



An annotated checklist of springtails (Hexapoda, Collembola) from Vojvodina province, Republic of Serbia

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ABSTRACT. Based on all collected literature dealing with the fauna of springtails in Vojvodina Province (Republic of Serbia), a list of species was created and taxonomically revised according to the latest system of Collembola taxonomy. In total, the check list of springtails of Vojvodina includes 125 species in 58 genera from 16 families and 3 orders. The most abundant order is Entomobryomorpha (55%), followed by Poduromorpha (24%) and Symphypleona (21%). According to the general distribution of the species themselves, the presented list has the following composition: 27.2% of the recorded species are European, the same number are Palearctic, 24% of the species on the list are Holarctic, 18.4% are cosmopolitan, and 3.2% are endemic to Serbia (mostly related to type localities). The species *Drepanura deliblatica* Loksa & Bogojević, 1970, *Sinella jugoslavica* Loksa & Bogojević, 1970, *Deuterostminthurus quadrangulatus* (Loksa & Bogojevic, 1970) and *Fasciosminthurus angulipunctatus* (Loksa & Bogojevic, 1970) are strictly protected species in the Republic of Serbia. This paper is a contribution to the knowledge of the Collembola fauna of Europe and represents a step towards the formation of a checklist of springtails of the Republic of Serbia.

Key words: Distribution, endemism, fauna, soil biology, springtails, taxonomy

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INTRODUCTION

Springtails are indispensable members of the terrestrial mesofauna and today represent a separate class of hexapod arthropods with over 9000 described species classified into four recent orders: Poduromorpha Börner, 1913; Entomobryomorpha Börner, 1913; Symphypleona Börner, 1901, and Neelipleona Massoud, 1971 (Bellinger et al., 1996–2023). Early Devonian springtail fossils, which are more than 400 million years old, are well known (Daly et al., 1998). Although they were once considered entognathous wingless insects, apart from the localization of the oral apparatus, they also differ from insects in the absence of Malpighian vessels, the eyes are simple with ocelli or absent, and there is no cessation of moulting in the adult phase (Hopkin, 1997). They are ametabolic organisms with special furcula (fork) and colophor (ventral tube) organs, which, in addition to other functions in a large number of species, play a role in jumping characteristic of springtails (Zhang et al., 2015). In

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recent years, a lot has been done on the knowledge of jumping in springtails (Oliveira, 2022; Rillich & Oliveira, 2023). Springtails and mites are considered the most abundant groups of terrestrial mesofauna in most terrestrial ecosystems, with densities of up to 100,000 individuals per m² in soils free of anthropogenic interference (Hopkin, 1997). Due to their multiple roles in trophic networks, as well as their large densities and biomass, springtails are an important component of many ecosystems in terms of nutrient circulation and energy flow (Rusek, 1998). As a significant soil decomposer group that controls the cycling of nutrients and has an effect on soil fertility and water retention, they play a significant function in the soil ecosystem (Daghighi et al., 2017). Most springtails are detritivores and microbivores feeding on algae, fungi, litter, and other microorganisms and can be divided into two groups. While large and patterned surface-dwelling species are frequently connected to plant diets, small and pale species that live in soil and litter frequently occupy high trophic levels (Chahartaghi et al., 2005; Potapov et al., 2022).

Springtails have been studied for three centuries, but knowledge about their diversity is still far from complete. Researchers estimate that the actual number of species is *m* times higher than described, with estimates ranging from over 50,000 to as high as 500,000 (Potapov et al., 2020). According to the findings of a global investigation, neither springtail density nor community metabolism is predicted by local species richness, which is high in the tropics but comparable in certain temperate forests and even tundra (Potapov et al., 2023). According to a pan-European study, despite comparably higher species richness in natural forest-dominated areas compared to mixed-use areas, the average species richness of forest areas (local richness) decreased along the gradient, indicating that forest patches in mixed-use areas are supported by lower species richness than areas dominated by forests (Sousa et al., 2006). The known fauna of European springtails counts over 2078 species (Fiera et al., 2017). The first data on the fauna of springtails based on material from the territory of today's Republic of Serbia were provided by great researchers, including Absolon, Denis, Stach, Nosek, Gisin, Da Gama, and others (Bogojević, 1968). Pioneering, but also the most extensive research in the territory of the Republic of Serbia began at the beginning of the second half of the 20th century. Researchers Jelena Bogojević and Dragica Stevanović Koledin made the most significant contribution. They also provided the first checklist of the Serbian springtail fauna with 228 species (Koledin & Bogojević, 1976). The latest list of the springtail fauna was given by Bogojević (1989), with 158 identified species in research conducted between 1976 and 1988. This list is actually not a checklist like the previous one but represents all species found in the period after the publication of the previous list (including many already registered). According to Lučić (2006), 243 species of springtails were listed in Serbia, but no proper checklist has been published so far. Currently, the only checklist of springtails covers the southern province of Serbia, Kosovo, and Metohija, with 119 species (Grujić, 2022a). Although springtails are a neglected group of arthropods by local researchers, several endemic species have been discovered and described in Serbia in recent years (Ćurčić & Lučić, 1997; 1998; Lučić & Stanković, 2002; Lučić et al., 2008; Kováč & Papáč, 2010).

This paper with a checklist of springtails of Vojvodina province represents a contribution to the knowledge of Collembola fauna distribution and a step closer to establishing a checklist of springtails of the Republic of Serbia.

MATERIAL AND METHODS

Vojvodina is the northern province of the Republic of Serbia. Unlike the rest of the country located on the Balkan Peninsula, it lies on the Pannonian Plain and occupies an area between 44°38' and 46°10' North latitude and 18°10' and 21°15' East longitude. Although homogeneous at first glance, this area, with a rich geological past, possesses a wealth of geodiversity worth protecting (Vasiljević, 2015). The relief of the province was formed by the action of endogenous and exogenous forces so that today it is made up of the geomorphological units shown in Figure 1. In terms of geomorphology, Vojvodina has the following characteristics: *a.* alluvial deposits on the river terraces, on which fluvisols, semi-gley soils, lithic chert, swamp clay and halomorphic soils develop; *b.* loess plateaus with chernozem and

loess terraces on which chernozem alluvial soil and salt marshes develop; *c.* aeolian sand with types: arenosols, Rendzina and chernozems. According to the conditions of its creation, the land of Vojvodina constitutes a specific pedo-geographic zone, namely the steppe and forest-steppe area of the Pannonian Plain and its periphery part (Hadžić et al., 2005). The province is both the granary of the Republic of Serbia and an area of developed agriculture, considering that loess covers 60% of the surface. At the same time, chernozem is the most widespread type of soil (Marković et al., 2008). This is an area of plains whose monotony is broken by island mountains, sandstones, loess plains, and alluvial plains (Rodić, 1994). Different types of saline (halomorphic) soils were created as a result of the processes of soil salinization and alkalization (Grujić et al., 2021). Vojvodina is geographically divided into three parts: Srem (between Sava and Danube), Bačka (between Danube and Tisa), and Banat (between Tisa and Danube). The Universal Transverse Mercator (UTM) map of Vojvodina marks the areas where Collembola has been explored so far and which are included in this paper (Fig. 2). Below are brief descriptions of the regions where the researched localities are found.

Fruška Gora – Low, isolated island-mountain rising above the Vojvodina plains in northern Serbia, with a peak elevation of 539 meters. The numerous natural values put this mountain on the list of geo-heritage sites (Mészáros et al., 2005). This mountain has the status of a national park with significant biodiversity (c. 1,000 plants, c. 1,750 fungi, 60 mammals, > 20 amphibians and reptiles, > 1,700 insects, 150 birds) (Braunović & Jovanović, 2020).

Obedska Bara – The wetland is under protection as a Special Nature Reserve and represents an important international Ramsar site with significant biodiversity (Jojić-Glavonjić, 2020).

Bačka – This is a lowland region (76–130 m) characterized by the presence of all basic saline soil types (Budak, 1998). The area is located between the great rivers Danube and Tisza.

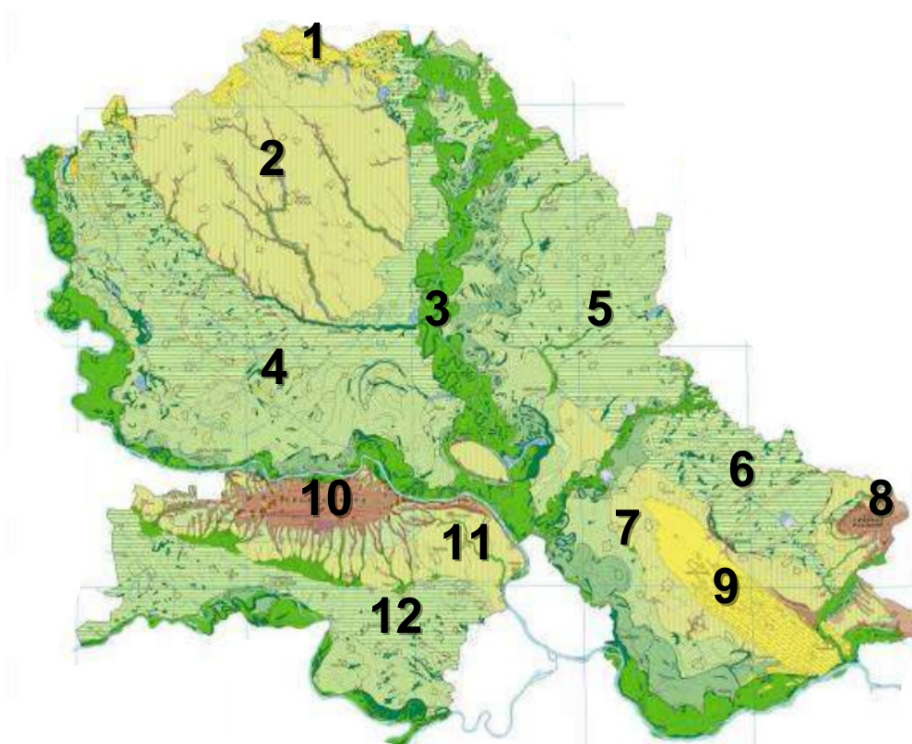


Figure 1. Geomorphologic units of Vojvodina (According to Forkapic et al., 2017). **1.** Horgos sands; **2.** Backa loess plateau; **3.** Alluvial plain; **4.** Backa loess terrace; **5.** Banat loess terrace; **6.** Tamiš loess plateau; **7.** Deliblato loess plateau; **8.** Vrsac mountains; **9.** Deliblato sands; **10.** Fruška Gora mountain; **11.** Fruška Gora loess plateau, **12.** Srem loess terrace.

