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Preliminary Research on the Earthworm (Clitellata; Lumbricidae) Fauna of Eskişehir Beşik Deresi and Eskişehir-Mihalıççık Gürleyik Village

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ABSTRACT: This study was carried out as a preliminary research on the earthworms of two different promenade area in Eskişehir province: Eskişehir Beşik Deresi and Eskişehir-Mihalıççık Gürleyik Village.
The identification of organism was made by examining the earthworm specimens collected in 4 different localities in Beşik Deresi and 2 localities in Gürleyik Village. At the end of the study, totally 7 species belonging to 4 genera were recorded: *Aporrectodea rosea* (Savigny, 1826), *Aporrectodea trapezoides* (Dugès, 1828), *Dendrobaena alpina armeniaca* (Rosa, 1893), *Dendrobaena byblica* (Rosa, 1893), *Dendrobaena veneta* (Rosa, 1886), *Dendrodrilus rubidus rubidus* (Savigny, 1826) and *Octolasion lacteum* (Örley, 1881).
The species recorded in Beşik Deresi were *Aporrectodea trapezoides* (Dugès, 1828), *Dendrobaena alpina armeniaca* (Rosa, 1893), *Dendrobaena veneta* (Rosa, 1886), *Dendrodrilus rubidus rubidus* (Savigny, 1826) and in Gürleyik Village were *Aporrectodea rosea* (Savigny, 1826), *Aporrectodea trapezoides* (Dugès, 1828), *Dendrobaena byblica* (Rosa, 1893) and *Octolasion lacteum* (Örley, 1881)
These results represent the first data on the earthworm biodiversity in those regions.
Keywords: Beşik Deresi, Earthworms, Fauna of Turkey, Gürleyik, Lumbricidae.

Eskişehir Beşik Deresi ve Eskişehir-Mihalıççık Gürleyik Köyü Topraksolucanı (Clitellata; Lumbricidae) Faunası Üzerine Ön Araştırma

ÖZET: Bu çalışma Eskişehir ilindeki iki farklı mesire alanı olan Eskişehir Beşik Deresi ve Eskişehir-Mihalıççık Gürleyik Köyü topraksolucanları üzerine bir ön araştırma olarak yapılmıştır.
Çalışmada Beşik Deresinden 4, Gürleyik Köyünden 2 ayrı lokaliteden toplanan topraksolucanları incelenerek teşhisleri yapılmıştır. Çalışma sonunda toplam 4 cinse ait 7 tür kaydedilmiştir. Bu türler *Aporrectodea rosea* (Savigny, 1826), *Aporrectodea trapezoides* (Dugès, 1828), *Dendrobaena alpina armeniaca* (Rosa, 1893), *Dendrobaena byblica* (Rosa, 1893), *Dendrobaena veneta* (Rosa, 1886), *Dendrodrilus rubidus rubidus* (Savigny, 1826) ve *Octolasion lacteum* (Örley, 1881)'dur.
Beşik deresinde bulunan türler *Aporrectodea trapezoides* (Dugès, 1828), *Dendrobaena alpina armeniaca* (Rosa, 1893), *Dendrobaena veneta* (Rosa, 1886), *Dendrodrilus rubidus rubidus* (Savigny, 1826), Gürleyik Köyünde bulunan türler ise *Aporrectodea rosea* (Savigny, 1826), *Aporrectodea trapezoides* (Dugès, 1828), *Dendrobaena byblica* (Rosa, 1893), *Octolasion lacteum* (Örley, 1881)'dur.
Bu sonuçlar bölgelerin topraksolucanı biyoçeşitliliği üzerine ilk bulgulardır.
Anahtar Kelimeler: Beşik Deresi, Toprak solucanları, Türkiye Faunası, Gürleyik, Lumbricidae.

INTRODUCTION

Turkey is a vast country, situated in Western Asia and Southeastern Europe. Beşik Deresi and Gürleyik Village are situated in Eskişehir province (Northwestern Turkey). Beşik Deresi is a natural promenade area about 10 ha in size in the forest and about 35 km away from the center of Eskişehir. The rich flora of this wooded area with a natural waterfall and a clean stream consists of larch, juniper, plane, maple, nuts, willow, hawthorn, poplar, cranberry, blackberry, wild rose, oak and ivy. Gürleyik Village is connected to Mihalıççık District of Eskişehir and it is 120 km away from the centre of Eskişehir. Gürleyik Village, which takes its name from the deep green waters, has a waterfall and surrounded by greenery.

