

NEW AND LITTLE KNOWN EARTHWORM SPECIES FROM
PERIPHERAL AREAS OF THE ROMANIAN CARPATHIANS
(OLIGOCHAETA, LUMBRICIDAE)

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Collecting trips organized to the little investigated regions of Romania (Oltenia, Banat, Bucovina) resulted in 41 earthworm species being recorded, including a new country record (*Octolasion lacteovicinum* Zicsi, 1968) and the discovery of a peculiar new anecic species *Dendrobaena virgata* sp. n. Consequently the number of earthworm species reported from Romania is raised to 73.

Key words: Megadrili, earthworms, anecic, Oltenia, Banat, Romania.

INTRODUCTION

The earthworm fauna of Romania is one of the most thoroughly studied in Europe due to the continuous research started by Örley in the late 19th century (ÖRLEY 1881, 1885). Örley's fundamental work was followed by Victor Pop who when summarizing the earthworm fauna of Romania reported the presence of 47 + 3 earthworm species and subspecies (POP 1949, 1964). This work was later pursued by his son, Victor V. Pop and the number of recorded earthworm taxa reached 71 (POP *et al.* 2012). However, residing in Cluj-Napoca, the focus of both Pops' research was Transylvania and the inner Carpathian Mts. Thus, relatively little attention was paid to the outside regions of the Carpathian Arch. Till now, several endemic species were described from here such as *Proctodrilus antipai* (Michaelsen, 1891), *Allolobophora leoni* Michaelsen, 1891, *Aporrectodea jassyensis* (Michaelsen, 1891), *Cernosvitovia dobrogeana* (Pop, 1938), *C. munteniana* Zicsi *et V. V. Pop*, 1991 and *C. opisthocystis* (Rosa, 1895), belonging mostly to the Moesian chorological group suggesting a strong East Balkanic influence in the region (CSUZDI *et al.* 2011).

Peculiarities of the outer sides of the Romanian Carpathian Arch held out a promise to find more interesting or even new earthworm species, therefore, we have organized collecting trips to northern part of Oltenia and southern part of Banat and Bucovina resulted in the discovery of a specific earthworm fauna dominated by little-known Moesian elements and also a large-bodied

anecic *Dendrobaena* species proved to be new to science and described hereby. Supplementary data from several other regions of Transylvania gathered recently are also presented.

MATERIAL AND METHODS

Earthworms were collected by the diluted formaldehyde method (RAW 1959), complemented with digging and hand-sorting. A combination of both methods provides more efficient sampling of earthworms (CSUZDI & PAVLIČEK 1999). The specimens collected were killed in 75% ethanol, fixed in 4% formalin, then transferred into 75% ethanol and deposited in the earthworm collection of the Hungarian Natural History Museum (HNHM) and partly in the earthworm collection in the Biological Research Institute, Cluj-Napoca. Samples from earthworms' body were fixed and placed into 96% ethanol for further DNA studies.

TAXONOMY

Family Lumbricidae Rafinesque-Schmaltz, 1815

Allolobophora mehadiensis boscaiui Pop, 1948

Allolobophora mehadiensis var. *boscaiui* Pop, 1948: 104.

Allolobophora mehadiensis var. *boscaiui*: Pop 1949: 449.

Allolobophora (Serbiona) *mehadiensis voivodinensis* Šapkarev, 1989: 40. **syn. nov.**

Serbiona mehadiensis boscaiui: Mršić 1991: 187.

Serbiona mehadiensis voivodinensis: Mršić 1991: 189.

Material examined. HNHM/16219 1 ex., Oltenia, Dâmbova, oak-hornbeam mixed forest, 458 m, N44°56.995' E23°11.667', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 30.10.2007. HNHM/16223 1 ex., HNHM/16224 1 ex., HNHM/16765 3 ex., Oltenia, Groșerea, young oak forest, 131 m, N44°42.341' E23°29.320', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 30.10.2007. HNHM/16257 4 ex., Oltenia, near Lelești, oak forest and meadow, 265 m, N45°04.102' E23°12.525', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 27.10.2007.

Remarks. *Allolobophora mehadiensis* is a polytypic species with extensive Dacian distribution (STOJANOVIĆ *et al.* 2012) and quite variable clitellar and tubercular data. The position of the clitellum in the subspecies *boscaiui* and *voivodinensis* is almost completely overlapping and this is also the case with the tubercles (Table 1). Moreover the two type localities are quite close to each other (some 120 km apart).

ŠAPKAREV (1989) was well aware of the existence of *A. m. boscaiui* but seemingly didn't read the original description because in his graphical representation of the clitellar organs of the different *mehadiensis* subspecies (ŠAPKAREV 1989, fig. 9) he gave erroneous data for *boscaiui* (cl. 33, 34, 35–44,

Table 1. Distinguishing characters of the subspecies of *Allolobophora mehadiensis*.

| Subspecies | clitellum | tubercles |
|---|---------------|-------------------|
| <i>A. m. mehadiensis</i> Rosa, 1895 | 35, 36–47, 48 | 41, 42–47, 48 |
| <i>A. m. oreophila</i> V. V. Pop, 1978 | 34, 35–49, 50 | 39, 40, 41–45, 46 |
| <i>A. m. boscaiui</i> Pop, 1948 | 33, 34–44, 45 | 38–43, 44 |
| <i>A. m. voivodinensis</i> Šapkarev, 1989 | 33, 34–46 | 38, 39–44, 45 |

45; tb. 37–42, 43, 44) therefore we concluded that *A. m. voivodinensis* is only a synonym name of *A. m. boscaiui*.

Our material corresponds well with the original data of *A. m. boscaiui* with slight variation of the clitellar data as cl. $\frac{1}{2}$ 33, 34–44, 45; tb. $\frac{1}{2}$ 38, 38, 39–44, 45.

Allolobophora mehadiensis oreophila V. V. Pop, 1978

Allolobophora mehadiensis oreophila Pop, 1978: 255.

Serbiona mehadiensis oreophila: Mršić 1991: 190.

Material examined. HNHM/16822 1 ex., after Corbești (the Zarand Mts), beech forest with alder by the stream, 337 m, N46°6.544' E22°21.590', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, Zs. Ujvári, 26.10.2009.

Remark. This subspecies with its very long clitellum (15–17 segments) clearly differs from both *A. m. mehadiensis* and *A. m. boscaiui* (Table 1).

Allolobophora robusta robusta Rosa, 1895

Allolobophora robusta Rosa, 1895: 2, Pop 1949: 450, Pop *et al.* 2012: 63.

Serbiona robusta robusta: Mršić 1991: 193.

Material examined. HNHM/16232 1 ex., Oltenia, after Baia de Arama, near Ponoarele, beech-hornbeam mixed forest, 131 m, N44°59.465' E22°47.103', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 31.10.2007. HNHM/16240 1 ex., HNHM/16771 2 ex., Oltenia, near Balta, oak-hornbeam mixed forest, 485 m, N44°54.303' E22°38.485', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 31.10.2007. HNHM/16241 1 ex., HNHM/16242 1 ex., HNHM/16243 1 ex., Banat, after Măru, beech forest, 501 m, N45°25.978' E22°27.550', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 02.11.2007. HNHM/16552 1 ex., Băile Herculane, leg. Cs. Csuzdi, V. V. Pop, 28.04.2004.

Remarks. All these Oltenian specimens belong to the larger *A. robusta robusta* subspecies with the following data: cl. $\frac{1}{2}$ 38, 38–59, 60, $\frac{1}{2}$ 61 and tb. 1/n 49, 50, 51–59, 60, 1/n 61. Their size alive sometimes exceeded 50 cm.

Allolobophora sturanyi dacica (Pop, 1938)

Eophila dacica Pop, 1938: 142.

Allolobophora dugesi var. *dacica*: Pop 1949: 440.

Karpatodinariona dacica: Mršić 1991: 246.

Allolobophora sturanyi dacica: Csuzdi & Pop 2008a: 26, Pop *et al.* 2012: 63.

