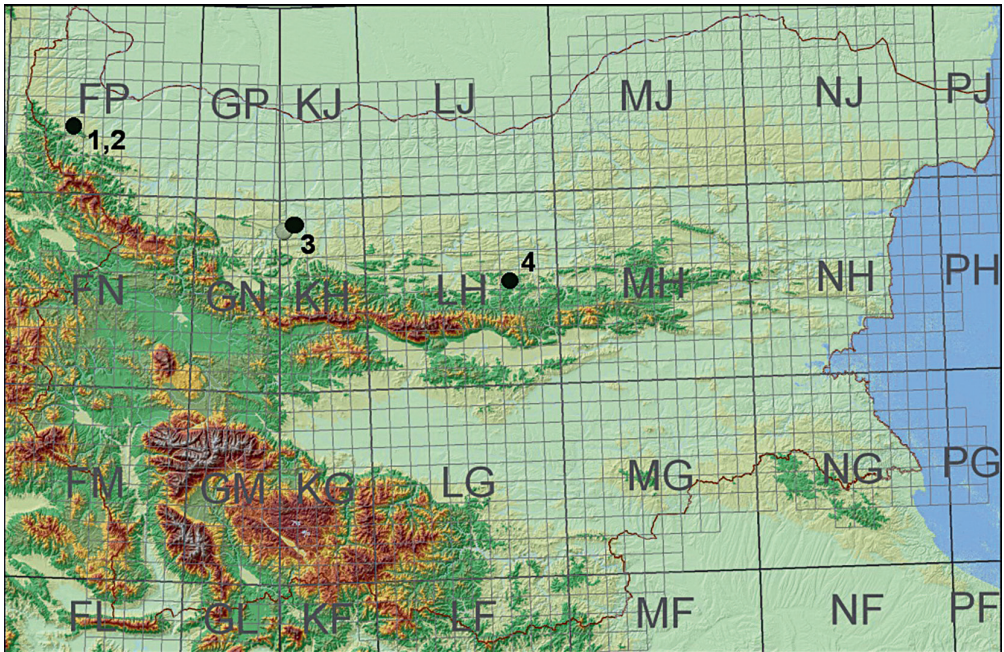


Fig. 1. Distribution of the fossil bone findings of *Alces alces* in Bulgaria. Legend: 1 – Kozarnika (Suhi Peč) Cave, 2 – Mirizlivka Cave, 3 – Temnata Dupka Cave, 4 – Bačo Kiro Cave.

Table 1. Localities of fossil bone remains of *Alces alces* in Bulgaria

locality	province	altitude [m a. s. l.]	age	years and leaders of excavations	reference
Kozarnika (Suhi Peč) Cave	Vidin	375	Late Pleistocene, MNQ 18–26 (end of Saalian, Eemian and Weischelian), 1.000.000–700.000 BP	1996–2005, N. SIRAKOV, J.-L. GUADELLI	GUADELLI et al. 1999, 2005, FERNANDEZ 2009
Mirizlivka Cave	Vidin	750	Early–Late Pleistocene Paleolithic	1924, 1929, V. ATANASOV & L. FILKOV; 1931, R. POPOV & V. ATANASOV; 1993, Z. BOEV	POPOV 1933, 1936, BERON et al. 2006
Temnata Dupka Cave	Loveč	250	Middle–Late Paleolithic	1938, R. POPOV; 1982, N. SIRAKOV	POPOV 1931, BERON et al. 2006
Bačo Kiro Cave	Gabrovo	335	Late Pleistocene, Middle–Late Paleolithic, 70.000–20.000 BP	1938, D. GAROD & R. POPOV; 1971–1975, B. GINTER & J. KOZŁOWSKI	KUBIAK & NADACHOWSKI 1982, BERON et al. 2006

Table 2. Localities of fossil bone remains of *Rangifer tarandus* in Bulgaria

locality	province	altitude [m a. s. l.]	age	years and leaders of excavations	reference
Kozarnika (Suhi Peč) Cave, for details see Table 1					
Mirizlivka Cave, for details see Table 1					
Temnata Dupka Cave	Loveč	250	Middle–Late Paleolithic	1938, R. POPOV; 1982, N. SIRAKOV	MIKOV 1926, POPOV 1925a, 1926a, b, 1929, BERON et al. 2006
Malkata Cave	Veliko Tarnovo	355	Early Paleolithic	1897, 1899, 1900, 1905, 1909, R. POPOV	POPOV 1911, 1926a, 1936, BERON et al. 2006
Polički Cave	Gabrovo	390	Paleolithic	1890, S. ŪRINIČ	POPOV 1911, 1926a, 1936, POPOV & VAPCAROV 1972, BERON et al. 2006
Malkata (Toneva) Cave	Veliko Tarnovo	370	Early Paleolithic	1899, 1900, 1905, 1909, R. POPOV	POPOV 1925b

