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THE ARACHNOFAUNA OF BOHEMIAN PEAT BOGS SPIDERS (ARANEIDA) OF THE STATE NATURE RESERVE MRTVÝ LUH, ŠUMAVA MTS.

1. INTRODUCTION

At present, wetlands are the most important and also the most endangered ecosystems. Owing to their specific value, they represent an irreplaceable refuge of a relict fauna and flora in Central Europe. Preserved wetlands are numerous mainly in the eastern part of Bohemia (Třeboň basin) and in mountainous areas along its frontier. An important complex of peat bogs is located in the Šumava Mts. (SW-Bohemia). In 1980, a prolonged investigation of the arachnofauna was started in one of its peat bogs called Mrtvý luh.

The literature evaluating the arachnofauna of peat bogs of Bohemia and Moravia is not extensive (KRATOCHVÍL et MILLER 1947, MILLER 1951, BUCHAR 1967, 1977, 1981, MAJKUS 1987, CHALUPSKÁ 1983). BUCHAR (1963) examined the spider population of Kvildská slať in the Šumava Mts. A paper by KASAL (1981) contained sporadic data on the arachnofauna of the State Nature Reserve Mrtvý Luh, ALBRECHT (1979) studied in detail its vegetation, NOVÁK et SPITZER (1972) made a leptidopterological study of this locality.

2. CHARACTERISTICS OF THE STUDY AREA

The State Nature Reserve Mrtvý luh (Fig. 1) lies in the cadastre of České Žleby (district Prachatice-mapping square no. 7149). It is bordered by the streams Studená and Teplá Vltava and by the railway track Volary – Černý Kříž. It is a raised peat bog located in the floodplain of the rivers Teplá and Studená Vltava, altitude 731–747 m, height of peat 750 cm. Its geological substratum consists of granite, mostly two-mica granite, adamelite. The underlaying mineral substratum is made up mainly of alluvial sands, loamy sand, sandy loam admixed with fine gravel and larger

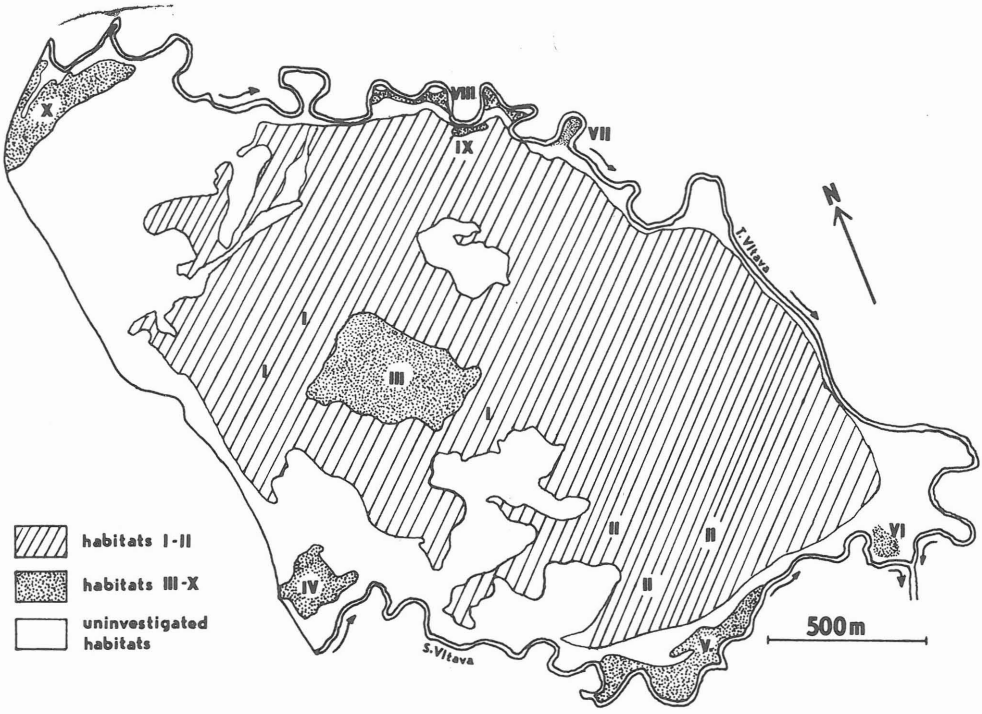


Fig. 1 – Map of the State Nature Reserve Mrtvý luh, habitats I–X.

boulders. The bottommost peat layer (sedge-reed fen peat) which rests directly on the alluvium, is covered by two wood layers alternating with moss peat. In addition to the peat deposit proper, medium heavy loamy floodplain soils and deep alluvia border the banks of the Vltava streams. The peat bog is supplied with water mainly from aboveground sources and lateral colluvial springs of the Stožec massif. The groundwater table reaches mostly the ground surface of the peat bog or slightly below it, peat acidity ranges between 3.5 and 6.0 pH. Owing to an accasional flooding, the grasslands bordering the two Vltava streams are between meso- and eutrophic, the peat bog proper is oligotrophic (ALBRECHT 1979).

Average annual precipitation ranges between 850 and 900 mm, average annual temperature is 4.0 °C (14 °C in July, −6 °C in January). Generally, the ground is snowbound from the beginning of November to the second half of April.

Phytogeographically, the Mrtvý luh belongs to the rerion of the Oreophyticum, province Czech Oreophyticum (Oreophyticum Massivi bohemici), district Šumava Mts., and is situated between the phytogeographical subdistricts of the Šumava plane and the Boubín-Stožec Mts. (SKALICKÝ 1988). Zoogeographically, the study area lies in the province of the variscian mountains, within the faunistic perimeter of the Šumava Mts. and the Novohradské Mts., faunistic district Šumava Mts. (MAŘAN 1958; ZELENÝ 1972).

The vegetation cover of the Mrtvý luh consists of several types of vegetation units (ALBRECHT 1979), of which several units were selected for studies of the arachnofauna of this locality (Fig. 1):

I – Pine forest on peat (W-border) composed of stands of *Pinus mugo ssp. rotundata* (height 5–8 m) which change gradually in intermediary types of *P. mugo ssp. rotundata* (height 2–4 m) as they proceed towards the centre of the raised bog. The habitat occupies the relatively driest site of the raised peat bog. The cover of *P. mugo ssp. rotundata* attains 60–80 %, that of the intermediary type 30–80 %. Dominant in the area are plants of the alliance Sphagnion fusci BR.-BL. 1926, ass. Pino rotundatae-Sphagnetum KÄSTN. et FLÖSS. 1933 corr. NEUHÄUSL 1969, of the phase

Vaccinium-Calluna or an internediary type between phases *Vaccinium-Calluna* and *Eriophorum vaginatum.*

II – Pine forest on peat (S-border): characteristics identical to those of vegetation unit I.

III – Dwarf-shrub formations on peat: Open spaces of the peat bog proper (central part), without a continuous pine stand. Dominants: *Calluna vulgaris, Vaccinium uliginosum.* Moss layer rich, leaf cover 90 %. All. Oxycocco-Empetrion hermaphroditi NORTH. 1936, with signs of relationships with Oxycocco-Ericion tetralicis NORTH. 1936, also all. Sphagnion fusci BR.-BL. 1926, irregularly distributed.

IV – Peat bog forest (Betulion pubescentis): at a railway bridge over the Studená Vltava river (SW-border of the reservation). The dominant species is *Betula pubescens.* A loose birch forest on blown sand abutting the raised part of the peat bog, marshy stands in moist sedge meadows. Cover degree of the tree layer about 40 %, of the brush layer 15–30 %. Herbaceous layer relatively rich, dominated by Carex and Molinia. Syntaxonomical classification of the stands rather difficult, apparently closely related to the alliance Betulion pubescentis.

V – Grasslands dominated by *Carex brizoides* (S-border of the reservation): canopy of herbaceous layer 95 %. Provisional syntaxonomic classification, vegetation type Carex brizoides – Polygonum bistorta (HOLUBIČKOVÁ 1960).

VI – Stand of *Spiraea salicifolia:* near the confluence of the two Vltava rivers. A continuous stand of an intermediary type, syntaxonomic position doubtful.

VII – Alder grove: bank of the Teplá Vltava river (N-border of the reservation). Ass. Alnetum incanae AICH. et SIEGR. 1930, all. Alnion glutinoso-incanae OBERDORFER 1953.

VIII – Stands of reed and tall sedge: right bank of the Teplá Vltava river (N-border of the reservation). Dense, tall stands of *Typhoides arundinacea* and *Carex acuta* (all. Caricion gracilis NEUHÄUSL, apparently ass. Caricetum gracilis ALMQUIST 1929, or all. Phalaridion arundinaceae KOPECKÝ, ass. Phalaridetum arundinaceae LIBBERT 1931).

IX – Waterlogged spruce forest: natural, waterlogged spruce stands, tall trees, canopy 90 %; canopy of shrub layer 15–20 %, herbaceous layer poor. All. Vaccinio-Piceion BR.-BL. 1939, ass. Calamagrosti villosae – Piceetum HARTMANN 1953.

X – Moist sedge meadows in the lagg zone: NW- border of the peat bog. Heavily waterlogged, dominant plant species *Carex rostrata.* Herbaceous layer relatively rich in species – all. Caricion canescentis-fuscae NORDH. 1936, ass. axclusively Caricetum-fuscae BR.-BL. 1915.
(Characteristics of vegetation units – formation types- as suggested by ALBRECHT 1979. Roman numerals, from I to X, will be used in the text for the individual habitats conform to the relevant vegetation units).

3. MATERIALS AND METHODS

My material consisted of 12,081 specimens and I identified 4,743 adults. Our sampling methods were these:

1 – quantitative method of formalin pitfall traps: preservation jars (1 litre volume) were submerged up to the rim in the soil and filled with 4 % formalin up to one third. They were seated by fives in habitats I–VI, in 1980 on May 20 and 21, and collected between June 30 and July 1, on August 30, October 14, November 10; in 1981 on May 20 and collected between July 10 and 11, August 17, October 1, November 11;

2 – sieving was used as a complementary qualitative method: soil of the substratum was sieved for the purpose of intercepting terrestrial species in all habitats;

3 – sweeping method – for sampling in the herbaceous layer using sweeping nets (65 cm in diameter). Except habitat VI, the remaining habitats were swept with a constant number of sweeps (200 times) at each visit;

4 – beating method – specimens were beaten off the shrub- and tree layers (200 strokes each time) of all habitats except III, V, VIII and X;

5 – sampling of individuals – specimens were collected from the surface of the soil and from sites not sampled with the aforementioned methods.

All quantitative evaluations were made from the number of adult specimens only.

4. RESULTS

4.1 Systematic survey of the species identified

We identified a total of 200 species of spiders (18 families) in the material obtained from all habitats of the study area. The symbols used were these: I – X = habitats I – X; arabic numerals = number of adult specimens; BE = beating method; FT = formalin pitfall traps; IS = individual sampling; SI = sieving method, SW = sweeping method. Data on each species were complemented with notes suggesting to which of the basic groups of the arachnofauna of Bohemia the individual species belonged. In addition, we determined the degree of relictness of each species (BUCHAR 1972, 1975, 1983). Symbols used: P – psychrophilic component, T – thermophilic component, N – nonspecific component, S – synanthropic component, RI – relict of the first order, RII – relict of the second order, E – expansive species. An inavailabity of one or the other of these data in the pertinent literature was the reason for their absence in the present survey.

A system suggested by MILLER (1971) was used with certain modifications (the data in front of the hyphen is that given by Miller):
Micaria pulicaria, family *Clubionidae* – fam. *Gnaphosidae; Scotina paillardi – S. palliardi; Arctosa lamperti – A. alpigena lamperti; Amaurobius – Coelotes; Argiopidae – Araneidae; Araneus cucurbitinus, Araneus displicatus – Araniella cucurbitina, Araniella displicata; Meta reticulata* var. *mengei – Meta mengei; Araneus (Hypsosinga) pygmaeus – Singa pygmaea; Araneus (Singa) saguinea – Singa sanguinea; Centromerus similis – C. silvicola; Oedothorax gibbosus + O. tuberosus – O. gibbosus* (RŮŽIČKA 1978).

The number of specimens obtained with the method of formalin pitfall traps is given separately in Table 1.

Family: *Dictynidae*

1. *Dictyna arundinacea* (LINNAEUS, 1758): N E, I BE 15, II SW 5, BE 7, III SW 1, V SW 1, VI BE 3
2. *Dictyna pusilla* THORELL, 1856: P RII, I BE 14, II BE 10, IV BE 1, IX SW 1

Family: *Dysderidae*

3. *Harpactes lepidus* (C. L. KOCH, 1839): P RII, FT, IX SI 2

Family: *Gnaphosidae*

4. *Drassodes lapidosus* (WALCKENAER, 1802): N RII, FT
5. *Drassodes pubescens* (THORELL, 1856): N RII, FT, III IS 1
6. *Gnaphosa microps* HOLM, 1939: P RI, FT
7. *Haplodrassus moderatus* (KULCZYŃSKI, 1897): FT, IV SI 1, V SI 1
8. *Haplodrassus signifer* (C. L. KOCH, 1839): N E, FT, IV IS 1
9. *Haplodrassus soerenseni* (STRAND, 1900): FT
10. *Micaria pulicaria* (SUNDEVALL, 1831): N RII, FT
11. *Zelotes clivicola* (L. KOCH, 1870): P RII, FT
12. *Zelotes latreillei* (SIMON, 1878): P RII, FT

Family: *Clubionidae*

13. *Agroeca brunnea* (BLACKWALL, 1833): N RII, FT, IX SI 1

14. *Agroeca proxima* (O. P. CAMBRIDGE, 1871): P RII, FT
15. *Chiracanthium erraticum* (WALCKENAER, 1802): II BE 1
16. *Clubiona diversa* O. P. CAMBRIDGE, 1862: N RII, I SI 1, VI BE 1
17. *Clubiona germanica* THORELL, 1870: P RII, IV SW 1
18. *Clubiona reclusa* O. P. CAMBRIDGE, 1863: P E, FT, IV SW 1, V SW 1, SI 1, VI BE 5, VII SI 4, VIII SW 1 SI 1
19. *Clubiona subsultans* THORELL, 1875: P RII, I IS 1
20. *Clubiona trivialis* C. L. KOCH, 1843: N RII, I BE 40, II SW 2, BE 57
21. *Phrurolithus festivus* (C. L. KOCH, 1875): RII, FT, I SI 1
22. *Scotina palliardi* (L. KOCH, 1881): P RII, FT, I SI 2, III SI 1

Family: *Zoridae*

23. *Zora silvestris* KULCZYŃSKI, 1897: RII, FT, II SW 1, III SI 2, X SI 1
24. *Zora spinimana* (SUNDEVALL, 1833): P RII, FT, IV SI 1, V SI 1, VI BE 1, IX SI 1

Family: *Sparassidae*

25. *Micrommata roseum* (CLERCK, 1757): RII, II 1 juv., IV SW 1 juv IS 1 juv.

