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## **Project**

*State and prospects of the *Castanea sativa* population in Belasitsa mountain: climate change adaptation; maintenance of biodiversity and sustainable ecosystem management.*

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## **Report**

Faunistic Diversity of Spiders (Araneae) in Castanian forests of Belasitsa Mt

# Faunistic Diversity of Spiders (Araneae) in Castanian forests of Belasitsa Mt

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## 1. Research history

The earliest data concerning the spiders in Belasitsa Mt were published by Drensky (1936). In his "Katalog der echten Spinnen (Araneae) der Balkanhalbinsel" 22 species of 16 families were listed. Additional information can be found also in Drensky (1938, 1939, 1940, 1941, 1942, 1943). More recent publications include those of Deltshev & Dimitrov (1996) and Deltshev & Blagoev (2001). The data comprise 29 spider species known for the mountain to date.

## 2. Material and Methods

The present investigation concerns faunistic diversity of spiders in castanian forests of Belasitsa Mountain, including in reserve parts. The faunistic material is collected in 17 study plots during the period 26.03. – 07.10.2010, using different field methods:

- Pitfall trapping. At each study plot 10 traps (plastic cups) were placed, about 5 meters apart from each other, and emptied once in a two months.
- Air-traps fixed into tree crown in 10 study sites, and emptied once in a two months.
- Collecting faunistic material by hand under stones, fallen trees, in the crevices of rocks and ground, and every potential refuges for invertebrates.

- Sieving leaf litter using a sieve with holes of 0.5 cm.

The collected and identified materials are conserved in 70 % alcohol and kept in glass vials and jars.

### 3. Results

#### ***Taxa richness***

The faunistic composition of spiders established in the castanian forests of Belasitsa Mt includes 112 species of 25 families (Appendix 1, Table 1). 80 species are newly established for the mountain, five of which are new also for the fauna of Bulgaria (marked in the text with \*). In addition *Barusia* sp. and *Xysticus* sp. are possibly new taxa for the science. In this number 14 endemics are also included (Balkan – 11 species, Bulgarian – 3 species).

The established number of spiders represent about 20 % of expected about 600 species for the mountain and 11 % from the known 1014 species for Bulgarian aranean fauna. Best represented are the families Linyphiidae (31 species), Gnaphosidae (13 species), Theridiidae (11 species), Agelenidae (8 species) and Salticidae (9 species) – Table 2. The distribution of the species into different exploration sites is not equal represented. The highest number of species is established in the regions of the study plots P9 (38 species), P22 (34), P20 (33), P3, P8 and P13 with 30 species. Study plots 11 and 12 had fewest number of species – 21. The species *Harpactea saeva*, *Harpactea samuili* (Disderidae), *Tenuiphantes floriana*, *Walckenaeria simplex* (Linyphiidae), *Histoipona torpida*, *Inermocoelotes brevispinus*, *Tegenaria regispyrri*, (Agelenidae), *Agroeca cuprea*, *Liocranum rupicola*, *Liocranum rutilans* (Liocranidae), *Drassyllus villicus*, (Gnaphosidae) and *Cozyptila blackwalli* (Thomisidae) had numerous populations in most of the study plots.

The faunistic diversity of the established 112 species shows that the castanian forests of Belasitsa Mt is a habitat with significant species richness. This conclusion is supported also by the existence of 14 endemics and 29 rare (stenotopic) species. It has to emphasized that the list is not final, because in the frame of this pioneer research not all ecological niches of the investigated territory are covered.

**Table 1.** Family composition of the spiders in castanian forests of Belasitsa Mountain

No	Family	Species number	%
1	Atypidae	1	0.9
2	Nemesidae	2	1.8
3	Scytodidae	1	0.9
4	Leptonetidae	1	0.9
5	Segestriidae	1	0.9
6	Dysderidae	4	3.6
7	Mimetidae	1	0.9
8	Theridiidae	11	9.8
9	Anapidae	1	0.9
10	Linyphiidae	31	27.6
11	Araneidae	2	1.8
12	Lycosidae	6	5.3
13	Pisauridae	1	0.9
14	Zoriidae	1	0.9
15	Agelenidae	8	7.2
16	Hahnidae	1	0.9
17	Dictynidae	1	0.9
18	Amaurobiidae	1	0.9
19	Miturgidae	1	0.9
20	Liocranidae	4	3.6
21	Corinidae	2	0.9
22	Gnaphosidae	13	11.6
23	Philodromidae	3	2.9
24	Thomisidae	6	2.7
25	Salticidae	8	7.2
	<b>Total</b>	<b>112</b>	<b>100</b>

#### 4. Taxa of conservation significance

The population of invertebrate animals does not require protection of the individuals, but protection of their natural habitats (Bern Convention). The establishment of the conservation significance of different habitats is determined by the presence of species and population richness, endemics, rare (stenotopic) and threatened species.

