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The epigeic spider communities of lowland forests in the surroundings of the Danube River on the territory of Slovakia and their usage for biota monitoring

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Gabčíkovo-Nagymaros water dam, inundation forests, Danube River, spider communities, monitoring

Abstract. Research on spiders was carried out on seven selected model areas of inundation forests along the Danube River during 1991–1993. Altogether 2240 individual spiders were caught, belonging to 104 species. In the wet soft wood inundation forests, *Pirata hygrophilus* was eudominant (D > 40%). On the drier sites *Ozyptila praticola* was eudominant (D > 29%). The proportion in which these two species are present in soft wood inundation forests is a very good marker for moisture evaluation of the model areas. Changes in the spider communities were observed during the time of research in consequences of the Gabčíkovo-Nagymaros dam construction and functioning.

INTRODUCTION

The Danube River on the boundary of Slovakia and Hungary, creates an inland delta with a motley of biotopes and a high biodiversity. Due to the evident influence of human activities upon the surrounding landscape, such as the Gabčíkovo-Nagymaros dam construction and functioning, the need arose for a long term biota monitoring and for regular evaluation and prognosis of the situation in that area. The research of the above mentioned territory started in 1991, two years before the dam began to function, on selected model areas along the Danube River.

The first information on spiders from the model areas were published by Böckh (1857, 1862a,b) and Ortvay (1902), and come from the surroundings of Bratislava. Some sporadic data from the last century were given by Chyzer and Kulczyński (1891, 1894, 1897, 1899). Gajdoš (1987) investigated the spiders in the State Nature Reservation Kopáč which is situated very close to the Danube River. Krumpálová (1994) and Gajdoš (1994b) were dealing with selected areas along the Danube River. A summary of the present time knowledge about the spiders of the Podunajská Nižina lowlands on the Slovakia territory was published by Gajdoš et al. (1992).

Data on spider communities of inundation forests along the Danube River from Austria and Germany were published by Thaler et al. (1984), Thaler and Steiner (1989) and Bauchhenss (1991), respectively.

MATERIAL AND METHODS

The research of the spiders was carried out on six selected model areas during 1991 and 1992, which were in 1993 supplemented with one additional locality (Číčov) (Fig. 1). The spiders were collected by the square method (square 25 x 25 cm) from 16 different squares, altogether 1 m^2. The samples were collected about once a month, in the period from March till November from each locality. The spiders were taken out of the samples by a xeroeclector (Mocarsky type).

The similarity of the communities was evaluated on the basis of the Wishart index. Cluster analysis was performed by program NCLAS2 (Podanini, 1980) with the use of the UPGMA method. The spiders collected are listed (Table 1) in the order of Platnik (1993). Average yearly soil moisture was calculated from two-weakly measurings, to 10 cm of soil depth (Janík 1991–1994).

OVERVIEW OF THE MODEL AREAS

Bo—Bodíky

Inundation forest (*Saliceto-Populetum*) in the surroundings of the village Bodíky, age of trees 80 years (river kilometer 1830, 115 m altitude above sea level).

