

## New earthworm records from Bulgaria (Oligochaeta, Lumbricidae)

T. SZEDERJESI\*

**Abstract.** Elaboration of a small earthworm material collected in different parts of Bulgaria resulted in recording altogether 15 species. Surprisingly, the peregrine *Dendrobaena veneta veneta* proved to be new to the fauna of Bulgaria and with this, the present list of Bulgarian earthworms consists of 42 confirmed species and subspecies.

**Keywords.** Earthworms, faunistics, new records, Bulgaria.

### INTRODUCTION

The earthworm fauna of Bulgaria is far from well known, although the beginning of the researches goes back to the end of the 19th century. 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) and Zicsi & Csuzdi (1986). Recently, Valchovski (2012) summarized the knowledge about the Bulgarian earthworm fauna and reported the presence of 50 species and subspecies including several unconfirmed records as well.

In the last decade, researchers of the Hungarian Natural History Museum organized several collecting trips to the Balkan Peninsula. The earthworm material collected from Bulgaria has been elaborated and the results are hereby presented.

### MATERIAL AND METHODS

Earthworms were collected by the diluted formaldehyde method (Raw 1959), complemented with digging and searching under stones and the bark of fallen logs. The specimens were killed and fixed in 96% ethanol, then transferred into 75% ethanol and deposited in the earthworm collection of the Hungarian Natural History Museum (HNHM). For later molecular studies, tail parts of specimens of taxonomic importance were placed into 96% ethanol.

The sampling localities in Bulgaria are shown in Figure 1 and in the text the site numbers are indicated in brackets.

### RESULTS

#### *Aporrectodea jassyensis* (Michaelsen, 1891)

*Allolobophora jassyensis* Michaelsen, 1891: 15., Plisko 1963: 430., Mihailova 1966: 188.

*Aporrectodea (Aporrectodea) jassyensis*: Mršić 1991: 316.

*Aporrectodea jassyensis jassyensis*: Valchovski 2012: 89.

*Material examined.* HNHM/16074 1 ex., (No. 16) Haskovo province, Gorata Mts., Borislavci, brook in a beech forest W of the village, 225m, N41°39.542' E25°53.406', 29.05.2012., leg. J. Kontschán, D. Murányi, T. Szederjesi; HNHM/16085 1 ex., (No. 16) Haskovo province, Gorata Mts., Borislavci, brook in a beech forest W of the village, 225m, N41°39.542' E25°53.406', 29.05.2012., leg. J. Kontschán, D. Murányi, T. Szederjesi; HNHM/16088 3 ex., (No. 15) Kărdzhali province, Šarta Mts., Pelin, mixed pine forest NE of the village, 645m, N41°31.070' E25°47.010', 29.05.2012., leg. J. Kontschán, D. Murányi, T. Szederjesi.

#### *Cernosvitovia rebeli* (Rosa, 1897)

*Allolobophora rebelii* Rosa, 1897: 3., Csuzdi & Pop 2007: 20.

*Octolasion rebeli*: Černosvitov 1934: 77., 1937: 89., Mihailova 1966: 194.

*Cernosvitovia (Cernosvitovia) rebeli*: Mršić 1991: 148.  
*Cernosvitovia rebeli*: Valchovski 2012: 91.

\**Tímea Szederjesi*, Department of Systematic Zoology and Ecology, Eötvös Loránd University, H-1117 Budapest, Pázmány P. sétány 1/C. E-mail: t.szederjesi@gmail.com

