

COLLEMBOLAN COMMUNITIES (HEXAPODA: COLLEMBOLA) FROM THE BUZĂU LAND GEOPARK (BUZĂU MOUNTAINS, ROMANIA)*

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Abstract. The authors present the Collembola species collected from the Buzău Land Geopark (Buzău Mountains, Romania). The uniqueness of the Buzău Land Geopark is illustrated by the presence of very rare collembolan species such as *Friesea afurcata* (Denis, 1926), *Deutonura phlegraea* (Caroli, 1910), *Xenylla welchi* Folsom, 1916, *Desoria tigrina* Nicolet, 1842, *Tetracanthella transylvanica* Cassagnau, 1959 and *Neanura parva* (Stach, 1951). We also mention here *Orchesella maculosa* Ionescu, 1915, an endemic species for the Carpathian Mountains (Romania and Ukraine).

Key words: Collembola, Buzău Mountains, Romania, rare species.

1. INTRODUCTION

The collembolan fauna from the Buzău County is poorly known. There are only 13 species of Collembola reported from Meledic Plateau – the southern area of the Buzău Mountains (NITZU *et al.*, 1999). Our work is the first attempt to investigate the collembolan fauna from the Buzău Mountains. Aiming this, we used both qualitative and quantitative sampling methods (direct sampling, soil sampling and Barber traps) in five locations, all part of the Rupestral Assembly from the Buzău Land Geopark: Schitul Aluniș, Schitul Fundu Peșterii, Biserica lui Iosif, Schitul Agatonul Nou and Schitul Fundătura.

We present here the list of collembolan species collected from the Buzău Land Geopark (Buzău Mountains, Romania). Taking into consideration that many areas of the Buzău Mountains are still unexplored, further interesting results might be also expected.

2. MATERIAL AND METHODS

Our studies were carried out between March 2017 and November 2017. Five sampling sites (stations), all part of the Rupestral Assembly from the Buzău Land

Geopark, were investigated. In each station, we used both qualitative and quantitative sampling methods: direct sampling using tweezers, litter sifting using Winkler extractor, soil sampling using core drill and Barber traps. Five baited Barber traps, 1/2 fill with ethyl alcohol 75%, were operated in each sampling site. The traps were emptied after one month, following season: Vernal (April–May 2017), Aestival (July–August 2017) and Autumnal (October–November 2017). The specimens were transferred in 75% ethyl alcohol.

The sampling stations are located in a temperate broadleaf and mixed forest in places with different vegetation cover, slope inclination and antropic influence.

The sampling stations are:

● **Station I – Schitul Aluniș.**

GPS coordinates: 45°24'34.15"N, 26°24'49.98"E; Altitude: 647.77 m; Temperature (T) and Relative Humidity (RH): May 2017: T = 15.6° C; RH = 68.9%; August 2017: T = 24.3° C; RH = 58.9%; November 2017: T = 13° C; RH = 69%.

● **Station II – Schitul Fundu Peșterii.**

GPS coordinates: 45°25'23.71"N, 26°26'22.12"E; Altitude: 716 m; Temperature (T) and Relative Humidity (RH): May 2017: T = 15.4° C; RH = 74.4%; August 2017: T = 25.5° C; RH = 62.8%; November 2017: T = 11.8° C; RH = 66.5%.

● **Station III – Biserica lui Iosif.**

GPS coordinates: 45°25'36.25"N, 26°26'23.49"E; Altitude: 823.5 m; Temperature (T) and Relative Humidity (RH): May 2017: T = 16.5° C; RH = 67.6%; August 2017: T = 23.5° C; RH = 63%; November 2017: T = 11.5° C; RH = 65.4%.

● **Station IV – Schitul Agatonul Nou.**

GPS coordinates: 45°25'51.15"N, 26°26'41.40"E; Altitude: 960.1 m; Temperature (T) and Relative Humidity (RH): May 2017: T = 15.4° C; RH = 67%; August 2017: T = 21.5° C; RH = 55.6%; November 2017: T = 10.6° C; RH = 69.5%.

● **Station V – Schitul Fundătura.**

GPS coordinates: 45°25'30.37"N, 26°26'51.94"E; Altitude: 715.88 m; Temperature (T) and Relative Humidity (RH): May 2017: T = 17.6° C; RH = 73.5%; August 2017: T = 24° C; RH = 62.2%; November 2017: T = 10.8° C; RH = 70.1%.