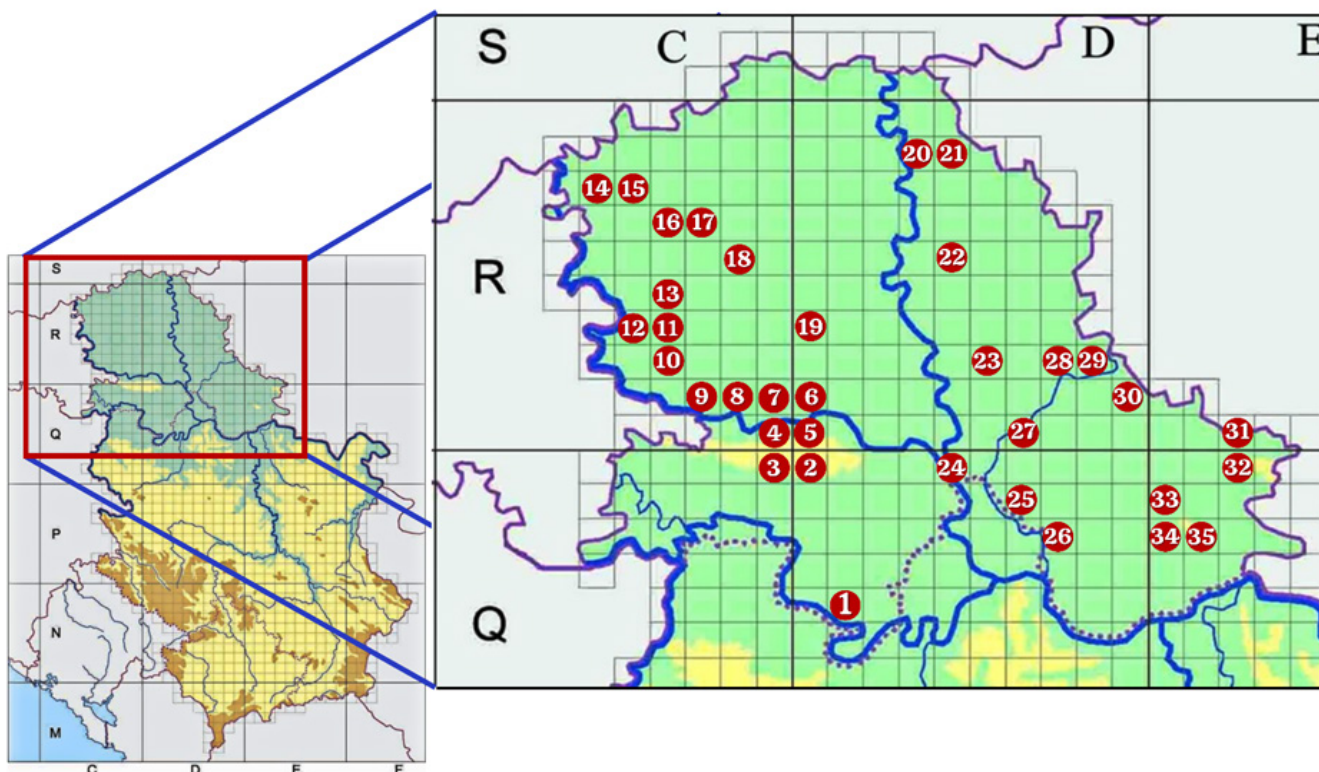


Figure 2. Map of the localities where Collembola were investigated in Vojvodina (in Serbia) in UTM projection (grid zone 34T; basic square 10 km × 10 km). SREM: **1.** Obedska Bara; **2.** Iriški Venac (Fruška Gora); **3.** Fruška Gora National Park; **4.** Popovica (Fruška Gora); **5.** Ledinci (Fruška Gora); BAČKA: **6–7.** Novi Sad; **8.** Čelarevo; **9.** Bačka Palanka; **10.** Bač; **11.** Ristovača; **12.** Deronje; **13.** Odžaci; **14.** Bezdankozara; **15.** Sombor; **16.** Kljajićevo; **17.** Sivac; **18.** Kula; **19.** Sirig; BANAT: **20.** Padej; **21.** Sajanj; **22.** Melenci-Bašaid; **23.** Mužlja; **24.** Perlez-Čenta; **25.** Sefkerin; **26.** Jabuka; **27.** Tomaševac; **28.** Sečanj; **29.** Boka; **30.** Konak; **31.** Margita; **32.** Vršac; **33.** Alibunar; **34–35.** Deliblatska Peščara.

Banat – Humogley of the Serbian part of Banat comprises one of the most important soil resources in Serbia (Belić et al., 2011). The eastern part is flat, while the western part rises towards the Carpathians.

Deliblatska Peščara – This is the largest European continental sand area, located in Banat, covering around 300 km² of ground. The area is protected as a Special Nature Reserve with significant biodiversity and endemic species (Trišić et al., 2023).

The presented list is entirely based on published literature data about Collembola of Vojvodina (Bogojević, 1971a, 1971b, 1973, 1979, 1984; Stevanović, 1967, 1968; Lučić, 2006; Sántha, 2017; Grujić, 2022b, 2023). Although the province is part of the Republic of Serbia where the fauna of springtails has been investigated the most, we still have relatively little data, and this list is far from complete. Based on the collected data, a species list was formed, revised, and classified according to the system *sensu* Bellinger et al. (1996–2023). Since the taxonomic revision is not possible based only on genera, the list includes species identified at the species level. Within a genus, the species are arranged alphabetically. For each species, the following is reported: **1.** the scientific name, the complete name of the author, and year of publication; **2.** the original name with its bibliographic quotation, type material data and type locality, depository location; **3.** general geographic distribution, according to Bretfeld (1999); Fjellberg (1998); Gisin (1960); Jordana et al. (1997); Potapov (2001); Zimdars and Dunger (1994); Dányi & Traser (2008); Jordana (2012); **4.** localities where the species was recorded in Vojvodina, and **5.** ecological comment based on the collected literature.

Wherever possible, the depository location of the type material was provided based on the literature. The following abbreviations were used: **BMNH** – The Natural History Museum, London, UK; **HNHM** – Hungarian Natural History Museum, Budapest, Hungary; **MCNT** – Museo de Ciencias Naturales de Tenerife, Spain; **MCUC** – Museu da Ciência da Universidade de Coimbra, Portugal; **MNCN** – Museo Nacional de Ciencias Naturales de Madrid, Spain; **MNHN** – Muséum National d'Histoire Naturelle, Paris, France; **MSNG** – Natural History Museum, Genova Italy “Giacomo Doria”, Italy; **PAN** – Institute of Systematics and Evolution of Animals of the Polish Academy of Sciences, Krakow, Poland; **UUZM** – Uppsala University, Museum of Evolution, Zoology Section.

RESULTS

Phylum Arthropoda Latreille, 1829

Superclass Hexapoda Blainville, 1816

Class Collembola Lubbock, 1870

Order Poduromorpha Börner, 1913

Superfamily Hypogastruroidea Börner, 1906

Family Hypogastruridae Börner, 1906

Genus *Ceratophysella* Börner, 1932

Ceratophysella denticulata (Bagnall, 1941)

Achorutes denticulatus Bagnall, 1941:218–219. England, Northumberland.

General distribution. Cosmopolitan (Fjellberg, 1998).

Distribution in Vojvodina. Odžaci (Bogojević, 1984).

Ecological note. Found in poplar plantations on yellow sand (Bogojević, 1984).

Ceratophysella succinea (Gisin, 1949)

Hypogastrura succinea Gisin, 1949:393. Switzerland, Schaffhausen. – NHMG.

General distribution. Cosmopolitan (Fjellberg, 1998).

Distribution in Vojvodina. Deliblatska peščara (Bogojević, 1971a, 1971b), Sivac (Bogojević, 1984).

Ecological note. In Deliblatska peščara (Banat), the species was found in the separate groves of *Robinia pseudoacacia* and *Pinus nigra*, also in the plant community *Chrysopogonetum pannonicum typicum* (Bogojević, 1971a, 1971b). In Sivac (Bačka), the species was found on a wet meadow with *Lotus corniculatus*, *Carex* sp., and *Juncus* sp. as dominant plant cover (Bogojević, 1984).

Genus *Hypogastrura* Bourlet, 1839

Hypogastrura gisini Strenzke, 1954

Hypogastrura gisini Strenzke, 1954:47–48. Germany, Baltic Sea coast.

General distribution. Palearctic (Fjellberg, 1998).

Distribution in Vojvodina. Konak (Bogojević, 1979).

Ecological note. In Konak (Banat), the species was found in saline soil with *Festuca* sp. as 100% dominant plant cover (Bogojević, 1979).

Hypogastrura manubrialis (Tullberg, 1869)

Achorutes manubrialis Tullberg, 1869:9–10. Sweden, Simtuna. – UUZM.

General distribution. Cosmopolitan (Fjellberg, 1998).

Distribution in Vojvodina. Obedska Bara (Lučić, 2006).

Ecological note. often found in compost (Dányi & Traser, 2008).

***Hypogastrura socialis* (Uzel, 1891)**

Achorutes socialis Uzel, 1981:69. Czechia, Hradec Králové.

General distribution. Holarctic (Fjellberg, 1998).

Distribution in Vojvodina. Fruška Gora (Stevanović, 1967); Obedska Bara (Lučić, 2006).

Ecological note. Mostly gregarious in early spring, often in great masses (Fjellberg, 1998).

***Hypogastrura vernalis* (Carl, 1901)**

Achorutes vernalis Carl, 1901:249–251. Switzerland, Cima da Fex.

General distribution. Cosmopolitan (Fjellberg, 1998).

Distribution in Vojvodina. Deliblatska peščara (Bogojević, 1971a, 1971b).

Ecological note. In Deliblatska peščara (Banat), the species was found in the plant community *Chrysopogonetum pannonicum typicum* (Bogojević, 1971a, 1971b).

***Hypogastrura viatica* (Tullberg, 1872)**

Achorutes viaticus Tullberg, 1872:50–51. Sweden. – UUZM.

General distribution. Cosmopolitan (Fjellberg, 1998).

Distribution in Vojvodina. Obedska Bara (Lučić, 2006).

Ecological note. Mainly in coastal and wet areas (Greenslade et al., 2013).

Genus *Xenylla* Tullberg, 1869***Xenylla brevisimilis* Stach, 1949**

Xenylla brevisimilis Stach, 1949:209. Poland, Czarny Dunajec. – PAN.

General distribution. Holarctic (Fjellberg, 1998).

Distribution in Vojvodina. Bezdán-Kozara (Bogojević, 1984).

Ecological note. In litter and moss (Dányi & Traser, 2008). In Bezdán-Kozara (Bačka), the species was found in extremely dry soil in an old forest of *Quercus robur*. *Parietaria officinalis*, *Brachypodium silvaticum* and *Dactylis glomerata* dominated in the herbaceous layer (Bogojević, 1984).

***Xenylla humicola* (Fabricius, 1780)**

Podura humicola Fabricius, 1780:213. Greenland.

General distribution. Cosmopolitan (Fjellberg, 1998).

Distribution in Vojvodina. Padej, Tomaševac (Bogojević, 1979).

Ecological note. In Padej, the species was found on salt land pasture with *Statice gmelini*, *Festuca pseudovina*, *Agropyrum* sp. and *Achillea* sp. as dominant plant cover. In Tomaševac, the species was found in wet depression with *Juncus* sp., *Potentilla anserina* and *Trifolium repens* as dominant plants (Bogojević, 1979).

***Xenylla maritima* Tullberg, 1869**

Xenylla maritima Tullberg, 1869:11–12. Scandinavia.

General distribution. Cosmopolitan (Fjellberg, 1998).

Distribution in Vojvodina. Deliblatska peščara (Bogojević, 1971a, 1971b); Deronje, Ristovača hunting grounds (Bogojević, 1984).

Ecological note. In Deliblatska peščara (Banat), the species was found in the separate groves of *Robinia pseudoacacia* and *Pinus nigra*, also in the plant community *Chrysopogonetum pannonicum typicum* and habitat under *Juniperus communis* (Bogojević, 1971a, 1971b). In Deronje, *Lysimachia nummularia*, *Potentilla anserina* and *Rumex* sp. were dominant plant (Bogojević, 1984). Locality Ristovača hunting grounds is an association of *Quercus robur* with *Acer campestre* and *Carpinus betulus* (Bogojević, 1984).

***Xenylla tullbergi* Börner, 1903**

Xenylla tullbergi Börner, 1903:182. Germany, Hesse.

General distribution. Palearctic (Fjellberg, 1998).

Distribution in Vojvodina. Deronje (Bogojević, 1984).