Family: *Thomisidae*

26. *Oxyptila trux* (BLACKWALL, 1846): P E, FT, IV SW 1, V SW 1
27. *Philodromus aureolus* (CLERK, 1757): E, I BE 1
28. *Philodromus collinus* C. L. KOCH, 1835: P RII, I BE 2
29. *Philodromus emarginatus* (SCHRANK, 1803): P RII, I BE 1, II BE 2, VI BE 1
30. *Xysticus audax* (SCHRANK, 1803): N E, I BE 10, II BE 5 SI 1

Family: *Salticidae*

31. *Dendryphantes rudis* (SUNDEVALL, 1832): P RII, I BE 7, II BE 6
32. *Evarcha arcuata* (CLERCK, 1758): P RII, FT, II BE 1, IV SW 11, VI BE 1, X SW 2
33. *Evarcha flammata* (CLERCK, 1758): N RII, I SW 2 BE 2 SI 1
34. *Evarcha laetabunda* (C. L. KOCH, 1848): T RI, FT, I SW 3 BE 1, II SW 2
35. *Evophrys westringi* SIMON, 1868: FT
36. *Heliophanus cupreus* (WALCKENAER, 1802): T RII, IV SW 2
37. *Neon reticulatus* (BLACKWALL, 1853): P RII, FT, II SI 1
38. *Neon valentulus* FALCONER, 1912: P RI, III SI 1
39. *Salticus cingulatus* (PANZER, 1797): P RII, I BE 1, II BE 1, IV SW 1
40. *Sitticus caricis* (WESTRING, 1861): P RI, III SI 1, VIII SW 1
41. *Synageles venator* (LUCAS, 1836): P RII, IV SW 1

Family: *Oxyopidae*

42. *Oxyopes ramosus* (MARTINI et GOEZE, 1778): N RII, I BE 2, II SW 9 juv. BE 3

Family: *Lycosidae*

43. *Alopecosa pulverulenta* (CLERCK, 1758): N E, FT, I IS 1, II SI 1 IS 8
44. *Arctosa alpigena lamperti* DAHL, 1908: P RI, FT
45. *Aulonia albimana* (WALCKENAER, 1805): N RII, FT
46. *Pardosa amentata* (CLERCK, 1758): P E, FT, VII SI 1, VIII SW 3 IS 99

47. *Pardosa hyperborea* (THORELL, 1872): P RI, FT, III SI 1 IS 6
48. *Pardosa lugubris* (WALCKENAER, 1802): N RII, FT
49. *Pardosa pullata* (CLERCK, 1758): N E, FT, II IS 12, IV SI 1 IS 3
50. *Pardosa riparia* (C. L. KOCH, 1833): N RI, FT
51. *Pardosa sordidata* (THORELL, 1875): FT
52. *Pirata hygrophilus* THORELL, 1872: P RII, FT, IV SI 1, X SI 2
53. *Pirata uliginosus* (THORELL, 1856): P RI, FT, II IS 1, III IS 1, X SI 2
54. *Trochosa ruricola* (DE GEER, 1778): P E, FT
55. *Trochosa spinipalpis* (F. CAMBRIDGE, 1895): P RII, FT, II SI 1 IS 1
56. *Trochosa terricola* (THORELL, 1856): N E, FT

Family: *Pisauridae*

57. *Dolomedes fimbriatus* (CLERCK, 1758): P RII, FT, II SW 4 juv., IV IS 2, VI BE 2 juv., VII SW 1 juv. BE 1 juv. II. SW 4 juv.

Family: *Agelenidae*

58. *Coelotes inermis* (L. KOCH, 1868): P RII, FT
59. *Coelotes terrestris* (WIDER, 1834): N RII, FT
60. *Cryphoeca silvicola* (C. L. KOCH, 1834): P RII, I SI 2, IX SI 4 IS 2
61. *Tegenaria torpida* (C. L. KOCH, 1834): P RII, I IS 2

Family: *Hahnidae*

62. *Antistea elegans* (BLACKWALL, 1841): P E, FT, III SI 2
63. *Hahnia difficilis* (HARM, 1966): FT
64. *Hahnia pusilla* C. L. KOCH, 1841: P RII, FT, I SI 4 IS 1, II SI 1, III SI 1

Family: *Theridiidae*

65. *Crustulina guttata* (WIDER, 1834): N E, FT, I SI 1, III SI 1
66. *Dipoena tristis* (HAHN, 1831): RII, I BE 3, II BE 1, IV SW 1 BE 1
67. *Enoplognatha ovata* (CLERCK, 1757): N E, IV SW 2
68. *Episinus angulatus* (BLACKWALL, 1836): P RII, I SI 1
69. *Episinus truncatus* LATREILLE, 1809: N RII, I SW 1
70. *Euryopis flavomaculata* (C. L. KOCH, 1844): N RI, FT
71. *Neottiura bimaculata* (LINNAEUS, 1767): N E, IV SW 1, V SW 1, X SI 1
72. *Robertus arundineti* (O. P. CAMBRIDGE, 1871): E, FT, II SW 4, III SI 1, IV SW 2, X SI 1
73. *Robertus lividus* (BLACKWALL, 1836): P E, FT, II SI 1, IV SW 1 SI 4, V SI 3, VI SI 1
74. *Theridion impressum* L. KOCH, 1881: N E, I BE 4, III SW 2, IV SW 3 BE 1, X SW 1
75. *Theridion ohlerti* THORELL, 1870: P RI, I BE 5, II SW 1 BE 4, IV BE 1, VI BE 1
76. *Theridion sisyphium* CLERCK, 1757: P E, I BE 1, II BE 1, IV SW 2, VI BE 1
77. *Theridion varians* HAHN, 1831: E, I BE 53, II BE 12

Family: *Tetragnathidae*

78. *Pachygnatha listeri* SUNDEVALL, 1830: N RII, FT, VI SW 9, V SW 14 SI 1, VI BE 18, VII SW 5 SI 2

79. *Tetragnatha dearmata* THORELL, 1873: P RII, IX BE 1 juv.
80. *Tetragnatha extensa* (LINNAEUS, 1785): P RII, IV SW 9, VII BE 1, X SW 1
81. *Tetragnatha obtusa* C. L. KOCH, 1837: P RII, VIII SW 1 juv.
82. *Tetragnatha pinicola* L. KOCH, 1870: N RII, IV SW 1, VIII SW 1

Family: *Araneidae*

83. *Araneus ceropegius* (WALCKENAER, 1802): RII, I SW 1 juv., IV SW 1 juv.
84. *Araneus cornutus* CLERCK, 1758: P E, IV IS 4, X IS 2
85. *Araneus diadematus* CLERCK, 1758: N E, I IS 1
86. *Araneus marmoreus* CLERCK, 1758: P RII, I SW 2 BE 6 IS 3, II BE 1 IS 2, IV BE 3, V SW 2
87. *Araneus quadratus* CLERCK, 1758: N E, IV IS 4, X SW 3
88. *Araneus silvicultrix* (C. L. KOCH, 1835): I BE 1 IS 8, II BE 1, IV BE 2 juv.
89. *Araneus sturmi* (HAHN, 1831): P RII, I BE 1, II BE 2
90. *Araniella cucurbitina* (CLERCK, 1758): N E, I SW 1 BE 1, IV BE 2, VI BE 1
91. *Araniella displicata* (HENTZ, 1847): I BE 1
92. *Cyclosa conica* (PALLAS, 1772): P RII, IX BE 2 juv.
93. *Mangora acalypha* (WALCKENAER, 1802): N E, III SW 1 juv., V SW 1
94. *Meta mengei* (BLACKWALL, 1869): P RII, II IS 1, VII SW 1, VIII SW 1
95. *Meta segmentata* (CLERCK, 1757): P E, I IS 1, III SW 1, IX SW 1 juv.
96. *Singa pygmaea* (SUNDEVALL, 1831): P RII, I SW 11 juv.
97. *Singa sanguinea* (C. L. KOCH, 1845): N RII, II SW 1

Family: *Linyphiidae*

98. *Agyneta cauta* (O. P. CAMBRIDGE, 1902): P RI, FT
99. *Agyneta conigera* (O. P. CAMBRIDGE, 1863): P RII, FT, III SI 1 IS 1
100. *Agyneta subtilis* (O. P. CAMBRIDGE, 1863): P RI, FT
101. *Aprolagus beatus* (O. P. CAMBRIDGE, 1906): P E, FT, IV SW 1, V SW 15
102. *Aprolagus saxatilis* (BLACKWALL, 1884): E, FT, I BE 1, II SW 1, V SW 30, VIII SI 1, IX SI 2
103. *Bathyphantes approximatus* (O. P. CAMBRIDGE, 1871): P RII, FT, VI BE 1, VII SW 1, VIII SI 6
104. *Bathyphantes gracilis* (BLACKWALL, 1841): N RII, FT, III SW 1, IV SW 1 BE 3 SI 1, V SW 1 SI 2, VI BE 2, VI SI 3, VII SI 3, IX BE 1, X SI 2
105. *Bathyphantes nigrinus* (WESTRING, 1851): R II, FT, V SW 13 SI 8 IS 2, VI BE 2, VII SW 2 SI 5, VIII SW 1 SI 17, IX SW 67 SI 2
106. *Bolyphantes alticeps* (SUNDEVALL, 1832): P RII, FT, I SW 2, IV SW 4 BE 2 SI 1, V SW 6, VI BE 3, VIII SW 1 IS 1
107. *Centromerita bicolor* (BLACKWALL, 1883): P E, FT, I BE 1, II SW 1 BE 1
108. *Centromerus alnicola* SCHENKEL, 1936: P RI, FT, V SW 9 SI 8, VIII SI 7
109. *Centromerus arcanus* (O. P. CAMBRIDGE, 1873): P RII, FT, I SI 1, II SI 5, III SI 3, IV BE 1 SI 1, V SW 1 SI 2, IX SI 1
110. *Centromerus expertus* (O. P. CAMBRIDGE, 1871): P E, FT, I SW 1, II SW 1, V SW 19, VII SI 1, VIII IS 1
111. *Centromerus incilium* (L. KOCH, 1881): N RII, V SW 1
112. *Centromerus levitarsis* (SIMON, 1884): P RI, FT, IV SI 1
113. *Centromerus pabulator* (O. P. CAMBRIDGE, 1875): P RI, FT

114. *Centromerus silvicola* (KULCZYNSKI, 1887): P RII, VI BE 1
115. *Centromerus sylvaticus* (BLACKWALL, 1841): N E, FT, I SW 1, V SW 7
116. *Diplostyla concolor* (WIDER, 1834): P E, FT, IV SI 2, VII SI 1, VIII SI 1
117. *Drapetisca socialis* (SUNDEVALL, 1835): P E, I BE 1 SI 1, III SW 1, IX SW 1
118. *Drepanotylus uncatus* (O. P. CAMBRIDGE, 1873): P RII, I SW 1, IV SW 1, V SW 1, VI BE 1
119. *Floronia bucculenta* (CLERCK, 1758): P RII, I IS 2
120. *Helophora insignis* (BLACKWALL, 1841): P RII, VII SW 1 SI 1, IX SW 6 BE 4
121. *Hilaira excisa* (O. P. CAMBRIDGE, 1871): P RI, FT
122. *Hillhousia misera* (O. P. CAMBRIDGE, 1901): P RI, FT, IV SW 1
123. *Kaestneria dorsalis* (WIDER, 1834): P RII, II BE 2, IV BE 15, VI BE 51, VII BE 1, IX BE 3
124. *Leptorhoptrum huthwaiti* (O. P. CAMBRIDGE, 1861): P RII, FT, IV SW 1, VII SI 3, VIII SI 2
125. *Lepthyphantes alacris* (BLACKWALL, 1803): P RII, I SW 1 IS 2, IX SI 2 IS 2
126. *Lepthyphantes cristatus* (MENGE, 1866): P RII, FT, I IS 2, II SW 1, IV SW 4 BE 1, VI BE 2, IX SW 5
127. *Lepthyphantes flavipes* (BLACKWALL, 1854): N RII, FT
128. *Lepthyphantes mansuetus* (THORELL, 1875): P RII, IV SW 1, V SW 1
129. *Lepthyphantes mengei* KULCZYNSKI, 1887: N E, FT, III SI 1 IS 1, IV SI 1, V SW 1 SI 2, VI BE 1
130. *Lepthyphantes monticola* (KULCZYNSKI, 1881): P RI, FT
131. *Lepthyphantes nodifer* SIMON, 1884: P RII, II SW 1 BE 1, V SW 1, IX SI 9
132. *Lepthyphantes obscurus* (BACKWALL, 1841): P RI, I BE 2, II BE 1, III SW 1, IV SW 1, IX BE 1
133. *Lepthyphantes pallidus* (O. P. CAMBRIDGE, 1871): N RII, FT
134. *Lepthyphantes tenebricola* (WIDER, 1834): P RII, IV BE 2, IX SI 1 IS 1
135. *Lepthyphantes tenuis* (BLACKWALL, 1852): T RII, FT, I BE 1
136. *Linyphia clathrata* SUNDEVALL, 1829: P RII, I IS 1
137. *Linyphia montana* (CLERCK, 1758): E, IX SI 1 IS 1
138. *Linyphia pusilla* SUNDEVALL, 1830: N E, II SW 1, IV SW 9, V SW 4, VII SW 1, X SW 1
139. *Linyphia triangularis* (CLERCK, 1758): N E, I SW 8 BE 3, II SW 4, IV SW 6 BE 1 IS 3, VI BE 1 SI 1, IX SW 3 BE 1
140. *Maro minutus* (O. P. CAMBRIDGE, 1906): P RI, II SW 1, IV BE 1, V SW 2, VI SI 1
141. *Maro sublestus* FALCONER, 1915: P RI, V SI 9, VI BE 1 SI 3, VIII SI 1
142. *Meioneta rurestris* (C. L. KOCH, 1836): N E, FT, I SW 3, II SW 5 BE 2, III SW 1 SI 2 IS 1, V SW 2 VI BE 2 SI 1, VII SW 1, X SW 1
143. *Mengea scopigera* (GRUBE, 1859): P RI, VIII IS 1
144. *Mengea warburtoni* (O. P. CAMBRIDGE, 1889): P RI, FT, VI SI 1, VII SI 24, VIII IS 6
145. *Microneta viaria* SIMON, 1897: N RII, IX SI 1
146. *Oreonetides abnormis* (BLACKWALL, 1841): FT, IV SW 1