3. RESULTS AND DISCUSSIONS

We identified 57 species of Collembola, belonging to 4 orders, 14 families and 33 genera (Table 1). The best represented is fam. Neanuridae (10 species), followed by fam. Isotomidae (8 species) and families Hypogastruridae and Orchesellidae (7 species each). Regarding species richness, the highest number of species were found in Station II (25 species), followed by Station IV (24 species) (Table 2). Only 19 species were found in Station I, possibly related to the strong anthropization of this habitat. In our paper, we used the systematics and taxonomy according to BELLINGER *et al.* (1996–2018).

Table 1
Seasonal distribution of Collembolan species from the Buzău Land Geopark
(V/Ae/A = Vernal/Aestival/Autumnal; X = Present; 0 = Absent)

Species	I. Schitul Aluniș V/Ae/A	II. Schitul Fundu Peșterii V/Ae/A	III. Biserica lui Iosif V/Ae/A	IV. Schitul Agatonul Nou V/Ae/A	V. Schitul Fundătura V/Ae/A
Ord. Poduromorpha					
Fam. Neanuridae			0/X/0		
<i>Deutonura phlegraea</i> (Caroli, 1910)					
<i>Deutonura plena</i> (Stach, 1951)		X/X/0			
<i>Friesea afurcata</i> (Denis, 1926)	0/X/0				
<i>Friesea mirabilis</i> (Tullberg, 1871)		0/X/0			
<i>Morulina verrucosa</i> (Borner, 1903)		X/0/0		X/X/0	0/X/0
<i>Neanura parva</i> (Stach, 1951)	0/X/0	X/0/0			
<i>Pseudachorutes dubius</i> Krausbauer, 1898		X/X/0	X/X/0	X/0/0	X/X/0
<i>Pseudachorutes palmiensis</i> Borner, 1903		X/0/0	X/X/0		
<i>Pseudachorutes subcrassus</i> Tullberg, 1871			X/0/0		
<i>Thaumanura carolii</i> (Stach, 1920)	0/X/0	X/0/0	0/0/X	0/X/0	X/X/0
Fam. Odontellidae					
<i>Superodontella empodialis</i> (Stach, 1934)		X/0/0		0/0/X	
<i>Superodontella lamellifera</i> (Axelson, 1903)		0/X/0			
Fam. Hypogastruridae					
<i>Ceratophysella annae</i> (Babenko, Chernova, Potapov & Stebaeva, 1994)			X/0/X		
<i>Ceratophysella armata</i> (Nicolet, 1842)	0/0/X		0/0/X		
<i>Ceratophysella granulata</i> Stach, 1949			0/0/X		
<i>Ceratophysella silvatica</i> Rusek, 1964			X/0/X	X/X/0	X/X/0
<i>Hypogastrura socialis</i> (Uzel, 1891)			0/X/0		
<i>Hypogastrura tullbergi</i> (Schaffner, 1900)	X/0/0			X/X/0	
<i>Xenylla welchi</i> Folsom, 1916			0/X/0		
Fam. Onychiuridae					
<i>Kalaphorura tuberculata</i> (Moniez, 1890)					0/0/X
<i>Protaphorura armata</i> (Tullberg, 1869)		0/0/X			X/0/0