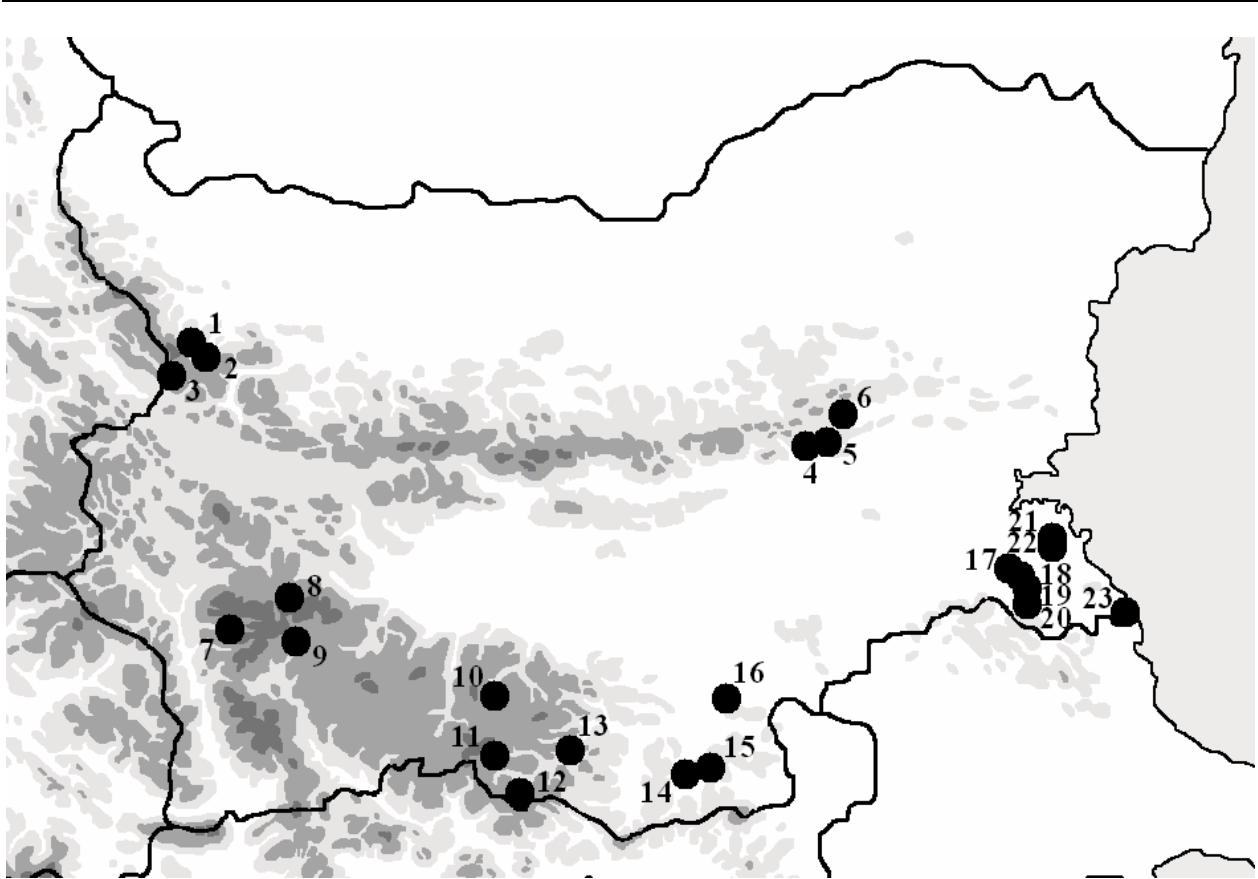


Figure 1. Collecting sites in Bulgaria (for explanations see the text)

*Material examined.* HNHM/15789 1 ex., (No. 22) Burgas province, Strandcha Mts., sidebrook of Ropotamo Stream in an oak forest, 2km N of Jasna poljana, 80m, N42°17.819' E27°37.246', 08.04.2007., leg. L. Dányi, Z. Eröss, Z. Fehér, J. Kontschán, D. Murányi; HNHM/16072 1 ex., (No. 16) Haskovo province, Gorata Mts., Borislavci, brook in a beech forest W of the village, 225m, N41°39.542' E25°53.406', 29.05.2012., leg. J. Kontschán, D. Murányi, T. Szederjesi; HNHM/16073 1 ex., (No. 16) Haskovo province, Gorata Mts., Borislavci, brook in a beech forest W of the village, 225m, N41°39.542' E25°53.406', 29.05.2012., leg. J. Kontschán, D. Murányi, T. Szederjesi; HNHM/16084 1 ex., (No. 16) Haskovo province, Gorata Mts., Borislavci, brook in a beech forest W of the village, 225m, N41°39.542' E25°53.406', 29.05.2012., leg. J. Kontschán, D. Murányi, T. Szederjesi.