Material examined. HNHM/16174 1 ex., Transylvania, Micestii de Câmpie, young forest, 420 m, N46°50.950' E24°18.640', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 03.11.2007. HNHM/16175 1 ex., Transylvania, Zorenii de Vale, mixed forest fragment, 411 m, N46°47.532' E24°03.795', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 03.11.2007. HNHM/16486 1 ex., after Stana, meadow, leg. Cs. Csuzdi, 01.08.2003. HNHM/16737 2 ex., before Mădrigești, Leurda board, beech forest, 439 m, N46°11.085', E22°15.606', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, Zs. Ujvári, 27.10.2009. HNHM/16738 10 ex., HNHM/16819 1 ex., before Mădrigești, 477 m, N46°11.432', E22°15.810', Cs. Csuzdi, J. Kontschán, V. V. Pop, Zs. Ujvári, 27.10.2009. HNHM/16746 1 ex., before Mădrigești, beech forest, 503 m, N46°11.587', E22°16.717', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, Zs. Ujvári, 28.10.2009.

Remark. *A. s. dacica* is widely distributed in the Carpathian Basin however, it is replaced by *A. s. dacidoides* in the higher region of the Carpathians.

Allolobophora sturanyi dacidoides Bouché, 1973

Allolobophora sturanyi dacidoides Bouché, 1973: 327, Csuzdi & Pop 2008a: 26, 2008b: 145., Pop *et al.* 2012: 63.

Karpatodinariona sturanyi dacidoides: Mršić 1991: 248.

Material examined. HNHM/15583 2 ex., HNHM/16489 2 ex., Transylvania, before St. Ana lake, leg. Cs. Csuzdi, 28.07.2003. HNHM/15588 3 ex., Banat, Băile Herculane, leg. Cs. Csuzdi, V. V. Pop, 28.04.2004. HNHM/16225 13 ex., HNHM/16260 8 ex., HNHM/16263 7 ex., Oltenia, near Balta, oak-hornbeam mixed forest, 485 m, N44°54.303' E22°38.485', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 31.10.2007. HNHM/16280 1 ex., Maramureș Mts, Borșa-Băile Borșa, brook and alpine grassland above the Bălăcini Pass, 1573 m, N47°40.934' E24°52.774', leg. Cs. Csuzdi, L. Dányi, J. Kontschán, D. Murányi, 22.05.2007. HNHM/16283 1 ex., Maramureș Mts, Borșa-Băile Borșa, Vinișor valley middle section, spring in a beech forest, 988 m, N47°40.160' E24°47.253', leg. Cs. Csuzdi, L. Dányi, J. Kontschán, D. Murányi, 22.05.2007. HNHM/16286 1 ex., Maramureș Mts, Borșa-Băile Borșa, Mt. Cearcănul, brooks and rocks, 1687 m, N47°39.801' E24°52.663', leg. Cs. Csuzdi, L. Dányi, J. Kontschán, D. Murányi, 22.05.2007. HNHM/16297 1 ex., Maramureș Mts, Poienile de sub Munte, Socolău valley, stream and its sidebrook in mixed forest, 825 m, N47°53.456' E24°31.089', leg. Cs. Csuzdi, L. Dányi, J. Kontschán, D. Murányi, 24.05.2007. HNHM/16544 2 ex., before St. Ana lake, beech forest, leg. Cs. Csuzdi, 27.07.2003. HNHM/16551 2 ex., Băile Herculane, leg. Cs. Csuzdi, 27.04.2004. HNHM/16561 1 ex., Băile Herculane, leg. Cs. Csuzdi, 28.04.2004.

Remarks. *A. s. dacidoides* is clearly a montane species, up to now it is known only from the higher regions of the Carpathians (above 1000 m a.s.l.).

The number of spermathecae in the *A. sturanyi* subspecies is variable but shows some differences in the different subspecies (Csuzdi & Pop 2008a). One specimen of *A. s. dacidoides* collected near St. Ana Lake (No. 15583) possesses 5 pairs of spermathecae instead of the typical 3–4, however, its clitellum and tubercles are in the position typical for *dacidoides*.

Allolobophoridella eiseni (Levinsen, 1884)

Lumbricus eiseni Levinsen, 1884: 241.

Eisenia parva f. *typica*: Pop 1949: 471.

Allolobophoridella eiseni: Mršić 1991: 254, Pop *et al.* 2012: 63.

Material examined. HNHM/16491 1 ex., Izvoare (Harghita county), hillside, beech forest, leg. Cs. Csuzdi, 29.07.2003.

Remarks. This is the second record of this peregrine species from Romania after recent reports of its occurrence in the country (Csuzdi *et al.* 2011). It seems that this species is more widely distributed but its specific habitat (under bark of fallen trees) is usually not searched for earthworms.

Aporrectodea caliginosa (Savigny, 1826)

Enterion caliginosum Savigny, 1826: 80.

Allolobophora caliginosa: Pop 1949: 435.

Aporrectodea (Aporrectodea) caliginosa caliginosa: Mršić 1991: 321.

Aporrectodea caliginosa: Csuzdi & Pop 2008b: 146, Pop *et al.* 2012: 63.

Material examined. HNHM/16165 Banat, Cerna Sat, beech forest, near a small stream, 496 m, N45°07.390' E22°40.541', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 29.10.2007. HNHM/16226 1 ex., Oltenia, near Runcu, canyon, 317 m, N45°08.333' E23°08.240', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 28.10.2007. HNHM/16736 1 ex., Apuseni Mts, Padiş, Poiana Ponor, leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, Zs. Ujvári, 25.10.2009.

Remark. All the *Ap. caliginosa* specimens found in Romania so far belong to the typical form.

Aporrectodea carpathica (Cognetti, 1927)

Allolobophora carpathica Cognetti, 1927: 5, Mršić 1991: 217, Pop *et al.* 2012: 63.

Material examined. HNHM/16298 1 ex., Maramureş Mts, Poienile de sub Munte, Socolău valley, stream and its sidebrook in mixed forest, 825 m, N47°53.456' E24°31.089', leg. Cs. Csuzdi, L. Dányi, J. Kontschán, D. Murányi, V. V. Pop, 24.05.2007. HNHM16372 1 ex., Mogosa, leg. Cs. Csuzdi, V. V. Pop, 19.09.2005. HNHM/16452 1 ex., Rodnei Mts, Borşa,

Stațiunea Borșa, Cimpoiș valley, beech forest, wet grassland and brooks in the vicinity of the mineral water spring, 1023 m, N47°36.187' E24°46.500', leg. L. Dányi, J. Kotschán, D. Murányi, 26.09.2006.

Remark. This Carpathian endemism is quite common at higher elevations in the Eastern Carpathians but missing from the Southern ranges.

Aporrectodea georgii (Michaelsen, 1890)

Allolobophora georgii Michaelsen, 1890: 3.

Allolobophora georgii var. *transylvanica*: Pop 1949: 444.

Aporrectodea (Aporrectodea) georgii: Mršić 1991: 315.

Aporrectodea georgii: Csuzdi & Pop 2008b: 146, Pop *et al.* 2012: 63.

Material examined. HNHM/16167 6 ex., Transylvania, after Micestii de Câmpie, meadow, 382 m, N46°50.520' E24°18.093', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 03.11.2007. HNHM/16492 1 ex., Izvoare, hillside, beech forest, leg. Cs. Csuzdi, 29.07.2003.

Remark. *Ap. georgii* is a widely distributed Atlanto-Mediterranean species (Csuzdi *et al.* 2011) preferring moist loamy soils.

Aporrectodea rosea (Savigny, 1826)

Enterion roseum Savigny, 1826: 182.

Allolobophora rosea f. *typica*: Pop 1949: 451.

Aporrectodea (Aporrectodea) rosea rosea: Mršić 1991: 296.

Aporrectodea rosea: Csuzdi & Pop 2008b: 146, Pop *et al.* 2012: 63.

Material examined. HNHM/15542 4 ex., Vlădeasa Mts, 1300 m, N46°47.248' E22°48.568', leg. Cs. Csuzdi, M. Csuzdi, 29.06.2005. HNHM/16749 2 ex., Zarand Mts before Mădrigești, 2 km from the Drum Forestier Leurda board, beech forest, 439 m, N46°11.085' E22°15.606', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, Zs. Ujvári, 27.10.2009., HNHM/16770 1 ex., Oltenia, after Măru, beech forest, 501 m, N45°25.978' E22°27.550', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 02.11.2007.

