EESTI NSV TEADUSTE AKADEEMIA TOIMETISED, 29. KÖIDE
BIOLOOGIA. 1980, NR. 4

ИЗВЕСТИЯ АКАДЕМИИ НАУК ЭСТОНСКОЙ ССР. ТОМ 29
БИОЛОГИЯ. 1980, № 4

https://doi.org/10.3176/biol.1980.4.06

УДК 591.5+595.44

Asta VILBASTE

THE SPIDER FAUNA OF ESTONIAN MIRES

Mires cover about 20% of the territory of the Estonian SSR. Of all the mires, 57% are fens, 12% transitional bogs and 31% bogs.

Whereas the larger bogs have only slightly been affected by human activity, in fens and transitional bogs man has considerably altered the course of natural processes. As a result, sparse stands of stunted bog pines and fen birches have been replaced by forests of higher quality.

Of mires, those are especially bogs with their characteristic spider fauna that have attracted the attention of investigators.

Through the papers of F. Peus (1928, 1932), W. Rabeler (1931), R. Krogerus (1960), P. Palmgren (1964, 1965a, b, 1972), S. Koponen (1968) and H. Casemir (1976), we have surveys of the spider fauna of the territories lying south (North-German lowland) as well as north of Estonia (Finland). In Estonia we can refer only to the investigations of A. Dampf (1924—1926) in the twenties of this century and to the papers of H. Kauri (1936, 1937a, b) a decade later. In the sixties and seventies the present author published her surveys of the spider fauna of fens (1969), bogs (1972) and forests of transitional bogs (1973). Several extensive investigations in which spiders are treated from faunistic, ecological or zoogeographical viewpoints, enable investigators to compare the number of species and the abundance of individual species in bogs located at various geographical points. On the one hand, we can observe great similarities in the species composition, on the other we can state great dissimilarities in the abundance of dominant species, depending on the geographical location of the bogs.

Materials for the present survey were collected over a very long period of time (1947—1976) by numerous entomologists for various purposes. In the fens (H. Haberman, J. Vilbaste) and bogs (V. Maavara, to a lesser extent V. Masing, J. Vilbaste, A. Vilbaste) main attention was directed to the investigation of ecological relationships prevailing in the mesofauna of the field layer and the dwarf shrub layer, and the principal part of the material was collected by sweep-net samples (100 strokes). The fauna of the moss layer was investigated to a lesser extent. Later the materials collected in various bogs (Nigula Bog in 1969—1975, Laukasoo and Hara Suursoo bogs in 1975—1976) considerably promoted the knowledge of the mesofauna of the moss layer. The materials of the forests of transitional bogs (A. Kuusik, V. Maavara, J. Vilbaste, A. Vilbaste) were collected equally from the dwarf shrub as well as from the moss layer.

The elaboration of these materials enabled us to explain the species composition, fluctuations in the numbers and some regularities in the

structure of the spider fauna in Estonian mires. In the evaluation of the species composition of spiders, all samples have been made use of (the materials were collected from 28 fens and 42 bogs). In the description of the structure and abundance of the fauna, only quantitative sweep-net (100 strokes) and sieve (1 m^2) samples, made in one mire at least once a month during the whole growing period (in fens 1948, 1951—1952; in transitional bog forests in 1959—1960; in bogs in 1948, 1950, 1952—1953, 1959—1960) were used.

Of fens, mostly grass fens and only a few flooded fens were investigated. More detailed studies were carried out in the *Myrica gale — Schoenus ferrugineus* fen at Avaste by H. Haberman (1956) and J. Vilbaste (1955, 1958).

Of transitional bogs, the present survey covers sparse treed transitional bogs and some transitional bog pine forests of greater density in the vicinity of Sõmerpalu, Väätsa and Venevere.

Of bogs, the Endla and Tähtvere bogs were investigated in greater detail. As bog types only the commonest ones — the treeless bog, the treed bog and the bog pine forest (Masing, Trass, 1955; Masing, 1959) — have been distinguished. The lagg zone — a narrow transitional zone stretching from the mineral soil to the bog — has been dealt with separately.

Altogether 1227 quantitative sweep-net and sieve samples have been collected from Estonian mires, which, together with occasional specimens, contained a total of 35273 specimens belonging to 295 species (Table 1, 2).

To this list must be added the species collected by A. Dampf (1924—1926) and identified by E. Schenkel-Haas, but not found by the author. Only the species found in mires have been included.* They are the following:

Xysticus sabulosus (Hahn)
Philodromus histrio (Latr.)
Tetragnatha ? obtusa C.L.K.
Theridion tinctum (Walck.)
Meta merianae (Scop.)
Bolyphantes luteolus (Bl.)

The species *T. obtusa* has also been found by H. Kauri (1936) in the Endla Bog.

Table 1

Spiders collected in Estonian mires

Methods and collected specimens	Fens	Transitional bog forests	Lagg zone	Bogs	Total
Sweep-net samples	313	170	35	454	972
Sieve samples	74	95	13	73	255
Total number of samples	387	265	48	527	1227
Total number of specimens collected	12287	8023	1118	13845	35273

* A. Dampf's list also contains the species of *Heliophanus auratus* C.L.K., *Erigonidium graminicola* (Sund.), *Trichopterna cito* (O. P.-C.) and *Kaestneria dorsalis* Wid., which he found during his trip to Estonia, but outside mire habitats.

