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Coelodonta antiquitatis in the Pleistocene of Bulgaria (Perissodactyla: Rhinocerotidae)

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Abstract. An analysis of the geographical and altitudinal distribution of remains of the woolly rhinoceros (*Coelodonta antiquitatis*) in Bulgaria is given. The paper summarizes all scattered data on the distribution of the species gathered in the last 114 years, only a part of them having been published before. Data on nine fossil localities (early–latest Pleistocene) from six provinces of Bulgaria are presented. The fossil record proves the wide species distribution in the riverine foothills of mountains, plains, and lowlands of the country. Its Pleistocene localities were concentrated in the Danubian Plain, although the species was recorded also in the southernmost part of the country. About 90 percent of the localities were situated below 400 m a. s. l., although the species' altitudinal distribution reached the maximum of 750 m a. s. l. All findings of the wooly rhinoceros in Bulgaria were made together with those of some species that now inhabit deciduous woodlands or rocky massifs of the temperate zone – *Cervus elaphus*, *Capreolus capreolus*, *Rupicapra rupicapra*, or *Capra ibex*, as well as extinct *Bos primigenius*. In Bulgaria, *C. antiquitatis* showed the same habitat preferences as in the core parts of the species range in Siberia. The Bulgarian localities of findings were both natural habitats and former human dwellings.

Key words. Pleistocene megafauna, Rhinoceroses, Quaternary mammals, Balkan fossil fauna, Bulgarian Pleistocene environment

INTRODUCTION

In the Late Pleistocene, the vast Eurasian tundra-steppe was the homeland of the cold-adapted large mammals, known as "*Mammuthus-Coelodonta* faunal complex" (Boeskorov 2012) and this zone also covered the territory of Bulgaria. According to Markova et al. (2011), the Eurasian distribution of the woolly rhinoceros, *Coelodonta antiquitatis* (Blumenbach, 1799), is broadly proved from 263 localities, 147 of them from Europe. They were dated 50,000 to 9,335 years BP and all of them lie between 45°–55° N. It is interesting that this comprehensive study does not list any data from Bulgaria and the Balkans at all – a region lying on the species range periphery. As well documented, the range of *Coelodonta antiquitatis* in East Asia reaches even southern China (Lucas 2001).

The distribution of *Coelodonta antiquitatis* was not a subject of special research in Bulgaria. Beron et al. (2006) provided data on two cave localities (Malkata Cave and Mirizlivka Cave). Boev (2017) provided a summary of the published data from six Pleistocene localities of this species in Bulgaria: Temnata dupka Cave, Bačo Kiro Cave, Malkata Cave, 'Unknown site 1'

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in the Loveč Province, 'Unknown site 2' near Pirgovo, and the Mirizlivka Cave. One of these localities, the Bačo Kiro Cave was listed erroneously, as the only finding was in fact identified as *Dicerorhinus hemitoechus* Falconer, 1860 (Kubiak 1982). The remnants found in all other localities were listed as *Rhinoceros tichorinus* Cuvier, 1812 (now considered a synonym of *Coelodonta antiquitatis*).

The woolly rhinoceros became extinct approximately 14 Ka BP (Lord et al. 2020). In the westernmost parts of its range (Iberian Peninsula), the species survived until 20 Ka BP (Álvarez-Lao & García 2011) and the data from Russia indicate the species survival up to 10.2 Ka. In Siberia and the Ural Mts., the chronostratigraphic distribution of *Coelodonta antiquitatis* was confined between 53 and 10 Ka (Orlova et al. 2008). However, Stuart & Lister (2012) accepted another final date, 14 Ka BP for the species global extinction.

The territory of Bulgaria also lies on the periphery of its range in the Balkans (Gromov & Baranova 1981, Markova et al. 2011, Álvarez-Lao & García 2011). Thus, any data on its occurrence in the country are valuable for understanding its final history in southern Europe.