##### **Endemics**

Here we can classify taxa which up to now aren't found outside the borders of the Balkan Peninsula. They are divided in *Balkan type* (determined mainly on the territory of more than one Balkan country) and *Bulgarian type* (found only in Bulgaria) (Appendix 1, Table 2).

Best represented are the Balkan endemics (11 species), and the species *Harpactea samuili*, *Tenuiphantes floriana*, and *Tegenaria regispyrrhi* are established into all study plots. With numerous populations are presented also the species *Tapinocyba silvestris* and *Inermocoelotes falciger*, found into the half of the study plots. The rest of the species are established into 2, 3 or 4 study plots. It has to emphasize the finding of the species *Zantherella relict*a, known till now mainly from caves.

The Bulgarian endemics *Brachythele langourovi*, *Harpactea mentor* and *Inermocoelotes brevispinus* are characteristic for the forest belt of Belasitsa and Slavianka Mountains.

### **Rare (stenotopic) species**

Here are classified species, inhabiting single localities and being represented by not numerous populations. In most cases they are connected with a restricted type of habitats and require specific, abiotic and biotic conditions of the sites (Appendix 1, Table 1).

The established rare (stenotopic) species are 29. They are best represented in the families Theridiidae (7 species), Linyphiidae (7 species), Gnaphosidae (3 species), Salticidae (2 species).

Some of the rare (stenotopic) species are montane elements living in xerothermic conditions, but the most of them are closely connected with the forest belt of the mountain.

### **Current and potential threats to the survival of invertebrate fauna in castanian forests**

The present investigation is insufficient to give us full and exact information concerning the conservation problems of faunistic diversity, but we shall point out some of the very distinct trends.

- The clearing of the forests and braking of some terrains.
- Fires.
- The urbanization of the mountain.
- The constructing of temporary mountain roads in the regions inhabited by species of conservation value.
- The pollution in the zone of intensive tourism, including the areas around the tourist huts.
- The water catchment has also very grave consequences for the fauna in the mountain.

### ***Recommendations for protection of natural habitats and invertebrate fauna in castanian forests***

- Strengthening of the administrative regulations.
- New legislative measures.
- Effective local control concerning clearing of the forests, urbanization and every construction practices in territory inhabited by populations of invertebrates of conservation significance.
- Enhancing of the environmental culture in all strata of the Bulgarian society, which will lead to enhanced environmental consciousness and control.
- The best protection for all groups of invertebrates in castanian forests of Belasitsa Mountain would be to protect all typical forest habitats and keep its state as natural and undisturbed as possible.
- Creation and development of faunistic electronic data base in GIS format.
- Creation of a system for monitoring of invertebrate species and their communities.

### **8. References**

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**Appendix 1.** List of the spider species (Araneae), established in the study plots (P) of castanian forests in Belasitsa Mt.

Abbreviations: Tot – total number; Con – conservation significance; BG – Bulgarian endemic; BP – Balkan endemic; R – rare species; \* - new species for the fauna of Bulgaria.

TAXA	P3	S4	S6	S7	S8	S9	S 10	P11	P12	P13	P19	P20	P21	P22	P23	P24	P25	Tot	Con
<b>Atypidae</b>																			
<i>Atypus piceus</i>	3				3					2				1			1	10	R
<b>Nemesidae</b>																			
<i>Brachythele denieri</i>								1										1	BP
<i>Brachithele langourovi</i>	3				6	6	4	11		20				1			2	43	BG
<b>Scytodidae</b>																			
<i>Scytodes thoracica</i>							1	1	1								8	11	R
<b>Leptonetidae</b>																			
<i>Barusia sp</i>										1							3	4	
<b>Segestridae</b>																			
<i>Segestria senoculata</i>		1	1									1						3	
<b>Dysderidae</b>																			
<i>Dysdera longirostris</i>			1							1		1	1	4		1	1	10	
<i>Harpactea mentor</i>		4	6									3	2			2		17	BG
<i>Harpactea saeva</i>	19	12	28	27	34	24	18	21	22	11	27	54	54	55	33	48	15	502	
<i>Harpactea samuili</i>	12	19	21	10	2	4	12	10	26	9	11	25	17	31	14	12	15	250	BP
<b>Mimetidae</b>																			
<i>Ero furcata</i>	1									2								3	R
<b>Theridiidae</b>																			
* <i>Dipoena braccata</i>													1					1	R
<i>Dipoena melanogaster</i>		1					1											2	R
* <i>Dipoena nigroreticulata</i>				1								1		1				3	R
<i>Enoplognata quadripunctata</i>		1																1	R

