

# New earthworm records from the Ukrainian part of the north-eastern Carpathians (Megadrili: Lumbricidae)

T. SZEDERJESI

*Timea Szederjesi, Hungarian Natural History Museum, Department of Zoology, H-1088 Budapest, Baross u.13. E-mail: t.szederjesi@gmail.com*

**Abstract.** Elaboration of the earthworm material collected from the Ukrainian part of the north-eastern Carpathians resulted in recording 8 species. Revision of the former *E. spelaea* (Rosa, 1901) records revealed that all these specimens are misidentifications of *E. lucens* (Waga, 1857). *D. veneta cognettii* (Černosvitov, 1935), a former synonym of *D. alpina alteclitellata* (Pop, 1938) and junior homonym of *D. cognettii* (Michaelsen, 1903) has been reinstated and a new replacement name *D. cernosvitovi* nom. nov. is proposed.

**Keywords.** Oligochaeta, Eisenia, Dendrobaena, veneta cognettii, replacement name.

## INTRODUCTION

Research on the earthworm fauna of the north-eastern Carpathians started at the beginning of the 20<sup>th</sup> century however, this area is still insufficiently known.

The recent research are focused mainly on the Maramureş region in Romania and revealed remarkable diversity. Csuzdi & Pop (2006, 2008) recorded presence of altogether 22 species, which is nearly the quarter of the total number of earthworm species known in the Carpathian Basin and among them, two species (*Octodriloides izanus* and *Octodrilus parvi-vesiculatus*) proved to be new to science (Csuzdi *et al.* 2011).

The Ukrainian part of the north-eastern Carpathians was first studied by Cognetti (1927), Černosvitov (1928, 1932) and then Perel (1979). Altogether, 18 earthworm taxa were reported from this region so far (Černosvitov 1935, Perel 1979).

The aim of this study is to present the results of the earthworm collectings carried out in the early 2000s, in the Zakarpatska province (Kárpátalja) of Ukraine.

## MATERIAL AND METHODS

Earthworms were collected by hand-sampling, *i.e.* searching under stones, the bark of fallen logs, etc. The specimens were killed and fixed in 75% ethanol and deposited in the earthworm collection of the Hungarian Natural History Museum (HNHM). Additional material in the earthworm collection of Lev Černosvitov was also used for the study (C/numbers).

## RESULTS

### *Aporrectodea carpathica* (Cognetti, 1927)

*Allolobophora carpathica* Cognetti, 1927: 5; Černosvitov 1928: 26; 1932: 529; 1935: 51.  
*Aporrectodea carpathica*: Csuzdi & Pop 2006: 38; 2008: 146.

*Material examined.* HNHM/17417 2 ex., Polonyna Krasna (Kraszna-havas), spring section of a forest sidebrook of Luzhanka River, N48° 22.432' E23°45.050', 1195 m, from wood and under stones, leg. D. Murányi, 18.05.2002.

### *Bimastos rubidus* (Savigny, 1826)

*Enterion rubidum* Savigny, 1826: 182.  
*Bimastos constrictus*: Cognetti 1927: 7. Černosvitov 1928: 26.

*Dendrobaena subrubicunda*: Černosvitov 1932: 531.  
*Dendrobaena subrubicunda* f. *typica*: Černosvitov 1935: 43.  
*Bimastus tenuis*: Černosvitov 1935: 63.  
*Dendrodrilus rubidus rubidus*: Csuzdi & Pop 2006: 40; 2008: 148.  
*Bimastos rubidus*: Csuzdi 2012.

*Material examined*. HNHM/17413 1 ex., Polonyna Krasna (Kraszna-havas), upper section of Luzhanka River, below the ice covered sections, N48°22.759' E23°45.372', 1130 m, from wood and under stones, leg. D. Murányi, 19.05.2002.

***Dendrobaena alpina alteclitellata* (Pop, 1938)**

(Figure 1)

*Eisenia alpina alteclitellata* Pop, 1938: 136.  
*Eisenia alpina* (part.): Černosvitov 1932: 528.  
*Eisenia alpina* f. *typica* (part.): Černosvitov 1935: 37.  
*Dendrobaena alpina alteclitellata*: Csuzdi & Pop 2006: 39; 2008: 147.

*Material examined*. HNHM/17402 1 ex., Polonyna Krasna (Kraszna-havas), Luzhanka River catchment basin, beech forest, 1000 m, leg. B. Cser, 04.07.2003. HNHM/17405 1 ex., Polonyna Krasna (Kraszna-havas), Topas hillside on the treeline, beech forest, from wood and under stones, 1300 m, leg. D. Murányi, 19.05.2002. HNHM/17420 9 ex., Polonyna Krasna (Kraszna-havas), valley of Luzhanka River, beech forest, 580 m, leg. B. Cser, 07.08.2003.