Turkey's extraordinary soil biodiversity results from its varied geophysical relief, diverse climate, and complex geotectonic history (Pavlíček et al. 2010). The first data of earthworms in Turkey were published by Rosa (1893). His work was followed by Omodeo (1952; 1955) and Zicsi (1973). Subsequently, Omodeo & Rota (1989; 1991) presented new records of lumbricid biodiversity from Turkey. Recently, some scientists published new data on the earthworm fauna of the country (Csuzdi et al. 2007; Mısırlıoğlu 2002, 2004, 2009, Mısırlıoğlu et al., 2004; Szederjesi et al., 2014; Mısırlıoğlu & Szederjesi 2015; Valchovski & Mısırlıoğlu, 2017). Currently, 75 lumbricid earthworm species are listed for Turkey (Szederjesi et al., 2014). The explorations of the earthworm fauna from Eskişehir province were launched by Mısırlıoğlu (2002; 2004) and Mısırlıoğlu & Szederjesi (2015).

These areas have been selected for study because these are natural areas and have not been studied so far on earthworms.

MATERIAL and METHODS

The field investigations were carried out during the spring of the year 2016. The earthworms were collected by digging and handsorting. The specimens were killed in 85% ethanol in the field. After 15 minutes, they were transferred to 96% ethanol. Specimens were described and dissected under low power stereo microscope. Csuzdi and Zicsi 2003 were followed for nomenclature.

RESULTS

Species found in Beşik Deresi

At the end of the study, four species belonging to three genera were found.

1. Eskişehir Beşik deresi, after the iron barrier at the entrance of trout farm, right side of the road, under humid sawdust cover, 16.05.2016, leg. Mete Mısırlıoğlu.

Dendrobaena veneta (Rosa, 1886)	8 exemplars
Dendrobaena rubidus rubidus (Savigny, 1826)	1 exemplars
Aporrectodea trapezoides (Dugès, 1828)	2 exemplars

2. Eskişehir Beşik deresi, after the iron barrier at the entrance of trout farm, under the small concrete bridge, under the cover consist of tree branches and leaves at the side of stream leg. 16.05.2016, leg. Mete Mısırlıoğlu.

Dendrobaena veneta (Rosa, 1886)	11 exemplars
Aporrectodea trapezoides (Dugès, 1828)	1 exemplar

3. Eskişehir Beşik deresi, before the iron barrier at the Entrance of trout farm, right side of the road, 16.05.2016, leg. Mete Mısırlıoğlu.

Dendrobaena alpina armeniaca (Rosa, 1893)	5 exemplars

4. Eskişehir Beşik deresi, waterfall located in forest consist of angiosperm and gymnosperms, 16.05.2016, leg. Mete Mısırlıoğlu.

Dendrobaena alpina armeniaca (Rosa, 1893)	6 exemplars
Aporrectodea trapezoides (Dugès, 1828)	1 exemplar

Species found in Gürleyik Village

At the end of the study, four species belonging to three genera were found.

1. Eskişehir, Mihalıççık, Gürleyik Village, edge of the stream (near the water like a swimming pool), planty area, among the roots, 04.09.2016, leg. Mete Mısırlıoğlu.

Dendrobaena byblica (Rosa, 1893)	1 exemplar
Octolasion lacteum (Örley, 1881)	1 exemplar
Aporrectodea rosea (Savigny, 1826)	7 exemplars

2. Eskişehir-Mihalıççık-Gürleyik Village, 150 m later after the entrance, edge of the small waterfall, 10.11.2016. leg. Ezgi Öğdür.

Aporrectodea trapezoides (Dugès, 1828)	3 exemplars

***Aporrectodea rosea* (Savigny, 1826)**

Enterion roseum Savigny, 1826: 182.

Eisenia rosea f. *acystis*: Omodeo 1952: 9.

Allolobophora rosea f. *balcanica*: Omodeo 1955: 2.

Allolobophora rosea: Zicsi 1973: 229; Omodeo & Rota 1991:177.