<i>Enoplognatha latimana</i>				1														1	
<i>Episus angulatus</i>					1													1	
<i>Episus maculipes</i>	1	1		1					1				1					5	
<i>Pholcomma gibbum</i>		1																1	R
<i>Sardinidion blackwalli</i>											1							1	R
<i>Steatoda bipunctata</i>	1							1										2	
<i>Theridion melanurum</i>									1									1	R
<b>Anapidae</b>																			
<i>Zangherella relict</i>									1		1							2	BP
<b>Linyphiidae</b>																			
<i>Abacoproeces saltuum</i>	1					1						2		1	1			6	R
<i>Centromerus acutidentatus</i>												1				1		2	BP
<i>Centromerus lakatnikensis</i>			1			1				4				2	4			12	BP
<i>Diplocephalus picinus</i>												1						1	
<i>Diplostyla concolor</i>		1			2				1									4	
<i>Gonatium nemorivagum</i>									1									1	R
<i>Labula thoracica</i>												1						1	R
<i>Lepthyphantes leprosus</i>	2	1	1									2						6	
<i>Lepthyphantes magnesia</i>				1		4									1			6	BP
<i>Lepthyphantes minutus</i>													1					1	R
<i>Linyphia hortensis</i>												1						1	
<i>Mansuphantes mansuetus</i>			1															1	
<i>*Mansuphantes pr. fragilis</i>																1		1	R
<i>Megalepthyphantes collinus</i>			1				1		1	2	1							6	
<i>Micrargus herbigradus</i>											1				1			2	
<i>Microneta viaria</i>		3	7		1	1	3	2		8	3	4	3	3	4	4		46	
<i>Pelecopsis elongata</i>					2													2	
<i>Scutpelecopsis krausi</i>					1													1	BP
<i>Tapinocyba pallens</i>									1									1	R

<i>Tapinocyba silvestris</i>	1				2				1		7	3	4	1	1	8	11	<b>39</b>	<b>BP</b>
<i>Tapinopa longidens</i>									1									<b>1</b>	<b>R</b>
<i>Tenuiphantes floriana</i>	2	2	8	3	2		5	11	4	13	7	4	4	6	2	6	4	<b>83</b>	<b>BP</b>
<i>Tenuiphantes tenebricola</i>																	1	<b>1</b>	
<i>Thyreosthenius parasiticus</i>				2		1				7		1						<b>11</b>	
<i>Trichoncus affinis</i>						2												<b>2</b>	
<i>Trichoncus hackmani</i>						3												<b>3</b>	
<i>Walckenaeria alticeps</i>												1						<b>1</b>	
<i>Walckenaeria antica</i>						1												<b>1</b>	
<i>Walckenaeria furcilata</i>						5							2	1				<b>8</b>	
<i>Walckenaeria mitrata</i>	1			1									1					<b>1</b>	
<i>Walckenaeria simplex</i>	5	1	11	17	1		1	13	39	4	51	13	3	5	15	10	13	<b>202</b>	
<b>Araneidae</b>																			
<i>Cercidia prominens</i>					1													<b>1</b>	
<i>Nuctenea umbratica</i>										1								<b>1</b>	
<b>Lycosidae</b>																			
<i>Alopecosa accentuata</i>				1														<b>1</b>	
<i>Alopecosa albofasciata</i>						1												<b>1</b>	
<i>Hogna radiata</i>						11												<b>11</b>	
<i>Pardosa alacris</i>					4	4	1	5	2	5				2			4	<b>27</b>	
<i>Pardosa hortensis</i>						1				1		1						<b>3</b>	
<i>Pardosa lugubris</i>			1		1	7				9								<b>18</b>	
<b>Pisauridae</b>																			
<i>Pisaura mirabilis</i>	1						1											<b>2</b>	
<b>Zoridae</b>																			
<i>Zora nemoralis</i>	7				3	12	3	2		16	3	6		3			1	<b>56</b>	
<b>Agelenidae</b>																			
<i>Histopona torpida</i>	11		8	3		1	35	6	10	15	8			2	1	1	4	<b>105</b>	
<i>Inermocoelotes brevispinus</i>	7	10	29	4	10	4	3	10	7		27	13	45	10	23	14	5	<b>227</b>	<b>BG</b>

