

## SPIDERS (ARANEAE) IN THE BIRDS' NESTS IN SLOVAKIA

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Gajdoš, P., Krištofik, J., Šustek, Z., Spiders (Araneae) in the birds' nests in Slovakia. *Biologia (Bratislava)* 46, 887—905, 1991.

The spiders were obtained from 876 nests of 39 birds' species collected in 25 localities in Slovakia. Occurrence of spiders was registered in 299 nests of 29 birds' species. Altogether we have obtained 747 spiders belonging to 52 species and 16 families. In this preliminary study we have evaluated the relation between the occurrence of spiders in the nests and the position and type of the nests. Tentatively we have subjected the spiders species spectra to the cluster analysis. The hydrophilous spiders dominated in the nests in humid habitats and at waters. The ombrophilous species dominated in the free nests and in the nesting boxes, while the synanthropic species predominated in the nests on the man-built objects.

Key words: spiders, birds nests, nesting boxes, bionomy, numerical classification.

The spiders represent an important component of ecosystems and they are found relatively frequently also in birds' nests. They do not belong to the typical nidicolus species, but they penetrate into the nests to search the food there or they find there suitable conditions for breeding, overwintering etc.

Only few authors occupied with the problem of the spiders' occurrence in the birds nests. Norberg (1936) gives seven species of spiders occurring in the birds' nests in North Europe. The spiders from the nests of *Delichon urbica* in West Slovakia were dealt with by Svatoň (1985). Nosek and Lichard (1962) mentioned spiders from the nests of more birds species. Also Ondrejková (1987) and Krumpál et al. (1988) occupied with this problem marginally.

The aim of this paper is to investigate the qualitative and quantitative representation of spiders in different types of birds' nests.

The nests were collected in the years 1978, 1982–1988, always after the birds had leaved the nests. The collected material consists of 876 nests. The arthropods were extracted from the nests by means of the Tullgrens apparatus. A considerable part of the spiders is represented by the juvenile individuals. The unweight average linkage method was used for the classification of the spiders' species spectra in the individual breeders. The index of the proportional similarity [s. c. Renkonens index], [Balogh, 1958] and Wisharts index [Podani, 1980] were used as similarity measures. The unidentified species were included in the classification only in those cases, when it was sure that the unidentified individuals belong only to one species. The individuals belonging at least potentially to more congeneric species were excluded from the classification.

*Review and brief characteristic of the localities*

The studied localities are ordered according the orographical classification of Slovakia. The locality codes of the Database of Fauna of Slovakia are given in the parantheses.

Little Carpathians [90].

Bratislava — Lištiny [7868] — an oak-locust-tree forest surrounded by vineyards, orchards and fields.

Bratislava — Záhorská Bystrica [7868] — an orchard at the foot of the Little Carpathians.

Bratislava — Železná studnička [7868] — a beech forest.

Kuchyňa [7588] — an orchard in a beech forest.

Mariánka [7768] — an garden on the margin of a beech forest.

Plavecké Podhradie [7569] — margin of a beech forest.

Sološnica [7569] — buildings of the State Farm in the centre of fields.

Považský Inovec mountains [100].

Moravany nad Váhom [7473] — a beech forest.

Strážovské vrchy hills [120].

Rajecké Teplice [6878] — margin of a pine forest neighbouring with a park and garden.

Veľká Fatra mountains [150].

Stankovany — the settlement Podšíp [6881] — margin of a beech forest.

Borská nížina lowland [770].

Borský Jur [7368] a garden around a family house in the village.

Jakubov [7587] — fish-ponds in the centre of fields.

Rohožník [7569] — a river side stand along a stream in fields and margin of a beech forest.

Šaštín-Stráže [7368] — an abandoned orchard in the fields.

Podunajská rovina plain [790].

Boheňov [8072] — a fish-pond in the centre of fields.

Bratislava — Kopáč [7868] — locust-tree coppice in fields.

Bratislava — Vrakuňa [7868] — a locust-tree coppice in fields.

Dobrohošť [8070] — a ploppe and willow flood plain forest.

Gabčíkovo [8171] — a small house on the Danube bank.

Hroboňovo [8072] — fish-ponds in the centre of fields and meadows.

Jahodná [7972] a flood plain forest along Small Danube and water sides of a periodical wet-land.

Jur pri Bratislave [7769] — bushes on a meadow in the vicinity of an alder forest, buildings of the Biological Station of the Comenius University.

Jur pri Bratislave — Čierna Voda [7769] — hawthorn bushes in a meadow in the vicinity of an alder forest.

Kalinkovo [7969] — poplar-willow flood plain forest.

Nitrianska pahorkatina hills [802].

Vinohrady nad Váhom [7672] — a sandy bank above the river Váh, surrounded by fields.

*The ecological classification of the nests*

At the evaluation of the material, the nests have been classified according their allocation and ecological properties into the following four groups:

1. nests on the humid habitats:

a) free nests situated on water, in wet-lands on the ground, on the islands in fish-ponds and artificial lakes. This group is represented by *Cygnus olor*, *Anas platyrhynchos*, *Netta rufina* and *Larus ridibundus*,

b) nests situated on the reed: *Acrocephalus scirpaceus* and *A. arundinaceus*.