Table 2

Spider species collected in Estonian mires in 1947—1976 (only adults have been counted)

Species	Fens	Transitional bog forests	Lagg zone	Bog			
				Bog pine forest	Treed bog with pools	Treeless bog	Total
1 | 2	3	4	5	6	7	8	9
1. *Dictyna arundinacea* (L.)	+	+	+	+	+	+	+
2. *D. pusilla* Thor.		+				+	+
3. *D. uncinata* Thor.							+
4. *Argenna patula* (Sim.)	+						
5. *Drassodes pubescens* (Thor.)	+						
6. *Haplodrassus signifer* (C. L. K.)	+				+	+	+
7. *H. soerenseni* (Strand)				+			+
8. *H. moderatus* Kulcz.	+	+		+			+
9. *Zelotes lutetianus* (L. K.)	+						
10. *Gnaphosa lugubris* (C. L. K.)	+						
11. *G. intermedia* Holm		+					
12. *G. microps* Holm		+	+				
13. *Micaria pulicaria* (Sund.)	+				+		+
14. *M. subopaca* Westr.		+					
15. *Clubiona reclusa* O. P.-C.		+		+			+
16. *C. subsultans* Thor.	+	+		+			+
17. *C. stagnatilis* Kulcz.	+	+	+	+	+		+
18. *C. norvegica* Strand		+	+				
19. *C. pallidula* (Cl.)				+			+
20. *C. phragmitis* C. L. K.				+			+
21. *C. frutetorum* L. K.	+	+		+			+
22. *C. germanica* Thor.	+	+			+		+
23. *C. neglecta* O. P.-C.		+					
24. *C. trivialis* C. L. K.		+	+	+	+	+	+
25. *C. subtilis* L. K.	+	+			+		+
26. *Cheiracanthium erraticum* (Walck.)	+	+		+	+		+
27. *Agroeca brunnea* (Bl.)	+						
28. *A. proxima* (O. P.-C.)		+					
29. *A. lusatica* (L. K.)		+	+				
30. *Scotina celans* (Bl.)				+			+
31. *S. palliardi* (L. K.)				+	+	+	+
32. *Phrurolithus festivus* (C. L. K.)				+	+		+
33. *Zora. spinimana* (Sund.)	+	+		+	+		+
34. *Z. armillata* Sim.	+						
35. *Anyphaena accentuata* (Walck.)	+	+					
36. *Micrommata virescens* (Cl.)	+	+		+	+		+
37. *Coriarachne depressa* C. L. K.		+		+	+	+	+
38. *Diaea dorsata* (F.)				+			+
39. *Heriaeus hirtus* (Latr.)	+	+			+		+
40. *Misumena vatia* (Cl.)	+	+		+	+		+
41. *Xysticus cristatus* (Cl.)	+	+	+	+	+	+	+
42. *X. kochi* Thor.	+						
43. *X. ulmi* (Hahn)	+	+	+	+	+		+
44. *X. bifasciatus* C. L. K.				+			+

1	2	3	4	5	6	7	8	9
45.	*X. chippewa* Gertsch	+						
46.	*X. lineatus* (Westr.)	+	+		+			+
47.	*X. obscurus* Coll.		+					
48.	*Oxyptila trux* (Bl.)	+	+		+	+		+
49.	*O. gertschi* Kurata	+						
50	*O. atomaria* (Panz.)	+	+	+	+			+
51.	*O. brevipes* (Hahn)	+	+		+			+
52.	*Philodromus aureolus* (Cl.)	+			+			+
53.	*P. cespitum* (Walck.)	+	+	+	+	+	+	+
54.	*P. collinus* C. L. K.				+			+
55.	*P. emarginatus* (Schrk.)	+	+	+	+			+
56.	*P. fuscomarginatus* (Deg.)				+			+
57.	*P. margaritatus* (Cl.)	+						
58.	P. *poecilus* (Thor.)	+						
59.	*Thanatus striatus* C. L. K.	+						
60.	*T. formicinus* (Cl.)	+			+		+	+
61.	*Tibellus maritimus* (Menge)	+	+		+	+	+	+
62.	*T. oblongus* (Walck.)	+	+		+	+		+
63.	*Salticus scenicus* (Cl.)		+					
64.	*S. cingulatus* (Panz.)	+	+		+	+	+	+
65.	*Heliophanus flavipes* C. L. K	+			+	+		+
66.	*H. dampfi* Schkl.	+	+	+	+	+	+	+
67.	*H. dubius* C. L. K.		+			+	+	+
68.	*Marpissa radiata* (Grube)	+	+	+	+			+
69.	*Dendryphantes hastatus* (Cl.)				+			+
70.	*D. rudis* (Sund.)		+		+			+
71.	*Bianor aenescens* (Sim.)	+					+	+
72.	*Neon reticulatus* (Bl.)		+		+			+
73.	*N. valentulus* Falc.	+						
74.	*Euophrys frontalis* (Walck.)		+		+			+
75.	*E. aequipes* (O. P.-C.)	+	+			+		+
76.	*Sitticus caricis* (Westr.)	+	+	+	+			+
77.	*S. floricola* (C. L. K.)	+		+	+	+		+
78.	*Evarcha falcata* (Cl.)		+	+	+	+		+
79.	*E. arcuata* (Cl.)	+	+	+	+	+		+
80.	*E. laetabunda* (C. L. K.)	+	+	+	+	+	+	+
81.	*Synageles venator* (Luc.)	+	+		+	+	+	+
82.	*S. hilarulus* (C. L. K.)						+	+
83.	*Oxyopes ramosus* (Panz.)	+	+		+	+		+
84.	*Pardosa hyperborea* (Thor.)				+	+	+	+
85.	*P. palustris* (L.)		+			+		+
86.	*P. pullata* (Cl.)	+	+		+			+
87.	*P. prativaga* (L. K.)	+		+	+			+
88.	*P. fulvipes* Coll.	+	+		+			+
89.	*P. sphagnicola* (Dahl)	+	+	+	+	+		+
90.	*P. riparia* (C. L. K.)		+					
91.	*P. amentata* (Cl.)		+		+			+
92.	*P. nigriceps* (Thor.)					+	+	+
93.	*P. lugubris* (Walck.)		+		+			+
94.	*P. paludicola* (Cl.)	+	+		+			+
95.	*P. atrata* (Thor.)				+	+	+	+
96.	*Hygrolycosa rubrofasciata* (Ohl.)	+	+				+	+
97.	*Xerolycosa nemoralis* (Westr.)				+			+