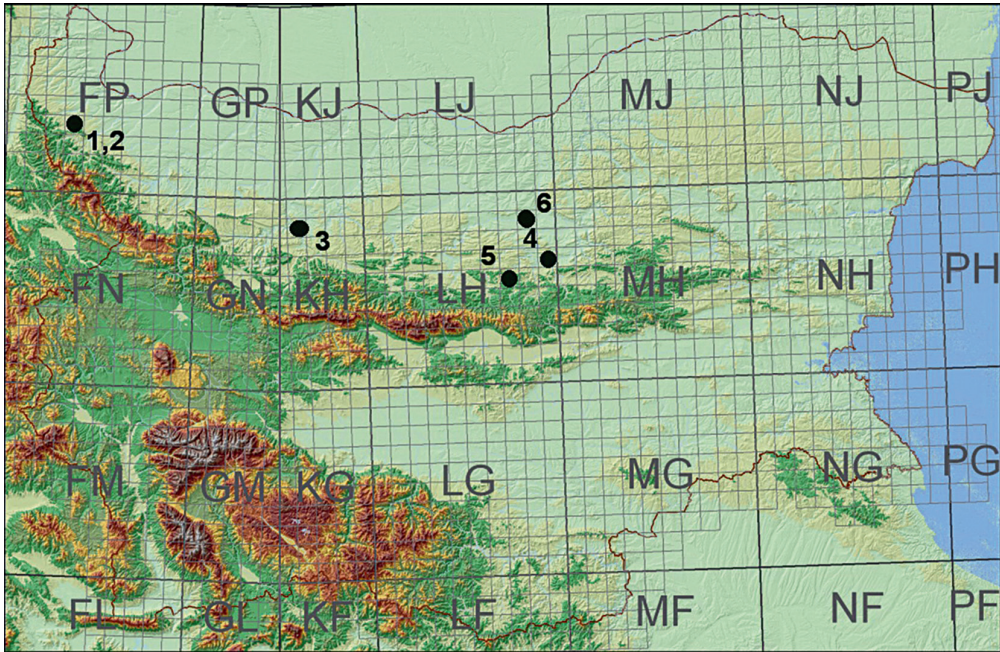


Fig. 2. Distribution of the fossil bone findings of *Rangifer tarandus* in Bulgaria. Legend: 1 – Kozarnika (Suhli Peč) Cave, 2 – Mirizlivka Cave, 3 – Temnata Dupka Cave, 4 – Malkata Cave, 5 – Polički Cave, 6 – Malkata (Toneva) Cave.

All findings were made occasionally and no special paleontological research was undertaken – all Bulgarian localities of these deer species are former human dwellings (caves). All localities presented here revealed a very scant fossil material, but sufficient to outline the former distribution of *A. alces* and *R. tarandus* in the country. These summary data indicate that both tundra-steppe cold-adapted large mammals were widespread in Bulgaria (and in the whole Balkans as well), a country lying on the species range periphery. As documented, the range of the genus *Alces* in eastern Asia reaches even China (LUCAS 2001).

In the steppes of Eurasia, *A. alces* and *R. tarandus*, being cold-adapted herbivores, were numerous in most of the lowland and plain areas in the Pleistocene. It is worth mentioning that both deer species are mammals with good migration ability. Considering their large body size, we can assume that the Pleistocene localities listed here may reflect authentically the former distribution of these species.

All ten available localities of the fossil record of these deer in Bulgaria indicate their wide distribution in the plain and hilly landscapes in the Danubian Plain and the foothills of the Pre-Balkan in northern Bulgaria (Figs. 1, 2). No record of these species has been known from southern Bulgaria, i.e. the areas south of the Stara Planina Mts. (Balkan Range). As boreal species of the Pleistocene, these deer were spread only in the steppe habitats of the country's north. The Stara Planina Mts. (Balkan Range) cross the territory of Bulgaria from west to east and

also at present they play an important role as a natural climatic barrier stopping the colder climate from penetrating south and vice versa. The altitudinal distribution of both species was confined between 250 and 750 m a. s. l. but majority of the records were located within the range of 335–390 m a. s. l. The findings in the Bačo Kiro Cave were identified ad “cf. *Alces* sp.” (KUBIAK & NADACHOWSKI 1982).

Although not explored in detail, the Bulgarian localities reveal that the two deer species were not abundant. They were a rare hunting prey of the Paleolithic people in the region. Their bone remains were collected occasionally during various archaeological excavations in the prehistoric cave human dwellings.

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