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

*Helodrilus* (*Dendrobaena*) *attemsi* Michaelsen, 1902: 47.  
*Dendrobaena attemsi*: Perel 1979: 236. Csuzdi & Pop 2006: 39; 2008: 147.

*Material examined*. HNHM/17403 2 ex., Polonyna Krasna (Kraszna-havas), Luzhanka River catchment basin, beech forest, 1000 m, leg. B. Cser, 04.07.2003. HNHM/17406 3 ex., Polonyna Krasna (Kraszna-havas), Topas hillside on the treeline, beech forest, from wood and under stones, 1300 m, leg. D. Murányi, 19.05.2002. HNHM/17407 2 ex., Polonyna Krasna (Kraszna-havas), Kvasovets stream source region, beech

forest, gulch, from leaf litter, wood and under stones, leg. D. Murányi, 21.05.2002.

***Dendrobaena cernosvitovi* nom. nov.**

(Figure 2)

*Eisenia veneta* var. *cognettii* Černosvitov, 1935: 40 = *Dendrobaena cognettii* (Černosvitov, 1935) non *Dendrobaena cognettii* (Michaelsen, 1903).  
*Eisenia veneta* var. *concolor*: Cognetti 1927: 5. Černosvitov 1928: 25; 1932: 528.  
*Eisenia alpina* (part.): Černosvitov 1932: 528.  
*Eisenia alpina* f. *typica* (part.): Černosvitov 1935: 37.  
*Dendrobaena alpina*: Perel 1972: 109.  
non *Dendrobaena alpina alteclitellata* (Pop, 1938): Csuzdi & Pop 2006: 39; 2008: 147.

*Material examined*. C/597 Holotype, Bilky-Sinevir, 12–16.08.1926. C/497 3 ex., Carpathians, Apšinec, leg. L. Černosvitov, 03.07.1932. C/590 4 ex., Carpathians, 1925. C/591 4 ex., Carpathians, Hoverla, leg. S. Hrabě, 02.08.1925. C/601 5 ex., Carpathians, Byčkov, leg. O. Jirovec, 07.1929. C/614 1 ex., Carpathians, Svidovec, leg. V. Vladykov, 07.1925. C/628 1 ex., Tempa-Užčerna, 1200 m, leg. L. Černosvitov, 28.07.1926. HNHM/17411 5 ex., Polonyna Krasna (Kraszna-havas), beech forest in the upper valley of Luzhanka River, N48°22.81' E23°45.29', 1190 m, from wood and soil, leg. D. Murányi, 19.05.2002. HNHM/17414 1 ex., Polonyna Krasna (Kraszna-havas), upper section of Luzhanka River, below the ice covered sections, N48°22.759' E23°45.372', 1130 m, from wood and under stones, leg. D. Murányi, 19.05.2002.

*External characters*. Length 48–62 mm, diameter 3–4 mm. Number of segments 100–122. Pigmentation red-violet dorsally, darker anteriorly. Prostomium epilobous ½ open. First dorsal pore at the intersegmental furrow 5/6. Setae distantly standing. Setal arrangement behind clitellum: *aa:ab:bc:cd:dd* = 1.83:1.07:1.22:1:2.88. Male pores large on segment 15, accompanied by a glandular crescent protruding into the 16<sup>th</sup> segment. Nephridial pores irregularly alternate between setal line *b* and above *d*. Clitellum on segments 27, ½ 27–33. Tubercula pubertatis on segments 31–32. Glandular tumescences on segments 11, 12, 16 *b*.

*Internal characters.* Septa 6/7–8/9 slightly thickened. Testes and funnels paired in segments 10–11. Three pairs of seminal vesicles in 9, 11, 12. Two pairs of spermathecae in 9/10, 10/11 with external openings between setal line *d* and the mid-dorsal line (M). Calciferous glands with well-developed diverticula in segment 11–12. Last pair of hearts in segment 10. Nephridial bladders sausage-shaped. Crop in segments 15–16, and gizzard in segments 17–18. Typhlosolis T-shaped. The cross-section of the longitudinal muscle layer of pinnate type.