<i>Protaphorura quadriocellata</i> Gisin, 1947				0/X/0	
<i>Tetrodontophora bielanensis</i> (Waga, 1842)		X/X/X			
Fam. Tullbergiidae <i>Mesaphorura</i> cf. <i>sylvatica</i> Rusek, 1971	0/X/0				
Ord. Entomobryomorpha Fam. Tomoceridae <i>Plutomurus carpaticus</i> Rusek & Weiner, 1978	0/X/0				
<i>Pogonognathellus flavescens</i> (Tullberg, 1871)	X/X/X	X/X/X	X/X/X	X/X/X	X/X/X
<i>Tomocerus minor</i> (Lubbock, 1862)	X/X/0	X/X/0		X/X/X	X/X/X
<i>Tomocerus vulgaris</i> (Tullberg, 1871)	X/0/0	X/X/X	X/X/0		X/X/X
Fam. Isotomidae <i>Desoria hiemalis</i> (Schöt, 1893)				0/X/0	
<i>Desoria olivacea</i> (Tullberg, 1871)		X/0/0			0/X/0
<i>Desoria tigrina</i> Nicolet, 1842	0/0/X				
<i>Desoria violacea</i> (Tullberg, 1876)		X/0/0		0/0/X	X/X/0
<i>Folsomia alpina</i> Kseneman, 1936			X/0/X	X/0/0	
<i>Isotoma viridis</i> (Bourlet, 1839)	X/0/0		0/0/X	X/X/0	
<i>Tetracanthella transylvanica</i> Cassagnau, 1959	0/0/X				
<i>Vertagopus cinereus</i> (Nicolet, 1842)					X/X/0
Fam. Orchesellidae <i>Orchesella albofasciata</i> Stach, 1960	0/0/X				
<i>Orchesella bifasciata</i> Nicolet, 1842				0/0/X	
<i>Orchesella maculosa</i> Ionescu, 1915				0/X/0	
<i>Orchesella multifasciata</i> (Scherbakov, 1898)		X/0/0		X/X/0	
<i>Orchesella pontica</i> Ionescu, 1915	0/X/X	X/X/0	X/X/X	0/X/X	X/X/X
<i>Orchesella pseudobifasciata</i> Stach, 1960					0/0/X
<i>Orchesella xerothermica</i> Stach, 1960				0/X/0	
Fam. Lepidocyrtidae <i>Lepidocyrtus curvicollis</i> (Bourlet, 1839)	X/0/0			0/0/X	

<i>Lepidocyrtus cyaneus</i> Tullberg, 1871		0/X/0	0/X/X		0/0/X
<i>Lepidocyrtus lignorum</i> (Fabricius, 1775)	X/0/X	X/X/X	X/X/X	X/X/X	X/X/0
<i>Pseudosinella alba</i> (Packard, 1873)		0/0/X			
Fam. Entomobryidae <i>Entomobrya multifasciata</i> (Tullberg, 1871)		X/X/0			
<i>Entomobrya muscorum</i> (Nicolet, 1842)	0/X/0			0/0/X	0/0/X
<i>Entomobrya nivalis</i> (Linnaeus, 1756)			0/0/X	X/X/X	X/X/0
Ord. Neelipleona Fam. Neelidae <i>Neelides minutus</i> (Folsom, 1901)					X/X/0
Ord. Symphypleona Fam. Katiannidae <i>Sminthurinus niger</i> (Lubbock, 1867)			X/0/0		
Fam. Sminthuridae <i>Allacma fusca</i> (Linnaeus, 1758)		0/X/X			0/X/0
<i>Caprainea marginata</i> (Schott, 1893)	X/0/0	X/X/0		X/X/0	0/X/0
<i>Lipothrix lubbocki</i> (Tullberg, 1872)			0/0/X	0/0/X	X/X/0
<i>Sminthurus viridis</i> (Linnaeus, 1758)			0/X/0		
Fam. Dicyrtomidae <i>Dicyrtomina minuta</i> (Fabricius, 1783)		0/X/0			

Table 2
Families and number of species per sampling stations

Families	I. Schitul Aluniș	II. Schitul Fundu Pesterii	III. Biserica lui Iosif	IV. Schitul Agatonul Nou	V. Schitul Fundătura
Neanuridae	3	7	5	3	3
Odontellidae		2		1	
Hypogastruridae	2		6	2	1
Onychiuridae		2		1	2
Tullbergiidae	1				
Tomoceridae	4	3	2	2	3
Isotomidae	3	2	2	4	3
Orchesellidae	2	2	1	5	2
Lepidocyrtidae	2	3	2	2	2
Entomobryidae	1	1	1	2	2
Neelidae					1
Katiannidae			1		
Sminthuridae	1	2	2	2	3
Dicyrtomidae		1			
Total No. species	19	25	22	24	22

Friesea afurcata (Denis, 1926) (Fig. 1) was mentioned in Romania by GRUIA, 2000, without locality or collection data. We confirm the presence of this species in the Romanian fauna. Material collected: 2 specimens, body length 1.24–1.36 mm, St. I (Schitul Aluniș), Barber trap, 19.08.2017.