147. *Pityohyphantes phrygianus* (C. L. KOCH, 1836): P RII, I BE 1, II BE 1, IX BE 5, X SW 1
148. *Porrhomma campbelli* CAMBRIDGE, 1894: P RI, V SW 1, VII BE 1
149. *Porrhomma convexum* (WESTRING, 1861): P RI, I BE 1
150. *Porrhomma montanum* JACKSON, 1913: FT
151. *Porrhomma pallidum* JACKSON, 1913: P RII, FT
152. *Porrhomma pygmaeum* (BLACKWALL, 1834): P E, II SW 1, VI SI 1, IX BE 1
153. *Sintula corniger* (BLACKWALL, 1856): P RI, FT, I SI 1, II SI 2
154. *Taranucnus setosus* (O. P. CAMBRIDGE, 1863): P RI, FT, I SI 1 IS 4, II IS 3

Family: *Erigonidae*

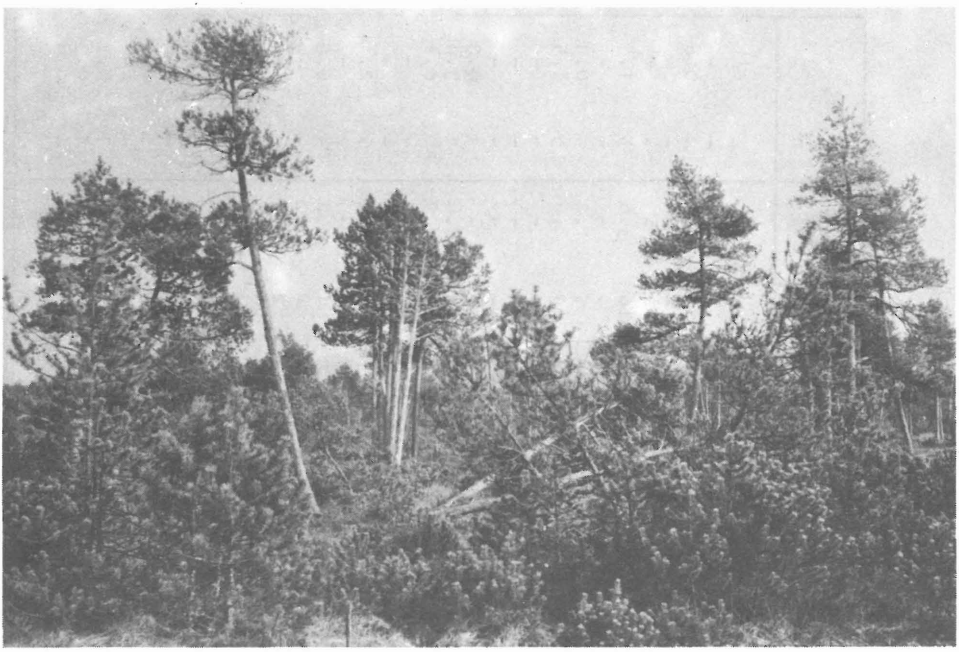
155. *Anacotyle stativa* (SIMON, 1881): P RII, V SW 1
156. *Araeoncus humilis* (BLACKWALL, 1841): N E, II SW 1, III SW 1, V SW 1, VI BE 2, VIII SW 1, IX SW 1
157. *Asthenargus helveticus* SCHENKEL, 1937: P RII, FT
158. *Carorita limnaea* (CROSBY et BISHOP, 1927): II SI 1
159. *Ceratinella brevipes* (WESTRING, 1851): P E, IV SW 2, X SI 1
160. *Ceratinella brevis* (WIDER, 1834): P RII, II SI 1
161. *Cnephalocotes obscurus* (BLACKWALL, 1834): P, III SI 1, V SW 1
162. *Cornicularia cuspidata* (BLACKWALL, 1833): P RII, FT, II SI 2, IV SI 1, VI SI 1, VII SI 2
163. *Cornicularia kochi* (O. P. CAMBRIDGE, 1872): P RI, FT, VIII SI 2
164. *Dicymbium nigrum* (BLACKWALL, 1834): N E, FT, V SW 1, VI BE 1
165. *Diplocephalus cristatus* (BLACKWALL, 1833): P E, II BE 1, V SW 1, VIII SI 1
166. *Diplocephalus latifrons* (O. P. CAMBRIDGE, 1863): P RII, FT, V SW 1, VI SI 1, VII SI 2, IX SI 7, X SW 1
167. *Dismodicus bifrons* (BLACKWALL, 1841): P RII, FT, IV SW 3 BE 3, V SW 4, VI BE 74, VII BE 2, VIII SI 4, X SI 2
168. *Dismodicus elevatus* (C. L. KOCH, 1838): P RII, V SI 1, VII SI 6
169. *Enidia bituberculata* (WIDER, 1834): P RII, V SW 7, VI BE 2
170. *Entelecara congenera* (O. P. CAMBRIDGE, 1879): P RII, I BE 44, II SW 1 BE 1, V SW 4, VI BE 2, X SW 1
171. *Erigone atra* (BLACKWALL, 1841): N E, FT, I BE 3, II SW 2, III SW 5, IV SW 3 BE 2, V SW 9, VI BE 1, VII SW 1 SI 2, VIII SW 1, IX SW 1 BE 1
172. *Erigone dentipalpis* (WIDER, 1834): P ♀ I SW 1, III SW 2, V SW 5, VIII SW 1
173. *Erigonella hiemalis* (BLACKWALL, 1841): P RII, FT, V SW 2
174. *Erigonella ignobilis* (O. P. CAMBRIDGE, 1871): P RI, V SW 2 SI 1
175. *Glyphesis servulus* (SIMON, 1884): FT, VI SI 1, VII SI 1, IX SI 1
176. *Gonatium rubens* (BLACKWALL, 1833): P RI, FT, I SW 2, V SI 1, VI BE 4, VIII SI 2
177. *Gongylidiellum latebricola* (O. P. CAMBRIDGE, 1871): P RII, FT, II SI 1, IV SI 1
178. *Lophomma punctatum* (BLACKWALL, 1841): P RI, FT
179. *Maso sundevalli* (WESTRING, 1851): P RII, IX SW 1 BE 1 SI 6

180. *Metopobactrus prominulus* (O. P. CAMBRIDGE, 1872): P RI, FT, II SW 1
181. *Micrargus herbigradus* (BLACKWALL, 1854): P E, FT, I BE 2 SI 2, II SI 1, III SI 1, IV SI 8, V SI 3, IX SI 4
182. *Minicia marginella* (WIDER, 1834): RII, FT, I SW 9, II SW 30, III SW 8 SI 8, IV SW 1, V SW 1
183. *Minyriolus pusillus* (WIDER, 1834): P RII, II SW 2, III SI 1
184. *Moebelia penicillata* (WESTRING, 1851): RII, I BE 1
185. *Notioscopus sarcinatus* (O. P. CAMBRIDGE, 1872): P RI, IV SW 1, X SI 1
186. *Oedothorax agrestis* (BLACKWALL, 1853): P RII, VII SI 1
187. *Oedothorax gibbosus* (BLACKWALL, 1841): P RII, FT, I BE 1, II SW 1, IV SW 4 BE 1, V SW 6 SI 2, VI BE 11 SI 1, VII SW 1 BE 1, VIII SW 4 SI 8, X SW 2 SI 1
188. *Oedothorax retusus* (WESTRING, 1851): P E, VI BE 1, VII SI 4, VIII SI 1
189. *Pelecopsis elongata* (WIDER, 1834): P RII, VI BE 1
190. *Peponocranium orbiculatum* (O. P. CAMBRIDGE, 1882): RI, III SI 4
191. *Pocadicnemis pumila* (BLACKWALL, 1841): E, FT, IV SI 1, V SW 11 SI 3, VIII SW 1 SI 10
192. *Savignya frontata* BLACKWALL, 1883: FT, VII SI 3
193. *Tapinocyba affinis* LESSERT, 1907: P RII, FT, I BE 2 SI 6, II SI 5, IV SI 1, VI BE 1
194. *Tiso vagans* (BLACKWALL, 1834): RII, V SW 2
195. *Trachynella nudipalpis* (WESTRING, 1851): P RII, FT, IV SW 1
196. *Troxochrus nasutus* SCHENKEL, 1925: VI BE 1
197. *Wideria antica* (WIDER, 1834): N E, FT, IV SW 1
198. *Wideria fugax* (O. P. CAMBRIDGE, 1871): P RII, FT, VI SI 1
199. *Wideria melanocephala* (O. P. CAMBRIDGE, 1879): RII, FT
200. *Wideria mitrata* (MENGE, 1868): RII, FT

Remark: KASAL (1981) reported the incidence of *Dictyna major* MENGE, 1869 in the locality Mrtvý luh -three females in a stand of dwarf pine.

4.2 Epigeic arachnofauna

Habitats I–VI offered good conditions for an investigation of the epigeic arachnofauna with the method of formalin pitfall traps owing to a favourable groundwater table in contrast to the relatively extensive habitats VIII and X frequently exposed to floods. In addition, traps were seated in sites covered with large, expansive vegetation units (mainly in habitats I–V). The locality Mrtvý luh covers an area of 383 ha. Of these, 205 ha are occupied by pine and its intermediary types, in addition to dwarf-shrub formations (habitats I and II). Dwarf-shrub formations cover 70 ha (habitat III), Betulion pubescentis 10.5 ha (habitat IV), grasslands with *Carex brizoides* 22 ha (habitat V). Hence, the vegetation units selected for sampling covered 85 % of the study area. The raised part of the peat bog proper was represented by habitats I–III, marginal areas (intermediary zones with *Betula pubescens* and grasslands with *Carex brizoides* and *Spiraea salicifolia*) by habitats IV–VI.



1. Mrtvý luh, habitat I

4.2.1 Abundant dominance and index of concentrated dominance

We obtained a total of 2,805 specimens from the formalin pitfall traps (30 traps) and identified 105 spider species (Table 1). Using a dominance scale suggested by TISCHLER (1949) and HEYDEMANN (1953) (eudominant – more than 10 %, dominant – between 5 and 10 %, subdominant – between 2 and 5 %, receding species between 1 and 2 %, subreceding species less than 1 %), the species *Pirata uliginosus* and *Gnaphosa microps* were highly eudominant in habitats I–III. Another eudominant species was *Pardosa hyperborea* (in the open central space of habitat III). It was absent in the remaining habitats except II in which it was a subreceding species. The situation was different in marginal and intermediary habitats: habitat IV with a high groundwater table – eudominant species *Pirata hygrophilus, P. uliginosus, Bathyphantes gracilis;* habitat V (marginal grasslands with *Carex brizoides*) – dominant species *Bathyphantes nigrinus, Pachygnatha listeri;* habitat VI (below the canopy of *Spiraea salicifolia*) – dominant species *Trochosa spinipalpis* (Fig. 2).