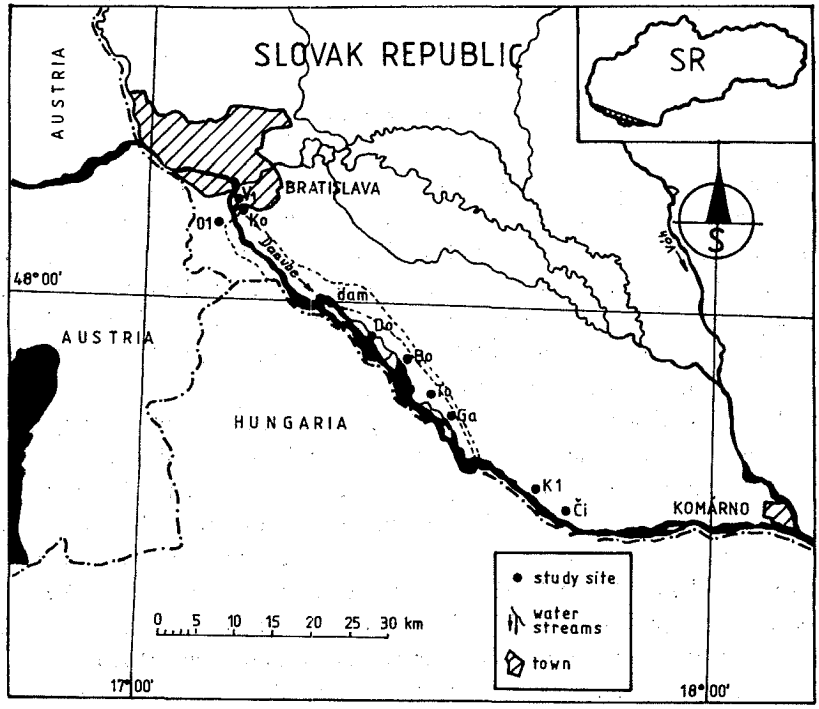

Fig. 1. Position of the model areas in surroundings of the Danube river.

Ga—Gabčíkovo-Istragov
Inundation forest (*Saliceto-Populetum*) in the surroundings of the town Gabčíkovo, age of trees 80 years (river kilometer 1817, 113 m altitude).

To—Trstená na Ostrove-Kráľovská Lúka
Inundation forest (*Saliceto-Populetum*) in the surroundings of the village Trstená na Ostrove, age of trees 90 years (river kilometer 1826, 117 m altitude).

Do—Dobrohošť
Inundation forest (*Saliceto-Populetum*) in the surroundings of the village Dobrohošť, age of trees 60 years (river kilometer 1840, 120 m altitude).

Kl—Klúčovec
Inundation forest (*Saliceto-Populetum*) in the surroundings of the village Klúčovec, age of trees 100 years (river kilometer 1804.5, 116 m altitude).

Či—Čičov
Inundation forest (*Saliceto-Populetum*) in the surroundings of the village Čičov, age of trees 100 years (river kilometer 1799–1801, 116 m altitude).

Vl—Bratislava-Vlčie hrdlo
Hard wood inundation forest (*Ulmeto-Fraxinetum*) remotes from the main river-bed of the Danube River, age of trees 80 years (river kilometer 1864, 132 m altitude).

RESULTS AND DISCUSSION

On the searched territory, 136 samples were collected during the period 1991–1993. Altogether 2240 individual spiders were caught, belonging to 104 species. In the wet soft wood inundation forests *Pirata hygrophilus* was eudominant (D > 40%), while on the drier sites the *Ozyptila praticola* was dominant (D > 29%). *Pirata hygrophilus* according to Martin (1991), is considered to be hygrophilous or hemihygrophilous. The ecological requirements for *Ozyptila praticola* are rather hemihygrophil to hemixerophil by Martin (1991). In the hard wood inundation forests the following species were eudominant: *Enoplognatha thoracica* (D_{91-93} from 14.5 to 16.7%), *Zelotes apricorum* (D_{92} = 11.7%, D_{93} = 19.4%), and partly in 1991 also *Ozyptila praticola* (D_{91} = 14.5%). From faunistic point of view, the captures of rare and threatened species occuring on the Red list of spiders of Slovakia (Gajdoš & Svatoň, 1993), such as *Ero aphana, Anelosimus vittatus, Entelecara erythropus, Gongylidiellum murcidum, G. vivum, Lessertinella kulczynskii, Walckenaeria obtusa, Hahnia helveola, Anyphaena furva* and *Zelotes gracilis* are the most important (Table 1). The average annual abundance of spiders on 1 m^2 ranges from 7.2 (**Vl** in 1993) to 28.7 specimens (**To** in 1992).

Table 1. Dominance of epigeic spiders of inundation forests in the surroundings of Danube River on the territory of Slovakia. D—average dominance. Bo—Bodíky, Ga—Gabčíkovo-Istragov, To—Trstená na Ostrove, Do—Dobrohošť, Kl—Kľúčovec, Vl—Bratislava-Vlčie hrdlo, Či—Čičov.

