

COLLEMBOLA (INSECTA: COLLEMBOLA) FROM THE „PLAIUL FAGULUI” STATE NATURE RESERVE

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Abstract. *The inventory of collembolan species with their habitat preference are reported from the „Plaiul Fagului” State Nature Reserve. As a result of the investigation 103 species of Collembola was established. Among them, 40 species are new for this reserve, including nine new for the Republic of Moldova.*

Keywords: *Collembola, State Nature Reserve, specific diversity.*

Rezumat. *Diversitatea specifică a colembolelor din Rezervația Naturală de Stat „Plaiul Fagului”. S-a efectuat inventarierea speciilor de colembole din Rezervația Naturală de Stat „Plaiul Fagului”. Ca rezultat al investigațiilor efectuate în diverse habitate ale rezervației au fost identificate 103 specii de colembole, dintre care, 40 sunt noi pentru fauna rezervației, inclusiv nouă specii sunt noi pentru fauna Republicii Moldova.*

Cuvinte cheie: *Collembola, Rezervație naturală, diversitate specifică.*

INTRODUCTION

Knowledge of the collembolan fauna of the protected European areas is far from satisfactory. Most important studies were done by STACH, 1959; WEINER, 1981; BULIMAR, 1983; KAPRUS, 1998; TRASER, 1999; KOVAC et al., 1999; SMOLIS & SKARZINSKI, 2003; TRASER et al., 2006. The most interesting, and especially rare and unique species have been found and described from such areas.

The „Plaiul Fagului” State Nature Reserve is famous for its natural deciduous forest typical for Central-European region. These spots of natural ecosystems are fragmented and very scarce in our days, so the study of their biological diversity is a priority direction as soon as the majority of species are very vulnerable to human impact. Although the papers on Collembolan fauna of the „Plaiul Fagului” State Nature Reserve have already been published (BUSMACHIU, 2006, 2007), they don't treat the species living in the moss on rotten wood, in the soil of the lakes' shores and meadow.

The aim of our research was to inventory the representatives of Order Collembola from different habitats of the „Plaiul Fagului” State Nature Reserve with special attention to rare species.

MATERIALS AND METHODS

The „Plaiul Fagului” State Nature Reserve is located at 70 km from the city of Chisinau – the capital of the country, at the longitude of approximately 28° 01' E and latitude 47° 17' N. This reserve is an important part of protected areas in Moldova, with a surface of 5,558.7 km² situated in the north – west of the Central Moldavian Hills. Different types of natural European leafy forests cover the most part of the „Plaiul Fagului” State Nature Reserve (URSU, 2005). However, there are also four lakes with a surface of 23.7 km² and two small rivers, which flow through reserve forming humid places and meadows.

The intensive collections in this area were made during 2006-2008 years. The Collembola were collected all over the years, including winter seasons, in various habitats in the whole area of the reserve. The following sites were selected for the study: forest soil and litter layers, moss, moss on rotten wood, meadow and shores of lakes. In addition, some large specimens from the bark of trees, moss and snow were collected with exhauster.

The faunistic material is deposited in the collection of the Institute of Zoology, Academy of Sciences of Moldova.

RESULTS AND DISCUSSIONS

As a result of investigation 103 species belonging to 52 genera and 16 families are presented. The list of species below includes 40 species first recorded in the „Plaiul Fagului” State Nature Reserve (marked by an asterisk). Among them, nine species *Willemia intermedia*, *Xenylla corticalis*, *Pseudachorutes parvulus*, *Mesaphorura jarmilae*, *Mesaphorura hylophila*, *Subisotoma pusilla*, *Vertagopus cinereus*, *Lepidocyrtus weidneri*, *Sminthurus wahlgreni* and three genera *Willemia*, *Subisotoma*, *Vertagopus* are new for the fauna of the Republic of Moldova and *Xenylla andrzeji* was described as a new species for science (BUSMACHIU & WEINER, 2008). This is the second species new for science described from this reserve after *Neanura moldavica* (BUSMACHIU & DEHARVENG, 2008).

LIST OF SPECIES

Family Poduridae

1. **Podura aquatica* LINNE, 1758: 13.07.2007, numerous exemplars (ex.), along the shores of lakes.

Family Hypogastruridae

2. *Ceratophysella succinea* GISIN, 1949: 10.04.2006, 5 ex.
3. **Ceratophysella engadinensis* GISIN, 1949: 14.12.2007, 8 ex.; 29.02.2008, 28 ex.
4. **Xenylla andrzeji* sp. n.: 23.04.2008, 25 ex., moss on rotten wood.
5. **Xenylla boernerii* AXELSON, 1905: 29.02.2008, 7 ex., moss on rotten wood.
6. *Xenylla brevicauda* TULLBERG, 1869: 19.05.2006, 5 ex.; 16.01.2007, 8 ex.; 10.09.2007, 7 ex.; 23.04.2008, 4 ex.
7. *Xenylla brevisimilis brevisimilis* STACH, 1949: numerous ex., in all habitats.
8. **Xenylla corticalis* BORNER, 1901: 29.02.2008, 1 ex., moss on rotten wood.
9. **Willemia intermedia* MILLS, 1934: 14.12.2007, 1 ex., shore of lake.

