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PRELIMINARY NOTES ON THE SPIDER FAUNA (ARACHNIDA, ARANEAE) OF THE SPECIAL NATURE RESERVE ZASAVICA

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Abstract

Based on literature data and preliminary investigations a total of 104 spider species can be recorded from the Special Nature Reserve (SNR) Zasavica. Five species, *Cyclosa oculata* (Walckenaer, 1802), *Mendoza canestrinii* (Ninni, 1868), *Philodromus albidus* Kulczynski, 1911, *Heriaeus graminicola* (Doleschall, 1852) and *Sibianor aurocinctus* (Ohlert, 1865), were not recorded in Serbia until the present study. The rediscovery of the species *Dolomedes plantarius* (Clerck, 1757), *Cresmatoneta mutinensis* (Canestrini, 1868), *Hypsosinga heri* (Hahn, 1831) and *Argyroneta aquatica* (Clerck, 1757) represents an important result that could possibly be used as a guideline for future faunistic and ecological studies with the purpose of successful protection and conservation measures in the SNR Zasavica.

KEY WORDS: new data, rediscovered species, Serbia

Introduction

The Special Nature Reserve (SNR) Zasavica is a wetland in the region of Mačva, west-central Serbia. It extends through the settlements of Crna Bara, Banovo Polje, Ravnje, Zasavica I, Zasavica II, Salaš Noćajski, Noćaj and Mačvanska Mitrovica. It includes the river and surrounding terrains, with a total area of 18.25 square kilometers. Over time, the Zasavica River was initially formed on the former riverbed of the Sava River, then from the subterranean waters of the Drina River and from several streams from Cer Mountain. Today it is connected with the Sava River via the Bogaz canal (OBRATOV-PETKOVIĆ *et al*., 2007).

The majority of the protected zone includes the water surface of the rivers and the Zasavica, Jovača, Prekopac, and Batar canals. The second largest protected area is the Valjevac pasture with its mixture of semi-aquatic and hydrophilic vegetation and a dry area under the major influence of Podolian cattle and a Mangulica pig population. Finally, the forest vegetation contains various hydrophilic forests of European ash, poplar, willow and black alder. Large parts of the forest vegetation are communities of oak and hornbeam (*Genisto elatae – Quercetum* Horv. 1938 subass. *Carpinetosum betuli* Vuk. 1958) and lime trees, and English and Turkey oak (*Rusco aculeate – Tilio – Quercetum* Erd.1955) (OBRATOV-PETKOVIĆ *et al*., 2007).

As one of the last authentically preserved wetlands in Serbia, this area was proclaimed a Special Nature Reserve in 1997 and placed under state protection as a category I natural treasure of exquisite value. It became a popular attraction after the successful reintroduction of the beaver (*Castor fiber* Linnaeus, 1758) in 2004 (OBRATOV-PETKOVIĆ *et al*., 2007).

The arachnofauna of the site remains poorly documented. Literature data only shows records of 6 spider species from the Crna Bara locality (STOJIĆEVIĆ, 1929; DELTSHEV *et al*., 2003). In the last few years some interesting spider species were caught during student research camps and through casual collection by the third author. Therefore the aim of this preliminary study is to present a preliminary list of spider species living in the SNR Zasavica. We hope thereby to establish a basis for future faunistic and ecological studies, and to offer some indications for protection and conservation measures.

Material and Methods

Part of the material presented here was collected during the student scientific research camps from the 1st till the 10th of August 2008, 2009 and 2010 in the SNR Zasavica. During these short research periods the aim of the fieldwork was to gather more knowledge about the spider fauna of the site and to educate students in fieldwork. To make the best use of the research time available, different collection methods were applied.

Table I. Basic information about the visited localities in the Special Nature Reserve Zasavica.

Locality	Coordinates	Level of protection	General habitat description
Banov brod	44°54'52.33"N 19°23'41.60"E	Pending	Dry and wet meadow, forest, humid forest
Batar	44°55'32.16"N 19°28'19.40"E	II level, pending	Stream, flooded meadow and forest
Bogaz	44°57'55.44"N 19°35'14.74"E	II level	Canal, humid forest
Bostanište	44°56'28.12"N 19°26'14.37"E	II level	Flooded forest
Jovača	44°54'7.50"N 19°24'18.12"E	II level, protected zone	Stream, flooded meadow and forest
Panjevine	44°55'19.76"N 19°26'39.85"E	Pending	River source, flooded meadow and forest
Poljane	44°55'54.22"N 19°28'52.56"E	Pending	Flooded forest
Prekopac	44°55'0.72"N 19°25'32.13"E	II level	Canal, flooded meadow and forest