Ecological note. The species was found in a wet meadow in Deronje. *Lysimachia nummularia*, *Potentilla anserina*, and *Rumex* sp. were dominant plants (Bogojević, 1984).

***Xenylla unisetata* da Gama, 1963**

Xenylla unisetata Da Gama, 1963:43–45. Croatia, Dalmatia. – MCUC

General distribution. Europe (Gisin, 1960).

Distribution in Vojvodina. Deliblatska peščara (Bogojević, 1971a, 1971b).

Ecological note. In Deliblatska peščara (Banat), the species was found in the separate groves of *Robinia pseudoacacia* and *Pinus nigra*, also in the plant community *Chrysopogonetum pannonicum typicum* and habitat under *Juniperus communis* (Bogojević, 1971a, 1971b).

Superfamily Neanuroidea Börner, 1901**Family Neanuridae Börner, 1901****Subfamily Frieseinae Massoud, 1967****Genus *Friesea* von Dalla Torre, 1895*****Friesea afurcata* (Denis, 1926)**

Polyacanthella afurcata Denis, 1926:10–11. Italy, Ravenna.

General distribution. Cosmopolitan (Fjellberg, 1998).

Distribution in Vojvodina. Tomaševac, Margita (Bogojević, 1979).

Ecological note. In Tomaševac, the species was found on salt land pasture with *Festuca pseudovina* and *Cynodon dactylon* as a dominant plant cover (Bogojević, 1979). Sampling was done in August; the soil surface temperature was 30.8 °C, and, at -5 cm 24.4 °C. In Margita, the species was found in two localities on salt land pasture in October, where the soil surface temperature was around 25 °C, and at -5 cm around 17 °C. Sampling was done from plant communities like islands on a bare salt land pasture. In one locality, the plant community consisted of *Festuca pseudovina* and *Artemisia* sp., and in the other only *Atriplex* sp (Bogojević, 1979).

***Friesea mirabilis* (Tullberg, 1871)**

Triaena mirabilis Tullberg, 1871:155. Sweden, Uppland.

General distribution. Cosmopolitan (Fjellberg, 1998).

Distribution in Vojvodina. Tomaševac, Vršac (Bogojević, 1979); Kljajićevo, Deronje, Bač (Bogojević, 1984).

Ecological note. In Tomaševac, the species was found in a wet depression with *Juncus* sp., *Potentilla anserina*, and *Trifolium repens* (Bogojević, 1979). Sampling was done in August; the soil surface temperature was 25.8 °C, and, at -5 cm, 22.2 °C. In Vršac, the species was found in dry and cracked soil with *Festuca pseudovina* and *Limonium gmelinii* (Bogojević, 1979). Sampling was done in October; the soil surface temperature was 25.4 °C and, at -5 cm, 15.2 °C. In Kljajićevo, the species was found in a wet meadow with *Lotus corniculatus*, *Symphytum officinale*, *Plantago lanceolata*, and *Juncus* sp. (Bogojević, 1984). Sampling was done in July; the soil surface temperature was 24.2 °C, and, at -5 cm, 21 °C. In Deronje, the species was found on salt land pasture with *Festuca pseudovina* and *Cynodon dactylon* (Bogojević, 1984). Sampling was done in August; the soil surface temperature was 28.2 °C, and, at -5 cm, 26.2 °C. In Bač, the species was found on salt land pasture with *Festuca pseudovina*, *Scilla autumnalis*, and *Cynodon dactylon* (Bogojević, 1984). Sampling was done in August; the soil surface temperature was 29 °C, and at -5 cm, 26.4 °C.

Subfamily Neanurinae Börner, 1901**Genus *Deutonura* Cassagnau, 1979*****Deutonura conjuncta* (Stach, 1926)**

Achorutes conjunctus Stach, 1926:3, Lectotype juv. Poland, West-Charpatians. – PAN

General distribution. Europe.

Distribution in Vojvodina. Bačka Palanka, Čelarevo (Bogojević, 1984); Obedska Bara (Lučić, 2006).

Ecological note. In Bačka Palanka, the species was found in association of *Robinia pseudoacacia* (cca 80%) with *Glechoma hederacea* and *Urtica dioica* in the herb layer (Bogojević, 1984). Sampling was done in August; the soil surface temperature was 23.5 °C, and, at -5 cm, 21.2 °C. In Čelarevo, the species was found in an association of *Quercus robur* (cca 80%) with *Brachypodium sylvaticum* and *Urtica dioica* on the first floor (Bogojević, 1984).

***Deutonura dextra* (Gisin, 1954)**

Neanura dextra Gisin, 1954:50. Austria, Graz.

General distribution. Europe (Gisin, 1960).

Distribution in Vojvodina. Fruška Gora (Stevanović, 1967).

Ecological note. Mostly in forest habitats (e.g. Kühnelt, 1963; Stevanović, 1967).

Genus *Neanura* MacGillivray, 1893***Neanura muscorum* (Templeton, 1835)**

Achorutes muscorum Templeton, 1835:97. Ireland, Cranmore.

General distribution. Cosmopolitan (Fjellberg, 1998).

Distribution in Vojvodina. Deliblatska peščara (Bogojević, 1971a, 1971b), Obedska Bara (Lučić, 2006); Popovica, Iriški venac - Fruška Gora (Sántha, 2017); Novi Sad (Grujić, 2023).

Ecological note. A hemiedaphic species, commonly found in association with *Pinus nigra* (Bogojević, 1971a).

Genus *Thaumanura* Börner, 1932***Thaumanura carolii* (Stach, 1920)**

Achorutes carolii Stach, 1920:141–144, Lectotype: juv. Poland, Charpatians. – PAN

General distribution. Europe (Gisin, 1960).

Distribution in Vojvodina. Obedska Bara (Lučić, 2006).

Ecological note. Silvicolous (Dányi & Traser, 2008).

Subfamily Pseudachorutinae Börner, 1906**Genus *Pseudachorutes* Tullberg, 1871*****Pseudachorutes dubius* Krausbauer, 1898**

Pseudachorutes dubius Krasubauer, 1898:504. Germany, Weilburg.

General distribution. Palearctic (Fjellberg, 1998).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b); Ristovača, Bačka Palanka (Bogojević, 1984).

Ecological note. In Deliblatska Peščara, the species was found in a *Robinia pseudoacacia* stand and also in the plant community *Chrysopogonetum pannonicum typicum* (Bogojević, 1971a, 1971b). In Ristovača, the species was found in association with *Quercus robur* in August (Bogojević, 1984). The temperature on the soil surface was 25.2 °C, and, at -5 cm, 22.2 °C. In Bačka Palanka, the species was found in an association of *Robinia pseudoacacia* (cca 80%) with *Glechoma hederacea* and *Urtica dioica* in the herb layer (Bogojević, 1984). Sampling was done in August; the soil surface temperature was 23.4 °C, and, at -5 cm, 21.2 °C.

***Pseudachorutes parvulus* Börner, 1901**

Pseudachorutes parvulus Börner, 1901:701. Germany, Marburg.

General distribution. Palearctic, Japan.

Distribution in Vojvodina. Fruška Gora (Stevanović, 1967); Deliblatska Peščara (Bogojević, 1971a, 1971b; 1973); Odžaci (Bogojević, 1984).

Ecological note. Hemiedaphic. In Deliblatska Peščara, the species was found in *Robinia pseudoacacia* stand. In Odžaci, the species was found in a poplar plantation on yellow sand. Sampling was done in August; the soil surface temperature was 27.2 °C, and, at -5 cm, 24.2 °C.

***Pseudachorutes subabdominalis* Steiner, 1958**

Pseudachorutes subabdominalis Steiner, 1958:76. Spain, Puerto de Carrales. – MNCN.

General distribution. Palearctic (Fjellberg, 1998).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b).

Ecological note. This hemiedaphic species was found in Deliblatska Peščara in association with *Robinia pseudoacacia* (Bogojević, 1971a, 1971b).

Family Brachystomellidae Stach, 1949**Genus *Brachystomella* Ågren, 1903*****Brachystomella curvula* Gisin, 1948**

Brachystomella curvula Gisin, 1948:86. Switzerland, Lugano. – MHNG.

General distribution. Holarctic (Fjellberg, 1998).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b, 1973).

Ecological note. In Deliblatska Peščara, the species was found in the following plant associations: *Festucetum vaginatae deliblasticum fumanetosum*, *Festucetum vaginatae deliblasticum muscetosum* and *Chrysopogonetum pannonicum typicum* (Bogojević, 1971a, 1971b; 1973).

***Brachystomella parvula* (Schäffer, 1896)**

Schöttella parvula Schäffer, 1896:176. Austria, Auwiesen.

General distribution. Cosmopolitan (Fjellberg, 1998).

Distribution in Vojvodina. Mužlja, Sajan, Konak, Boka, Sečanj, Perlez-Čenta (Bogojević, 1979).

Ecological note. In Mužlja, the species was found on salt land pasture with rare sods of *Festuca pseudovina* in November (Bogojević, 1979). The temperature on the soil surface was 15.2 °C, and, at -5 cm, 12.4 °C. In Sajan, the species was found in soil solonetz (Bogojević, 1979). The temperature on the soil surface was 29.6 °C, and, at -5 cm, 21.8 °C. In Konak, the species was also found in August (Bogojević, 1979). The species was found in Boka, Sečanj, and salt land pasture between Perlez and Čenta in October (Bogojević, 1979).

Superfamiy Onychiuroidea Börner, 1901**Family Onychiuridae Börner, 1901****Subfamily Onychiurinae Börner, 1901****Genus *Hymenaphorura* Bagnall, 1948*****Hymenaphorura alticola* (Bagnall, 1935)**

Onychiurus alticola Bagnall, 1935:63, Neotype ♀. Switzerland, Kanton Bern.

General distribution. Europe (Gisin, 1960).

Distribution in Vojvodina. Obedska Bara (Lučić, 2006).

Ecological note. In forest soils and caves (Marcuzzi, 1977; Lučić, 2006)

Genus *Kalaphorura* Absolon, 1901***Kalaphorura burmeisteri* (Lubbock, 1873)**

Lipura burmeisteri Lubbock, 1873:190. UK, England.

General distribution. Europe (Gisin, 1960).

Distribution in Vojvodina. Obedska Bara (Lučić, 2006).

Ecological note. In forest soils and often also in caves (e.g. Lučić, 2006; Dányi & Traser, 2008).

Genus *Protaphorura* Absolon, 1901***Protaphorura armata* (Tullberg, 1869)**

Lipura armata Tullberg, 1869:18. Sweden, Uppsala. – UUZM

General distribution. Cosmopolitan (Fjellberg, 1998).

Distribution in Vojvodina. Fruška Gora (Stevanović, 1967; 1968); Ristovača, Bačka Palanka (Bogojević, 1984); Obedska Bara (Lučić, 2006).

Ecological note. Euedaphic. On Fruška Gora, the highest number and densest frequency of this species was found in the plant association *Querceto-carpinetum serbicum* (Stevanović, 1967; 1968). In Ristovača, the species was found in association of *Quercus robur* in August (Bogojević, 1984). The temperature on the soil surface was 25.2 °C, and, at -5 cm, 22.2 °C. In Bačka Palanka, the species was found in a *Robinia pseudoacacia*-dominated (cca. 80%) stand with *Glechoma hederacea* and *Urtica dioica* in the herb layer (Bogojević, 1984). Sampling was done in August; the soil surface temperature was 23.4 °C, and, at -5 cm, 21.2 °C. In Obedska Bara, the species was collected in an oak-elm forest (Lučić, 2006).

***Protaphorura aurantiaca* (Ridley, 1880)**

Lipura aurantiaca Ridley, 1880:1–2. UK, New Randor. – BMNH.

