

# COLLEMBOLA (HEXAPODA) FROM MEHEDIŢI MOUNTAINS (SW CARPATHIANS, ROMANIA), WITH FOUR NEW RECORDS FOR THE ROMANIAN FAUNA

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*Abstract.* The authors present the Collembola species collected from the MehediŢi Mountains, SW Carpathians. Four species [*Pachyotoma recta* (Stach, 1930), *Megalothorax incertus* Börner, 1903, *Pygmarrhopalites infrasecundarius* (Loksa & Rubio, 1966) Vargovitsh, 2009 and *Pygmarrhopalites longicornis* (Cassagnau & Delamare Deboutteville, 1953) Vargovitsh, 2009] are reported as new for the Romanian fauna. Notes on the taxonomic status, morphology and distribution of the species are given.

*Key words:* Collembola, MehediŢi Mountains, Romania, new records.

## 1. INTRODUCTION

The collembolan fauna of the MehediŢi Mountains is represented by 63 species (GRUIA, 1977, 2003). Of these, 40 species are reported from a total of 43 caves (GRUIA, 2003), 17 species are reported from the mesovoid shallow substratum (MSS) (GRUIA, 2003) and 36 species are reported from soil (edaphic) (GRUIA, 1977).

We present here the list of collembolan species collected from two caves from the MehediŢi Mountains (Lazului and Cloşani caves) and the soil habitats near the entrances of the caves, with four species representing new records for the Romanian fauna. Taking into consideration that many areas of the MehediŢi Mountains are still unexplored, further interesting results might be also expected.

## 2. MATERIAL AND METHODS

Our studies were carried out between April and September 2014. The specimens were collected using Barber method (pitfall traps with olfactory attractant – rotten cheese – and ethyl alcohol), soil samples and water samples (gours). The Barber traps were emptied and replaced monthly and the specimens were transferred in 70% ethyl alcohol.

The sampling stations are:

● **Station I – Lazului.**

GPS coordinates: 45°04'11"N, 22°45'58"E.

**Soil** (Edaphic – near the entrance of Lazului Cave): 13 Barber traps replaced monthly, from April to September 2014, leg. Nitzu E., Nae A., Popa I.

**Lazului Cave:** 5 Barber traps replaced monthly, from April to September 2014, vestibular zone of the cave, leg. Nitzu E., Nae A., Popa I.; soil samples, leg. Šustr V., Devetter M., 09.09.2014.

● **Station II – Cloșani.**

GPS coordinates: 45°04'51"N, 22°48'02"E.

**Soil** (Edaphic – near the entrance of Cloșani Cave): 2 Barber traps replaced monthly, from April to September 2014, leg. Nitzu E., Nae A., Popa I.

**Cloșani Cave:** 4 Barber traps replaced monthly, from April to September 2014, vestibular zone of the cave, leg. Nitzu E., Nae A., Popa I.; soil and water samples (gours), Laboratory Gallery, leg. Šustr V., Devetter M., 06.09.2014.

### 3. RESULTS AND DISCUSSIONS

We identified 57 species of Collembola, belonging to 16 families and 38 genera. Of these, 51 species were collected from Lazului (St. I) and 20 species were collected from Cloșani (St. II). 14 species are common to both stations (*Table 1*). Four species [*Pachyotoma recta* (Stach, 1930), *Megalothorax incertus* Börner, 1903, *Pygmarrhopalites infrasecondarius* (Loksa & Rubio, 1966) Vargovitsh, 2009 and *Pygmarrhopalites longicornis* (Cassagnau & Delamare Debutteville, 1953) Vargovitsh, 2009] are reported as new for the Romanian fauna. In this paper we used the systematics and taxonomy according to BELLINGER *et al.* (1996–2016).

