

On the Maximum Sizes in Snake Species (Reptilia: Serpentes) from Bulgaria

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To Vladimir Beshkov, our mentor and friend

Abstract. The maximum known size for all currently living snake species from Bulgaria was estimated based on a combination of literature and new data. A comparison between the maximum size documented in Bulgaria and that in the rest of the respective species range was made. Results revealed that the maximum known size of *Platyceps najadum* was registered in Bulgaria. Up to date across all species, only three specimens (all belonging to *Dolichophis caspius*) have a reported size in excess of 2 meters. The "record" sizes of the largest species are discussed.

Key words: Colubridae, Viperidae, Typhlopidae, Boidae, morphometry, *Platyceps*, Balkans.

Introduction

The size of snakes has long been of interest to the scientific community and the general public around the world. In the popular press, as well as in some popular science publications, there is a wealth of information about "giant snakes" without specifying the origin of this information. A number of scientific publications have also indicated maximum size for some snake species, without reference to documented measurements that could be verified. The green anaconda (*Eunectes murinus* (Linnaeus, 1758)) could be used as a typical example, with maximum size established by reliable measurements standing at 8.3 m, and a

number of unconfirmed reports of specimens exceeding 12 and even 14 m (Murphy, 1997; Murphy & Henderson, 1997). In Bulgaria, there are many superstitions related not only to snake behaviour, but also to their size, the latter being significantly overestimated. In the mass media (newspapers, TV shows, internet sites, etc.), there are frequent publications that promote such misconceptions but lack any scientific justification. In this regard, the need for a scientifically sound review of the size of snakes in Bulgaria is evident.

Eighteen species of snakes are known from the territory of Bulgaria, two of which have not been found in the last 80 years (Stojanov et al., 2011). A number of

publications on Bulgarian herpetofauna (e.g. Beshkov, 1964; Beshkov & Nanev, 2002; Biserkov et al., 2007; Buresch & Zonkow, 1934; Kovachev, 1912; Stojanov et al., 2011) have stated that the Caspian Whip snake (*Dolichophis caspius*) is the largest snake in the country. In many cases, the maximum size that is known for other species of snakes is also indicated, but it is often unclear whether this size is registered in Bulgaria or applies to other parts of the range of the respective species. Targeted morphometric studies on snakes at national level have not yet been conducted.

The aim of the present work is to summarize the available data (new and published) for the maximum size of the different snake species in Bulgaria.

Material and Methods

For the purpose of this work we used all documented snake measurements (a total of 2914 measured specimens from 16 species; see Table 1), done by the authors (during field trips across Bulgaria in the period 1965-2019), as well as similar data, provided by colleagues, or derived from the mobile

application SmartBirds Pro (Popgeorgiev et al., 2015). All available scientific publications, containing original data on snake size from Bulgaria, were reviewed (publications which did not provide specific data sources, were excluded). The species *Vipera aspis* (Linnaeus, 1758) and *Vipera ursinii* (Bonaparte, 1835) were not examined, because there are only four adult specimens known from Bulgaria, and currently both species are considered extinct (see Beschkov, 2015a, b).

Data on the three largest specimens of each species from Bulgaria are presented as a total length (from the snout tip to the tail tip) in centimetres. The cited maximum size for each species (in its entire range) was derived after reviewing a great number of literary sources, but most probably this review is not complete.

Abbreviations used: Mts. = mountains; vill. = village; geographic directions were denoted by their initials; in cases of presenting original data, the author names are given as initials. The Latin names of the species are given according to Speybroeck et al. (2020).

Table 1. Origin of data and number of measured specimens by species.

Species	Author's data	SmartBirds	Total
<i>Xerotyphlops vermicularis</i>	270	31	301
<i>Eryx jaculus</i>	15	2	17
<i>Coronella austriaca</i>	99	7	106
<i>Dolichophis caspius</i>	238	126	364
<i>Elaphe quatuorlineata</i>	29	-	29
<i>Elaphe sauromates</i>	9	46	55
<i>Malpolon insignitus</i>	74	28	102
<i>Natrix natrix</i>	119	16	135
<i>Natrix tessellata</i>	84	6	90
<i>Platyceps collaris</i>	3	5	8
<i>Platyceps najadum</i>	54	5	59
<i>Telescopus fallax</i>	10	-	10
<i>Zamenis longissimus</i>	233	31	264
<i>Zamenis situla</i>	40	16	56
<i>Vipera ammodytes</i>	922	28	950
<i>Vipera berus</i>	370	-	370
Total	2567	347	2916

Results and Discussion

Data on the maximum size of snakes are presented following a catalogue principle (families in systematic order, species in alphabetical order), by first giving the largest documented sizes for the respective species in Bulgaria, and then for the species in its entire range.

Family Typhlopidae

Xerotyphlops vermicularis (Merrem, 1820)

Bulgaria: 33.2 cm (this study: Maleshevska Mts., SW Bulgaria, V.B.), 32 cm (Buresch & Zonkow, 1934), and 30.5 cm (this study: Maleshevska Mts., SW Bulgaria, V.B.).