***Dendrobaena alpina alpina* (Rosa, 1884)**

*Allolobophora alpina* Rosa, 1884: 28.  
*Eisenia alpina* f. *typica*: Černosvitov 1937: 80., Mihailova 1966: 185.  
*Dendrobaena alpina*: Plisko 1963: 437., Zicsi & Csuzdi 1986: 118., Valchovski 2012: 91.  
*Dendrobaena alpina alpina*: Mršić 1991: 627., Csuzdi et al. 2006: 127.

*Material examined.* HNHM/16077 1 ex., (No. 10) Smoljan province, Radjuva Planina, Pavelsko, beech forest and alpine grassland SE of the village, 1545m, N41°49.826' E24°44.657', 31.05.2012., leg. J. Kontschán, D. Murányi, T. Szederjesi.

***Dendrobaena attemsi* (Michaelsen, 1902)**

*Helodrilus* (*Dendrobaena*) *attemsi* Michaelsen, 1902: 74.

*Dendrobaena attemsi*: Černosvitov 1937: 83., Plisko 1963: 436., Mihailova 1966: 190., Zicsi & Csuzdi 1986: 118., Mršić 1991: 604., Valchovski 2012: 91.

*Material examined*. HNHM/16071 3 ex., (No. 13) Kărdžhali province, Zălti Djal Mts., Sedlarci, spring and limestone gorge NW of the village, 585m, N41°33.073' E25°01.783', 30.05.2012., leg. J. Kontschán, D. Murányi, T. Szederjesi; HNHM/16089 1 ex., (No. 11) Smoljan province, Perelik Mts., Smoljan, forest stream and spruce forest above (N of) the city, 1370m, N41°36.524' E24°41.498', 31.05.2012., leg. J. Kontschán, D. Murányi, T. Szederjesi.

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

*Allolobophora byblica* Rosa 1893: 4–5.

*Dendrobaena ganglbaueri* var. *byblica*: Černosvitov 1934: 74., 1937: 84.

*Dendrobaena byblica*: Plisko 1963: 437., Mršić 1991: 566., Valchovski 2012: 92.

*Material examined*. HNHM/15579 1 ex., (No. 9) Blagoevgrad province, Rila Mts., Mesta basin, sidebrook of the Stream Ropalica below the Grăničar mountain hut, 2100m, 07.09.2005., leg. M. Földvári, J. Kontschán, D. Murányi, T. Szűts; HNHM/15790 1 ex., (No. 22) Burgas province, Strandcha Mts, sidebrook of Ropotamo Stream in an oak forest, 2km N of Jasna poljana, 80m, N42°17.819' E27°37.246', 08.04.2007., leg. L. Dányi, Z. Eröss, Z. Fehér, J. Kontschán, D. Murányi; HNHM/15808 2 ex., (No. 17) Burgas province, Strandcha (Bosna) Mts, Karamlák stream, gallery and rocks above Mladežko, 210m, N42°09.080' E27°21.918', 07.04.2007., leg. L. Dányi, Z. Eröss, Z. Fehér, J. Kontschán, D. Murányi.

#### ***Dendrobaena hortensis* (Michaelsen, 1890)**

*Allolobophora subrubicunda* var. *hortensis* Michaelsen, 1890: 15.

*Eisenia veneta* var. *hibernica*: Mihailova 1966: 187.

*Dendrobaena hortensis*: Mršić 1991: 622., Valchovski 2012: 92.

