

PEREGRINE EARTHWORMS (CLITELLATA: LUMBRICIDAE)
FROM BULGARIA AND TURKEY

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Abstract: In this paper we summarize the knowledge on peregrine earthworm fauna from the entire area of Bulgaria and Turkey. The peregrine lumbricids from Bulgaria and Turkey contains 16 taxa belonging to 7 genera. The most common peregrine taxa of Bulgaria are: *Aporrectodea rosea* (Savigny, 1826), *Aporrectodea caliginosa* (Savigny, 1826), *Aporrectodea trapezoides*, *Lumbricus rubellus* Hoffmeister, 1843, *Lumbricus terrestris* Linnaeus, 1758 and *Octolasion lacteum* (Örley, 1881). The most common peregrine earthworm taxa of Turkey are: *Aporrectodea caliginosa* (Savigny, 1826), *Aporrectodea rosea* (Savigny, 1826), *Dendrobaena veneta veneta* (Rosa, 1884), *Eiseniella tetraedra* (Savigny, 1826), and *Lumbricus rubellus* Hoffmeister, 1843.

INTRODUCTION

The earthworm fauna of Bulgaria remains unexplored. Rosa (1897) was the first who published data on the Bulgarian earthworms. His work was followed by Černosvitov (1934, 1937), Plisko (1963), Mihailova (1964, 1965, 1966, 1968), Zicsi and Csuzdi (1986), Duhlińska (1988), Kvavadze and Miloikova (1991), Šapkarev (1986), Deltchev et al. (1998). Recently Stojanović et al. (2012, 2013),

Valchovski (2012, 2014), Szederjesi (2013), Valchovski and Szederjesi (2016) elaborate knowledge of earthworm fauna of the country.

The explorations of earthworm fauna from Turkey were launched by Rosa (1893, 1905), Michaelsen (1907, 1910), Pop (1943), Omodeo (1952, 1955). Their work was continued by Zicsi (1973, 1981), Omodeo and Rota (1989, 1991, 1999), Mısırlıoğlu, (2002, 2004, 2007a, 2007b, 2008a, 2008b, 2009, 2010; 2011). In the last decade Csuzdi et al. (2006), Csuzdi et al. (2007), Mısırlıoğlu et al. (2007), Pavlíček et al. (2010), Szederjesi et al. (2014a, 2014b), Mısırlıoğlu and Szederjesi (2015) published new earthworm data from the country.

RESULTS AND DISCUSSION

Peregrine species have wide ecological tolerance, replacing fully or partially autochthonous and endemic species with narrow ecological tolerance. The earthworm fauna of Bulgaria is highly peregrine. Out of the 49 species, 16 taxa (32.65%) belong to the peregrines. 74 lumbricid earthworms are recorded in Turkey. Peregrine earthworms from Turkey are 16.21%. 12 earthworm taxa are registered both in Bulgaria and Turkey (Table 1). The species: *Aporrectodea longa*, *Aporrectodea trapezoides*, *Dendrobaena octaedra*, *Eisenia andrei* and *Lumbricus terrestris* are not recorded in Turkey. In comparison to earthworm fauna of Bulgaria *Lumbricus terrestris* and *Aporrectodea trapezoides* are some of the most common species, especially in the southern parts of the country. The most common peregrine taxa of Bulgaria are: *Aporrectodea rosea*, *Aporrectodea caliginosa*, *Aporrectodea trapezoides*, *Lumbricus rubellus*, *Lumbricus terrestris* and *Octolasion lacteum* (Mihailova 1966, Šapkarev 1986, Valchovski 2012, 2014). The most common peregrine earthworm taxa of Turkey are *Aporrectodea caliginosa*, *Aporrectodea rosea*, *Dendrobaena veneta veneta*, *Eiseniella tetraedra*, *Lumbricus rubellus* (Csuzdi et al., 2006; Mısırlıoğlu, 2009, 2011).

Peregrine earthworms belong to different ecological groups (Bouché, 1972). Most of them inhabit soil surface. Epigeic species are 8 taxa. Less numerous are endogeic lumbricids from humus layer of the soil. Endogeic lumbricids of Bulgaria and Turkey are 5 taxa. Peregrine taxa (anecic species) from mineral layer of the soil are *Lumbricus terrestris* and *Aporrectodea longa*, which are registered on territory of Bulgaria. One taxa is epi-endogeic: *Lumbricus rubellus*. New peregrine lumbricid species are expected to be found on the territory of Turkey in the future, because large areas of the country are not explored yet.

Table 1. Distribution and habitat of peregrine earthworms from Bulgaria and Turkey.