Cernosvitovia opisthocystis (Rosa, 1895)

Allolobophora opisthocystis Rosa, 1895: 4.

Allolobophora dugesi var. *opisthocystis*: Pop 1949: 443.

Italobalkaniona opisthocystis: Mršić 1991: 170.

Cernosvitovia opisthocystis: Pop *et al.* 2012: 63.

Material examined. HNHM/16170 3 ex., Oltenia, near Runcu, beech forest, 409 m, N45°10.429' E23°08.090', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 28.10.2007. HNHM/16550 2 ex., Băile Herculane, leg. Cs. Csuzdi, V. V. Pop, 27.04.2004. HNHM/16563 2 ex., Băile Herculane, leg. Cs. Csuzdi, V. V. Pop, 28.04.2004.

Cernosvitovia rebeli (Rosa, 1897)*Allolobophora rebelii* Rosa, 1897: 3.*Cernosvitovia rebeli*: Mršić 1991: 148, Szederjesi & Csuzdi 2012: 263.*Cernosvitovia rebelii*: Pop *et al.* 2012: 63.

Material examined. HNHM/16198 3 ex., HNHM/16227 1 ex., HNHM/16751 6 ex., HNHM/16766 8 ex., Oltenia, after Baia de Aramă, near Ponoarele, beech-hornbeam mixed forest, 131 m, N44°59.465' E22°47.103', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 31.10.2007. HNHM/16261 1 ex., Oltenia, near Balta, oak-hornbeam mixed forest, 485 m, N44°54.303' E22°38.485', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 31.10.2007. HNHM/16560 1 ex., Banat, Băile Herculane, leg. Cs. Csuzdi, V. V. Pop, 28.04.2004.

Remarks. Both *Cernosvitovia* species represent Moesian elements entering the Carpathian Basin through the Cerna Valley and reaching Băile Herculane and its environs. The correct orthography of *C. rebeli* has recently been clarified by SZEDERJESI and CSUZDI (2012).

***Dendrobaena virgata* sp. n.**
(Figs 1–3)

Holotype. HNHM/16803, Banat, Caras-Severin County, Măru village, the Tarcu Mts, South Carpathians, beech forest, 501 m, N45°25.978' E22°27.550', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 02.11.2007.

Paratypes. HNHM/16804 4 ex., locality and date same as that of the Holotype. HNHM/16805 2 ex., Oltenia, near Runcu, pine mixed beech forest, 674 m, N45°14.896' E22°07.683', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 28.10.2007. HNHM/16806 1 ex., Banat, Poiana Mărului, beech forest, 890 m, N45°23.362' E22°34.475', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 02.11.2007. HNHM/16808 1 ex., Banat, Poiana Mărului, pine forest, 1371 m, N45°21.083' E22°38.284', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 02.11.2007.

Etymology. The new species is named for its evidently striped body, with alternating dark red – light pinkish body colour.

Diagnosis. Length 74–144 mm, diameter 5–7 mm, setae distantly standing. Pigmentation red-violet, darker and striped anteriorly. First dorsal pore in 5/6. Clitellum on ½ 27, 28–34, tubercles on 1/n 29–½ 34. Male pore on 15, surrounded by a glandular crescent. Nephridial pores irregularly alternated between setal line *b* and above *d*. Three pairs of vesicles in 9, 11, 12; spermathecae 9/10, 10/11 between *c* and *d*. Calciferous glands with well-developed diverticula in 11–12. Hearts in segments 7–11, nephridial bladders simple, sausage-shaped.

External characters. Holotype: 116 mm long and 7 mm wide. Number of segments 141. Paratypes: 74–144 mm long and 5–7 mm wide. Number of segments 88–149. Pigmentation red-violet, darker and slightly striped anteriorly. Prostomium epilobous ½ opened.

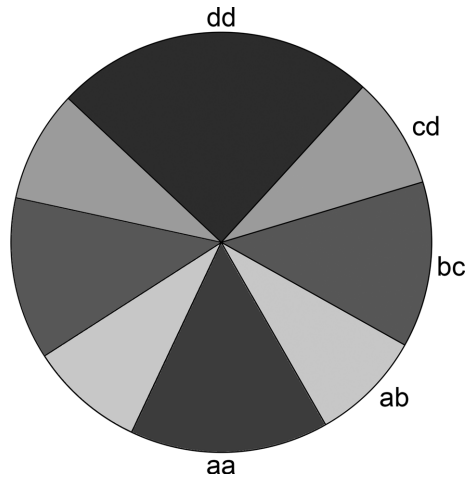


Fig. 1. *Dendrobaena virgata* sp. n. Setal ratio.

First dorsal pore at the intersegmental furrow 5/6. Setae distantly standing. Setal arrangement behind clitellum: $aa:ab:bc:cd:dd = 1.76:1:1.43:1:2.81$ (Fig. 1). Male pores large on segment 15, surrounded by a glandular crescent, confined in its own segment. Nephridial pores irregularly alternated between setal line *b* and above *d*. Clitellum on segments $\frac{1}{2}$ 27, 28–34. Tubercula pubertatis on segments $\frac{1}{n}$ 29– $\frac{1}{2}$ 34 (Fig. 2). Glandular tumescence on segments 10, 17, 25, 26, 30 *ab*.

Internal characters. Septa 6/7–8/9, 12/13 thickened, 13/14–14/15 strongly thickened. Testes and funnels paired in segments 10–11, covered by perioesophageal testis sac in segment 10. Three pairs of seminal vesicles in 9, 11, 12. Two pairs of spermathecae in 9/10, 10/11 with external openings between setal line *c* and *d*. Calci-

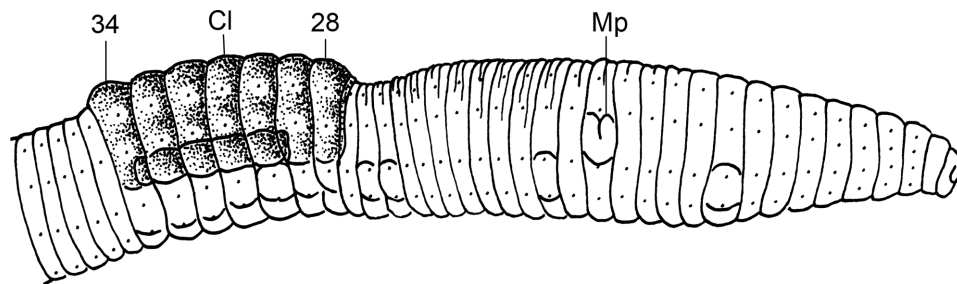


Fig. 2. *Dendrobaena virgata* sp. n. Ventrolateral view of the clitellar region. Cl = clitellum, Mp = male pore.



Fig. 3. *Dendrobaena virgata* sp. n. Photo of a living specimen.

ferous glands with well-developed diverticula in segments 11–12. Paired hearts appear in segments 7–11., extraoesophageal vessels missing. Nephridial bladders simple, sausage-shaped. Crop in segments 15–16, and gizzard in segments 17–18. Typhosolis biramous, large. The cross-section of the longitudinal muscle layer is of pinnate type.

Remarks. *D. virgata* sp. n. is a typical anecic species. With its striped red-violet pigmentation superficially resembles to the somewhat larger *Lumbricus polyphemus* Fitzinger, 1833 (Fig. 3), however, it is easily distinguished by the widely paired setae. According to the clitellar organs the new species shows similarity with the much smaller *D. illyrica* (Cognetti, 1906) but differs from it in the position of the spermathecal pores (between c–d vs. d–M) and the tubercles (1/n 29–½ 34 vs. 1/n 30, 31–33, 1/n 34). The position of the nephridial pores is also different in the two species, while it is irregular in *D. virgata* sp. n., *D. illyrica* possesses regularly alternating nephridial pores (*attemsi* type).

