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Scientific Report

European bison (Bison bonasus Linnaeus, 1758) in Bulgaria: fossil and historical records, distribution, and disappearance

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Abstract

An analysis of the past geographical, altitudinal and chronological distribution of the European bison remains in Bulgaria is given. The Paper summarizes all scattered data published in the last 36 years on the distribution of the species. Data of 18 fossil and subfossil localities (Late Pleistocene to 17th c. AD) from 15 out of 28 provinces in the country are presented. The fossil/subfossil record in Bulgaria proves the wide distribution of the wisent in the lowland, plain, and lower hilly landscapes in Bulgaria. Most data originate from prehistoric, ancient, and medieval settlements. The wisent was distributed mainly in the plains in places up to 300 m a. s. l., where are located over 70 percent of the known sites, although it was found in the mountains at 1080 m. a. s. l. The species survived in the country until the 16th -17th c. AD, i.e. seven centuries longer than known so far.

Keywords: History of mammals in Bulgaria, Quaternary mammals, Balkan fossil fauna, Large bovines of Europe

Introduction

The European bison (wisent; zubr; *Bison bonasus*, Linnaeus, 1758) is considered one of the few large mammals "to have survived the mass megafaunal extinction during the Pleistocene/Holocene transition (12-9 thousand years ago)" (van Loenen et al., 2018). The presence of Paleolithic rock images of the Muskox (*Ovibos moshatus* (Zimmermann, 1780)) along with images of wisent in the caves in Western Europe is considered an indication of the occupied habitats - open landscape and dry and cold climate during the glacial extremes in the Late Pleistocene (Stoychev & Spassov, 2003).

At present, the species is Near Threatened and spread in Belarus, Bulgaria, Germany, Latvia, Lithuania, Poland, Romania, Russia, Slovakia, and Ukraine (Plumb *et al.*, 2020).

It is supposed that the former native population of the wisent in Bulgaria was referred to as Białowieża Forest (lowland) subspecies *B. bonasus bonasus* (Linnaeus, 1758) – the only survived subspecies till nowadays. After Van Loenen et al. (2018) between 12,000 - 9,000 BP *B. bonasus* was spread in the NW Bulgaria. It was absent in the territory of the former Yugoslavia (most of pr. Western Balkans), but present in hilly-mountain Bulgaria (Pererva, 1992). The former range limit in Europe passed through Bulgaria and Greece (Zablotskiy, 1968). Plumb et al. (2020) defined Bulgaria as the southernmost area of the species' former range. About 1050 AD the southern range of *B. bonasus* in the Balkans passed through the NE Bulgarian region of Dobrudzha (Żabinski, 1947). The same is stated for the Holocene and the "early historical time" (Sokolov, 1979). It was believed to have disappeared in the country between 9th -and 10th c. AD (Spassov & Iliev, 1986).

It is also believed that *B. bonasus* was always patchily distributed in Europe, but forest expansion (12,000-8,000 BP) reduced suitable open habitats. The Neolithic agriculture "revolution" (7,000-5,000 BP) additionally pressed European bison. Spassov (1992) states that wisent was more adapted to forest habitat in comparison to Aurochs (*Bos primigenius* Bojanus, 1827). Between 9,500 and 7,000 BP, it disappeared from most of Europe. Since the 16th c. AD the species persisted in the wild only through royal protection. Between 1919 and 1927 both survived subspecies and became extinct in the wild (Plumb et al., 2020). Thus, the territory of Bulgaria as a former periphery of the range of the European bison represents a significant interest in elucidating its distribution in the past and tracing its disappearance in Europe.

Material and methods

I tried to gather all scattered published (and unpublished) data in the last 36 years on the former distribution of *B. bison* throughout the present-day territory of Bulgaria. For each locality (site) I present as much as possible complete data on the age, years, and leaders of excavations and the reference of the original published information (Table 1). All finds came from the excavated archeological localities of prehistoric, ancient, and medieval settlements. Over 3/4th of the finds were published in less accessible scattered (often regional or semi-popular) archaeological or wide-scoped editions which remained unknown to the zoological community. All they represent a valuable source for evaluating the former distribution of the wisent in the Balkans.