*Table 1*  
Collembola species and their distribution

Families and species	St. I. Lazului		St. II. Cloșani		Distribution
	Soil	Cave	Soil	Cave	
<b>Neanuridae Börner, 1901</b>					
<i>Deutonura conjuncta</i> (Stach, 1926)	+				Europe
<i>Deutonura plena</i> (Stach, 1951)	+				Central and Eastern Europe
<i>Endonura tatricola</i> (Stach, 1951)	+				Central and Eastern Europe
<i>Morulina verrucosa</i> (Börner, 1903)	+				Europe
<i>Neanura muscorum</i> (Templeton, 1835)	+				Cosmopolite
<i>Pseudachorutes dubius</i> Krausbauer, 1898	+				Palaeartic
<i>Pseudachorutella asigillata</i> (Börner, 1901)	+				Palaeartic
<i>Thaumanura carolii</i> (Stach, 1920)	+		+		Europe
<b>Brachystomellidae Stach, 1949</b>					
<i>Brachystomella parvula</i> (Schaffer, 1896)	+				Cosmopolite

Table 1 (continued)

<b>Odontellidae Massoud, 1967</b> <i>Superodontella lamellifera</i> (Axelson, 1903)	+				Palaeartic
<b>Hypogastruridae Börner, 1906</b> <i>Ceratophysella armata</i> (Nicolet, 1842) <i>Ceratophysella granulata</i> Stach, 1949 <i>Ceratophysella silvatica</i> Rusek, 1964 <i>Hypogastrura tullbergi</i> (Schaffer, 1900) <i>Mesogastrura ojcoviensis</i> (Stach, 1919)		+	+	+	Cosmopolite Europe Europe Holarctic Palaeartic
<b>Onychiuridae Lubbock, 1867</b> <i>Deuteraphorura silvaria</i> (Gisin, 1952) <i>Onychiuroides granulatus</i> (Stach, 1930) <i>Onychiuroides pseudogranulosus</i> (Gisin, 1951) <i>Orthonychiurus rectopapillatus</i> (Stach, 1933) <i>Protaphorura armata</i> (Tullberg, 1869) <i>Tetrodontophora bielaniensis</i> (Waga, 1842)	+			+	Europe Europe Europe Europe Cosmopolite Central and Eastern Europe
<b>Tomoceridae Schaffer, 1896</b> <i>Pogonognathellus flavescens</i> (Tullberg, 1871) <i>Pogonognathellus longicornis</i> (Müller, 1776) <i>Tomocerus minor</i> (Lubbock, 1862) <i>Tomocerus vulgaris</i> (Tullberg, 1871)	+	+			Holarctic Palaeartic Holarctic Holarctic
<b>Isotomidae Schaffer, 1896</b> <i>Desoria olivacea</i> (Tullberg, 1871) <i>Desoria violacea</i> (Tullberg, 1876) <i>Folsomia quadrioculata</i> (Tullberg, 1871) <i>Isotomurus palustris</i> (Müller, 1776) <i>*Pachyotoma recta</i> (Stach, 1930) <i>Pseudisotoma sensibilis</i> (Tullberg, 1876) <i>Vertagopus cinereus</i> (Nicolet, 1842)	+	+			Europe Europe Holarctic Palaeartic Europe Holarctic Holarctic
<b>Orchesellidae Börner, 1906</b> <i>Orchesella balcanica</i> (Stach, 1960) <i>Orchesella multifasciata</i> (Scherbakov, 1898) <i>Orchesella pontica</i> Ionescu, 1915	+		+	+	Bulgaria, Romania Europe Central and Eastern Europe
<b>Heteromuridae Absolon &amp; Kseneman 1942</b> <i>Heteromurus nitidus</i> (Templeton, 1836)				+	Holarctic
<b>Lepidocyrtidae Wahlgren, 1906</b> <i>Lepidocyrtus curvicollis</i> (Bourlet, 1839) <i>Lepidocyrtus cyaneus</i> Tullberg, 1871 <i>Lepidocyrtus lignorum</i> (Fabricius, 1775) <i>Lepidocyrtus serbicus</i> Denis, 1933 <i>Pseudosinella alba</i> (Packard, 1873) <i>Pseudosinella sexoculata</i> Schött, 1902	+	+	+	+	Holarctic Cosmopolite Holarctic Central and Eastern Europe Cosmopolite Holarctic
<b>Entomobryidae Schaffer, 1896</b> <i>Entomobrya multifasciata</i> (Tullberg, 1871) <i>Entomobrya muscorum</i> (Nicolet, 1842)	+		+	+	Cosmopolite Palaeartic
<b>Neelidae Folsom, 1896</b> <i>*Megalothorax incertus</i> Börner, 1903 <i>Neelus murinus</i> Folsom, 1896		+		+	Palaeartic + Australian Cosmopolite
<b>Katiannidae Börner, 1913</b> <i>Sminthurinus elegans</i> (Fitch, 1863) <i>Sminthurinus niger</i> (Lubbock, 1867)	+				Palaeartic Palaeartic
<b>Arrhopalitidae Richards, 1968</b> <i>*Pygmarrhopalites infrasecundarius</i> (Loksa & Rubio, 1966) Vargovitsh, 2009 <i>*Pygmarrhopalites longicornis</i> (Cassagnau & Delamare Deboutteville, 1953) Vargovitsh, 2009 <i>Pygmarrhopalites pygmaeus</i> Vargovitsh, 2009 <i>Pygmarrhopalites terricola</i> Vargovitsh, 2009	+			+	Hungary, Romania France, Austria, Romania Holarctic Europe