General distribution. Palearctic (Fjellberg, 1998).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b); Sajan (Bogojević, 1979).

Ecological note. Euedaphic. In Deliblatska Peščara, the species was found in a *Robinia pseudoacacia* stand, and also in the plant community *Chrysopogonetum pannonicum typicum* (Bogojević, 1971a, 1971b). In Sajan, the species was found in soil solonetz (Bogojević, 1979). The temperature on the soil surface was 29.6 °C, and, at -5 cm, 21.8 °C.

***Protaphorura sakatoi* (Yosii, 1966)**

Onychiurus sakatoi Yosii, 1966:335–336. Afghanistan.

General distribution. Palearctic (Fjellberg, 1998).

Distribution in Vojvodina. Melenci-Bašaid, Konak, Perlez-Čenta, Jabuka (Bogojević, 1979).

Ecological note. The species was found on salt land pastures in August and October (Bogojević, 1979).

Family Tullbergiidae Bagnall, 1935**Genus *Metaphorura* Bagnall, 1936*****Metaphorura affinis* (Börner, 1902)**

Tullbergia affinis Börner, 1902:130. Italy, Sicilia.

General distribution. Palearctic (Zimdars & Dunger, 1994; Fjellberg, 1998).

Distribution in Vojvodina. Padej, Tomaševac, Vršac, Konak, Boka (Bogojević, 1979); Bačka Palanka (Bogojević, 1984).

Ecological note. The species was found in different salt land pastures throughout Banat in August and October (Bogojević, 1979). In Bačka Palanka, the species was found in *Robinia pseudoacacia* stand (Bogojević, 1984). Sampling was done in August; the soil surface temperature was 23.4 °C, and, at -5 cm, 21.2 °C.

Genus *Mesaphorura* Börner, 1901***Mesaphorura krausbaueri* Börner, 1901**

Mesaphorura krausbaueri Börner, 1901:24. Germany, Bremen.

General distribution. Cosmopolitan (Zimdars & Dunger, 1994; Fjellberg, 1998).

Distribution in Vojvodina. Deliblatska peščara (Bogojević, 1971a, 1971b, 1973); Mužlja (Bogojević, 1979), Sombor, Kula, Deronje, Bač, Čelarevo (Bogojević, 1984).

Ecological note. A common, eurytopic species (Dányi & Traser, 2008; Dunger & Schlitt, 2011).

Order Entomobryomorpha Börner, 1913**Superfamily Tomoceroidea Schäffer, 1896****Family Tomoceridae Schäffer, 1896****Genus *Pogonognathellus* Paclt, 1944*****Pogonognathellus flavescens* Tullberg, 1871**

Macrotoma flavescens Tullberg, 1871:149. Sweden, Uppland. – UUZM.

General distribution. Holarctic (Dányi & Traser, 2008).

Distribution in Vojvodina. Bezdan-Kozara, Bačka Palanka, Čelarevo (Bogojević, 1984).

Ecological note. The species was found in an old forest of *Quercus robur* between Bezdan and Kozara in July (Bogojević, 1984). In Bačka Palanka and Čelarevo, the species was found in salt land pastures in August (Bogojević, 1984).

***Pogonognathellus longicornis* (Müller, 1776)**

Podura longicornis Muller, 1776:184. Denmark and Norway.

General distribution. Palearctic (Dányi & Traser, 2008).

Distribution in Vojvodina. Ristovača (Bogojević, 1984); Popovica and Iriški Venac on Fruška Gora (Sántha, 2017).

Ecological note. Silvicolous. Locality Ristovača hunting grounds is an association of *Quercus robur* with *Acer campestre*, *Carpinus betulus*, *Crataegus monogyna*, and *Umlus campestris* (Bogojević, 1984). The temperature on the soil surface was 25.2 °C, and at -5 cm, 22.2 °C.

Genus *Tomocerina* Yosii, 1955***Tomocerina minuta* (Tullberg, 1877)**

Tomocerus minutus Tullberg, 1876:32. Russia, Siberia.

General distribution. Holarctic (Dányi & Traser, 2008).

Distribution in Vojvodina. Popovica and Ledinci on Fruška Gora (Sántha, 2017).

Genus *Tomocerus* Nicolet, 1842***Tomocerus baudoti* Denis, 1932**

Tomocerus baudoti Denis, 1932:375-377. France, Bar le Duc.

General distribution. Europe (Dányi & Traser, 2008).

Distribution in Vojvodina. Fruška Gora (Stevanović, 1967).

***Tomocerus minor* (Lubbock, 1862)**

Macrotoma minor Lubbock, 1862:598-599. UK, Kent.

General distribution. Holarctic (Dányi & Traser, 2008).

Distribution in Vojvodina. Obedska Bara (Lučić, 2006); Popovica, Ledinci and Iriški venac on Fruška Gora (Sántha, 2017).

Ecological note. Hygrophilous, troglphilous (Lučić, 2006; Dányi & Traser, 2008).

***Tomocerus vulgaris* (Tullberg, 1871)**

Macrotoma vulgaris Tullberg, 1871:149. Sweden, Uppland.

General distribution. Cosmopolitan (Fjellberg, 2007).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b); Obedska Bara (Lučić, 2006); Ledinci and Iriški venac on Fruška Gora (Sántha, 2017), Novi Sad (Grujić, 2023).

Ecological note. Hemiedaphic, silvicolous (Fjellberg, 2007).

Genus *Tritomurus* Frauenfeld, 1854***Tritomurus terrestralis* Stach, 1922**

Tritomurus terrestralis Stach, 1922:118–121. Montenegro, Virpasar.

General distribution. Central Europe (Gisin, 1960).

Distribution in Vojvodina. Fruška Gora (Stevanović, 1967); Obedska Bara (Lučić, 2006).

Ecological note. In Fruška Gora, the species was found in rock formations (Stevanović, 1967), while in Obedska Bara, it was collected in an oak-elm forest (Lučić, 2006).

Superfamily Isotomoidea Schäffer, 1896**Family Isotomidae Schäffer, 1896****Subfamily Pachyotominae Potapov, 2001****Genus *Pachyotoma* Bagnall, 1949*****Pachyotoma crassicauda* (Tullberg, 1871)**

Isotoma crassicauda Tullberg, 1871:152. Georgia, Caucasus. – UUZM

General distribution. Palearctic (Potapov, 2001).

Distribution in Vojvodina. Padej, Alibunar, Boka (Bogojević, 1979); Kljajićevo, Deronje (Bogojević, 1984).

Ecological note. Neustonic. In Kljajićevo, the species was found in a wet meadow with *Lotus corniculatus*, *Symphytum officinale*, *Plantago lanceolata*, and *Juncus* sp (Bogojević, 1984). Sampling was done in July; the temperature on the soil surface was 24.2 °C, and, at -5 cm, 21 °C. In Deronje, the species was found on salt land pasture with *Festuca pseudovina* and *Cynodon dactylon* (Bogojević, 1984). Sampling was done in August; the soil surface temperature was 28.2 °C, and, at -5 cm, 26.2 °C. In Padej, Alibunar, and Boka, the species was found in different salt land pastures in August and October (Bogojević, 1979).

Subfamily Proisotominae Stach, 1947**Genus *Proisotoma* Börner, 1901*****Proisotoma minuta* (Tullberg, 1871)**

Isotoma minuta Tullberg, 1871:152. Sweden, Gotland.

General distribution. Cosmopolitan (Potapov, 2001).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b).

Ecological note. Hemiedaphic, thermophilic, frequently in compost. In Deliblatska peščara, the species was found in the plant community *Chrysopogonetum pannonicum typicum* (Bogojević, 1971a, 1971b).

Genus *Folsomides* Stach, 1922***Folsomides fjellbergi* Arbea, 2015**

Folsomides fjellbergi Arbea, 2015:414–416. Spain, Canary Island. – MCNT

General distribution. Palearctic (Potapov, 2001).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b, 1973).

Ecological note. Hemiedaphic (Arbea, 2015). In Deliblatska Peščara, the species was frequent in association of *Juniperus communis*, *Festucetum vaginatae deliblaticum fumanetosum* and *Festucetum vaginatae deliblaticum muscetosum* (Bogojević, 1971a, 1971b, 1973).

***Folsomides parvulus* Stach, 1922**

Folsomides parvulus Stach, 1922:17–19. Slovakia, Podlužany.

General distribution. Cosmopolitan (Potapov, 2001).

Distribution in Vojvodina. Sivac (Bogojević, 1984).

Ecological note. Xerophilous. In Sivac (Bačka), the species was found on a wet meadow with *Lotus corniculatus*, *Carex* sp., and *Juncus* sp. as a dominant plant cover (Bogojević, 1984). Sampling was done in July; the soil surface temperature was 31.2 °C, and, at -5 cm, 22.2 °C.

Subfamily Anurophorinae Börner, 1901**Genus *Folsomia* Willem, 1902*****Folsomia penicula* Bagnall, 1939**

Folsomia penicula Bagnall, 1939:57. Great Britain, East Yorkshire.

General distribution. Palearctic (Potapov, 2001).

Distribution in Vojvodina. Fruška Gora (Stevanović, 1967).

Ecological note. Silvicolous, mesophilic (Dányi & Traser, 2008).

***Folsomia quadrioculata* (Tullberg, 1871)**

Isotoma quadrioculata Tullberg, 1871:152. Sweden, Uppsala. – UUZM

General distribution. Holarctic (Potapov, 2001).

Distribution in Vojvodina. Fruška Gora (Stevanović, 1967, 1968); Bačka Palanka, Čelarevo, Bezdankozara, Ristovača, (Bogojević, 1984).

Ecological note. Eurytopic (Fjellberg, 2007).

***Folsomia similis* Bagnall, 1939**

Folsomia similis Bagnall, 1939:57. UK, East Yorkshire.

General distribution. Holarctic (Potapov, 2001).

Distribution in Vojvodina. Fruška Gora (Stevanović, 1967); Obedska Bara (Lučić, 2006).

Ecological note. Occurring in open (Prokopenko, 1987), and forest habitats (Stevanović, 1967; Lučić, 2006).

Genus *Hemisotoma* Bagnall, 1949***Hemisotoma pontica* (Stach, 1947)**

Isotomina pontica Stach, 1947:267. Georgia.

General distribution. Palearctic (Potapov, 2001).

Distribution in Vojvodina. Sefkerin (Bogojević, 1979).

Ecological note. In Sefkerin, the species was found on salt land pasture in October (Bogojević, 1979). The temperature on the soil surface was 20.4 °C, and, at -5 cm, 18.2 °C.

***Hemisotoma thermophila* (Axelson, 1900)**

Isotoma thermophila Axelson, 1900:113–114. Finland, Helsinki.

General distribution. Cosmopolitan (Potapov, 2001).

Distribution in Vojvodina. Mužlja, Padej, Sajan, Melenci-Bašaid, Tomaševac, Alibunar, Vršac, Sečanj (Bogojević 1979); Sivac, Deronje, Bač, Bačka Palanka (Bogojević, 1984).

Ecological note. Nitrophilous, sometimes interstitial. The species was found in different salt land pastures throughout Banat and Bačka (Bogojević, 1979, 1984).

Genus *Isotomiella* Bagnall, 1939***Isotomiella minor* (Schäffer, 1896)**

Isotoma minor Schäffer, 1896:182. Germany, Blankenese.

General distribution. Cosmopolitan (Potapov, 2001).

Distribution in Vojvodina. Fruška Gora (Stevanović, 1967); Melenci-Bašaid, Tomaševac, Konak, Konak-Boka, Boka (Bogojević, 1979); Sombor, Kljajicevo, Sivac, Bačka Palanka, Kula, Čelarevo (Bogojević, 1984), Obedska Bara (Lučić, 2006).