Abbreviations: AD - Anno Domini, BP – before present, c. – century, P. – province; v. – village.

Table 1. Localities of fossil bone remain of the European Wisent in Bulgaria

No	Locality	Province	Altitude a. s. l. (m)	Age	Years and leaders of excavations	Reference
1.	Propastta Cave	Near Gintsi v. (Sofia P.)	ca. 1080	Late Pleistocene		Neov et al. (2021)
2.	South Vitosha Cave	Near Bosnek v. (Pernik P.)	ca. 940	Late Pleistocene		Neov et al. (2021)
3.	Mladenova Dupka Cave	Near Chiren v. (Vratsa P.)	300	Late Pleistocene - Early Holocene		Neov et al. (2021)
4.	Cave in Ponor Mnt.	Near Tserovo v. (Sofia P.)	ca.800	Early Holocene		Neov et al. (2021)
5.	Durankulak	Near Durankulak v. (Dobrich P.)	26	Neolithic – Chalcolithic, 6500 - 4200 BP	1975-1980, 1990-1995, H. Todorova	Vasilev (1989); Nobis (2002); Spassov & Popov (2007)
6.	Golyamo Delchevo	Near former Golyamo Delchevo v. (Varna P.)	ca. 34	Early – Late Neolithic, 6000-4000 BP	1931, D. Zlatarski; 1968-1971, H. Todorova	Ivanov & Vasilev (1975)
7.	Ovcharovo	Near Ovcharovo v. (Targovishte P.)	294	Early Neolithic	1971-1973, H. Todorova; 1976, I. Angelova	Vasilev (1981, 1985)
8.	Kocherinovo	Near town of Kocherinovo (Blagoevgrad P.)	392	Early Neolithic to Medieval	2014, V. Vandova, R. Spasov	Z. Boev – unpubl. data
9.	Burgas	Burgas City (Burgas P.)	30	Early Chalcolithic	2008, M. Klasnakov	Spassov & Iliev - unpubl. data
10.	Malo Pole - Gradeshnitsa	Near Gradeshnitsa v. (Pleven P.)	189	Chalcolithic (5000-4000 BP)	1964-1973, B. Nikolov	N. Spassov - unpubl. data
11.	Urdoviza	Near town of Kiten (Burgas P.)	0	Early Bronze Age, 5000-4000 BP	1989-1990, M. Lazarov	Spassov & Popov (2007); Spassov & Iliev – unpubl. data
12.	Kabile	Near Kabile v. (Yambol P.)	130	Roman period, 1st-3rd c. AD	1972-1989, V. Velkov	Ribarov (1991)
13.	Dyakovo	Near Dyakovo v. (Kyustendil P.)	620	Late Antiquity, 2nd half of 3rd c. AD to 1st half of 5th c. AD. (i.e. ~250 AD — 550 AD).	2012, R. Spassov	Boev (2014)
14.	Shipot	Near Shipot v. (Vidin P.)	236	Late Antiquity, 3rd-6th c. AD	2021, Aleksandar Manev	(Boev, 2022)

15.	Garvan	Near Garvan v. (Silistra P.)	200	Middle Ages, 6th-11th c. AD	1964-1980, Zh. Vazharova	Spassov & Iliev (1986); Komitov (2016)
16.	Veliki Preslav	Near the town of Veliki Preslav (Shumen P.)	92	Middle Ages, 9th-10th c. AD	1983-1987, St. Vitlyanov	Spassov & Popov (2007); Spassov & Iliev – unpubl. data
17.	Rusokastro	Near Rusokastro v. (Burgas P.)	20	Middle Ages, 13-14th AD	2017-2019, G. Ribarov	Ribarov (2021)
18.	Ivancha	Near Ivancha v. (Veliko Tarnovo P.)	87	Middle Ages, 16-17th c. AD	2020-2021, G. Ribarov	G. Ribarov – unpubl. data

Results and discussion

Our literature reference shows that the first published data on the past presence of the wisent in Bulgaria came in 1975. It is well seen from Fig. 1 that the fossil record in Bulgaria proves the wide species' distribution in the plain and hilly landscapes in the Danubian Plain in North Bulgaria, incl. large regions of Ludogorie and Dobrudzha (Fig. 1).