Locality	Coordinates	Level of protection	General habitat description (Table I – continued)
Preseka	44°56'1.39"N 19°31'13.54"E	II level, protected zone	Flooded forest
Staniševac	44°55'52.33"N 19°24'53.62"E	Pending	Non-flooded forest
Široka bara	44°54'55.14"N 19°24'38.03"E	Protected zone	Flooded meadow and forest
Šumareva ćuprija	44°57'0.14"N 19°29'39.68"E	II level	Flooded forest
Trebljevine	44°55'47.42"N 19°26'18.86"E	II level	Flooded forest
Turske livade 1	44°57'31.50"N 19°31'41.17"E	II level, protected zone, pending	Flooded forest
Turske livade 2	44°57'34.96"N 19°31'39.59"E		Non-flooded forest
Valjevac	44°56'50.75"N 19°31'35.62"E	II level	Pasture, semi-aquatic and hydrophilic vegetation
Vrbovac	44°57'12.02"N 19°28'49.43"E	II level	Flooded forest
Zovik	44°56'49.44"N 19°27'51.01"E	Pending	Stream, flooded forest

Most of the material was collected by sweeping, beating and hand collecting. The entire collection area is situated at the low altitude of 76 – 82 m. Pitfall traps were set only at the Turske livade locality. Eight plastic juice cups of 30cl, half-filled with vinegar and without a lid, were set in non-flooded deciduous woodland and another eight were set in a flooded area. Every year, the traps were installed on the first day of the camp, and emptied on the last. Other collection activities were conducted at another 16 localities. Some of the visited sites are in the protected zone, but some are outside, still pending protection. The incomplete literature data meant that a uniform description of the habitat at all localities could not be given, but some basic information is presented here (see Tab. I).

The remaining material represents the parcel of the private collection of the third author, collected opportunistically with no regular protocol during his day-to-day checks of the protected area. With the addition of this material, we prepared better species lists but without detailed information on localities or habitats for these specimens.

All material was fixed in 70% ethanol and deposited in the private collection of the first author. Identification of species was largely based on the "araneae – spiders of Europe' website (NENTWIG *et al*., 2011). Standard literature for individual groups was also used, but is mentioned only where appropriate. Challenging specimens were sent to A. HÄNGGI for further checking. Nomenclature follows the World Spider Catalog (PLATNICK, 2011).

Figure 1. Map of the Special Nature Reserve Zasavica with global position of the visited localities.

Results and discussion

A total of 429 adult spiders were caught (122 male, 307 female). One hundred and two species from 17 families were established. The most common spiders were wetland species in the Linyphiidae, Tetragnathidae, Lycosidae and Pisauridae families, but some species typical of dry habitats were also caught (see Tab. II). The species *Araneus diadematus* (Clerck, 1757), *Araniella cucurbitina* (Clerck, 1757), *Argyroneta aquatica* (Clerck, 1757) and *Heliophanus cupreus* (Walckenaer, 1802) – all known from the historical literature - were confirmed and found at some other localities. The remaining species recorded in the literature *Dipoena braccata* C.L.Koch, 1841 and *Xysticus lanio* (C.L.Koch, 1835) could not be confirmed. The main research was conducted only in August, but future research throughout the year will certainly confirm these species too.

Table II. List of the recorded spider species at the Special Nature Reserve Zasavica.

Families / Species	**Localities**
Dysderidae	
Dysdera longirostris Doblika, 1853	Trebljevine (1♂, 24.07.03)
Mimetidae	
Ero aphana (Walckenaer, 1802)	Trebljevine (2♀, 07.07.07)
Theridiidae	
Cryptachaea riparia (Blackwall, 1834)	Jovača (1♂, 21.07.07)
Enoplognatha ovata (Clerck, 1757)	Poljane (1♀, 03.08.08),
Enoplognatha latimana Hippa & Oksala, 1982	Jovača (1♀, 01.08.08), Prekopac (1♀, 05.08.08), Preseka (1♀, 07.08.9)
Episinus truncatus Latreille, 1809	Banov brod (1♀, 07.08.10), Prekopac (1♀, 05.08.10), Trebljevine (1♀, 05.08.10)
Neottiura bimaculata (Linnaeus, 1767)	Prekopac (1♀, 05.08.10), Jovača (1♀, 09.08.10), Poljane (1♀, 03.08.10)