2. Free nests situated above the ground:

a) only in the free nature: *Troglodytes troglodytes*, *Turdus merula*, *T. philomelos*, *Sylvia atricapilla*, *Aegithalos caudatus*, *Remiz pendulinus*, *Lanius collurio*, *Pica pica*, *Carduelis chloris*, *Emberiza citrinella*,

b) only on the man-built objects: *Hirundo rustica*, *Delichon urbica*.

3. Nests from the holes and grooves:

a) nests from the nesting boxes: *Ficedula albicollis*, *Parus caeruleus*, *P. major*, *Sturnus vulgaris*, *Passer domesticus*, *P. montanus*,

b) from the holes in the ground: *Merops apiaster*, *Riparia riparia*.

4. Nests found in various habitats and in their combinations:

*Motacilla alba*, *Phoenicurus ochruros*, *Muscicapa striata*.

The above classification is based partly on the classifications proposed by other authors, mainly Nordberg (1936), Krumpál et al. (1984) and Sedláček et al. (1984).

*Ecological analysis of spiders in the birds nests*

Among the total of 876 nests of 39 bird species, the spiders were found in 299 nests of 29 bird species and in the nests inhabited secondarily by four mammals species. From all nests we obtained altogether 747 individuals of spiders belonging to 52 species and 16 families.

The species spectrum of spiders in the nests is strongly influenced by the surrounding habitat, microclimatical conditions in the nests and by its type, shape and position.

The first group of the nests is characterized by the hygrophilous species *Pirata piraticus*, *Clubiona trivialis* and *Gnathonarium dentatum*. This group takes a specific position within the material. The quantitative representation of spiders in relation to the number of collected nests does not differ from the nests of other groups.

The nests group 2a was dominated by the folicolous and corticolous spiders

*Harpactea hombergi*, *Enoplognatha ovata* and *Ozyptila praticola*. The largest number of the spider species (23) and individuals (103) in this group of nests was found in the nests of the genus *Turdus*.

The nests of the group 2c were characteristic by the typical eusynantropic species *Scytodes thoracica*, synanthropic species *Steatoda bipunctata* (Valešová, Žďárek, 1968) and by the folicolous and corticolous species.

The nests of the group 3a were dominated by the ombrophilous species, before all by those of the genus *Clubiona*. The species *Clubiona brevipes* (18.5%), *Scotophaeus scutulatus* (13.7%) and *Theridion tinctum* (10.8%) were eudominant. The frequent occurrence of *S. scutulatus* in the nesting boxes was observed also by Prószyński and Staręga (1971). Because some of the nesting boxes were situated in the vicinity of human habitations, we found also representants of the synanthropic species *Teutana triangulosa* and *Achaearanea tepidariorum*. Within our material, the richest species spectrum of spiders was in the nests of *Passer domesticus*, which were the most numerous among all nests. 30 spider species were found in these nests. The dominant species were *Clubiona brevipes* (20.6%) and *Scotophaeus scutulatus* (14.4%). The ombrophilous species dominated in the nests of *Passer montanus*.

The synanthropic species *Pholcus opiltonides*, *Tegenaria domestica*, *Neriene montana* and the myrmecophilous species *Thyreosthenius parasiticus* were found in the nests of the group 3b.

In the fourth group of nests there were found the synanthropic species *Tegenaria domestica* on one hand and the ombrophilous species *Clubiona brevipes* and *Scotophaeus scutulatus* on other hand.

The occurrence of great number of the juvenile individuals 501 juveniles among the total of 747 was caused by the collecting the nests after the nesting period, when the majority of spiders was juvenile. Besides we suppose that the sufficient food sources, lower competition pressure and suitable microclimatic conditions are further factors making possible the survival and occurrence of spiders in the bird nests.

The average species number of spiders in individual nests fluctuates within the limits of 1–2.3 in the positive nests and 0.1–2.1 in all nests respectively (tab. 1 and 2). The average individuals number of spiders per one positive nests fluctuates between 0.5–9 individuals and average individuals number per one nests fluctuates between 0.1–2.4. Our material indicates that the most suitable survival conditions for spiders are in the nests in nesting boxes, before all in those occupied by *Passer* sp., which have a rich bedding. We suppose the nests of *Sturnus vulgaris* to satisfy the food requirements of spiders. Among the free nests, the nests of the genus *Turdus* suit the spiders at most. The nests of *Riparia riparia* seem to be the less suitable for the survival of spiders. It is probably due to their position.

An attempt at numerical classification of the spider species spectra in the nests of individual breeders.

Although we are aware of the heterogeneity of our material and in some breeders even of its insufficiency for the numerical classification, we have subjected tentatively the species spectra found in each breeder to the cluster

analysis (unweight average linkage method). The aim of it is to verify whether the intuitive ecological classification of the nests is reflected also in the species composition of spiders. An other aim is to create a basis for the future comparison of classifications of other everttebrate assemblages found in the nests.

According to their proportional similarity the species spectra of spiders form six cultures on the similarity level of cca 10%. The species spectra in the breeders 11, 12 and 18 remain isolated as outliers (fig. 1).

