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Distribution of spider and digger wasps (*Hymenoptera: Pompilidae, Sphecidae*) in a mossy pine forest (*Pinetum pleurosum*) in the Berezinsky Biosphere Reserve

Abstract. Malaise's and Moericke's traps set in a mossy pine forest within the Berezinsky Biosphere Reserve have revealed 18 *Pompilidae* species and 44 *Sphecidae* species. The distribution of *Pompilidae* and *Sphecidae* in the forest was not uniform and dependent on the heterogeneity of the pine stand and the forest layer. Insects of both families were found to concentrate in the cutting, and *Sphecidae*, in addition, in the crown.

The main objective of this study was to investigate the species composition and density of spider and digger wasps in a moss pine forest in relation to the spatial structure of the biogeocenosis studied.

The layer distribution of *Pompilidae* and *Sphecidae* was investigated in 1989 and 1990, using 45 Moericke's traps. The relationship between the distribution of these wasps and heterogeneity of the pine stand were studied using three Malaise's traps in 1990. These insect counting methods were described in detail by SAWONIEWICZ (1979) and TERESHKIN and SHLYAKHTENOK (1989) who used Moericke's and Malaise's traps, respectively.

The traps were set in the following sites:

Malaise's traps

I - in the bulk of the pine stand under the canopy

II - in an over groving cutting in the pine forest

III - in the forest margin

Moericke's traps

IV - on the soil (20 traps)

V - in the pine crowns (25 traps)

The *Aculeata* were caught during the whole field season from early May to late September. The material was collected every two weeks.

During the study 590 specimens of 62 species were caught in total.

Pompilidae. In the pine forest 19 *Pompilidae* species were caught (Tab. I). The most numerous were *Arachnospila spissa* (17.9%), *Caliadurgus fasciatellus* (16.3%), *Priocnemis perturbator* (10.5%), *Dipogon bifasciatus* (9.5%), *Priocnemis schioedtei* (8.9%), *Anoplius nigerrimus* (6.3%). The distribution of *Pompilidae* in the forest was not uniform.

Table I. The distribution of *Pompilidae* in the mossy pine forest

Method	Malaise's traps			Moericke's traps	
Trap sites	I	II	III	IV	V
Agenioideus cinctellus SPIN.	1		1		
Anoplius nigerrima SCOP.		9	1	1	1
Anoplius viatica L.		3			
Arachnospila anceps WESM.		1	1		
Arachnospila spissus SCHICEDTE		27	7		
Arachnospila trivialis DHLB.		3	2		
Caliadurgus fasciatellus SPIN.	1	16	14		1
Dipogon bifasciatus GEOFFROY	2	6	5	1	4
Dipogon vechti DAY	1	3	2	1	8
Episyron rufipes L.		3			
Evagetes crassicornis SHUCK.		1			
Evagetes sahlbergi F. MOR.		3			
Priocnemis cordivalvatus HAUPT		1	1		
Priocnemis coriaceus DHLB.		3	3		
Priocnemis exaltata F.		7	3		
Priocnemis hyalinata F.	1	1	3		
Priocnemis perturbator HARRIS	1	3	5	10	1
Priocnemis schioedtei HAUPT		2	15		

The data obtained with Malaise's traps indicate that spider wasps are associated with open areas with rich vegetation. For example, the largest number of species and greatest density of them were recorded in the cutting passing through the pine forest. There 18 species were recorded. A somewhat smaller species number (13) was found in the forest margin. The smallest number (as little as 6 species) was found in the stand bulk under the canopy. Differences were found not only in the species number but also in the composition of the dominant species group. In the stand bulk the density of all species was low. Among abundant species from open sites there were both common species (*Arachnospila spissa, Caliadurgus fasciatellus*) and those dominating only in the cutting (*Anoplius nigerrimus*) and only in the margin (*Priocnemis schioedtei*).

Substantially fewer *Pompilidae* individuals were caught into Moericke's traps than into Malaise's traps. Although the same species were found in Moericke's traps set on the soil and the crown, the ratio of their densities was different. Thus, in the soil traps the *Priocnemis perturbator*, nesting in soil, constituted the majority of the *Pompilidae* caught. The traps set in the crown caught mainly representatives of the *Dipogon* genus which nest in tree trunks and branches.

Thus, the *Pompilidae* distribution in the pine forest depended largely on the heterogeneity of the pine stand. They were found to concentrate in large amounts in open sites (the cutting, in margin). Under the canopy and the upper layer spider wasps were poorly represented.

Sphecidae. The distribution of *Sphecidae* in the pine forest was somewhat different from that of *Pompiliade* (Tab. II). A larger amount of digger wasps was caught in Malaise's traps set in the cutting and margin than in the trap set in the bulk of the forest. Unlike spider wasps, these differences were, however, less distinctive. *Pemphredon lugubris* (40.7%) was the most abundant in the stand bulk and *Nysson spinosus* (25-35%), in the open sites.