Alolobophora rosea complex: Omodeo & Rota 1989: 183.

Aporrectodea rosea: Mısırlıoğlu 2002: 18; Csuzdi et al. 2007: 349; Mısırlıoğlu 2007: 354 ; Mısırlıoğlu 2008b: 469; Pavlíček et al. 2009: 119; Szederjesi et al. 2014: 557; Mısırlıoğlu & Szederjesi 2015: 100.

Distribution in Turkey: Distributed in all regions of Turkey (Csuzdi et al. 2006; Mısırlıoğlu, 2011).

Zoogeographical distribution type: A common peregrine species, native to the Palearctic (Csuzdi and Zicsi, 2003).

***Aporrectodea trapezoides* (Dugès, 1828)**

Lumbricus trapezoides Dugès, 1828: 289.

Allolobophora caliginosa subsp. *trapezoides*: Omodeo 1952: 9.

Allolobophora caliginosa f. trapezoides: Omodeo 1955: 2.

Allolobophora caliginosa: Zicsi 1973: 229.

Nicodrilus caliginosus trapezoides: Omodeo & Rota 1989: 181.

Nicodrilus caliginosus complex: Omodeo & Rota 1991: 176.

Aporrectodea trapezoides: Mısırlıoğlu 2002: 18. Mısırlıoğlu 2004: 2; Mısırlıoğlu 2007: 353.

Aporrectodea caliginosa trapezoides: Mısırlıoğlu 2008a: 474; Mısırlıoğlu 2008b: 470.

Aporrectodea caliginosa trapezoides: Mısırlıoğlu 2008b: 470; Mısırlıoğlu & Szederjesi 2015: 101.

Distribution in Turkey: Distributed in all regions of Turkey (Csuzdi et al. 2006; Mısırlıoğlu, 2011).

Zoogeographical distribution type: One of the most widely distributed peregrine earthworms (Csuzdi and Zicsi, 2003).

***Dendrobaena alpina armeniaca* (Rosa, 1893)**

Allolobophora alpina v. armeniaca Rosa, 1893b: 431.

Dendrobaena alpina armeniaca: Omodeo & Rota 1989: 193 ; Csuzdi et al. 2006: 8; Mısırlıoğlu 2008b: 470; Szederjesi et al. 2014: 558.

Distribution in Turkey: Marmara, North, East and Inner Anatolia regions (Omodeo & Rota 1989; Csuzdi et al. 2006; Mısırlıoğlu 2008b; Szederjesi et al. 2014).

Zoogeographical distribution type: Caucaso-Anatolian (Csuzdi and Zicsi, 2003; Csuzdi et al. 2006).

***Dendrobaena byblica* (Rosa, 1893)**

Allolobophora (*Dendrobaena*) *byblica* Rosa, 1893: 4.

Dendrobaena byblica: Zicsi 1973: 220; Omodeo & Rota 1989: 185; Pavlíček et al. 2009: 119-120.

Dendrobaena byblica byblica: Csuzdi et al. 2007: 350; Szederjesi et al. 2014: 558.

Distribution in Turkey: Marmara, Mediterranean, East, and South-Eastern Anatolia regions (Zicsi 1973; Omodeo & Rota 1989; Csuzdi et al. 2007; Pavlíček et al. 2009; Szederjesi et al. 2014).

Zoogeographical distribution type: Circum-Mediterranean. It was registered in central and southeast part of Europe, Russia, Dağıstan, Iran and Afghanistan (Perel, 1997; Csuzdi and Zicsi, 2003).

***Dendrobaena veneta* (Rosa, 1886)**

Allolobophora veneta Rosa, 1886: 674.
Allolobophora (Notogama) veneta Rosa, 1905: 5.
Allolobophora (Notogama) veneta succinta Rosa, 1905: 5.
Dendrobaena veneta var. *concolor*: Pop 1943: 22.
Dendrobaena veneta var. *zebra*: Pop 1943: 22.
Eisenia veneta typica: Omodeo 1952: 6.
Eisenia veneta kervillei: Omodeo 1952: 7.
Dendrobaena veneta typica: Omodeo 1955: 7.
Dendrobaena veneta: Zicsi 1973: 225; Omodeo & Rota 1989: 187, 1991: 179; Mısırlıoğlu 2002: 18 , 2004: 2, 2008a: 474, 2008b: 469; Szederjesi et al. 2014: 560; Mısırlıoğlu & Szederjesi 2015: 100.
Dendrobaena veneta veneta: Csuzdi et al. 2007: 354.