Dendrobaena alpina alpina (Rosa, 1884)

Allolobophora alpina Rosa, 1884: 28.

Dendrobaena alpina f. *typica*: POP 1949: 481.

Dendrobaena alpina alpina: MRŠIĆ 1991: 627, POP *et al.* 2012: 63.

Material examined. HNHM/16190 2 ex., Banat, Cerna Sat, beech forest, near the river Cerna, 436 m, N45°04.646' E22°37.368', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 29.10.2007. HNHM/16191 3 ex., HNHM/16196 10 ex., Oltenia, near Runcu, pine mixed beech forest, 674 m, N45°14.896' E23°07.683', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 28.10.2007. HNHM/16236 1 ex., HNHM/16246 1 ex., Oltenia, near Runcu, beech forest, 967 m, N45°16.142' E23°05.617', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 28.10.2007. HNHM/16252 1 ex., Banat, Poiana Mărului, pine forest, 1371 m, N45°21.083' E22°38.284', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 02.11.2007. HNHM/16259 13 ex., HNHM/16262 27 ex., Banat, Cerna Sat, beech forest, near a small stream, 496 m, N45°07.390' E22°40.541', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 29.10.2007. HNHM/16288 3 ex., Oltenia, after Baia de Arama, near Ponoarele, beech-hornbeam mixed forest, 131 m, N44°59.465' E22°47.103', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 31.10.2007. HNHM/16548 15 ex., Băile Herculane, leg. Cs. Csuzdi, V. V. Pop, 28.04.2004.

Dendrobaena alpina alteclitellata (Pop, 1938)

Eisenia alpina alteclitellata POP, 1938: 136.

Dendrobaena alpina var. *alteclitellata*: POP 1949: 482.

Dendrobaena alpina alteclitellata: CSUZDI & POP 2008b: 147, POP *et al.* 2012: 63.

Material examined. HNHM/15969 1 ex., Bucovina, after Stratioara, mixed beech-pine forest, 847 m, N47°28.957' E25°39.402', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, Zs. Ujvári, 04.11.2011. HNHM/15972 1 ex., Bucovina, above Brosteni, mixed beech-pine forest, 935 m, N47°18.607' E25°41.716', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, Zs. Ujvári, 03.11.2011.

HNHM/16293 1 ex., Maramureş Mts, Poienile de sub Munte, Budescu valley, brook in mixed forest, 821 m, N47°52.254' E24°36.192', leg. Cs. Csuzdi, L. Dányi, J. Kotschán, D. Murányi, 24.05.2007. HNHM/16296 1 ex., Maramureş Mts, Poienile de sub Munte, Socolău valley, stream and its sidebrook in mixed forest, 825 m, N47°53.456' E24°31.089', leg. Cs. Csuzdi, L. Dányi, J. Kotschán, D. Murányi, 24.05.2007. HNHM/16301 1 ex., Maramureş Mts, Poienile de sub Munte, Lutoasa valley, brook in mixed forest, 868 m, N47°51.241' E24°33.544', leg. Cs. Csuzdi, L. Dányi, J. Kotschán, D. Murányi, 24.05.2007. HNHM/16371 1 ex., Rodnei Mts, Borşa, Staţiunea Borşa, spring area of the Bistriţa Aurie River under the Gărgalău Peak, spring brooks and torrents, tarn, peatbog, pine scrub and alpine grassland, 1688–1711 m, N47°34.380' E24°48.575', leg. J. Kotschán, D. Murányi, M. Orci Kirill, 29.06.2005. HNHM/16454 2 ex., Maramureş Mts, Borşa, Băile Borşa, Vulcănescu brook and alpine grassland at Mt. Preluca Cerbului, 1703 m, N47°38.674' E24°52.045', leg. Cs. Csuzdi, L. Dányi, J. Kotschán, D. Murányi, 23.05.2007. HNHM/16559 5 ex., Băile Herculane, leg. Cs. Csuzdi, 28.04.2004.

Remarks. *D. alpina* is represented by two subspecies in Romania. The larger and more deeply pigmented subspecies *alteclitellata* occurs in the Northern part of the Eastern Carpathians while the smaller, lightly pigmented nominal subspecies is distributed in the Southern Carpathians (Csuzdi & Pop 2006: 39.)

Dendrobaena attemsi (Michaelsen, 1902)

Helodrilus (*Dendrobaena*) *attemsi* Michaelsen, 1902: 47.

Dendrobaena attemsi: Mršić 1991: 604, Csuzdi & Pop 2008b: 147, Pop *et al.* 2012: 63.

Material examined. HNHM/15967 2 ex., Bucovina, Iedu, spruce forest with alder marsh, 1130 m, N47°41.412' E25°06.427', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, Zs. Ujvári, 01.11.2011. HNHM/15968 3 ex., Bucovina, after Stratioara, mixed beech-pine forest, 847 m, N47°28.957' E25°39.402', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, Zs. Ujvári, 04.11.2011. HNHM/16233 1 ex., HNHM/16239 1 ex., Banat, Cerna Sat, beech forest, near a small stream, 486 m, N45°05.396' E22°38.134', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 29.10.2007. HNHM/16284 2 ex., Maramureş Mts, Borşa - Băile Borşa, Vinişor valley middle section, spring in a beech forest, 988 m, N47°40.160' E24°47.253', leg. Cs. Csuzdi, L. Dányi, J. Kotschán, D. Murányi, 22.05.2007. HNHM/16289 3 ex., Maramureş Mts, Borşa - Băile Borşa, alpine grassland between Stanchi hut and Mt. Cearcănul, 1685 m, N47°39.569' E24°52.834', leg. Cs. Csuzdi, L. Dányi, J. Kotschán, D. Murányi, 22.05.2007. HNHM/16294 5 ex., Maramureş Mts, Poienile de sub Munte, Budescu valley, brook in mixed forest, 821 m, N47°52.254' E24°36.192', leg. Cs. Csuzdi, L. Dányi, J. Kotschán, D. Murányi, 24.05.2007. HNHM/16299 2 ex., Maramureş Mts, Poienile de sub Munte, Socolău valley, stream and its sidebrook in mixed forest, 825 m, N47°53.456' E24°31.089', leg. Cs. Csuzdi, L. Dányi, J. Kotschán, D. Murányi, 24.05.2007. HNHM/16303 4 ex., Maramureş Mts, Poienile de sub Munte, Lutoasa valley, brook in mixed forest, 868 m, N47°51.241' E24°33.544', leg. Cs. Csuzdi, L. Dányi, J. Kotschán, D. Murányi, 24.05.2007. HNHM/16455 2 ex., Maramureş Mts, Borşa - Băile Borşa, Vulcănescu Brook and alpine grassland at Mt. Preluca Cerbului, 1703 m, N47°38.674' E24°52.045', leg. Cs. Csuzdi, L. Dányi, J. Kotschán, D. Murányi, 23.05.2007. HNHM/16547 1 ex., Băile Herculane, leg. Cs. Csuzdi, V. V. Pop, 28.04.2004.

Dendrobaena byblica byblica (Rosa, 1893)

Allolobophora byblica Rosa, 1893: 4.

Dendrobaena byblica: Mršić 1991: 566, Pop 1949: 483, Pop *et al.* 2012: 63.

Material examined. HNHM/15542 1 ex., Vlădeasa Mts, before the alpine hut, 1300 m, N46°47.248' E22°48.568', leg. Cs. Csuzdi, M. Csuzdi, 29.06.2005. HNHM/15578 1 ex., Padis Mts, Stațiunea Boga, Bazarul Someșului, 1300 m, leg. D. Murányi, 17.07.2006. HNHM/16064 2 ex., Țarcu Mts, open brook on the W slope of Mt. Țarcu, 1700 m, leg. Á. Ecsedi, T. Kovács, G. Puskás, 14.10.2011. HNHM/16231 3 ex., Oltenia, after Baia de Arama, near Ponoarele, beech-hornbeam mixed forest, 131 m, N44°59.465' E22°47.103', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 31.10.2007. HNHM/16235 1 ex., Banat, Godeanu, beech forest, 896 m, N45°01.313' E22°37.996', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 29.10.2007. HNHM/16490 1 ex., Vlădeasa, Răchițele waterfall, leg. Cs. Csuzdi, 01.08.2003. HNHM/16553, 1 ex., HNHM/16557 2 ex., Băile Herculane, leg. Cs. Csuzdi, 28.04.2004. HNHM/16742 1 ex., Poiana Horea, Mt. Ursoi, mossy pine forest, 1298 m, N46°32.516', E22°53.351', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, Zs. Ujvári, 24.10.2009. HNHM/16807 4 ex., Oltenia, Poiana Mărului, beech forest, 890 m, N45°23.362' E22°34.475', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 02.11.2007.