The first cluster (breeders 20 and 22) includes the species spectra from the nests situated in holes and grooves in the ground. The second cluster (breeders 2, 3, 4 and 6) includes the species spectra from the nests situated at water (group 1), where the hygrophilous species predominate. The third cluster is divided into two subclusters. The first subcluster (nests 7 and 35) is formed by the spiders from two different breeders (one from a nesting box, other one from a free nests). It arises occasionally due to the low number of positive nests of these breeders. The second subcluster (breeders 19, 8 and 9)

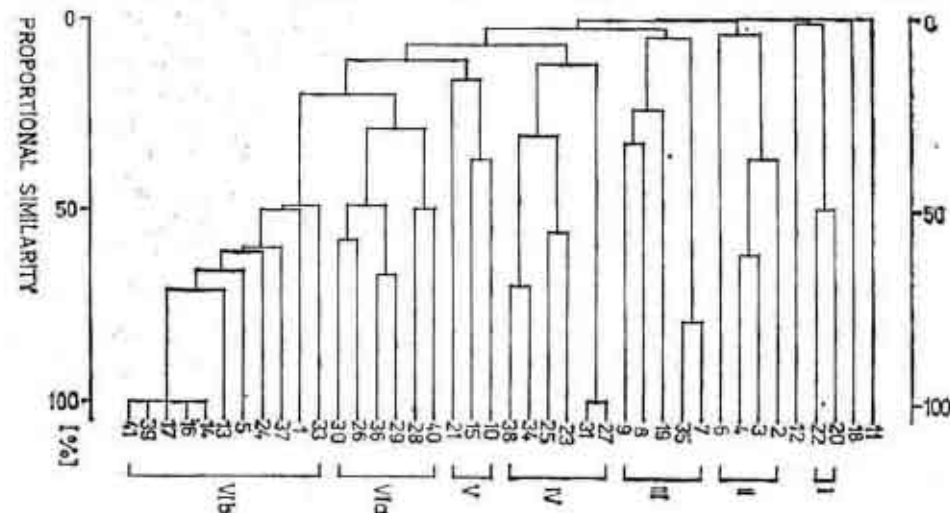


Fig. 1. Hierarchical classification of the spiders species spectra in the birds nests according the proportional similarity [Renkonens index].

(1 — *Cygnus olor*, 2 — *Anas platyrhynchos*, 3 — *Netta rufina*, 4 — *Larus ridibundus*, 5 — *Acrocephalus scirpaceus*, 6 — *Acrocephalus arundinaceus*, 7 — *Troglodytes troglodytes*, 8 — *Turdus merula* 9 — *Turdus philomelos*, 10 — *Sylvia atricapilla*, 11 — *Aegithalos caudatus*, 12 — *Remiz pendulinus*, 13 — *Lanius collurio*, 14 — *Pica pica*, 15 — *Carduelis chloris*, 16 — *Emberiza citrinella*, 17 — *Muscicapa striata*, 18 — *Hirundo rustica*, 19 — *Delichon urbica*, 20 — *Merops apiaster*, 21 — *Riparia riparia*, 22 — *Motacilla alba*, 23 — *Phoenicurus ochruros*, 24 — *Ficedula albicollis*, 25 — *Parus caeruleus*, 26 — *Parus major*, 27 — *Parus sp.* 28 — *Sturnus vulgaris*, 29 — *Passer domesticus*, 30 — *Passer montanus*, 31 — *Passer sp.*, 32 — *Parus caeruleus* + *Passer montanus*, 33 — *Parus major* + *Passer montanus*, 34 — *Parus major* + *Glis glis*, 35 — *Parus sp.* + *Passer montanus*, 36 — *Sturnus vulgaris* + *Passer domesticus*, 37 — *Sturnus vulgaris* + *Passer montanus*, 38 — *Passer montanus* + *Apodemus flavicollis*, 39 — *Passer montanus* + *Apodemus sylvaticus*, 40 — *Passer montanus* + *Muscardinus avellanarius*, 41 — *Passer sp.* + *Muscardinus avellanarius*).