Earthworm species	Habitat	Bulgaria	Turkey
<i>Allolobophora chlorotica</i> (Savigny, 1826)	highly organic sites near river banks and in cultivated soils (Šapkarev, 1986)	Sofia plain (Plisko, 1963; Valchovski, 2014), Thracian lowland (Mihaliova, 1966; Šapkarev, 1986), South-Western Bulgaria (Stojanović et al., 2012)	Western Anatolia and Western part of Inner Anatolia (Omodeo and Rota, 1989; Misrihoğlu, 2002; 2008a; 2008b; Misrihoğlu and Szederjesi, 2015)
<i>Aporrectodea caliginosa</i> (Savigny, 1826)	cultivated soils (Šapkarev, 1986) and meadows (Mihaliova, 1966)	Very common in Bulgaria (Plisko, 1963; Šapkarev, 1986; Mihaliova, 1966; Stojanović et al., 2012; Uzunov, 2010; Valchovski, 2014; Valchovski and Szederjesi 2016)	Very common in Turkey (Omodeo, 1952; 1955; Zirci, 1973; Omodeo and Rota, 1989; Misrihoğlu, 2002, 2007; 2008b; Pavliček et al., 2009; Szederjesi et al., 2014; Misrihoğlu and Szederjesi, 2015).
<i>Aporrectodea longa</i> (Ude, 1885)	pastures, cultivated soils, forests (Mihaliova, 1966) and river banks (Valchovski, 2014)	Konyavska Mt. (Černosvitov, 1937), Thracian lowland, Stredna Gora Mt. (Mihaliova, 1966) and Sofia plain (Valchovski, 2014)	not registered from Turkey
<i>Aporrectodea rosea</i> (Savigny, 1826)	forests, cultivated soils, meadows (Šapkarev, 1986)	Very common in Bulgaria (Rosa, 1897; Černosvitov, 1937; Plisko, 1963; Mihaliova, 1964; 1966; Šapkarev, 1986; Uzunov, 2010; Stojanović et al., 2012; Valchovski, 2014; Valchovski and Szederjesi, 2016)	Very common in Turkey (Rosa, 1905; Pop, 1943; Omodeo, 1952; 1955; 1956; Zirci, 1973; Omodeo and Rota, 1989; 1991; Misrihoğlu, 2002; 2007; 2008a; Csuzdi et al., 2007; Pavliček et al., 2009; Szederjesi et al., 2014; Misrihoğlu 2007; Misrihoğlu & Szederjesi 2015)
<i>Aporrectodea trapezoides</i> (Dugès, 1828)	cultivated soils, river banks (Šapkarev, 1986) and forests (Valchovski, 2014)	Very common in Bulgaria (Mihaliova, 1966; Šapkarev, 1986; Stojanović et al., 2012; Valchovski, 2014)	It has been recorded almost all geographic regions of Turkey (Omodeo, 1952; 1955; Omodeo and Rota, 1989; Misrihoğlu, 2002; 2004; 2007; 2008a; 2008b; Misrihoğlu and Szederjesi, 2015)

<i>Dendrobaena hortensis</i> (Michaelsen, 1890)	river banks (Szeserjesi, 2013)	Thracian lowland (Deltichev et al., 1998), Sredna Gora Mt. (Mihailova, 1966) and Strandja Mt. (Szederjesi, 2013)	Common in north half of Anatolia. Bursa province (Omodeo, 1955); Uludağ Mt., Anadolitu Dağları Mt., Bolu Mt., Belgrad forest (Omodeo and Rota, 1989), Antalya province (Omodeo and Rota, 1991); Kocaeli province (Misirlioğlu, 2007; Tekir Mts., Istranca Mt., Malatya province (Szederjesi et al., 2014), Çorum province, Bodrum peninsula (Misirlioğlu and Szederjesi, 2015).
<i>Dendrobaena octaedra</i> (Savigny, 1826)	under stones and moss in forest soils, river banks (Šapkarev, 1986)	Pirin Mt. (Kvavadze and Miloikova, 1991), Rila Mt. (Plisko, 1963; Šapkarev, 1986; Zicsi and Csuzdi, 1986; Uzunov, 2010; Stojanovic et al., 2012), Stara Planina Mts. (Plisko, 1963), Vitosha Mt. (Plisko, 1963; Šapkarev 1986), Sofia plain, Šapkarev Mt. (Šapkarev, 1986), Rhodope Mts. (Uzunov, 2010; Szederjesi, 2013).	not registered from Turkey
<i>Dendrobaena veneta veneta</i> (Rosa, 1886)	under decaying leaves, organic rich soils, manure piles (Sims and Gerard, 1985)	Pirin Mt. (Kvavadze and Miloikova, 1991), Eastern Stara Planina Mts. (Szederjesi, 2013)	Very common in Turkey (Rosa, 1905; Pop 1943; Omodeo, 1955; Zicsi, 1973; Omodeo and Rota, 1991; Misirlioğlu, 2002; 2004; 2007; 2008a; 2008b; Csuzdi et al., 2007; Pavlíček et al., 2009; Misirlioğlu and Szederjesi, 2015)
<i>Dendrodrilus rubidus rubidus</i> (Savigny, 1826)	under stones, leaves and mosses (Šapkarev, 1986), under the bark of old rotten trees (Valchovski and Szederjesi, 2016)	Found almost everywhere in Bulgaria, except Danube plain (Cernosvitov, 1934; Plisko, 1963; Mihailova, 1966; Šapkarev, 1986; Zicsi and Csuzdi, 1986; Valchovski and Szederjesi, 2016)	Isparta province (Zicsi, 1973); Uludağ Mt., (Zicsi, 1973; Omodeo and Rota, 1991); Ordu province (Omodeo and Rota, 1989); Istranca Mt., North Anatolia Mts. (Szederjesi et al., 2014).