The indices of concentrated dominance (SIMPSON 1949) : $c = \sum_{i=1}^{s} \left(\frac{N_i}{N}\right)$

whereby Ni = number of individuals of the i-th species, N = sum of individuals of all species, S = number of species) attained these values in the individual

Table 1. Dominance of terrestrial spider species in habitats I - VI (results obtained on the years 1980, 1981).
n = number of specimens, % = dominance in %

Species	I.		II.		III.		IV.		V.		VI.	
	n	%	n	%	n	%	n	%	n	%	n	%
Agroeca brunnea	27	5.2	35	5.7	-	-	4	0.8	4	1.0	-	-
Agroeca proxima	8	1.5	6	1.0	16	3.8	-	-	-	-	-	-
Agyneta cauta	4	0.8	-	-	-	-	-	-	-	-	2	0.6
Agyneta conigera	2	0.4	-	-	4	1.0	-	-	-	-	-	-
Agyneta subtilis	1	0.2	2	0.3	1	0.2	-	-	-	-	-	-
Alopecosa pulverulenta	12	2.3	18	2.9	36	8.6	-	-	16	3.8	5	1.5
Antistea elegans	12	2.3	39	6.3	24	5.7	-	-	-	-	-	-
Aprolagus beatus	-	-	-	-	-	-	-	-	5	1.2	1	0.3
Aprolagus saxatilis	-	-	-	-	-	-	1	0.2	11	2.6	5	1.5
Arctosa alpigena lamperti	1	0.2	-	-	-	-	-	-	-	-	-	-
Asthenargus helveticus	2	0.4	-	-	-	-	-	-	-	-	-	-
Aulonia albimana	-	-	-	-	1	0.2	-	-	-	-	-	-
Bathyphantes approximatus	-	-	-	-	-	-	1	0.2	-	-	1	0.3
Bathyphantes gracilis	2	0.4	3	0.5	-	-	70	13.8	35	8.4	11	3.4
Bathyphantes nigrinus	-	-	2	0.3	2	0.5	8	1.6	62	14.9	20	6.1
Bolyphantes alticeps	-	-	1	0.2	-	-	2	0.4	10	2.4	-	-
Centromerita bicolor	-	-	-	-	1	0.2	-	-	11	2.6	-	-
Centromerus alnicola	-	-	-	-	-	-	-	-	9	2.2	7	2.1
Centromerus arcanus	10	1.9	32	5.2	17	4.0	18	3.6	-	-	-	-
Centromerus expertus	-	-	4	0.6	1	0.2	1	0.2	1	0.2	1	0.3
Centromerus levitarsis	-	-	-	-	-	-	2	0.4	-	-	-	-
Centromerus pabulator	-	-	2	0.3	-	-	-	-	2	0.5	-	-
Centromerus sylvaticus	1	0.2	-	-	1	0.2	1	0.2	20	4.8	17	5.2
Clubiona reclusa	-	-	-	-	-	-	2	0.4	2	0.5	2	0.6
Coelotes inermis	2	0.4	-	-	-	-	-	-	-	-	-	-
Coelotes terrestris	4	0.8	-	-	-	-	-	-	-	-	-	-
Cornicularia cuspidata	1	0.2	3	0.5	-	-	1	0.2	-	-	-	-
Cornicularia kochi	-	-	-	-	-	-	-	-	-	-	1	0.3
Crustulina guttata	-	-	-	-	-	-	1	0.2	-	-	-	-
Dicymbium nigrum	-	-	-	-	-	-	-	-	2	0.5	1	0.3
Diplocephalus latifrons	-	-	-	-	-	-	-	-	-	-	1	0.3
Diplostyla concolor	-	-	-	-	-	-	17	3.4	15	3.6	21	6.4

Table 1 (continued)

Species	I.		II.		III.		IV.		V.		VI.	
	n	%	n	%	n	%	n	%	n	%	n	%
Dismodicus bifrons	-	-	-	-	-	-	-	-	2	0.5	12	3.7
Dolomedes fimbriatus	-	-	-	-	-	-	1	0.2	-	-	-	-
Drassodes lapidosus	1	0.2	2	0.3	2	0.5	-	-	-	-	-	-
Drassodes pubescens	3	0.6	2	0.3	10	2.4	-	-	1	0.2	-	-
Erigone atra	-	-	-	-	1	0.2	-	-	-	-	1	0.3
Erigonella hiemalis	-	-	-	-	-	-	-	-	2	0.5	-	-
Evarcha arcuata	-	-	-	-	-	-	1	0.2	-	-	-	-
Evarcha laetabunda	-	-	1	0.2	-	-	-	-	-	-	-	-
Euryopis flavomaculata	2	0.4	-	-	3	0.7	-	-	-	-	-	-
Evophrys westringi	1	0.2	-	-	-	-	-	-	-	-	-	-
Glyphesis servulus	-	-	-	-	-	-	-	-	-	-	1	0.3
Gnaphosa microps	81	15.7	82	13.3	86	20.4	1	0.2	-	-	-	-
Gonatium rubens	2	0.4	-	-	1	0.2	-	-	1	0.2	4	1.2
Gongylidiellum latebricola	7	1.4	5	0.8	-	-	-	-	-	-	-	-
Hahnia dificillis	3	0.6	-	-	-	-	-	-	-	-	-	-
Hahnia pusilla	2	0.4	-	-	6	1.4	5	1.0	-	-	-	-
Haplodrassus moderatus	-	-	-	-	-	-	3	0.6	2	0.5	3	0.9
Haplodrassus signifer	-	-	7	1.1	-	-	-	-	-	-	-	-
Haplodrassus soerenseni	-	-	4	0.6	-	-	-	-	-	-	-	-
Harpactes lepidus	6	1.2	-	-	-	-	-	-	-	-	-	-
Hilaira excisa	-	-	-	-	-	-	-	-	-	-	1	0.3
Hillhousia misera	-	-	-	-	-	-	1	0.2	-	-	-	-
Lepthorrhoptrum huthwaiti	-	-	-	-	-	-	-	-	21	5.0	5	1.5
Lepthyphantes cristatus	4	0.8	2	0.3	-	-	42	8.3	6	1.4	5	1.5
Lepthyphantes flavipes	1	0.2	-	-	-	-	1	0.2	-	-	-	-
Lepthyphantes mengei	1	0.2	1	0.2	-	-	-	-	-	-	-	-
Lepthyphantes monticola	-	-	-	-	-	-	1	0.2	-	-	-	-
Lepthyphantes pallidus	-	-	-	-	-	-	-	-	7	1.7	16	4.9
Lepthyphantes tenuis	-	-	1	0.2	-	-	-	-	-	-	-	-
Lophomma punctatum	-	-	-	-	-	-	1	0.2	-	-	1	0.3
Meioneta rurestris	2	0.4	2	0.3	1	0.2	-	-	-	-	-	-
Mengea warburtoni	-	-	-	-	-	-	-	-	35	8.4	15	4.6
Metopobactrus prominulus	-	-	-	-	3	0.7	-	-	-	-	-	-
Micaria pulicaria	1	0.2	-	-	-	-	-	-	-	-	-	-
Micrargus herbigradus	4	0.8	6	1.0	6	1.4	17	3.4	19	4.6	1	0.3
Minicia marginella	-	-	-	-	1	0.2	-	-	-	-	-	-

Table 1 (continued)

Species	I.		II.		III.		IV.		V.		VI.	
	n	%	n	%	n	%	n	%	n	%	n	%
Neon reticulatus	1	0.2	1	0.2	-	-	-	-	-	-	-	-
Oedothorax gibbosus	-	-	6	1.0	-	-	2	0.4	2	0.5	8	2.4
Oreonetides abnormis	-	-	-	-	-	-	1	0.2	-	-	-	-
Oxyptila trux	-	-	-	-	-	-	-	-	2	0.5	1	0.3
Pachygnatha listeri	-	-	1	0.2	-	-	3	0.6	44	10.6	12	3.7
Pardosa amentata	-	-	-	-	-	-	-	-	-	-	3	0.9
Pardosa hyperborea	2	0.4	-	-	61	14.5	-	-	-	-	-	-
Pardosa lugubris	1	0.2	1	0.2	-	-	-	-	-	-	1	0.3
Pardosa pullata	-	-	33	5.4	2	0.5	31	6.1	19	4.6	9	2.7
Pardosa riparia	1	0.2	-	-	-	-	-	-	-	-	-	-
Pardosa sordidata	-	-	-	-	-	-	-	-	-	-	1	0.3
Phrurolithus festivus	5	1.0	-	-	-	-	-	-	-	-	-	-
Pirata hygrophilus	-	-	35	5.7	-	-	151	29.8	3	0.7	2	0.6
Pirata uliginosus	255	49.3	213	34.6	101	24.0	65	12.8	3	0.7	2	0.6
Pocadicnemis pumila	1	0.2	-	-	-	-	-	-	9	2.2	5	1.5
Porrhomma montanum	-	-	-	-	-	-	-	-	-	-	9	2.7
Porrhomma pallidum	-	-	-	-	-	-	-	-	-	-	1	0.3
Robertus arundineti	-	-	-	-	2	0.5	-	-	-	-	-	-
Robertus lividus	5	1.0	7	1.1	4	1.0	13	2.6	11	2.6	21	6.4
Savignya frontata	-	-	-	-	-	-	-	-	-	-	1	0.3
Scotina palliardi	1	0.2	4	0.6	7	1.7	-	-	-	-	-	-
Sintula corniger	1	0.2	3	0.5	2	0.5	-	-	-	-	-	-
Tapinocyba affinis	1	0.2	2	0.3	-	-	-	-	-	-	-	-
Taranucnus setosus	3	0.6	1	0.2	4	1.0	3	0.6	-	-	-	-
Trachynella nudipalpis	12	2.3	9	1.5	6	1.4	4	0.8	-	-	7	2.1
Trochosa ruricola	-	-	-	-	-	-	-	-	-	-	1	0.3
Trochosa spinipalpis	3	0.6	23	3.7	-	-	20	4.0	18	4.3	65	19.8
Trochosa terricola	-	-	1	0.2	-	-	-	-	-	-	5	1.5
Wideria antica	3	0.6	-	-	2	0.5	-	-	2	0.5	-	-
Wideria fugax	1	0.2	-	-	1	0.2	-	-	-	-	4	1.2
Wideria melanocephala	-	-	1	0.2	-	-	2	0.4	-	-	9	2.7
Wideria mitrata	-	-	-	-	3	0.7	-	-	-	-	-	-
Zelotes clivicola	3	0.6	1	0.2	-	-	-	-	-	-	-	-
Zelotes latreillei	-	-	-	-	-	-	1	0.2	-	-	-	-
Zora silvestris	7	1.4	11	1.8	2	0.5	5	1.0	-	-	-	-
Zora spinimana	1	0.2	1	0.2	-	-	2	0.4	1	0.2	-	-
Total: 104 species 2805 specimens	517	100.0	616	100.0	421	100.0	506	100.0	417	100.0	328	100.0

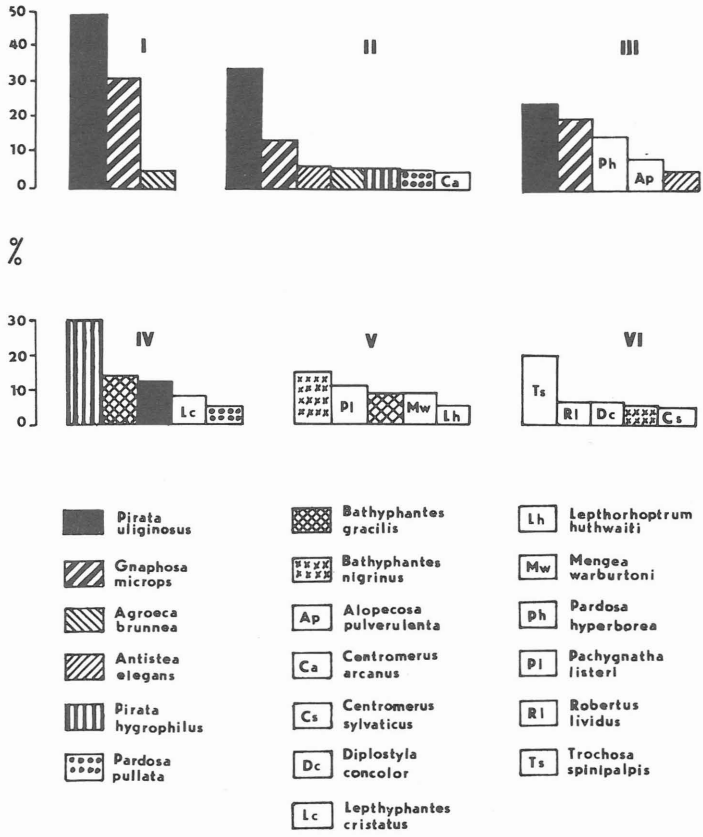


Fig. 2 – Abundant dominance of the epigeic arachnofauna of habitats I–VI.

localities: I – 0.27, II – 0.16, III – 0.14, IV – 0.15, V – 0.07, VI – 0.07. Hence, concentrated dominance was highest in habitat I. This was due mainly to an abundance of the eudominant species *Pirata uliginosus* which in numbers of individuals attained almost one half of the number of individuals of all other species. However, generally speaking, values of the index of concentrated dominance were low particularly in marginal and intermediary habitats which indicated that dominance was shared by a large number of species (ODUM 1977; Fig. 3).

4.2.2 Temperature requirements

The representation of the individual climatically-ecological components of the epigeic arachnofauna (BUCHAR 1975) was conform to temperature conditions in the individual habitats (Table 2). The psychrophilic component was dominant in all habitats, but it was more marked in habitats I–III (raised part of the peat bog) and in habitat IV (birch stand). The nonspecific

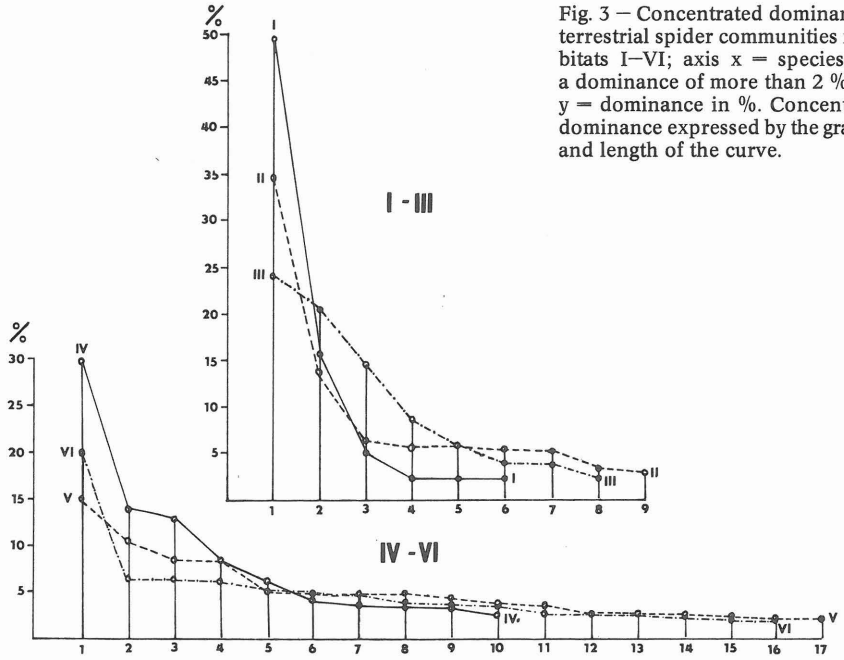


Fig. 3 – Concentrated dominance of terrestrial spider communities in habitats I–VI; axis x = species with a dominance of more than 2 %, axis y = dominance in %. Concentrated dominance expressed by the gradient and length of the curve.

component was well-represented in marginal and intermediary habitats (IV–VI). The thermophilic component was represented by one specimen each of *Evarcha laetabunda* and *Lepthyphantes tenuis* in habitat II, but not in the remaining habitats.