Table  
Qualitative and quantitative representation of spiders in birds nests

Total of the nests collected	2	2	2	12	2	1	3	31	3	2	3	24	1	40	1	13	24	4	108	3	8	3	
Number of the nests positive for spiders	2	1	2	6	1	1	2	20	2	2	1	10	1	9	1	3	11	2	7	2	4	1	
Breeder																							
Family	<i>Cygnus olor</i>	<i>Anas platyrhynchos</i>	<i>Netta rufina</i>	<i>Larus ridibundus</i>	<i>Acrocephalus scirpaceus</i>	<i>Acrocephalus arundinaceus</i>	<i>Troglodytes troglodytes</i>	<i>Turdus merula</i>	<i>Turdus philomelos</i>	<i>Sylvia atricapilla</i>	<i>Aegithalos caudatus</i>	<i>Remiz pendulinus</i>	<i>Lanius collurio</i>	<i>Pica pica</i>	<i>Carduelis chloris</i>	<i>Emberiza citrinella</i>	<i>Hirundo rustica</i>	<i>Delichon urbica</i>	<i>Merops aplaster</i>	<i>Riparia riparia</i>	<i>Motacilla alba</i>	<i>Phoenicurus ochruros</i>	<i>Muscicapa striata</i>
Species																							
Locality																							
Breeders groups classified according to the positions of nests	1a			1b			2a						2b	3b	4								
<i>Scytodidae</i>																							
<i>Scytodes thoracica</i> (L. tr.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1 JB	-	-	-	-	-	-	
<i>Pholcidae</i>																							
<i>Pholcus optilonoides</i> (Schr.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1 G	-	-	-	
<i>Dysderidae</i>																							
<i>Dysdera erythrina</i> (Walck.)	-	-	-	-	-	-	-	2 BL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<i>Dysdera</i> sp.	1 SS	-	-	-	-	-	-	3 BL	3 JB	-	-	-	-	-	-	-	-	-	-	-	-	6 JB	
<i>Harpactea hombergi</i> (Scop.)	-	-	-	-	-	-	4 BZ	1 BL	10 BL	-	-	-	-	-	-	-	-	-	-	-	-	-	
<i>Harpactea rubicundus</i> (C. L. K.)	-	-	-	-	-	-	-	-	1 B	-	-	-	-	-	-	-	-	1 V	-	-	-	-	
<i>Theridiidae</i>																							
<i>Enoplognatha ovata</i> (Cl.)	-	-	-	-	-	-	-	-	-	-	-	1 D	1 D	-	-	-	-	-	-	-	-	-	
<i>Neottiura bimaculatum</i> (L.)	-	-	-	-	-	-	-	-	1 D	-	-	-	-	-	-	-	-	-	-	-	-	-	
<i>Robertus lividus</i> (B.)	-	-	-	1 H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<i>Theridion pinnastri</i> L. K.	-	-	-	-	-	-	-	-	1 BL	-	-	-	-	-	-	-	-	-	-	-	-	-	
<i>Theridion</i> sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2 G	-	-	1 J	-	-	-	
<i>Linyphiidae</i>																							
<i>Linyphiinae</i>																							
<i>Diplostyla concolor</i> (Wid.)	-	-	-	-	-	-	1 BZ	1 JB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<i>Centromerus</i> sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1 G	-	-	
<i>Neriene montana</i> (Cl.)	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	
<i>Linyphia</i> sp.	-	-	-	1 J	-	-	-	-	1 JB	-	-	-	-	-	-	-	-	-	-	-	-	-	



Breeders groups classified according by the positions of nests	1a			1b		
<i>Leptyphantes minutus</i> (Bl.)	-	-	-	-	-	-
<i>Leptyphantes</i> sp.	-	-	-	-	-	-
<i>Pityohyphantes phrygtanus</i> C. L. K.	-	-	-	-	-	-
<i>Linyphiinae</i>	-	-	2	-	1	-
<i>Micryphantinae</i>	-	-	1	-	1	-
<i>Ceratinella scabrosa</i> (O. P. Chr.)	-	-	-	-	-	-
<i>Erigone atra</i> (Bl.)	-	-	-	1	-	-
<i>Gnathonarium dentatum</i> (Wid.)	-	-	1	1	-	-
<i>Moebelia penicillata</i> (Westr.)	-	-	1	1	-	-
<i>Thyreosthenius parasiticus</i> (Westr.)	-	-	-	-	-	-
<i>Lycosidae</i>	-	-	-	-	-	-
<i>Pardosa</i> sp.	-	-	-	-	-	-
<i>Pirata piraticus</i> (Cl.)	-	-	-	1	-	-
<i>Pirata</i> sp.	-	2	1	1	4	-
<i>Agelenidae</i>	-	1	1	1	-	-
<i>Agelena gracilis</i> (Walck.)	-	-	-	-	-	-
<i>Tegenaria campestris</i> (Cl.)	-	-	-	-	-	-
<i>Tegenaria domestica</i> (Panz.)	-	-	-	-	-	-
<i>Dictynidae</i>	-	-	-	-	-	-
<i>Dictyna arundinacea</i> (L.)	-	-	-	-	-	-
<i>Dictyna</i> sp.	-	-	-	-	-	2
<i>Lathys humilis</i> (Bl.)	-	-	-	-	-	BZ
<i>Liocranidae</i>	-	-	-	-	-	-
<i>Agroeca brunea</i> (Bl.)	-	-	-	-	-	-
<i>Clubionidae</i>	-	-	-	-	-	-
<i>Clubiona brevipes</i> (Bl.)	-	-	-	-	-	-
<i>Clubiona comta</i> (C. L. K.)	-	-	-	-	-	-
<i>Clubiona trivialis</i> (C. L. K.)	-	-	-	-	1	-
<i>Clubiona pallidula</i> (Cl.)	-	-	-	-	-	-

