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COLLEMBOLA (HEXAPODA: COLLEMBOLA) ASSEMBLAGES IN TINOVL DE LA LĂPTICI - BUCEGI MASSIF (ROMANIAN CARPATHIANS)

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Abstract. The paper presents the results of an investigation of Collembola occurring in soil, litter, mushrooms around tree trunks and from moss with *Sphagnum* of the only peat-bog in the Bucegi Massif - Tinovul de la Lăptici. Microhabitats preferences of Collembola are discussed. The first records of Collembola from peat-bogs of Romania are reported. *Friesea truncata* is a new species for the Romanian collembolan fauna.

Résumé. On présente les résultats d'une investigation sur les Collembolés existant dans le sol, la litière, dans les champignons se trouvant autour des troncs d'arbres et dans la mousse avec du *Sphagnum* de l'unique tourbière qui existe dans le Massif Bucegi – Tinovul de la Lăptici. On discute les préférences des Collembola concernant les microhabitats. On communique la première liste des espèces de Collembola trouvées dans une tourbière de Roumanie. L'espèce *Friesea truncata* est nouvelle pour la faune de collembolés de Roumanie.

Key words: Collembolan community, peat-bog, microhabitats, new record, Romania.

INTRODUCTION

Tinovul de la Lăptici is small and geographically isolated from the Romanian areas containing many large peat-bogs. Its flora contains rare Northern species, some of them being relict and its fauna is rich and differs from that of the other peat-bogs. *Sphagnum* mosses strongly reduce the availability of nutrients to vascular plants by efficiently accumulating nutrients from atmospheric deposition and reducing decay and mineralization rates (Lee & Woodin, 1988). The abiotic and biotic environments thus place extreme demands on vascular plant growth and nutrient-use efficiency in peat-bogs. The ecologically unique habitats offer shelter and favorable reproduction condition for several invertebrates strictly dependent on oligotrophic bogs with *Sphagnum*. Despite the great knowledge of peat-bogs vegetation, the fauna of this biotope has only occasionally been investigated; a few taxa of entomofauna were studied (Godeanu, 1970), but the Collembolan communities had never been studied.

Many ecological studies mentioned Collembola in some peatlands of Poland (Slawska, 1996 a, 2000, 2001; Slawska & Smolenski, 2003; Sterzynska & Ehrnsberger, 2000), in mountainous peat-bogs of Bosnia and Herzegovina (Ivadinovic & Iher-Štrbo, 1991), from bogs areas, flushes and moorland soils of the British uplands (Hale, 1966; Wood, 1967 a, b, c). The hydrophilous species living on the semiaquatic belt of each type of hummock were investigated together with other invertebrates by Popp (1966).

In other ecological studies on entomofauna in peatlands, new species were often found (Rusek, 1970, 1973, 1994). Also, Slawska (1996 b) described one new *Stachorutes* species (*S. sphagnophilous*) from a marshy and humid pine forest of Poland.

This study details preliminary results concerning the Collembolan assemblages; in Tinovul de la Lăptici (Bucegi Massif). Also, the microhabitat preferences of Collembola species are analyzed.

MATERIAL AND METHOD

The study site was established on a protected peat-bog (view. Law no. 5/2000), situated in Moroeni locality (Dâmbovița County), laying on 1.5 ha in the Bucegi Massif (Romanian Carpathians) at 1470 m altitude. A high proportion of oligotrophic raised moss bogs (3-6 m) was the most conspicuous characteristic of the region's peat formation, with a high percent of organic matter (98.5%) and a low content of mineral substances (1-1.5%). The pH varies between 4, 5 and 6. The climate was characterized by low temperature during the vegetation season and the annual temperature is about 5.5- 2.0 degrees. The peat-bog was uniformly covered with grass, mosses and *Sphagnum* in its terrestrial parts, and abundant aquatic plant in the ponds. Around most of the peat-bog was a large *Picea abies* forest. The bog plant association belonged to *Sphagnetum magellanici* (Malcuit, 1929) Kästner et Flösner, 1933.

We collected samples along one transect from the center area of the peat-bog to the surrounding forest on August 2005. The material was collected from different microhabitats: soil and litter, mushrooms around *Picea abies* trunks and from moss on trunks and under barks. The soil samples were taken using a metallic quadrat (area 10*10 cm, depth - 10 cm). 1,220 specimens were extracted using Tullgren funnels. The extraction lasted for 10 days until complete drying of the substrate. The Collembolan specimens were preserved in alcohol and identified under the stereomicroscope.

RESULTS AND DISCUSSIONS

Our results exhibited 38 species of Collembola from the investigated site (Tab. 1).

Friesea truncata Cassagnau, 1958 is a new species for the Romanian fauna.

