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## Checklist of earthworms (Oligochaeta: Lumbricidae) from Montenegro: Diversity and biogeographical review

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### Abstract

A checklist of the lumbricid earthworms in Montenegro is presented. Comprehensive information on the distribution and habitats of all earthworms is given in order to establish the definitive list of known taxa from Montenegro. The complete list of earthworm taxa of Montenegro comprises 40 species and subspecies, belonging to 12 genera of the family Lumbricidae. The list underlines the diversity of earthworms and provides a general overview of their distribution and zoogeographical type. Our study shows that the degree of endemism is comparatively high, exceeding 20%. Summing up the endemics and the Balkanic species, 42.5% of the total lumbricid fauna shows an autochthonous character.

**Key words:** Clitellata, Lumbricidae, Balkans, Montenegro, diversity, zoogeography

### Introduction

The Balkan Peninsula is one of the European hotspots of biodiversity (Griffiths *et al.* 2004). It is known that the living world of the Balkan Peninsula went through a very dynamic geologic history during which it changed and gained a greater complexity due to abiogenic and biogenic factors. This is why the Balkans contain an exceptionally rich fauna (Mršić 1991; Džukić & Kalezić 2004), including that of earthworms (Mršić 1991; Stojanović *et al.* 2008; Szederjesi 2013; Szederjesi & Csuzdi 2012).

The position of Montenegro, in the southwestern part of the Balkans, contributes to the great biodiversity of earthworms in this territory. The first data on the earthworm fauna of Montenegro were provided by Cognetti (1906) and Černosvitov (1937, 1938, 1939). Subsequently, some other scientists presented data about earthworms in this area (Karaman 1972; Šapkarev 1972, 1975, 1978, 2002; Mršić 1983; Mršić 1990). The most complete overview of the earthworms of the Balkan Peninsula was published by Mršić (1991), listing altogether 135 taxa, including 36 from Montenegro. After this comprehensive work, several papers dealt with the earthworm fauna of Montenegro (Karaman & Stojanović 1995; Stojanović & Karaman 2002, 2003, 2006; Stojanović *et al.* 2008; Szederjesi 2013).

Karaman & Stojanović (1995) identified 24 taxa of earthworms (23 species and 1 subspecies); of these, 8 species were new for the earthworm fauna of Montenegro. A most recent summary on the earthworms recorded for Montenegro was published by Stojanović & Karaman (2003), who reviewing the previously published data added 4 species to the earthworm fauna of Montenegro, raising the number of lumbricid species to 45. However, this number is lowered in this contribution due to doubtful records and synonymies, see discussion. The synonyms and references cited in this checklist are only those relevant to the taxonomy and distribution of lumbricids of Montenegro.

The aim of this paper is to summarize all published data on earthworms from Montenegro in order to establish the definitive list of known earthworm taxa from the entire area of Montenegro. The list underlines the diversity of earthworms and provides a general overview of their distribution and zoogeographical type.