Ecological note. Parthenogenetic, eurytopic (Dányi & Traser, 2008).

Genus *Isotomodes* Linnaniemi, 1907***Isotomodes productus* (Axelson, 1906)**

Isotoma producta Axelson, 1906:11. Estonia, Tallinn.

General distribution. Cosmopolitan (Potapov, 2001).

Distribution in Vojvodina. Saján, Alibunar, Boka (Bogojević, 1979); Sombor, Sirig (Bogojević, 1984).

Ecological note. Xerothermophilic (Dányi & Traser, 2008).

***Isotomodes templetoni* Bagnall, 1939**

Isotomodes templetoni Bagnall, 1939:197. UK, Belfast.

General distribution. Europe (Potapov, 2001).

Distribution in Vojvodina. Padej, Tomaševac (Bogojević, 1979).

Ecological note. The species was found in different salt land pastures in August (Bogojević, 1979). In Padej, the temperature on the soil surface was 22.8 °C, and, at -5 cm, 19 °C. In Padej, the temperature on the soil surface was 25.8 °C, and, at -5 cm, 22.2 °C.

Genus *Proisotomodes* Bagnall, 1949***Proisotomodes bipunctatus* (Axelson, 1903)**

Isotoma bipunctata Axelson, 1903:9–10. Russia, Polyany.

General distribution. Palearctic (Potapov, 2001).

Distribution in Vojvodina. Fruška Gora (Stevanović, 1967).

Ecological note. Xerotolerant (Dányi & Traser, 2008).

Genus *Pseudanurophorus* Stach, 1922***Pseudanurophorus boernerii* Stach, 1922**

Pseudanurophorus boernerii Stach, 1922:15–16. Slovakia, Podlužany.

General distribution. Europe (Potapov, 2001).

Distribution in Vojvodina. Bačka Palanka (Bogojević, 1984).

Ecological note. Rare species occurring with low abundance (Bogojević, 1984).

Subfamily Isotominae Schäffer, 1896**Genus *Desoria* Agassiz & Nicolet, 1841*****Desoria fennica* (Reuter, 1895)**

Isotoma hiemalis var. *fennica* Reuter, 1895:27. Finland, Halikko.

General distribution. Palearctic (Potapov, 2001).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b).

Ecological note. Eurytopic (Fjellberg, 2007).

***Desoria olivacea* (Tullberg, 1871)**

Isotoma olivacea Tullberg, 1871:151. Sweden, Uppsala.

General distribution. Europe (Potapov, 2001).

Distribution in Vojvodina. Obedska Bara (Lučić, 2006).

Ecological note. Hygrophilous (Dányi & Traser, 2008).

Genus *Hydroisotoma* Stach, 1947***Hydroisotoma schaefferi* (Krausbauer, 1898)**

Isotoma schaefferi Krausbauer, 1898:502. Germany, Weilburg.

General distribution. Holarctic (Potapov, 2001).

Distribution in Vojvodina. Fruška Gora (Stevanović, 1967).

Ecological note. Neustonic, associated with streams (Dányi & Traser, 2008).

Genus *Isotoma* Bourlet, 1839***Isotoma viridis* Bourlet, 1839**

Isotoma viridis Bourlet, 1839:401. Europe, not defined.

General distribution. Holarctic (Potapov, 2001).

Distribution in Vojvodina. Mužlja, Padej, Tomaševac, Alibunar, Margita, Konak, Konak-Boka, Boka, Sečanj, Perlez-Čenta, Sefkerin, Jabuka (Bogojević, 1979); Bezdan, Sombor, Sivic, Sirig, Deronje, Bač, Bačka Palanka (Bogojević, 1984); Novi Sad (Grujić, 2023).

Ecological note. Eurytopic, more abundant in open habitats (Potapov, 2001).

Genus *Isotomurus* Börner, 1903***Isotomurus palustris* (Muller, 1776)**

Podura palustris Muller, 1776:184. Denmark and Norway.

General distribution. Holarctic (Potapov, 2001).

Distribution in Vojvodina. Mužlja (Bogojević, 1979), Kljajićevo (Bogojević, 1984).

Ecological note. Hygrophilous. In Mužlja, the species was found on different salt land pastures in November (Bogojević, 1979). In Kljajićevo, it was found in a wet meadow with *Lotus corniculatus*, *Symphytum officinale*, *Plantago lanceolata*, and *Juncus* sp. (Bogojević, 1984). Sampling was done in July; the soil surface temperature was 24.2 °C, and, at -5 cm, 21 °C.

Genus *Parisotoma* Bagnall, 1940***Parisotoma notabilis* (Schäffer, 1896)**

Isotoma notabilis Schäffer, 1896:187. Germany, Hamburg.

General distribution. Cosmopolitan (Potapov, 2001).

Distribution in Vojvodina. Fruška Gora (Stevanović, 1967), Deliblatska Peščara (Bogojević, 1971a, 1971b; 1973); Sajan, Alibunar, Boka, Jabuka (Bogojević, 1979); Bezdan-Kozara, Sivic, Kula, Sirig, Novi Sad, Odžaci, Ristovača, Bačka Palanka, Čelarevo (Bogojević, 1984); Obedska Bara (Lučić, 2006); Popovica and Ledinci on Fruška Gora (Sántha, 2017); Novi Sad (Grujić, 2023).

Ecological note. Eurytopic, very common (Potapov, 2001).

Superfamily Entomobryoidea Schäffer, 1896**Family Orchesellidae Börner, 1906****Subfamily Orchesellinae Börner, 1906**

Genus *Orchesella* Templeton, 1836***Orchesella albofasciata* Stach, 1960**

Orchesella albofasciata Stach, 1960:22–23. Ukraine and Romania.

General distribution. Europe (Dányi & Traser, 2008).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b); Mužlja, Padej, Sajan, Melenci-Bašaid, Tomaševac, Alibunar, Vršac, Margita, Konak, Boka, Sečanj, Jabuka (Bogojević, 1979); Sombor, Novi Sad, Deronje (Bogojević, 1984), Novi Sad (Grujić, 2023).

Ecological note. Xerothermophilic. In Deliblatska Peščara, the species was found en masse in the bush of *Juniperus communis* during the whole year (Bogojević, 1971a, 1971b).

***Orchesella cincta* (Linnaeus, 1758)**

Podura cincta Linnaeus, 1758:609. Europe, not defined.

General distribution. Palearctic (Dányi & Traser, 2008).

Distribution in Vojvodina. Jabuka (Bogojević, 1979); Odžaci, Deronje (Bogojević, 1984).

Ecological note. In Jabuka, the species was found on pasture with *Bothriochloa ischaemum* (Bogojević, 1979). In Odžaci, the species was found in a poplar plantation on yellow sand (Bogojević, 1984). The species was found in a wet meadow in Deronje (Bogojević, 1984).

***Orchesella flavescens* (Bourlet, 1839)**

Heterotoma flavescens Bourlet, 1839:395–396. Europe, not defined.

General distribution. Palearctic (Dányi & Traser, 2008).

Distribution in Vojvodina. Fruška Gora (Stevanović, 1967); Obedska Bara (Lučić, 2006); Popovica and Iriški venac on Fruška Gora (Sántha, 2017).

Ecological note. Silvicolous (Fjellberg, 2007).

***Orchesella hungarica* Stach, 1930**

Orchesella hungarica Stach, 1929:306–307. Hungary, Simontornya.

General distribution. Europe (Dányi & Traser, 2008).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b).

Ecological note. In Deliblatska Peščara, the species was found in association of *Robinia pseudoacacia*, also in the plant community *Chrysopogonetum pannonicum typicum* (Bogojević, 1971a, 1971b).

***Orchesella multifasciata* Scherbakov, 1898**

Orchesella multifasciata Scherbakov, 1898:13–14. Ukraine, Kiev.

General distribution. Europe (Dányi & Traser, 2008).

Distribution in Vojvodina. Fruška Gora (Stevanović, 1967); Popovica and Iriški venac on Fruška Gora (Sántha, 2017); Deliblatska Peščara (Bogojević 1971a; 1971b); Sajan, Alibunar, Perlez-Čenta, Jabuka (Bogojević, 1979); Obedska Bara (Lučić, 2006).

Ecological note. Silvicolous (Dányi & Traser, 2008).

***Orchesella pannonica* Stach, 1960**

Orchesella pannonica Stach, 1960:26. Hungary, Budapest.

General distribution. Europe (Dányi & Traser, 2008).

Distribution in Vojvodina. Fruška Gora (Stevanović, 1967).

Ecological note. Xerothermophilic (Dányi & Traser, 2008).

***Orchesella spectabilis* Tullberg, 1871**

Orchesella spectabilis Tullberg, 1871:147. Sweden. – UUZM

General distribution. Europe (Dányi & Traser, 2008).

Distribution in Vojvodina. Fruška Gora (Stevanović, 1967).

Ecological note. Xerothermophilic (Dányi & Traser, 2008).

***Orchesella villosa* (Geoffroy, 1764)**

Podura villosa Geoffroy, 1764:608–609. France.

General distribution. Europe (Dányi & Traser, 2008).

Distribution in Vojvodina. Obedska Bara (Lučić, 2006).

Ecological note. Eurytopic (Fjellberg, 2007).

Subfamily Heteromurinae Absolon & Kseneman, 1942**Genus *Heteromurus* Wankel, 1860*****Heteromurus major* (Moniez, 1889)**

Templetonia major Moniez, 1889:26–27. Portugal, Sao Miguel.

General distribution. Europe (Dányi & Traser, 2008).

Distribution in Vojvodina. Alibunar, Sefkerin, Jabuka (Bogojević, 1979); Sombor, Sivac, Sirig, Odžaci, Deronje, Bač (Bogojević, 1984); Obedska Bara (Lučić, 2006).

Ecological note. Thermophilic (Dányi & Traser, 2008).

***Heteromurus nitidus* (Templeton, 1836)**

Podura nitida Templeton, 1836:94. UK, Cranmore.

General distribution. Holarctic (Dányi & Traser, 2008).

Distribution in Vojvodina. Bezdán-Kozara (Bogojević, 1984); Obedska Bara (Lučić, 2006); Popovica and Ledinci on Fruška Gora (Sántha, 2017).

Ecological note. Edaphic, troglphilous (Dányi & Traser, 2008).

***Heteromurus tetraphthalmus* Börner, 1903**

Heteromurus tetraphthalmus Börner, 1903:156. Italy.

General distribution. Palearctic.

Distribution in Vojvodina. Sirig, Bačka Palanka (Bogojević, 1984).

Ecological note. In Sirig, the species was found in the steppe with *Bothriochloa ischaemum* in July (Bogojević, 1984). In Bačka Palanka, the species was found in association with *Robinia pseudoacacia* (Bogojević, 1984). Sampling was done in August; the soil surface temperature was 23.4 °C, and, at -5 cm, 21.2 °C.

Family Paronellidae Börner, 1906**Subfamily Paronellinae Börner, 1906****Genus *Cyphoderus* Nicolet, 1842*****Cyphoderus albinus* Nicolet, 1842**

Cyphoderus albinus Nicolet, 1842:67. Europe, not defined.

General distribution. Cosmopolitan (Dányi & Traser, 2008).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b); Padej, Boka, Sečanj (Bogojević, 1979); Deronje, Bačka Palanka (Bogojević, 1984).

Ecological note. Myrmecophilous. In Deliblatska Peščara, the species was found in the plant community *Chrysopogonetum pannonicum typicum* (Bogojević, 1971a, 1971b).