Maximum for the species: 47 cm from the Cyprus Island (Grillitsch & Grillitsch, 1993 after Jan, 1864), but it should be borne in mind that the populations from Cyprus may represent a separate taxon in the *X. vermicularis* complex (see Kornilios, 2017).

Family Boidae

Eryx jaculus (Linnaeus, 1758)

Bulgaria: 56.5 cm (this study: near Sandanski, SW Bulgaria, 15.05.2017, M. Stanchev pers. comm. to B.N.), 51.5 cm (this study: near Srem vill., SE Bulgaria, 12.08.2004, G.P.), and 46.5 cm (Müller, 1939).

Maximum for the species: 83.8 cm from Egypt (Flower, 1933) or 87 cm (Ananjeva et al., 1998 without providing precise locality or data source, and therefore it should be taken with caution).

Family Colubridae (sensu lato)

Coronella austriaca Laurenti, 1768

Bulgaria: 76 cm (this study: near Ezeroto vill., Stara Planina Mts., 29.04.2012, N. Tzankov pers. comm. to G.P.), 75.6 cm (this study: near Balsha vill., Stara Planina Mts., 27.10.2016, A.D.), and 73.4 cm (this study: Maleshevska Mts., SW Bulgaria, 1973, V.B.).

Maximum for the species: 92 cm from Gyugavar, Azerbaijan (Nikolsky, 1916).

Dolichophis caspius (Gmelin, 1789)

Bulgaria: 204 cm (Beshkov, 1981), 203 cm (Telenchev et al., 2019), and 202 cm (Stojanov et al., 2011). The size "2080 mm", given by Stojanov et al., 2011 (after Petrov et al., 2006) is based on misinterpretation (and incorrect summation) of data for a specimen from Gospodintsi (see page 896 in Petrov et al., 2006), so the following clarification is required (B. Petrov pers. comm. to B.N.): the measure " $L_{\text{body}} = 168 \text{ cm}$ " refers to the entire length of the snake, and not only to the body, despite that the tail length is given separately.

Maximum for the species: about 215 cm (injured tail) from the Samos Island, Greece (Cattaneo, 2003); without providing the data source, Arnold & Burton (1978) mention that in Europe, the species reaches to 250 cm, and this size is given later as maximal in many other publications (also without providing the data source), e.g. Engelmann et al. (1985), Ananjeva et al. (1998), Arnold & Ovenden (2002), Valakos et al. (2008), and Speybroeck et al. (2016).

Elaphe quatuorlineata (Bonnaterre, 1790)

Bulgaria: 176 cm (Beshkov, 1981), 168.1 cm (this study: near Kresna, SW Bulgaria, 01.10.2018, A.D.) and 166 cm (this study: Pirin Mts., SW Bulgaria, 1971, V.B.).

Maximum for the species: 180 cm from the Skiathos Island, Greece (Cattaneo, 1999); larger sizes are given by Speybroeck et al. (2016): 250 cm, and Böhme & Ščerbak (1993, after Bruno, 1966): 240 cm, but without providing any other information.

Elaphe sauromates (Pallas, 1811)

Bulgaria: 175 cm (Buresch & Zonkow, 1934), 173.5 cm (this study: near Mladinovo vill., SE Bulgaria, 11.06.2012, N. Tzankov pers. comm. to G.P.), and 160 cm (this study: near Rechitsa vill., SE Bulgaria, 04.06.2012, D. Dobrev pers. comm. to G.P.).

Maximum for the species: about 180 cm (injured tail) from Cernavodă, Romania (Kiritzescu, 1901); without providing the data source, Fuhn & Vancea (1961) mention

260 cm, Speybroeck et al. (2016) – 250 cm, and Ananjeva et al. (1998) – 200 cm.

***Malpolon insignitus* (Geoffroy de St-Hilaire, 1827)**

Bulgaria: 167 cm (Pulev et al., 2018), 156.8 cm (Beshkov & Nanev, 2002), and 154 cm (this study: near Arkutino, Southern Black Sea coast, 24.06.2017, R. Georgieva pers. comm. to G.P.).

Maximum for the species: 200 cm from Jordan (Amr & Disi, 2011) and 182 cm from Egypt (Anderson, 1898); the larger sizes, mentioned in the literature, refer to the western part of the range of the genus *Malpolon*, which is occupied by *M. monspessulanus* (see De Haan, 1999).

***Natrix natrix* (Linnaeus, 1758)**

Bulgaria: 163 cm and 148 cm (this study: near Shipka vill., Stara Planina Mts., 11.06.2017, A. Sokolov and D. Alfrey pers. comm. to B.N.), about 145 cm (this study: near Konstantinovo vill., Thracian Lowland, 27.06.2012, G.P.; a part of the tail of this specimen was torn off, and the body length without the tail was 118 cm, so the total length given here, was derived by calculating the possible tail length according to published mean values for the proportion body/tail in females (see Kabisch, 1999)).

Maximum for the species: 205 cm from the Veglia (= Krk) Island, Croatia (Schreiber, 1912).

