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Abstract.

Epigeic spider communities of a peat bog and their relation with the communities from surrounding habitats were studied in Tapeliai peat bog in 2002. Material was collected in pitfall traps. Six epigeic communities in three peat bog habitats and three in dry surrounding habitats (pine forest, spruce forest and meadow) were studied. A total of 3399 adult specimens belonging to 167 species and 19 families were registered. The highest similarity of the dominating species to the peat bog communities showed the community of the spruce forest, while the communities from pine forest and meadow have had only few common species. The spider communities of the small peat bog investigated are very similar to those found in larger peat bogs of Southern and Eastern Lithuania. Three spider species recorded during the investigation are new to the spider fauna of Lithuania (*Walckenaeria incisa*, *Micromatta virescens*, *Abacoproecis saltuum*).

Key words: Araneae, peatbog, communities, Lithuania

Comunidades de arañas epigeas de una turbera y hábitats adyacentes.

Resumen:

En el año 2002 se estudiaron las comunidades de arañas epigeas de una turbera de Tapeliai (Lituania) y de áreas adyacentes. El material fue recolectado mediante trampas "pitfall". Se estudiaron un total de seis comunidades epigeas: tres turberas y tres hábitats secos circundantes (pinar, abetal y prado). Se capturaron un total de 3399 ejemplares adultos pertenecientes a 167 especies y 19 familias. La similitud más elevada de las especies dominantes se corresponde con las comunidades de abetal y turberas, mientras que el pinar y el prado presentan pocas especies en común. Las comunidades de arañas de las pequeñas turberas estudiadas son muy similares a las existentes en las grandes turberas del sur y este de Lituania. Tres especies de arañas capturadas durante este estudio son nuevas para la fauna lituana. (*Walckenaeria incisa*, *Micromatta virescens*, *Abacoproecis saltuum*).

Palabras clave: Araneae, turberas, comunidades, Lituania

Introduction

Wetlands are the most vulnerable and endangered habitats in Central Europe (Succow, 2000). Also peat bogs were among the most threatened habitats in Lithuania because of intensive peat extraction, lowering of the water table, drainage and reclamation. About 5 % of the Lithuania's area is covered by wetlands. During the past 30 years more than 70% of Lithuanian wetlands have been drained or totally destroyed (Švažas S, 1999). Most of them became highly fragmented or naturally overgrown by forest. There are a lot of investigations of spider fauna of European raised peat bogs (Schikora, 1994, 1997, Koponen 2001, 2002, Relys, 2000, 2001, 2002). There are some studies on the relationships between spider communities living in peat bogs and surrounding dry habitats (Koponen, 1979, Hiebsch, 1980, Vilbaste, 1981). The spider fauna of Lithuanian peat bogs are under active investigation (Relys, 2000, 2002, Biteniekytė, 2006).

The first research about epigeic spider communities in peat bog and surrounding pine forest in Lithuania can be obtained from paper of Relys (2000). The aim of present study was to investigate relationships between epigeic spider communities in small isolated peat bog and surrounding habitats: meadow, pine forest and spruce forest.

INVESTIGATION AREA

The investigation was performed in a small peat bog (Tapeliai) 17 km southeast of Vilnius and surrounding habitats. 6 study sites were chosen (3 in peat bog and 3 in surroundings):

Pine bog 1: (Fig. 1). (54° 46' 08.7"N, 25° 28' 42.6" E). It is typical Ledo – Pinetum community with a well-expressed mould structure of *Sphagnum*. This type of habitat (Code 91DO) has a status of protected area under European Habitat Classification NATURA 2000.

Pine bog 2: (54° 46' 06.0" N, 25° 28' 44.5" E). It is analogical habitat as previous, far-off from Pine bog 1 about 50 meters to southeast.

Open bog: (54° 46' 08.3" N, 25° 28' 49.2"). Habitat code – D1.1/P-51.1135. This is open peat bog area without trees, where *Sphagnum*, *Ledum palustre*, *Calluna vulgaris*, *Vaccinium uliginosum*, *Empetrum nigrum* are dominating. This is the wettest of the sites.

Meadow: (54° 45' 52.6" N, 25° 28' 50.0" E.). Habitat code – E1.9/P-64.11. Dominating plant species are *Festuca ovina* agg., *Corynephorus canescens*, *Carex arenaria*. It is most far from peat bog communities (about 400 m).

Spruce forest: (54° 46' 13,9" N, 25° 28' 44,1" E). Habitat code – G3A/P-42.C1. Dominating plant species are *Picea abies*, *Vaccinium myrtillus*, and very dense moss.