Families / Species	Localities
Theridiidae	(Table II – continued)
Phylloneta impressa (L. Koch, 1881)	Jovača (2♀, 07.08.10)
Linyphiidae	
Abacoproeces saltuum (L. Koch, 1872)	Turske livade (2♀, 07.08.09)
Araeoncus humilis (Blackwall, 1841)	Banov brod (1♂, 07.08.10), Valjevac (2♀, 06.08.10),
Bathyphantes gracilis (Blackwall, 1841)	Valjevac (1♀1♂, 06.08.10)
Cresmatoneta mutinensis (Canestrini, 1868)	Turske livade (1♀, 02.08.10), Poljane (1♀, 03.08.10)
Erigone dentipalpis (Wider, 1834)	Jovača (1♂, 09.08.10), Trebljevine (1♀1♂, 5.08.10), Banov brod (2♀2♂, 07.08.10), Poljane (1♀, 03.08.10), Valjevac (1♂, 06.08.10), Prekopac (1♀, 05.08.10)
Frontinellina frutetorum (C.L. Koch, 1834)	Prekopac (2♀,0 4.08.9), Staniševac (1♀1♂, 05.08.09)
Gnathonarium dentatum (Wider, 1834)	Bostanište (1♀, 07.08.10),
Linyphia triangularis (Clerck, 1757)	Jovača (1♂, 09.08.10), Šumareva ćuprija (1♀1♂, 27.07.07), Staniševac (4♂, 03.08.10), Prekopac (4♀, 03.08.10)
Meioneta rurestris (C.L.Koch, 1836)	Banov brod (6♀5♂, 07.08.10), Valjevac (18♀13♂, 06.08.10), Bostanište (1♂, 07.08.10), Prekopac (11♀2♂, 5.08.10),
Microlinyphia pusilla (Sundevall, 1830)	Trebljevine (1♀, 05.08.10)
Nematogmus sanguinolentus (Walckenaer, 1842)	Banov brod (1♀, 07.08.10), Trebljevine (1♀, 05.08.10)
Neriene clathrata (Sundevall, 1830)	Jovača (1♀, 07.08.10), Prekopac (2♀, 04.08.09)
Pelecopsis parallela (Wider, 1834)	Banov brod (1♀, 07.08.10), Prekopac (1♀, 05.08.10)
Prinerigone vagans (Audouin, 1826)	Valjevac (1♂, 06.08.10)
Trichoncoides piscator (Simon, 1884)	Valjevac (2♀, 06.08.10), Bostanište (1♀1♂, 07.08.10), Prekopac (1♀1♂, 05.08.10)
Tetragnathidae	
Metellina segmentata (Clerck, 1757)	Jovača (1♀, 27.07.07)
Metellina merianae (Scopoli, 1763)	Zovik (1♀, 02.08.09)
Pachygnatha degeeri Sundevall, 1830	Banov brod (1♂, 07.08.10)
Tetragnatha obtusa C. L. Koch, 1837	Batar (1♀, 18.08.10)
Tetragnatha montana Simon, 1874	Valjevac (1♀, 22.04.07), Šumareva ćuprija (2♀, 30.05.05), Vrbovac (1♀, 07.05.06), Batar (1♀3♂, 18.07.07), Trebljevine (1♀, 27.07.07)
Tetragnatha extensa (Linnaeus, 1758)	Prekopac (1♀, 04.05.08), Šumareva ćuprija (1♀, 27.07.07)
Araneidae	
Agalenatea redii (Scopoli, 1763)	Vrbovac (1♀, 07.05.06)
Araneus alsine (Walckenaer, 1802)	Banov brod (1♂, 07.08.10), Trebljevine (1♂, 05.08.10), Zovik (1♂, 02.08.10), Batar (1♀1♂, 29.07.07)
Araneus angulatus Clerck, 1757	Batar (3♀, 22.08.05), Jovača (1♀, 29.07.06; 5♀, 03.08.10), Turske livade (1♀, 02.08.10),
Araneus circe (Audouin, 1826)	Šumareva ćuprija (1♀, 28.08.06), Turske livade (1♀, 5.07.09)
Araniella cucurbitina (Clerck, 1757)	Prekopac (1♀, 04.08.09)
Araneus diadematus Clerck, 1757	Panjevine (4♀, 01.09.06), Prekopac (4♀, 12.07.06), Batar (5♀1♂, 12.07.06), Zovik (3♀, 09.09.09)
Araneus quadratus Clerck, 1757	Prekopac (1♀, 10.09.06), Banov brod (1♀2♂, 07.08.10)
Araneus marmoreus Clerck, 1757	Batar (2♀, 28.08.06; 3♀, 29.08.07), Jovača (1♀, 09.08.10)

