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True bugs (*Hemiptera*: *Heteroptera*) of the Brzeźno nature reserve near Chełm

Pluskwiaki różnoskrzydłe (*Hemiptera*: *Heteroptera*) rezerwatu Brzeźno koło Chełma

SUMMARY

The Brzeźno nature reserve is part of a unique complex of calcareous peatbogs, one of the largest in Poland. In the course of three-year investigations of the true-bug fauna of the reserve 98 species have been found. In the complexes of *Cladietum marisci* and *Betulo-Salicetum repentis* the species strongly associated with these habitats were hygrophilous *Agramma ruficorne*, *Monosynamma bohemani*, and *Rhopalus maculatus*. In the fauna of midmarsh xerothermic grasses, the group of dominants with a high frequency coefficient included *Coptosoma scutellatum* and *Adelphocoris seticornis*. The presented results converge with data obtained for the fauna of other peat bogs in the area near Chełm (Zawadówka and Serebryskie Swamp).

STRESZCZENIE

Rezerwat Brzeźno wchodzi w skład największego, unikalnego w skali kraju, kompleksu torfowisk węglanowych. W wyniku trzyletnich badań nad fauną pluskwiaków różnoskrzydłych rezerwatu stwierdzono występowanie 98 gatunków. W zespołach *Cladietum marisci* i *Betulo-Salicetum repentis* gatunkami o silnym powiązaniu z tymi siedliskami były higrofile *Agramma ruficorne*, *Monosynamma bohemani*, *Rhopalus maculatus*. W faunie śródbagiennych muraw kserotermicznych do grupy dominantów z wysokim wskaźnikiem frekwencji zaliczono *Coptosoma scutellatum* i *Adelphocoris seticornis*. Prezentowane wyniki wykazały zbieżność z danymi uzyskanymi dla fauny innych torfowisk w okolicach Chełma (Zawadówka i Bagno Serebryskie).

K e y w o r d s: *Heteroptera*, numerical force, frequency

INTRODUCTION

Lowmoor in the Chełmski Landscape Park are distinguished by an abundance of calcium carbonate in the substratum and constitute the largest complex of this type of communities in Poland. Peculiar geomorphic conditions and hydrological relations are the cause of the large differentiation of habitats. This results in the uniqueness of the flora, characterized by widespread occurrence of calciphilous plants in almost every complex of this area. The Brzeźno is the oldest reserve, established in 1973 for the protection of an area of exceptional natural value. The largest area of the peat bog is occupied by complexes of great fen-sedge and rich calcareous fens. The chalky elevations of terrain, the so-called "grądziki" are overgrown with xerothermic grasses (1, 2).

This paper is one in the series of articles presenting the results of research on the *Hemiptera*: *Heteroptera* fauna of calcareous peat bogs in the area near Chełm. So far, the composition and structure of true bug groupings in the reserve of "Serebryskie Swamp" and the Zawadówka ecological land (4, 5) have been described.

METHODS AND LOCALITY

Research on the true bug fauna of the reserve was conducted in the years 1996–1998. The insects were caught with the use of an entomological scoop adopting a series of 8 × 25 catches as one assay. The zoocenological structure included three parameters: 1° species domination, 2° numerical force (n') – average number of insects per 25 scoops was assumed as its measure; 3° frequency – the ratio of assays in which a species occurred and the total number of assays in a studied plant community (as %). The species diversity was counted using Shannon and Weaver's formula (6).

The research covered the following plant communities: *Cladietum marisci*, *Ribo nigri-Alnetum*, *Betulo-Salicetum repentis*, *Inuletum ensifoliae*, *Brachypodio-Teucrietum*. A detailed characteristics of the floristic conditions is presented in a study by Grądziel (3).

RESULTS

In the course of a three-year study in selected plant communities, 3,240 true bug individuals were caught, among which 98 species were distinguished (Table 1). A profile of the qualitative and quantitative structure of the grouping *Heteroptera* for individual habitats is given below.

Cladietum marisci

The fauna of this complex was characterized by low species diversity (H = 2.5680), very low number (n' = 0.54) as well as poor species composition (13 species). Over 50% of all true bugs belonged to *Agramma ruficorne*, a tyrphophilous species associated with plants of *Carex* and *Juncus* genera. The above-mentioned species was also characterized by highly regular occurrence – 50%. The remaining species were represented by few or single specimens.