Pine forest: (54° 46' 13,5" N, 25° 28' 50,2" E.). Habitat code – G3B/P-42.C6. In tree level dominating *Pinus silvestris*, in shrub layer growing *Vaccinium vitis-idaea*, *Calluna vulgaris*, *Vaccinium myrtillus*, *Pyrola chlorantha*, *Goodyera repens*, *Lycopodium complanatum*. In moss layer abundantly grows *Pleurozium schreberi*,

Hylocomium splendens, *Dicranum polysetum*, *Dicranum scoparium*.

Material and methods

Pitfall traps were used for collecting the material at six sites. Five pitfall traps (300 ml volume jars, 7cm wide and 10 cm deep) filled with 4% formaldehyde solution mixed with some drops of detergent as preservative were installed in each locality. The pitfall traps were set on in a line in distance of five meters from each other. The traps were emptied once every three weeks. They were exposed from 14th April 2002 to 27th October 2002. Altogether 8 samples were taken. The similarities of dominance levels of spiders at the different sites were counted using percentage similarity index. The diversity index of Shannon-Wiener (log base 2) was used to compare internal complexity of community structure.

The nomenclature of spiders follows Platnick (2006).

Results and discussion

GENERAL OVERVIEW OF THE MATERIAL

Altogether 3399 adult spider specimens belonging to 167 species and 19 families were registered during the investigation. The number of species ranged from 57 in Pine bog 1 to 70 in Open bog (Table I). The highest number of species were found in Open bog (70) and Meadow (66). The lowest species richness was in Pine bog 2 (47) and Pine bog 1 (57). The number of specimens varied between 349 in Meadow and 740 in Pine forest. Eight species: *Robertus lividus*, *Goniatium rubens*, *Pocadicnemis pumila*, *Walckenaeria alticeps*, *Agroeca proxima*, *Zora spinimana*, *Haplodrassus signifer*, *Neon reticulatus* occurred in all 6 habitats. A lot of species (up to 68,0% from the all species in particular set) were not abundant and were represented by 3 or less specimens (N<3). Up to 46.8 % were represented by only 1 specimen. Their occurrence can be considered as accidental and they were not included in calculations of the significance of the differences between the materials from different sets. Three spider species are new to Lithuania spider fauna.

Investigated spider communities according most parameters are characteristic for that type of habitats. Unexpected very high diversity index values of all investigated communities (Hs = 4, 36 - 4, 9). This shows that community structure is even, because of lack of highly dominating species and differences between dominating species are low.

CONNECTION BETWEEN GROUPS OF DOMINATING SPECIES

Were selected 10 the most abundant species of each study site. Totally were estimated 38 species, that in one or even in several investigated habitats were among the 10 most abundant species (Table II). Dominant species of peat bog complex makes separate group and are well isolated from surrounding communities. The biggest similarity in dominating species complex was in habitats Pine bog 1 and Pine bog 2. Seven from 10 most abun-



Fig. 1. The investigation area in site Pine bog.

dant species are common for both habitats. Dominant species of Open bog habitat slightly differed. This community has seven common dominant species with Pine bog 2 and five with Pine bog.

In each of investigated sites there were found only here high dominating level reached species. In Pine bog 2 it was *Hygrolycosa rubrofasciata*, Pine bog1 – *Pirata insularis* (Table 2). In Open bog site there were found three only here dominating species (*Hahnia pusilla*, *Scotina palliardi*, *Glyphesis cotonnae*). The most common dominant species with peat bog complex had spruce forest (*Agroeca proxima*, *Centromerus sylvaticus*, *Walckenaeria alticeps*). Meanwhile Meadow had only two (*Centromerus sylvaticus*, *Trochosa terricola*), Pine forest only one common specie (*Pardosa lugubris*). Comparing separate surrounding habitats with single investigation sites in a peat bog, we see that Spruce forest have in two's common dominating species with each of in peat bog investigated sites. Meanwhile Pine bog have only one common dominant species with one of the peat bog sites (*Pardosa lugubris* with Pine bog 1).

One common dominant specie Meadow has with Pine bog1 (*Centromerus sylvaticus*).

SIMILARITIES OF SPECIES COMPOSITION

Very big differences of species composition were detected comparing Pine bog communities (Pine bog 1, Pine bog2) with adjacent communities of not peat bog habitats (Spruce forest, Pine forest, and Meadow). Comparing species composition for the set of all species found in pine forest, meadow and spruce forest species makes quite similar part of in pine bog complex found species (accordingly 42,85, 44,28 and 38,57 %). Different results are analyzing abundant species group. Most in pine bog communities found abundant species were found in Spruce forest (36 %), meanwhile only small part of this species group were found in Pine forest and Meadow (12 %). With pine forest and meadow communities pine bog have common mostly unimportant (<1% species of community) found species, where of main part are not characteristic peat bog species.

