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New earthworm records from Turkey, with description of three new species (Oligochaeta: Lumbricidae)

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Abstract

Identifying the earthworm material recently collected in different parts of Turkey (Marmara Region, Upper Mesopotamia, Hatay Province and East Anatolia) resulted in records of 29 earthworm species including three lumbricids new to science: *Dendrobaena cevdeti*, *D. szalokii* and *Eisenia patriciae* **spp. nov.** In addition, *Dendrobaena cognettii* is reported for the first time from the country. With this contribution, the number of earthworm species and subspecies registered in Turkey is raised to 80.

Key words: Earthworms, Anatolia, biodiversity, new species, Lumbricidae, Clitellata

Introduction

Turkey, this huge country (surface area 790,000 km²) includes a border between the European and Asian Mediterranean (the Strait of Bosphorus), and it is part of a biotic exchange corridor between Europe and Central Asia and eventually of Africa. Turkey's extraordinary biodiversity results from its varied geophysical relief, diverse climate, and complex geotectonic history (Pavliček *et al.* 2010, Şekercioğlu *et al.* 2011). This is the only country where three biodiversity hotspots meet, the Mediterranean, the Caucasus and the Iran-Anatolian hotspot (Willis *et al.* 2007, Şekercioğlu *et al.* 2011). In contrast to the overall biodiversity richness, surprisingly little is known about the diversity of specific invertebrate groups including earthworms (Mısırlıoğlu *et al.* 2008, Şekercioğlu *et al.* 2011). Almost all earthworm data from the late 19th and early 20th century originated as by-products of other investigations (e.g. Rosa 1893a, 1905; Omodeo 1955).

The first focused earthworm collecting trip took place only 25 years ago, as part of an expedition organized by Italian zoologists, and was led by Pietro Omodeo, the world-renowned earthworm taxonomist. During this trip, some 2000 earthworm specimens were gathered, belonging to 51 species, including 14 species new to science (Omodeo & Rota 1989). The success of this trip stimulated a second collection campaign to the unexplored SW of Turkey; accomplished in 1990, it resulted in additional 1000 specimens distributed among 27 species and including one subspecies new to science and three new records for Turkey. In the 2000s further collection trips were organized by T. Pavliček to the Levantine part of Turkey (Hatay Province) and led to the discovery of three additional species new to science (Csuzdi *et al.* 2007).

Currently, 76 earthworm species (70 lumbricid, 3 megascolecid, 2 acanthodrilid and 1 criodrilid) are listed for Turkey (Csuzdi *et al.* 2006; Csuzdi *et al.* 2007; Mısırlıoğlu 2009). This species richness is only slightly higher than the species richness recorded for the 93,000 km² large Hungary (59 species, Csuzdi & Zicsi 2003) and much smaller than that of mainland Spain (504,000 km², 108 species, Rota 2013). This clearly indicates the probability that the earthworm fauna of Turkey is highly underestimated. In particular, it would be not surprising if new collections, especially those coming from so far under-explored regions like East Anatolia or Upper Mesopotamia, contained new records and species new to science.

Material examined. *Upper Mesopotamia*: HNHM/15412 5 ex, Diyarbakır, Merkez, 5 km S of Ongözlü köprü, 23.05.2008, leg. Y. Coşkun, T. Pavlíček; HNHM/15421 3 ex, Diyarbakır, Ergani, Boncuklu village, 27.05.2008, leg. Y. Coşkun, T. Pavlíček.

Family Criodrilidae Vejdovsky, 1884

***Criodrilus lacuum* Hoffmeister, 1845**

Criodrilus lacuum Hoffmeister, 1845: 41; Omodeo 1952: 3; Csuzdi, Pavlíček & Mısırlıoğlu 2007: 358.

Material examined. *Hatay*: HNHM/16535 1 ex, Antakya, left bank of the Asi nehri, near of Karşıyaka, mud sediments, 36°05'N 36°03'E, 14.04.2006, leg. T. Pavlíček.

Family Acanthodrilidae Claus, 1880

***Microscolex dubius* (Fletcher, 1887)**

Eudrilus dubius Fletcher, 1887: 378.

Microscolex dubius: Pavlíček, Csuzdi & Coşkun 2009: 119.

Material examined. *Upper Mesopotamia*: HNHM AF/5563 6 ex, Diyarbakır, Tigris River, 24.04.2009, leg. Cs. Csuzdi.

Discussion

Of the recorded 27 lumbricid species, three, (one from Upper Mesopotamia and two from East Anatolia) proved to be new to science. In addition, *Dendrobaena cognettii* (Michaelsen, 1903), collected in the European part of Turkey, represents a new record for the country.

The two new East Anatolian species *Dendrobaena cevdeti* and *D. szalokii* **spp. nov.** belong to a genus represented in Turkey by 27 taxa (Csuzdi *et al.* 2006, 2007) including 17 Anatolian/Transcaucasian endemics (Mısırlıoğlu *et al.* 2008). Taking into account the 2 new species described herein, some 20% of the so far known *Dendrobaena* species (19 out of 92 species regarded as valid, see Csuzdi 2012) occur exclusively in the Anatolian/Transcaucasian region. These data supports the view of Omodeo and Rota (2008) that Anatolia is one of the most important diversity centres of the genus *Dendrobaena*. Table 1 lists the *Dendrobaena* species reported from Anatolia and the Turkish Levant, together with distinguishing characters.

Together with the new data presented here, the total number of earthworm species recorded in Turkey is raised to 80. This number appears quite low when compared to the checklists of smaller nations, which indicates that the earthworm fauna should still be better explored throughout the Turkish territory.

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