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Spiders (Araneae) of dwarf Norway spruces

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Abstract: Spiders of dwarf Norway spruce in Rokytská Slat' peat bog, Šumava Mountains, South Bohemia, were studied. Material was collected using desk pitfall traps, which are situated among branches within dense canopy. *Cryphoeca silvicola*, *Ceratinella brevis*, *Agyneta conigera* and *Clubiona norvegica* are the most frequent species. *Cryphoeca silvicola*, *Ceratinella brevis*, *Agyneta conigera*, *Lepthyphantes obscurus* and *Clubiona trivialis* proved to be most numerous. *Clubiona norvegica*, *Gnaphosa badia*, *Micaria aenaea* and *Achaearanea ohlerti* occur in the Czech Republic exclusively in peat bogs in Šumava mountains.

Key words: spiders, dwarf trees, Norway spruce, peat bog, pitfall traps, late frost.

Introduction

Spiders of peat bogs in the Czech Republic are intensively studied (Miller 1951, Buchar 1967, Majkus 1987, Kůrka 1990, 1995b). The main part of material is collected by pitfall traps, other methods (sweeping, beating, sieving) are also used. A lake of cold air builds up in the most low-lying areas of mountain peat bogs, as a result of the flow of cold air (Geiger 1966). These small-scale topographic influences causes the presence of nights with late frost. Special dwarf forms of Norway spruce occur in such cold-air pools of some peat bogs in the Šumava mountains. Their shape is formed prevalingly by late frosts in June and July; young branches are destroyed, new ones grow from adventive buds and the canopy turns thick. A canopy of these (mostly 1-2 m high) spruces is built by a very dense labyrinth of branches making collecting of material complicated. Buchar (1967) found in this niche in Šumava Mountains boreoalpin spider *Stemonyphantes conspersus* (L. Koch, 1879), Spitzer & Elsner found in an area of these dwarf spruces boreo-montane noctuid moth *Anomogyne sincera* H. S. I probe to obtain spider material from canopies of dwarf spruces by desk pitfall traps.

Territory and site examined

The territory of the broad southern corner of the Czech Republic includes the geomorphological unit of the Jihočeská Vysočina (South Bohemian Highland). About 125 km long and 80 km broad, the Šumava Mountains (Bohemian Forest), form an important part of the Czech border mountain system. Rising up 1 000 m, the edges of the Šumava Mts. lie on both sides of the Czech-German and Czech-Austrian borders. The tops of the highest peaks rise as much as 300 m and more above the flat mountain plateau.

Extensive primeval forests on mountain slopes and numerous great peatbogs on flat plateaus, gentle slopes and in valleys form the main part of natural riches of Šumava National Park. Rokytská Slat' is a part of Modravské Slati Natural Monument, a complex of numerous peat bogs in the spring area of Vydra river. It lies at an altitude of about 1 100 m, and is 195 ha in area. The annual average temperature is 3.45 °C, the average temperature in January is –4.7 °C, in July 12.2 °C. The annual precipitation amounts 1486 mm, the snow cover persists in average for 140 days (Dohnal et al. 1965). Dwarf pine (*Pinus mugo*) grows in the flat upper part of peat bogs, the area is full of small lakes,

small shrubs (*Vaccinium uliginosum*, *Empetrum hermaphroditum*, *Vaccinium vitis-idaea*, *Vaccinium myrtillus*, *Oxycoccus quadripetalus*, *Andromeda polifolia*) are present, other vegetation is formed by *Eriophorum vaginatum*, *Drosera rotundifolia*, *Scheuchzeria palustris*, *Carex* spp. and *Sphagnum* spp. In the lower part, in terrain depressions along the Rokytká brook, numerous dwarf spruces are present (Fig. 1).

Methods

The material was collected using large desk pitfall traps made of rigid plastic, about 13 cm high and 10.5 cm in diameter. The traps contain a mixture of 7% formalin and 10% glycerol plus a few drops of detergent (Růžička 1982, 1988). These were positioned within of spruce canopy among dense branches. A piece of cloth was connected with a desk and spread on branches, to enlarge the trap's surface. Three traps were positioned on the ground under the lowest branches (i.e. the desk was 13 cm above soil surface), nine traps were positioned in the canopy at least 1 m above ground; three traps in dry, dead spruces, whose branches are overgrown with lichens, six traps in living spruces.

Results and Discussion

A total of 233 spider individuals belonging to 44 species were collected (Table 1).

The catch in living spruces was more numerous than that in dry spruces. The catch in near ground pitfalls was higher and more rich in species than that in traps situated high in the canopy.

