

DIVERSITY OF EARTHWORMS (CLITELLATA: OLIGOCHAETA) FROM SERBIAN SIDE OF ŠAR MOUNTAIN

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Abstract:

This paper presents the currently known records on the diversity of earthworm fauna on Šar Mountain. The Šar Mt. is located in the south part of Serbia and is a part of the Šar-Pindus Mountain system. The complete list of present taxa of the family Lumbricidae in the researches area was formed by reviewing data from old collections, relevant literary sources and by its own field research in the period from 2019 to 2020. The list comprises 24 taxa, belonging to 10 genera of the family Lumbricidae. The genera with the largest number of the registered taxa are *Dendrobaena* (7) and *Aporrectodea* (5), while the genera *Bimastos*, *Eiseniella*, *Helodrilus*, *Octodrilus* and *Octolasion* are represented by one taxon. With respect to the zoogeographical analysis, the majority of the recorded taxa belong to the group of peregrine species (12). The endemic species are represented by two taxa and belong to the genera *Dendrobaena* and *Helodrilus*. The Balkan endemic subspecies *Helodrilus balcanicus plavensis* (Karaman, 1972) and illyric *Dendrobaena illyrica* (Cognetti, 1906), were recorded on new sites from the Šar Mt., that represent the southernmost limits of the geographical range of these species at the moment.

Key words: earthworms, Šar Mountain, zoogeography distribution

1. Introduction

The Šar Mountain is situated in the central part of the Balkan Peninsula, with the main ridgeline that is 85 km long, making the natural border line between Serbia in the North and North Macedonia in the South, partially between Serbia and Albania in the West. From the main plateau of Šar Mountain, having an average altitude of 2.000 to 2.100 m, 25 peaks are rising, reaching an altitude of more than 2.500 m. The highest peaks are Titov vrh (2.747 m) and Bistra (2.651 m). Šar Mountain marks the beginning of a separate morphotectonic massif of the Dinaric Alps, known in classical geological and geomorphological literature as the Šar-Pindus Mountain system. This mountain is distinguished the complex paleo-geographical changes in the past, refugial character during the Ice Age, very complex floristic composition, as well as a combination of various ecological conditions changing in a small area [1]. In biogeographical terms, Šar Mt. belongs to Mediterranean Central European, boreal and Central-South-European mountain region [2]. The earthworm fauna of Serbia is quite well-known. Stojanović et al. [3] recorded the presence of 77 lumbricid taxa in the country. It is worth mentioning that most of the earlier researches focused mainly on northern, western central and eastern Serbia [4-8], while only a few collecting expeditions were led to the areas of this mountain range.

The aim of this paper is to present the results of the recent collectings as well as the unpublished and literature data on the earthworm fauna in order to document the lumbricid diversity of the Šar Mt. and zoogeographical distribution of the taxa.

2. Material and Methodes

Our researches were carried out in 2019-2020 on the Šar Mountain (42°05' N; 20°50'E). Earthworms were collected using the diluted formaldehyde method complemented with digging (0.4 x 0.4 m²) and hand sorting as well as turning over rocks, debris and logs. Species identification was made according to the complex features provided in Mršić [9], Csuzdi & Zicsi [10] and Blakemore [11]. For each species in the list below, we represents distribution from literature data, unpublished data (name of collection/number in the collection, number of species, locality, habitat, date of sampling), author's data (number of species, locality, habitat, date of sampling) and zoogeographical distribution type as proposed by Csuzdi et al. [12].

3. Results and Discussion

The present research resulted in reporting altogether 24 earthworm taxa from different parts of the Šar Mt. The genera *Dendrobaena* and *Aporrectodea*, represented by seven and five taxa respectively are the dominant faunal component of the earthworms from Šar Mt. The remaining registered taxa belong to the genera which shown in Table 1. Chronologically these species can be allocated to eight different types of zoogeographical distribution (Table 1). The earthworm fauna of the Šar Mt., is highly peregrine (12 taxa). In this area, the endemic taxa were represented by two taxa belonging to the genera *Dendrobaena* and *Helodrilus*.