*Material examined*. HNHM/15803 2 ex., (No. 21) Burgas province, Strandcha Mts, Ropotamo Stream and its shore vegetation, 3km N of Jasna poljana, 30m, N42°18.644' E27°37.428', 08.04.

2007., leg. L. Dányi, Z. Eröss, Z. Fehér, J. Kontschán, D. Murányi; HNHM/15804 2 ex., (No. 19) Burgas province, Strandcha Mts, Veleka River S of Zvedec, 200m, N42°05.009' E27°25.662', 07.04.2007., leg. L. Dányi, Z. Eröss, Z. Fehér, J. Kontschán, D. Murányi; HNHM/15817 1 ex., (No. 18) Burgas province, Strandcha (Bosna) Mts, Karamlák stream and its gallery 3km W of Mladežko, 180m, N42°08.817' E27°24.950', 07.04.2007., leg. L. Dányi, Z. Eröss, Z. Fehér, J. Kontschán, D. Murányi.

#### ***Dendrobaena octaedra* (Savigny, 1826)**

*Enterion octaedrum* Savigny, 1826: 183.

*Dendrobaena octaedra*: Černosvitov 1937: 83., Plisko 1963: 435., Zicsi & Csuzdi 1986: 118., Mršić 1991: 607., Valchovski 2012: 93.

*Material examined*. HNHM/16070 4 ex., (No. 13) Kărdžhali province, Zălti Djal Mts., Sedlarci, spring and limestone gorge NW of the village, 585m, N41°33.073' E25°01.783', 30.05.2012., leg. J. Kontschán, D. Murányi, T. Szederjesi; HNHM/16078 2 ex., (No. 10) Smoljan province, Radjuva Planina, Pavelsko, beech forest and alpine grassland SE of the village, 1545m, N41°49.826' E24°44.657', 31.05.2012., leg. J. Kontschán, D. Murányi, T. Szederjesi; HNHM/16083 1 ex., (No. 12) Smoljan province, Ardinski Djal Mts., Koritata, stream and mixed forest SW of the village, 995m, N41°24.089' E24°46.786', 30.05.2012., leg. J. Kontschán, D. Murányi, T. Szederjesi; HNHM/16091 3 ex., (No. 11) Smoljan province, Perelik Mts., Smoljan, forest stream and spruce forest above (N of) the city, 1370m, N41°36.524' E24°41.498', 31.05.2012., leg. J. Kontschán, D. Murányi, T. Szederjesi.

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

*Allolobophora veneta* Rosa, 1886: 674.

*Dendrobaena veneta veneta*: Mršić 1991: 613.

*Material examined*. HNHM/15580 1 ex., (No. 6) Sliven province, Stara Planina, Vărbishka Mts., above Medven, 420m, N42°50.543' E26°33.950', 04-05.09.2005., leg. M. Földvári, J. Kontschán, D. Murányi, T. Szűts.

*Remark.* This peregrine species is new to the fauna of Bulgaria.

***Eisenia lucens* (Waga, 1857)**

*Lumbricus lucens* Waga, 1857: 161.

*Eisenia submontana*: Černosvitov 1934: 71., 1937: 79., Mihailova 1966: 184.

*Allolobophora latens*: Mihailova 1964: 164.

*Eisenia lucens*: Plisko 1963: 428., Mršić 1991: 500., Valchovski 2012: 94.