14 species were collected exclusively by beating (all species of families Araneidae, Theridiidae, and e.g. *Metellina segmentata* and *Heliophanus dampfi*), 22 species were collected exclusively by pitfall traps, 8 species only were collected by both methods used. These facts document repeatedly great differences in species composition of material collected by different methods (Clausen 1987).

Cryphoea silvicola, *Ceratinella brevis*, *Agyneta conigera*, and *Clubiona norvegica* proved to be the most frequent spider species in canopies of dwarf Norway spruces (they were collected in at least four traps). All these species were found both in near ground and above ground pitfalls.

Cryphoea silvicola, *Ceratinella brevis*, *Agyneta conigera*, *Lepthyphantes obscurus* and *Clubiona trivialis* proved to be the most numerous, *Achaearanea ohlerti* and *Clubiona norvegica* are also numerous.

Pardosa prativaga was found exclusively in near ground traps. One specimen of *Gnaphosa badia* was collected at the height of 140 cm.

Achaearanea ohlerti and *Clubiona trivialis* were collected by beating prevailing in canopies of dry spruces, *Heliophanus dampfi* was collected by beating of prevailing living spruces.

Cryphoea silvicola is a typical inhabitant of Norway spruce trunks at an altitude of 1 100 m a.s.l. in the Bavarian Forest National Park (Weiss 1995).

Kůrka (1990, 1995b) obtained spider material by beating canopies of dwarf pines (*Pinus mugo*) on two peat bogs in the Šumava Mts. (Table 2). *Clubiona trivialis* only one species was found numerously on Rokytská Slat' peat bog and at these two comparative localities. *Theridion varians* and *Entelecara congeners* are characteristic species of dwarf pine in Mrtvý Luh peat bog. *Dismodicus elevatus* and *Achaearanea ohlerti* are characteristic for dwarf pine in Zhůřská Slat' peat bog. *Cryphoea silvicola*, *Ceratinella brevis* and *Clubion norvegica* had not been collected on dwarf pines in these localities.

Clubiona norvegica, *Gnaphosa badia*, *Micaria aenaea* and *Achaearanea ohlerti* occur in the Czech Republic exclusively in peat bogs in the Šumava Mts., lying at an altitude more than 1000 m a.s.l. These peat bogs represent severe semi-open wetland country, with sporadic dwarf needle trees. *Achaearanea ohlerti* lives on tree branches, *Clubiona norvegica* was collected in most cases also on trees, *Gnaphosa badia* lives both arboreal and epigeic, *Micaria aenaea* is epigeic species (Buchar 1989, Kůrka 1995a).

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Table 1. Survey of material. ♂/♀.

	pitfall traps		beeting
	ground	above ground	
Theridiidae			
<i>Achaearanea ohlerti</i> (Thorell, 1870)	–	–	2/7
<i>Theridion sisypium</i> (Clerck, 1757)	–	–	–/1
<i>Theridion varians</i> Hahn, 1833	–	–	–/1
Linyphiidae			
<i>Agyneta conigera</i> (O. P.-Cambridge, 1863)	1/2	4/–	2/7
<i>Bolyphantes alticeps</i> (Sundevall, 1833)	–/3	–	–
<i>Centromerus arcanus</i> (O. P.-Cambridge, 1873)	1/–	–	–
<i>Centromerus sylvaticus</i> (Blackwall, 1841)	1/–	–	–
<i>Ceratinella brevis</i> (Wider, 1834)	5/8	1/2	1/–
<i>Dismodicus elevatus</i> (C. L. Koch, 1838)	–	–	–/1
<i>Drapetisca socialis</i> (Sundevall, 1833)	–	1/2	–
<i>Entelecara congenera</i> (O. P.-Cambridge, 1879)	–	1/–	–/1
<i>Erigone arta</i> Blackwall, 1833	–	–/1	–
<i>Erigone dentipalpis</i> (Wider, 1834)	–	–	–
<i>Gongylidiellum vivum</i> (O. P.-Cambridge, 1875)	–	–	1/–
<i>Hilaira tatraica</i> Kulczyński, 1915	–/1	–	–
<i>Lepthyphantes alacris</i> (Blackwall, 1853)	2/–	–	–
<i>Lepthyphantes cristatus</i> (Menge, 1866)	1/–	–	–
<i>Lepthyphantes mengei</i> Kulczyński, 1887	–	1/–	–/1
<i>Lepthyphantes obscurus</i> (Blackwall, 1841)	3/2	2/–	4/2
<i>Maso sundevalli</i> (Westring, 1851)	–/1	–	–
<i>Moebelia penicillata</i> (Westring, 1851)	1/–	–	–
<i>Nerienne clathrata</i> (Sundevall, 1830)	1/–	–	–
<i>Nerienne emphana</i> (Walckenaer, 1841)	–	–	–/1
<i>Pityohyphantes phrygianus</i> (C. L. Koch, 1836)	–/1	–/1	–/3
<i>Walckenaeria antica</i> (Wider, 1834)	1/1	–	–
<i>Walckenaeria nudipalpis</i> (Westring, 1851)	1/–	–	–
Tetragnathidae			
<i>Metellina segmentata</i> (Clerck, 1757)	–	–	–/1
Araneidae			
<i>Araneus diadematus</i> Clerck, 1757	–	–	–/1
<i>Larinioides patagiatus</i> (Clerck, 1757)	–	–	1/5
<i>Zilla diodia</i> (Walckenaer, 1802)	–	–	2/–
Lycosidae			
<i>Pardosa prativaga</i> (L. Koch, 1870)	13/1	–	–
<i>Trochosa spinipalpis</i> (F. O. P.-Cambridge, 1895)	2/–	–	–
Hahniidae			
<i>Cryphoeca silvicola</i> (C. L. Koch, 1834)	33/5	36/3	–/6
<i>Hahnia pusilla</i> C. L. Koch, 1841	–	–	–/1