Remarks. *D. byblica* is a highly variable species even inside Romania. The most widespread form is deeply pigmented red-violet with clitellum on 25–30, however several specimens (HNHM/16490, 16742) possess a shorter clitellum on 25–29 which represents a transitory stage toward *D. ganglbaueri* (Rosa, 1894) characterized by a clitellum on (23)24–29. In Oltenia we found two distinct populations. The typical Romanian deeply pigmented form and a large form with comparable size of *F. platyura platyura* (Fitzinger, 1833). These specimens (HNHM/16231, 16235, 16553, 16557) are not easy to distinguish; the only external difference from *F. pl. platyura* is the position of the male pore (the generic difference between *Fitzingeria* and *Dendrobaena*) which is always on 15 in these specimens. Interestingly, both *byblica* forms in Romania possess large calciferous diverticula in 11 which is a characteristics of *F. platyura* and not known in the typical *byblica* population distributed in the Levant and Anatolia. To clear the taxonomic status of these deeply pigmented *D. byblica* populations further molecular studies need to be carried out.

Dendrobaena clujensis Pop, 1938

Dendrobaena clujensis Pop, 1938: 137, 1949: 485, Mršić 1991: 644, Csuzdi & Pop 2008b: 147, Pop *et al.* 2012: 63.

Material examined. HNHM/15503 1 ex., Apuseni Mts, Tarcaia, young mixed beech-hornbeam forest, alders by a little stream, 478 m, N46°33.165' E22°15.950', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, Zs. Ujvári, 29.10.2009. HNHM/15564 1 ex., Apuseni Mts, Mărișel, pine forest, leg. Cs. Csuzdi, V. V. Pop, 11.2008. HNHM/16168 1 ex., Transylvania, Vlădeasa, Săcuieu, pine forest, 1327 m, N46°46.368' E22°48.683', leg. Cs. Csuzdi, J. Kontschán, V. V.

Pop, 04.11.2007. HNHM/16747 1 ex., before Mădrigești, beech forest, 439 m, N46°11.085' E22°15.606', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, Zs. Ujvári, 27.10.2009. HNHM/16772 4 ex., HNHM/16774 4 ex., HNHM/16775 3 ex., Padis, leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, Zs. Ujvári, 25.10.2009.

Remark. *D. clujensis* is a typical Dacian species distributed exclusively in the Carpathian Basin.

Dendrobaena octaedra (Savigny, 1826)

Enterion octaedrum Savigny, 1826: 183.

Dendrobaena octaedra f. *typica*: Pop 1949: 486.

Dendrobaena octaedra var. *quadrivesiculata*: Pop 1949: 487.

Dendrobaena octaedra: Mršić 1991: 607, Csuzdi & Pop 2008b: 148, Pop *et al.* 2012: 63.

Material examined. HNHM/15575 1 ex., stream bank before St. Ana lake, leg. Cs. Csuzdi, 28.07.2003. HNHM/15961 4 ex., Bucovina, Cârlibaba, river bank, 965 m, N47°35.334' E25°07.125', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, Zs. Ujvári, 01.11.2011. HNHM/15966 1 ex., Bucovina, Iedu, spruce forest with alder marsh, 1130 m, N47°41.412' E25°06.427', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, Zs. Ujvári, 01.11.2011. HNHM/15970 2 ex., Bucovina, above Broșteni, after the mountain pass, mixed beech-pine forest, 994 m, N47°18.593' E25°41.324', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, Zs. Ujvári, 03.11.2011. HNHM/16258 1 ex., Banat, Cerna Sat, beech forest, near a small stream, 496 m, N45°07.390' E22°40.541', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 29.10.2007. HNHM/16265 1 ex., Banat, Muntele Mic, after Borlova, beech forest, 1434 m, N45°20.772' E22°28.590', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 01.11.2007. HNHM/16285 1 ex., Maramureș Mts, Borșa - Băile Borșa, Vinișor valley middle section, spring in a beech forest, 988 m, N47°40.160' E24°47.253', leg. Cs. Csuzdi, L. Dányi, J. Kotschán, D. Murányi, 22.05.2007. HNHM/16302 1 ex., Maramureș Mts, Poienile de sub Munte, Lutoasa valley, brook in mixed forest, 868 m, N47°51.241' E24°33.544', leg. Cs. Csuzdi, L. Dányi, J. Kotschán, D. Murányi, 24.05.2007. HNHM/16456 1 ex., Maramureș Mts, Borșa, Băile Borșa, Vulcănescu brook and alpine grassland at Mt. Preluca Cerbului, 1703 m, N47°38.674' E24°52.045', leg. Cs. Csuzdi, L. Dányi, J. Kotschán, D. Murányi, 23.05.2007. HNHM/16487 1 ex., Harghita Mts, Mădăraș, leg. Cs. Csuzdi, 30.07.2003. HNHM/16741 4 ex., Apuseni Mts, Poiana Horea, Mt. Ursoi, mossy pine forest, 1298 m, N46°32.516' E22°53.351', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, Zs. Ujvári, 24.10.2009.

Dendrobaena vladeasa Csuzdi, Pop et Pop, 2011

Dendrobaena vladeasa Csuzdi, Pop & Pop, 2011: 3, Pop *et al.* 2012: 63.

Material examined. HNHM/15543 16 ex., Vlădeasa Mts, before the alpine hut, 1300 m, N46°47.248' E22°48.568', leg. Cs. Csuzdi, M. Csuzdi, 29.06.2005. HNHM/16169 5 ex., Transylvania, Vlădeasa, Săcuieu, pine forest, 1327 m, N46°46.368' E22°48.683', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 04.11.2007.

Remarks. *D. vladeasa* has recently been described from the Apuseni Mts, Romania. Our new records are also confined to this region.

Table 2. Distinguishing characters of the *Fitzingeria platyura* subspecies and *Dendrobaena* sp.

| Species | ♂ | clitellum/tubercles | vesicles | spermathecae | colour | size (mm) |
|------------------------|----|---------------------|----------|-----------------|--------|-----------|
| <i>Dendrobaena</i> sp. | 15 | 25–30 ½ 25–½ 29 | 9–12 | 9/10–10/11 d | grey | 132/6 |
| <i>F. pl. platyura</i> | 26 | ½ 24, 25–30 | 9, 11, | 9/10–10/11 | dark | 65– |
| | 27 | 25, 26–29 | 12 | d | red | 120/6 |
| <i>F. pl. depressa</i> | 26 | ½ 24, 25–30 | 9, 11, | (6/7, 7/8) 8/9– | grey | 80– |
| | 27 | 25, 26–29, 30 | 12 | 10/11 d | | 150/7 |
| <i>F. pl. montana</i> | 25 | ½ 24, 25–30 | 11, 12 | (6/7, 7/8) 8/9– | dark | 130– |
| | 26 | ½ 24, 25–30 | | 10/11 d | grey | 380/12 |

Dendrobaena sp.

Material examined. HNHM/16810 1 ex., Oltenia, after Măru, beech forest, 501 m, N45°25.978' E22°27.550', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 02.11.2007.

External characters. 132 mm long and 6 mm wide. Number of segments 134. Pigmentation reddish grey. Prostomium epilobous ½ closed. First dorsal pore at the intersegmental furrow 8/9. Setae distantly standing. Setal arrangement behind clitellum: *aa:ab:bc:cd:dd* = 1.57:1.29:1.19:1:1.95. Male pores hardly seen on segment 15. Nephridial pores just above setal line *b*. Clitellum on segments 25–30. Tubercula pubertatis on segments ½ 25–½ 29. Glandular tumescence on segments 10, 11, 26, 29, 30 *ab*.