*Material examined.* HNHM/15569 1 ex., (No. 3) Montana province, Stara Planina, 892m, N43°12.319' E23°03.095', 28.06.2006., leg. Z. Barina, D. Pifkó, L. Lőkös; HNHM/15570 1 ex., (No. 2) Montana province, Stara Planina, 1002m, N43°08.381' E23°13.095', 28.06.2006., leg. Z. Barina, D. Pifkó, L. Lőkös; HNHM/15593 2 ex., (No. 1) Montana province, Berkovica, 15km along the road to the Petrohanski prohod, 1000m, 25.07.2009., leg. Z. Eröss, Z. Fehér; HNHM/15792 1 ex., (No. 5) Sliven province, Stara Planina (Slivenska Planina), beech forest N of Sinite Kamâni, 830m, N42°44.766' E26°25.243', 08.04.2007., leg. L. Dányi, Z. Eröss, Z. Fehér, J. Kontschán, D. Murányi; HNHM/15801 3 ex., (No. 20) Burgas province, Strandcha Mts, stream, gallery, rocks in secondary forest 5km of Malko Târnovo, 280m, N42°01.761' E27°28.418', 07.04.2007., leg. L. Dányi, Z. Eröss, Z. Fehér, J. Kontschán, D. Murányi; HNHM/16090 3 ex., (No. 11) Smoljan province, Perelik Mts., Smoljan, forest stream and spruce forest above (N of) the city, 1370m, N41°36.524' E24°41.498', 31.05.2012., leg. J. Kontschán, D. Murányi, T. Szederjesi.

***Eisenia storkani* (Černosvitov, 1934) stat. nov.**

*Eisenia rosea* var. *storkani* Černosvitov 1934: 74., 1937: 80.

*Eisenia (Dendrobaena) grandis storkani*: Zicsi & Csuzdi 1986: 119.

*Eisenia grandis storkani*: Mršić 1991: 510., Valchovski 2012: 94.

*Material examined.* HNHM/15334 1 ex., (No. 4) Sliven province, Stara Planina, Slivenska Mts., Sinite Kamâni Natural Park, Karandila, karstic spring, 05.09.2005., leg. M. Földvári, J. Kont-

schán, D. Murányi, T. Szüts; HNHM/15582 1 ex., (No. 8) Sofia province, Rila Mts., Marica basin, Stream Prava Marica at Zavračica mountain hut, 2189m, N42°10.073' E23°38.483', 08.09.2005., leg. M. Földvári, J. Kontschán, D. Murányi, T. Szüts

*Remarks.* This species was described by Černosvitov (1934) as *Eisenia rosea* var. *storkani* from Belasica Mts., South-Western Bulgaria. Because of its fasciculated longitudinal musculature and the position of its clitellum (26–32) later, Zicsi & Csuzdi (1986) placed it into the *Eisenia grandis* species group, which unites large bodied species that live mainly in the Caucasus region and possess striped pigmentation. Considering the clitellum and musculature, this species may also belong to the *E. grandis* species group, but its small size and the lack of pigmentation shows that *E. storkani* should be regarded as a separate species. Probably *E. storkani* has closer relations with *E. ebneri* (Michaelsen, 1914), *E. kattoulasi* Zicsi & Michalis, 1981 and *E. oreophila* Szederjesi & Csuzdi 2012, all from Greece.

***Eiseniella tetraedra* (Savigny, 1826)**

*Enterion tetraedrum* Savigny, 1826: 184.

*Eiseniella tetraedra* f. *typica*: Černosvitov 1934: 71., 1937: 78., Mihailova 1966: 183.

*Eiseniella tetraedra* mut. *hercynia*: Černosvitov 1937: 79., Mihailova 1966: 184.

*Eiseniella tetraedra pupa*: Valchovski 2012: 95.

*Eiseniella tetraedra tetraedra*: Zicsi & Csuzdi 1986: 120., Mršić 1991: 514., Valchovski 2012: 95.

*Eiseniella tetraedra*: Plisko 1963: 433., Csuzdi & Zicsi 2003: 153. (for complete synonymy)

*Material examined.* HNHM/15805 1 ex., (No. 19) Burgas province, Strandcha Mts., Veleka River S of Zvedec, 200m, N42°05.009' E27°25.662', 07.04.2007., leg. L. Dányi, Z. Eröss, Z. Fehér, J. Kontschán, D. Murányi.

***Lumbricus terrestris* Linnaeus, 1758**

*Lumbricus terrestris* (part.) Linnaeus, 1758: 647.