1	2	3	4	5	6	7	8	9
98.	*X. miniata* (C. L. K.)				+			+
99.	*Alopecosa aculeata* (Cl.)				+			+
100.	*A. pulverulenta* (Cl.)		+		+	+	+	+
101.	*A. cuneata* (Cl.)		+					
102.	*A. pinetorum* (Thor.)				+			+
103.	*Trochosa spinipalpis* (F. O. P.-C.)	+	+	+	+	+		+
104.	*Arctosa leopardus* (Sund.)							+
105.	*Tricca alpigena* (Dol.)					+	+	+
106.	*Pirata piraticus* (Cl.)	+			+			+
107.	*P. hygrophilus* Thor.	+	+	+	+			+
108.	*P. latitans* (Bl.)	+						
109.	*P. piscatorius* (Cl.)	+						
110.	*P. uliginosus* (Thor.)		+	+	+		+	+
111.	*P. piccolo* Dahl	+	+	+	+	+	+	+
112.	*Pisaura mirabilis* (Cl.)	+	+		+	+		+
113.	*Dolomedes fimbriatus* (Cl.)	+	+		+	+		+
114.	*Argyroneta aquatica* (Cl.)	+				+		+
115.	*Agelena labyrinthica* (Cl.)							+
116.	*Antistea elegans* (Bl.)	+	+	+			+	+
117.	Hahnia pusilla C. L. K.	+	+	+	+	+	+	+
118.	*H. ononidum* Sim.		+					
119.	*H. nava* (Bl.)		+		+		+	+
120.	*Ero furcata* (Vill.)			+	+			+
121.	*E. tuberculata* (Deg.)	+						
122.	*Euryopis flavomaculata* (C. L. K.)					+	+	+
123.	*Dipoena tristis* (Hahn)		+					
124.	*Crustulina guttata* (Wid.)	+	+			+		+
125.	*C. sticta* (O. P.-C.)	+					+	+
126.	*Steatoda bipunctata* (L.)				+			+
127.	*S. grossa* (C. L. K.)				+			+
128.	*Achaearanea lunata* (Cl.)	+						
129.	*Theridion sisyphium* (Cl.)		+		+			+
130.	*T. impressum* L. K.	+	+	+	+	+		+
131.	*T. pictum* (Walck.)	+	+		+	+		+
132.	*T. simile* C. L. K.				+	+		+
133.	*T. varians* Hahn		+		+	+		+
134.	*T. bimaculatum* (L.)	+		+	+			+
135.	*Enoplognatha ovata* (Cl.)		+		+			+
136.	*Robertus lividus* (Bl.)	+	+		+	+		+
137.	*R. arundineti* (O. P.-C.)	+	+	+	+	+	+	+
138.	*R. neglectus* (O. P.-C.)				+			+
139.	*R. scoticus* Jacks.				+			+
140.	*R. insignis* O. P.-C.	+						
141.	*R. lyrifer* Holm.		+					
142.	*R. ungulatus* Vogels.	+						
143.	*Theonoë minutissima* (O. P.-C.)		+		+	+	+	+
144.	*Tetragnatha extensa* (L.)	+	+	+	+	+		+
145.	*T. pinicola* L. K.	+	+	+	+	+		+
146.	*T. montana* Sim.		+					
147.	*T. nigrita* Lendl.		+	+				
148.	*Pachygnatha clercki* Sund.	+		+		+		+
149.	*P. degeeri* Sund.	+		+	+	+	+	+
150.	*P. listeri* Sund.	+	+		+		+	+

1	2	3	4	5	6	7	8	9
151.	*Meta segmentata* (Cl.)				+			+
152.	*M. mengei* (Bl.)	+	+	+	+	+		+
153.	*Araneus bituberculatus* (Walck.)				+			+
154.	*A. angulatus* Cl.				+			+
155.	*A. diadematus* Cl.		+		+			+
156.	*A. quadratus* Cl.	+	+		+	+	+	+
157.	*A. marmoreus* Cl.	+	+		+	+	+	+
158.	*A. m. pyramidatus* Cl.				+	+		+
159.	*A. alsine* (Walck.)		+		+			+
160.	*A. cornutus* Cl.	+		+	+	+		+
161.	*A. patagiatus* Cl.	+	+		+	+	+	+
162.	*A. ceropegius* (Walck.)				+			+
163.	*A. redii* (Scop.)					+		+
164.	*A. adiantus* (Walck.)	+				+	+	+
165.	*A. sturmi* (Hahn)		+					
166.	*A. cucurbitinus* Cl.	+			+		+	+
167.	*A. opistographus* Kulcz.		+		+	+		+
168.	*A. proximus* Kulcz.		+					
169.	*A. silvicultrix* (C. L. K.)				+			+
170.	*Hyposinga albovittata* (Westr.)					+	+	+
171.	*H. pygmaea* (Sund.)	+	+	+	+	+	+	+
172.	*H. sanguinea* C. L. K.	+	+	+	+	+		+
173.	*H. heri* (Hahn)	+			+			+
174.	*Singa hamata* (Cl.)	+	+		+			+
175.	*S. nitidula* C. L. K.	+	+	+	+	+		+
176.	*Cercidia prominens* (Westr.)	+	+		+	+	+	+
177.	*Cyclosa conica* (Pall.)		+					
178.	*Ceratinella brevipes* (Westr.)	+					+	+
179.	*C. brevis* (Wid.)	+	+	+	+	+		+
180.	*Walckenaera antica* (Wid.)	+	+	+	+	+		+
181.	*W. cucullata* (C. L. K.)				+			+
182.	*W. nodosa* O. P.-C.		+					
183.	*W. dysderoides* (Wid.)				+			+
184.	*W. nudipalpis* (Westr.)	+	+					
185.	*W. obtusa* Bl.					+		+
186.	*W. unicornis* O. P.-C.		+		+	+		+
187.	*W. kochi* (O. P.-C.)		+	+	+			+
188.	*W. cuspidata* Bl.	+	+	+			+	+
189.	*Dicymbium nigrum* (Bl.)			+	+			+
190.	*D. tibiale* (Bl.)		+					
191.	*Entelecara acuminata* (Wid.)	+				+		+
192.	*E. erythropus* (Westr.)	+						
193.	*Moebelia penicillata* (Westr.)	+	+				+	+
194.	*Gnathonarium dentatum* (Wid.)	+			+			+
195.	*Gongylidium rufipes* (Sund.)			+				
196.	*Dismodicus elevatus* (C. L. K.)	+	+	+	+	+		+
197.	*Hypomma bituberculatum* (Wid.)	+						
198.	*H. fulvum* Bös.	+						
199.	*Metopobactrus prominulus* (O .P.-C.)	+		+			+	+
200.	*Acanthophyma gowerensis* (Locket)	+						
201.	*Gonatium rubens* (Bl.)	+	+	+	+	+		+
202.	*G. rubellum* (Bl.)		+					
203.	*G. corallipes* (O. P.-C.)		+					