Internal characters. Septa 6/7–7/8 and 11/12 slightly thickened, 8/9–10/11 thickened, 12/13–14/15 strongly thickened. Testes and funnels paired in segments 10–11, covered by perioesophageal testis sac in segment 10–11. Four pairs of seminal vesicles in 9–12. Two pairs of spermathecae in 9/10, 10/11 with external openings in setal line *d*. Calciferous glands with well-developed diverticula in segment 11. Paired hearts appear in segments 7–11. with a pair of small extraoesophageal vessels in 12. Nephridial bladders biscuit-shaped. Crop in segments 15–16, and gizzard in segments 17–18. Typhlosolis unilobous. The cross-section of the longitudinal muscle layer is of pinnate type.

Remarks. We have only one specimen from this enigmatic species. Phenetically it looks belonging to the *Fitzingeria platyura* group, however, it has male pores on segment 15. According to the position of the clitellar organs it can belong to the *D. byblica* complex, however it is much larger than any species in this group and furthermore it has well developed calciferous glands in 11 and strongly thickened septa in 12/13–14/15. Both characters are typical for *F. platyura*.

Apart from the male pores' position the main differences between *Dendrobaena* sp. and the three subspecies of *F. platyura* are summarized in Table 2.

Dendrodrilus rubidus rubidus (Savigny, 1826)

Enterion rubidum Savigny, 1826: 182.

Dendrobaena rubida: Pop 1949: 490.

Dendrodrilus rubidus rubidus: Mršić 1991: 263, Csuzdi & Pop 2008b: 148, Pop *et al.* 2012: 63.

Material examined. HNHM/16740 2 ex., Apuseni Mts, Poiana Horea, Mt. Ursoi, mossy pine forest, 1298 m, N46°32.516' E22°53.351', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, Zs. Ujvári, 24.10.2009.

Eisenia lucens (Waga, 1857)

Lumbricus lucens Waga, 1857: 161.

Lumbricus submontanus Vejdovsky, 1875: 199.

Eisenia submontana: Pop 1949: 473.

Eisenia lucens: Mršić 1991: 500, Csuzdi & Pop 2008b: 149, Pop *et al.* 2012: 63.

Material examined. HNHM/15502 5 ex., Tărcăița, young mixed beech-hornbeam forest, alders by a little stream, 478 m, N46°33.165' E22°15.950', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, Zs. Ujvári, 29.10.2009. HNHM/15520 1 ex., Bihor Mts, between Abrud and Zlatna, beech forest, leg. Cs. Csuzdi, V. V. Pop, 17.09.2006. HNHM/15525 1 ex., Mărișel, small valley with stream, mixed beech forest, 900 m, N46°40.106' E23°08.718', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, Zs. Ujvári, 24.10.2009. HNHM/15526 2 ex., HNHM/16748 1 ex., before Mădrigești, beech forest, 439 m, N46°11.085' E22°15.606', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, Zs. Ujvári, 27.10.2009. HNHM/15527 1 ex., Rodna Mts, Săcel, Iza Spring in pine forest, ~900 m, leg. Cs. Csuzdi, L. Dányi, J. Kontschán, D. Murányi, 23.05.2007. HNHM/15528 1 ex., Igriș Mts, Desești - Stațiunea Izvoare, brook in beech forest on the Valhani Plateau, 967 m, N47°43.619' E23°44.704', leg. Cs. Csuzdi, L. Dányi, J. Kontschán, D. Murányi, 25.05.2007. HNHM/15551 1 ex., Oltenia, 1.5 km before Lainici, beech forest, 413 m, N45°16.255' E23°22.542', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 27.10.2007. HNHM/15552 1 ex., HNHM/16245 1 ex., Banat, Cerna Sat, beech forest, near a small stream, 486 m, N45°05.396' E22°38.134', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 29.10.2007. HNHM/15553 1 ex., Oltenia, near Runcu, beech forest, 967 m, N45°16.142' E23°05.617', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 28.10.2007. HNHM/15545 1 ex., Oltenia, near Runcu, canyon, 317 m, N45°08.333' E23°08.240', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 28.10.2007. HNHM/15984 1 ex., Caraș - Severin county, Țarcu Mts, 1500 m, leg. T. Kovács, D. Murányi, 09.06.2011. HNHM/15985 1 ex., Caraș - Severin county, Cerna Mts, Țațu, 710 m, leg. T. Kovács, D. Murányi, G. Puskás, 10.06.2011. HNHM/16063 2 ex., Țarcu Mts, open brook on the W slope of Mt. Țarcu, 1700 m, leg. Á. Ecsedi, T. Kovács, G. Puskás, 14.10.2011. HNHM/16192 1 ex., Banat, Poiana Mărului, beech forest, 890 m, N45°23.362' E22°34.475', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 02.11.2007. HNHM/16244 2 ex., Petroșen, 1.5 km before Lainici, beech forest, 413 m, N45°16.255' E23°22.542', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 27.10.2007. HNHM/16253 1 ex., Banat, Poiana Mărului, pine forest, 1371 m, N45°21.083' E22°38.284', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 02.11.2007. HNHM/16281 4 ex., Maramureș Mts, Borșa - Băile Borșa, Vinișor valley middle section, spring in a beech forest, 988 m, N47°40.160' E24°47.253', leg. Cs. Csuzdi, L. Dányi, J. Kontschán, D. Murányi, 22.05.2007. HNHM/16282 6 ex., Maramureș Mts, Borșa - Băile Borșa, Vinișor valley upper section, mixed forest and stream, 1032 m, N47°39.834' E24°47.707', leg. Cs. Csuzdi, L. Dányi, J. Kontschán, D. Murányi, 22.05.2007.

HNHM/16291 2 ex., Munții Rodnei, Săcel, Iza Spring in pine forest, 1037 m, N47°35.587' E24°32.121', leg. Cs. Csuzdi, L. Dányi, J. Kontschán, D. Murányi, 23.05.2007. HNHM/16292 1 ex., Maramureș Mts, Poienile de sub Munte, Budescu valley, brook in mixed forest, 821 m, N47°52.254' E24°36.192', leg. Cs. Csuzdi, L. Dányi, J. Kontschán, D. Murányi, 24.05.2007. HNHM/16295 1 ex., Maramureș Mts, Poienile de sub Munte, Socolău valley, stream and its sidebrook in mixed forest, 825 m, N47°53.456' E24°31.089', leg. Cs. Csuzdi, L. Dányi, J. Kontschán, D. Murányi, 24.05.2007. HNHM/16300 1 ex., Munții Igriș, Desești - Stațiunea Izvoare, brook in beech forest on the Valhani Plateau, 967 m, N47°43.619' E23°44.704', leg. Cs. Csuzdi, L. Dányi, J. Kontschán, D. Murányi, 25.05.2007. HNHM/16545 1 ex., before St. Ana lake, beech forest, leg. Cs. Csuzdi, 27.07.2003.

Remark. *E. lucens* is widely distributed in the higher regions of the Carpathians and also in the Apuseni Mts.

Fitzingeria annectens (Rosa, 1895)

Allolobophora ganglbaueri annectens Rosa, 1895: 7.

Fitzingeria annectens: Mršić 1991: 540, Pop *et al.* 2012: 64.

Material examined. HNHM/16230 1 ex., Oltenia, Dâmbova, oak-hornbeam mixed forest, 458 m, N44°56.995' E23°11.667', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 30.10.2007. HNHM/16238 1 ex., Banat, Cerna Sat, beech forest, near a small stream, 486 m, N45°05.396' E22°38.134', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 29.10.2007. HNHM/16249 1 ex., Banat, Cerna Sat, beech forest, near the river Cerna, 436 m, N45°04.646' E22°37.368', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 29.10.2007. HNHM/16251 1 ex., Banat, Cerna Sat, beech forest, near a small stream, 496 m, N45°07.390' E22°40.541', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 29.10.2007. HNHM/16558 1 ex., Băile Herculane, leg. Cs. Csuzdi, 28.04.2004.