*Lumbricus terrestris*: Černosvitov 1937: 90., Plisko 1963: 438., Zicsi & Csuzdi 1986: 120., Mršić 1991: 481., Valchovski 2012: 96.

*Material examined.* HNHM/15561 1 ex., (No. 7) Sofia province, Rila Mts., Rilski Manastir, 11.08.2005., leg. D. Murányi; HNHM/16081 1 ex., (No. 12) Smoljan province, Ardinski Djal Mts., Koritata, stream and mixed forest SW of the village, 995m, N41°24.089' E24°46.786', 30.05.2012., leg. J. Kontschán, D. Murányi, T. Szederjesi.

#### ***Octodrilus complanatus* (Dugès, 1828)**

*Lumbricus complanatus* Dugès, 1828: 289.  
*Octolasion complanatum*: Černosvitov 1937: 90., Mihailova 1966: 193.  
*Octodrilus complanatus*: Mršić 1991: 398., Valchovski 2012: 96.

*Material examined.* HNHM/16087 1 ex., (No. 14) Kárdžhali province, Boljarsko, Vransko, Krumovica River and a pasture E of the village, 200m, N41°29.505' E25°37.269', 29.05.2012., leg. J. Kontschán, D. Murányi, T. Szederjesi.

#### ***Octodrilus transpadanus* (Rosa, 1884)**

*Allolobophora transpadana* Rosa, 1884: 45., 1897: 4.  
*Octolasion rectum*: Černosvitov 1934: 76., 1937: 90.  
*Octodrilus transpadanus*: Mršić 1991: 371., Valchovski 2012: 97.

*Material examined.* HNHM/15809 1 ex., (No. 23) Burgas province, Rezovo, spring and puddles in secondary forest at the mouth of Rezovska River, 6m, N41°59.007' E28°01.648', 08.04.2007., leg. L. Dányi, Z. Eröss, Z. Fehér, J. Kontschán, D. Murányi.

#### ***Octolasion lacteum* (Örley, 1881)**

*Lumbricus terrestris* var. *lacteus* Örley, 1881: 584.  
*Octolasion lacteum*: Černosvitov 1934: 76., 1937: 89., Plisko 1963:432., Mihailova 1966: 193., Zicsi & Csuzdi 1986: 120.,  
*Octolasion tyrtaeum*: Mršić 1991: 347.  
*Octolasion lacteum*: Valchovski 2012: 98.

*Material examined.* HNHM/16082 1 ex., (No. 12) Smoljan province, Ardinski Djal Mts., Koritata, stream and mixed forest SW of the village, 995m, N41°24.089' E24°46.786', 30.05.2012., leg. J. Kontschán, D. Murányi, T. Szederjesi.

## **DISCUSSION**

According to the present and literature data, the number of recorded earthworm species and subspecies known from Bulgaria is 51. This seems to be relatively few, but we have to consider that Bulgaria is an under-researched area and there have been no focused earthworm collections except a few regions.

Besides, there are some uncertainties in the data published. Mihailova (1968) reported the presence of three Dacian endemisms from Bulgaria; *Octodrilus frivaldszkyi* (Örley, 1885), *Oc. exacystis* (Rosa, 1896) and *Oc. gradinescui* (Pop, 1938). However, *Oc. frivaldszkyi* lives solely in the Transylvanian Island Mts. (Apuseni) (Pop *et al.* 2010) so its presence in Bulgaria is inconceivable. *Oc. gradinescui* (Pop, 1938) occurs only inside the Carpathian Basin and doesn't cross the Carpathians (Csuzdi *et al.* 2011). Although *Oc. exacystis* (Rosa, 1896) is present on the outer side of the Carpathians (Pop 1949) as a typical montane species its occurrence in Bulgaria requires further corroboration.

*Aporrectodea carpathica* (Cognetti, 1927) a Carpathian endemism was also listed by Mihailova (1964) but this species is missing even from the Southern Carpathians (Csuzdi & Pop 2006).