	2a						2b	3b	4		
	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	1	-	-	-	-	-
	-	1	-	-	-	JB	-	-	-	-	-
	-	St	-	-	-	-	-	-	-	-	-
	1	-	-	-	-	-	-	-	1	-	-
	JB	-	-	-	-	-	-	-	G	-	-
	-	1	-	-	-	-	-	-	-	-	-
	-	JB	-	-	-	-	-	-	-	-	-
	1	5	-	-	-	-	-	-	-	-	-
	JB	JB	-	-	-	-	-	-	-	-	-
	2	1	-	-	-	-	-	-	5	-	-
	BL	BL	-	-	-	-	-	-	1	-	-
	-	-	-	-	-	-	-	2	-	-	-
	-	-	-	-	-	-	-	BZ	-	-	-
	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-
	1	-	-	-	-	-	-	-	-	-	-
	JB	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	2	-	-	-
	-	-	-	-	-	-	-	BZ	-	-	-
	1	-	-	-	-	-	-	-	1	1	-
	BL	-	-	-	-	-	-	-	V	BZ	-
	-	-	-	-	1	-	-	-	-	-	-
	-	-	-	-	D	-	-	-	-	1	-
	-	-	-	-	-	-	-	-	-	BZ	-
	-	4	-	-	-	-	-	-	-	-	-
	-	BL	-	-	-	-	-	-	-	-	-
	-	1	-	-	-	-	-	-	-	-	-
	-	JB	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	6
	-	-	-	-	-	-	-	-	-	1	-
	2	2	-	-	-	-	-	1	-	-	-
	BL	JB	-	-	-	-	-	G	-	-	-
	-	-	-	-	-	-	-	-	-	-	-
	-	1	-	-	-	-	-	-	-	-	-
	-	JB	-	-	-	-	-	-	-	-	-

Table 1/

Breeders groups classified according to the positions of nests	1a				1b		
	1	2	3	4	5	6	7
<i>Clubiona</i> sp.	1 SS	—	—	1 J	2 J	—	—
<i>Phrurolithus festivus</i> (C. L. K.)	—	—	—	—	—	—	—
<i>Gnaphosidae</i>							
<i>Scotophaeus scutulatus</i> (L. K.)	—	—	—	—	—	—	—
<i>Phlodromidae</i>							
<i>Phlodromus aureolus</i> (C.L.)	—	—	—	—	—	—	—
<i>Phlodromus emarginatus</i> (Schr.)	—	—	—	—	—	—	—
<i>Thomisidae</i>							
<i>Ozyptilla praticola</i> (C. L. K.)	—	—	—	—	—	—	—
<i>Xysticus</i> sp.	—	—	—	—	—	—	—
<i>Salticidae</i>							
<i>Heliophanus</i> sp.	—	—	—	—	—	—	—
<i>Neon reticulatus</i> (Bl.)	—	—	—	—	—	—	—
<i>Salticus eingulatus</i> (Panz.)	—	—	—	—	—	—	—
<i>Salticus zebraneus</i> (C. L. K.)	—	—	—	—	—	—	—
<i>Salticus scenicus</i> (C.L.)	—	—	—	—	—	—	—
<i>Salticus</i> sp.	1 SS	—	—	—	—	—	—
Total	3	2	2	17	3	1	7
Average species number in positive nests	1.5	1	1.5	2	2	1	1.5
Average species number in all nests	1.5	0.5	1.5	1	1	1	1
Average individuals number per one positive nest	1.5	2	0.5	2.8	3	1	3.5
Average individuals number per one nest	1.5	1	0.5	1.4	1.5	1	2.3

Abbreviations of the localities names:

BL — Bratislava — Lištiny  
 BZ — Bratislava — Záhorská Bystrica  
 BŽ — Bratislava — Železná studnička  
 KV — Kuchyňa — Vývrat  
 M — Marianka  
 PP — Plavecké Podhradie

S — Sološnica  
 MV — Moravany nad Váhom  
 RJ — Ražejské Teplice  
 St — Stankovany  
 BJ — Borský Jur  
 J — Jakubov

2a									2b		3b		4		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2 JB	1 JB	—	—	—	5 D, JB, SS	1 J	2 JB	—	—	—	—	—	—	—	3 J
1 BL	1 JB	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4 BL, BJ
—	1 BL	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	3 G	—	—	—	—	—
5 M, D, S, JB, BL	28 S,	—	—	—	—	—	—	1 D	—	3 G	—	—	—	—	—
1 JB	4 JB, BL	1 BL	—	—	1 BK	—	1 JB	—	1 BZ	1 G	—	—	—	—	—
—	—	—	1 JB	—	14 K, D, JB	—	—	1 JB	—	—	—	1 J	—	—	—
—	1 JB	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1 BL	—	1 JB	—	—	—	—	—	2 JB, D	—	—	—	—	—	—	—
—	—	—	2 JBC	—	—	—	—	3 JB	—	—	—	—	—	—	—
—	4 JB	—	—	—	—	—	—	—	—	—	—	—	—	—	—
29	74	2	3	9	22	1	14	1	6	17	2	11	2	16	3
1.7	1.8	1.5	1	1	1.1	1	1.1	1	1	1.5	1	1	1	1.5	1
0.9	1.1	1	1	0.3	0.6	1	0.3	1	0.2	0.7	0.5	0.1	0.7	0.6	0.3
1.9	3.7	1	1.5	9	2.4	1	1.6	1	2	1.6	1	1	1	4	3
1	2.4	0.6	1.5	3	0.8	1	0.4	1	0.5	0.7	0.5	0.1	0.7	2	1

SS — Šaštín — Stráže  
 P — Rohožník  
 B — Bohelov  
 KK — Bratislava — Kopáč  
 D — Dobrohošť  
 G — Gabčíkovo  
 H — Hroboňovo