Xenylla welchi Folsom, 1916 (Fig. 2) is reported for the second time in Romania. Up till now, the only record of this species was by GRUIA, 1998b, in Mangalia, Southern Dobrogea. Material collected: 13 specimens, body length 0.8–0.9 mm, St. III (Biserica lui Iosif), Barber traps, 20.08.2017.

Desoria tigrina Nicolet, 1842 (Fig. 3) was reported for the first time in the Romanian fauna from the natural reserve Codrul Secular Giupalău – Eastern Carpathians (BUȘMACHIU, POPA & WEINER, 2014). Also reported from the Leaota Massif – Southern Carpathians (POPA & DOROBĂȚ, 2015). Material collected: 8 specimens, body length 1.6–1.8 mm, St. I (Schitul Aluniș), Barber traps, 12.11.2017.

Deutonura phlegraea (Caroli, 1910) (Fig. 4) is known from Călimani Mountains (BULIMAR, 1987) and the Danube Delta (HARȘIA, 1997). Material collected: 9 specimens, body length 2.3–2.4 mm, St. III (Biserica lui Iosif), Barber traps, 20.08.2017.

Neanura parva (Stach, 1951) (Fig. 5) is known from Retezat Mountains – Southern Carpathians (FALCĂ, 1984) and the natural reserve Codrul Secular Giupalău – Eastern Carpathians (NITZU *et al.*, 2009). Material collected: 2 specimens, body length 1.2 mm, St. II (Schitul Fundu Peșterii), Barber trap, 12.05.2017; 2 specimens, body length 1.1–1.2 mm, St. I (Schitul Aluniș), Barber trap, 19.08.2017.

Tetracanthella transylvanica Cassagnau, 1959 is known from Retezat Mountains – Southern Carpathians (CASSAGNAU, 1959) and Motrului Valley (GRUIA, 1977). This is the third record for the Romanian fauna. Material collected: one specimen, body length 1.16 mm, St. I (Schitul Aluniș), Barber trap, 12.11.2017.

We also mention here *Orchesella maculosa* Ionescu, 1915, an endemic species for the Carpathian Mountains (Romania, Ukraine). Material collected: 4 specimens, body length 4.7–5 mm, Winkler, St. IV (Schitul Agatonul Nou), 11.07.2017.



Fig. 1. *Friesea afurcata* (Denis, 1926). Photo by E. Nitzu.



Fig. 2. *Xenylla welchi* Folsom, 1916. Photo by E. Nitzu.



Fig. 3. – *Desoria tigrina* Nicolet, 1842. Photo by E. Nitzu



Fig. 4. *Deutonura phlegraea* (Caroli, 1910). Photo by E. Nitzu.

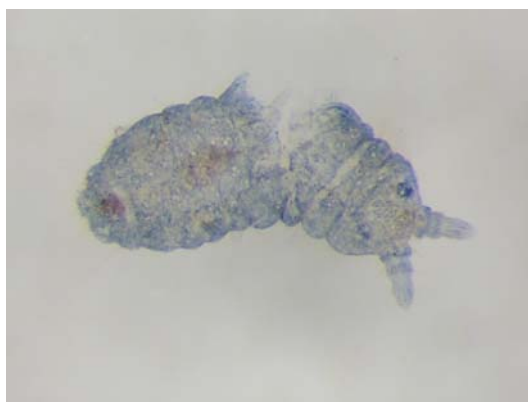


Fig. 5. *Neanura parva* (Stach, 1951). Photo by E. Nitzu.

4. CONCLUSIONS

As a result of the studies in the Buzău Land Geopark, we identified 57 species of Collembola, belonging to 4 orders, 14 families and 33 genera. The uniqueness of the Buzău Land Geopark is illustrated by the presence of very rare collembolan species such as *Friesea afurcata* (Denis, 1926), *Deutonura phlegraea* (Caroli, 1910), *Xenylla welchi* Folsom, 1916, *Desoria tigrina* Nicolet, 1842, *Tetracanthella transylvanica* Cassagnau, 1959, *Neanura parva* (Stach, 1951) and *Orchesella maculosa* Ionescu, 1915.

This is the first attempt to investigate the collembolan fauna from the Buzău Mountains. Taking into consideration that many areas of the Buzău Mountains are still unexplored, further interesting results might be also expected.

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