4.2.3 Faunistic similarities in the individual habitats was determined by means of the Renkonen index and the coefficient of concordance (Fig. 4.). KENDALL (1962) based his method of the coefficient of concordance on nonparametric serial tests whereby, at *n* observations of the incidental value *X*, different values x were obtained which could be arranged by their sizes. He added the natural number R between 1 and n (= its serial number in the chronology of observations) to each x (= number of individuals of the i – th species).

The formula used in calculation of the coefficient of concordance was this:

$$W = \frac{S}{\frac{1}{12} m^2 (n^3 - n) - m \Sigma T'}$$

whereby S = sum of second powers of deviations from the average sequence r, m = number of columns in the matrix of arranged numerals (in our case the number of compared habitats, i.e., two), n = number of rows in the matrix (number of species common to the two habitats compared). This equation was

Table 2. Representation of individual climato-ecological components of terrestrial spiders in habitats I - VI. Evaluation of samples from formalin pitfall traps (1980,1981)

Explanations: P = psychrophilic component, T = thermophilic component, N = nonspecific component, ? = component not determined, n = species not listed in the pertinent literature

Habitat	Component	Number of species	%	Number of specimens	%
I.	P	31	62.0	445	86.1
	T	0	0	0	0
	N	15	30.0	62	12.0
	?	2	4.0	6	1.2
	n	2	4.0	4	0.8
	Total	50	100.0	517	100.0
II.	P	25	58.1	490	79.6
	T	2	4.7	2	0.3
	N	12	27.9	106	17.2
	?	3	7.0	14	2.3
	n	1	2.3	4	0.6
	Total	43	100.0	616	100.0
III.	P	20	57.1	352	83.6
	T	0	0	0	0
	N	10	28.6	59	14.0
	?	5	14.3	10	2.4
	n	0	0	0	0
	Total	35	100.0	421	100.0
IV.	P	25	64.1	375	74.0
	T	0	0	0	0
	N	8	20.5	119	23.5
	?	3	7.7	8	1.6
	n	3	7.7	5	1.0
	Total	39	100.0	507	100.0
V.	P	23	63.9	183	43.9
	T	0	0	0	0
	N	9	25.0	148	35.5
	?	3	8.3	82	19.8
	n	1	2.7	4	1.0
	Total	36	100.0	417	100.0
VI.	P	29	61.7	197	60.1
	T	0	0	0	0
	N	9	19.1	77	23.5
	?	4	8.5	39	11.9
	n	5	10.6	15	4.6
	Total	47	100.0	328	100.0

valid in the case of a consistency of quantities x_i, with $T' = \frac{1}{12} \Sigma (t^3 - t)$

whereby t is a number of the repetition of some values x. The value of the coefficient W varies from zero to 1, whereby denotes a complete similarity of the habitats under consideration, W = 0 a complete dissimilarity, W close to 0.5 an approximate independence of habitats, W close to 1 a closely positive relationship, W close to 0 a closely negative relationship (KARNECKÁ, 1976).

Coefficients of concordance for pairs of habitats I–VI were as follows:

	I	II	III	IV	V
I	–				
II	0.582	–			
III	0.608	0.554	–		
IV	0.415	0.563	0.357	–	
V	0.272	0.379	0.247	0.533	–
VI	0.271	0.354	0.250	0.499	0.711

A summation of minimal dominances brought forth these values for the Renkonen index of similarity (RENKONEN 1938):

$$PS = \sum_{i=1}^{n} \min (P_{1i}, P_{2i})$$

	I	II	III	IV	V
I	–				
II	70.4	–			
III	56.3	58.2	–		
IV	22.9	39.0	23.3	–	
V	9.1	18.6	9.4	34.7	–
VI	9.1	15.0	6.8	24.9	52.7

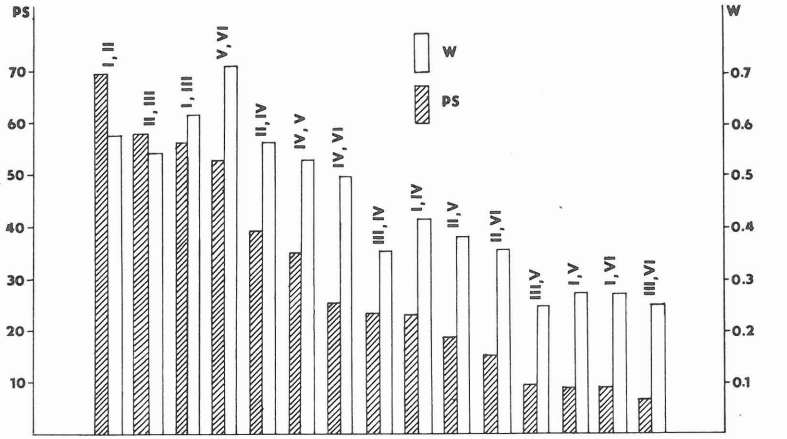
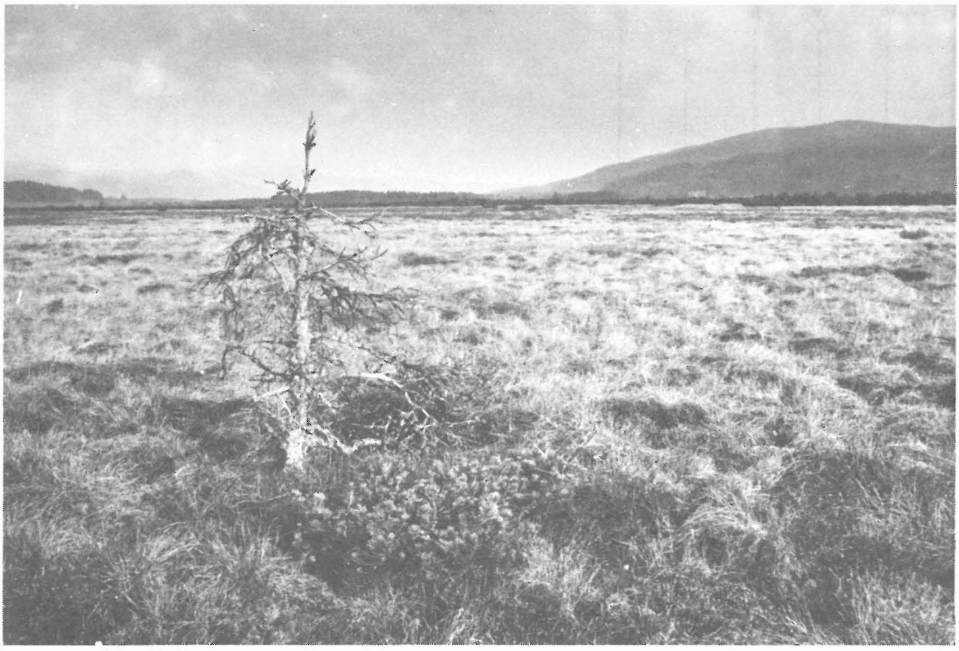


Fig. 4 – Similarity of the epigeic arachnofauna of habitats I–VI shown by Renkonen's index PS and the coefficient of concordance W.



2. Mrtvý luh, habitat III

Values PS and W were higher than 50 or 0.5 for pairs of habitats I, II; II, III; I, III, all in the centre of the peat bog. The pair of habitats V, VI (marginal part of the peat bog) were leading in terms of similarity, their value W was the highest. Two pairs of habitats (II, IV; IV, V) determined both indeces differently (at an application of degrees of similarity of coefficient W for index PS, i.e., a mutual independence for values PS close to 50, a close positive relationship for values close to 100, a negative relationship for those close to zero). Values for the remaining habitats were lower than 0.5 (W) or 50 (PS). According to the results, the epigeic arachnofauna of the two main habitats of the raised peat bog, i.e. the part covered with stands of *Pinus mugo* (cover degree 70% – stands I and II) with a dwarf-shrub formation in its centre without either shrub- or tree layers (habitat III) showed a high degree of similarity. Of interest was a high degree of similarity of samples from habitats V and VI. In the former, traps has been seated in sites covered with a herbaceous layer only (without E_2) in the latter in a continuous stand of *Spiraea salicifolia* with a complete canopy of E_2.

The index PS and the coefficient W confirmed also that the value of similarity of the epigeic arachnofauna was the relatively lowest in central habitats when compared with intermediary and marginal habitats. These conclusions were in agreement with the results of a cluster analysis (MOUNTFORD 1962) calculated on the basis of W values (Fig. 5).

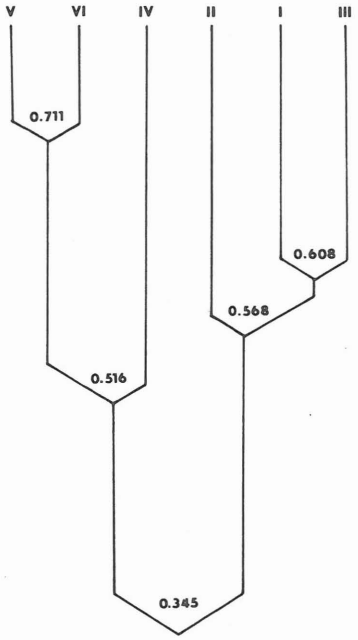


Fig. 5 — Similarity of the epigeic arachnofauna of habitats I—VI evaluated by means of the Mountford crowding analysis.

Table 3. Relict character of the epigeic arachnofauna of habitats I - VI. Quantitative evaluation of samples from formalin pitfall traps (1980,1981): RI = relicts of the 1st order (number of specimens), RII = relicts of the 2nd order, E = expansive species, n = number of specimens of species for which no data on their character were found in the pertinent literature, N = total number of specimens

Habitat	RI	%	RII	%	E	%	n	%	N
I.	353	68.3	119	23.0	41	7.9	4	0.8	517
II.	304	49.4	190	30.8	118	19.2	4	0.7	616
III.	262	62.2	78	18.5	81	19.2	0	0	421
IV.	74	14.6	344	68.0	83	16.4	5	1.0	506
V.	50	12.0	218	52.3	145	34.8	4	1.0	417
VI.	33	10.1	180	54.9	100	30.5	15	4.6	328

4.2.4 Degree of relictness

BUCHAR (1983) suggested a classification of relictness based on results of a study on the arachnofauna of 21 model habitats in Bohemia. RŮŽIČKA (1986) maintained that it may be used in ". . . bioindication of the degree of deterioration of landscape, for the purposes of the State Nature Conservancy, for the delimiting of territories minimally impacted by the activity of man . . ." Buchar divided his material consisting of a total of 526 species, into three groups: group I – relicts of the first order (RI) which occured in habitats the fauna of which ". . . resembled communities of earlier geological periods"; group II – relicts of the second order (RII), i.e., species that had ". . . entered cultured forests from the aforementioned habitats, because these provided favourable conditions for their successful survival in contrast to survival in an artificially deforested landscape . . ."; group III – expansive species (E) ". . . surviving successfully in artificially deforested habitats and entering frequently sites also otherwise greatly changes by man . . .".

The relict character of the epigeic arachnofauna of the study area (Mrtvý luh) is shown in Tables 3 and 4. A quantitative analysis based on the number of individuals (Table 3) disclosed considerable differences between central habitats (I–III, raised part of the peat bog) and both marginal and intermediary habitats (IV–VI). RI species were clearly dominant in habitats I, II and III; they participated with almost one half or even more in the number of individuals in the sample. Of interest were differences between habitats I and II in spite of their almost identical vegetation cover. The representation of RI was lowest in habitats IV–VI (between 10.1 and 14.6 %). In both habitats, more than one half of the number of individuals in the sample were RII species, while in habitat V and VI, expansive species were dominant in the samples.

Out of a total of 22 RI species, four species only participated with more than 5 % in the samples (Fig. 6). *Gnaphosa microps* and *Pirata uliginosus* were eudominant in habitats I, II and III, *P. uliginosus* was eudominant also in

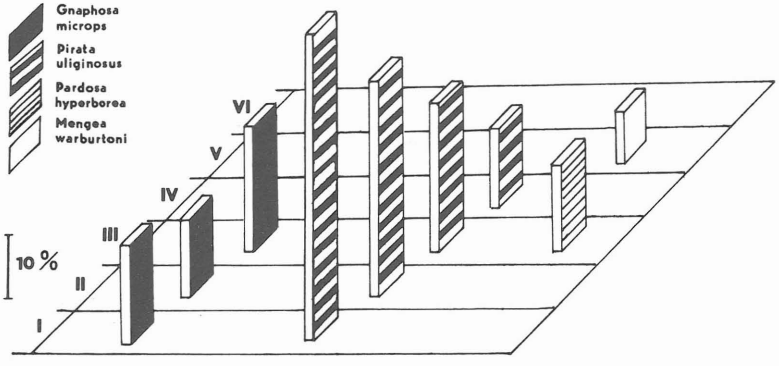


Fig. 6 – Dominance of relicts of the first order in samples from formalin pitfall traps, habitats I–VI. RI species with a dominance of 5 % and more.

habitat IV. *Pardosa hyperborea* was the eudominant RI species of the central area without pine (III), *Mengea warburtoni* was the dominant RI species of sedge meadows (V). Dominant RI species were absent in habitat VI.