Table 1. List of the earthworm taxa from the Šar Mountain classified to zoogeographical distribution types

Taxa	Distribution	Localities (Literature data, unpublished data from collection, author's data)
<i>Allolobophora chlorotica</i> (Savigny, 1826)	Peregrine	Uroševac (Šapkarev, 1975); CEKUS/214 2 exp., Dragaš (42°03'N,20°39'E), meadow, 01.05.1990;
<i>Allolobophora leoni</i> Michaelsen, 1891	Trans-Aegean	Uroševac (Šapkarev, 1975);
<i>Aporrectodea caliginosa caliginosa</i> (Savigny, 1826)	Peregrine	Uroševac (Šapkarev, 1972); Prizren, Uroševac (Šapkarev, 1975); CEKUS/209 3 exp., Dragaš, meadow 01.05.1990; CEKUS/210 2 exp., Ljubovište, meadow 07.01.1992; CEKUS/211 3 exp., Dragaš, meadow 01.05.1992; CEKUS/212 1 exp., Dragaš, arable land 01.05.1992;
<i>Aporrectodea caliginosa trapezoides</i> (Duges, 1828)	Peregrine	CEKUS/213 1 exp., Ljubovište (42°03'N,20°45'E), 01.05.1990; 1 exp., Dublice (42°23'N,21°01'E), 05.05.2019;
<i>Aporrectodea georgii</i> (Michaelsen, 1890)	Atlanto-Mediterranean	Uroševac (Šapkarev, 1972); CEKUS/208 1 exp., Dragaš, 01.05.1990;
<i>Aporrectodea jassyensis</i> Michaelsen, 1891	Trans-Aegean	Uroševac (Šapkarev 1972); Prizren (1975);
<i>Aporrectodea rosea</i> (Savigny, 1826)	Peregrine	Uroševac (Šapkarev 1975); CEKUS/201 5 exp., Dragaš, 01.05.1990; CEKUS/202 1 exp., Dragaš, 07.07.1990; CEKUS/203 2 exp., Dragaš, 08.07.1990; CEKUS/204 3 exp., Dragaš, 22.02.1992; CEKUS/205 1 vexp., Dragaš, 01.05.1990; CEKUS/206 2 exp., Dragaš, 22.02.1992; CEKUS/207 6 exp., Dragaš, 22.02.1992; 1 exp., Viča (42°15'N,21°04'E), 12.03.2019; 3 exp., Popovce (43°04'N,20°47'E), 05.05.2019; 2 exp., Berevce, (42°14'N,20°01'E), 05.05.2019; 2 exp., Štrpce (42°14'N,21°01'E), 05.05.2019; 2 exp., Štrpce, 06.06.2020;
<i>Bimastos rubidus</i> (Savigny, 1826)	Peregrine	Brezovica (Zicsi, 1972); Uroševac (Szederjesi, 2019); CEKUS/200 1 exp., Dragaš, anthropogenic biotope, 22.02.1992;
<i>Dendrobaena alpina alpina</i> (Rosa, 1884)	Balkan-Alpine	Brezovica (Zicsi, 1972);
<i>Dendrobaena attemsi</i> (Michaelsen, 1902)	Balkan-Alpine	Šar Mt. (Černosvitov, 1931);
<i>Dendrobaena byblica byblica</i> (Rosa, 1893)	Circum-Mediterranean	Šar Mt. (Černosvitov, 1931); Šar Mt. (Karaman, 1969, 1971); Ljuboten (Šapkarev, 1972); Ljuboten (Šapkarev, 1975);
<i>Dendrobaena illyrica</i> (Cognetti, 1906)	Illyric	2 exp., Viča, 12.03.2019;
<i>Dendrobaena jahorensis</i> Mršić, 1991	Endemic	Uroševac (Szederjesi, 2019).
<i>Dendrobaena octaedra</i> (Savigny, 1826)	Peregrine	Šar Mt. (Karaman, 1971); Ljuboten (Šapkarev, 1972); 3 exp., Viča, 12.03.2019;