***Cyphoderus bidenticulatus* (Parona, 1888)**

Beckia albinos, Nic. var. *bidenticulata* Parona, 1888:140–141. Italy.

General distribution. Palearctic (Dányi & Traser, 2008).

Distribution in Vojvodina. Bačka Palanka, Čelarevo (Bogojević, 1984).

***Cyphoderus gisini* Gruia, 1967**

Cyphoderus gisini Gruia, 1967:319–321. Romania.

General distribution. Europe (Arbea, 2023).

Distribution in Vojvodina. Padej, Sajan, Melenci-Bašaid (Bogojević, 1979).

Ecological note. Thermophilic, mostly in open habitats (Dányi & Traser, 2008).

Family Entomobryidae Tömösvary, 1882**Subfamily Willowsiinae Yoshii & Suhardjono, 1989****Genus *Willowsia* Shoebotam, 1917*****Willowsia nigromaculata* (Lubbock, 1873)**

Seira nigromaculata Lubbock, 1873:146. Europe, not defined.

General distribution. Holarctic (Dányi & Traser, 2008).

Distribution in Vojvodina. Iriški Venac on Fruška Gora (Sántha, 2017).

Ecological note. Corticophilous (Dányi & Traser, 2008). The species was found in a litter in a dense forest (Sántha, 2017).

***Willowsia platani* (Nicolet, 1842)**

Degeria planati Nicolet, 1841:72–73. Europe, not defined.

General distribution. Europe (Dányi & Traser, 2008).

Distribution in Vojvodina. Obeska Bara (Lučić, 2006).

Ecological note. Corticophilous (Dányi & Traser, 2008). The species was found in a litter under a tree (Lučić, 2006).

Subfamily Entomobryinae Schäffer, 1896 *sensu* Zhang & Deharveng, 2015**Genus *Coecobrya* Yosii, 1956*****Coecobrya tenebricosa* (Folsom, 1902)**

Entomobrya caeca Schött, 1896:178. USA, San Francisco.

General distribution. Cosmopolitan (Jordana, 2012).

Distribution in Vojvodina. Obeska Bara (Lučić, 2006).

Genus *Drepanura* Schött, 1891***Drepanura deliblatia* Loksa & Bogojević, 1970**

Drepanura deliblatia Loksa & Bogojevic, 1970:131–132. Serbia, Deliblatska Peščara.

General distribution. Endemic for Deliblatska Peščara, Serbia.

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b).

Ecological note. Atmobiontic. The species was found in the plant association *Festucetum vaginatae deliblatium humanetosum* (Bogojević, 1971a, 1971b).

Genus *Entomobrya* Rondani, 1861***Entomobrya handschini* Stach, 1922**

Entomobrya handschini Stach, 1922:44–46. Slovakia, Podluzany. – PAN.

General distribution. Palearctic (Europe, Asia Minor) (Jordana, 2012).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b); Mužlja, Padej, Tomaševac (Bogojević, 1979).

Ecological note. Atmobiontic, xerothermophilic. In Deliblatska peščara, the species was found in the plant community *Chrysopogonetum pannonicum typicum* (Bogojević, 1971a, 1971b).

***Entomobrya lanuginosa* (Nicolet, 1842)**

Degeeria lanuginosa Nicolet, 1842:74–75. Europe, not defined.

General distribution. Europe (Jordana, 2012).

Distribution in Vojvodina. Fruška Gora (Stevanović, 1967); Padej, Tomaševac, Sajan, Melenci-Bašaid, Alibunar, Vršac, Margita, Konak-Boka, Sečanj (Bogojević, 1979); Odžaci (Bogojević, 1984).

Ecological note. This species occurs in open habitats (Jordana, 2012). In the study area it was found in different pastures.

***Entomobrya multifasciata* (Tullberg, 1871)**

Degeeria multifasciata Tullberg, 1871:148. Sweden, Skåne, Gotland. – UUZM

General distribution. Cosmopolitan (Jordana, 2012).

Distribution in Vojvodina. Fruška Gora (Stevanović, 1967); Deliblatska Peščara (Bogojević, 1971a, 1971b); Odžaci (Bogojević, 1984); Obedska Bara (Lučić, 2006).

Ecological note. Atmobiontic, xerothermophilic (Dányi & Traser, 2008).

***Entomobrya muscorum* (Nicolet, 1842)**

Degeeria muscorum Nicolet, 1842:75–76. Europe, not defined.

General distribution. Europe, Morocco (Jordana, 2012).

Distribution in Vojvodina. Obedska Bara (Lučić, 2006); Popovica, Ledinci and Iriški Venac on Fruška Gora (Sántha, 2017).

Ecological note. The species was found in dense vegetation (Sántha, 2017).

***Entomobrya nivalis* (Linnæus, 1758)**

Podura nivalis Linnæus, 1758:608. Europe, not defined.

General distribution. Cosmopolitan (Jordana, 2012).

Distribution in Vojvodina. Obedska Bara (Lučić, 2006).

Ecological note. Atmobiontic (Dányi & Traser, 2008).

***Entomobrya quinquelineata* Börner, 1901**

Entomobrya quinquelineata Börner, 1901:69–70. Germany, Varden an der Aller.

General distribution. Europe (Jordana, 2012).

Distribution in Vojvodina. Fruška Gora (Stevanović, 1967); Deliblatska Peščara (Bogojević, 1971a, 1971b).

Ecological note. Atmobiontic, xerothermophilic (Dányi & Traser, 2008).

***Entomobrya spectabilis* Reuter, 1890**

Entomobrya spectabilis Reuter, 1890:62. Finland, Helsinki.

General distribution. Europe (Dányi & Traser, 2008).

Distribution in Vojvodina. Obedska Bara (Lučić, 2006).

Ecological note. Synanthropic (Dányi & Traser, 2008).

Genus *Sinella* Brook, 1882***Sinella jugoslavica* Loksa & Bogojević, 1970**

Sinella pulcherrima jugoslavica Loksa & Bogojevic, 1970:130. Serbia, Deliblatska Peščara.

General distribution. Serbia (Jordana, 2012).

Distribution in Vojvodina. Deliblatska Peščara (Bogoević, 1971a, 1971b).

Ecological note. Atmobiontic (Bogoević, 1971a).

Subfamily Lepidocyrtinae Wahlgren, 1906**Genus *Lepidocyrtus* Bourlet, 1839*****Lepidocyrtus curvicollis* Bourlet, 1839**

Lepidocyrtus curvicollis Bourlet, 1839:392. Europe, not defined.

General distribution. Europe (Dányi & Traser, 2008).

Distribution in Vojvodina. Obedska Bara (Lučić, 2006); Sombor, Kljajićevo, Sivac, Kula, Sirig, Novi Sad, Deronje, Ristovača, Bač, Bačka Palanka (Bogoević, 1984); Fruška Gora (Stevanović, 1967); Popovica, Ledinci on Fruška Gora (Sántha, 2017); Novi Sad (Grujić, 2023).

Ecological note. Edaphic, troglophilous (Dányi, 2011).

***Lepidocyrtus cyaneus* Tullberg, 1871**

Lepidocyrtus cyaneus Tullberg, 1871:150. Sweden. – UUZM

General distribution. Cosmopolitan (Dányi & Traser, 2008).

Distribution in Vojvodina. Deliblatska Peščara (Bogoević, 1971a, 1971b); Kula, Deronje (Bogoević, 1984); Obedska Bara (Lučić, 2006).

Ecological note. Hemiedaphic, often found in humid habitats (Fjellberg, 2007).

***Lepidocyrtus lanuginosus* (Gmelin, 1788)**

Podura langinosa Gmelin, 1788:2911. Denmark.

General distribution. Holarctic (Dányi & Traser, 2008).

Distribution in Vojvodina. Deliblatska Peščara (Bogoević, 1971a, 1971b); Obedska Bara (Lučić, 2006); Fruška Gora (Stevanović, 1967); Popovica, Ledinci and Iriški Venac on Fruška Gora (Sántha, 2017).

Ecological note. Mesophilic (Dányi & Traser, 2008).

***Lepidocyrtus lignorum* (Fabricius, 1775)**

Podura lignorum Fabricius, 1775:302. Europe, not defined.

General distribution. Holarctic (Dányi & Traser, 2008).

Distribution in Vojvodina. Deliblatska Peščara (Bogoević, 1971a, 1971b); Mužlja, Padej, Sajan, Melenci-Bašaid, Tomaševac, Alibunar, Konak, Boka, Sečanj, Perlez-Čenta, Sefkerin, Jabuka (Bogoević, 1979); Obedska Bara (Lučić, 2006).

***Lepidocyrtus paradoxus* Uzel, 1890**

Lepidocyrtus paradoxus Uzel, 1890:50–51. Czechia.

General distribution. Holarctic (Dányi & Traser, 2008).

Distribution in Vojvodina. Deliblatska Peščara (Bogoević, 1971a, 1971b); Mužlja, Padej, Sajan, Melenci-Bašaid, Tomaševac, Alibunar, Konak, Boka, Sečanj, Perlez-Čenta, Sefkerin, Jabuka (Bogoević, 1979); Bezdan-Kozara, Sombor, Kljajićevo, Sivac, Sirig, Novi Sad, Odžaci, Deronje, Bač, Bačka Palanka (Bogoević, 1984); Novi Sad (Grujić, 2023).

Ecological note. In open habitats (Dányi & Traser, 2008).

***Lepidocyrtus violaceus* (Fourcroy, 1785)**

Podura violacea Geoffroy 1762:525. France, Paris.

General distribution. Holarctic (Dányi & Traser, 2008).

Distribution in Vojvodina. Ledinci on Fruška Gora (Sántha, 2017).

Ecological note. Hemiedaphic, common in forests (Fjellberg, 2007).

Genus *Pseudosinella* Schäffer, 1897***Pseudosinella alba* (Packard, 1873)**

Lepidocyrtus albus Packard, 1873:37. USA, Knoxville.

General distribution. Holarctic (Dányi & Traser, 2008).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b); Sirig (Bogojević, 1984); Obedska Bara (Lučić, 2006).

Ecological note. Edaphic. In Deliblatska Peščara, the species was found in association of *Pinus nigra* (Bogojević, 1971a, 1971b), while in Obedska Bara in oak-elm forest (Lučić, 2006).

***Pseudosinella decipiens* Denis, 1924**

Pseudosinella decipiens Denis, 1924:198. France, Herault.

General distribution. Europe (Dányi & Traser, 2008).

Distribution in Vojvodina. Padej, Alibunar, Vršac (Bogojević, 1979).

Ecological note. The species was found in different pastures (Bogojević, 1979).

***Pseudosinella duodecimpunctata* Denis, 1931**

Pseudosinella duodecimpunctata Denis, 1931:82–83. Italy, Erba.

General distribution. Europe (Dányi & Traser, 2008).

Distribution in Vojvodina. Obedska Bara (Lučić, 2006).

Ecological note. In caves (Christian, 1993) and wet habitats (Lučić, 2006).

***Pseudosinella imparipunctata* Gisin, 1953**

Pseudosinella imparipunctata Gisin, 1953:62. Switzerland, Signal de Bernex.

General distribution. Palearctic (Dányi & Traser, 2008).

Distribution in Vojvodina. Sirig, Čelarevo (Bogojević, 1984).

Ecological note. Hemiedaphic, in open habitats (Bogojević, 1984).

***Pseudosinella octopunctata* Börner, 1901**

Pseudosinella octopunctata Börner, 1901:705. Germany, Marburg.

General distribution. Holarctic (Dányi & Traser, 2008).

Distribution in Vojvodina. Novi Sad, Odžaci (Bogojević, 1984); Obedska Bara (Lučić, 2006); Novi Sad (Grujić, 2023).

