

A new record of *Dendrobaena Serbica* karaman, 1973 (Clitellata; Lumbricidae) from Serbia

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Abstract: The new records of the little-known Balkan endemic species *Dendrobaena serbica* Karaman, 1973 from Kopaonik Mountain, Serbia, are reported. So far, the species has been recorded at four localities: three localities in Serbia (Čakor, Kragujevac, Niš) and one locality in Montenegro (Prokletije Mountain). The first records were from 1973 from the locality in southwestern Serbia (Čakor, Prokletije). A review of the geographical distribution of *D. serbica* is presented. The confirmed geographical distribution of the species includes only the territories of the Republic of Serbia and Montenegro. Also, its distinction from the taxonomic similar congeners *Dendrobaena illyrica* (Cognetti de Martiis, 1906), *Dendrobaena sasensis* Šapkarev 1983 and *Dendrobaena vej dovskyi* (Černosvitov, 1935) is discussed. Further, the habitats of this species are restricted to the uppermost litter layer in forest soil and humid forests near stream banks. This paper summarized the knowledge of the taxonomy, ecology, and distribution of a little-known Balkan endemic species *D. serbica*.

Keywords: a new record, *Dendrobaena serbica*, earthworm, Serbia

1. Introduction

The total number of the species within the genus *Dendrobaena* Eisen, 1873 is estimated at about 92 species [1], of which 25 are endemics of the Balkan Peninsula [2]. Previous faunistic studies have revealed 14 species of the genus *Dendrobaena* in Serbia, of which only four are endemic– *Dendrobaena kozuvensis* (Šapkarev 1971), *Dendrobaena rhodopensis* (Černosvitov 1937), *Dendrobaena serbica* Karaman 1973 and *Dendrobaena zicsi* Karaman 1973. *Dendrobaena serbica* is one of the smallest earthworms known only in a few localities in Serbia [3], was first recorded in Serbia in the early 1970s from the Prokletije Mountain [4].

In this article, we summarise data on the distribution of *D. serbica* in Serbia and provide information on some taxonomic and ecological characteristics of the species.

2. Material and Methods

Dendrobaena serbica was recorded twice during the sampling on the eastern slopes of Kopaonik Mountain: in 2020 and 2021. The samples were collected on the forest soil. Earthworms were collected by digging (0.4 × 0.4 m²), hand sorting (by turning over rocks, debris, and logs) and then fixed in 96% alcohol. Species identification was done in accordance with the key by Karaman [4] and Stojanović et al. [3]. The specimens were deposited at the Earthworm Collection of the University of Kragujevac, Serbia (CEKUS). The main taxonomic differences between *D. serbica* and its Balkan congeners (*Dendrobaena illyrica* (Cognetti de Martiis, 1906), *Dendrobaena sasensis* Šapkarev, 1983 and *Dendrobaena vejvodskyi* (Černosvitov, 1935)) are presented according to their original descriptions and the features mentioned in the different identification keys. The map of the distribution of the species was created with Google Maps.

3. Results and Discussion

Dendrobaena serbica Karaman, 1973

(Figure 1)

Dendrobaena serbica Karaman, 1973: 180.

Dendrobaena serbica Šapkarev, 1993: 17; Stojanović et al., 2008: 60; Csuzdi, 2012: 97–99; Trakić et al., 2016: 263; Stojanović et al., 2018: 139; Stojanović-Petrović et al., 2020: 163–164.

Material examined. CEKUS/2806, CEKUS/2807, CEKUS/2808, CEKUS/2809 CEKUS/2810, 5 exp., Serbia, Kopaonik Mt. (Lukovska Banja), 43.16 N 21.03 E, beech forest, M. Stojanović, T. Trakić, J. Sekulić and F. Popović, 11.03.2020; CEKUS/2812, CEKUS/2813, CEKUS/2814, CEKUS/2815 4 exp., Serbia, Kopaonik Mt. (Kuršumlijska Banja), 43.25 N 20.69 E, oak forest, M. Stojanović, T. Trakić, J. Sekulić and F. Popović, 04.05.2021; CEKUS/2818, CEKUS/2819 2 exp., Serbia, Kopaonik Mt. (Metode), 43.3 N 20.85 E, river bank, M. Stojanović, T. Trakić, J. Sekulić and F. Popović, 21.06.2021.