MATERIAL AND METHODS

I tried to gather all scattered data (published and unpublished in the last 114 years) on the former distribution of the woolly rhinoceros throughout the present territory of Bulgaria. For each locality (site) I present as complete data as possible on the age, years and leaders of excavations, and the reference to the original published information (Table 1). The majority of findings came from the excavated archeological localities of prehistoric human cave dwellings.

Thus, many of the findings were published in less accessible (often regional or semi-popular) archeological editions, remaining unknown to the zoological community. All of them represent a valuable source for elucidating former distribution of one of the iconic Pleistocene megamammals in the Balkans.

The chronostratigraphy follows Cohen et al. (2013): (1) Chibanian (middle Pleistocene, 770,000–129,000 years BP); (2) late Pleistocene (129,000–11,700 years BP) (Table 1).

RESULTS AND DISCUSSION

A profound literature reference shows that the first published data on *Coelodonta antiquitatis* in Bulgarian science appeared in 1906 (Kovačev 1906), i.e. 75 years after its original description. Later Popov (1925) mentioned a Paleolithic finding of "*Rhinoceros* sp." from the Temnata dupka Cave. Much later Nikolov (1977, 1983) confirmed their identification as *Rhinoceros tichorinus.* Remains of the Middle Paleolithic (Early MIS 5e, 135,000–85,000 years BP) "Rhinocerathidae indet." are reported from the Mišin Kamik Cave (Gurova et al. 2017). Todorova (1984) mentions that *Coelodonta antiquitatis* was recorded in Dobrudža (NE Bulgaria) without providing a concrete locality and more data.

In the steppes of Eurasia, the woolly rhinoceros, being a cold-adapted megaherbivore (Lord et al. 2020), was never as numerous as other smaller Pleistocene perissodactylians, like the wild horse (tarpan, *Equus ferus ferus* Boddaert, 1785) or the wild ass (*Equus hemionus hydruntinus* Regalia, 1907). Boeskorov (2001: 17) found that in north-eastern Asia "The highest frequency [of *Coelodonta antiquitatis* …] was observed on the plateaus and in the mountain river valleys, while in the lowlands and in the long river valleys the rhino remains were rather rare […]. Numerous remains […] were […] also found in mountainous regions". In Bulgaria most of the sites of the species records were located in the northern parts of the country. The only locality in southern Bulgaria (Mečata dupka Cave) is remarkable with its southern and rather remote

Table 1. Localities of fossil bone remains of the woolly rhinoceros (*Coelodonta antiquitatis*) in Bulgaria

No	site, localisation	province	altitude [m a. s. l.]	age	excavation (year/leader)	reference
1	Mirizlivka Cave, near Orešec r/w station	Vidin	750	early–late Pleistocene, Paleolithic	1924, 1929, V. Atanasov & L. Filkov; 1931, R. Popov & V. Atanasov; 1993, Z. Boev	Popov (1933, 1936a, b); Nikolov (1977, 1983); Beron et al. (2006); Boev (2015)
2	Mečata dupka Cave, near Stoilovo	Burgas	320	middle Pleistocene, Paleolithic	2004, 2010, S. Taneva	Taneva et al. (2005)
3	Manastira Cave, near Arbanasi	Veliko Tărnovo	392	middle–early late Paleolithic, >46,500 years BP	2012–2013, A. Guadelli	Guadelli et al. (2014)
4	Pirgos, near Pirgovo	Ruse	68	late Pleistocene	1905, G. Kovačev	Kovačev (1906)
5	Malkata Cave, near Veliko Tărnovo	Veliko Tărnovo	355	early Paleolithic	1897, 1899, 1900, 1905, 1909, R. Popov	Nikolov (1977, 1983); Beron et al. (2006)
6	Temnata dupka Cave, near Karlukovo	Loveč	250	middle–late Paleolithic	1938, R. Popov; 1982, N. Sirakov	Mikov (1926); Nikolov (1977, 1983); Popov (1925, 1926, 1929, 1931, 1936a, b, 1943)
7	Muselievo, near Muselievo	Pleven	35	late Paleolithic, 50,000–35,000 years BP	1983, N. Džambazov	Bogdanov (1983)
8	Dolni Vit, near Dolni Vit	Pleven	30	Paleolithic	1970s–1980s	Bogdanov (1983)
9	Ruse	Ruse	45	latest Pleistocene	1960s, I. Iliev	E. Undžián (unpubl. data)

