





# New records of *Xerotyphlops vermicularis* (Merrem, 1820) indicate the northernmost locality of the species in the Balkan Peninsula

Teodora Koynova<sup>1</sup>, Pavlina Marinova<sup>1</sup>, Nikola Stanchev<sup>2</sup>, Nikolay Natchev<sup>1,3</sup>, Daniel Jablonski<sup>4\*</sup>

<sup>1</sup> Department of Biology, Shumen University, Shumen, Bulgaria • TK: [t.koynova@shu.bg](mailto:t.koynova@shu.bg)  <https://orcid.org/0000-0001-9044-6708> • PM: [pepitymarinova@gmail.com](mailto:pepitymarinova@gmail.com) • NN: [natchev@shu.bg](mailto:natchev@shu.bg)  <https://orcid.org/0000-0002-0416-8738>

<sup>2</sup> Department of Zoology and Anthropology, Sofia University “St. Kliment Ohridski”, Sofia, Bulgaria • [nikolastanchev@abv.bg](mailto:nikolastanchev@abv.bg)

<sup>3</sup> Department for Integrative Zoology, Vienna University, Vienna, Austria • [natchev@shu.bg](mailto:natchev@shu.bg)  <https://orcid.org/0000-0002-0416-8738>

<sup>4</sup> Department of Zoology, Comenius University in Bratislava, Bratislava, Slovakia • DJ: [daniel.jablonski@uniba.sk](mailto:daniel.jablonski@uniba.sk)  <https://orcid.org/0000-0002-5394-0114>

\* Corresponding author

## Abstract

The *Xerotyphlops vermicularis* (Merrem, 1820) complex consists of small, burrowing snakes that occur from the Balkan Peninsula to Afghanistan and are mostly observed during the spring. We report new records of this snake (10 individuals observed) from Elenite village in coastal Bulgaria. According to current knowledge, they represent the northernmost locality of the species in the Balkan Peninsula. We expand the known distribution of *X. vermicularis* and fill information gaps.

## Keywords

Eurasian Blind Snake, geographic distribution, range extension, reptiles, Typhlopidae

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## Introduction

The *Xerotyphlops vermicularis* (Merrem, 1820) complex (Kornilios et al. 2020) represents the only native species of scoleophidian snakes in Europe and one of the few species of “thread snakes”, which are able to inhabit temperate climate zones (Stojanov et al. 2011). According to molecular data, European populations belong to so-called “clade I” sensu Kornilios (2017). In the Balkans, the range of the species was described in detail (Grillitsch and Grillitsch 1993; Stanchev 1996; Darevsky 1997; Sillero et al. 2014; Jablonski and Balej 2015; Mizsei et al. 2017; Jablonski et al. 2019), as mostly restricted to Mediterranean parts of the peninsula. To date, the

