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DISTRIBUTION OF ENDEMIC SPECIES *CERNOSVITOVIA DUDICHI* IN SERBIA

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Abstract:

The genus *Cernosvitovia* consists of nine species in the whole world. Out of the nine species, eight species are with primary distribution in the eastern part of the Balkan Peninsula (except *Cernosvitovia schweigeri*). In the Lumbricidae fauna of Serbia, seven species from this genus have been registered. Among them, 6 taxa are endemic. The aim of this paper is to present new data of the endemic species *Cernosvitovia dudichi* Zicsi & Šapkarev, 1982, based on the current taxonomic status of species, literature data, and our unpublished data. In this paper, we have summarized the knowledge on the geographic distribution, biology, and habitat *C. dudichi* in Serbia. Our recent investigations have revealed new records for *C. dudichi* in Central Serbia. After 30 years, this species was found in another place in this area, in Goč Mt. New locality suggests that *C. dudichi* possess a wider range than it was previously thought.

Key words: earthworm; endemic species; *Cernosvitovia dudichi*; Serbia

1. Introduction

The species from genus *Cernosvitovia* are distributed on the Balkan Peninsula, in the Southern Carpathians and Asia Minor [1, 2]. Genus *Cernosvitovia* is a typical endemic genus with a total of nine species that have been described so far (eight are from the Balkans and one species from the Marmara region of Asia Minor). According to the literature Stojanović et al. [3], it seems that the species diversity from genus *Cernosvitovia* is the highest in Serbia. Out of the seven species, six are endemic, most widespread along with the Serbo-Macedonian tectonic plate. It spreads primarily throughout the Rhodope (Balkan) tectonic plate. The high number endemic of *Cernosvitovia* species in Serbia is obvious even in comparison with neighboring zones, where recent studies serve as a comparison [3].

Cernosvitovia dudichi Zicsi & Šapkarev, 1982 was the first described in Serbia, Jastrebac Mt. [4] and, has not been reported another place so far. *C. dudichi* belongs to the endemic species [5], distributed in a southeast part of the Balkan Peninsula. Until now, the southernmost limit of the species is the central part of Serbia [4-7]. Our recent investigations have revealed new records for *C. dudichi* in Serbia. After 30 years, this species was found in another place in central Serbia. A new investigated locality (Goč) could contribute to better insight into the spread of this species.

The objective of this paper is to analyze the whole list of records of *C. dudichi* to present a general overview of its distribution on the Balkan Peninsula. Additionally, our study records an extension of the known distribution of *C. dudichi* to the northwest.

2. Material and methods

We used data on species obtained from the old Institute's collection (from Faculty of Science, Kragujevac, Serbia) that relate to undetermined material collected in the central part of Serbia. All published and unpublished data currently known were included. Earthworms were collected by the formalin method, digging (0.4 x 0.4 m) and hand sorting (as well as by turning over rocks, debris, and logs. The earthworms were killed in 70% ethanol, immediately fixed in 4% formalin solution, and later stored in 90% ethanol. The collected species were identified in the laboratory of the Faculty of Science in Kragujevac, Serbia. Species identification was made according to the complex features provided in Šapkarev [8], Zicsi [9] Mršić [6], Csuzdi & Zicsi [1] and, Blakemore [10].

3. Results and Discussion

***Cernosvitovia dudichi* Zicsi & Šapkarev, 1982**
Cernosvitovia dudichi Zicsi & Šapkarev, 1982: 181.
Cernosvitovia dudichi: Karaman 1987: 71; Trakić *et al.* 2016: 259; Stojanović *et al.* 2018: 135.
Cernosvitovia (Zicsiona) dudichi: Mršić & Šapkarev 1987: 71; Mršić & Šapkarev 1988: 13; Mršić 1991: 149; Csuzdi 2012: 97–99.

Description of the species
Body cylindrical, the length of body 82-132 mm, and consisting of 173-191 body segments. The prostomium is epilobous. The first dorsal pore is in intersegmental groove 8/9. The male aperture openings on the 26th segment. The distance between the hetae in the precliteral part is *2bc = aa*; *bc = 3ab* and in the postclitheral part *ab = 1.5bc; ab = cd*. Glandular papillae surround setae *ab* on 12th, 15th, 17th or 12th, 15th, 18th, 20th and 34th or 13th, 15th, 17th, 22nd and, 23rd segments. The clitellum extends from the 23-32 segment. The *tubercula pubertatis* is located on the 24-31 segment (Fig. 1). The septa are thickened from 5/6 to 8/9. Four pairs of seminal vesicles in the 9th to the 12th segment. Lateral hearts 6-11. The crop occupies segments 15-16 and the gizzard is in 17-19. Testes and sperm funnels in 10 and 11 segments, free. Two pairs of spermathecae in the 11th and 12th segments. The calciferous glands have lateral tubercles in the 9-12 segment.