1	2	3	4	5	6	7	8	9
204.	*Minyrioloides trifrons* (O. P.-C.)	+						
205.	*Maso sundevalli* (Westr.)		+		+			+
206.	*Pocadicnemis pumila* (Bl.)	+	+	+	+	+	+	+
207.	*Hypselistes jacksoni* (O. P.-C.)			+				
208.	*Oedothorax tuberosus* (Bl.)			+			+	+
209.	*O. retusus* (Westr.)						+	+
210.	*Trichopterna thorelli* (Westr.)	+					+	+
211.	*T. mengei* (Sim.)			+	+			+
212.	*Pelecopsis parallela* (Wid.)	+		+	+			+
213.	*Silometopus elegans* (O. P.-C.)	+						
214.	*S. reussi* (Thor.)	+						
215.	*Cnephalocotes obscurus* (Bl.)	+	+	+	+	+	+	+
216.	*Ceratinopsis stativa* (Sim.)	+						
217.	*Tiso vagans* (Bl.)	+	+					
218.	*Minyriolus pusillus* (Wid.)	+	+		+	+		+
219.	*Tapinocyba pallens* (O. P.-C.)	+	+	+	+	+		+
220.	*T. insecta* (L. K.)		+					
221.	*Perimones britteni* (Jacks.)	+						
222.	*Minicia marginella* (Wid.)	+	+	+	+	+	+	+
223.	*Carorita limnaea* (Grosby & Bish.)					+		+
224.	*Lophomma punctatum* (Bl.)	+			+			+
225.	*Gongylidiellum latebricola* (O. P.-C.)		+					
226.	*Gongylidiellum murcidum* Sim.	+	+		+			+
227.	*Micrargus herbigradus* (Bl.)		+		+	+	+	+
228.	*M. subaequalis* (Westr.)			+				
229.	*Notioscopus sarcinatus* (O. P.-C.)	+	+	+	+			+
230.	*Glyphesis cottonae* (La Touche)	+						
231.	*Erigonella hiemalis* (Bl.)		+		+		+	+
232.	*E. ignobilis* (O. P.-C.)	+	+	+				
233.	*Savignya frontata* (Bl.)	+	+	+	+			+
234.	*Diplocephalus latifrons* (O. P.-C.)		+					
235.	*D. picinus* (Bl.)		+					
236.	*D. dentatus* Tullgr.		+					
237.	*Araeoncus humilis* (Bl.)	+	+	+			+	+
238.	*A. crassiceps* (Westr.)	+						
239.	*A. curvatus* Tullgr.	+						
240.	*Typhochrestus tenuis* (Holm)						+	+
241.	*Diplocentria bidentata* (Emert.)		+					
242.	*Erigone dentipalpis* (Wid.)	+	+	+	+	+		+
243.	*E. atra* (Bl.)	+	+	+	+	+	+	+
244.	*E. welchi* Jacks.	+						
245.	*Drepanotylus uncatus* (O. P.-C.)	+		+				
246.	*Hilaira excisa* (O. P.-C.)				+			+
247.	*Aphileta misera* (O. P.-C.)	+	+		+			+
248.	*Hylyphantes nigritus* (Sim.)	+						
249.	*Porrhomma pygmaeum* (Bl.)	+			+	+	+	+
250.	*P. pallidum* Jacks.				+			+
251.	*Agyneta subtilis* (O. P.-C.)		+					
252.	*A. conigera* (O. P.-C.)		+					
253.	*A. cauta* (O. P.-C.)		+			+	+	+
254.	*A. ramosa* Jacks.	+						
255.	*Meioneta rurestris* (C. L. K.)	+	+		+			+
256.	*Meioneta mollis* (O. P.-C.)	+					+	+