localities 1991						localities 1992						Species	localities 1993						
Bo91	Ga91	To91	Do91	Kl91	Vl91	Bo92	Ga92	To92	Do92	Kl92	Vl92		Bo93	Ga93	To93	Do93	Kl93	Či93	Vl93
D[%]	D[%]	D[%]	D[%]	D[%]	D[%]	D[%]	D[%]	D[%]	D[%]	D[%]	D[%]		D[%]	D[%]	D[%]	D[%]	D[%]	D[%]	D[%]
					4.0						3.3	Atypus sp.							8.3
						0.8						Pholcus opilionoides (Schr.)							
	0.9				2.6					0.6	3.3	Dysdera erythrina (Walck.)							
					11.8						3.3	Harpactea rubicunda (C.L.K.)							
												Ero aphana (Walck.)							2.8
						0.8					1.7	Ero furcata (Villers)							
												Anelosimus vittatus (C.L.K.)			0.7				
						0.8			3.5			Enoplognatha ovata (Cl.)	1.0	0.6					
0.6					14.5						16.7	Enoplognatha thoracica (Hahn)				0.7		3.1	16.7
									0.7			Episinus angulatus (Bl.)							
					4.0					1.2		Euryopis flavomaculata (C.L.K.)							
0.6						1.6						Neottiura bimaculata (L.)							
0.6			0.9	1.2			2.3					Robertus arundineti (O.P.-Cbr.)							
1.8	1.8	0.6		1.2	2.6	0.8	2.3	0.6	0.7	1.2	1.7	Robertus lividus (Bl.)	1.0	0.6	2.1	2.7	23.1	3.1	
	1.8		0.9		1.3	1.6	0.8			1.7		Robertus sp.	5.2			1.1			
0.6												Theridion varians Hahn							
		1.3										Araeoncus humilis (Bl.)							
								0.6				Bathyphantes approximatus (O.P.-Cbr.)							
	0.9			1.2		0.8		0.6				Bathyphantes nigrinus (Westr.)	1.0	2.6	2.9		2.2		
			0.9									Bolyphantes sp.						1.5	
0.6	0.9						1.5					Centromerus sp.							
			3.6			0.8	0.8		0.7			Centromerus sylvaticus (Bl.)							
0.6			3.6	1.2								Ceratinella scabrosa(O.P.-Cbr.)	1.0			2.0			
	0.9											Dicymbium nigrum (Bl.)		0.6					
1.2	2.8						1.5					Dicymbium tibiale (Bl.)							
0.6	0.9			2.4					0.7			D. latifrons (O.P.-Cbr.)				0.7			
1.2		3.2	0.9	1.2		1.6	1.5			0.6		Diplocephalus picinus (Bl.)	1.0	7.0	2.1	0.7	4.4		
0.6			1.8			1.6	0.8	2.9	2.8	1.7		Diplostyla concolor (Wid.)				4.1			
		0.6	1.8	3.6		0.8	4.6	2.3	4.2	1.2		Diplocephalus sp.			2.1	2.0		3.1	
						0.8						Entelecara erythropus (Westr.)							
		1.3										Entelecara media Kulcz.							
												Entelecara sp.		0.6					
		0.6										Erigone atra Bl.							
		0.6						0.6				Gnathonarium dentatum (Wid.)			0.7				
												Gongylidiellum murcidum Sim.		1.3					
		0.6										Gongylidiellum vivum(O.P.-Cbr.)							
1.2	5.5	4.5	0.9	7.1		4.1	6.1	4.7	3.5	4.6		Gongylidium rufipes (L.)	1.0	3.8	7.1	4.7	2.2	1.6	
									0.7	1.2	5.0	Lepthyphantes flavipes (Bl.)							5.6
											1.7	L. tenebricola (Wider)							
											1.7	Lepthyphantes tenuis (Bl.)	1.0						
1.2	0.9	1.9	8.0				0.8			0.6		Lepthyphantes sp.	1.0	0.6					
0.6						0.8						Lessertinella kulczynskii (Less)							
1.2		1.9				4.1		7.6	10.4	7.5	8.3	Linyphiidae not det.	1.0		5.0	0.7		1.5	
2.1						7.4	0.8	1.2	4.2	0.6		Maso sundevalli (Westr.)	2.1	1.9		1.4			
1.0												Micrargus herbigradus (Bl.)	1.0						
									0.7			Microneta viaria (Bl.)				0.7			

Table 1. (cont.)