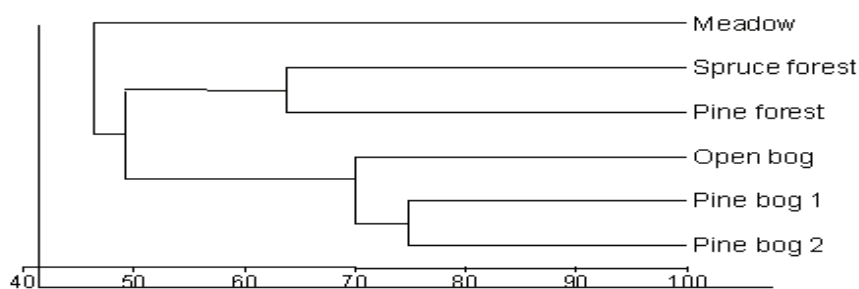


Fig. 2. Percentage similarity of species abundance (N > 1 %).

Similarities between spider communities in pine bog and surrounding habitats (all species %)

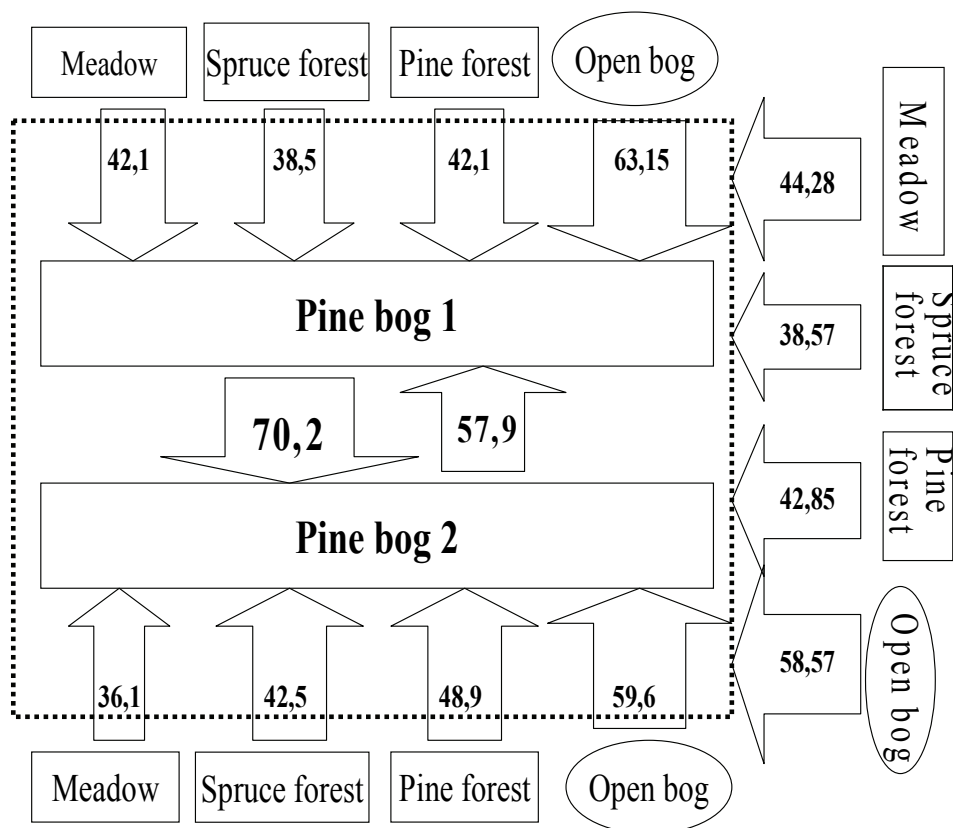


Fig. 3. Similarities between spider communities in pine bog and surrounding habitats (all species %)

Comparison of the species making up more than 1 % of the individuals was done (Fig. 2.) The biggest species similarity was registered between the closely located sites in Ledo pinetum community (Pine bog 1 and Pine bog 2). These habitats had 33 (47, 14 %) species in common. Four of them were registered only in these two habitats. From peat bog complex mostly divergent open peat bog community Open bog. In this community there were 18, 5 % off abundant species (more than 1 %), which were not found in other investigated peat bog communities (Pine bog1 and Pine bog 2). The greatest difference in species similarity and community structure was revealed between Meadow and other investigated communities. In each of in peat bog investigated sites (Pine bog1, Pine bog2 and Open bog) were found only in one particular site living species. This means that despite of similar conditions caused *Sphagnum* coverage in epigeic layer, here are different ecological niche, with different spider species