Remarks. *Fitzingeria annectens* was in synonymy with *D. byblica* for a long time until Zicsi and Pop (1984) restored it because the type specimen of Rosa described from Transylvania and also several newly collected ones from the Southern Carpathians possessed backward shifted male pores which is an indication for inclusion in the genus *Fitzingeria*. Our specimens show backward shifted male pores as well, however their similarity with the deep-red pigmented form of *D. byblica* is astonishing.

Fitzingeria platyura montana (Černosvitov, 1932)

Octolasion montanum Černosvitov, 1932: 535.

Dendrobaena platyura var. *montana*: Pop 1949: 489.

Fitzingeria platyura montana: Mršić 1991: 546, Csuzdi & Pop 2008b: 149, Pop *et al.* 2012: 64.

Material examined. HNHM/15963 1 ex., Bucovina, after Ciumârna, over the mountain pass, mixed beech-pine forest, 1016 m, N47°44.835' E25°38.507', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, Zs. Ujvári, 04.01.2011. HNHM/15964 1 ex., Bucovina, after Sucevița, mixed beech-pine forest, 1035 m, N47°44.613' E25°38.517', leg. Cs. Csuzdi, J. Kontschán, V.

V. Pop, Zs. Ujvári, 30.10.2011. HNHM/16171 3 ex., HNHM/16776 2 ex., Transylvania, after Micestii de Câmpie, meadow, 382 m, N46°50.520' E24°18.093', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 03.11.2007.

Remark. The area of this Carpathian species slightly extends down to the Bucovinian Middle Ranges (Obscinas), however, it is completely missing from the Southern Carpathians.

Lumbricus castaneus (Savigny, 1826)

Lumbricus castaneus Savigny, 1826: 180, Mršić 1991: 466, Pop *et al.* 2012: 64.
Lumbricus castaneus f. *typica*: Pop 1949: 476.

Material examined. HNHM/15960 4 ex., Bucovina, Cârlibaba, river bank, 965 m, N47°35.334' E25°07.125', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, Zs. Ujvári, 01.11.2011. HNHM/15965 6 ex., Bucovina, Iedu, spruce forest with alder marsh, 1130 m, N47°41.412' E25°06.427', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, Zs. Ujvári, 01.11.2011. HNHM/15971 6 ex., Bucovina, Valea Stânei, spruce forest with alder marsh, 1130 m, N47°31.401' E25°10.308', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, Zs. Ujvári, 01.11.2011.

Remarks. This peregrine species is distributed only in Bucovina in Romania. It has already been collected there (Vatra-Dornei, Suceava county) in 1937 (Pop 1949).

Lumbricus polyphemus (Fitzinger, 1833)

Enterion polyphemum Fitzinger, 1833: 552.
Lumbricus polyphemus: Pop 1949: 477, Mršić 1991: 473., Csuzdi & Pop 2008b: 149., Pop *et al.* 2012: 64.

Material examined. HNHM/15495 1 ex., Zarand Mts, Meziad Cave, 390 m, leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, Zs. Ujvári, 29.10.2009. HNHM/15501 2 ex., Zarand Mts, after Corbești, beech forest with alder by the stream, 337 m, N46°6.544' E22°21.590', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, Zs. Ujvári, 26.10.2009. HNHM/15587 1 ex., Băile Herculane, leg. Cs. Csuzdi, V. V. Pop, 28.04.2004. HNHM/16164 1 ex., Oltenia, after Baia de Aramă, near Ponoarele, beech-hornbeam mixed forest, 131 m, N44°59.465' E22°47.103', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 31.10.2007. HNHM/16195 1 ex., Banat, Obârsia - Cloșani, beech forest, 271 m, N45°01.333' E22°42.378', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 29.10.2007. HNHM/16218 1 ex., Oltenia, Dâmbova, oak-hornbeam mixed forest, 458 m, N44°56.995' E23°11.667', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 30.10.2007. HNHM/16237 1 ex., Banat, Cerna Sat, beech forest, near a small stream, 486 m, N45°05.396' E22°38.134', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 29.10.2007. HNHM/16248 1 ex., Oltenia, near Balta, oak-hornbeam mixed forest, 485 m, N44°54.303' E22°38.485', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 31.10.2007. HNHM/16250 1 ex., Banat, Cerna Sat, beech forest, near a small stream, 496 m, N45°07.390' E22°40.541', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 29.10.2007. HNHM/16549 2 ex., Băile Herculane, leg. Cs. Csuzdi, 27.04.2004.

Lumbricus rubellus Hoffmeister, 1843

Lumbricus rubellus Hoffmeister, 1843: 187, Pop 1949: 478, Mršić 1991: 474, Csuzdi & Pop 2008b: 150, Pop *et al.* 2012: 64.

Material examined. HNHM/16290 1 ex., Maramureş Mts, Borşa – Băile Borşa, Vinişor valley, mixed forest and stream at Canton Silvic, 870 m, N47°41.081' E24°47.416', leg. Cs. Csuzdi, L. Dányi, J. Kontschán, D. Murányi, 22–24.05.2007.

Lumbricus terrestris Linnaeus, 1758

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

Lumbricus terrestris: Mršić 1991: 481, Csuzdi & Pop 2008b: 150, Pop *et al.* 2012: 64.

Material examined. HNHM/15577 1 ex., Izvoare, stream bank, leg. Cs. Csuzdi, 29.07.2003. HNHM/15958 1 ex., HNHM/15959 1 ex., Bucovina, Voievodeasa, 568 m, N47°48.536' E25°43.140', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, Zs. Ujvári, 30.11.2011.

Octodriloides izanus Csuzdi, Pop et Pop, 2011

Octodriloides izanus Csuzdi, Pop & Pop 2011: 4, Pop *et al.* 2012: 64.

Material examined. HNHM/16458 1 ex., Rodna Mts, Săcel. Iza Gorge, Iza river and the shore vegetation, limestone rocks, 800 m, leg. Cs. Csuzdi, L. Dányi, J. Kontschán, D. Murányi, 22.09.2005.

Remark. *Oi. izanus* has recently been described from the NE Carpathians. The present specimen is from the type locality.

Octodriloides transylvanicus (Zicsi et Pop, 1984)

Octodrilus transylvanicus Zicsi & Pop, 1984: 243.

Octodriloides transylvanicus: Mršić 1991: 456. (lapsus)

Octodriloides transylvanicus: Csuzdi *et al.* 2011: 15, Pop *et al.* 2012: 64.

Material examined. HNHM/16488 1 ex., Harghita county, Harghita-Mădăraş, leg. Cs. Csuzdi, 30.07.2003.

Remark. This species is recorded so far only from the Eastern Carpathians.

Octodrilus bihariensis bihariensis Pop, 1989

Octodrilus bihariensis bihariensis Pop, 1989: 199, Pop *et al.* 2012: 64.

Material examined. HNHM/16735 3 ex., Apuseni Mts, Padiş, Poiana Ponor, leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, Zs. Ujvári, 25.10.2009.

Remark. The present material is from the type locality.

Octodrilus compromissus compromissus Zicsi et Pop, 1984

Octodrilus compromissus Zicsi & Pop, 1984: 245.

Octolasium lissaense: Pop 1949: 466.

Octodrilus compromissus compromissus: Pop 1989: 202, Pop *et al.* 2012: 64.

Octodrilus compromissus: Mršić 1991: 389, Csuzdi & Pop 2008b: 151.

Material examined. HNHM/16221 2 ex., Oltenia, near Runcu, beech forest, 409 m, N45°10.429' E23°08.090', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 28.10.2007. HNHM/16229 1 ex., Oltenia, Dâmbova, oak-hornbeam mixed forest, 458 m, N44°56.995' E23°11.667', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 30.10.2007. HNHM/16172 2 ex., HNHM/16247 3 ex., HNHM/16256 3 ex., Transylvania, after Zoreni de Vale, meadow, 303 m, N46°48.144' E24°09.368', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 03.11.2007. HNHM/16287 1 ex., Maramureş Mts, Borşa, Băile Borşa, brooks and rocks between Stanchi hut and Mt. Cearcănul, 1687 m, N47°39.801' E24°52.663', leg. Cs. Csuzdi, L. Dányi, J. Kotschán, D. Murányi, 22.05.2007.

