Proc. 16th Europ. Coll. Arachnol.	281-287	Siedlce, 10.03.1997

Spiders (Araneae) of dwarf Norway spruces

Vlastimil RŮŽIČKA

Institute of Entomology, Branišovská 31, 370 01 Ceské Budějovice, Czech Republic.

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

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 were situated among branches within dense canopy. *Cryphoeca silvicola*, *Ceratinella brevis*, *Agyneta conigera* and *Clubiona norvegica* were 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 the Šumava Mountains.

INTRODUCTION

Spiders of peat bogs in the Czech Republic have been intensively studied (Miller 1951; Buchar 1967; Majkus 1987; Kůrka 1990, 1995b). Most material is being collected by pitfall traps, other methods (sweeping, beating, seeing) are also being 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 result in 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 predominantly by late frosts in June and July when young branches are destroyed and new ones grow from adventive buds and thus the canopy thickens. 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 boreoalpine spider *Stemonyphantes conspersus* (L. Koch, 1879), Elsner and Spitzer (1975) found there 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).

Fig. 1. Rokytská Slat' peat bog with dwarf Norvay spurces.

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 valleys form the main part of the 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 1,486 mm, the snow cover persist on the 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 Rokytka 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 contained 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 the 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 were overgrown with lichens, six traps in living spruces.

RESULTS AND DISCUSSION

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

Tab. l. Survey of material. M/F.

	pitfall traps		beeting
	near ground	above ground	
Theridiidae			
Achaearanea ohlerti (Thorell, 1870)	-	-	2/7
Theridion sisyphium (Clerck, 1757)	-	-	-/1
Theridion varians Hahn, 1833	-	-	-/1
Linyphiidae			
Agyneta conigera (O. P.-Cambridge, 1863)	1/2	4/-	2/7
Bolyphantes alticeps (Sundevall, 1833)	-/3	-	-
Centromerus arcanus (O. P.-Cambridge, 1873)	1/-	-	-
Centromerus sylvaticus (Blackwall, 1841)	1/-	-	-
Ceratinella brevis (Wider, 1834)	5/8	1/2	1/-
Dismodicus elevatus (C. L. Koch, 1838)	-	-	-/1
Drapetisca sociali.s (Sundevall, 1833)	-	1/2	-
Entelecara congenera (O. P.-Cambridge, 1879)	-	1/-	-/1
Erigone arta Blackwall, 1833	-	-/1	-
Erigone dentipalpis (Wider, 1834)	-	-	
Gongylidiellum vivum (O. P.-Cambridge, 1875)	-	-	1/-
Hilaira tatrica Kulczyński, 1915	-/1	-	-
Lepthyphantes alacris (Blackwall, 1853)	2/-	-	-
Lepthyphantes cristatus (Menge, 1866)	1/-	-	-
Lepthyphantes mengei Kulczyński, 1887	-	1/-	-/1
Lepthyphantes obscurus (Blackwall, 1841)	3/2	2/-	4/2
Maso sundevalli (Westring, 1851)	-/1	-	-
Moebelia penicillata (Westring, 1851)	1/-	-	-
Neriene clathrata (Sundevall, 1830)	1/-	-	-
Neriene emphana (Walckenaer, 1841)	-	-	-/1
Pityohyphantes phrygianus (C. L. Koch, 1836)	-/1	-/1	-/3
Walckenaeria antica (Wider, 1834)	1/1	-	-
Walckenaeria nudipalpis (Westring, 1851)	1/-	-	-
Tetragnathidae			
Metellina segmentata (Clerck, 1757)	-	-	-/1
Araneidae			
Araneus diadematus Clerck, 1757	-	-	-/1
Larinioides patagiatus (Clerck, 1757)	-	-	1/5
Zilla diodia (Walckenaer, 1802)	-	-	2/-
Lycosidae			
Pardosa prativaga (L. Koch, 1870)	13/1	-	-
Trochosa spinipalpis (F. O. P.-Cambridge, 1895)	2/-	-	-
Hahniide			
Cryphoeca silvicola (C. L. Koch, 1834)	33/5	36/3	-/6
Hahnia pusilla C. L. Koch, 1841	-	-	-/1
Clubionidae			
Clubiona comta C. L. Koch, 1839	-	-	-/1

Tab. 1 cont.

	pitfall traps		beeting
	near ground	above ground	
Clubiona kulczynskii Lessert, 1905	-/1	-	-
Clubiona norvegica Strand, 1900	1/3	2/1	-
Clubiona trivialis C. L. Koch, 1843	1/-	1/2	3/6
Gnaphosidae			
Gnaphosa badia (L. Koch, 1866)	-/1	-/1	-
Haplodrassus signifer (C. L. Koch, 1839)	-/1	-	-
Micaria aenea Thorell, 1871	-/1	-	-
Zelotes latreillei (Simon, 1878)	1/-	-	-
Zoridae			
Zora nemoralis (Blackwall, 1861)	1/-	-	-
Salticidae			
Heliophanus dampfi Schenkel, 1923	-	-	-/6
Total number of specimens	**102**	**62**	**69**
Total number of species	**26**	**12**	**22**

Tab. 2. Dominant species of needle trees in peat bogs in the Šumava Mountains. Rokytská Slat', 1,100 m a.s.l., Norvay spruce, pitfall traps, 2. dtto, beeting, 3. Zhůřská Slat', 1,130 m, dwarf pine, beeting (Kůrka 1995b), 4. and 5. Mrtvý Luh, 740 m, 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 prativaga* as common epigeic species is not included.