Table 1 (continued)

<b>Sminthuridae Lubbock, 1862</b>					
<i>Allacma gallica</i> (Carl, 1899)	+				Europe, North Africa
<i>Capraïnea marginata</i> (Schott, 1893)	+	+	+		Europe
<i>Disparrhopalites patrizii</i> (Cassagnau & Delamare Deboutteville, 1953)		+		+	Europe
<b>Dicyrtomidae Börner, 1906</b>					
<i>Dicyrtoma fusca</i> (Lubbock, 1873)	+				Palaeartic
<i>Dicyrtomina omata</i> (Nicolet, 1842)	+		+		Palaeartic

\*new records for the Romanian fauna

*Pachyotoma recta* (Stach, 1930) (Fig. 1)

*Material examined.* Five specimens (two adults and three juveniles), collected from the vestibular zone of the Lazului Cave: 26.06.–17.07.2014 (one adult), Barber trap, leg. Nitzu E., Nae A., Popa I.; 17.08.–03.09.2014 (one adult and three juveniles), Barber trap, leg. Nitzu E., Nae A., Popa I..

Total length of the adult specimens 1.1–1.2 mm. Juveniles 0.8–0.9 mm. Pigmentation blackish blue in adults, juveniles more light blue. Granulation on body and appendages present only in the adult specimens. 8 + 8 ommatidia, with G and H clearly smaller. PAO about 2 times as long as ommatidia. Dens with 15–18 setae on anterior side and 11–13 setae on the posterior side. Mucro straight, with weak apical tooth present. Mucro 3.2–3.4 times shorter than dens.

According to POTAPOV, 2001, *P. recta* is a mountain species, mostly recorded in wet mosses on rocks, often near streams and waterfalls.

General distribution: Europe.



Fig. 1. *Pachyotoma recta* (Stach, 1930): Habitus dorso-lateral (Photo by E. Nitzu).

*Megalothorax incertus* Börner, 1903 (Figs. 2, 3)

*Material examined.* Twelve specimens, collected from the vestibular zone of the Lazului Cave: 01.04.–24.04.2014 (five specimens), Barber traps, leg. Nitzu E., Nae A., Popa I.; 24.04.–13.05.2014 (three specimens), Barber traps, leg. Nitzu E., Nae A., Popa I.; 26.06.–17.07.2014 (four specimens), Barber traps, leg. Nitzu E., Nae A., Popa I.

Total length 0.52–0.56 mm. Pigmentation white-yellowish, length of antennae about 1/2 of head diagonal (Fig. 2). Length of dens + mucro about 0.1 mm. Mucro narrow, without constriction, edges clearly serrate (Fig. 3). *Megalothorax incertus* Börner, 1903 is very close to *Megalothorax minimus* Willem, 1900, the main character that differentiate the former species being the serrate edges of the mucro.

According to MASSOUD & THIBAUD, 1973, this is a troglophile species.

General distribution: Palaearctic + Australian.



Figs. 2, 3. *Megalothorax incertus* Börner, 1903: 2 – Habitus (Photo by V. Šustr); 3 – dens and mucro (Photo by V. Šustr).

*Pygmarrhopalites infrasecundarius* (Loksa & Rubio, 1966) Vargovitsh, 2009 (Figs. 4–7).