The proportion of RII was lowest in habitat III, slightly higher in habitats I and II, but never dominant in any of these three habitats. The situation was reversed in samples from both marginal and intermediary habitats. There, RII species participated with more than one half in the total number of specimens and surpassed 4.4–5.5 times the number of RI individuals. Surprising was the large number of RII species in habitats without forests, i.e., in sedge meadows with just a herbaceous layer (habitat V).

Expansive species participated significantly in the epigeic arachnofauna of habitats V and VI, but they were never dominant there.

Table 4. Relict character of the epigeic arachnofauna of habitats I - VI on the basis of a representation of species. (For explanations see Table 3. Numerals refer to absolute and proportional number of species.)

Habitat	RI	%	RII	%	E	%	n	%	N
I.	11	22.0	28	56.0	9	18.0	2	4.0	50
II.	7	16.3	25	51.8	10	23.3	1	2.3	43
III.	9	25.7	14	40.0	12	34.3	0	0	35
IV.	7	17.5	21	52.5	9	22.5	3	7.5	40
V.	5	13.6	15	40.5	15	40.5	2	5.4	37
VI.	8	17.0	17	36.2	17	36.2	5	10.6	47

According to our results, the degree of relictness of the epigeic arachnofauna was highest in habitats I, II and III when compared with marginal habitats. Hence, these habitats of the central part of the peat bog showed the higher the degree of relictness and the lover the degree of anthropogenic influence.

RŮŽIČKA (1986) recommended to use the proportion of the number of samples of expansive species (complemented by the proportion of the other two categories – RI, RII) in a determination of the anthropic and anthropogenic influence on a locality. He compared values of a quantitative analysis of samples (formalin pitfall trap method) from 26 localities of Bohemia and obtained thus data on the presentation of expansive species (in %) in nonforest habitats: 0 – 45 % for nature reserves and other protected habitats untouched

by man; 45–85% for intensively nonmanaged territories; above 85% for intensively managed areas – grasslands and fields. The expansive component of the terrestrial arachnofauna of the study area (Mrtvý luh) was less than 45%, i.e., top value of protected areas (Fig. 7).

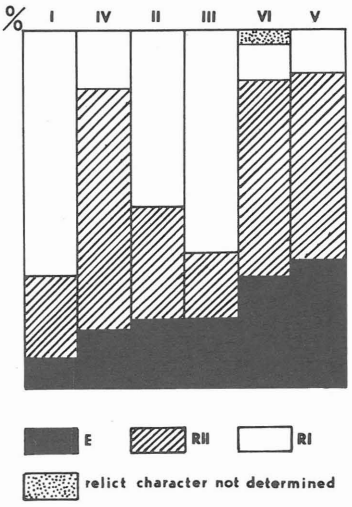


Fig. 7 – Proportional representation of relicts RI and RII and expansive species (E) in communities of terrestrial spiders of habitats I–VI.

4.3 Arachnofauna of layers E_1 and E_2

In addition to formalin pitfall traps and sieving (used for an investigation of the terrestrial spiders), sweeping was used for sampling in the herbaceous layer (E_1), and beating for sampling in shrub-and tree layers (E_2). Although the two methods could be regarded as quantitative if a constant number of sweeps and beats were used, their results were not very reliable because intervals between sampling dates were about 4–6 weeks while sampling with formalin pitfall traps was continuous; apart from this, they were greatly influenced by weather conditions (a small number of adults was obtained from habitats I and II mainly when using the sweeping method). Other reasons against the use of the two methods were given by PALMGREN (1972). Nevertheless, the results of these methods complemented the general picture of the arachnofauna of the study area and determined the composition of species inhabiting layers E_1 and E_2. Although unreliable, we included the samples obtained with these two methods in our evaluation.

4.3.1. Results of the sweeping method

The method was not very successful in habitats I, II and III (core of the peat bog) as evident from the small number of individuals in our samples (38, 71, 21 adults respectively). A major role was played by RII and E species:

3. Mrtvý luh, habitat IV – spring look

Minicia marginella in all three habitats, *Linyphia triangularis* (I), *Dictyna arundinacea* (II), *Meioneta rurestris* (II), *Erigone atra* (III). RI species were represented by *Evarcha laetabunda* (I, II), *Theridion ohlerti* (II), *Lepthyphantes obscurus* (III), *Maro minutus* (II), *Gonatium rubens* (I), *Metopobactrus prominulus* (II) in numbers between one and three specimens.

RII and E species participated almost equally in the arachnofauna of the herbaceous layer in a birch stand (96 specimens, habitat IV). The species were represented mainly by *Evarcha arcuata, Pachygnatha listeri, Linyphia pusilla, L. triangularis.* RI species were represented by *Hillhousia misera, Lepthyphantes obscurus* and *Notioscopus sarcinatus* (one specimen each). The arachnofauna of the herbaceous layer of sedge meadows (habitat V, 195 specimens) was made up by more than one half of E species (mainly *Aprolagus beatus, A. saxatilis, Centromerus expertus, Pocadicnemis pumilla* and *Erigone atra*), by more than one third of RII (mainly *Pachygnatha listeri, Bathyphantes nigrinus* and *Enidia bituberculata*). RI were represented by 4 species (1 to 4 specimens each): *Centromerus alnicola, Maro minutus, Porrhomma campbelli* and *Erigonella ignobilis.*

Samples obtained by sweeping in habitats VII – X consisted RII and E species only. An exception was *Sitticus caricis* (one specimen in habitat VIII). *Bathyphantes nigrinus* was represented by almost 100 % in habitat IX.

4. Mrtvý luh, habitat IV – summer look

Both the psychrophilic and the nonspecific components were represented in the samples. Thermophilic jumping spiders (*Evarcha laetabunda* and *Heliophanus cupreus*) occurred occasionally.

4.3.2 Results of the beating method

The arachnofauna of the tree layer of *P. mugo ssp. rotundata* differed considerably in habitat I and II. Our relatively large spider material sampled in the two habitats with identical methods and at identical dates could be compared mathematically. Differences were found mainly in an absolute number of adults (236 in habitat I, 132 in II). Renkonen's index for similarity was relatively low (57.8). Although RII were dominant in both habitats, they participated with 55 % only in samples from habitat I (E species were represented by 40.7 %). On the other hand, RII species were remarkably dominant in habitat II (73.5 % RII, 21.1 % E species). The most abundant species in samples from both habitats were *Theridion varians, Clubiona trivialis, Dictyna arundinacea, D. pusilla* and *Entelecara congenera.* The RI species (*Evarcha laetabunda, Theridion ohlerti, Lepthyphantes obscurus* and *Porrhomma convexum*) participated with less than 4 %.

RII species represented mainly by the species *Kaestneria dorsalis,* were dominant among the 41 adult specimens sampled with the beating method

5. Mrtvý luh, habitat VI

in a birch stand (IV). RI species were represented by *Theridion ohlerti* and *Maro minutus* (one specimen each).

A large number of adult spiders was obtained with the beating method from meadowsweet (202 specimens-habitat VI); of these, 176 specimens were RII species. Dominant species were *Dismodicus bifrons, Kaestneria dorsalis, Pachygnatha listeri* and *Oedothorax gibbosus.* RI species were represented by *Theridion ohlerti, Maro sublestus* and *Gonatium rubens.*

Sampling in habitats VII and IX (for the purpose of orientation) indicated a dominance of RII species. RI species were represented by *Porrhomma campbelli* (VII) and *Lepthyphantes obscurus* (IX).

Results of the beating method confirmed differences between habitats I and II, evident even in a representation of climatically-ecological components of the arachnofauna of the tree layer. Components P and N were balanced in habitat I, while P was twice as high as N in habitat II. Two specimens of T species, i.e. *Evarcha laetabunda* and *Lepthyphantes tenuis,* were found in habitat I only. The psychrophilic component was remarkably dominant in habitats IV and VI (3.5 times and 5 times respectively).

4.3.3 Results of the sieving method

The method is very important when sampling either in moss, leaf- and needle litter or detritus. It is used mainly in complementing the method of formalin pitfall traps because it intercepts species even whose radius of action

is small and which are normally absent in traps. The species of the study area obtained solely with the sieving method were these: *Carorita limnaea, Dismodicus elevatus, Episinus elongatus, Glyphesis servulus, Neon valentulus, Oedothorax agrestis* and *Peponocranium orbiculatum. Maro sublestus* was present mainly in sieved material (13 specimens), once only in knocked off material.

4.4. Remarks about several species of faunistic and ecological importance.

Haplodrassus moderatus

This is the first reliable report of the presence of the species in Bohemia. It was found just in marginal habitats (IV–VI) of the peat bog Mrtvý luh (a subreceding species in the traps). The only other locality of its incidence in Czechoslovakia is the peat bog Bol, E-Slovakia (J. Svatoň 1♀, June 26, 1976, 1gt. Antuš). It appears to be a hygrophilic rather than a tyrphophilic species preferring swampy habitats. According to LEHTINEN et al. (1979) the species is a typical inhabitant of swamps ("better bogs"); this was confirmed by other authors such as KOPONEN (1976 – Finish bogs) and PALMGREN (1972 – Finish bogs, "Myrico-Molinia bogs and open bogs, meadows of mean or high humidity"); hence, this species favours evidently moist habitats. PALMGREN (1977) recovered it also from "overhanging grass, meadow ditches". Its incidence in Estonian mires was reported by VILBASTE (1969, 1972, 1980). KOPONEN (1968) reported as exceptional finding of the species in Sphagnetum (Eriacaceae-Sphagnum-Weissmoor").

Savignya frontata

Also this is the first report from Bohemia. We obtained it both from formalin pitfall traps seated in a stand of dwarf pine (II) and from samples of sieved material (Alnetum -habitat VII). According to PALMGREN (1972), it occurred also in the so-called "Alneta" habitats, in Sphagnetum, in meadows (1977) and elsewhere ". . . on or near shores and in moist, open habitats: Most abundant in *Pleurozium* or among grass on small skerries, also fairly abundant in moist meadow and along the edges of ditches, scarce in open bogs and in fenlike Alneta on shores, lacally abundant in wrack on shores" (1977). A preference of the species for moist habitats including bogs was confirmed by other authors (ANDERSEN et al. 1980, BROEN et MORITZ 1963, HELSDINGEN 1976, VILBASTE 1980).

Evarcha laetabunda

The species was found in a pine stands (habitats I, II; 1 ♀ – formalin trap, 5 specimens in a herbaceous stand, one specimen an dwarf pine). The incidence of the species in the peat bog Rejvíz (KRATOCHVÍL et MILLER 1947) appeared to be incidental. According to MILLER (1971), the species is thermophilic and typical of very warm habitats. BUCHAR (1975) arranged the species to the thermophilic component of the arachnofauna on the basis of its present in xerothermic localities of Bohemia, and also BRAUN (1975)

regarded it as a xerophilic species. On the other hand, MAURER et WALTER (1980) called it an inhabitant of open, raised peat bog complexes ("in dem offenen Hochmoorkomplex"). THALER (in LÖSER et al. 1982) reported the species from a German peat bog. VILBASTE (1957, 1969, 1972, 1980) recovered it from mires of Estonia, and PALMGREN (1972) from similar habitats in Finland ("only in the bogs").

Family *Lycosidae*

Pirata uliginosus was dominant among the 14 species of the family *Lycosidae*. It occurred both in shaded and unshaded sites of the central part of the peat bog Mrtvý luh. It was well-represented also in a birch grove (habitat IV) but was found occasionally only in other marginal habitats.

Pardosa hyperborea preferred unshaded sites (habitat III) where it was eudominant together with *Pirata uliginosus* and *Gnaphosa microps*. Its affinity to unshaded, moist habitats was confirmed by BUCHAR (1963) and VILBASTE (1982) who found in Estonia "only in bogs, being most numerous on treeless bogs". However, according to PALMGREN (1965), the species was most abundant in forests of Finland (". . . an zahlreichsten auf Mooren . . . in der Waldzone"). KOPONEN (1976) recovered specimens of *P. hyperborea* both from a "birch forest" and a "low alpine heath".

Of interest was the absence of *P. sphagnicola*, a typical inhabitant of peat bogs.

Araneus silvicultrix

Typical resident in peat bogs with pine. MILLER (1951) stated that habitat conditions were more important to the species than specific microclimatic requirements, whereby just peat bog pine, richly covered with lichen, offered the most favourable conditions. In Bohemia, it was recovered solely from dwarf pine-covered peat bogs (MILLER 1951, 1971). This fact was supported by data from other peat bogs of the Šumava Mts. (altitudes between 900 and 1150 m) obtained in a recent investigation. VILBASTE (1972, 1980) reported its incidence from a pine-covered bog of Estonia, LEHTINEN et al. (1979) from a habitat ". . . mostly overgrown with coniferous trees". PALMGREN (1972) found it ". . . under bark scales on a low pine at the edge of a bog" and also in a habitat of "Calluna, rocky Pinetum".

Oedothorax gibbosus

According to RŮŽIČKA (1978) *Oedothorax tuberosus* was identical to *O. gibbosus*. This statement was based on the existence of two morphs which differed clearly from one another in the shape of the cephalothorax: males of *"gibbosus"* possess an ovoid pit densely covered with chaeta, which is situated in front of the large thoracic hump; this is absent in males of *"tuberosus"*. In the present paper, we accepted a fusion of the two morphs. The representation of the two morphs in the study area was this: II FT 6g, II SW 1t, IV SW 1g, IV BE 1g, V SW 3g 2t, VI BE 1g 3t, VIII SW 1g 1t, VIII SI 1t, X SW 1t (g = m. *gibbosus*, t = m. *tuberosus*, for other symbols see Systematic survey).