1	2	3	4	5	6	7	8	9
257.	*M. saxatilis* (Bl.)	+	+					
258.	*M. beata* (O. P.-C.)		+				+	+
259.	*M. fuscipalpis* (C. L. K.)						+	+
260.	*Micronеta viaria* (Bl.)		+		+			+
261.	*Maro minutus* O. P.-C.		+		+	+	+	+
262.	*M. apertus* Holm		+					
263.	*Centromerus sylvaticus* (Bl.)	+	+					
264.	*C. expertus* (O. P.-C.)	+	+	+	+			+
265.	*C. arcanus* (O. P.-C.)		+		+	+	+	+
266.	*C. alnicola* Schkl.	+	+					
267.	*C. laevitarsis* (Sim.)	+	+	+				
268.	*Centromerita bicolor* (Bl.)				+			+
269.	*C. concinna* (Thor.)				+	+	+	+
270.	*Sintula cornigera* (Bl.)		+		+			+
271.	*Macrargus rufus* (Wid.)		+		+			+
272.	*M. carpenteri* (O. P.-C.)				+			+
273.	*Bathyphantes approximatus* (O. P.-C.)				+			+
274.	*B. gracilis* (Bl.)	+	+					
275.	*B. setiger* F. O. P.-C.	+		+	+			+
276.	*Kaestneria pullata* (O. P.-C.)	+		+	+	+	+	+
277.	*Drapetisca socialis* (Sund.)		+					
278.	*Tapinopa longidens* (Wid.)					+		+
279.	*Floronia bucculenta* (Cl.)		+					
280.	*Stemonyphantes lineatus* (L.)		+		+	+	+	+
281.	*Bolyphantes alticeps* (Sund.)	+	+	+				
282.	*B. index* (Thor.)		+		+	+	+	+
283.	*Lepthyphantes leprosus* (Ohl.)	+						
284.	*L. obscurus* (Bl.)		+					
285.	*L. cristatus* (Menge)		+		+	+		+
286.	*L. mengei* Kulcz.		+	+				
287.	*L. tenebricola* (Wid.)		+	+	+			+
288.	*L. angulatus* (O. P.-C.)		+					
289.	*Helophora insignis* (Bl.)				+			+
290.	*Linyphia triangularis* (Cl.)		+	+	+	+		+
291.	*L. (Neriene) montana* (Cl.)				+			+
292.	*L. (Neriene) emphana* (Walck.)	+	+		+			+
293.	*L. (Neriene) peltata* Wid.		+					
294.	*L. (Neriene) marginata* (Walck.)		+			+		+
295.	*Microlinyphia pusilla* (Sund.)	+	+	+	+	+	+	+
		158	170	74	164	101	69	208

Thus the total number of spider species found in Estonian mires amounts to 301 — that is about 60% of all the spider species so far established in Estonia (ca. 500 species).

Since A. Dampf visited Estonia in autumn (13. 08.—17. 09. 1922), when juvenile specimens predominate in bogs, he did not catch many species characteristic of bogs, or caught them only occasionally. Thus, in several bogs, he did not find such typical species as *Dictyna arundinacea* and *Oxyopes ramosus*. This was pointed out already by H. Kauri (1936). As a result, in literature there exist some erroneous conclusions about the frequency of occurrence and the abundance of several bog

species. For instance, in literature one can find a note that *D. arundinacea* is quite occasional in Estonian bogs (cf. Rabeler, 1931, p. 210).

Nevertheless, this species is a dominant spider species in Estonian bogs (as well as in those of many other countries). In addition, bogs *in sensu* A. Dampf include fens, swampy meadows and transitional bog forests, besides bogs.

It is impossible to characterize individual mire types on the basis of the number of species. Besides being connected with different types of vegetation, the number of species also depends on the number of samples, on the seasonal and dial occurrence of spiders. For instance, if we were to take into account only the samples collected in Avaste Fen at midday (at which time the majority of samples were taken in other fens), then the field layer would include only 44 species, but when using all the samples taken every three hours, we should get 64 species.

The role of spiders in the mire mesofauna

As predatory forms, spiders play an important role in the adjustment of the biocenological balance. Due to their abundance they are, besides *Diptera, Homoptera-Cicadina* and *Coleoptera,* an essential link in the mesofauna of the field layer (Table 3). The percentage of spiders is particularly high in spring and in autumn, low in midsummer, while during this time diptera predominate. Belonging to predators, spiders do not depend so much on the development of vegetation as on the presence of the field layer as their hunting ground.

The share of spiders in the field layers of fens constitutes 25%, increasing in bog pine forests even up to 30%. In transitional bog forests the percentage is considerably lower (up to 17%). In treeless bogs and drained treed bogs the role of spiders is secondary.

The moss layer is climatically more stable, and seasonal fluctuations in the numbers of spiders are considerably smaller than in the field and dwarf shrub layers. In all the bog types studied, the percentage of spiders was high in summer (33—52%) and in autumn (36—48% of the total mesofauna of the field layer). Only in treeless bogs and partly in treed bogs with pools, where overwintering conditions are most unfavourable, the percentage of spiders is very low in spring (4—6% of the total mesofauna). In the moss layer of transitional bog forests the percentage is high in summer (20—40%) and rises considerably in some transitional bogs in autumn (38—74%).

Dominance. Dominance groups are classified in this paper in the following manner:

dominants >10% of the spider specimens
influents 5—10% „ „ „ „
recedents <4% „ „ „ „

In the field and dwarf shrub layer of all types of mires there is only a very small number of dominant species, but they comprise the majority of spider specimens (Fig. 1). The majority of the spider species belong to recedents; these are species which occur only in few specimens. Of all the specimens, the recedents constitute up to one-third. If we raise the number of samples, the number of species in mire habitats can increase just at the expense of recedents. Intermediate species — influents — occur in the community more or less steadily (5—18% of the species from up to 20% of all the adult specimens collected).