Distribution in Turkey: Distributed in all regions of Turkey (Csuzdi et al. 2006; Mısırlıoğlu, 2011).

Zoogeographical distribution type: This is a peregrine species introduced worldwide due to vermicomposting (Sims and Gerard, 1999; Csuzdi and Zicsi, 2003; Csuzdi et al., 2006). It is probably originated in the Eastern Mediterranean (Perel 1997).

***Dendrodrilus rubidus rubidus* (Savigny, 1826)**
Enterion rubidum Savigny, 1826: 182.
Dendrobaena rubida: Zicsi 1973: 226.
Dendrodrilus rubidus: Omodeo & Rota 1989: 184.
Dendrodrilus rubidus beddardi (Michaelsen, 1894):
Dendrodrilus rubidus rubidus: Szederjesi et al. 2014: 565.

Distribution in Turkey: Marmara, Mediterranean and North Anatolia regions (Zicsi 1973; Omodeo & Rota 1989, 1991; Szederjesi et al. 2014).

Zoogeographical distribution type: Peregrine. It is native in Palearctis but introduced extratropically all over the world (Sims and Gerard, 1999; Csuzdi and Zicsi, 2003).

***Octolasion lacteum* (Örley, 1881)**
Lumbricus terrestris var. lacteum Örley, 1881: 584.
Octolasium lacteum: Omodeo & Rota 1989: 183; : Omodeo & Rota 1991: 178;
Octolasion lacteum: Mısırlıoğlu 2002: 18; Mısırlıoğlu 2004: 2; Mısırlıoğlu & Szederjesi 2015: 101.

Distribution in Turkey: Marmara, North, Aegean and Inner Anatolia regions (Omodeo & Rota 1989, 1991; Mısırlıoğlu 2002, 2004; Mısırlıoğlu & Szederjesi 2015).

Zoogeographical distribution type: Peregrine (Csuzdi et al 2006, Mısırlıoğlu, 2011).

DISCUSSION

At the end of the study totally seven species belonging to four genera were recorded.

Three of the four recorded species in Beşik Deresi are peregrine: *Aporrectodea trapezoides*, *Dendrobaena veneta*, *Dendrodrilus rubidus rubidus*. Among them *Dendrobaena veneta* and *Aporrectodea trapezoides* are one of the most common peregrine species in Turkey. *Dendrodrilus rubidus rubidus* is a relatively rare species in Turkey. It was recorded in several localities almost all in North Anatolia, except one in the Mediterranean region. In Marmara it was recorded in the Asian and the Thracian regions as well. Now, it is reported from Eskişehir-Inner Anatolia.

Dendrobaena alpina armeniaca is a Caucaso-Anatolian endemism recorded especially in the forested area of North Anatolia. Beside this, it was recorded in Inner Anatolia (Sivas) but it is in the neighborhood of North Anatolia. Except these, it was recorded also in Asian Marmara, in Bursa-Uludağ and Eskişehir-Bozdağ which are mountain areas covered with forests. Again, it was found in a wooded area of Eskişehir.

Four species were found in the Gürleyik Village: *Aporrectodea rosea, Aporrectodea trapezoides, Dendrobaena byblica* and *Octolasion lacteum.* Among the recorded species, three of them are peregrine: *Aporrectodea rosea, Aporrectodea trapezoides* and *Octolasion lacteum. Aporroctodea rosea* and *Aporrectodea trapezoides* are very common peregrine species in Turkey. *Octolasion lacteum* was recorded from several localities in Turkey (Marmara Aegean area, Northeastern Anatolia and Inner Anatolia near Marmara) (Csuzdi et al. 2006; Mısırlıoğlu 2011). *Dendrobaena byblica* was recorded in several cities on both sides of the Marmara region and also in the Aegean region. It was recorded also in Mediterranean, North, East and Southeastern Anatolia.

Surely, a more comprehensive study should be done to understand the earthworm fauna of the studied regions completely but we think that the first results of these unsampled areas are important. So, this study could be helpful to studies which will be done in the regions in future.

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