NEW SPECIES IN LITHUANIA

Three spider species found during the investigation were new to Lithuania. These are *Walckenaeria incisa* (O.P.-Cambridge, 1871), found in site Pine bog 1, *Micromatta virescens* (Clerck, 1757), in Open bog and *Abacoproecis saltuum* (L.Koch, 1872) registered in Spruce forest.

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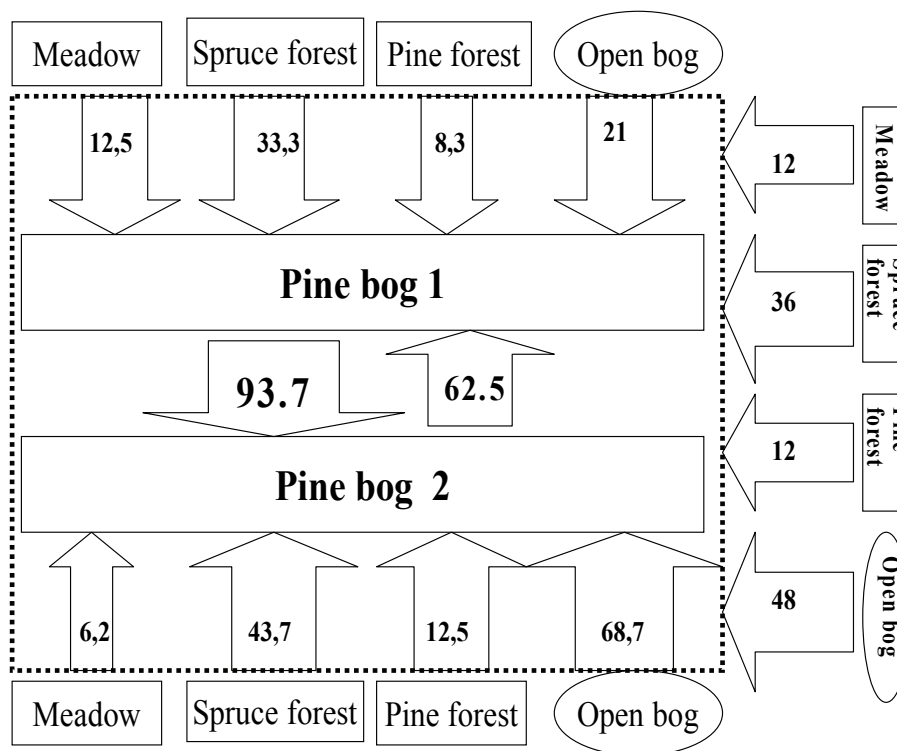


Fig. 4. Similarities between spider communities in pine bog and surrounding habitats (abundant species %)

References

- BITENIEKYTĖ M. & RĖLYS V., 2006. Investigation of activity and vertical distribution of spiders in *Sphagnum* tussocks of peat bogs. *Biologija*, No. 1: 77 – 82.
- HIEBSCH H., 1985. Zur Spinnenfauna der geschützten Hochmoore des Thüringer Waldes. *Landschaftspflege und Naturschutz in thuringe* 22 (3): 71-78
- KOPONEN S., 1979. Differences of spider fauna in natural and man – made habitats in a raised bog. In: The use of ecological variables in environmental monitoring. *The National Swedish Environment Protection Board*, Report PM 1151, Uppsala, 104-108 p.
- KOPONEN S., RĖLYS, V. & DAPKUS D., 2001. Changes in structure of ground-living spider (Araneae) communities on peatbogs along a transect from Lithuania to Lapland. *Norwegian Journal of Entomology*: 48, 167-174 p.
- KOPONEN S. 2002. Ground-living spiders in bogs in Northern Europe. *Journal of Arachnology* 30 : 262-267.
- PLATNICK NI. The World Spider Catalog. Version 3.0/ American Museum of Natural History. New York, 2006. Online at <http://research.amnh.org/entomology/spiders/catalog81-87/index.html>.
- RAŠOMAVIČIUS V., 2001. Europinės svarbos buveinės Lietuvoje. [European significance habitats in Lithuania]. Botanikos institutas, LR Aplinkos ministerija, 138 psl.
- RĖLYS V. & DAPKUS D., 2000. Similarities between epigeic spider communities in a peatbog and surrounding pine forest: a study from southern Lithuania. In S. Toft & N. Scharffeds. *Proc. of the 19th. Europ. Coll. of Arachnol., Arhus*: 207-214.
- RĖLYS V. & DAPKUS D., 2001. Epigeic spider (Arachnida, Araneae) communities in exploited peatbogs of Lithuania. *Norwegian Journal of Entomology*, 48: 153-160.
- RĖLYS V. & KOPONEN S. & DAPKUS D., 2002. Annual differences and species turnover in peat bog spider communities. *Journal of Arachnology*, 30: 416-424
- SCHIKORA H.B., 1994. Changes in the terrestrial spider fauna (Arachnida:Araneae) of a north German raised bog disturbed by human influence. 1964-1965 and 1986-1987: A comparison. *Memoirs of the Entomological Society of Canada* 169: 61-71.
- SUCCOW, M. 2000. *Landschaftsökologische Moorkunde*. Fischer, Stuttgart.
- ŠVAŽAS S., DROBELIS E., BALČIAUSKAS L., RAUDONIKIS L. 2000. Important wetlands in Lithuania. – Vilnius, „Akstis“, 1999.
- VILBASTE A., 1981. The spider fauna of Estonian mires. *Eesti NSV Teaduste Akadeemia Toimetised*, 30. Koide Biologia 1, 7-17