localities 1991						localities 1992						Species	localities 1993						
Bo91	Ga91	To91	Do91	K191	V191	Bo92	Ga92	To92	Do92	K192	V192		Bo93	Ga93	To93	Do93	K193	Či93	V193
D[/]	D[/]	D[/]	D[/]	D[%]	D[%]	D[%]	D[%]	D[%]	D[%]	D[%]	D[%]		D[%]	D[%]	D[%]	D[%]	D[%]	D[%]	D[%]
0.6				1.2		2.5	2.3					Neriene clathrata (Sund.)	1.0	0.6		0.7	1.1		
							0.8	0.6				Oedothorax apicatus (Bl.)							
0.6	4.6	5.1						1.2				Oedothorax retusus (Westr.)			3.6		1.1		
		1.9						2.9	0.7	0.6		Oedothorax sp.							
												Panamomops sulcifrons (Wid.)						1.5	
0.6		18.5										Porrhomma convexum (Westr.)							
								1.2				P. microphthalmum (O.P.-Cbr.)							
						3.3		1.7		1.2		Porrhomma pygmaeum (Bl.)		4.5	8.6				
0.6	0.9	3.8		1.2								Porrhomma sp.				0.7			
					1.3			1.2			1.7	Syedra gracilis (Menge)							8.3
1.8			1.8			4.1			6.3	1.7		Tapinocyba insecta (L.K.)	2.1			0.7		3.1	2.8
1.2	0.9					4.1						Thyreosthenius parasiticus (Westr.)	1.0						
0.6	2.8		2.7	2.4			0.8		1.4			Walckenaeria antica (Wid.)		0.6		0.7			
		1.3										W. atrotibialis (O.P.-Cbr.)							
												W. dysderoides (Wid.)	2.1			0.7	1.1		
0.6												Walckenaeria obtusa Bl.					1.1		
											1.7	Meta segmentata (Cl.)	1.0						
						2.5		0.6		1.2		Meta sp.					1.1		
	0.9						0.8	0.6				Pachygnatha clercki Sund.							
									0.7			Pachygnatha degeeri Sund.			0.7				
3.1	3.7	1.9	3.6	2.4		2.5	0.8	0.6				Pachygnatha listeri Sund.	4.1	1.3	2.9	1.4		1.5	
1.2	0.9	1.3							0.7			Pachygnatha sp.		0.6			1.1	1.5	
		0.6				1.6	0.8					Tetragnatha sp.					1.1		
	0.9											Araneus alsine (Walck.)							
			0.9									Araneus sp.							
												Larinioides patagiatus (Cl.)		0.6					
								0.6				Alopecosa sp.							
												Arctosa lutetiana (Sim.)		0.6					
						0.8				0.6		Pardosa amentata (Cl.)		0.6					
									0.7			Pardosa lugubris (Walck.)	1.0	0.6		2.0	1.1	1.5	
0.6					2.6		0.8	0.6				Pardosa sp.							
40.2	49.5	42.0	23.2	9.5		1.6	42.4	55.2	2.1	1.7		Pirata hygrophilus Thor.	8.3	52.9	50.7	6.1	26.4	23.1	
							0.8				1.7	Trochosa sp.	2.1				4.4	1.5	2.8
1.2			0.9	4.8							3.3	Trochosa ruricola (De Geer)							
					6.6					2.9		Trochosa terricola Thor.							
											1.7	Tegenaria agrestis (Walck.)							
											1.7	Tegenaria campestris C.L.K.							
										0.6		Tegenaria silvestris C.K.							
										0.6		Cryphoeca silvicola (C.L.K.)							
										0.6		Hahnia helveola Sim.							
				2.4						0.6		Hahnia pusilla C.L.K.					1.1	1.5	
										0.6		Cicurina cicur (Fabr.)							
	0.9			3.6			2.3	1.2	2.8	0.6		Dictyna sp.		0.6	1.4	1.4			
0.6												Dictyna uncinata Thor.							
					1.3							Nigma flavescens (Walck.)							
												Lathys humilis (Bl.)				0.7			
	0.6											Amaurobius sp.		0.6					

EVALUATION OF INDIVIDUAL MODEL AREAS

Bodíky

As to the spiders collected this is the most important area with the highest number of species (44) and with the occurrence of four threatened species during the period

Table 1. (cont.)