Remark. *Oc. compromissus* is a polytypic species (CSUZDI & POP 2006). Our present specimens belong to the typical subspecies.

Octodrilus exacystis exacystis (Rosa, 1896)

Allolobophora exacystis Rosa, 1896: 3.

Octolasium exacystis: Pop 1949: 461.

Octodrilus exacystis exacystis: Pop 1989: 205, Pop *et al.* 2012: 64.

Octodrilus exacystis: Mršić 1991: 432.

Material examined. HNHM/16173 1 ex., Transylvania, Miceştii de Câmpie, young forest, 420 m, N46°50.950' E24°18.640', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 03.11.2007. HNHM/16193 1 ex., Banat, Poiana Mărlului, beech forest, 890 m, N45°23.362' E22°34.475', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 02.11.2007. HNHM/16255 1 ex., HNHM/16768 6 ex., Banat, after Măru, beech forest, 501 m, N45°25.978' E22°27.550', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, 02.11.2007. HNHM/16546 1 ex., before St. Ana lake, beech forest, leg. Cs. Csuzdi, 27.07.2003. HNHM/16744 1 ex., HNHM/16820 10 ex., after Corbeşti, beech forest with alder by the stream, 337 m, N46°6.544' E22°21.590', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, Zs. Ujvári, 26.10.2009., HNHM/16817 12 ex., before Yarabd Mts, Mădrigeşti, beech forest, 439 m, N46°11.085' E22°15.606', leg. Cs. Csuzdi, J. Kotschán, V. V. Pop, Zs. Ujvári, 27.10.2009. HNHM/16818 8 ex., before Mădrigeşti, small diner by a stream, 477 m, N46°11.432' E22°15.810', Cs. Csuzdi, J. Kotschán, V. V. Pop, Zs. Ujvári, 27.10.2009.

Octodrilus exacystis oresbius Pop, 1989

Octodrilus exacystis oresbius Pop, 1989: 207, Pop *et al.* 2012: 64.

Material examined. HNHM/16745 3 ex., Zarand Mts, before Mădrigești, valley near a small diner, beech forest, 503 m, N46°11.587' E22°16.717', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, Zs. Ujvári, 28.10.2009.

Octodrilus frivaldszkyi (Örley, 1885)

Octolasium frivaldszkyi Örley, 1885: 17, Pop 1949: 462.

Octodrilus frivaldszkyi: Pop 1989: 208, Mršić 1991: 390, Pop *et al.* 2012: 64.

Material examined. HNHM/16743 1 ex., Apuseni Mts, Padiș, Poiana Ponor, leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, Zs. Ujvári, 25.10.2009.

Octodrilus parvivesiculatus Csuzdi, Pop et Pop, 2011

Octodrilus parvivesiculatus Csuzdi, Pop & Pop, 2011: 5, Pop *et al.* 2012: 64.

Material examined. HNHM/16453 1 ex., Rodnei Mts, Borșa - Stațiunea Borșa, Cimpoiș valley, beech forest, wet grassland and brooks in the vicinity of the mineral water spring, 1023 m, N47°36.187' E24°46.500', leg. L. Dányi, J. Kontschán, D. Murányi, 26.09.2006.

Octodrilus robustus (Pop, 1973)

Octolasium (Octodrilus) robustum Pop, 1973: 265.

Octodrilus robustus: Mršić 1991: 430, Csuzdi & Pop 2008b: 151, Pop *et al.* 2012: 64.

Material examined. HNHM/16556 1 ex., Mogoșa, Maramureș county, leg. Cs. Csuzdi, V. V. Pop, 19.11.2005.

Octodrilus transpadanus (Rosa, 1884)

Allolobophora transpadana Rosa, 1884: 45.

Octolasium transpadanum: Pop 1949: 468.

Octodrilus transpadanus: Mršić 1991: 371, Pop *et al.* 2012: 64.

Material examined. HNHM/16222 1 ex., Oltenia, Groșerea, young oak forest, 131 m, N44°42.341' E23°29.320', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 30.10.2007.

Remarks. This is a widely distributed Trans-Aegean species. Its range stretches from the Alps through Eastern Europe to Georgia in east and Jordan in south (SZEDERJESI *et al.* 2013).

Octolasion lacteovicinum Zicsi, 1968

Octolasion (Octolasion) lacteovicinum Zicsi, 1968: 236.

Octolasion lacteovicinum: Mršić 1991: 345.

Material examined. HNHM/15962 1 ex., Bucovina, Vârfu Dealului, mesic forest near the spring, 508 m, N47°35.369' E25°37.004', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, Zs. Ujvári, 04.01.2011.

Remarks. *O. lacteovicinum* has been described by ZICSI (1968) on the basis of 41 specimens collected in different localities around Gödöllő, Hungary. This Romanian specimen represents the first record outside Hungary and also after the original description.

Octolasion lacteum (Örley, 1881)

Lunbricus terrestris var. *lacteus* Örley, 1881: 584.

Octolasion lacteum: Pop 1949: 464.

Octolasion tyrtaeum: Mršić 1991: 347.

Octolasion lacteum: Csuzdi & Pop 2008b: 150, Pop *et al.* 2012: 64.

Material examined. HNHM/16166 1 ex., Banat, Cerna Sat, beech forest, near a small stream, 496 m, N45°07.390' E22°40.541', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 29.10.2007. HNHM/15254 1 ex., Oltenia, Dâmbova, oak-hornbeam mixed forest, 458 m, N44°56.995' E23°11.667', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 30.10.2007. HNHM/16739 1 ex., Zarand Mts, before Mădrigești, small diner by a stream, 477 m, N46°11.432' E22°15.810', Cs. Csuzdi, J. Kontschán, V. V. Pop, Zs. Ujvári, 27.10.2009. HNHM/16750 2 ex., before Mădrigești, beech forest, 439 m, N46°11.085' E22°15.606', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, Zs. Ujvári, 27.10.2009., HNHM/16767 1 ex., Oltenia, after Baia de Aramă, near Ponoarele, beech-hornbeam mixed forest, 131 m, N44°59.465' E22°47.103', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 31.10.2007., HNHM/16769 1 ex., Banat, after Măru, beech forest, 501 m, N45°25.978' E22°27.550', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 02.11.2007.

Proctodrilus thaleri Höser et Zicsi, 2009

Proctodrilus thaleri Höser & Zicsi, 2009: 652, Pop *et al.* 2012: 64, Höser 2013: 87.

Material examined. HNHM/16197 2 ex., Oltenia, near Runcu, beech forest, 409 m, N45°10.429' E23°08.090', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 28.10.2007. HNHM/16234 1 ex., Banat, Godeanu, meadow with laterit soil, 716 m, N45°01.399' E22°38.875', leg. Cs. Csuzdi, J. Kontschán, V. V. Pop, 29.10.2007.

Remark. This species was described from Copșa Mică, Sibiu county, Romania. This is its first record from the outer fringe of the Carpathian Arc.

DISCUSSION

The earthworm fauna of Romania is relatively well known. In a recent review (POP *et al.* 2012), the presence of 71 earthworm species and subspecies were reported for the country. The diverse new material elaborated hereby added a new species and a new record raising the number of species recorded in Romania to 73. However, the peculiar large bodied species found and the diversity of the different *D. byblica* forms suggest that still many undescribed species might be present in the region. These different “byblica” populations share the same clitellar position with the typical East Mediterranean form but differ in many characters like the deep red coloration, larger size, and presence of calciferous diverticula in segment 11 making the *D. byblica* species group (CSUZDI & PAVLÍČEK 1999) even more complex. To complicate the picture even more, we have found *D. byblica* specimens looking exactly the same as *F. platyura platyura* and other specimens exactly the same as *F. annectens* except in both cases the position of the male pores. It might indicate that the genus *Fitzingeria* is polyphyletic and the location of the male pore is a highly homoplastic character.

*

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