Table 1
Data on the spider communities investigated in Tapeliai peat bog and adjacent habitats in 2002.

	Pine bog 1	Pine bog 2	Open bog	Pine forest	Spruce forest	Meadow
Number of species (S)	57	47	70	62	63	66
Number of individuals (N)	462	608	518	740	722	349
Number of species (N>1%)	24	16	25	20	21	23
Number of species in % (N>1%)	42,1	34,04	38,6	32,3	34,9	34,8
Number of specimens (N>1%)	406	530	440	637	638	276
Species number represented by 1 specimen	17	11	22	18	20	21
Species number in % represented by 1 specimen	36.17	23.4	46.8	38.2	42.5	44.68
Number of species found only in this community	5	3	13	14	18	20
Number of species in % found only in this community	8.77	6.38	18.5	22.5	28.57	30.30
Hs (log2) for the whole set of species	4,81	4,36	4,93	4,5	4,5	4,9
Hs (log2) (N> 1%)	4,2	3,69	4,2	3,8	3,9	3,9

Table II.
Dominant species and their percent part of individuals in investigated communities.

Species	Pine bog 1	Pine bog 2	Open bog	Spruce forest	Pine forest	Meadow
<i>Hygrolycosa rubrofasciata</i>		5.10				
<i>Pirata insularis</i>	3.68					
<i>Agyneta cauta</i>	3.90	8.88				
<i>Centromerus arcanus</i>	5.41	4.77				
<i>Trochosa spinipalpis</i>	10.39	13.32	6.76			
<i>Aulonia albimana</i>	10.61	11.35	6.56			
<i>Pocadicnemis pumilla</i>	6.93	10.36	4.63			
<i>Pirata uliginosus</i>	4.55	4.44	15.44			
<i>Pardosa sphagnicola</i>		6.25	13.13			
<i>Hahnia pusilla</i>			3.67			
<i>Pardosa lugubris</i>	3.46				2.84	
<i>Agroeca proxima</i>		4.77	2.32	4.99		
<i>Walckenaeria alticeps</i>	4.76	5.76	2.51	4.02		
<i>Centromerus sylvaticus</i>	9.52			8.73		4.01
<i>Trochosa terricola</i>				8.59	16.62	20.63
<i>Pirata hygrophilus</i>				18.28		
<i>Agyneta subtilis</i>				9.42		
<i>Miniriolus pusillus</i>				4.02		
<i>Agyneta conigera</i>				3.74		
<i>Tapinocyba pallens</i>				6.65	7.97	
<i>Haplodrassus signifer</i>				2.22	7.97	
<i>Zelotes clivicola</i>					10.54	
<i>Walckenaeria cuculata</i>					9.59	
<i>Walckenaeria antica</i>					5.54	
<i>Alopecosa aculeata</i>					4.19	
<i>Dicymbium nigrum</i>						6.02
<i>Alopecosa pulverulenta</i>						5.73
<i>Pardosa pullata</i>						4.87
<i>Meioneta affinis</i>						3.44
<i>Trochosa ruricola</i>						3.44
<i>Trochsochrus scabriculus</i>						3.44