5. COMPARISON OF THE ARACHNOFAUNA OF THE PEAT BOG MRTVÝ LUH WITH THAT OF OTHER PEAT BOGS IN BOHEMIA AND MORAVIA

Although Czechoslovakia is rich in peat bog areas which cover about 30 000 ha (DOHNAL 1965), knowledge of their spider communities is available for a limited number of peat bogs. KRATOCHVÍL et MILLER (1947) and MILLER (1951) investigated the arachnofauna of Rejvíz, a peat bog in the Jeseníky Mts., BUCHAR (1963, 1972) the Kvildská slať, Šumava Mts., which he regarded as a model locality, MILLER (1951) and CHALUPSKÁ (1983) the intermediary peat bog Borkovická blata. BUCHAR (1981) evaluted a spider material sampled by Martínek in S-Bohemia, and investigated later (BUCHAR 1977) a peat bog in the Orlické hory. Spider communities of the peat bog Na Skřítku (Jeseníky Mts.) were examined by MAJKUS (1987) (Fig. 8).

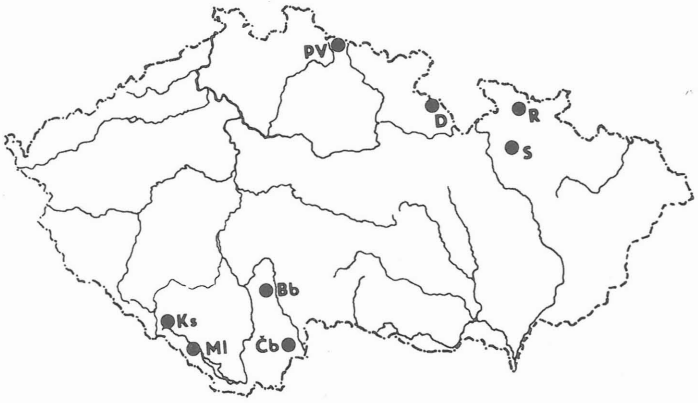


Fig. 8 – Map of peat bogs of Bohemia and Moravia investigated in terms of their arachnofauna: Bb – Borkovická blata, Čb – Červené blato, D – peat bogs of the Orlické hory, Ks – Kvildská slať, Ml – Mrtvý luh, PV – peat bogs of the Krkonoše Mts., R – Rejvíz, S – Skřítek.

The factors impeding a comparison of peat bogs were mainly differences both in sampling methods and in an evaluatian of the results. The most similar to our procedures were those used by BUCHAR (1967), CHALUPSKÁ (1983) and MAJKUS (1987). They all used formalin pitfall traps which enabled a comparison of quantitative data. *Lycosidae* could be used as a model group in a comparison of the composition of species in all peat bogs under consideration (using the Soerensen index of similarity). According to BUCHAR (1963), *Lycosidae* are the most suitable group for a comparison of spider communities of the individual localities, owing to their considerable size and abundance as well as their bionomics, which renders them readily available. It may also be assumed that all species of the family resident in the localities under consideration were recovered by means of individual sampling (Tables 5, 6).

Table 5. Comparison of the incidence of Lycosidae in the core of the peat bog Mrtvý luh with that in other peat bogs of Bohemia and Moravia.

Explanations: + = species present in the locality under consideration; for remaining symbols see Fig.8.

Species	Mrtvý luh		Ks	Bb	Čb	PV	D	R	S
	I.- - III.	IV.- - X.							
Alopecosa aculeata			+		+	+	+		+
Alopecosa pulverulenta	+	+	+	+					+
Arctosa alpigena lamp.	+		+			+			
Arctosa leopardus								+	
Aulonia albimana	+			+				+	
Pardosa amentata		+					+	+	+
Pardosa cursoria			+						
Pardosa hyperborea	+	+							
Pardosa lugubris	+	+		+					+
Pardosa nigriceps			+						
Pardosa prativaga								+	
Pardosa pullata	+	+	+		+	+		+	+
Pardosa riparia	+								+
Pardosa saltuaria						+			
Pardosa sordidata		+							+
Pardosa sphagnicola			+				+	+	
Pardosa tarsalis			+						
Pirata hygrophilus	+	+	+	+	+	+	+	+	+
Pirata latitans			+	+				+	+
Pirata piraticus			+			+		+	
Pirata piscatorius				+				+	
Pirata uliginosus	+	+	+	+	+		+	+	+
Trochosa ruricola		+							
Trochosa spinipalpis	+	+	+	+	+			+	+
Trochosa terricola	+	+	+	+	+			+	+
Xerolycosa nemoralis				+				+	+

Generally, the presence of the so-called tyrphobionts or tyrphophiles is regarded as characteristic of peat bogs, although opinions differ with regard to the arachnofauna. PEUS (1932) regarded 12 species as being strictly peat bog-bound. These were *Arctosa alpigena* (= *A. lamperti*), *Drepanotylus uncatus*

Table 6. Comparison of species similarity in the terrestrial arachnofauna of several peat bogs - Soerensen index based on an incidence of members of the family Lycosidae (in %). For explanation of symbols see Fig.8.

	M1 I.-III.	KS	Bb	Čb	PV	D	R
M1 I.-III.							
Ks	61.5						
Bb	66.7	48.0					
Čb	58.8	57.1	50.0				
PV	35.3	47.6	12.5	50.0			
D	25.0	40.0	26.7	54.6	36.4		
R	48.0	55.2	66.7	50.0	30.0	42.1	
S	66.7	57.1	70.0	63.2	31.6	44.5	59.3

(= *Oreonetides validior*), *Gnaphosa leporina, Hillhousia misera* (= *Oreonetides imbecilior*), *Lepthyphantes thienemanni, Maso britteni, Paragonatium strandi, Pardosa hyperborea* (= *P. hyperborea pusilla*), *Pardosa sphagnicola* (= *P. prativaga sphagnicola*) and *Pirata picollo*. Later, *D. uncatus* was recovered frequently from sites outside the peat bog for which it could not be regarded as a strictly bog-bound species. BUCHAR (1963) suggested to add two more species to this group, i.e., *Notioscopus sarcinatus* and *Theonoe minutissima*. In his opinion, all 11 species were tyrphobionts. CASEMIR (1976) added *Heliophanus dampfi* to this group, HELSDINGEN (1976) regarded as tyrphobionts the species *M. misera, T. setosus, P. sphagnicola* and also *P. uliginosus*. Other authors held different views. PEUS (1928) maintained that none of the spiders species of N-German peat bogs were true tyrphobionts.

MILLER (1951), in agreement with PEUS, regarded 12 species of the Moravian peat bog Rejvíz as tyrphophiles of the 1st order, and another 8 species as tyrphophiles of the 2nd order. THALER (in LÖSER et al. 1982) was doubtful about the term "tyrphobiont" in a strict sense with regard to a very different evaluation of ecological requirements of several spider species typical

of peat bogs. HIEBSCH (1977) and HIEBSCH at al. (1978) regarded several "tyrphobionts" (*N. sarcinatus, H. misera* and *P. uliginosus*) as typical bog species ("typische Moorarten", "Charakterart für den Hochmoorkern") and preferred TRETZEL's (1952) classification of ecological types.

According to the results of recent investigations of the arachnofauna of Bohemian peat bogs, considerable differences were observed in the structure of spider communities with characteristic dominant species represented just by two to four species. If these eudominant, and simultaneously habitat-specific species, displayed a marked affinity to peat bogs and were relicts of the first order in the sense of BUCHAR's (1983) definition of relictness, they ought to be regarded as species with a marked ecological affinity to peat bogs. However, the "typicality" of these "typical" peat bog species should be conceived in the sense of a preference for raised peat bog ecosystems in which a number of factors decides upon their preference or absence. In my opinion, the species *Gnaphosa microps, Pardosa hyperborea, P. sphagnicola* and *Pirata uliginosus* may have a major impact on a determination of a certain arachnofauna of a certain peat bog, and therefore may be used in a confrontation of spider communities resident in peat bogs and, simultaneously, as bioindicators. I compared also the incidence of the so-called "tyrphobionts" which, at least in our material from formalin pitfall traps, did not appear to be dominant species. (For a survey of the incidence and representation of the aforementioned species in several peat bogs of Bohemia and Moravia see Table 7.)

Kvildská slať (Šumava Mts., mapping square 6947, altitudes between 1055 and 1075 m)

Data on the arachnofauna of the locality were given by BUCHAR (1963). However, he concentrated mainly on spider communities resident in the surrouding grasslands and gave little attention to the arachnofauna of the peat bog proper. Therefore, his data could be used just in a comparison of the structure of the epigeic arachnofauna of the two localities and partly in a comparison of dominant species.

At an elimination of species resident solely in exploited parts of the locality Kvildská slať, the index of similarity for communities of terrestrial spiders recovered from the core of the peat bog Kvildská slať and in that of the peat bog Mrtvý luh (habitats I, II, III) attained a value of 59.4. The index was slightly higher for *Lycosidae* (61.5). A remarkable feature was mainly an absence of the species *Pardosa sphagnicola* in the peat bog Mrtvý luh, although it was the dominant species of a habitat of Kvildská slať characterized as "a stand of *Sphagnum* partly shaded by dispersed tufts of *P. mugo* and low dwarf spruce". Other dominant species of Kvildská slať were *Pirata uliginosus* and "*Gnaphosa* sp." (= *G. microps*). These were also dominant in the locality Mrtvý luh (habitat I – 34.6 – 49.3 %, habitat II – 13.3 – 15.7 % both shaded by *Pinus mugo,* and in the unshaded habitat III – 24.0 and 20.4 %). The dominant species of the second habitat of Kvildská slať characterized as "an unshaded stand of *Sphagnum* intermixed sparsely with grasses" were *Pardosa hyperborea* (63.6 %) and *Gnaphosa microps* (17.5 %). The first of these

Table 7. Occurrence and representation of species preferring several peat bogs of Bohemia and Moravia

r = receding and subreceding incidence (less than 2 %), I - X = habitats of Mrtvý luh, + = confirmed in the locality. Numerals refer to a dominance of more than 2 % of the species present. ? = not listed in the pertinent literature, Ks, Bb, Čb, PV, D, R, S - see Fig.8.

Species	Mrtvý luh			Ks	Bb		Čb	PV	D	R	S
	I., II.	III.	IV. - X.		1951	1983					
Gnaphosa microps	13.3-15.7	20.4	IV.r	17.5	?	-	-	-	-	-	-
Pardosa hyperborea	r	14.5	-	63.5	?	-	-	-	-	-	-
Pardosa sphagnicola	-	-	-	D	?	D	+	-	+	+	D
Hillhousia misera	-	-	IV.r	-	?	-	-	-	-	+	-
Notioscopus sarcinatus	-	-	IV.,X.	+	+	+	+	-	-	+	r
Taranucnus setosus	r	r	IV.r	-	+	+	-	-	-	-	-
Theonoe minutissima	-	-	-	-	?	-	-	-	-	+	-
Pirata uliginosus	34.6-49.3	24.0	IV.12.8 , V.r,VI.r,X.	D	?	D	+	-	+	+	D

species was eudominant in the unshaded habitat III, Mrtvý luh, but occurred also in shaded sites as confirmed by the presence of two specimens in a sample from habitat I. Hence, the species preferred, generally, open, unshaded sites in both localities. However, in contrast to Kvildská slať, *Pirata uliginosus* retained its dominance even in an unshaded site and was dominant both in shaded and unshaded habitats of the core of the peat bog. The dominance in spider communities of the core of the peat bog Kvildská slať was more concentrated -attaining a value of minimally 0.43 as compared with the maximum value at Mrtvý luh (0.27 -habitat I).

Another species common to both peat bogs was *Notioscopus sarcinatus*, recovered at Mrtvý luh solely from habitat X – marshy sedge-lagg meadows, i.e., on the periphery of the peat bog. *Hillhousia misera*, whose presence was not confirmed in the peat bog Kvildská slať, was also absent in habitats of the core of Mrtvý luh, but found to be resident in habitat IV, an intermediate marshy site. According to data by other authors (MARTÍNEK in BUCHAR (1981) – waterlogged forests, the bank of a fishpond; BUCHAR (1977) – a finding outside a peat bog), the species appeared to be a sphagnobiont rather (CASEMIR 1976) than a tyrphobiont. Equally, *Taranucnus setosus*, absent in Kvildská slať, was recovered from habitat IV – Mrtvý luh.

Borkovická blata (S-Bohemia, mapping square 6753, altitude 407–420 m)

MILLER (1951) did not give a complete list of spiders resident in the locality, but merely compared the so-called remarkable species of this peat bog with the arachnofauna of Rejvíz. The species common to Mrtvý luh and Borkovická blata were *T. setosus* and *N. sarcinatus*. CHALUPSKÁ (1983) found the dominant species *Pirata uliginosus*.

Červené blato (S-Bohemia, mapping square 7154, altitude 470 m)

In samples collected by Martínek (in BUCHAR 1981), two out of the seven compared species were common to both localities. These were *Notioscopus sarcinatus* and *Pirata uliginosus*. The dominance of the latter species was indicated by its "remarkable abundance".

Peat bogs of the Krkonoše Mts. (Pančické peat bogs, Violík; N-Bohemia, mapping square 5259, altitude 1359–1400 m)

BUCHAR (1967) suggested that the composition of spider communities of this area differed greatly from that of the two raised peat bogs of the Šumava Mts. in that the dominant species (*G. microps, P. hyperborea, P. uliginosus* – Mrtvý luh; *P. sphagnicola* – Kvildská slať) were absent in peat bogs of the Krkonoše Mts. The dominant species of the latter peat bogs (*Pirata piraticus, Araeoncus crassiceps, Pardosa saltuaria*) were either absent in the Šumava Mts. or occurred in the form of a subreceding species (*Centromerus pabulator*). *Drepanotylus uncatus*, a highly dominant species of the Krkonoše, was represented by four specimens only in the locality Mrtvý luh (samples obtained by sweeping and beating). Just three out of the 14 species of *Lycosidae* were common to both localities (with a low S-index 35.3).