localities 1991						localities 1992						Species	localities 1993						
Bo91	Ga91	To91	Do91	Kl91	Vl91	Bo92	Ga92	To92	Do92	Kl92	Vl92		Bo93	Ga93	To93	Do93	Kl93	Či93	Vl93
D[%]	D[%]	D[%]	D[%]	D[%]	D[%]	D[%]	D[%]	D[%]	D[%]	D[%]	D[%]		D[%]	D[%]	D[%]	D[%]	D[%]	D[%]	D[%]
		0.6			2.8				0.7			Anyphaena accentuata (Walck.)							2.8
					1.3						1.7	Anyphaena furva Miller							
0.6			7.1			3.3			6.9	3.5		Agraecina striata (Kulcz.)		0.6		1.4	2.2		
		0.7	2.7	4.8					1.4		3.3	Agroeca brunnea (Bl.)	7.2		0.7	4.1			
					1.3							Agroeca cuprea Menge				1.4			
									0.7			Agroeca sp.						1.5	5.6
1.2			0.9	1.2	6.6						1.7	Phrurolithus festivus C.L.K.				0.7			8.3
						3.3				1.2	3.3	Phrurolithus sp.				0.7			
2.4	0.9	1.3	0.9	1.2						2.9		Clubiona lutescens Westr.							
				1.2								Clubiona pallidula (Cl.)							
					5.3							Clubiona terrestris Westr.							
2.4	9.2	3.8	1.8	8.3		8.2	6.1	8.7	3.5	3.5	10.0	Clubiona sp.	7.2	1.3	2.1	6.1	5.5	3.1	2.8
					1.3							Callilepis sp.							
												Drassodes sp.							2.8
					2.6							Haplodrassus sp.							
	0.6									1.2	11.7	Zelotes apricorum (L.)		0.6				1.5	19.4
						0.8					1.7	Zelotes gracilis (Canetr.)						1.5	5.6
0.6	0.9				2.6							Zelotes sp.							
												Zora spinimana (Sund.)							2.8
									0.7			Thanatus formicinus (L.)							
	0.6											Misumenops tricuspidats (Fabr.)		0.6					
25.6	5.5	0.6	29.5	36.9	14.5	31.2	16.7	2.3	36.1	48.3	5.0	Ozyptila praticola (C.K.)	45.4	12.1	2.1	48.8	20.9	38.5	2.8
					2.6		0.8					Ozyptila sp.							
					4.0					1.7		Xysticus sp.							
												Xysticus ulmi (Hahn)			1.4				
	0.6						0.8		1.4	1.2	1.7	Ballus chalybeius (Walk.)		0.6		0.8			
											1.7	Euophrys frontalis (Wack.)						3.1	
										0.6		Myrmarachne formicaria(De Geer)							
					1.3	0.8			0.7	0.6		Neon reticulatus (Bl.)						1.5	
			0.9									Synageles venator (Lucas)							
164	109	157	112	84	76	122	132	172	144	174	60	Total	97	157	140	148	91	65	36
31	21	20	20	20	21	31	26	24	29	35	26	Number of species	24	28	19	30	17	21	16
8	8	8	8	8	11	7	7	6	7	8	5	Number of samples	6	7	6	6	7	6	5
20.5	13.6	19.6	14.0	14.0	6.9	17.4	18.9	28.7	20.6	21.8	12.0	Average number of ex./1 m2	16.2	22.4	23.3	24.7	13.0	10.8	7.2
2.22	2.10	2.16	2.32	2.40	2.84	2.77	2.20	1.89	2.52	2.35	2.92	Shannon's index H (ln)	2.21	1.96	1.99	2.25	2.10	2.18	2.52
0.63	0.66	0.68	0.75	0.78	0.91	0.81	0.67	0.59	0.75	0.66	0.90	Index of equitability (e)	0.70	0.59	0.68	0.66	0.74	0.72	0.91

Table 2. Soil moisture of the model areas in 1991–1994.

Localities	Bo	Do	To	Ga	Kl
1990	28.19	12.14	34.02	31.22	21.33
1991	29.70	17.67	35.12	31.77	26.58
1992	24.63	12.27	32.84	28.58	14.48
1993	22.93	13.29	31.43	26.68	17.39

1991–1992. This locality showed a remarkable change in the composition of the spider community, mainly during 1993 (retreat of hygrophilous species, decrease in abundance of *Pirata hygrophilus*, 30% decrease in number of species, absence of the threatened species), which corresponds with the expected decrease of the level of ground water (Lisický et al., 1988) and with mild decrease of soil moisture (Table 2).

Gabčíkovo-Istragov

Belongs to the wetter site with a high abundance of hygrophilous species *Pirata hygrophilus* (D from 42.4 to 52.9%). Lisický et al. (1988) forecasted the decrease of the level of ground water in the crucial period 1990–1991. The communities at the time of the research showed stability (Shannon's index H = 1.96–2.10) with a slight increase in the number and densities of species. The rare species *Gongylidiellum murcidum* was present here.