Table II. The distribution of *Sphecidae* in the mossy pine forest

Method	Malaise's traps			Moericke's traps	
Trap sites	I	II	III	IV	V
1	*2*	*3*	*4*	*5*	*6*
Alysson ratzeburgi DHLB.		1			
Ammophila sabulosa (L.)		7	2		
Argogorytes mystaceus (L.)	1		2		
Crabro cribrarius (L.)					1
Crabro scutellatus (SCHEV.)	1				
Crossocerus annulipes (LEP. et BRUL.)					1
Crossocerus dimidiatus (F.)					4
Crossocerus megacephalus (ROSSI)					8
Crossocerus nigritus (LEP. et BRUL.)					1
Crossocerus ovalis LEP. et ERUL.					1
Crossocerus quadrimaculatus (F.)	2	1	1		4
Crossocerus tarsatus (SHUCK)					4
Crossocerus vagabundus (PZ.)		1			1
Crossocerus walkeri (SHUCK.)					1
Ectemnius borealis (ZETT.)		1			
Ectemnius cavifrons (THOMS.)					2
Ectemnius guttatus (v. d. LIND.)		2	1		
Ectemnius lapidarius (PZ.)	1	2			
Ectemnius ruficornis (ZETT.)					4
Ectemnius sexcintus (F.)					2
Ectemnius spinipes (A. MOR.)					1
Mellinus arvensis (L.)	6		5		2
Mimesa equestris (F.)	1				
Mimumesa dahlbomi (WESM.)		1			
Nysson spinosus (J. FORST.)		24	20	11	8
Passaloecus corniger SHUCK.					1
Passaloecus eremita KOHL					24
Passaloecus gracilis (CURT.)	1	3	8		11
Passaloecus insignis (v. d. LIND.)				1	50
Passaloecus monilicornis DHLB.		2	1		5

1	2	3	4	5	6
Passaloecus singularis DHLB.		5	5	2	2
Pemphredon morio v. d. LIND.			1		
Pemphredon lethifer SHUCK.		1		1	
Pemphredon lugens DHLB.		1	2		10
Pemphredon lugubris LATR.	11	4	4		11
Pemphredon rugifera (DHLB.)			12		1
Psenulus fuscipennis (DHLB.)	1	2	6		
Psenulus pallipes (PZ.)	1				1
Rhopalum clavipes (L.)		2	3	1	48
Rhopalum coarctatum (SCOP.)					1
Tachyspex pompiliformis (PZ.)		1			
Trypoxylon clavicerum LEP. et SERV.			2		
Trypoxylon figulus (L.)		6			1
Trypoxylon minus DE BEAUMONT			4		

Moericke's traps set on the soil and the crown revealed substantial differences in the level distribution of *Sphecidae*. They were found to concentrate in the crown, where 29 species were recorded. The most abundant species in the crown were *Rhopalum clavipes* (22.7%), *Passaloecus insignis* (23.7%), *P. eremita* (11.4%) while on the soil it was *Nysson spinosus* (68.8%).

Thus, the *Sphecidae* concentration in open sites with ample vegetation and the crown testifies that there exist a relation between *Sphecidae* distribution in the pine forset and availability of areas suitable for their nesting and feeding.

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STRESZCZENIE

[Tytuł: Rozmieszczenie nastecznikowatych i grzebaczowatych żądłówek (*Hymenoptera: Pompilidae, Sphecidae*) w borze sosnowym świeżym (*Pinetum pleurosum*) w Berezyńskim Rezerwacie Biosfery]

W latach 1989-1990 badano skład gatunkowy i struktury zgrupowań żądłówek z rodzin *Pompilidae* i *Sphecidae* w sosnowym borze świeżym w Berezyńskim Re-

zerwacie Biosfery na Białorusi. Odłowy wykonano przy użyciu pułapek Malais'a i szalek Moericke'a. Ogółem odłowiono 590 osobników należących do 62 gatunków (18 gatunków *Pompilidae* i 44 gatunki *Sphecidae*). Gatunkami najbardziej liczebnymi - wśród *Pompilidae* były: *Arachnospila spissus* SCHIOEDTE (17.9%), *Caliadurgus fasciatellus* SPIN. (16.3%), *Priocnemis perturbator* HARRIS (10.5%), *Dipogon bifasciatus* GEOFFROY (9.5%), *Priocnemis schioedtei* HAUPT (8.9%), *Anoplius nigerrima* SCOP. (6.3); - wśród *Sphecidae*: *Nysson spinosus* (J. FORST.) (15.8%), *Rhopalum clavipes* (L.) (13.5%), *Passaloecus insignis* (v. d. LIND.) (12.8%), *Pemphredon lugubris* LATR. (7.5%) i *Passaloecus gracilis* (CURT.) (5.8%). Owady z obu badanych rodzin występowały głównie w miejscach prześwietlonych, ponadto stwierdzono koncentrację *Sphecidae* w warstwie koron.

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