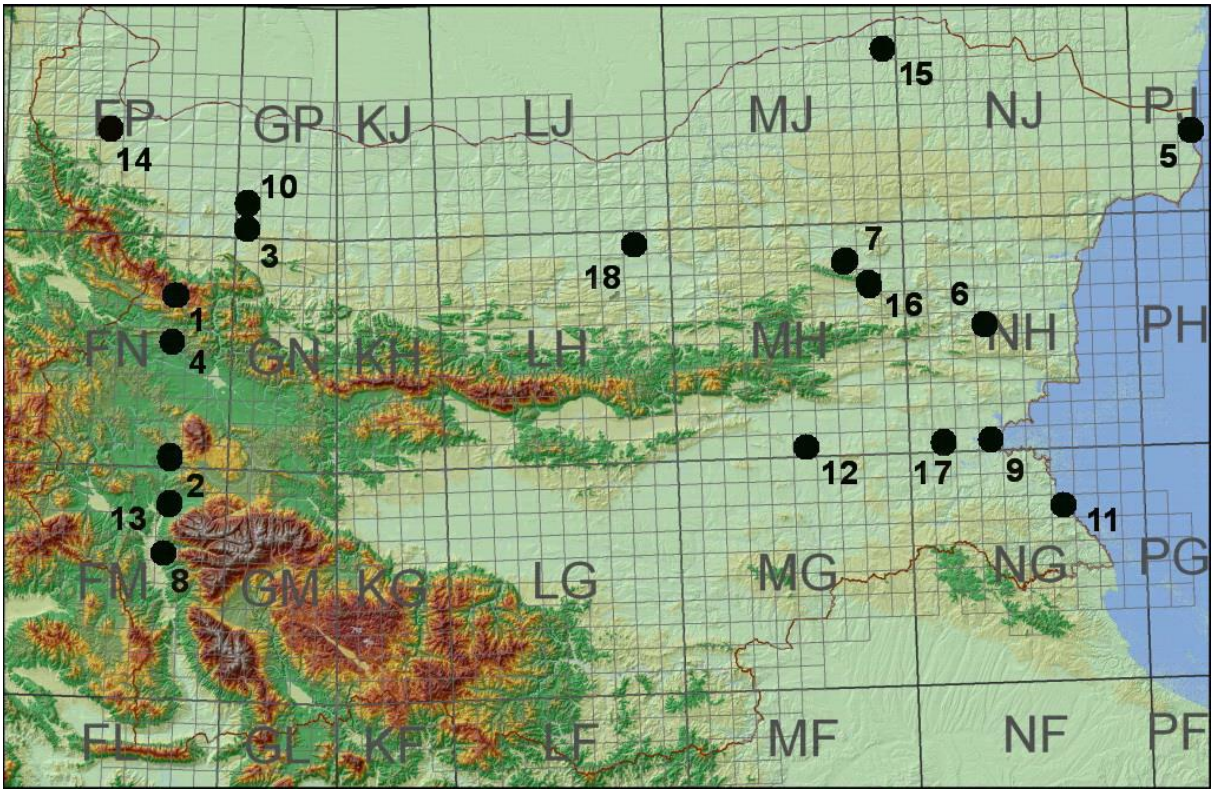

Figure 1. Former distribution of Bison bonasus in Bulgaria. Numbers correspond to the list of the localities in Table 1: Propastta Cave (1), South Vitosha Cave (2), Mladenova Dupka Cave (3), Cave in Ponor Mnt. (4), Durankulak (5), Golyamo Delchevo (6), Ovcharovo (7), Kocherinovo (8), Burgas (9), Malo Pole - Gradeshnitsa (10), Urdoviza (11), Kabile (12), Dyakovo (13), Shipot (14), Garvan (15), Veliki Preslav (16), Rusokastro (17), Ivancha (18).

The altitudinal distribution of species was confined between 0 and 1080 m a.s.l. but amajority of them were located bellow 300 m a.s.l.