*Material examined.* Fourteen specimens, collected from soil (edaphic), near the entrance area of the Lazului Cave: 13.05.–03.06.2014 (twelve specimens), Barber traps, leg. Nitzu E., Nae A., Popa I.; 26.06.–17.07.2014 (two specimens), Barber trap, leg. Nitzu E., Nae A., Popa I.

Total length 0.74–0.90 mm. Pigmentation violet to pale violet. Head with slender spines. Antennae about 1.5 times longer than head diagonal, antennal segment IV with 5 subsegments. 1 + 1 large black ommatidia (Fig. 4). Claws about 38–40  $\mu\text{m}$  in length, with strong inner tooth; empodium toothless, length > claw (Fig. 5). Dens with stout and oval spine E1 (Fig. 6). Subanal appendages about 30–32  $\mu\text{m}$  in length, with 6–9 branches (Fig. 7).

*Pygmarrhopalites infrasecundarius* (Loksa & Rubio, 1966) Vargovitsh, 2009 has been described and recorded up till now only from Hungary, in the litter of a Ceraso – Quercetum plant association. The species resembles *P. secundarius* and *P. thermophilus*, but differs in colour, shape of head spines and dens spines (BRETFFELD, 1999).

This is the second record worldwide of this species.

Distribution: Hungary, Romania.

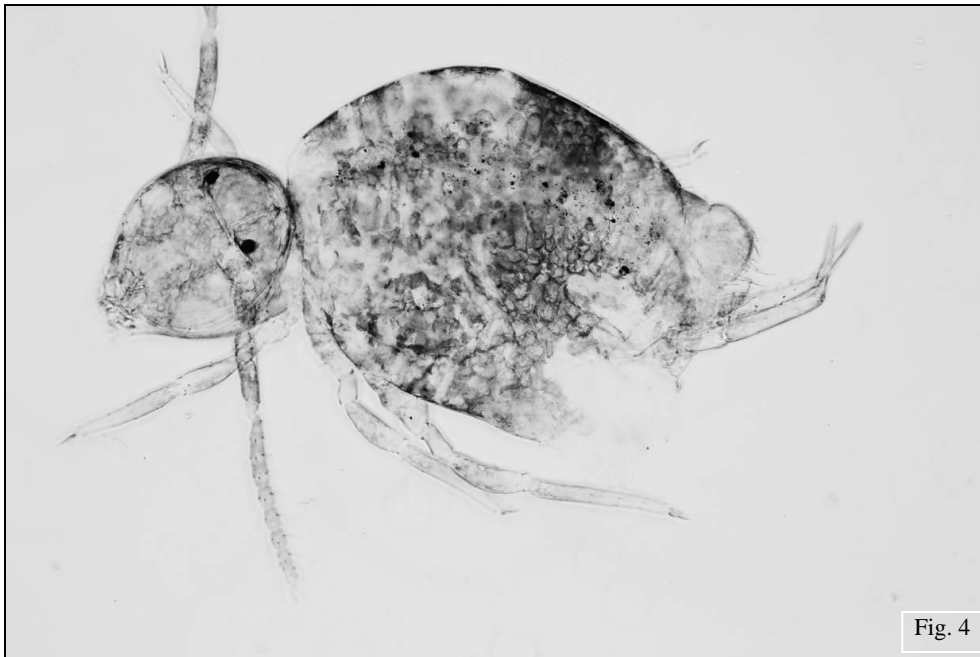
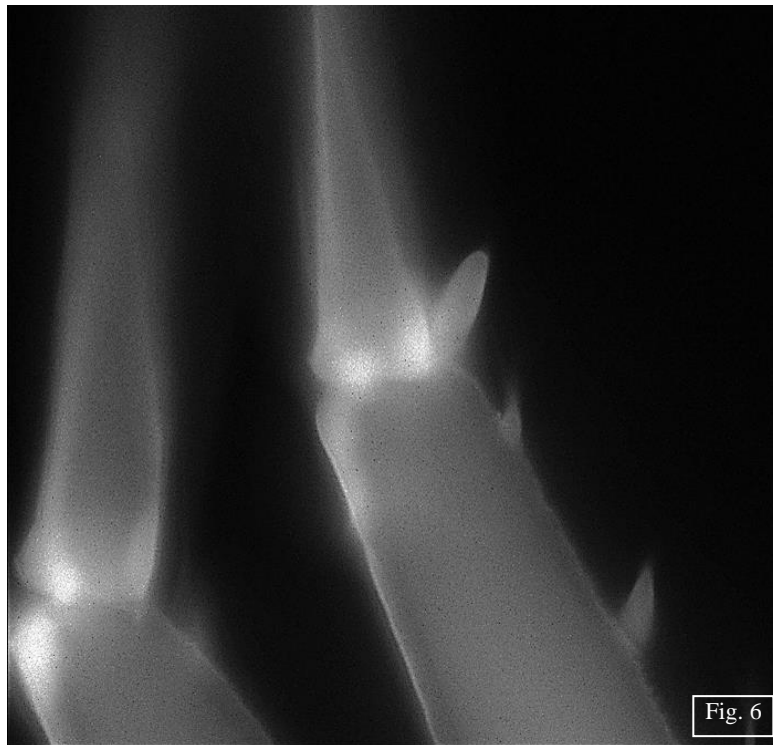
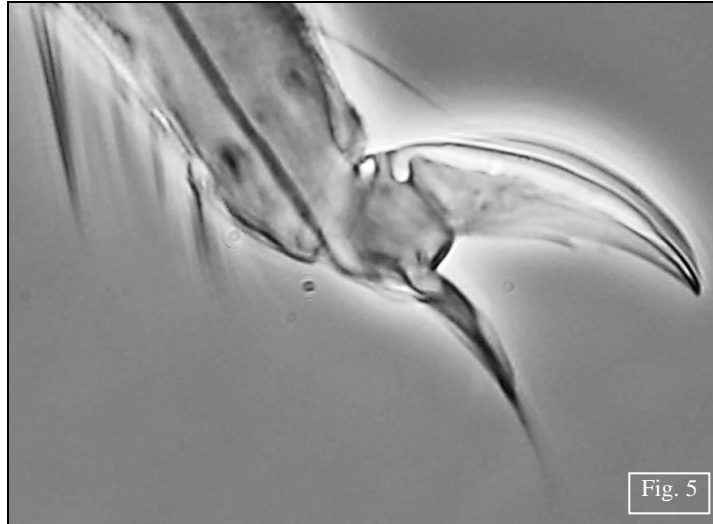