Again Mihailova (1964) indicated the presence of *Perelia phoebea* (Cognetti, 1913) in Bulgaria. This species was described from Rhodos Isl., Greece and its occurrence in Bulgaria is not plausible.

Another uncertain data is *Allolobophora mehadiensis mehadiensis* (Rosa, 1895), which is also of Dacian origin, but it possesses a wider range, so its occurrence in Bulgaria is feasible, but needs confirmation.

The presence of *Bimastos parvus* (Eisen, 1874) a peregrine species of North American origin is also need to be corroborated. The previously published Hungarian and Romanian records all proved to be misidentifications of *Allolobophora idella eiseni* (Levinsen, 1884) (Csuzdi & Zicsi 2003).

The list of Valchovski (2012) contains also some highly disputed subspecies like *Dd. rubidus tenuis* and *Eis. tetraedra pupa* which are commonly regarded only as parthenogenetic forms (Csuzdi & Zicsi 2003). Consequently the present list of Bulgarian earthworms consists of 42 confirmed species and subspecies.

**Acknowledgements** – The present work was supported by the Hungarian Scientific Research Fund (OTKA K72744, and K100369).

## REFERENCES

- ČERNOSVITOV, L. (1934): Die Lumbriciden Bulgariens. *Mitteilungen aus den Königlich Naturwissenschaftlichen Instituten in Sofia*, 7: 71–78.
- ČERNOSVITOV, L. (1937): Die Oligochaetenfauna Bulgariens. *Mitteilungen aus den Königlich Naturwissenschaftlichen Instituten in Sofia*, 10: 62–92.
- CSUZDI, CS. & ZICSI, A. (2003): *Earthworms of Hungary (Annelida: Oligochaeta; Lumbricidae)*. In: CSUZDI, CS. & MAHUNKA, S. (eds.) *Pedozoologica Hungarica 1*. Hungarian Natural History Museum, Budapest, pp. 271.
- CSUZDI, CS. & POP, V.V. (2006): Earthworms of the Maramureş (Romania) (Oligochaeta, Lumbricidae). *Studia Universitatis „Vasile Goldiș”* 17(suppl): 37–42.
- CSUZDI, CS., POP, A.A., POP, V.V., ZICSI, A. & WINK, M. (2006): *Revision of the Dendrobaena alpina (Rosa) Species Group (Oligochaeta, Lumbricidae)*. In: POP, V.V. & POP, A.A. (eds.) *Advances in earthworm taxonomy II*. Univ. Press, Cluj p. 119–128.
- CSUZDI, CS. & POP, V.V. (2007): Redescription of *Allolobophora dugesi* var. *getica* Pop, 1947 and its allocation to the genus *Cernosvitovia* Omodeo, 1956 (Oligochaeta Lumbricidae). *European Journal of Soil Biology*, 43S: 19–23.
- CSUZDI, CS, POP V.V. & POP, A.A. (2011): The earthworm fauna of the Carpathian Basin with new records and description of three new species (Oligochaeta: Lumbricidae). *Zoologischer Anzeiger*, 250: 2–18.
- DUGÈS, A. (1828): Recherche sur la circulation, la respiration, et la reproduction des Annélides sétigères abranches. *Annales des Sciences Naturelles Paris*, 15: 284–336.
- LINNAEUS, C. (1758): *Systema Naturae per Regna tria Naturae, secundum Classes, Ordines, Genera, Species, cum Characteribus, Differentiis, Synonymis, Locis*. 10th edition, volume 1. Laurentii Salvii, Holmiae, pp. 824.
- MICHAELSEN, W. (1890): Die Lumbriciden Norddeutschlands. *Jahrbuch der Hamburgischen Wissenschaftlichen Anstalten*, 7: 1–19.
- MICHAELSEN, W. (1891): Oligochaeten des Naturhistorischen Museums in Hamburg IV. *Jahrbuch der Hamburgischen Wissenschaftlichen Anstalten*, 8: 1–42.
- MICHAELSEN, W. (1902): Neue Oligochaeten und neue Fundorte alt-bekannter. *Mitteilungen aus dem Naturhistorischen Museum in Hamburg*, 19: 3–53.
- MIHAILOVA, P. (1964): Njakoje vidove ot semejstvo Lumbricidae (Oligochaeta) novi za faunata na Blgarija. *Annuaire de Université de Sofia*, 57: 163–169.
- MIHAILOVA, P. (1965): Pet vida Lumbricidae (Oligochaeta) novi za faunata na Blgarija. *Annuaire de Université de Sofia, Faculté de Biologie*, 58: 257–266.
- MIHAILOVA, P. (1966) Dzdovni cervi Lumbricidae (Oligochaeta) v Trakija. *Fauna na Trakija, Bulgarian Academy of Science, Sofia*, 3: 181–200.
- MRŠIĆ, N. (1991): *Monograph on earthworms (Lumbricidae) of the Balkans I-II*. Slovenska Akademija Znanosti in Umetnosti, Zazred za Naravoslovne Vede Opera 31 Ljubljana, pp. 757.
- ÖRLEY, L. (1881): A magyarországi Oligochaeták faunája. I. Terricolae. *Mathematikai és Természettudományi Közlemények*, 16: 562–611.
- PLISKO, D. (1963): Materialien zur Kenntnis der Regenwürmer (Oligochaeta, Lumbricidae) Bulgariens. *Fragmenta Faunistica*, Warsawa, 10: 425–440.
- POP, V. (1949): Lumbricidele din România. *Analele Academiei Republicii Populare Române Secțiunea de Științe Geologice Geografice și Biologice*, 1(9): 383–505.
- POP, A.A, POP, V.V. & CSUZDI, CS. (2010): Significance of the Apuseni Mountains (the Carpathians) in the origin and distribution of Central European earthworm fauna. *Zoology in the Middle East*, 2010(suppl. 2): 89–110.