Ribo nigri-Alnetum

In the undergrowth of a birch-alder forest, 44 true bug species were collected. Fauna of *Heteroptera* of this complex was characterized by considerable numerical force (n' = 4.35) as well as a high value of the species diversity coefficient (H = 4.1614). In the structure of domination the most prominent species were predator *Nabis pseudoferus* (16.3%), as well as forest polytop *Kleidocerys resedae* (14.7%). Both of the above-mentioned species, and also three other of lower numbers (*Stenodema calcarata, Adelphocoris seticornis*, and *Nabis limbatus*) were characterized by high frequency (above 50%). In this habitat one could observe a relatively high share (12.9%) of *Halticus pusillus*, an oligophagus associated with different species of bedstraw, which, however, exhibited a low degree of occurrence regularity.

Betulo-Salicetum repentis

The numbers of the true bug fauna of this community were similar to the grouping of the previous plot (n' = 5.05) and, like the former, had a high value of the diversity coefficient (H = 4.8406). Among 46 species, *Halticus apterus* (13.1%), *Nabis pseudoferus* (12.3%), and *Monosynamma bohemani* (11.7%) had the highest share in the domination structure. The last of the mentioned species is biologically associated with willow shrubs (*Salix repens, S. rosmarynifolia*) and can be considered as characteristic of this assemblage, although its frequency was low (30.8%). Apart from the three dominant species mentioned above, high numerical force and thus high values of the domination coefficient were reached by the polytop of open habitats *Plagiognathus chrysanthemi* (9.5%) as well as the hygrophilous *Rhopalus maculatus* (6.9%). The species which occurred most regularly were *Rhopalus maculatus* (76.9%) and *Nabis pseudoferus* (69.2%).

Inuletum ensifoliae

The grouping of this complex was the richest in species (75 taxons) and was characterized by the highest numerical force of insects (n' = 6.88). The coefficient of species diversity (H) in this grouping reached the value of 4.3605. In the structure of domination the most prominent species were the polytopic *Halticus apterus* (13.1%) and two eurytopic *Lygus rugulipennis* (10.8%) and *Nabis pseudoferus* (8.4%). Among xerothermophilous species, the highest share was that of *Stictopleurus punctatonervosus* (8.7%) – a species trophically associated with *Inula ensifolia*, *Coptosoma scutellatum* (7.3%), *Halticus pusillus* (6.3%),

and *Adelphocoris seticornis* (5.8%), the latter three species being nutritionally and reproductively associated with calciphilous plants.

The highest values of the coefficient of occurrence regularity were reached by: *Nabis pseudoferus* (69.4%), *Adelphocoris seticornis* (66.7%), *Halticus apterus* (61.1%), and *Coptosoma scutellatum* (58.3%).

Brachypodio-Teucrietum

The grouping of this complex was rich in species (50 taxons) and was characterized by a considerable number of insects (n' = 6.03). The coefficient of species diversity reached its highest value here (H = 4.8912). The dominant species were: *Halticus apterus* (11.6%), *Nabis pseudoferus* (11.1%), *Rhopalus parumpunctatus* (8.0%), *Coptosoma scutellatum* (6.8%), *Adelphocoris seticornis* (6.8%), and *Eurygaster testudinaria* (6.1%). The last three were characterized by high values of the coefficient of occurrence regularity (75%), but the highest value of this parameter (87.5%) was observed for *N. pseudoferus*.

CONCLUSIONS

The mixture of habitats varying in the degree of moistness results in alternating moist meadows, rushes, and xerothermic communities and favours occurrence of rich entomofauna. Such conditions occur in the area of Chełm in several places in the so-called calcareous peat bogs. Previously published data presenting the fauna of *Heteroptera* from identical or similar habitats in the Serebryskie Swamp reserve and in the Zawadówka peat bog show considerable convergence with the qualitative and quantitative structure of the groupings of this order observed in the Brzeźno reserve.

Groupings of *Heteroptera* of the great fen-sedge communities both in the Brzeźno and in the Serebryskie Swamp reserve were characterized by very small numbers and limited number of species. They were additionally characterized by a high degree of domination of one hygrophilous species. In the first reserve, *Agramma ruficorne* had a high share, which was connected with a high share of alimentary plants in places where *Cladium mariscus* was less dense. *Stenodema calcarata* dominated in the second one. The majority of the remaining species had no direct connections with this specific environment, and judging by their number they could have occurred there accidentally.

The fauna of the *Betulo-Salicetum repentis* complex, as in the Serebryskie Swamp reserve, was characterized by a high number of *Monosynamma bohemani*, a species closely associated with this community. In the structure of this

grouping, a high share of hygrophilous species could be observed (*Rhopalus maculatus* and *Agramma ruficorne*), constituting a group of a similar share as in the above-described reserves (4, 5). The grouping was characterized by a very large species diversity, which reflects the large number of species collected with simultaneous lack of clear domination of any of them.