Figure 1. A living specimen of *Dendrobaena serbica*

The species *D. serbica* was found and described by Karaman [4] and our studied specimens fully agree with her description. During this study, 11 specimens of *D. serbica*

were examined and three records were mapped (four from the literature) (Figure 2). *Dendrobaena serbica* is a broad-range Balkan endemic, characteristic of the Balkan part of Serbia and Montenegro [3, 5]. Based on literature data, the species *D. serbica* inhabits pastures and meadows [3, 4]. However, we found this species lives in the uppermost litter layer in forest soil and humid forests near stream banks. According to Bouché's ecological characterization, *D. serbica* belongs to the epigeic group.

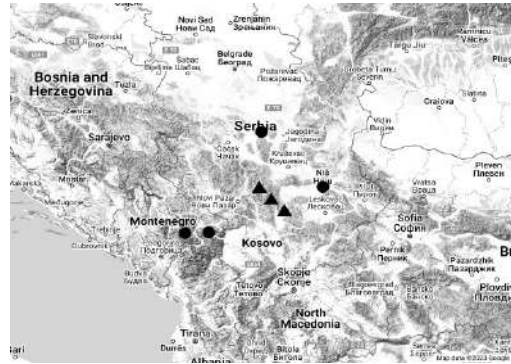


Figure 2. Distribution of *Dendrobaena serbica* (triangle: author's data; circle: literature data)

Dendrobaena serbica is taxonomically different from the similar species *D. illyrica* and *D. sasensis* by the absence of a tubercle, while it differs from the species *D. vej dovskiji* by the absence of a tubercle and the number of seminal vesicles (Table 1).

Table 1. Comparison of some taxonomic characteristics of the Balkan endemic species *Dendrobaena serbica* with its Balkan congeners.

T. characters	<i>D. serbica</i>	<i>D. illyrica</i>	<i>D. sasensis</i>	<i>D. vej dovskiji</i>
Body size	53–89	76–112	65–76	20–50
Body color	dark violet	dark violet	dark violet	dark violet
Prostomium	Epilobous	epi/tanilobous	Epilobous	Epilobous
S. vesicles	9–12	9–12	9–12	11,12
Spermathecae	9/10, 10/11	9/10, 10/11	9/10, 10/11	9,10
Clitellum	½ 29, 29–33, ½ 34, 34	½ 28, 28, 29–33, 34	29–34	½ 28, 29–33
Tubercle	Absent	(30)31–32(33)	31–32	31–32

3. Conclusions

According to Csuzdi & Zicsi [6], the genus *Dendrobaena* is heterogeneous very much and urgently needs a revision. Balkanic taxonomists of earthworms are taxonomically similar species that are difficult to distinguish; they have been described as new species, which raises doubts about their identity. On the other hand, it is known that earthworms absent some taxonomic characters and secondary sexual organs in varying degrees of development [7]. Some authors [8, 9] consider that the absence of tubercula indicates a form of parthenogenesis. Basically, little is known about the origin of parthenogenetic earthworms. The question arises: is the species *D. serbica* actually a parthenogenetic form

of the species *D. illyrica*? The molecular-phylogenetic analysis will be very useful in elucidating this topic in the near future. Also, the current earthworm species checklist for the whole of Kopaonik Mt. was updated by recording 29 taxa [10, 11]. We expect despite understudied the eastern slopes of Kopaonik Mt., future samplings will likely yield many more species, among them many endemic ones.

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