Clubionidae

<i>Clubiona compta</i> C. L. Koch, 1839	–	–	–/1
<i>Clubiona kulczynskii</i> Lessert, 1905	–/1	–	–
<i>Clubiona norvegica</i> Strand, 1900	1/3	2/1	–
<i>Clubiona trivialis</i> C. L. Koch, 1843	1/–	1/2	3/6

Gnaphosidae

<i>Gnaphosa badia</i> (L. Koch, 1866)	–/1	–/1	–
<i>Haplodrassus signifer</i> (C. L. Koch, 1839)	–/1	–	–
<i>Micaria aenea</i> Thorell, 1871	–/1	–	–
<i>Zelotes latreillei</i> (Simon, 1878)	1/–	–	–

Zoridae

<i>Zora nemoralis</i> (Blackwall, 1861)	1/–	–	–
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Salticidae

<i>Heliophanus dampfi</i> Schenkel, 1923	–	–	–/6
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Total number of specimens	102	62	69
Total number of species	26	12	22

Table 2. Dominant species of needle trees in peat bogs in the Šumava Mountains. 1. Rokytská Slat', 1 100 m a.s.l., Norway spruce, pitfall traps, 2. dtto, beeting, 3. Zhůrská Slat', 1 130 m a.s.l., dwarf pine, beeting (Kůrka 1995b), 4. and 5. Mrtvý Luh, 740 m a.s.l., dwarf pine, beeting on two localities (Kůrka 1990). The species with dominance reaching at least at one locality 4% are given. + means less than 1%. *Pardosa pratriga* as common epigeic species is not included.

	1	2	3	4	5
<i>Clubiona norvegica</i> Strand, 1900	4	–	–	–	–
<i>Ceratinella brevis</i> (Wider, 1834)	10	1	–	–	–
<i>Cryphoeca silvicola</i> (C. L. Koch, 1834)	47	9	–	–	–
<i>Agyneta conigera</i> (O. P.-Cambridge, 1863)	4	13	+	–	–
<i>Lepthyphantes obscurus</i> (Blackwall, 1841)	4	9	+	–	–
<i>Larinioides patagiatus</i> (Clerck, 1757)	–	9	–	–	–
<i>Achaearanea ohlerti</i> (Thorell, 1870)	–	13	33	–	–
<i>Clubiona trivialis</i> C. L. Koch, 1853	2	13	7	17	46
<i>Entelecara congenera</i> (O. P.-Cambridge, 1879)	1	1	–	19	–
<i>Heliophanus dampfi</i> Schenkel, 1923	–	9	+	–	–
<i>Dismodicus elevatus</i> (C. L. Koch, 1838)	–	1	48	–	–
<i>Theridion varians</i> Hahn, 1833	–	1	+	22	10
<i>Dictyna arundinacea</i> (Linné, 1758)	–	–	–	6	6
<i>Xysticus audax</i> (Schrank, 1803)	–	–	+	4	4
<i>Dendryphantes rudis</i> (Sundevall, 1832)	–	–	–	3	5
<i>Dictyna pusilla</i> Thorell, 1856	–	–	–	6	8