Family Neanuridae

10. *Friesea mirabilis* (TULLBERG, 1871): 10.09.2007, 1 ex., 23.04.2008, 2 ex.
11. *Friesea truncata* CASSAGNAU, 1958: 10.04.2006, 2 ex.; 13.07.2007, 1 ex.
12. *Pseudachorutella assigillata* BORNER, 1901: 14.03.2007, 1 ex.
13. *Pseudachorutes dubius* KRAUSBAUER, 1898: 10.04.2006, 1 ex.; 14.03.2007, 1 ex.
14. **Pseudachorutes parvulus* BORNER, 1901: 19.04.2007, 5 ex.
15. *Pseudachorutes subcrassus* TULLBERG, 1871: 19.05.06, 1 ex.
16. **Pseudachorutes* sp.: 10.04.2006, 1 ex.; 14.03.2007, 1 ex.
17. *Micranurida anophthalmica* STACH, 1949: 19.05.2006, 2 ex.
18. *Micranurida pygmaea* BORNER, 1901: 19.05.2006, 2 ex.; 16.01.2007, 2 ex.
19. *Endonura gracilirostris* SMOLIS, SKARZYNSKI, POMORSKI & KAPRUS, 2007: 10.04.2006, 1 ex.; 19.05.2006, 2 ex.
20. *Deutonura albella* (STACH, 1920): 10.04.2006, 10 ex.; 19.05.2006, 12 ex.; 16.01.2007, 3 ex.
21. *Deutonura conjuncta* (STACH, 1926): 10.04.2006, 1 ex.
22. *Deutonura stachi* GISIN, 1952: 23.03.2006, 2 ex.; 10.04.2006, 5 ex.; 19.05.2006, 5 ex.; 16.01.2007, 21 ex.; 10.09.2007, 1 ex.; 14.12.2007, 1 ex.
23. *Neanura minuta* GISIN, 1963: 10.04.2006, 1 ex.; 19.05.2006, 1 ex.
24. *Neanura moldavica* BUŞMACHIU & DEHARVENG, 2008: 10.04.2006, 17 ex.; 29.02.2008, 2 ex.
25. *Neanura muscorum* (TEMPLETON, 1835): 23.03.2006, 6 ex.; 29.02.2008, 2 ex.; 23.04.2008, 3 ex.
26. *Thaumanura caroli* (STACH, 1920): 23.03.2006, 12 ex.; 10.04.2006, 2 ex.; 14.09.2006, 1 ex.; 14.03.2007, 1 ex.; 29.02.2008, 1 ex., 23.04.2008, 1 ex.

Family Odontellidae

27. **Superodontella* sp.: 10.04.2006, 2 ex.; 30.10.2007, 1 ex.; 16.06.2006, 24 ex., moss on rotten wood.

Family Onychiuridae

28. *Micraphorura uralica* (KHANISLAMOVA, 1986): numerous ex., in the forest.
29. *Protaphorura cancellata* (GISIN, 1956): numerous ex., in all habitats.
30. *Protaphorura serbica* (LOKSA et BAGOJEVIC, 1967): numerous ex., in all habitats.
31. *Protaphorura subarmata* (GISIN, 1957): numerous ex., in all habitats.
32. *Deuterophorura silvaria* (GISIN, 1952): 23.03.06, 2 ex.; 10.04.2006, 5 ex.
33. **Metaphorura affinis* (BORNER, 1902): 30.10.07, 19 ex., meadow.
34. *Mesaphorura critica* ELLIS, 1976: 10.04.2006, 20 ex.
35. **Mesaphorura jarmilae* RUSEK, 1982: 19.04.2007, 3 ex.; 14.12.2007, 4 ex.
36. **Mesaphorura hylophila* RUSEK, 1982: 29.02.2008, 9 ex., meadow; 29.02.2008, 7 ex.
37. **Mesaphorura krausbaueri* BORNER, 1901: 14.12.2007, 16 ex.
38. **Doutnacia xerophila* RUSEK, 1974: 14.12.2007, 1 ex.