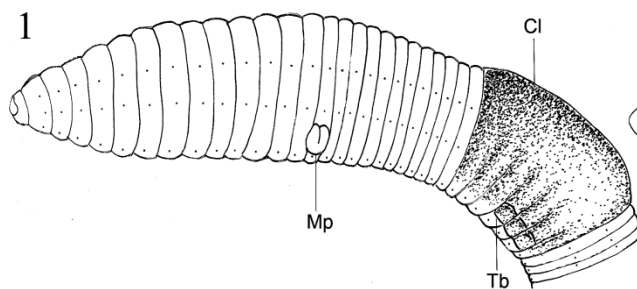
*Etymology.* The species is named after the renowned Oligochaete taxonomist, Dr. Lev Černosvitov.

*Remarks.* This species was first reported as *E. veneta* var. *concolor* (Cognetti 1927, Černosvitov 1928, 1932), which was originally described from the Caucasus and Transcaucasus, but based on the differences in the extension of the clitellar organs (cl: 27–32, tb: 30–31 vs. cl: 28–33, tb: 31–32) Černosvitov (1935) described it as a new variety; *E. veneta* var. *cognettii*. Perel (1972), highlighting that no *D. veneta* occurrences had yet been reported from the Carpathians, synonymized *D. veneta* v. *cognettii* with *D. alpina* (Rosa, 1884) due to the morphological similarities. Csuzdi & Pop (2006) reinstated *D. alpina alteclitellata* (Pop, 1938) from the synonymy with *D. alpina alpina* on the basis of recent molecular phylogenetic results (Csuzdi *et al.* 2005) and regarded *D. veneta cognettii* as a senior synonym of *D. alpina alteclitellata*. How-

ever, as the senior synonym name represents a junior homonym of *D. cognettii* (Michaelsen, 1903) they regarded the junior name *D. alpina alteclitellata* as valid.

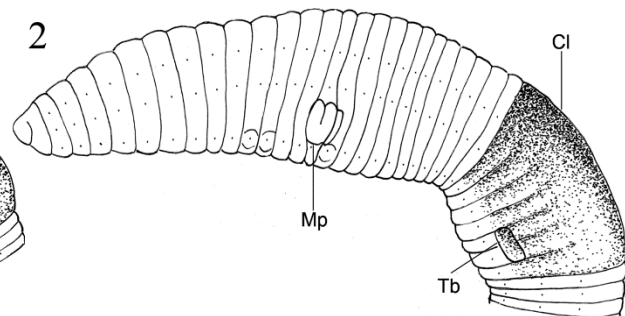
The differences in the position of the tubercles (31–32 vs. 30–31), the opening of the spermathecae (d–M vs. M), the position of the last hearts (10 vs. 11 and extraoesophageal vessels in 12) and the presence of calciferous diverticula in 11–12 clearly distinguish *D. veneta cognettii* from *D. veneta* and unequivocally shows its relationship with the *D. alpina* species group, especially with *D. alpina alteclitellata*. However, *cognettii* clearly differs from *alteclitellata* in the position of the tubercles (31–32 vs. 30–32) and the opening of the spermathecae (d–M vs. M). Besides, their distribution overlaps in the studied region of the north-eastern Carpathians, therefore *D. veneta cognettii* is suggested to be raised to species rank. As this name is a junior homonym of *D. cognettii* (Michaelsen, 1903), a new replacement name is proposed.

Revision of the material of Černosvitov revealed that several specimens previously reported as *D. alpina* from the studied region in fact belong to *D. cernosvitovi*. These and the newly collected specimens showed that the shape of the tubercles are thicker and look more like to that of *D. alpina alteclitellata* and *D. clujensis* instead of the thinner tubercles presented by Černosvitov (1935: 40).



**Figure 1.** *Dendrobaena alteclitellata* (Pop, 1938).

Ventrolateral view of the fore body. Cl = clitellum, Mp = male pore, Tb = tubercles.



**Figure 2.** *Dendrobaena cernosvitovi* nom. nov.

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

*Enterion octaedrum* Savigny, 1826: 183.

*Dendrobaena octaedra*: Cognetti 1927: 6. Černosvitov 1928: 26; 1932: 530. Csuzdi & Pop 2006: 39; 2008: 148.

*Dendrobaena octaedra* f. *typica*: Černosvitov 1935: 46.

*Material examined.* HNHM/17408 1 ex., Polonyna Krasna (Kraszna-havas), Kvasovets stream source region, beech forest, gulch, from leaf litter, wood and under stones, leg. D. Murányi, 21.05.2002. HNHM/17419 3 ex., Polonyna Krasna (Kraszna-havas), valley of Luzhanka River, beech forest, 580 m, leg. B. Cser, 07.08.2003.

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

*Lumbricus lucens* Waga, 1857: 161.