Ja — Jahodná  
 JB — Jur pri Bratislave  
 JBC — Jur pri Bratislave — Čierna Voda  
 K — Kalinkovo  
 V — Vinohrady nad Váhom  
 BV — Bratislava — Vrakuňa

Table  
Qualitative and quantitative

Total of the nests collected	11	12	69	11	14
Number of the nests positive for spiders	4	2	16	1	3
Breeder	<i>Ficedula albicollis</i>	<i>Parus caeruleus</i>	<i>Parus major</i>	<i>Parus sp.</i>	<i>Sturnus vulgaris</i>
Family Species Locality	1	2	3	4	5
<u>Dysderidae</u>					
<i>Dysdera sp.</i>	—	—	1 BL	—	—
<i>Harpactea hombergi</i> (Scop.)	4 MV	—	—	—	—
<i>Harpactea rubicundus</i> (C. L. K.)	—	—	1 R]	—	—
<u>Theridiidae</u>					
<i>Achaearanea riparia</i> (Bl.)	—	—	—	—	—
<i>Achaearanea tepidariorum</i> (C. L. K.)	—	—	—	—	—
<i>Enoplognatha ovata</i> (Cl.)	—	1 ]	—	—	—
<i>Neottiura bimaculatum</i> (L.)	—	—	—	—	—
<i>Steatoda bimaculatum</i> (L.)	—	—	—	—	—
<i>Teutana triangulosa</i> (Walck.)	—	1 ]	—	—	—
<i>Theridion pinastri</i> (L. K.)	—	—	—	—	—
<i>Theridion tinctum</i> (Walck.)	—	—	6 BL	—	12 BL
<u>Linyphiidae</u>					
<i>Leptyphantes minutus</i> (Bl.)	—	—	—	—	—
<i>Meioneta rupestris</i> (C. L. K.)	—	—	—	—	—
<i>Linyphiinae not det.</i>	—	—	—	—	—
<u>Araneidae</u>					
<i>Larionoides ixobolus</i> (Thor.)	—	—	—	—	—
<u>Agelenidae</u>					
<i>Agelena labyrinthica</i> (Cl.)	—	—	—	—	—

Number of spiders in nesting boxes

	216	3	1	7	2	3	6	3	5	2	2	3	
	103	1	1	7	1	1	6	1	2	2	1	6	
	<i>Passer domesticus</i>	<i>Passer montanus</i>	<i>Passer sp.</i>	2 + 7	3 + 7	3 + <i>Glaucidium</i>	4 + 7	5 + 6	5 + 7	7 + <i>Apodemus flavicollis</i>	7 + <i>Apodemus sylvaticus</i>	7 + <i>Muscardinus agellianicus</i>	8 + <i>Muscardinus agellianicus</i>
	6	7	8	Nests used by more breeders									
1 ]	3 BL	—	—	—	—	—	—	—	—	—	—	—	1 R
—	12 R, BL	—	—	2 R	—	1 R	—	—	—	—	—	—	—
—	13 KV, S	—	—	—	—	—	—	—	2 ]	—	—	—	—
—	13 S, R	—	1 R	—	—	—	—	—	—	—	—	—	—
1 R	1 S	—	—	—	—	—	—	—	—	—	—	—	—
—	2 BL	—	—	—	—	—	—	—	—	—	—	—	—
3 S, R	3 R	—	—	1 PP	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	1 R	—	—	—	—	—	—	—	—	—	—	—	—
13 R, BI	13 BL, R, ]	—	—	—	—	—	3 BL	—	1 KV	—	2 KV	—	—
—	1 BL	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	1 KV	—	—	—	—	—	—	—	—	—
—	2 R	—	—	—	—	—	—	—	—	—	—	—	—
—	1 R	—	—	—	—	—	—	—	—	—	—	—	—
25 ]	2 ]	—	—	—	—	—	5 ]	—	—	—	—	—	—