Family Isotomidae

39. *Tetracanthella pilosa* SCHOETT, 1891: 10.04.2006, 10 ex.; 11.08.2006, 16 ex.; 16.01.2007, 7 ex.
40. **Folsomia candida* WILLEM, 1902: 16.01.2007, 5 ex.; 14.12.2007, 3 ex.
41. *Folsomia penicula* BAGNALL, 1939: numerous ex.
42. *Folsomia manolachei* BAGNALL, 1939: numerous ex.
43. *Folsomia quadrioculata* (TULLBERG, 1871): numerous ex.
44. **Isotomodes productus* (AXELSON, 1906): 14.12.2007, 3 ex., meadow.
45. *Isotomiella minor* (SCHÄFFER, 1896): numerous ex.
46. **Subisotoma pusilla* (SCHÄFFER, 1900): 29.02.2008, 18 ex.; 22.04.2008, 14 ex., moss on rotten wood.
47. **Cryptopygus bipunctatus* (AXELSON, 1903): 29.02.2008, 7 ex., moss on rotten wood.
48. **Isotomurus palustris* (MÜLLER, 1776): 30.10.2007, 3 ex., meadow; 29.02.2008, 1 ex., meadow.
49. **Vertagopus cinereus* (NICOLET, 1842): 28.02.2008, 6 ex., moss on rotten wood.
50. *Parisotoma notabilis* (SCHÄFFER, 1896): numerous ex.
51. *Isotoma viridis* BOURLET, 1839: 10.04.2006, 5 ex.; 19.05.2006, 7 ex.; 16.01.2007, 7 ex.
52. **Desoria fennica* (REUTER, 1895): 14.12.2007, 1 ex.

53. **Desoria tigrina* NICOLET, 1842: 14.12.2007, 1 ex.
 54. *Desoria trispinata* (MAC GILLIVRAY, 1896): 10.04.2006, 5 ex.
 55. **Desoria violacea* TULLBERG, 1876: 29.02.2008, 19 ex., moss on rotten wood.

Family Entomobryidae

56. *Entomobrya arborea* (TULLBERG, 1871): 23.04.2008, 3 ex., moss.
 57. *Entomobrya handshini* STACH, 1922: 17.11.2006, 6 ex.
 58. *Entomobrya marginata* TULLBERG, 1871: 23.03.2006, 9 ex.; 10.04.2006, 9 ex.
 59. **Entomobrya multifasciata* (TULLBERG, 1871): 14.09.2006, 2 ex.
 60. *Entomobrya muscorum* NICOLET, 1841: 10.04.2006, 1 ex.; 19.05.2006, 1 ex.; 16.01.2007, 1 ex.; 14.03.2007, 4 ex.; 13.07.2007, 4 ex.; 30.10.2007, 2 ex.
 61. *Entomobrya nivalis* LINNAEUS, 1758: 19.05.2006, 7 ex.
 62. *Entomobrya puncteola* UZEL, 1891: 10.04.2006, 1 ex.; 17.11.2006, 23 ex.; 14.03.2007, 2 ex.
 63. *Lepidocyrtus cyaneus* TULLBERG, 1871: numerous ex.
 64. *Lepidocyrtus lignorum* FABRICIUS, 1793: numerous ex.
 65. **Lepidocyrtus paradoxus* UZEL, 1890: 13.07.2007, 4 ex., numerous ex., along the shores of lakes; 29.02.2008, 3 ex., meadow.
 66. **Lepidocyrtus violaceus* (GEOFFROY, 1762): 14.12.2007, 12 ex.; 29.02.2008, 8 ex.
 67. **Lepidocyrtus weidneri* HUTHER, 1971: 29.02.2008, 9 ex., moss on rotten wood.
 68. **Pseudosinella albida* (STACH, 1930): 14.03.2007, 2 ex.; 10.09.2007, 1 ex.
 69. **Pseudosinella gruiæ* GAMA, BUSMACHIU, 2002: 14.12.2007, 1 ex.
 70. *Pseudosinella horaki* RUSEK, 1985: numerous ex.
 71. **Pseudosinella moldavica* GAMA, BUSMACHIU, 2002: 14.12.2007, 2 ex.
 72. **Willowsia nigromaculata* (LUBBOCK, 1873): 29.02.08, 2 ex., moss.
 73. *Orchesella flavescens* BOURLET, 1839: 14.09.2006, 1 ex.; 22.06.2007, 1 ex.
 74. *Orchesella multifasciata* STSCHERBACOW, 1898: 10.04.2006, 2 ex.; 16.01.2007, 1 ex.
 75. *Orchesella pseudobifasciata* STACH, 1960: numerous ex., in litter and moss.
 76. **Orchesella pontica* IONESCU, 1915: 13.07.2007, 9 ex., along the shores of lakes.
 77. **Orchesella spectabilis* TULLBERG, 1872: 13.07.2007, 5 ex.
 78. *Orchesella xerothermica* STACH, 1960: numerous ex.
 79. *Heteromurus major* MONIEZ, 1889: 28.05.2007, 3 ex.; 30.10.2007, 3 ex.
 80. *Heteromurus nitidus* TEMPLETON, 1835: 19.04.2007, 1 ex.; 10.09.2007, 2 ex.