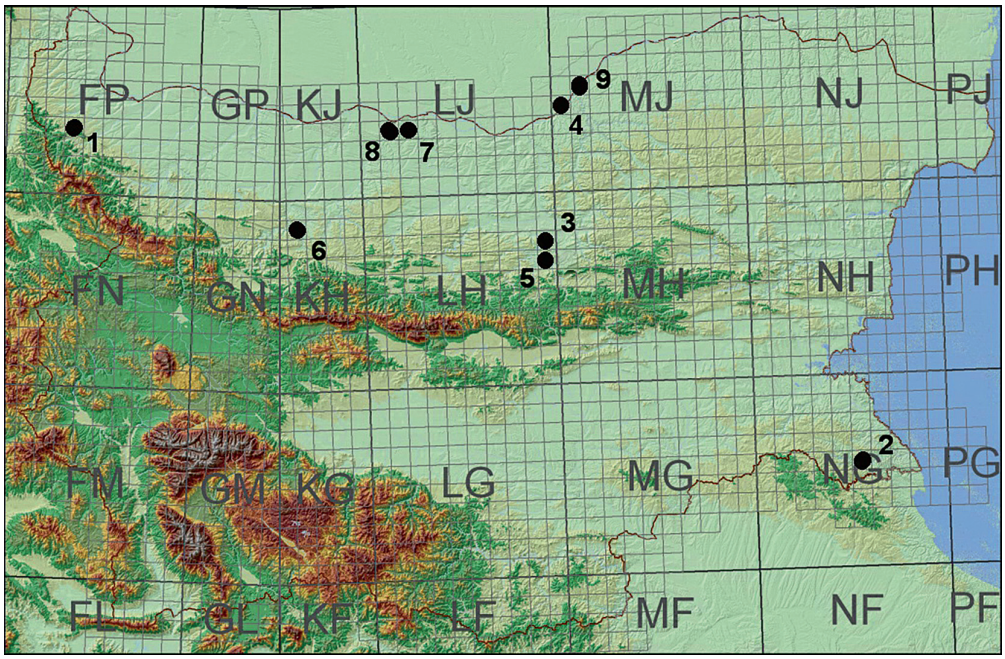

Fig. 1. Distribution of records of *Coelodonta antiquitatis* in Bulgaria. Numbers correspond to the list of localities in Table 1: Mirizlivka Cave (1), Mečata dupka Cave (2), Manastira Cave (3), Pirgos (4), Malkata Cave (5), Temnata dupka Cave (6), Muselievo (7), Dolni Vit (8), Ruse (9).

position. It is to be noted that all Bulgarian localities of the woolly rhinoceros are located along large rivers or in river valleys: Skomlâ (locality 1), Veleka and Aydere (Haidere) (2), Ântra and Rosica (3 and 5), Danube and Rusenski Lom (4 and 9), Danube and Vit (7 and 8). The altitude distribution is confined between 30 and 750 m a. s. l. About 90% of localities are located below 400 m a. s. l. (30–392 m). Thus, in Bulgaria *Coelodonta antiquitatis* showed the same habitat preferences as in the centre of the species range in Siberia (Orlova et al. 2008).

It is worthy to mention that *Coelodonta antiquitatis* was a mammal with low migration ability (Boeskorov 2001). Hence, the localities listed here may reflect authentically the species distribution in the Pleistocene. During the Late Pleistocene, the southern expansion of *Coelodonta antiquitatis* in the Balkans reached the south-eastern corner of the Peninsula (Strandža Mts., ca. 42° N; Fig. 1). The species was recorded also in the neighbouring Serbia (Marković 1998). This region approaches the latitudes of localities from other regions of Eurasia, although the southernmost margin of the species occurrence is located at 33° N in southern China (Stuart & Lister 2012).