Trstená na Ostrove-Kráľovská Lúka

Rather wet locality with a predominance of the hygrophilous species *Pirata hygrophilus* (D = 42.0–55.2%). During the three years of research the communities showed stability (H = 1.89–2.16), which is in conformity with the prognosis of Lisický et al. (1988), who did not expect any changes due to the remoteness of the locality from the old river-bed. Species richness was a little bit lower as compared to the other localities (31 species). From the threatened species of the fauna of Slovakia, the following species were found: *Anelosimus vittatus* and *Gongylidiellum vivum.*

Dobrohošť

The spider communities showed changes in their composition during each of the three years. A considerable decrease was observed in the dominance of the hygrophilous species *Pirata hygrophilus* and on the other hand, an increase of the hemihygro-hemi-xerophilous species *Ozyptila praticola.* An increase of 50% in species richness was observed in 1993 in comparison with 1991. The other species which were found belong also rather to hemihygrophilous or hemixerophilous ones. It indicates a desiccation of the soil horizons and corresponds with the decrease of the soil moisture (Table 2).

Klúčovec

After the Gabčíkovo-Nagymaros dam started to function on October 1992, the spider communities changed in favour of more hygrophilous species (considerable increase in the abundance of the species *Pirata hygrophilus* and decrease of the species *Ozyptila praticola* in 1993). Of faunistic interest are the captures of *Walckenaeria obtusa* and *Hahnia helveola.*

Bratislava-Vlčie hrdlo

This is the only model area of hard wood inundation forest which is reflected in the composition of the spider communities as compared to the soft wood inundation forests. There is a predominance of hemixerophilous species and the species *Pirata hygrophilus* is completely absent. The locality showed a relative stability during the period of investigation. From the 37 species three species are listed in the Red list of spiders of Slovakia: *Ero aphana, Anyphaena furva, Zelotes gracilis.*

Čičov

Locality with predominance of species *Ozyptila praticola* (D = 38.46%) showed a rather dry character of the habitat. Average annual abundance of spiders on 1 m^2 was very low (10.8 specimens). Totally, 21 species of spiders were found.

COMPARISON OF EPIGEIC SPIDER COMMUNITIES

Based upon the similarity of the communities at the value of Wishart's index cca 23%, the yearly evaluated spider communities from each model area were divided into three large clusters by use of the UPGMA method (Fig. 2).

Cluster A represents the communities of more wet soft wood inundation forests (**Bo_{91}, Ga_{92}, Ga_{91}, To_{92}, To_{93}, Ga_{93}, To_{91}, Kl_{93}**) with eudominance of the species *Pirata hygrophilus*. The spider community of Klučovec (subcluster Ad) has an intermediate position in this cluster in 1993, when *Pirata hygrophilus* (D = 26.3%) and *Ozyptila praticola* (D = 20.9%) are equally numerous and in this way the community formed the link to the dryer areas of cluster B. Subclusters Aa, Ab and Ac show a presence of *Pirata hygrophilus* higher than 40%, at which level there is also a significant presence of *Ozyptila praticola* (D > 16%) in the subcluster Aa, and of eudominant *Porrhomma*