Table 2

	1	2	3	4	5	6	7	8	Nests used by more breeders									
<i>Tegenaria agrestis</i> (C. L. K.)	—	—	—	—	—	—	1 R	—	—	—	—	—	—	—	—	—	—	—
<i>Tegenaria campestris</i> (Cl.)	—	—	—	—	—	—	2 BL	—	—	1 KV	—	—	—	—	—	—	—	—
<i>Tegenaria ferruginea</i> (Panz.)	—	—	—	—	—	—	1 R	—	—	—	—	—	—	—	—	—	—	—
<u>Dictynidae</u>																		
<i>Dictyna arundinacea</i> (L.)	—	—	—	—	—	—	1 J	—	—	—	—	—	—	—	—	—	—	—
<i>Lathys humilis</i> (Bl.)	—	—	—	—	—	1 J	—	—	—	—	—	—	—	—	—	—	—	—
<i>Nigma viridissima</i> (Walck.)	—	—	1 R	—	—	—	3 R	—	—	2 PP	—	—	—	—	—	—	—	—
<u>Amaurobiidae</u>																		
<i>Amarobius fenestratis</i> (Ström.)	—	—	3 R,R)	—	—	—	1 KV	—	—	—	—	—	—	—	—	—	—	—
<u>Liocranidae</u>																		
<i>Liocranum rupicola</i> (Walck.)	—	—	—	—	—	2 R	2 KV, BL	—	—	—	—	—	—	—	—	—	—	—
<u>Clubionidae</u>																		
<i>Clubiona brevipes</i> (Bl.)	—	1 BV	1 BZ	—	2 BL	11 KV, J	51 S,J, R	—	—	2 PP	2 KV	—	4 BL	4 J	14 KV	—	—	—
<i>Clubiona marmorata</i> (L. K.)	—	—	—	—	—	—	1 BL	—	—	—	—	—	1 BL	—	—	—	—	—
<i>Clubiona</i> sp.	6 BL,J	—	7 BZ, BL	—	7 BL	13 R,S, BL)	56 BZ, R,J, KV	—	—	10 KV, J	—	—	3 J	9 J	2 KV	1 KV	—	1 R
<u>Gnaphosidae</u>																		
<i>Scotophaeus scutulatus</i> (L. K.)	—	1 BV	4 BK, R	1 BK	—	23 KV,R	35 BV, J,R, BK	3 R	—	1 J	—	—	1 BL	—	—	—	—	—
<u>Philodromidae</u>																		
<i>Philodromus aureolus</i> (Cl.)	—	—	—	—	2 BL	3 KV	4 KV, R	—	—	1 J	—	—	—	—	3 KV	—	—	—
<i>Philodromus emarginatus</i> (Schr.)	—	—	—	—	—	2 S	7 KV, R,S	—	—	—	—	—	—	—	—	—	—	—
<i>Philodromus</i> sp.	—	—	—	—	—	2 BZ,R	3 BZ, R	—	—	2 PP, J	—	—	—	—	—	—	—	—
<u>Thomisidae</u>																		
<i>Ozyptila praticola</i> (C. L. K.)	—	—	—	—	1 BL	—	3 BL, R	—	—	—	—	—	—	—	—	—	—	—
<i>Pistius truncatus</i> (Pallas)	—	—	—	—	—	—	1 BZ	—	—	—	—	—	—	—	—	—	—	—
<i>Xysticus</i> sp.	—	—	—	—	—	—	3 BL, S	—	—	1 PP	—	—	—	—	—	—	—	—
<u>Salticidae</u>																		
<i>Neon reticulatus</i> (Bl.)	—	—	2 BL	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—



Table 2/

	1	2	3	4	5
<i>Salticus zebraneus</i> (C. L. K.)	—	—	1 R	—	—
<i>Salticus scintus</i> (C.L.)	—	—	—	—	—
<i>Salticus</i> sp.	—	—	—	—	—
Total	10	4	27	1	24
Average species number in positive nests	1	2	1.1	1	2.3
Average species number in all nests	0.4	0.3	0.3	0.3	0.4
Average individuals number per one positive nest	2.5	2	1.7	1	0.1
Average individuals number per one nest	0.9	0.3	0.4	0.1	1.5

includes the spider species spectra from free nests situated above ground. Two breeders in this cluster are even congeneric.

The fourth cluster is formed by three subclusters. The first (the nests 27 and 31) and the third (the nests 34 and 38) include the spider species spectra from the nesting boxes. The second subcluster arises due to the common occurrence of *Clubiona brevis* and *Scotophaeus scutulatus*. The fifth cluster spider species spectra from the free nests constructed above the ground (10 and 15), to which is joining the species spectrum from the nests of *Riparia riparia* (21) belonging to the third group.

The sixth cluster has a complex structure. It divides into two parts (VIa and VIb) on the similarity level of 20 %. The part VIa includes the species spectra from the nesting boxes. The further division pattern of this part into subclusters reflects before all the mutual proportion of the representation of *Clubiona* sp. and *Theridion tinctum* (tab. 2). The part VIb includes the nests from nesting boxes. The second part VIb is represented by the species spectra from two different types of nests. The third part VIc includes the spectra from the nesting boxes. The fourth part joins a hardly interpretable conglomerate of spectra from the different types of nests. It corresponds with the part VIb in fig. 2.

The results of classifications are obviously strongly biased by the unequal numbers of nests in each breeder and consequently by the different richness of the spider species spectra. In spite of it, both classification confirm the specificity of the spider species spectra in the nests on or at water (Group 1),

	7	8	Nests used by more breeders									
	8 BL, J,R, BZ 2	—	—	—	—	—	—	—	—	—	—	—
	J,R 3	1 BL	—	—	—	—	—	—	—	1 R	—	—
102	242	4	1	24	2	1	17	15	20	1	2	3
1.3	1.4	1	1	2.1	1	1	1.8	1	2	0.5	1	1.3
0.9	0.7	0.3	1	2.1	0.5	0.3	1.8	0.3	0.8	0.5	0.5	1.3
2.7	2.4	4	1	3.4	2	1	2.8	7.5	10	0.5	2	1
1.9	1.1	1.3	1	3.4	1	0.3	2.8	5	4	0.5	1	1

Abbreviations of the localities names as in table 1.