<i>Inermocoelotes falciger</i>	13				1			3		6	20	7	1			3		54	BP
<i>Malthonica ferruginea</i>	1	1	1	2	2				2			5						14	
<i>Malthonica silvestris</i>				1										1				2	
<i>Tegenaria parietina</i>											1			3				4	
<i>Tegenaria regispyrghi</i>	9	1	3		1	3	1	10	5	8	7	11		18	1	2	7	87	BP
<i>Textrix denticulata</i>			4			1		1				2		4	4		1	17	R
<b>Hahnidae</b>																			
<i>Hahnia nava</i>		1	1		1						19		21				2	45	R
<b>Dictynidae</b>																			
<i>*Nigma puella</i>																1		1	R
<b>Amaurobiidae</b>																			
<i>Amaurobius strandi</i>															1			1	R
<b>Miturgidae</b>																			
<i>Cheiracantium elegans</i>					1									1				2	
<b>Liocranidae</b>																			
<i>Agroeca cuprea</i>	13		7		22	6	3		2	6	7	41	15	2	17	7		148	
<i>Apostenus fuscus</i>		5																5	R
<i>Liocranum rupicola</i>	14	1	7	2	5	3	2	5	7	8	5	14	3	12	1	3	1	93	
<i>Liocranum rutilans</i>	13	2	7	5	7		3	9	8		8	8	1	6	2	1		80	
<b>Corrinidae</b>																			
<i>Cetonana laticeps</i>	1				1								2	1				5	R
<i>Phrurulithus festivus</i>						5													
<b>Gnaphosidae</b>																			
<i>Aphantaulux seminigra</i>		1																1	R
<i>Callilepis schuszteri</i>						24												24	
<i>Drassyllus villicus</i>	27		6	1	19	35	12	3	3	9	4	32	1	30	9	3	37	231	
<i>Echemus angustifrons</i>									1									1	R
<i>Haplodrassus silvestris</i>		1	1		3	1	2				2	2	1	3	1			17	
<i>Poecilochroa conspicua</i>	1																	1	R

<i>Scotophaeus blackwalli</i>				1					1								2	
<i>Scotophaeus scutulatus</i>			1														1	
<i>Trachizelotes pedestris</i>					2												2	
<i>Zelotes balcanicus</i>				1	10				3								14	BP
<i>Zelotes erebeus</i>					3				6		2				2		13	
<i>Zelotes oblongus</i>					5		1										6	
<i>Zelotes subterraneus</i>				2													2	
<b>Philodromidae</b>																		
<i>*Philodromus pinetorum</i>																1	1	R
<i>Philodromus praedatus</i>	1																1	
<i>Philodromus rufus</i>				1									1	1			3	
<b>Thomisidae</b>																		
<i>Cozyptila blackwalli</i>	4	3	2			2	1	11	10	5	2	4	1	12		8	65	
<i>Xysticus cristatus</i>		1	1														2	
<i>Xysticus lanio</i>	1																1	R
<i>Xysticus luctator</i>						1					2		4	1			8	
<i>Xysticus sp.</i>															1		1	
<i>Xysticus tenebrosus</i>						1					1				1	3	6	BP
<b>Salticidae</b>																		
<i>Ballus shaleibeyus</i>											1						1	
<i>Euophrys frontalis</i>				1	2					2	4	1	2		1		13	
<i>Evarcha jucunda</i>						4											4	R
<i>Macaroeris flavicomis</i>		1															1	R
<i>Marpisa muscosa</i>			1	1										1			3	
<i>Pseudeuophrys erratica</i>	1						1										2	
<i>Pseudeuophrys obsoleta</i>			1	1		1						2			1		6	
<i>Salticus zebraneus</i>						1				1							2	