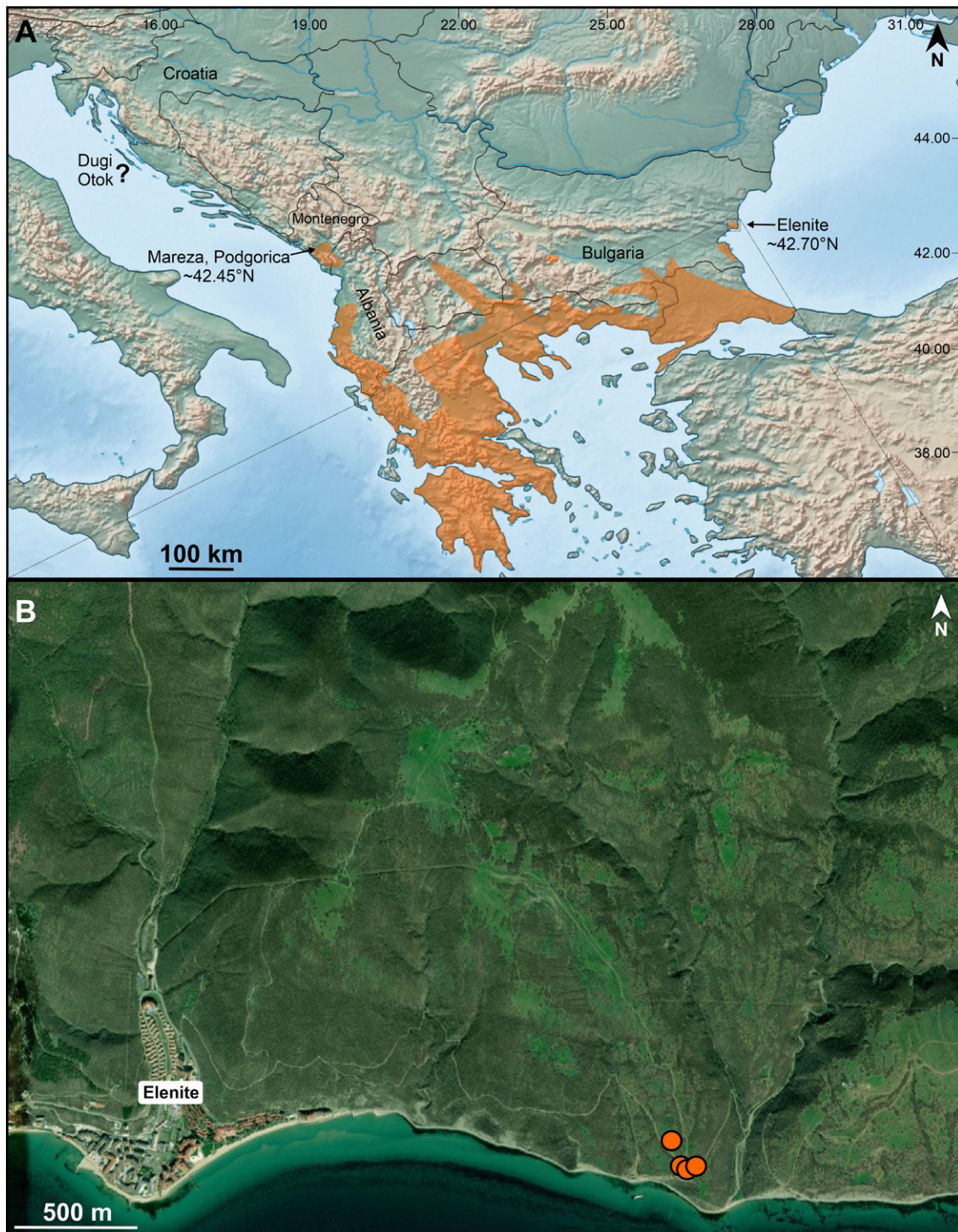
northernmost confirmed native population is in the area of Podgorica, Montenegro (Gvozdenović 2020) which extended the northern limit of the species from northern Lake Skadar in Montenegro (Crnobrnja-Isailović and Džukić 1995; Aghasyan et al. 2017). The species was also reported from Dugi Otok, an island in Croatia (Grillitsch et al. 1999), although this record was considered unreliable and to date the species is considered as not occurring in Croatia (Schmidt et al. 2020).

The Eurasian Blind Snake has been reported from several scattered sites in southern Bulgaria, in the warm valleys of the Struma River (SW Bulgaria), the lower

Maritsa River (Harmanli region), the Arda River (eastern Rhodope Mountains), western Rhodope Mountains, the Tundja River, and along the Black sea coast, south of Burgas (Stanchev 1996; Beshkov and Nanev 2002; Stojanov et al. 2011). Recently, Jablonski et al. (2019) revised the existing data on the occurrence of *X. vermicularis* along the Bulgarian Black Sea coast and provided three new localities where the species was found, all between the towns of Sozopol and Primorsko. These established a new northern distribution record on the Black Sea coast.

## Methods

On 17 May 2021 during a biodiversity assessment survey on the southern base of Emenska Mountain near the town of Elenite on the central coast of Bulgaria, our team found 10 specimens of *X. vermicularis* (Fig. 1). Specimens were captured by hand, measured, photographed, and released immediately at the point of capture. The survey was conducted under permit 863 issued by the Bulgarian Ministry of Environment and Water,



**Figure 1. A.** Distribution of *Xerotyphlops vermicularis* on the continental Balkan Peninsula (colored orange) showing both northernmost localities recorded to date, Mareza (Gvozdenović 2020) and Elenite (this study). The question mark indicates the position of Dugi otok (island) in Croatia (Grillitsch et al. 1999). **B.** Orange circles show the locations of observed individuals east of Elenite village, Bulgaria.