The record shows that *Coelodonta antiquitatis* inhabited largest plains and lowlands in Bulgaria. Eight of the total of nine localities are located in the Danubian Plain, but one in the foothills of the Strandža Mts. which border the third largest plain of Bulgaria – the Burgas Lowland (Fig. 1).

The sites of Muselievo and Manastira are among the oldest European localities of the wooly rhinoceros, being dated approximately to 50–45 Ka.

In the Mirizlivka Cave, the findings of the woolly rhinoceros were made together with those of some species that inhabit the temperate zone of Eurasia – *Cervus elaphus* Linnaeus, 1758, *Capra ibex* Linnaeus, 1758, and *Bos primigenius* (Bojanus, 1827) (Boev 2015). In the area of the Temnata dupka Cave, *Coelodonta antiquitatis* coexisted with *Cervus elaphus*, *Capreolus capreolus* (Linnaeus, 1758), *Rupicapra rupicapra* (Linnaeus, 1758), *Capra ibex*, and *Bos primigenius* (Guadelli & Delpech 2000). A similar composition of the associated fauna was found at other sites – the coexisting species were *Cervus elaphus* and *Rupicapra rupicapra* in Muselievo (Bogdanov 1983), *Bos primigenius* at the Malkata Cave (Popov 1911), and *Bos* sp. at the Manastira Cave (Guadelli et al. 2014). These records confirm that not only in the southwestern periphery of the range of *Coelodonta antiquitatis* in the Iberian Peninsula (Álvarez-Lao & García 2011), but also in the Balkans, there existed an association of the woolly rhinoceros with other taxa of the "temperate and forested environments …, showing a mixture of temperate and cold elements which does not reflect the typical faunal composition of the Eurasian tundra-steppe" (Álvarez-Lao & García 2011: 2016). We have to remind that the same faunal complexes occurred even at the southern peripheries of the range of this species in central Siberia (Foronova 1982) and in southern Italy (Gatta et al. 2019).

It could be summarised that in the period of the last 114 years only nine localities of *Coelodonta antiquitatis* were documented in Bulgaria. All these findings were made occasionally, and no special paleontological research was undertaken.

The Bulgarian localities of the wooly rhinoceros represent both natural habitats and former human dwellings (caves). The data on Neolithic paintings of *Coelodonta antiquitatis* in some caves of Europe (Carroll 1988) seem intriguing indeed. We already mentioned that the species became extinct no later than 14 Ka, i.e., before the early Neolithic. As Romer (1946: 440) states, the wooly rhinoceros "was a favorite subject for Old Stone Age artists" and not for New Stone Age (Neolithic), as the species did not existed until the Neolithic. Anyway, no images of the woolly rhinoceros are known from Bulgaria. All localities presented here revealed a very scant fossil material, but certainly still sufficient to outline the former distribution of the species in the country.

РЕЗЮМЕ

Косматият носорог (*Coelodonta antiquitatis*) в плейстоцена на България (Perissodactyla: Rhinocerothidae). Представен е анализ на географското и надморското разпространение на останките от космати носорози в България. Статията обобщава всички разпръснати данни от последните 114 години за разпространението на косматия носорог, част от които непубликувани. Представени са данни за 9 находища (ранен–най-късен плейстоцен) от 6 от 28-те области в страната. Фосилните данни от България доказват широкото разпространение на вида в крайречните подножия на планините, в равнините и низините. Плейстоценските му находища са съсредоточени в Дунавската равнина, въпреки че видът е регистриран и в най-южната част на страната. Около 90 процента от находищата са разположени под 400 m надморска височина. Неговото разпространение достига до 750 m н. в. Всички находки са открити заедно с тези на някои видове, които днес обитават широколистни гори или скални масиви в умерения пояс - благороден елен, сърна, дива коза или алпийски козирог, както и изчезналия тур. По този начин в България *C. antiquitatis* показва същите предпочитания към местообитанията, каквито е имал в централните части на ареала си в Сибир. Българските находища са както природни (неантропогенни), така и бивши човешки жилища.

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