Families / Species	**Localities**
Araneidae	(Table II – continued)
Argiope bruennichi (Scopoli, 1772)	Poljane (1♂, 22.07.06), Batar (2♀, 02.08.04), Zovik (4♂, 02.08.10), Jovača (1♂, 09.08.10)
Cyclosa oculata (Walckenaer, 1802) **	Jovača (1♂, 09.08.10), Bostanište (1♂, 07.08.10), Zovik (1♂, 02.08.10), Banov brod (4♂, 05.08.09)
Hypsosinga heri (Hahn, 1831)	Vrbovac (2♀, 07.05.05), Valjevac (1♀, 27.07.07)
Hypsosinga pygmaea (Sundevall, 1831)	Batar (1♀, 03.08.10), Bostanište (1♀, 07.08.10), Trebljevine (2♀, 05.08.10), Zovik (1♀, 02.08.10), Jovača (2♀, 09.08.10)
Hypsosinga sanguinea (C.L. Koch, 1844)	Batar (1♀, 03.08.10), Banov brod (2♀, 07.08.10)
Larinioides ixobolus (Thorell, 1873)	Turske livade (2♂, 10.08.10)
Larinioides suspicax (O. P.-Cambridge, 1876)	Batar (1♀1♂, 12.07.05; 2♀, 03.08.10), Turske livade (1♀, 17.05.06), Valjevac (1♀, 31.07.05), Jovača (1♀, 01.08.06; 2♀, 09.08.10), Staniševac (1♀, 02.08.06), Banov brod (1♀, 07.08.10), Bostanište (2♀1♂, 07.08.10)
Leviellus thorelli (Ausserer, 1871)	Turske livade (1♀, 10.08.10), Jovača (1♀, 09.08.10)
Mangora acalypha (Walckenaer, 1802)	Batar (3♀, 02.08.06; 1♂, 03.08.10), Banov brod (1♂, 07.08.10)
Nuctenea umbratica (Clerck, 1757)	Batar (1♀, 02.08.06)
Singa nitidula (C.L. Koch, 1844)	Prekopac (1♂, 05.08.10), Banov brod (2♀1♂, 07.08.10), Trebljevine (2♀, 07.08.10)
Lycosidae	
Arctosa leopardus (Sundevall, 1833)	Turske livade (1♀1♂, 06.08.10), Preseka (1♀, 29.09.10)
Hogna radiata (Latreille, 1817)	Staniševac(1♀, 03.08.04;1♂, 03.08.04), Banov brod (1♀, 07.08.10), Trebljevine (1♀, 25.07.07), Jovača (1♂, 28.07.02), Prekopac (1♀, 22.06.02),
Pardosa agrestis (Westring, 1861)	Poljane (1♂2♀, 03.08.10), Banov brod (1♂2♀, 07.08.10), Staniševac (3♂, 03.08.10; 2♀, 03.08.10)
Pardosa cf. agricola (Thorell, 1856)	Banov brod (1♀, 03.08.10), Staniševac (2♀, 03.08.10)
Pardosa amentata (Clerck, 1757)	Poljane (1♀, 03.08.10), Staniševac (2♀, 03.08.10)
Pardosa hortensis (Thorell, 1872)	Jovača (1♀, 09.08.10), Turske livade (1♀, 02.08.10; 1♀, 06.08.10)
Pardosa cf. lugubris (Walckenaer, 1802)	Jovača (1♀, 09.08.10), Prekopac (1♀, 05.08.10)
Pardosa cf. monticola (Clerck, 1757)	Jovača (1♀, 09.08.10), Trebljevine (1♀, 09.08.10), Staniševac (4♀, 03.08.10), Batar (1♀, 03.08.10)
Pardosa prativaga L. Koch, 1870	Banov brod (1♀, 07.08.10), Zovik (2♀, 02.08.09), Turske livade (2♀, 01.08.09)
Pardosa proxima (C.L. Koch, 1847)	Valjevac (2♀, 06.08.10), Jovača (2♀, 09.08.10), Trebljevine (6♀, 09.08.10), Turske livade (1♀, 02.08.10), Prekopac (1♀, 05.08.10), Staniševac (1♀, 03.08.10), Batar (1♀, 03.08.10)
Pirata hygrophilus (Thorell, 1872)	Bostanište (4♀, 07.08.10),
Pirata latitans (Blackwall, 1841)	Poljane (1♀, 03.08.10)
Pirata piraticus (Clerck, 1757)	Šumareva ćuprija (1♀, 29.04.05), Bostanište (7♀1♂, 07.08.10),Valjevac (1♂, 06.08.10),
Pisauridae	
Dolomedes fimbriatus (Clerck, 1757)	Poljane (2♀, 22.07.06), Jovača (1♀, 23.04.04;1♀, 02.08.04), Batar (1♀, 11.07.07), Trebljevine (1♀, 09.08.10)
Dolomedes plantarius (Clerck, 1757)	Staniševac (1♀, 03.08.04)
Pisaura mirabilis (Clerck, 1757)	Batar (1♀, 02.08.02)