***Natrix tessellata* (Laurenti, 1768)**

Bulgaria: 114 cm (this study: near Kresna, SW Bulgaria, 1973, V.B.), 112 cm (Buresch & Zonkow, 1934; this study: near Karlukovo vill., Western Predbalkan Mts., 11.05.2019, A.D., M. Slavchev and N. Stanchev), and 111 cm (this study: near Kresna, SW Bulgaria, V.B.).

Maximum for the species: up to 200 cm in the Cyclades, Greece (Schreiber, 1912).

***Platyceps collaris* (Müller, 1878)**

Bulgaria: 74.4 cm (this study: near Primorsko, Black Sea coast, 2014, N. Tzankov

pers. comm. to G.P.), 71 cm (Rehák, 1986), and 67 cm (Bartosik et al., 1981).

Maximum for the species: 112 cm and 111.9 cm from Jerusalem, Israel (respectively Rehák & Obst, 1993 and Rehák, 1986).

***Platyceps najadum* (Eichwald, 1831)**

Bulgaria: 152 cm (Stojanov et al., 2011), 150.3 cm (this study: Kresna Gorge, SW Bulgaria, 01.06.2014, A.D.), and 149 cm (Stojanov et al., 2011).

Maximum for the species: we could not find published data for larger size of this species, than the above mentioned (for example: 135 cm as a maximum length in Darewskij & Ščerbak, 1993, and 140 cm – in Speybroeck et al. 2016).

***Telescopus fallax* Fleischmann, 1831**

Bulgaria: 95 cm (this study: Maleshevska Mts., SW Bulgaria, 1971, V.B.), 90 cm (this study: Kresna Gorge, SW Bulgaria, 25.08.1991, B.N.), and 88.7 cm (this study: Kozhuh hill, SW Bulgaria, 1976, S. Vamporov pers. comm. to V.B.).

Maximum for the species: 120 cm from the former Yugoslavia (Grillitsch & Grillitsch, 1999 after Bruno & Maugeri, 1990) or 130 cm (Chmelík, 1992 without providing the data source).

***Zamenis longissimus* (Laurenti, 1768)**

Bulgaria: 176 cm (this study: near Dazhdovnitsa vill., Eastern Rhodopes Mts., 13.06.2018, G.P. and V. Vergilov), 162.6 cm (this study: near Chuypetlovo vill., Vitosha Mts., 28.04.2017, A.D.), and 154 cm (this study: near Konush vill., Eastern Rhodopes Mts., 2012, G.P.).

Maximum for the species: 225 cm from Krems, Austria (Luttenberger, 1978).

***Zamenis situla* (Linnaeus, 1758)**

Bulgaria: 104.6 cm (Moravec & Böhme, 2005), 103 cm (this study: Maleshevska Mts., SW Bulgaria, 1971, V.B.), and 99.5 cm (this study: Kresna Gorge, SW Bulgaria, 11.05.1998, B.N.).

Maximum for the species: about 116 cm (injured tail) and 112 cm from Italy (Bruno,

1969); without providing the data source, Speybroeck et al. (2016) give 120 cm as a maximal length.

Family Viperidae

Vipera ammodytes (Linnaeus, 1758)

Bulgaria: 87 cm (Stojanov et al., 2011), 86 cm (this study: near Rupite vill., SW Bulgaria, 2003, G. Krastev pers. comm. to B.N.), 85 cm (Beschkov, 1977 and Stojanov et al., 2011).

Maximum for the species: 110 cm from Carinthia, Austria (Sochurek, 1974).

Vipera berus (Linnaeus, 1758)

Bulgaria: 64 cm (this study: near the Ray hut, Stara Planina Mts., 1970, V.B.), 63 cm (this study: near the Mutorok peak, Pirin Mts., 1972, V.B.), and 62 cm (Buresch & Zonkow, 1932).

Maximum for the species: 104 cm from Sweden (Smith, 1919).

Conclusions

Our results indicate that presently in Bulgaria only three snake specimens have a confirmed length of slightly over 200 cm and they all belong to the species *Dolichophis caspius*. The other Bulgarian species could be grouped as follows: species with a maximum registered length of over 170 cm but below 200 cm (*Zamenis longissimus*, *Elaphe quatuorlineata*, and *E. sauromates*), species with a maximum length over 140 cm but below 170 cm (*Malpolon insignitus*, *Platyceps najadum*, and *Natrix natrix*), and species with a maximum length below 120 cm (the rest 11 species, including the two extinct vipers).

The maximum length for the three largest species across their whole ranges is given only in publications with scientific-popular character (i.e. not presenting original data or direct citations of other publications). Accordingly, the length of 250 cm for *D. caspius*, 260 cm for *E. sauromates* and 250 cm for *E. quatuorlineata* should be considered doubtful, at least until the

specific sources of these data are identified. Our efforts in this regard were unsuccessful.

When comparing the maximum documented size of Bulgarian specimens with the published ones for the respective species in their entire ranges, it is evident that in Bulgaria most species do not reach a length close to the known maximum. This may be due to both the influence of specific environmental factors and the lack of detailed morphometric studies in the country. The only exception is the species *Platyceps najadum*, the largest known specimens of which are registered in Bulgaria.

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