Proportion of major groups of mesofauna in the field layer

Groups of mesofauna	Fens			Transitional bog							
				Transitional bog pine forest						Treed	
	Flooded fen (delta) of the River Emajõgi 1948)	Fen (Avaste)		Sõmerpalu		Väätsa		Venevere		Sõmerpalu	
		1951	1952	1959	1960	1959	1960	1959	1960	1959	1960
Araneida	24.4	18.3	24.9	13.6	10.4	7.2	10.6	5.9	7.5	16.6	13.1
Cicadina	5.1	32.5	24.5	26.6	46.9	37.0	34.4	51.1	35.2	27.5	43.5
Coleoptera	13.8	2.4	2.9	8.7	8.6	13.3	12.6	2.4	5.0	17.2	16.1
Diptera	28.4	22.5	25.3	28.2	12.4	28.1	24.2	23.4	30.7	17.4	9.5
Others	28.3	24.3	22.4	22.9	21.7	14.4	18.2	17.2	21.6	21.3	17.8
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Such a scheme of distribution of dominance groups is characteristic of all the habitats which have been little affected by human activity, including mires. The changes occurring in different years are also inessential — the proportions between the dominance groups are stable.

An analysis of the dominance groups shows that changes in the structure of spider communities are expressed by changes in the rates of dominance of individual species (Table 4). Thus, in the field layer of fens as well as in transitional bog forests, there annually occur some species, the dominance of which considerably exceeds the dominance of the others. This species may alternate in different years, but it may also remain the same. Such species whose dominance exceeded that of others in the years under study were in fens: *Hyposinga pygmaea, Singa hamata* and *Evarcha arcuata*; in tansitional bog forests: *Linyphia triangularis, Evarcha falcata* and *E. arcuata*. The dominant species is followed by 1—3 species whose share exceeds 10%. They can also alternate in different years.

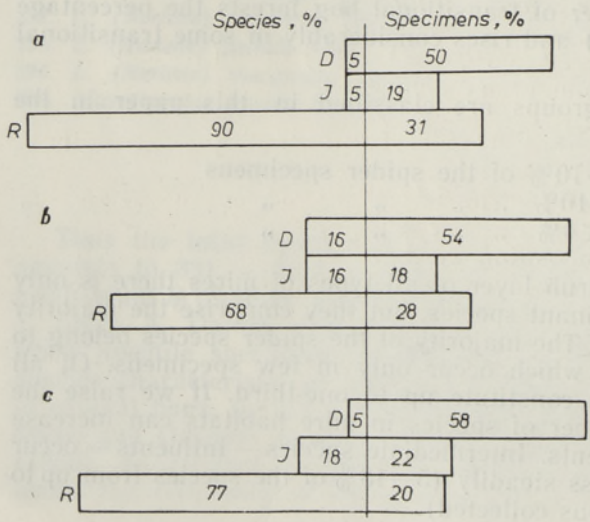

Fig. 1. Distribution of spiders according to dominance groups in the field and dwarf shrub layer. *a* — the Avaste fen (1952), *b* — a transitional bog pine forest at Sõmerpalu (1959), *c* — a bog pine forest at Endla (1950). *D* — dominants, *I* — influents, *R* — recedents.

Table 3

of Estonian mires (percentage of total specimens of mesofauna)

forests				Bog											
transitional bog				Bog pine forest				Treed bog with pools					Treeless bog		Drained bog (Endla)
Väätsa		Vene-vere		Endla		Tähtvere		Sõmer-palu		Endla	Tähtvere		Endla	Täht-vere	
1959	1960	1959	1960	1959	1950	1952	1953	1959	1960	1950	1952	1953	1950	1953	1950
9.6	13.8	6.8	8.4	23.3	16.2	25.6	29.3	20.0	24.7	15.7	19.6	23.9	3.1	12.7	6.0
47.3	55.5	25.0	22.5	3.3	2.3	1.8	2.1	6.8	1.9	7.0	29.5	28.9	63.2	24.9	29.8
7.8	21.6	7.7	14.2	16.3	26.8	10.5	4.3	33.7	32.6	35.9	8.9	5.8	9.0	16.5	10.2
11.4	6.8	24.6	23.4	14.9	6.6	12.8	15.3	5.7	10.6	11.9	14.4	19.8	9.0	19.8	24.6
23.9	13.3	35.9	31.5	43.2	48.1	49.3	49.0	33.8	30.2	29.5	27.6	21.6	15.7	26.1	29.4
100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Marked differences occur in the species composition of dominants in bog pine forests and in treed bogs with pools of large mire systems.* In such areas the dominance of one species — e. g., *Dictyna arundinacea* — is almost absolute 30.—52.8% and makes the spider community of the dwarf shrub layer of bogs quite distinct from other mire types. Such a dominance is stable in the dwarf shrub layer of those bogs also in different years. There follows a small group of influents, whose numbers are 3—9 times smaller than those of *D. arundinacea*, but considerably higher than those of the remaining species. The only stable species of the dwarf shrub layer is *Clubiona trivialis*, whose number is on the same level in various years. The other species of influents vary greatly. Those are only the dominant *D. arundinacea,* and the precentage of dominants and influents (77.6—80.0%) in the community that remain unchanged. The majority of bog species (77%) occur only in single specimens. They account for 20—22% of the total of spider specimens collected. Nevertheless, those are the recedents that characterize bogs. Such species are *Evarcha laetabunda, Heliophanus dampfi, Araneus adiantus* and *Clubiona trivialis.* They occur always in our bogs as single specimens; they are discovered more or less accidentally and can be found only with the help of numerous samples from the same habitat. In some years the dominance of a certain recedent spider species can increase to such an extent that it must be included among influents (such as *E. laetabunda* in the Endla treed bog with pools in 1948 or in the Tähtvere treed bog in 1952). The number of species found in bogs will increase at the expense of the species of this group.