Family Cyphoderidae

81. **Cyphoderus albinus* (NICOLET, 1842): 30.10.2007, 1 ex.
 82. *Cyphoderus bidenticulatus* PARONA, 1888: 13.07.2007, 1 ex.

Family Tomoceridae

83. *Tomocerus minor* LUBBOCK, 1862: 23.03.2006, 9 ex.; 13.07.2007, 2 ex.; 14.12.2007, 1 ex.; 29.02.2008, 5 ex.
 84. **Tomocerus vulgaris* (TULLBERG, 1871): 11.08.2006, 1 ex.; 13.07.2007, 1 ex.; 29.02.2008, 3 ex.
 85. *Pogonognathellus flavescens* TULLBERG, 1871: 23.03.2006, 3 ex.; 30.10.2007, 1 ex.; 14.12.2007, 1 ex.
 86. *Pogonognathellus longicornis* MULLER, 1776: 11.08.2006, 3 ex.; 13.07.2007, 7 ex.

Family Neelidae

87. *Megalothorax minimus* WILLEM, 1900: 19.04.2006, 5 ex.; 14.12.2007, 9 ex.
 88. *Neelus murinus* FOLSOM, 1896: 19.04.2006, 3 ex.; 14.03.2007, 9 ex.; 29.02.2008, 4 ex.

Family Sminthurididae

89. *Sphaeridia pumilis* KRAUSBAUER, 1898: numerous ex.
 90. **Sminthurides aquaticus* (BOURLET, 1842): 16.06.08, 4 ex., water surfaces.

Family Arrhopalitidae

91. *Arrhopalites caecus* TULLBERG, 1871: 23.03.2006, 1 ex.; 28.05.2007, 1 ex.; 22.06.2007, 1 ex.
 92. *Arrhopalites pygmeus* WANKEL, 1869: 23.03.2006, 1 ex.; 19.05.2006, 6 ex.; 19.04.2007, 3 ex.

Family Katiannidae

93. *Sminthurinus aureus* LUBBOCK, 1862: 30.10.2007, 2 ex.
 94. **Sminthurinus bimaculatus* AXELSON, 1902: 29.02.2008, 3 ex., shores of lakes.
 95. *Sminthurinus niger* LUBBOCK, 1868: 10.04.2006, 1 ex.; 19.04.2007, 1 ex., moss.

Family Dicyrtomidae

96. *Dicyrtoma minuta* FABRICIUS, 1783: 10.04.2006, 1 ex.

Family Bourletiellidae

97. **Deuterosminthurus bicinctus* (KOCH, 1840): 13.07.2007, 2 ex.
 98. *Bourletiella viridescens* STACH, 1920: 28.05.2008, 3 ex., meadow.

Family Sminthuridae

99. *Lipothrix lubbocki* (TULLBERG, 1872): 10.09.2007, 1 ex.
 100. *Caprainea marginata* STACH, 1930: 19.04.2007, 4 ex.
 101. *Sminthurus viridis* (LINNE, 1758): numerous ex., meadow.

- 102.**Sminthurus wahlgreni* STACH, 1920: 28.02.2008, 14 ex., on the snow.
 103.**Spatulosminthurus flaviceps* (TULLBERG, 1871): 30.10.2007, 1 ex.; 29.02.2008, 2 ex.

CONCLUSIONS

The results show us the interesting data on the species diversity of Collembola found in the soil and litter of the forest, in the moss on rotten wood, in the soil of meadow and along the shores of lakes. Some species such as *Subisotoma pusilla*, *Tetracanthella pilosa*, *Cryptopygus bipunctatus*, *Vertagopus cinereus* and *Dicyrtoma minuta* were present only in the moss. The species *Metaphorura affinis*, *Isotomodes productus*, *Isotomurus palustris*, *Sminthurinus bimaculatus* and *Deuterosminthurus bicinctus* were found only in the meadow. *Desoria violacea*, *Subisotoma pusilla* and *Sminthurus wahlgreni* prefer winter season and are absent in summer. This seasonal pattern is also common to some species observed in moss.

The species *Xenylla corticalis*, *Willemia intermedia*, *Superodontella* n.sp., *Deutonura conjuncta*, *Neanura minuta*, *Doutnacia xerophila*, *Pseudosinella albida* and *Entomobrya arborea* are rare or with few individuals in the studied biotope.

The presence of rare and unique collembolan species identified as new, indicates high diversity and conservation value of the „Plaiul Fagului” State Nature Reserve.

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