Fig. 1. Anterior part of the body of species *Cernosvitovia dudichi*
source [6]

Ecology: *Cernosvitovia dudichi* inhabits meadows and oak forests [5,11]. It belongs to the endogeic species.
Distribution in Serbia: Jastrebac, 1 exp., oak forest, 25.11.1979. [4-7].
Old Institute collection: Goč, 3 exp., oak forest, 13.04.2009.; 1 exp., meadows, 18.04.2009. (Fig. 2).
General distribution: *Cernosvitovia dudichi* is an endemic species, recorded in the central part of Serbia [3].
Remarks: Analysis of a very old Institute collection has shown that *C. dudichi* is also present at one place in the central part of Serbia.

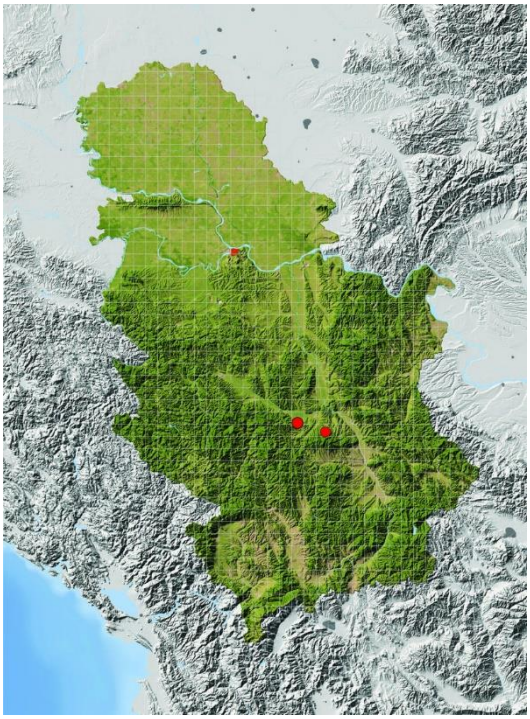

Fig. 2. Distribution of *Cernosvitovia dudichi* in Serbia
(UTM 10 x 10 km)

The geomorphology of the Balkan Peninsula, a somewhat warmer climate, and its position in relation to most of Europe have enabled the Balkan Peninsula, including the territory of Serbia, to become one of the most important refuge centers of European fauna, which is the reason for great biodiversity. The largest number of endemic species, in Europe, is represented in the Balkan and Iberian Peninsula and to a lesser extent in the Carpathians and Caucasus [12,13]. The cause of this wealth lies in the specific geographic location of Serbia, on the border between two biogeographical regions (Pannonian and Balkan). So far, recorded 77 taxa from 13 genera [3], with as many as 25 endemic taxa. Among the endemics, there are several typical ones that exclusively occur in the Balkan Peninsula. Such are the endemics from the genus *Cernosvitovia*, which is classified in the archaic group. These are archaic (old) species that, with their adaptability to specific conditions, have survived to this day. Archaic species are now present in the Balkans, the Pyrenees and the Apennine Peninsula, the northwestern part of Africa (Maghreb), the southern part of France, Sardinia, Corsica, the southern parts of Switzerland and the Czech Republic, Turkey, and the central parts of Asia. Today, these archaic species are relics or endemic forms that possess more of certain adaptive properties than the relic elements (*Cernosvitovia biserialis, C. crainensis, C. dudichi, C. getica*). Based on the number of endemic *Cernosvitovia* species in the Balkans, it is clear these areas are the most important centers of diversity of this genus. So far, *C. dudichi* has been found at high altitudes from 1000 to 1,500 m a.s.l. These data together with our results indicate that the habitat of *C. dudichi* is mainly in the high mountains. Considering en extension of the distribution of *C. dudichi* to the northwest, it is possible to assume that the species of this genus are mostly spread along with the Serbo-Macedonian tectonic plate.

4. Conclusion

Despite our intensive search, *C. dudichi* has not been found in other regions of the central parts of the Balkans. Nevertheless, the very fact that *C. dudichi* has occurred in the new locality, gives us the right to expect further expansion of a greater number of individuals into Serbia. Our knowledge of the distribution and abundance of *C. dudichi*, is still imperfect. However, new findings greatly expand the known range of the species and genus. Therefore, our study serves as a guideline and stimulus for further work on its improvement and revision.

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