Family Neanuridae Börner, 1901

Friesea von Dalla Torre, 1895

Friesea truncata Cassagnau, 1958

Taxonomical identification. This species is a bluish-grey moderately common and widespread soil-dwelling species with three, occasionally four or five anal spines. *Friesea truncata* does not possess clavate setae and a mucro is absent from the dens (this is the main feature which separates it from *Friesea mirabilis*). Some authors use chaetotaxy to separate *Friesea mirabilis* from *Friesea truncata*. *Friesea mirabilis* has been described as having seta a4 present on the dorsal side of the second thoracic segment (th2), whereas in *Friesea truncata*, seta a4 is absent from th2. In *Friesea mirabilis*, seta a4 is supposed to be present on the tibiotarsi whereas in *Friesea truncata* seta a4 is absent (Hopkin, 2004).

Distribution. Transpalaeartic (Babenko & Fjellberg, 2006).

Ecology. Hemiedaphic species (Stomp, Massoud & Thibaud, 1982) collected also from oak woods (Kovac et al., 2005).

Almost all of the identified species prefer the soil and litter, other occur on fungi bodies in high densities, about 120 individuals on one mushroom which is in the process of decomposition. Species composition and abundance of Collembola communities of peat-bogs depend on type of vegetation, water regime, edaphic, climatic factors (Iivadinovic & Piher-Štrbo, op. cit.) and other limited factors: water logging, anaerobiosis, low temperature (Slawska, 2000).

Isotomiella minor is a widely spread species, occurring in all studied microhabitats, except of those of mushrooms. Some collembolans are hydrophilous and occur in *Sphagnum* moss (*Podura aquatica*, *Smirthurides aquaticus*).

Folsomia alpina, a high-mountain forest and alpine species was found in low densities. According to Rusek (1993) it is probably a disappearing species in High Tatra Mountains (1700-1800 m) of Slovak due to strong alterations by air pollution in alpine ecosystems and ecotones.

A very abundant species is *Orthonychiurus rectopapilatus* in soil and litter samples.

Compared to the Collembola fauna from the above cited literature, the richness in studied site was significantly lower. This material was collected only once, in August, so it is an incomplete material because of missing spring and autumn data. But the results are interesting and are new and first records of an investigation on Collembola in peat-bogs of Romania. Few species were identified only at genus level and need some taxonomical clarification. *Sphagnum* peat-bogs should be under the special care of forest management and legally protected.

Table 1

The Collembolan communities in Tinovul de la Lăptici.

Species Name	soil	litter	on dead wood, under barks	mushrooms	<i>Sphagnum</i> moss
<i>Ceratophysella armata</i>	x	x	x	x	
<i>Ceratophysella denticulata</i>	x	x			
<i>Ceratophysella engadinensis</i>	x	x	x		
<i>Ceratophysella luteospina</i>				x	
<i>Ceratophysella sylvatica</i>				x	
<i>Desoria fennica</i>		x	x		
<i>Desoria violacea</i>	x	x		x	
<i>Desoria nivea</i>	x		x		
<i>Deteraphorura</i> sp.		x			
<i>Deutonura conjuncta</i>			x		
<i>Entomobrya</i> sp.					x
<i>Folsomia alpina</i>	x				
<i>Folsomia fimetaria</i>	x				
<i>Folsomia manolachei</i>	x	x	x		
<i>Folsomia quadrioculata</i>	x	x			
<i>Folsomia sensibilis</i>	x				
<i>Friesea truncata</i>		x			
<i>Heterosminthurus</i> sp.	x				
<i>Isotoma viridis</i>					x
<i>Isotomiella minor</i>	x	x	x		x
<i>Lepidocyrtus cyaneus</i>			x		

Table 1 (continued)

<i>Lepidocyrtus lanuginosus</i>	x				
<i>Lepidocyrtus</i> sp.	x				
<i>Neanura muscorum</i>		x			
<i>Orthonychiurus rectopapilatus</i>	x	x			
<i>Podura aquatica</i>					x
<i>Protaphorura armata</i>	x	x		x	
<i>Protaphorura glebata</i>		x			
<i>Protaphorura</i> sp.		x			
<i>Protaphorura subarmata</i>	x	x			
<i>Pseudosinella</i> sp.	x				
<i>Seira domestica</i>	x				
<i>Smirthurides aquaticus</i>					x
<i>Tetradontophora bielensis</i>	x				
<i>Tomocerus minor</i>				x	
<i>Tomocerus</i> sp.		x			
<i>Xenylla</i> sp.				x	

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COMUNITĂȚILE DE COLEMOLE (HEXAPODA: COLLEMBOLA) DIN TINOVUL DE LA LĂPTICI – MUNȚII BUCEGI (CARPAȚII ROMÂNEȘTI)

REZUMAT

În această lucrare sunt prezentate primele înregistrări ale faunei de colembol din Tinovul de la Lăptici (Masivul Bucegi). S-au prelevat probe de sol și litieră, de asemenea s-au colectat indivizi de pe ciupercile din jurul copacilor, mușchi de *Sphagnum*. *Friesea truncata* este o specie nouă pentru fauna României.

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