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Review of the *Eisenia muganiensis* (Michaelsen, 1910) species group with description of two new species (Oligochaeta: Lumbricidae)

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Abstract

The *Eisenia muganiensis* species group is established, consisting of a set of Asian earthworm species characterized by elongate, backward placed clitellum and tubercles: *Eisenia malevici* Perel, 1962; *Eisenia muganiensis* (Michaelsen, 1910); *Eisenia patriciae* Szederjesi, Pavlíček, Coşkun & Csuzdi, 2014 and *Eisenia transcaucasica* (Perel, 1967). The species are shortly reviewed and furthermore, two new species of the *E. muganiensis* group are described, *E. kotschani* sp. nov. from Turkey and *E. malekae* sp. nov. from Iran.

Key words: Earthworms, Clitellata, Asia, Turkey, Iran, biodiversity, Turanian-Far Eastern domain

Introduction

The earthworm species *Eisenia muganiensis* (Michaelsen, 1910), found in the Mughan steppe (Azerbaijan), was first described as a subspecies of *Helodrilus (Allolobophora) schneideri* Michaelsen, 1900 due to similarities in colour and clitellar positions. Both type specimens were grey and possessed quite long clitellum on segments 28–41 and 31–40, 41, respectively. However, *H. schneideri* had been described from Italy. Later, due to the lack of new material, the species was listed for a long time in the genus *Allolobophora* (e.g. Perel 1979).

The subspecies was revised by Perel & Klvavadze (1979) who managed to get two adult specimens collected in the Talysh Mts. near to the Mughan plain, Azerbaijan and ascertained that the worms are dark brownish-red and possess sausage-shaped nephridial bladders. Consequently, they concluded that *muganiensis* represents a "good" species belonging to the genus *Eisenia*. In the very same paper Perel & Klvavadze (1979) noted that several *Eisenia* species of Asian origin possess extraordinarily long clitellum and they might represent a relict *Eisenia* lineage in Asia consisting of *E. muganiensis*, *E. transcaucasica* (Perel, 1967), and *E. malevici* (Perel, 1962).

A few years later, Easton (1983), compiling the list of the valid Lumbricidae taxa, unfortunately overlooked the work of Perel & Klvavadze (1979) and placed *muganiensis* into the newly named *Perelia* genus (nom. nov. for *Svetlovia* Perel, 1976 nomen praeocc.). This mistake has later been taken over also by Blakemore (2004, 2008). Recently, Szederjesi, Pavlíček *et al.* (2014) reported a new *Eisenia* species from Turkey with clitellum on segments 26, 27–39, 40, and in a new material from Turkey and Iran we discovered two, still undescribed *Eisenia* species characterized by a similarly long clitellum.

In our opinion Perel & Klvavadze (1979) were right and these peculiar Turanian-Far-Eastern species (Csuzdi *et al.* 2011) represent an independent lineage inside the genus *Eisenia*, which we consider here as the *E. muganiensis* species group (Fig. 1, Table 1).

Material and methods

Earthworms were collected by the diluted formaldehyde method (Raw 1959), complemented with digging and

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