*Eisenia spelaea*: Cognetti 1927: 3. (misidentification)

*Eisenia spelea*: Černosvitov 1928: 25; 1932: 528; 1935: 39. (misidentification)

*Eisenia submontana*: Černosvitov 1932: 526; 1935: 35.

*Eisenia lucens*: Csuzdi & Pop 2006: 40; 2008: 149.

*Material examined.* C/185 3 ex., Carpathians, Apšinec, 1400 m, 20.07.1926. C/188 3 ex., Carpathians, Koroleve (Királyháza), 04.08.1926. C/621 4 ex., Berehove (Beregszász), leg. L. Černosvitov, 7–8.08.1926. C/625 2 ex., Lozeščina (Mezőhát), leg. L. Černosvitov, 25.07.1926. HNHM/17401 1 ex., HNHM/17418 1 ex., Polonyna Krasna (Kraszna-havas), valley of Luzhanka River, beech forest, 580 m, leg. B. Cser, 07.08.2003. HNHM/17409 7 ex., Polonyna Krasna (Kraszna-havas), Kvasovets stream source region, beech forest, gulch, from leaf litter, wood and under stones, leg. D. Murányi, 21.05.2002. HNHM/17410 3 ex., Polonyna Krasna (Kraszna-havas), beech forest in the upper valley of Luzhanka River, N48°22.81' E23°45.29', 1190 m, from wood and soil, leg. D. Murányi, 19.05.2002. HNHM/17412 3 ex., Polonyna Krasna (Kraszna-havas), Kolocava (Alsókalocsa), beech forest above Kvasovets stream,

from wood and under stones, 600–900 m, leg. D. Murányi, 16.05.2002. HNHM/17415 4 ex., Polonyna Krasna (Kraszna-havas), upper section of Luzhanka River, below the ice covered sections, N48°22.759' E23°45.372', 1130 m, from wood and under stones, leg. D. Murányi, 19.05.2002. HNHM/17416 1 ex., Polonyna Krasna (Kraszna-havas), spring section of a forest sidebrook of Luzhanka River N48°22.432' E23°45.050', 1195 m, leg. D. Murányi, 18.05.2002.

*Remarks.* The early literature contains several *E. spelaea* (Rosa, 1901) records from this region (Cognetti 1927, Černosvitov 1928, 1932, 1935). Distinguishing the *E. lucens*/*E. spelaea* species pair is rather difficult due to the high morphological similarity. Besides the ability of bioluminescence in case of *E. lucens*, the only difference is in the position of the spermathecal pores, which are near the mid-dorsal line (M) in *E. lucens* and near setal line *d* in *E. spelaea*. However, in case of this character a certain degree of variance can be observed. Examination of the newly collected specimens and the material of Černosvitov clearly showed that the openings of the spermathecal pores of the *E. lucens* specimens in the north-eastern Carpathians are halfway between M and *d*. A recent molecular study (Szedzerjesi *et al.* 2018) revealed that the species pair separates well in the Carpathian Basin. *E. spelaea* can only be found in the western edge, while *E. lucens* possesses a wider range and is distributed through the whole Carpathian arch. Consequently, the earlier records of *E. spelaea* from the north-eastern Carpathians are treated here as misidentifications of *E. lucens*.

***Lumbricus rubellus* Hoffmeister, 1843**

*Lumbricus rubellus* Hoffmeister, 1843: 187. Černosvitov 1932: 538; 1935: 75. Csuzdi & Pop 2006: 40; 2008: 150.

*Material examined.* HNHM/17404 2 ex., Talabor River under Nehrovets (Felsőkalocsa), under stones, leg. D. Murányi, 23.05.2002.

## DISCUSSION

The earthworm collectings in the Ukrainian part of the north-eastern Carpathians resulted in recording altogether 8 earthworm species.

Revision of the former *E. spelaea* (Rosa, 1901) records and its comparison with the newly collected material showed that all specimens from this part of the Carpathians are in fact *E. lucens* (Waga, 1857) however, a slight variance in the position of the openings of the spermathecae can be observed.

The new material also revealed that *D. veneta* var. *cognettii* described by Černosvitov (1935) from Bilky-Sinevir shows characteristic differences from *D. alpina alteclitellata* (Pop, 1938), therefore its resurrection from synonymy and a new replacement name *D. cernosvitovi* nom. nov. was proposed.

With the new records and the actualisation of the former data, the number of the known earthworm species in the Ukrainian part of the north-eastern Carpathians is 16. Taking into account the recent results of Csuzdi & Pop (2006, 2008), with thorough researches in the Ukrainian Carpathians the occurrence of several additional species is expected.

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