The true bugs of xerothermic grasses in the Brzeźno reserve, similarly to the ones from the Chełmski Landscape Park described above, were characterized by a considerable share of polyphagous species in the quantitative structure (*Lygus pratensis*, *L. rugulipennis*, *Halticus apterus*, *Rhopalus parumpunctatus*). Interestingly, the species are not typical of this type of environment. In this reserve, the species more closely associated with grasses were *Coptosoma scutellatum* and *Adelphocoris seticornis*. Although they were characterized by the lower number, they exhibited high values of the frequency coefficient. *Adelphocoris seticornis* is a species biologically associated with calciphilous plants of the *Fabaceae* family, it prefers sunny habitats of various degree of moistness. In the fauna of the xerothermic grasslands in Brzeźno it replaced *Adelphocoris lineolatus*, which occurs most often with a different lie of the slopes.

The varied composition of the birch-alder forest undergrowth, in which grassland, forest, and ecotonal plants were mixed, favoured the diversity of true bug fauna, the reflection of which is the high value of diversity coefficient as well as the occurrence among the dominant species those that had different trophic associations (*Kleidocerys resedae – Betula* sp., *Alnus* sp.; *Halticus pusillus – Galium* sp.; *Adelphocoris seticornis – Fabaceae*; *Stenodema calcarata – Poaceae*).

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Table 1. Numerical force of true bugs (*Hemiptera*: *Heteroptera*) in the Brzeźno peatland nature reserve

No.	Species / stand	I	II	III	IV	V
	Anthoridae					
12.	*Anthocoris confusus* Reut.				+	
13.	*A. nemorum* (L.)				+	
14.	*Orius minutus* (L.)		0.01			
15.	*O. niger* (Wolff)				+	

	Nabidae					
12.	*Himacerus boops* (Schiödte)				+	
13.	*Nabis flavomarginatus* (Scholtz)			0.02	0.01	
14.	*N. ferus* (L.)			0.13	0.02	
15.	*N. limbatus* (Dahlb.)		0.23	0.04	0.09	0.11
16.	*N. lineatus* (Dahlb.)			0.04		
17.	*N. pseudoferus* Rem.	0.05	0.71	0.62	0.58	0.67
18.	*N. punctatus* A. Costa		0.06	0.05	0.06	0.03
	Miridae					
12.	*Adelphocoris lineolatus* (Goeze)		0.01	0.01	0.11	0.06
13.	*A. quadripunctatus* (F.)				0.01	
14.	*A. reichelii* (Fieb.)			0.02	0.01	
15.	*A. seticornis* (F.)		0.26	0.03	0.40	0.41
16.	*A. ticinensis* (M.-D.)			0.03		
17.	*Blepharidopterus angulatus* (Fall.)		0.01			
18.	*Capsus ater* (L.)		0.09			
19.	*Charagochilus gyllenhalii* (Fall.)			0.02	0.02	0.08
20.	*Chlamydatus pulicarius* (Fall.)		0.03	0.03	0.04	0.05
21.	*Ch. pullus* Reut.		0.03	0.01	+	0.08
22.	*Closterotomus norwegicus* (Gmel.)			0.04		
23.	*Criocoris crassicornis* (Hahn)	0.05		0.01	0.01	
24.	*Deraeocoris ruber* (L.)		0.02		0.02	
25.	*Globiceps flavomaculatus* (F.)		0.01			
26.	*Halticus apterus* (L.)	0.01	0.40	0.66	0.90	0.70
27.	*H. pusillus* (H.-S.)		0.56		0.43	
28.	*Leptopterna ferrugata* (Fall.)				+	0.01
29.	*Lygus pratensis* (L.)	0.01	0.19	0.07	0.24	0.31
30.	*L. rugulipennis* Popp.	0.01	0.14	0.24	0.74	0.31
31.	*Macrotylus paykullii* (Fall.)				0.01	
32.	*Monosynamma bohemanni* (Fall.)			0.59		
33.	*Notostira erratica* (L.)			0.05	0.04	0.08
34.	*Orthops kalmii* (L.)		0.03	0.01	0.09	0.14
35.	*Phytocoris ulmi* (L.)					0.01
36.	*Plagiognathus chrysanthemi* (Wolff)		0.05	0.48	0.24	0.01