Peat bogs of the Orlické hory (Mts.) (NE-Bohemia, mapping square 5664, altitude 1050; BUCHAR 1977)

Using quantitative sampling methods only during a three-day-excursion (June 9–12, 1973), BUCHAR (1977) recovered just 14 spider species. His material could be used in a comparison of the fauna of *Lycosidae* (5 species): when compared with the core of the Mrtvý luh, the index of similarity was low (25) whereby only two of the 14 species were common to both localities, i.e., *P. uliginosus* and *P. hygrophilus*. According to the number of recovered specimens, this was remarkably high for *P. sphagnicola* which, together with the second most numerous species – *P. uliginosus* – were the dominant species of the locality.

Rejvíz (N-Moravia, Jeseníky Mts., mapping square 5769, altitude 734–794)

Although the sampling methods used by KRATOCHVÍL and MILLER (1947) and MILLER (1951) did not allow for a comparison based on quantitative methods, the precision of their working methods and the completeness of their list of species (138 in their own samples, 164 together with samples collected by KRATOCHVÍL et SCHUBERT, 1933) enabled a qualitative comparison of spider communities, which was made also by BUCHAR (1963) in the case of the locality Kvildská slať.

When comparing the arachnofauna of the core of Mrtvý luh (sampling all layers of habitats I–III) with that of two habitats of Rejvíz (which MILLER (1951) called "biochores") – the taiga at the Malé Jezírko and the taiga at the Velké Jezírko, and complemented by the species identified by KRATOCHVÍL et MILLER (1947), the Sorensen index of similarity was 51.3. It was surprising that the list of *Lycosidae* given by MILLER (1951) contained only 7 species, while KRATOCHVÍL et MILLER (1947) reported 13 species of the family (the total number of species in the family is 14). A slightly lower index of similarity (48) was obtained for *Lycosidae* resident in the very core of Mrtvý luh (with 6 species common to both localities). Of the species dominant in the locality Mrtvý luh, *Gnaphosa microps* and *Pardosa hyperborea* were not found at Rejvíz, *Pirata uliginosus* occurred in both localities. Of the "tyrphobionts", *Taranucnus setosus* was absent in Rejvíz, *Theonoe minutissima* was present there. Common to both localities were *Notioscopus sarcinatus* (from outside the core of Mrtvý luh) and *Hillhousia misera*. The latter was one of the four relicts of Rejvíz common to both localities. (According to MILLER, 1951, other relict species of the locality Rejvíz were *Clubiona kulczynskii, Latithorax faustus, Asthenargus perforatus.)*

Na Skřítku (N-Moravia, Hrubý Jeseník, mapping square 6068, altitude 820–870 m; Majkus, 1987)

The Sorensen index of species similarity was relatively low (39.3) when comparing the arachnofauna of the peat bog Na Skřítku with that of the core of Mrtvý luh (habitats I–III). Out of the 16 species of *Lycosidae*, 8 were common to both peat bogs (S = 66.7). Dominant species varied considerably

in the two localities: the dominant species of Na Skřítku – *Coelotes terrestris* – was just a receding species in the core af Mrtvý luh, similar to *Pardosa riparia* and *Trochosa terricola,* dominant at Na Skřítku, receding to subreceding at Mrtvý luh. *Pirata uliginosus* and *P. hygrophilus* were dominant in both localities (at Mrtvý luh at least in one of habitats I–III). By contrast, the species *Gnaphosa microps* and *Pardosa hyperborea* were dominant at Mrtvý luh (habitat III) but absent in the locality Na Skřítku. Species attaining a dominance between 5 and 10 % at Mrtvý luh, were either receding to subreceding in the locality Na Střítku (*Agroeca brunnea, Alopecosa pulverulenta, Centromerus arcanus, Pardosa pullata)* or absent (*Antistea elegans*). *Pardosa sphagnicola* was absent in both localities. Of the species typical of raised peat bogs, these were *Pirata uliginosus* and *Notioscopus sarcinatus,* the latter appearing as a receding species.

Our data obtained from a comparison of the arachnofauna of the individual peat bogs indicated that *Pirata uliginosus,* one of the "leading" species, occurred in all but the Krkonoše peat bogs. It was the dominant species of Mrtvý luh, Kvildská slať and Borkovická blata, and according to the results of a qualitative or orientational evaluation of samples, in all peat bogs examined. *Pardosa hyperborea* and *Gnaphosa microps* were dominant in raised peat bogs of the Šumava Mts., absent in all other localities! The distribution of the species *Pardosa sphagnicola* is not quite clear. Its presence appeared to be influenced by the altitude of the locality in that it was absent in Mrtvý luh and in all peat bogs of S-Bohemia (low altitudes) such as Červené Blato and Borkovická blata, but dominant in mountainous peat bogs (BUCHAR (1963, 1977) – data on Kvildská slať and peat bogs of the Orlické hory (Mts.), my recent findings in mountainous raised peat bogs and at Borová Lada in the Šumava Mts.). However, KRATOCHVÍL et MILLER (1947) found the species at Rejvíz, i.e. in an altitude similar to that of Mrtvý luh. Why the species did not spread from Borová Lada to Mrtvý luh by way of wetland ecosystems connecting the two peat bogs over a distance of 20 kilometres is still an open question.

The present study of the peat bog Mrtvý luh disclosed specific spider communities which were greatly dissimilar to communities of other known peat bogs. Apparently, the same may be said of all other peat bogs of Bohemia and Moravia, for which data on the arachnofauna are available. Just a certain similarity was observed between the community of habitat III – Mrtvý luh and that of an unshaded site of Kvildská slať, in both of which *Pardosa hyperborea* and *Graphosa microps* were the dominant species. Nevertheless, the arachnofauna of Mrtvý luh ought not to be regarded as a "connecting link" in the mosaic-like distribution of spider communities of other known peat bogs, but as another community unique in its quantitative and qualitative composition.

SUMMARY

The arachnofauna of the peat bog Mrtvý luh (Šumava Mts., Bohemia) was examined between 1980 and 1981. The material collected with various sampling methods consisted of 4753 specimens belonging to 200 species and 18 families. Of the 10 habitats selected for sampling, three made up the core of the peat bog, seven its periphery.

The epigeic arachnofauna was sampled in six habitats using formalin pitfall traps from which 2805 specimens were obtained. A quantitative analysis of the spider material showed these results:

Gnaphosa microps and *Pirata uliginosus* were dominant in all three habitats (core) of the peat bog, *Pardosa hyperborea* was another eudominant species inhabiting open spaces (without a canopy) in the central part of the peat bog. Other eudominant species were found in peripheral habitats (apart from *P. uliginosus* in a habitat with Betulion pubescentis). These were: *Pirata hygrophilus, Bathyphantes gracilis, B. nigrinus, Pachygnatha listeri* and *Trochosa spinipalpis.* Dominance was most highly concentrated in the core of the peat bog (with a canopy of *P. mugo,* 0.27);

– the psychrophile component (BUCHAR 1975) was dominant in all six habitats. Its dominance was more marked in the core of the peat bog and in a birch stand. The nonspecific component was considerably better represented in peripheral (marginal) habitats;

– a positive relationship between the terrestrial arachnofauna of habitats of the raised part of the pest bog, with a canopy of *P. mugo,* and the central part without a canopy was indicated by Renkonen's index of similarity and the coefficient of concordance. Relationships between these three habitats and those on the periphery of the peat bog were negative;

– the degree of relictness (BUCHAR 1983) was highest in the epigeic arachnofauna of the core of the peat bog, in which all eudominant species were relicts of the 1st order. Eudominant relicts of the 1st order inhabiting marginal habitats were *Pirata uliginosus* (Betulion pubescentis) and *Mengea warburtoni* (sedge meadows). Relicts of the 1st order attained a higher of dominance than relicts of the 2nd order in the raised part of the peat bog, but in marginal habitats, the dominance of the latter was 4.5–5.5 times as high as that of relicts of the first order. The representation (in %) of expansive species was highest in marginal habitats – sedge meadow and stand of *Spiraea salicifolia,* but did not surpass 45% regarded as the limit in a nature conservancy (RŮŽIČKA 1981).

The arachnofauna both of the herbaceous and the tree layers, sampled with the methods of sweeping and beating, consisted mainly of species of the psychrophile and nonspecific components. Except for *Centromerus alnicola, Erigonella ignobilis, Evarcha laetabunda, Gonatium rubens, Hillhousia misera, Lepthyphantes obscurus, Maro minutus, M. sublestus, Metopobactrus prominulus, Notioscopus sarcinatus, Porrhomma campbelli, P. convexum, Theridion ohlerti* (relicts of the 1st order), the arachnofauna of the two layers was represented both by relicts of the second order and expansive species.

The first documented findings of the species *Haplodrassus moderatus* and *Savignya frontata* were of utmost importance from a faunistic point of view. Another point of interest was the presence of *Evarcha laetabunda,* until now recovered almost exclusively from xerothermal habitats and therefore regarded as a member of the thermophilic component.

The dominant wolf spider species present in the core of the peat bog Mrtvý luh were *Pirata hygrophilus,* which preferred open, unshaded sites without *P. mugo,* and *P. uliginosus* eudominant both in unshaded and shaded sites (with *P. mugo*).

In addition, data on the results of the present study on the arachnofauna of the peat bog Mrtvý luh were compared with those obtained from arachnological investigations of seven other peat bogs of Bohemia and Moravia.

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ANTONÍN KŮRKA

ARACHNOFAUNA RAŠELINIŠŤ ČECH. PAVOUCI (ARANEIDA) STÁTNÍ PŘÍRODNÍ REZERVACE MRTVÝ LUH NA ŠUMAVĚ

V letech 1980–1981 jsem zkoumal arachnofaunu rašeliniště Mrtvý luh (Šumava, jižní Čechy). Materiál pavouků byl získán celkem na deseti stanovištích, z nichž tři jsou součástí vlastního vrchoviště, zbylá byla zvolena na okrajových biotopech. Metodami formalinových pastí, smyků, sklepávání, prosevu a individuálním sběrem zde bylo získáno 4753 kusů, náležejících 200 druhům a 18 čeledím.

Metodou formalinových pastí aplikovanou pro studium arachnofauny epigeonu na šesti stanovištích, bylo získáno 2805 kusů, jejichž kvantitativním rozborem bylo zjištěno:

– na všech třech stanovištích vlastního vrchoviště byly eudominantními druhy *Gnaphosa microps* a *Pirata uliginosus*. V centrální části vrchoviště bez zápoje byl ještě eudominantní druh *Pardosa hyperborea*. Na okrajových stanovištích byly zjištěny jiné eudominantní druhy (kromě *P. uliginosus* na biotopu Betulion pubescentis): *Pirata hygrophilus, Bathyphantes gracilis, B. nigrinus, Pachygnatha listeri* a *Trochosa spinipalpis*. Největší soustředěnost dominance (0.27) vykázala epigeická arachnofauna na centrálním vrchovišti se zápojem blatky;

– na všech šesti stanovištích převažovala psychrofilní složka (podle BUCHARA, 1975), zřetelněji na vlastním vrchovišti a v březovém porostu, na okrajových biotopech byla významněji zastoupena složka nespecifická;

– Renkonenův index podobnosti a koeficient konkordance shodně vykazují pozitivní příbuznost terestrické arachnoufauny stanovišť vlastního vrchoviště se zápojem blatky s centrálním stanovištěm bez zápoje a negativní příbuznost arachnofauny těchto tří stanovišť na vlastním vrchovišti s arachnofaunou okrajových biotopů;

– nejvyšší stupeň reliktnosti (BUCHAR, 1983) vykazuje arachnofauna epigeonu vlastního vrchoviště, kde všechny eudominantní druhy jsou zároveň relikty I. řádu. Na okrajových biotopech byly eudominantní relikty I. řádu *Pirata uliginosus* (Betulion pubescentis) a *Mengea warburtoni* (ostřicová louka). Relikty II. řádu nedosáhly na vlastním vrchovišti dominance reliktů I. řádu, naopak na okrajových biotopech byla jejich dominance 4,5–5,5× vyšší než dominance reliktů I. řádu. Expanzívní druhy byly procentuálně nejvýše zastoupeny na okrajových biotopech – ostřicové louce a porostu *Spiraea salicifolia;* na žádném zkoumaném stanovišti nedosáhla expanzívní složka hodnoty 45 %, kterou jsou podle RŮŽIČKY (1986) limitovány přírodní rezervace.

Arachnofauna bylinné a stromové etáže, získaná metodou smyků a sklepávání vykazuje vysoký podíl druhů psychofilní a nespecifické složky; až na výjimky (*Centromerus alnicola, Erigonella ignobilis, Evarcha laetabunda, Gonatium rubens, Hilhousia misera, Lepthyphantes obscurus, Maro minutus, M. sublestus, Metopobactrus prominulus, Notioscopus sarcinatus, Porrhomma campbelli, P. convexum, Theridion ohlerti* jako relikty I. řádu) je arachnofauna bylinného a stromového patra zastoupena relikty II. řádu a expanzivními druhy.

Faunisticky nejvýznamnější jsou nálezy druhů *Haplodrassus moderatus* a *Savignya frontata*, které jsou prvými nálezy pro území Čech. Zajímavý je nález druhu *Evarcha laetabunda*, dosud sbíraném téměř výhradně na xerotermních lokalitách a proto zařazeného do termofilní složky.

Na rašeliništi Mrtvý luh bylo zjištěno, že z vůdčích druhů slíďáků v centrální části vrchoviště preferuje *Pirata hygrophilus* volný nezastíněný biotop bez blatky, zatímco *Pirata uliginosus* je eudominantní jak na části nezastíněné, tak i na zastíněném biotopu porostem blatky.

V práci jsou dále srovnávány výsledky výzkumu arachnofauny Mrtvého luhu s dosavadními poznatky získanými arachnologickými výzkumy sedmi dalších rašelinišť Čech a Moravy.

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