Although the species composition of the dominants of small isolated bogs (such as the Tähtvere Bog, covering 260 ha) is similar to that of the larger bogs, the numerical relationships between the individual spider species are somewhat different and vary greatly in different years. Every year there exist in the Tähtvere Bog some species, the numbers of whose individuals exceed those of others, but there is no other single species (such as *D. arundinacea* in the Endla Bog) whose number would exceed

* In the Endla mire system there are 5400 ha of bogs, 12000 ha of fens and 2800 ha of transitional bogs.

Table 4

Dominance of spider species in the field layer of mires (only adults have been counted, %)

Flooded fen (Emajõgi) 1948		Fen (Avaste)				Transitional bog pine forest (Sõmerpalu)				Treed transitional bog (Sõmerpalu)			
		1951		1952		1959		1960		1959		1960	
H. pygmaea	32	*S. hamata*	20	*E. arcuata*	26	*L. triangularis*	26.3	*E. falcata*	27.3	*E. arcuata*	15.2	*E. falcata*	29.4
T. maritimus	10	*E. arcuata*	13	*H. pygmaea*	13	*P. listeri*	14.0	*S. venator*	18.2	*M. pusilla*	10.9	*X. ulmi*	14.7
X. ulmi	9	*C. subtilis*	13	*T. maritimus*	11	*M. mengei*	14.0	*P. listeri*	12.1	*P. sphagnicola*	8.7	*L. triangularis*	11.8
D. arundinacea	7	*T. maritimus*	11	*S. hamata*	7	*L. marginata*	7.0	*M. mengei*	12.1	*D. arundinacea*	6.5	*E. arcuata*	8.8
H. heri	6	*H. heri*	10	*C. subtilis*	6	*C. conica*	5.3	*L. marginata*	9.1	*C. trivialis*	6.5	*G. rubens*	8.8
T. extensa	5			*D. arundinacea*	6	*D. socialis*	5.3	*C. subsultans*	6.1	*X. ulmi*	6.5		
										G. rubens	6.5		
	69		67		69		71.9		84.9		69.5		73.5

Bog pine forest (Endla)				Treed bog with pools (Endla)				Bog pine forest (Tähtvere)				Bog pine forest (Sõmerpalu)	
1948		1950		1948		1950		1952		1953		1959	
D. arundinacea	51.2	*D. arundinacea*	58.2	*D. arundinacea*	58.1	*D. arundinacea*	50.6	*E. falcata*	29.9	*X. cristatus*	31.4	*D. arundinacea*	30.6
C. trivialis	11.6	*C. trivialis*	7.3	*C. trivialis*	6.5	*E. arcuata*	9.4	*D. arundinacea*	21.2	*E. falcata*	17.1	*C. trivialis*	11.1
X. cristatus	7.0	*E. falcata*	5.5	*E. laetabunda*	6.5	*T. extensa*	9.4	*X. cristatus*	10.2	*C. prominens*	11.4	*E. falcata*	11.1
E. arcuata	4.7	*E. arcuata*	4.6	*X. cristatus*	6.5	*C. trivialis*	8.7	*C. trivialis*	5.8	*G. rubens*	8.6	*D. elevatus*	8.3
												X. ulmi	5.6
												O. ramosus	5.6
												L. marginata	5.6
	79.2		80.0		77.6		78.1		67.1		68.5		77.9

Table 5

Dominance of spider species in the dwarf shrub layer of mires (only adults have been counted, %)

Fens (1953—1960)		Transitional bog forests (1959—1960)		Treed bogs (1947—1971)		Treeless bogs (1947—1971)		Drained bogs (1950)	
E. arcuata	8	*E. arcuata*	12	*D. arundinacea*	65	*D. arundinacea*	47	*D. arundinacea*	53
T. maritimus	7	*E. falcata*	10	*E. arcuata*	6	*E. laetabunda*	9	*C. trivialis*	10
M. pusilla	5	*L. triangularis*	9	*X. cristatus*	6	*H. albovittata*	7	*T. simile*	9
H. pygmaea	5	*M. mengei*	8	*O. ramosus*	4	*M. marginella*	4	*X. cristatus*	6
S. hamata	4	*P. listeri*	7			*M. pusilla*	4		
H. albovittata	3	*D. arundinacea*	6						
		G. rubens	5						
		X. ulmi	4						

the abundance of the other species many times every year. In the capacity of dominants there may occur *Evarcha falcata, Xysticus cristatus, D. arundinacea, Pachygnatha degeeri.* The following year may turn out to be unfavourable for the previous dominant, and another species may achieve roughly the same prevalence in the spider community.

The dominance of *D. arundinacea* in the dwarf shrub layer of Estonian bogs is so conspicuous and prevalent that the summing up of data on all bogs in different years (Table 5) gives us the rate of its dominance as 65%, which is about 10 times higher than that of the other species. Consequently, the spider fauna of the dwarf shrub layer of bogs is well established, having a typical structure and a rather permanent species composition.

When one sums up in a similar manner all the data available on the spiders of the dwarf shrub layer of fens and transitional bog forests, one can obtain an idea of the proportion of individual spider species (Table 5). But this does not reflect the real conditions existing in any particular fen. In summing up all data, the striking differences between the dominances of individual species disappear and we obtain a more or less smoothly descending row, in which the dominance of species differs only slightly due to the fact that different spider species predominate in various fens. In reality such a structure of dominance groups does not exist in any fen.

Arranging the spiders of the moss layer into dominance groups, we can obtain a rather similar, but even less varying picture than in the case of the field layer.

In the moss layer of both fens and bogs there are no spider species which predominate in all fens or bogs. Due to the low density and mosaic distribution of the spiders, the discovery of this or that species is quite occasional. The majority of species were caught as single specimens. For a complete characterization of the spider fauna inhabiting the moss layer of Estonian fens and bogs the material collected so far is insufficient.