Sofia, Bulgaria. The animals were photographed using a Panasonic Lumix DMC-FZ1000 II (Panasonic Corporation, Osaka, Japan), and their locations were recorded using a hand-held Garmin Etrex 30 GPS receiver (Garmin International Inc., Kansas, USA). The datum used for recording geographical coordinates was WGS84. The total length of all individuals was measured in the field. The updated map of the geographic distribution of *X. vermicularis* was built using the QGIS Development Team (2021).

## Results

Order Squamata

Family Typhlopidae

Genus *Xerotyphlops* Hedges, Marion, Lipp, Marin & Vidal, 2014

### *Xerotyphlops vermicularis* (Merrem, 1820)

Figure 2

**New records.** BULGARIA – Burgas • Elenite • 42.7024°N, 027.8395°E; 49 m a.s.l.; 17.V.2021; TK, PM, NN obs.; under flat stones in a meadow with bushes and scattered deciduous trees on a steep slope 99 m from the sea; 5 individuals (Fig. 2) • 42.7024°N, 027.8402°E; 52 m a.s.l.; 17.V.2021; TK, PM, NN obs.; under flat stones in a meadow with bushes and scattered deciduous trees

on a steep slope 134 m from the sea near an abandoned one-storey building; 2 individuals • 42.7023°N, 027.8404°E; 48 m a.s.l.; 17.V.2021; TK, PM, NN obs.; under flat stones in a meadow with bushes and scattered deciduous trees on a steep slope 136 m from the sea near an abandoned one-storey building; 2 individuals • 42.7033°N, 027.8394°E; 65 m a.s.l.; 17.V.2021; TK, PM, NS, NN obs.; under flat stones in a meadow with bushes and scattered deciduous trees 186 m from the sea; 1 individual.

The total length of all individuals ranged from 200 to 250 mm, which indicates that all of the animals were adults, according to Stanchev (1996). The five individuals observed together were initially tangled; however, no copulation activities were detected.

**Identification.** The observed species is the only native member of the family Typhlopidae Merrem, 1820 in Europe, and it cannot be confused with any other native snake. For characteristics of the species, see Speybroeck et al. (2016).

## Discussion

This is the first record of *Xerotyphlops vermicularis* north of the Gulf of Burgas (Stojanov et al. 2011; Jablonski et al. 2019). The new records extend the known distribution 32 km north of the previous record south of the Gulf of



**Figure 2.** Five individuals of *Xerotyphlops vermicularis* found under a flat rock on the southern slope of Emenska Mountain, Elenite village, Bulgaria.

Burgas (Jablonski et al. 2019). The new records also represent the northernmost location in the entire continental Balkan Peninsula (Fig. 1). The previous northernmost native population is in the vicinity of Mareza, Podgorica (Montenegro), on the Adriatic side of the peninsula, at approximately 42.45°N (Gvozdenović 2020). This record is slightly south of our new record from Elenite (approximately 42.70°N). Further investigations throughout the peninsula are, however, needed to define the northernmost range of this scoleophidian snake in Europe.

To date, most of the findings of the snake along the Bulgarian Black Sea coast were of solitary individuals (Jablonski et al. 2019). This is why previous authors discussed possible unintentional anthropogenic introduction (origin possibly from Greece) of the species in this part of Bulgaria. However, this new record supports native origin and highlights our insufficient knowledge on the species distribution in the country.

Our data confirm a form of grouping behavior for *X. vermicularis* during their mating period. Stanchev (1996) reported that several subadults of *X. vermicularis* may group under a stone or a rock during the spring and early summer. Similar behavior was reported for the species in Bulgaria from Kozhuh ridge, Ribnik village, Kresna gorge, and Oranovo gorge (Pulev et al. 2018).

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