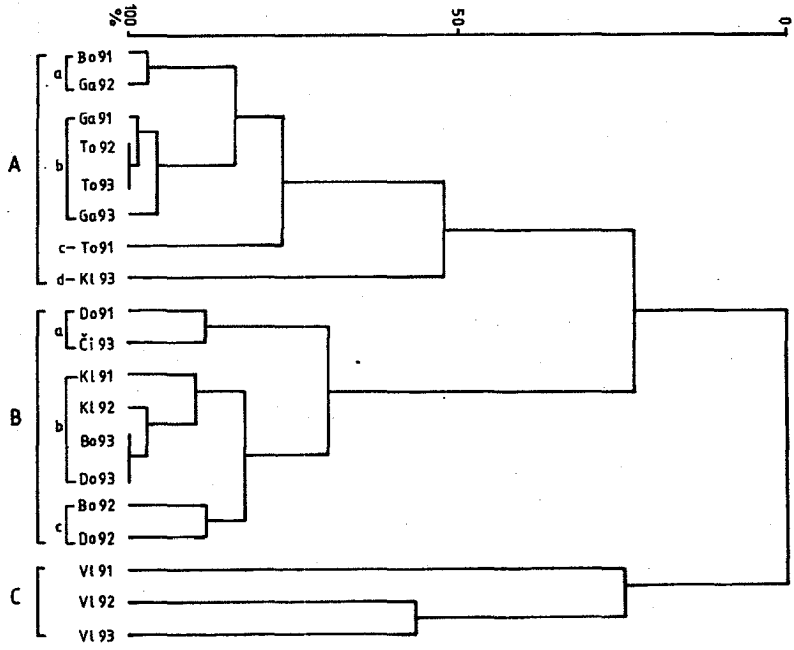

Fig. 2. Hierarchical classification of epigeic spider communities in the model areas according to the similarity of abundance (Wishart's index (UPGMA).

convexum in the community Ac (D = 18.5%). The subcluster Ab represents the localities with the highest number of hygrophilous species, *Pirata hygrophilus* being the most frequent species (D > 49%).

Cluster B represents the drier localities of soft wood inundation forests, where *Ozyptila praticola* is the predominant species. Subcluster Ba represents the link between wetter and drier localities because of the significant presence of *Pirata hygrophilus* (D cca 23 %). Subclusters Bb and Bc contain the communities with the highest dominance of the species *Ozyptila praticola* (D > 31%) and with the lowest number of *Pirata hygrophilus* (D < 10%).

Cluster C, with the communities of hard wood inundation forests, is distinguished from clusters A and B by the eudominant presence of the xerophilous species *Enoplognatha thoracica, Zelotes apricorum* and by the absence of *Pirata hygrophilus.*

The evaluated communities of the localities Gabčíkovo, Trstená na Ostrove and Vlčie hrdlo during the three years of research showed relative stability in composition and structure of the individual clusters. The most striking changes in the structure of the communities were found in the locality Bodíky, where a strong decrease of the hygrophilous species was found. This was manifested by the change in position of this locality in the dendrogram (shifting from subcluster Aa in 1991 to subclusters Bb and Bc in 1993 and 1992, respectively). The oposite tendency was registered in the locality Klúčovec, where a slight shifting towards the more wet habitat was observed during the research period. Small changes were also observed in the locality Dobrohošť, where the dominance of hemixerophilous species increased in comparison with the hygrophilous species during 1992–1993. These changes correspond with the soil moisture (Table 2) and Pišút's results. Pišút (1994), when monitoring of inundation forests, observed an obvious deterioration of the quality of woods and changes in species composition on the model areas of Dobrohošť and Bodíky. Similar changes were noticed in the quantity of Heteroptera in these model areas (Štepanovičová, 1994). This coresponds with our conclusions. Similar research was carried out by Krumpálová (1994). She studied the response of the arachnofauna to changes in the hydrological conditions in seven localities of inundation forest, near the Danube River during 1989–1991. She observed a decrease in the dominance of hygrophilous species *Pirata hygrophilus* during the research period and an increase of hemixerophilous species *Pardosa lugubris and Ozyptila praticola* which phenomenon she assumes to be connected with the changes in the level of ground water.

The research on the spider communities in inundation forests of the Danube River in Austria (Thaler & Steiner, 1987) and Germany (Bauchhenss, 1991) demonstrates the rather dry character of these habitats with a dominance of the hemixerophilous species *Pardosa lugubris* and *Ozyptila praticola.* Miller and Obrtel (1978) and Gajdoš (1994b) studied the spider communities in the inundation forests of the Morava River. These authors describe a similar composition of epigeic spider communities as near the Danube river, with a dominance of *Ozyptila praticola* in drier and *Pirata hygrophilus* in wet habitats.

Epigeic bog spiders for monitoring of habitat changes in Finland were used by Koponen (1979, 1980). No clear difference was found between the habitats in comparing the number of species, number of individuals and diversity. Changes in the

terrestrial spider fauna disturbed by human influence were studied in German raised bog after 22 years by Schikora (1994). On a general species level there were no clear clues ascertained about the consequences of biotope changes; 81% of the former species were found again. The spider *Antistea elegans* was discussed as a possible indicator species for monitoring hydrological changes in bog biotopes. According to our results occurence of threatened and rare species and abundance of specimens of *Pirata hygrophilus*, *Ozyptila praticola* could be considered as the bioidicators for monitoring hydrological changes in inundation forests. The proportion in which these two species are present in soft wood inundation forests is a very good marker for moisture evaluation of the model areas.

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