The more frequent spider species in the moss layer are:

In fens

Antistea elegans
Silticus caricis
Cnephalocotes obscurus

Notable is also *Robertus insignis,* which has been found in a limited number of fens, but in great numbers.

In bog pine forest

Tapinocyba pallens — *Ceratinella brevis*
Hahnia pusilla — *Centromerus arcanus*
Clubiona trivialis — *Pocadicnemis pumila*

In treed bogs with pools

Tapinocyba pallens — *Centromerus arcanus*
Pocadicnemis pumila — *Ceratinella brevis*
Scotina palliardi — *Robertus arundineti*

In treeless bogs

Clubiona trivialis — *Robertus arundineti*
Pirata uliginosus — *Pocadicnemis pumila*

If we compare the spider composition of the field and moss layers in transitional bogs in different years, we can see that the changes that take place in the field layer are much greater and that the species composition of a spider community is more variable there (Table 4) than in the moss layer (Table 6).

In transitional bog pine forests, the most abundant species is *Tapinocyba pallens* (which is also abundant in bog pine forests).

Treed transitional bogs are very heterogeneous with regard to their vegetation and also in respect to other ecological conditions. This is also reflected in the composition as well as in the numerical relationships of the spider species. The spider fauna of the field layer of treed transitional

Table

Dominance of spider species in the moss layer of transitional bog forests (only adults have been counted, %)

Transitional bog pine forest (Sõmerpalu)				Treed transitional bog (Sõmerpalu)			
1959		1960		1959		1960	
N. sarcinatus	17.1	*T. pallens*	22.7	*H. pusilla*	25.6	*T. pallens*	18.
G. latebricola	14.5	*H. rubrofasciata*	14.7	*T. pallens*	16.3	*P. piccolo*	17.
C. brevis	10.5	*P. piccolo*	8.0	*N. sarcinatus*	14.0	*G. latebricola*	12.
P. piccolo	9.2	*T. minutissima*	8.0	*P. piccolo*	7.0	*H. pusilla*	11.
H. pusilla	5.3	*C. brevis*	8.0	*C. arcanus*	7.0	*N. sarcinatus*	6.
		C. arcanus	8.0	*G. murcidum*	4.7	*C. arcanus*	4.
		G. latebricola	6.7				
		N. sarcinatus	6.7				
	56.6		82.8		74.6		70.

Transitional bog pine forest (Väätsa)				Treed transitional bog (Väätsa)			
1959		1960		1959		1960	
T. pallens	38.2	*T. pallens*	27.3	*T. pallens*	23.3	*G. obscurus*	23.
M. pusillus	16.2	*M. pusillus*	18.2	*R. arundineti*	13.3	*C. brevis*	14.
N. reticulatus	4.4	*R. lyrifer*	13.6	*E. aequipes*	6.7	*M. herbigradus*	14.
C. sylvaticus	4.4	*C. brevis*	9.1	*R. lividus*	6.7	*T. pallens*	14.
		M. apertus	9.1	*C. brevis*	6.7	*M. minutus*	9.
				C. obscurus	6.7		
				C. laevitarsis	6.7		
	63.2		77.3		70.1		75.

bogs alternates to a larger extent and varies in different years even in the same site. The comparison of data of two subsequent years showed that in 1960 there existed in the field layer only 50—75% of the dominants and influents of the previous year, only 38—50% of them belonging to dominants and influents. At the same time 75—100% of the dominants and influents of 1959 had survived in the moss layer, and 50—75% of them still belonged to dominants and influents in 1960.

Pirata piccolo is a spider species typical of the moss layer of the lagg zone. Its population density is considerably smaller than that of the other lycosid spiders.

On the moss cover of bogs there are active some typical spider species which may be met with only in bogs and even there in certain bog types. One of such tyrphophil species in *Pardosa sphagnicola*, which lives in the transitional zone between the lagg zone and the treed bog. Its favourite habitat is a relatively wet area with sparse pines and large *Sphagnum* hummocks. It is a narrow zone with very good light and shadow conditions. The population density of *P. sphagnicola* in such marginal areas is extraordinarily great. Adult specimens can be found from the middle of May to the end of July, but most abundantly in June.

Extreme living conditions in treeless parts of bogs keep the population density of spiders generally on a low level. On the other hand, some species with a low competitive ability can occur there in a considerable density. On the moss cover of treeless bogs one of such species is the smallest lycosid spider *Pardosa hyperborea*. It lives in Estonia only in bogs, being most numerous on treeless bogs. Here its numbers are equally high on hummocks as well as hollows. When the dwarf shrub cover becomes more dense, its percentage and density fall considerably (in treed bogs and in bog pine forests it was found only occasionally). *P. hyperborea* was met with from the middle of May to the middle of August, with the greatest density in June. The number of eggs in a coccoon varied from 16 to 32, being 23 eggs on the average (Nigula Bog, 19.—21. 06. 1969). In single coccoons of a later date, the number of eggs was considerably smaller, ranging between 9—13 eggs (Kesu Bog, 14. 08. 1960). This northern species, considered to be a relict of the Glacial, has found the most suitable living conditions in treeless bogs. If we consider that the very scarce dwarf shrub layer of a treeless bog is inhabited only by few spider species catching their food with web-nets (the most abundant species are *Dictyna arundinacea* and *Araneus adiantus*), and keep in mind the fact that the only spider species catching its prey on the moss cover is *P. hyperborea*, we can see that the spider species of the dwarf shrub layer cannot be any competitors in obtaining food. Perhaps the small competition for food may be one of the most decisive reasons why the roughest bog habitat with regard to climatic conditions has proved to be the only congenial site for *P. hyperborea* in our bog landscape.

(To be continued)