37.	*Polymerus palustris* Reut.				+	0.06
38.	*P. unifasciatus* (F.)		0.03	0.04	0.02	0.02
39.	*Stenodema calcarata* (Fall.)	0.03	0.24	0.25	0.18	0.05
40.	*S. laevigata* (L.)		0.12	0.01	0.03	
41.	*S. virens* (L.)				0.01	
42.	*Strongylocoris leucocephalus* (L.)				0.01	
43.	*Trigonotylus caelestialium* (Kirk.)	0.03		0.02	0.03	0.03
	Reduviidae					
44.	*Phymata crassipes* (F.)			0.01	0.10	0.19
45.	*Rhynocoris iracundus* (Poda)			0.01		
	Tingidae					
46.	*Agramma ruficorne* (Germ.)	0.28	0.02	0.21	+	0.01
47.	*A. tropidopterum* Flor			0.14		
48.	*Campylosteira verna* (Fall.)			0.01		
49.	*Lasiacantha capucina* (Germ.)				+	0.01
50.	*Tingis ampliata* (H.-S.)				+	0.01
51.	*T. cardui* (L.)		0.01			
	Saldidae					
52.	*Saldula saltatoria* (L.)		0.02			
	Alydidae					
53.	*Alydus calcaratus* (L.)			0.01		
54.	*Megalotomus junceus* (Scop.)			0.07	0.01	0.03
	Coreidae					
55.	*Coreus marginatus* (L.)			0.07	0.01	
	Rhopalidae					
56.	*Corizus hyoscyami* (L.)				0.01	0.01
57.	*Myrmus miriformis* (Fall.)		0.01		0.04	0.06
58.	*Rhopalus maculatus* (Fieb.)	0.03	0.03	0.35	0.06	0.14
59.	*Rh. parumpunctatus* Schill.			0.17	0.16	0.48
60.	*Rh. subrufus* (Gmel.)		0.03		0.01	
61.	*Stictopleurus abutilon* (Rossi)				+	
62.	*S. punctatonervosus* (Goeze)				0.60	0.13
	Berytidae					
63.	*Berytinus clavipes* (F.)			0.01	0.03	0.03

64.	*B. minor* (H.-S.)				+	
65.	*Neides tipularius* (L.)		0.01		+	
	Lygaeidae					
66.	*Cymus glandicolor* Hahn			0.02	0.27	0.25
67.	*Drymus ryeii* Douglas&Scott				0.01	0.01
68.	*Ischnodemus sabuleti* (Fall.)				+	
69.	*Kleidocerys resedae* (Panz.)	0.01	0.64	0.02	0.02	0.11
70.	*Nysius thymi* (Wolff)				+	
71.	*Pachybrachius luridus* (Hahn)			0.01		
72.	*Rhyparochromus pini* (L.)		0.01		0.01	
73.	*Scolopostethus pilosus* (Reut.)		0.01			
74.	*S. thomsoni* Reut.					0.03
	Acanthosomatidae					
75.	*Elasmostethus interstinctus* (L.)		0.01			
76.	*Elasmucha grisea* (L.)		0.06		+	0.01
	Cydnidae					
77.	*Canthophorus impressus* (Horv.)				0.03	
	Pentatomidae					
78.	*Aelia acuminata* (L.)		0.04	0.01	0.01	0.05
79.	*Arma custos* (F.)	0.01			+	
80.	*Carpocoris fuscispinus* (Boh.)				+	0.03
81.	*C. purpureipennis* (De Geer)			0.06	0.11	0.11
82.	*Dolycoris baccarum* (L.)	0.01	0.03	0.03	0.10	0.11
83.	*Eurydema oleracea* (L.)		0.01		+	0.03
84.	*E. ornata* (L.)				+	
85.	*Eysarcoris aeneus* (Scop.)		0.01	0.16	0.03	0.08
86.	*Holcostethus strictus vernalis* (Wolff)			0.03	0.02	
87.	*Palomena prasina* (L.)					0.01
88.	*P. viridissima* (Poda)		0.02		0.01	
89.	*Picromerus bidens* (L.)		0.01		+	
90.	*Piezodorus lituratus* (F.)		0.01			
91.	*Podops inuncta* (F.)					0.01
92.	*Sciocoris cursitans* (F.)				0.01	
93.	*S. microphthalmus* Flor				0.01	0.05

Plataspididae						
94.	*Coptosoma scutellatum* (Geoffr.)		0.06		0.50	0.41
Scutelleridae						
95.	*Eurygaster maura* (L.)		0.01		0.02	0.03
96.	*E. testudinaria* (Geoffr.)	0.01		0.13	0.23	0.37
Piesmatidae						
97.	*Piesma capitatum* (Wolff)		0.02		0.01	0.01
98.	*P. maculatum* (Lap.)		0.04		+	
Total		0.54	4.35	5.05	6.88	6.03

Explanation: I – *Cladietum marisci*; II – *Ribo nigri-Alnetum*; III – *Betulo-Salicetum repentis*; IV – *Inuletum ensifoliae*; V – *Brachypodio-Teucrietum*; + – numerical force less than 0.01

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