Fig. 4





Figs. 4–7. *Pygmarrhopalites infrasecondarius* (Loksa & Rubio, 1966) Vargovitsh, 2009: 4 – Habitus; 5 – claw III and empodium; 6 – dens with oval spine; 7 – subanal appendage. Photo by V. Šustr.

*Pygmarrhopalites longicornis* (Cassagnau & Delamare Deboutteville, 1953) Vargovitsh, 2009 (Fig. 8)

*Material examined.* One specimen, collected from a gour surface in the Cloșani Cave (Laboratory Gallery), 06.09.2014, leg. Šustr V., Devetter M..

Total length 0.80 mm. Colour white. 1 + 1 unpigmented ommatidia. Antennae long, antennal segment IV with 6 subsegments, the second one observable (Fig. 8). Antennae 0.85 mm, head diagonal 0.29 mm; length of antennae : head diagonal = 2.93. Claws II, III with distinct inner tooth, claw I with very weak inner tooth. Edges of mucro serrate, apex globular.

*P. longicornis* belongs to *pygmaeus*-group (BRETFFELD, 1999). This species resembles *P. pygmaeus*, but the antennae length and the apex of mucro clearly differ. Globular apex of mucro is the character of most species from the *caecus*-group, but similar mucronal apex also was described in *P. longicornis*, from the *pygmaeus*-group (CASSAGNAU & DELAMARE DEBOUTTEVILLE, 1953).

This species is recorded only from caves in France and Austria (BRETFFELD, 1999). Distribution: France, Austria, Romania.



Fig. 8. *Pygmarrhopalites longicornis* (Cassagnau & Delamare Deboutteville, 1953) Vargovitsh, 2009: Head and antennae.



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