Ecological note. Hemiedaphic, in open habitats (Fjellberg, 2007).

***Pseudosinella sexoculata* Schött, 1902**

Pseudosinella sexoculata Schött, 1902:34–35. Sweden.

General distribution. Holarctic (Dányi & Traser, 2008).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b); Novi Sad, Odžaci (Bogojević, 1984); Obedska Bara (Lučić, 2006).

Ecological note. In Deliblatska Peščara, the species was found in association of *Pinus nigra* (Bogojević, 1971a, 1971b).

Subfamily Seirinae Yosii, 1961**Genus *Seira* Lubbock, 1870*****Seira domestica* (Nicolet, 1842)**

Degeeria domestica Nicolet, 1842:76. Europe, not defined.

General distribution. Europe (Dányi & Traser, 2008).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b).

Ecological note. Synanthropic, common in Deliblatska Peščara (Bogojević, 1971a, 1971b).

***Seira pallidipes* Reuter, 1895**

Sira pallidipes Reuter, 1895:114. Hungary, Kecskemét. – HNHM.

General distribution. Central-Europe (Winkler & Dányi, 2017).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b).

Ecological note. Xerophilous, characteristic of open habitats (Bogojević, 1971a, 1971b; Winkler & Dányi, 2017).

Order Symphypleona Börner, 1901**Suborder Sminthuridida Bretfeld, 1986****Superfamily Sminthuridoidea Fjellberg, 1989****Family Sminthurididae Börner, 1906****Genus *Sphaeridia* Linnaniemi, 1912*****Sphaeridia pumilis* (Krausbauer, 1898)**

Sminthurus pumilis Krausbauer, 1898:495–496. Germany, Weilburg.

General distribution. Holarctic and Australia (Bretfeld, 1999).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b); Mužlja, Padej, Melenci-Bašaid, Tomaševac, Alibunar, Margita, Konak, Boka, Sečanj, Sefkerin, Jabuka (Bogojević, 1979); Sombor, Kljajićevo, Sivac, Novi Sad, Deronje, Bačka Palanka (Bogojević, 1984).

Ecological note. Mesophilic (Dányi & Traser, 2008).

Suborder Appendiciphora Bretfeld, 1986**Infrasuborder Katianniformia Bretfeld, 1986****Superfamily Katiannoidea Bretfeld, 1994****Family Katiannidae Börner, 1913****Genus *Sminthurinus* Börner, 1901*****Sminthurinus aureus* (Lubbock, 1862)**

Sminthurus aureus Lubbock, 1862:589–590. UK, Kent.

General distribution. Palearctic (Bretfeld, 1999).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b); Alibunar, Vršac, Sefkerin (Bogojević, 1979); Somor, Kljajićevo, Novi Sad, Sivac, Kula (Bogojević, 1984); Obedska Bara (Lučić, 2006).

Ecological note. Eurytopic (Dányi & Traser, 2008).

***Sminthurinus elegans* (Fitch, 1862)**

Sminthurus elegans Fitch, 1863:674. USA, Virginia.

General distribution. Holarctic (Bretfeld, 1999).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b); Sajan, Perlez-Čenta, Sefkerin (Bogojević, 1979); Novi Sad (Bogojević, 1984); Fruška Gora (Stevanović, 1967); Popovica and Ledinci on Fruška Gora (Sántha, 2017); Novi Sad (Grujić, 2023).

Ecological note. Hemiedaphic/epigeic, in open and dryer habitats than *S. aureus* (Bogojević 1971a, 1979).

***Sminthurinus niger* (Lubbock, 1862)**

Sminthurus niger Lubbock, 1862:111. England, Kent.

General distribution. Palearctic (Bretfeld, 1999).

Distribution in Vojvodina. Futoški park (Novi Sad) (Grujić, 2022b, 2023).

Ecological note. Eurytopic species (Dányi & Traser, 2008), in Futoški park (Novi Sad) it was found in humid habitats (litter, and moss) (Grujić, 2022b; 2023).

Family Arrhopalitidae Stach, 1956**Genus Arrhopalites Börner, 1906*****Arrhopalites acanthophthalmus* Gisin, 1958**

Arrhopalites acanthophthalmus Gisin, 1958:773–774, Holotype ♀. Spain, Valle de Salvaron. – NHMG.

General distribution. Europe (Bretfeld, 1999).

Distribution in Vojvodina. Deronje (Bogojević, 1984); Obedska Bara (Lučić, 2006).

Genus Pygmarrhopalites Vargovitsh, 2009***Pygmarrhopalites principalis* (Stach, 1945)**

Arrhopalites principalis Stach, 1945:37–41. Poland, Tatra Mountains.

General distribution. Holarctic (Bretfeld, 1999).

Distribution in Vojvodina. Fruška Gora (Stevanović, 1967); Obedska Bara (Lučić, 2006).

***Pygmarrhopalites sericus* (Gisin, 1947)**

Arrhopalites sericus Gisin, 1947:89. Switzerland, Basel.

General distribution. Palearctic (Bretfeld, 1999).

Distribution in Vojvodina. Obedska Bara (Lučić, 2006).

***Pygmarrhopalites terricola* (Gisin, 1958)**

Arrhopalites terricola Gisin, 1958:774–776. Switzerland. – NHMG.

General distribution. Europe (Bretfeld, 1999).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b).

Infrasuborder Sminthuriformia Bretfeld, 1986**Superfamily Sminthuroidea Lubbock, 1862****Family Sminthuridae Lubbock, 1862****Subfamily Sphyrothecinae Betsch, 1980****Genus *Lipothrix* Börner, 1906*****Lipothrix lubbocki* (Tullberg, 1872)**

Sminthurus (Pilosus) lubbockii Tullberg, 1872:33. Sweden, Uppland.

General distribution. Palearctic (Bretfeld, 1999).

Distribution in Vojvodina. Ristovača (Bogojević, 1984).

Ecological note. Common forest species (Fjellberg, 2007).

Subfamily Sminthurinae Lubbock, 1862**Genus *Allacma* Börner, 1906*****Allacma fusca* (Linnaeus, 1758)**

Podura fusca Linnaeus, 1758:608. Europe, not defined.

General distribution. Holarctic (Bretfeld, 1999).

Distribution in Vojvodina. Iriški Venac, Fruška Gora (Sántha, 2017), Novi Sad (Grujić, 2023).

Ecological note. Silvicolous, corticophilous (Dányi & Traser, 2008).

***Allacma gallica* (Carl, 1899)**

Sminthurus gallicus Carl, 1899:7–8. France, Collobrières.

General distribution. Palearctic (Bretfeld, 1999).

Distribution in Vojvodina. Obedska Bara (Lučić, 2006); Novi Sad (Grujić, 2023).

Ecological note. The species was found in sun-exposed litter in Novi Sad (Grujić, 2023).

Genus *Caprainea* Dallai, 1970

***Caprainea marginata* (Schött, 1893)**

Sminthurus marginatus Schött, 1893:25. Sweden, Uppland.

General distribution. Europe (Bretfeld, 1999).

Distribution in Vojvodina. Popovica and Ledinci on Fruška Gora (Sántha, 2017).

Ecological note. Forest species (Fjellberg, 2007).

Genus *Sminthurus* Latreille, 1802

***Sminthurus maculatus* Tömösváry, 1883**

Sminthurus maculatus Tömösváry, 1883:36. Hungary, Budapest.

General distribution. Palearctic (Bretfeld, 1999).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b); Kljajićevo, Deronje (Bogojević, 1984).

Ecological note. Thermophilic (Dányi & Traser, 2008).

***Sminthurus multipunctatus* Schäffer, 1896**

Sminthurus viridis multipunctatus Schäffer, 1896:210. Germany, Berlin-Charlottenburg.

General distribution. Palearctic (Bretfeld, 1999).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b).

Ecological note. Xerothermophilic (Dányi & Traser, 2008).

***Sminthurus nigromaculatus* Tullberg, 1871**

Papirius nigro-maculatus Tullberg, 1871:146. Sweden.

General distribution. Holarctic (Bretfeld, 1999).

Distribution in Vojvodina. Mužlja, Padej, Tomaševac, Margita, Konak, Boka, Sečanj, Perlez-Čenta (Bogojević, 1979).

Ecological note. Abundant in the low vegetation of dry grasslands (Bogojević, 1979).

Genus *Spatulosminthurus* Betsch & Betsch-Pinot, 1984

***Spatulosminthurus flaviceps* (Tullberg, 1871)**

Sminthurus flaviceps Tullberg, 1871:145. Sweden, Skåne.

General distribution. Europe (Bretfeld, 1999).

Distribution in Vojvodina. Fruška Gora (Stevanović, 1967).

Ecological note. In Fruška Gora the species lives in lowlands and highlands in litter and moss of humid forests and in the low vegetation of wet meadows (Stevanović, 1967).

Family Bourletiellidae Börner, 1913**Genus Bourletiella Banks, 1899*****Bourletiella (Bourletiella) hortensis (Fitch, 1863)***

Smynthurus hortensis Fitch, 1863:668. USA, New York.

General distribution. Europe (Bretfeld, 1999).

Distribution in Vojvodina. Obedska Bara (Lučić, 2006).

Remarks. The species name “*Bourletiella spinata* Stach, 1920” in the paper of Lučić (2006) is most likely a *lapsus calami*. The name is the closest to the one specified is *Pseudobourletiella spinata* (MacGillivray, 1893), a species that is native to North America. It may be supposed, although it cannot be stated with certainty, that the author was referring to *Bourletiella signata* Linnaniemi, 1912, a synonym of the common species *Bourletiella hortensis*.

***Bourletiella viridescens* Stach, 1920**

Bourletiella viridescens Stach, 1920:199. Poland.

General distribution. Europe (Bretfeld, 1999).

Distribution in Vojvodina. Fruška Gora (Stevanović, 1967); Padej, Tomaševac, Vršac (Bogojević, 1979); Kula (Bogojević, 1984); Obedska Bara (Lučić, 2006); Novi Sad (Grujić, 2023).

Ecological note. The species was found mostly in open dry habitats (e.g., Bogojević, 1979; Grujić, 2023).

Genus Deuterosminthurus Börner, 1901***Deuterosminthurus bicinctus (Koch, 1840)***

Smynthurus bicinctus Koch, 1840:353. Germany, Regensburg.

General distribution. Palearctic, Australia (Bretfeld, 1999).

Distribution in Vojvodina. Ledinci on Fruška Gora (Sántha, 2017).

Ecological note. Mostly in forests (Dányi & Traser, 2008).

Deuterosminthurus pallipes (Bourlet, 1842)

Sminthurus pallipes Bourlet, 1842:536. France.

General distribution. Holarctic (Bretfeld, 1999).

Distribution in Vojvodina. Margita, Konak, Boka (Bogojević, 1979).

Ecological note. Common in open habitats (Fjellberg, 2007).

Deuterosminthurus quadrangulatus (Loksa & Bogojevic, 1970)

Bourletiella quadrangulata Loksa & Bogojevic 1970:140. Serbia, Deliblatska Peščara.

General distribution. Known only from type locality (Deliblatska Peščara).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b).

Ecological note. The species was found in the plant community *Chrysopogonetum pannonicum typicum* (Bogojević, 1971a, 1971b).

Genus Fasciosminthurus Gisin, 1960***Fasciosminthurus albanicus (Stach, 1956)***

Deuterosmonthurus albanicus Stach, 1956:164. Albania.

General distribution. Europe (Bretfeld, 1999).

Distribution in Vojvodina. Melenci-Bašaid, Tomaševac (Bogojević, 1979).

Ecological note. Lives in dry or humid grasslands and *Medicago* fields (Bogojević, 1979).