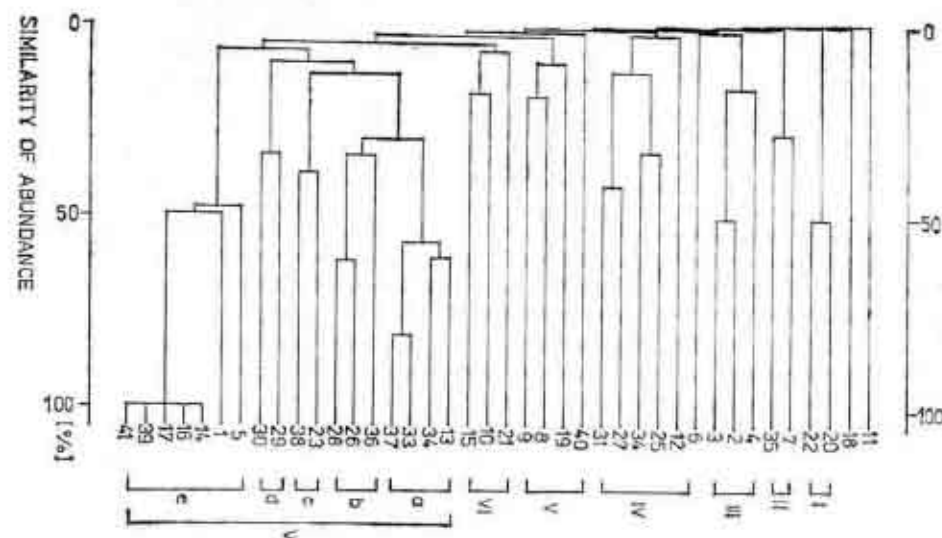


Fig. 2. Hierarchical classification of the spiders species spectra in the birds nests according to the similarity of abundance (Wishart's index), the symbols as in fig. 1.

in nesting boxes and a tendency to separation of the species spectra from the nests constructed above the ground. It is evident that a higher correspondence between the intuitive ecological classification of the nests and numerical classification of spider species spectra would be reached if a richer material is available.

### Discussion

A possibility to compare our results with those of other authors is limited, because only few authors occupied with this problem. Only the paper on *Dellehon urbica* of Svatoň [1985] is more comprehensive. The author supposed *Dellehon urbica* to be dominant. This species was the most dominant also in our material. Besides it, we found four further species, which had not been found by Svatoň [1985].

The more extensive paper of Nordberg [1936] deals with the fauna of a relatively wide spectrum of birds' nests, but the spiders are treated only from a part. Author gives seven species of spiders and further four species are identified only into the family. He found the hygrophilous species *Dolomedes jimbriatus*, *Argyroneta aquatica* and *Pirata* sp. in the nests from humid habitats and from those floating on water surface. The spiders of the genus *Pirata* were the most abundant also in our material. In other groups of the nests Nordberg found a frequent occurrence of the species of the genus *Clubiona*. They were abundant also in our material. Nosek and Lichard [1962] found 11 spiders species in the nests of the following five species of the birds, viz. *Turdus merula*, *Ficedula albicollis*, *Sturnus vulgaris*, *Parus major* and *Anas platyrhynchos*. Unfortunately they did not specify the spiders species spectra found in the nests of individual birds species. Four of the species found by them (*Anyphaena accentuata*, *Diadea dorsata*, *Entelecara* sp. and *Theridion varians*) were not found in our material. Ondrejková [1987] and Krumpál et al. [1988] dealt with the seasonal dynamics of the whole order *Araneae* without any specific identification.

### Conclusions

During the years 1978 and 1982—1988 in the frame of the investigations on fauna in bird nests we collected 876 nests of 39 bird species in 25 localities in Slovakia. Occurrence of spiders was registered in 299 nests on 29 species of birds. Altogether we have obtained 747 spiders belonging to 52 species and 16 families. In this preliminary study we have evaluated relationship of spiders' occurrence in the nests to the position and type of the nest. The hygrophilous spiders dominated in the group of nests built in humid sites and at or on water. The ombrophilous species dominated in the free nests and in the nesting boxes. The synanthropic species predominated in the nests constructed on the man-built objects. The existence of some groups of nests has been confirmed by the numerical classification of the spider species spectra.

We express our deep thanks to Dr. Alžbeta Darolová and Mr. Oliver Máchal for their help in the collecting the nests and in their identification.

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### PAVŮKY (ARANEAE) VO VTÁČÍCH HNIEZDACH NA SLOVENSKU

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Pavúky sme získali z 876 hniezd 39 druhov vtákov z 25 lokalít na Slovensku. Výskyt pavúkov sa zistil v 299 hniezdach 29 druhov vtákov. Celkovo sme získali 747 pavúkov, ktoré patria do 52 druhov a 16 číadi. V tejto predbežnej štúdií sme vyhodnotili vzťah medzi výskytom pavúkov v hniezdach a ich umiestnením a typom. Pokusne sme urobili i numerickú klasifikáciu druhových spektier pavúkov v hniezdach jednotlivých druhov hniezdíčov. Vlhkomilné pavúky dominovali v hniezdach na vlhkých stanovištiach a na vodnej hladine. Ombrofilné pavúky prevažovali vo voľných hniezdach a v búdkach. Naproti tomu synantropné druhy boli početne zastúpené v hniezdach postavených na antropogénnych objektoch.

Došlo 4. 12. 1990