- POP, V.V., POP, A.A & CSUZDI, CS. (2012): An annotated checklist of the Romanian earthworm fauna. *Zoology in the Middle East*, in press.
- RAW, F. (1959): Estimating earthworm population by using formalin. *Nature*, 184: 1661–1662.
- ROSA, D. (1884): *Lumbricidi del Piemonte*. Unione Tipografico-Editrice Torino, pp. 54.
- ROSA, D. (1886): Note sui lombrici del Veneto. *Atti del Reale Istituto Veneto di Scienze*, 4: 673–687.
- ROSA, D. (1893): Viaggio del Dr. E. Festa in Palestina, nel Libano e regioni vicine. II. Lumbricidi. *Bollettino dei Musei di Zoologia ed Anatomia comparata della R. Università di Torino*, 8(160): 1–14.
- ROSA, D. (1897): Nuovi lombrichi dell'Europa orientale. (Seconda serie.) *Bollettino dei Musei di Zoologia ed Anatomia comparata della R. Università di Torino*, 12(269), 1–5.
- SAVIGNY, J.C. (1826): In G. Cuvier: Analyse des Travaux de l'Académie royale des Sciences, pendant l'année 1821, partie physique. *Mémoires de l'Académie des Sciences de l'Institut de France Paris*, 5: 176–184.
- VALCHOVSKI, H.I. (2012): Checklist of earthworms (Oligochaeta: Lumbricidae) from Bulgaria – a review. *Zootaxa*, 3458: 86–102.
- WAGA, A. (1857): Sprawozdanie z podróży naturalistów odbytej w r. 1854 do Ojcowa. *Bibliotheca Warszawska*, 2: 161–227.
- ZICSI, A. & CSUZDI, CS. (1986): Regenwürmer aus Bulgarien (Oligochaeta Lumbricidae). *Opuscula Zoologica Budapest*, 22: 113–121.