<i>Dendrochilus rubidus subrubicundus</i> (Eisen, 1874)	pastures, forests and river banks (Šapkarev, 1986)	Found almost everywhere in Bulgaria, except Danube plain (Plisko, 1963; Mihalova, 1966; Šapkarev, 1986; Zicsi and Csuzdi, 1986; Stojanović et al., 2012)	Konya province (Omodeo, 1952; Omodeo and Rota, 1991; Eskişehir province (Mısrırlıoğlu, 2004).
<i>Eisenia andrei</i> Bouché, 1972	high organic matter materials, manure piles (Valchevski and Szederjesi, 2016)	Thracian lowland (Valchevski & Szederjesi, 2016)	not registered from Turkey
<i>Eisenia fetida</i> (Savigny, 1826)	materials with high organic matter content. It may be formed naturally from leaf litter or manure piles (Butt and Lowe, 2011)	Stara Planina Mts. (Rosa, 1897), Thracian lowland (Mihalova, 1966; Šapkarev, 1986), Rila Mt. (Šapkarev, 1986), Sofia plain (Šapkarev, 1986; Valchevski, 2014), Pirin Mt. (Stojanović et al., 2012)	Istanbul province (Omodeo, 1955; Omodeo and Rota, 1989); Bolu Mt. (Omodeo and Rota, 1989); Eskişehir province (Mısrırlıoğlu, 2002; 2004), Antalya province (Mısrırlıoğlu, 2008a), Ispiran Mts., Diyarbakır province (Szederjesi et al., 2014), Aydın province (Mısrırlıoğlu and Szederjesi, 2015).
<i>Eiseniella tetraedra</i> (Savigny, 1826)	wet meadows, river banks (Miltutinović et al., 2010)	Widely distributed in Bulgaria (Černosvitov, 1934; Plisko, 1963; Mihalova, 1966; Zicsi and Csuzdi, 1986; Stojanović et al., 2012; Uzunov, 2010; Valchevski, 2014)	Very common in Turkey (Rosa, 1905; Omodeo, 1956; Omodeo and Rota, 1989; 1991; Mısrırlıoğlu, 2002; 2008a; Csuzdi et al., 2007; Pavlíček et al., 2009)
<i>Lumbricus rubellus</i> Hoffmeister, 1843	cultivated soils, forests, also near river banks (Šapkarev, 1986)	Very common in Bulgaria (Černosvitov, 1934; 1937; Plisko, 1963; Mihalova, 1966; Zicsi and Csuzdi, 1986; Šapkarev, 1986; Stojanović et al., 2012; Valchevski, 2014)	Very common in Turkey (Rosa, 1905; Omodeo, 1952; Omodeo and Rota, 1991; Mısrırlıoğlu, 2002; 2004; 2008a; Mısrırlıoğlu and Szederjesi, 2015).
<i>Lumbricus terrestris</i> Linnaeus, 1758	cultivated soils and forests (Šapkarev, 1986), pastures (Stojanović and Karaman, 2003),	Common in southern parts of the country. Sofia plain (Valchevski, 2014), Stara Planina Mts. (Šapkarev, 1986), Rila Mt. (Zicsi and Csuzdi, 1986), Rhodope Mts. (Szederjesi, 2013)	not registered from Turkey
<i>Octolasion lacteum</i> (Örley, 1881)	cultivated soils, forests, meadows and river banks (Šapkarev, 1986)	Very common in Bulgaria (Černosvitov, 1934; Plisko, 1963; Šapkarev, 1986; Mihalova, 1966; Zicsi and Csuzdi, 1986; Stojanović et al., 2012; Szederjesi, 2013; Valchevski, 2014)	Uludağ Mt., Artvin province (Omodeo and Rota, 1989); Afyon and Burdur province (Omodeo and Rota, 1991); Eskişehir province (Mısrırlıoğlu, 2004) Mısrırlıoğlu and Szederjesi, 2015).

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