***Fasciosminthurus angulipunctatus* (Loksa & Bogojevic, 1970)**

Bourletiella albanica angulipunctata Loksa & Bogojevic, 1970:138. Serbia, Deliblatska Peščara.

General distribution. Known only from type locality (Deliblatska Peščara).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b).

Ecological note. Found in the association *Chrysopogonetum pannonicum typicum* (Bogojević, 1971a, 1971b).

***Fasciosminthurus virgulatus* (Skorikov, 1899)**

Sminthurus virgulatus Skorikow, 1899:390. Ukraine, Charkov.

General distribution. Palearctic (Bretfeld, 1999).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b).

Ecological note. Found in the association *Chrysopogonetum pannonicum typicum* (Bogojević, 1971a, 1971b).

Superfamily Dicyrtomoidea Börner, 1906**Family Dicyrtomidae Börner, 1906****Subfamily Dicyrtominae Richards, 1968****Genus *Dicyrtoma* Bourlet, 1842*****Dicyrtoma fusca* Lubbock, 1873**

Papirius fuscus Lubbock, 1873:120–122. France, England, not specified.

General distribution. Holarctic (Bretfeld, 1999).

Distribution in Vojvodina. Deliblatska Peščara (Bogojević, 1971a, 1971b); Bezdán-Kozara (Bogojević, 1984); Novi Sad (Grujić, 2023).

Ecological note. Mostly collected in moist or wet habitats of meadows (Bogojević, 1984; Grujić, 2023) and forests (Bogojević, 1971a, 1971b). In Deliblatska Peščara the species was found in separate associations of *Pinus nigra* and *Robinia pseudoacacia*.

Genus *Dicyrtomina* Börner, 1903***Dicyrtomina minuta* (Fabricius, 1783)**

Podura minuta Fabricius, 1783:307–309. Norway.

General distribution. Holarctic (Bretfeld, 1999).

Distribution in Vojvodina. Obedska Bara (Lučić, 2006).

***Dicyrtomina ornata* (Nicolet, 1842)**

Smynthurus ornatus Nicolet, 1842:83. Switzerland, Neuchâtel.

General distribution. Palearctic (Bretfeld, 1999).

Distribution in Vojvodina. Popovica and Ledinci on Fruška Gora (Sántha, 2017); Novi Sad (Grujić, 2023).

Ecological note. Mostly collected in moist or wet habitats of meadows and forests (Sántha, 2017; Grujić, 2023).

Subfamily Ptenothricinae Richards, 1968**Genus *Ptenothrix* Börner, 1906*****Ptenothrix setosa* (Krausbauer, 1898)**

Papirius setosus Krausbauer, 1898:501–502. Germany, Weilburg

General distribution. Europe (Bretfeld, 1999).

Distribution in Vojvodina. Obedska Bara (Lučić, 2006).

Ecological note. Hygrophile and troglophile (Bretfeld, 1999).

DISCUSSION

In this paper, we report on a total of 125 species of springtails from 58 genera, 16 families, and 3 orders for Vojvodina Province, Republic of Serbia. The most abundant order is Entomobryomorpha which includes 5 families, 28 genera, and 69 species, followed by Poduromorpha with 5 families, 14 genera, and 30 species, and Symphypleona with 6 families, 15 genera, and 27 species. Representatives of the order Neepliona are completely absent, which certainly does not reflect the real situation. The family with the largest number of species is Entomobryidae (26), followed by Isotomidae (20), Orchesellidae and Hypogastruridae, with 12 species each. Sminthuridae is a family with a single registered species, namely *Sphaeridia pumilis* (Krausbauer, 1898). *Orchesella* is the genus with the largest number of registered species (8), followed by *Entomobrya* with 7, and *Pseudosinella* and *Lepidocyrtus* with 6 species each. The following species are widely represented and common in the territory of Vojvodina Province: *Orchesella albofasciata* Stach, 1960; *O. multifasciata* Scherbakov, 1898; *Isotomiella minor* (Schäffer, 1896); *Lepidocyrtus curvicolis* Bourlet, 1839; *L. lanuginosus* (Gmelin, 1788); *L. lignorum* (Fabricius, 1775); *L. paradoxus* Uzel, 1890; *Neanura muscorum* (Templeton, 1835); *Parisotoma notabilis* (Schäffer, 1896); *Protaphorura armata* (Tullberg, 1869); *Sminthurinus elegans* (Fitch, 1862) and *Tomocerus vulgaris* (Tullberg, 1871).

According to biogeographic zonation, Serbia has been considered part of the West Palearctic region in the Temperate zone. Unlike the rest of the Republic of Serbia, Vojvodina Province belongs to the Pannonian biogeographical region of Europe. According to the general distribution of the species themselves, the presented list has the following composition: 27.2% of the recorded species are European, the same number are Palearctic, 24% of the species on the list are Holarctic, 18.4% are cosmopolitan, and 3.2% are endemic to Serbia (mostly related to type localities).

The territory of Vojvodina is the breadbasket of Serbia and has been under strong anthropogenic influence for centuries. It is not surprising that the registered number of species is almost the same as in the southern province, Kosovo and Metohija, which is twice as small in area, although significantly more research has been conducted (Grujić, 2022a). This is probably a consequence of the apparent homogeneity of the terrain, i.e., the similarity of the investigated localities. The largest number of investigated localities belong to pastures. However, although apparently homogenous, Vojvodina has great potential for the study of springtails. It would be interesting to investigate the fauna of sandy terrains, fields with different agricultural cultures, different plantation forests, natural forests, wetlands, floodplains of the Danube and Tisza, oil fields, oil-gas, and gas fields, urban and industrial areas. Four endemic species discovered on Deliblatska Peščara speak in support of the research potential of specific habitats (Loksa & Bogojević, 1970). The following species, which were found only in this locality, are strictly protected species in the Republic of Serbia, and the Deliblato Sands itself is a special nature reserve under protection category I: *Drepanura deliblatica* Loksa & Bogojević, 1970, *Sinella jugoslavica* Loksa & Bogojević, 1970, *Deuterosminthurus quadrangulatus* (Loksa & Bogojević, 1970) and *Fasciosminthurus angulipunctatus* (Loksa & Bogojević, 1970). For the species *D. deliblatica*, the authors state that individuals can be found throughout the year in the association with *Festucetum vaginatae deliblaticum-fumanetosum* and sods of *Festuca*. The species *S. jugoslavica* was found in separate groves of *Robinia pseudoacacia* and *Pinus nigra*, and *F. angulipunctatus* was found in associations with *Festucetum vaginatae deliblaticum fumanetosum* and *Festucetum vaginatae deliblaticum muscetosum*. The species *D. quadrangulatus* was found in the association with *Chrysopogonetum pannonicum typicum*. The status of this species is questionable, given that it was described based on a single female specimen and that this is the only find of this species so far. Nayrolles (1996) questions the distinction between *D. quadrangulatus* and *D. pallipes* (Bourlet, 1843). However, more extensive future research at this site will resolve this issue.

Apart from the mentioned four species, Loksa and Bogojević (1970) described a new subspecies and an interesting colour form from the area of Deliblatska peščara: *Subisotoma variabilis psammophila* Loksa & Bogojević, 1970 and *Seira pallidipes* f. *decolorata* Loksa & Bogojević, 1970. The species *S. variabilis psammophila* is described based on specimens found throughout the year in associations *Festucetum*

vaginatae deliblasticum fumanetosum and *Festucetum vaginatae deliblasticum muscetosum* as well as in *Festuca* sods (Loksa & Bogojević 1970). Back then, the authors cited problems in the classification of this species, talking about similarities but also differences with *S. variabilis* and *Isotoma angularis* Axelson, 1905. Fjellberg (1993) does not classify it in any group but states that it is probably a species identical to *Folsomides portucalensis* da Gama, 1961 *sensu* Fjellberg, 1993; Arbea (2015) resolves the status of this species after describing and defining *Folsomides fjellbergi* Arbea, 2015. The species *Seira pallidipes* f. *decolorata* is defined as a colour form on the basis of coloration, but Winkler and Dányi (2017), when redescribed *S. pallidipes*, could not find any specimens with the colouration as described by Loksa and Bogojević (1967). The species *Onychiurus tetragrammatus serbicus* (Loksa & Bogojević, 1967) was described based on specimens from around Belgrade (Radnilovac) and was found in several localities in Vojvodina. Based on Polish data, Pomorski (1998) redescribed this subspecies as the species *Protaphorura serbica*; however, Kaprus and Pomorski (2008) regarded it as a junior synonym of *Protaphorura sakatoi* (Yosii, 1966). Parimuchová and Kováč (2016) conclude that the taxonomic status of *P. serbica* remains unclear due to the lack of specimens from Deliblatska Peščara, but the ventral parapseudocellar formula (1/000/1101(0)1) refers to *P. sakatoi*.

The presented checklist of springtails of the Vojvodina Province, with 125 species in 58 genera from 16 families and 3 orders, is a contribution to the knowledge of the Collembola fauna of the Republic of Serbia. It represents a base for planning and carrying out further research of this group of arthropods in this area and a step towards the formation of a checklist of springtails of the Republic of Serbia

AUTHOR'S CONTRIBUTION

The authors confirm their contribution in the paper as follows: N.G.: Compiling the species records and background data, taxonomic revisions of the species names, drafting and preparing the manuscript; D.W.: Drafting, preparing and revising the manuscript, providing the necessary literature; E.D.: Drafting and revising the manuscript. The authors read and approved the final version of the manuscript.

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The authors declare that there is no conflict of interest regarding the publication of this paper.

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چک لیست مشروح دم‌فتری‌ها (Hexapoda, Collembola) استان ووی‌ودینا، جمهوری صربستان

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چکیده: مبتنی بر مرور کامل منابع جمع‌آوری شده در مورد دم‌فتری‌ها در استان وویودینا (جمهوری صربستان)، فهرست گونه‌ها تهیه و بر اساس آخرین تغییرات رده‌بندی این گروه بازنگری شد. به طور کلی، فهرست دم‌فتری‌های در وویودینا شامل ۱۲۵ گونه متعلق به ۵۸ جنس از ۱۶ خانواده و ۳ راسته است. بیشترین فراوانی گونه‌ها متعلق به راسته Entomobryomorpha (۵۵٪) و پس از آن Poduromorpha (۲۴٪) و Symphypleona (۲۱٪) قرار داشتند. با توجه به توزیع عمومی گونه‌ها، فهرست حاضر دارای ترکیب زیر است: ۲۷.۲٪ از گونه‌های ثبت شده اروپایی هستند، تعداد مشابهی از گونه‌ها در پالئارکتیک انتشار دارند، ۲۴٪ از گونه‌های فهرست دارای انتشار هولارکتیک، ۱۸.۴٪ همه‌جایی و ۳.۲٪ صرفاً به فون صربستان اختصاص دارند (بیشتر مربوط به محل‌های نمونه‌های مرجع). گونه‌های *Sinella jugoslavica* Loksa & Bogojević, 1970، *Drepanura deliblatica* Loksa & Bogojević, 1970 و *Fasciosminthurus angulipunctatus* و *Deuterostminthurus quadrangulatus* (Loksa & Bogojević, 1970) به عنوان گونه‌های شدیداً محافظت‌شده در جمهوری صربستان شناخته می‌شوند. این مقاله، فعالیتی در جهت شناخت فون دم‌فتری‌های اروپا و گامی به سوی ایجاد یک فهرست کامل این بندپایان در جمهوری صربستان می‌باشد.

واژگان کلیدی: پراکنش، توزیع داخلی، فون، زیست‌شناسی خاک، دم‌فتری، تاکسونومی