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

Cryphoeca 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 higher pitfalls.

Cryphoeca silvicola, *Ceratinella brevis*, *Agyneta conigera*, *Lepthyphantes obscurus* and *Clubiona trivialis* proved to be the most numerous, *Achaearanea ohlerti* and *Clubiona norvegica* were 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 predominantly in the canopies of dry spruces, *Heliophanus dampfi* was collected by beating of predominantly living spruces.

Cryphoeca silvicola is a typical inhabitant of Norway spruce trunks at an altitude of 1,100 m 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. (Tab. 2). *Clubiona trivialis* only one species was found numerously on Rokytská Slat' peat bog and at these two comparative localities. *Theridion varians* and *Entelecara congenera* 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. *Cryphoeca silvicola*, *Ceratinella brevis* and *Clubiona 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 1,000 m. 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).

Acknowledgement

I am obliged to the authorities at the Šumava National Park for the approval of my field research activities in the National Park. This research was supported by the Grant Agency of the Czech Republic (Project No. 206/96/0326).

REFERENCES

Buchar J. 1967a. Die Spinnenfauna der Pančická louka und der nahen Umgebung. Opera corcontica, **4**: 79-93. (In Czech, Germ. abstr.).

Buchar J. 1967b. Eine wenig bekannte Baldachinspinne *Stemonyphantes pictus* Schenkel, 1930. Věst. čs. Spol. zool., **31**: 116-120.

Buchar J.1989. Recent Bohemian arachnofauna and its employment to evaluation of development of natural conditinos. Diss., Faculty of Natural History, Charles University, Praha, 206 pp. (In Czech).

Clausen I. H. S. 1987. Spiders (Araneae) from Nordmarken on the island of Laeso in Denmark. Faunistic notes, habitat description, and comparison of sampling methods. Ent. Meddr., **55**(1): 7-20.

Dohnal Z. *et al.* 1965: The Czechoslovak peat bogs and fens. Academia, Praha, 332 pp. (In Czech).

Elsner G. & Spitzer K. 1975. *Anomogyne sincera* H. S. - neu für die tschechoslowakische Fauna. Acta sci. nat. Mus. Bohem. merid., **15**: 210. (In Czech, Germ. abstr.).

Klášterský I. 1969. Die Frostformen der Fichten. Zpravodaj CHKO Šumava, **10**:14-19. (In Czech, Germ. abstr.).

Kůrka A. 1990. The arachnofauna of Bohemian peat bogs. Spides (Araneida) of the State Nature Reserve Mrtvý Luh, Sumava Mts. Acta Mus. Nat. Pragae, (B), **46**: 37-78.

Kůrka A. 1995a. Some rare and remarkable spider species (Araneida) from peatbogs of the Czech Republic. Časopis Národního muzea, Řada přírodovědná, **164**: 77-86.

Kůrka A. 1995b. The arachnofauna of Bohemian peatbogs. Spiders (Araneida) of two peatbogs in the Šumava mountains. Acta Mus. Nat. Pragae, (B), **50** [1994]: 93-106.

Majkus Z. 1987. Die Spinnenfauna (Araneida) des Naturschutzgebietes Moosweichten (Na Skřítku). Acta Fac. Paed. Ostrav., E-17, **103**: 85-102. (In Czech, Germ. abstr.).

Miller F. 1951. Araneous-fauna of the peat-bogs near Rejvíz, High-Jeseník, CSR. Přír. Sborn. Ostrav. kraje, **12**: 202-247. (In Czech, Engl. abstr.).

Růžička V. 1982. Modifications to improve the efficiency of pitfall traps. Newsl. Brit. arachnol. Soc., **34**: 2-4.

Růžička V. 1988. The longtimely exposed rock debris pitfalls. Věst. čs. Společ. zool., **52**: 238- 240.

Sofron J. & Šandová M. 1972. Pflanzengesellschaften des Hochmoores Rokytská slat' (Weitfäller Filz) im Šumava-Gebirge (Böhmerwald). Fol. Mus. Rer. natur. Bohemiae occident., Plzeň, Botanica, **1**: 28 pp.

Weiss I. 1995. Spinnen und Weberknechte auf Baumstämmen im Nationalpark Bayerischer Wald. In: Růžička V. (ed.), Proc. 15th Europ. Coll. Arachnol., České Budějovice, pp. 184-192.