Most of the finds have been found occasionally and no special paleozoological research has been undertaken. Most of thediscussed Bulgarian localities represent former human settlements. All localities presented here revealed a very scant fossil material, but it is sufficient to outline the former distribution of the wisent in the country.

As seen from Fig. 1, the wisent inhabited all lowland plain and lower hilly regions of the country – Danube Plain, Burgas Lowland, Tundzha Lowland, Struma Valley, and Dobrudzha. Only 3(4) of the 18 localities could be defined as a mountain (Nos 1, 2, 4 /and 13/; Table 1). In general, the former distribution of *B. bonasus* was more concentrated in the northeastern half of the country, where lie a total of 13 of the 18 localities. Only 5 localities have been established in the southwestern half of the present territory of Bulgaria.

B. bison and Steppe bison (*B. priscus* Bojanus, 1827) coexisted in Europe (Spassov & Stoychev, 2003; Spassov, 2016). The author supposed that this coexistence dated from the Late (and even the Middle) Pleistocene. The Bulgarian Pleistocene find of wisent excavated near Eliseyna village (Vratsa P.) in the late 1920-s (PETKOV, 1930) must be referred to *B. priscus*, based on its long and wide horncores.

After GROMOV & BARANOV (1981) *B. bonasus* appeared in the Late Pleistocene and its range covered woodland Europe and the Caucasus, except Crimea. Probably the species appeared in Southeastern Europe or the Middle East in the Late Pleistocene (Spassov & Iliev, 1986; Spassov, 2016). Neov et al. (2021) conclude that the Balkan wisent represented a relict isolated mountainous population, distinct from *B. b. bonasus* and *B. b. caucasicus*. (The extinct subspecies *B. b. hungarorum* is considered an isolated form of *B. b. bonasus* (Neov et al., 2021).)

The finds of two sites (Ovcharovo and Durankulak) are considered controversial by SPASSOV & POPOV (2007), but these authors didn't provide any arguments. After Spassov & Popov (2007) the wisent was found in the Holocene of Bulgaria "only through a few too rare and in some cases controversial bones" (p. 45). It could be stated in the 1990-s, but the situation has changed in the last decades. As seen in Table 1, all listed records in Bulgaria (except the first three, Table 1) came from the Holocene deposits. In particular, in one of the sites (Ivancha) are found several dozens of bones of *B. bonasus* (G. Ribarov – unpubl. data). Seven bones are found in Dyakovo (Boev, 2014) and three in Rusokastro (Ribarov, 2021).

Compared to another large bovine in Europe (the Aurochs), after some research, the wisent seems more rarely presented in the past due to its less-accessed woodland habitats (Spassov et

al., 2001; Spassov & Popov, 2007). We may compare wisent to another large herbivore, the Alpine Ibex (*Capra ibex* Linnaeus, 1758) in the fossil and subfossil record in Bulgaria. This wild goat nevertheless its much more less-accessed "alpine" habitats, is of surprisingly good representation (Boev, in press). We have a rather different explanation of the under-representation of the European bison in the Bulgarian fossil/subfossil record and it is related to the misidentification of most of the post-cranial bone findings by the researchers. This problem was evaluated and examined by Vasilev (1981). In most of the previous studies, the archaeozoological material was studied by veterinarians or archaeologists, rather than qualified osteologists, mammalogists, or paleozoologists.

Conclusions

The present study displaces the chronological limit of the survival of wisent in Bulgaria. The European bison survived in the country until the 16th -17th c. AD, i. e. at least 6 centuries longer than known so far.

With 3 (4) localities it proves that the species in Bulgaria existed long after the 10th century, as previously thought. The wisent was distributed mainly in the plains in places up to 300 m a. s. l., where are located over 70 percent of the known sites, although it was found in the mountains at 1080 m. a. s. l. Again, 70 percent of the localities are confined to the northeastern half of the country. In Bulgaria (and possibly most of the Balkans) the European bison was a lowland and woodland inhabitant. In the last 1000 years *B. bonasus* was still spread both in the South (Rusokastro) and the North (Garvan, Veliki Preslav, Ivancha) of Bulgaria.

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