<i>Dendrobaena platyura</i> (Fitzinger, 1833)	Central European	CEKUS/218 2 exp., Ljubovište, 07.05.1992;
<i>Eisenia fetida</i> (Savigny, 1826)	Peregrine	CEKUS/216 1 exp., Ljubovište, 01.05.1990;
<i>Eisenia lucens</i> (Waga, 1857)	Central European	Ljuboten (Šapkarev, 1971, Šapkarev, 1972);
<i>Eiseniella tetraedra tetraedra</i> (Savigny, 1826)	Peregrine	CEKUS/217 1 exp., Ljubovište, 05.05.1990;
<i>Helodrilus balcanicus plavensis</i> (Karaman, 1972)	Endemic	CEKUS/218 2 exp., Dragaš, 08.07.1990;
<i>Lumbricus castaneus</i> (Savigny, 1826)	Peregrine	Ljuboten (Šapkarev, 1972);
<i>Lumbricus rubellus</i> Hoffmeister, 1843	Peregrine	Prizren (Szederjesi, 2019); CEKUS/219 2 exp., Ljubovište, 08.05.1990; CEKUS/220 1 exp., Dragaš, 22.02.1992; CEKUS/221 3 exp., Dragaš, 22.02.1992; CEKUS/222 4 exp., Dragaš, 08.04.1992; 5 exp., Viča, meadow 12.03.2019; 2 exp., Štrpce meadow 06.06.2020;
<i>Lumbricus terrestris</i> Linnaeus, 1758	Peregrine	12 exp., Viča, 13.10.2019;
<i>Octodrilus transpadanus</i> (Rosa, 1884)	Trans-Aegean	Ljuboten (Šapkarev, 1972); CEKUS/223 3 exp., Dragaš, 08.07.1990; CEKUS/224 2 exp., Dragaš, 22.02.1992;
<i>Octolasion lacteum</i> (Örley, 1881)	Peregrine	Prizren (Šapkarev, 1975); CEKUS/225 1 exp., Ljubovište, 08.07.1990; CEKUS/226 2 exp., Dragaš, 22.02.1992; CEKUS/1228 1 exp., Berevce, 05.05.2019; CEKUS/1333 2 exp., Štrpce, 06.06.2020;

According to Szederjesi [8], the Balkan endemic *D. jahorensis* has been found for the first time in Kosovo and Metohija. Hence, the number of earthworm taxa present in Serbia is now 78. So far, Mršić [9] has found this species only at one locality in Bosnia and Herzegovina (Jahorina Mountain). According to Trakić et al. [13], *D. jahorensis* has a narrow geographical range in the Balkans. However, research conducted by Szederjesi [8] has shown that this species belongs to the group of broad-ranged Balkans taxa. *Helodrilus balcanicus plavensis*, is a broad-ranged Balkan endemic taxon, present in the western part of Montenegro as well as in the broader area of Serbia [3]. The new locality from the Šar Mt., represents the southernmost limit of the geographical range of this species at the moment. *D. illyrica* belongs to the Illyrian zoogeographical type. It is mostly represented in the north-western part of the Balkans. It is only sporadically registered in Montenegro and in the southwestern parts of Serbia. Namely, our findings extended its area of distribution to the south and currently represent the southernmost limit of the geographical range of this species (Fig. 1).

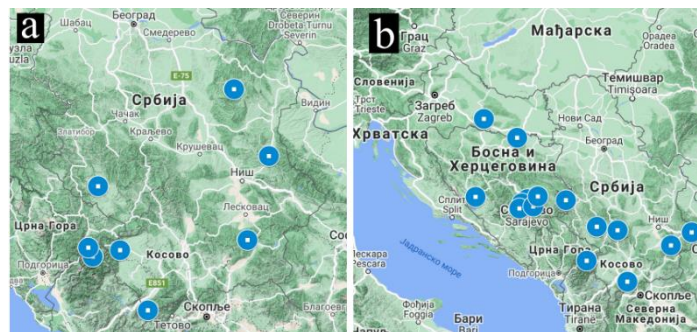


Fig. 1. Distribution map of **a.** *Helodrilus balcanicus plavensis* and **b.** *Dendrobaena illyrica* in the Balkan Peninsula as well as the southernmost limits of the geographical range of these species in the south part of Serbia

4. Conclusion

Overall, the first list of known earthworm taxa in the area of Šar Mt. comprises 24 taxa with only two endemic taxa which are much lower in comparison to 28 endemic taxa distributed in Serbia. Even though our knowledge of the distribution of earthworm taxa in the Šar Mt., is far from complete, our study noted significant faunistic observations. So, we have found an extension of the known distribution of taxa *H. balcanicus plavensis* and *D. illyrica* to the south, in Serbia. If we consider the fact that the territory of the Šar Mt. represents glacial refugia in the Balkan Peninsula, we expect more species, particularly endemic taxa, in further research on this mountain.

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