Families / Species	Localities
Agelenidae	(Table II – continued)
Agelena labyrinthica (Clerck, 1757)	Trebljevine (1♀, 22.07.07), Prekopac (2♀, 25.07.07), Staniševac (1♀, 27.07.07), Batar (1♀, 03.08.10),
Allagelena gracilens (C.L. Koch, 1841)	Batar (1♀, 02.08.04; 1♀1♂, 29.07.07), Prekopac (7♀, 05.08.10),Trebljevine (1♂, 05.08.10), Bostanište (1♂, 07.08.10),
Histopona torpida (C.L. Koch, 1837)	Poljane (1♀1♂, 22.07.06), Turske livade (8♂, 25.05.06; 1♂, 27.07.08)
Inermocoelotes inermis (L. Koch, 1855)	Batar (1♀1♂, 04.11.10), Preseka (1♀, 29.09.10)
Cybaeidae	
Argyroneta aquatica (Clerck, 1757)	Bogaz (1♀, 11.06.07), Bostanište (1♀1♂, 08.08.10)
Dictynidae	
Dictyna uncinata Thorell, 1856	Panjevine (1♂, 16.04.07), Bostanište (1♀, 07.08.10),Vrbovac (1♀, 03.08.09)
Dictyna arundinacea (Linnaeus, 1758)	Banov brod (1♀, 03.08.10)
Clubionidae	
Clubiona lutescens Westring, 1851	Bostanište (1♀, 07.08.10), Trebljevine (1♀, 04.08.09)
Clubiona pallidula (Clerck, 1757)	Panjevine (1♀, 16.04.07)
Clubiona terrestris Westring, 1851	Turske livade (1♂, 25.05.06), Bostanište (1♀, 07.08.10)
Gnaphosidae	
Scotophaeus scutulatus (L. Koch, 1866)	Zovik (1♂, 08.08.02)
Zelotes subterraneus (C.L. Koch, 1833)	Turske livade (1♂, 24.07.03)
Sparassidae	
Micrommata virescens (Clerck, 1757)	Jovača (1♀, 21.07.07), Zovik (2♀, 02.08.09)
Philodromidae	
Tibellus oblongus (Walckenaer, 1802)	Bostanište (1♀, 24.07.07), Banov brod (1♂, 07.08.10), Jovača (1♀, 21.07.07)
Philodromus albidus Kulczynski, 1911 **	Turske livade (1♀, 31.07.08)
Philodromus cespitum (Walckenaer, 1802)	Jovača (1♀, 21.07.07)
Philodromus poecilus (Thorell, 1872)	Jovača (1♀, 30.07.08),
Thomisidae	
Ebrechtella tricuspidata (Fabricius, 1775)	Široka bara (1♂, 06.08.06), Jovača (1♀, 21.07.07)
Heriaeus graminicola (Doleschall, 1852) **	Prekopac (1♀, 05.08.10), Preseka (1♀, 07.08.09)
Misumena vatia (Clerck, 1757)	Batar (1♀, 11.07.07), Trebljevine (2♀2♂, 27.07.07), Zovik (1♂, 05.08.10), Poljane (1♀1♂, 03.08.10), Jovača (1♀, 21.07.07)
Ozyptila praticola (C.L. Koch, 1837)	Turske livade (1♀, 19.07.03)
Synema globosum (Fabricius, 1775)	Banov brod (1♀, 07.08.10), Prekopac (1♀, 05.08.10), Jovača (1♀, 21.07.07)
Tmarus piger (Walckenaer, 1802)	Staniševac (1♀, 05.08.09), Prekopac (1♀, 04.08.09)
Xysticus kochi Thorell, 1872	Poljane (1♀, 03.08.10), Staniševac (2♀, 05.08.09)
Xysticus luctator (L. Koch, 1870)	Staniševac (1♀, 03.08.04), Turske livade (2♂, 25.05.06)
Xysticus ulmi (Hahn, 1832)	Jovača (1♀, 09.08.10), Preseka (1♀, 07.08.09)

Families / Species	Localities
Salticidae	(Table II – continued)
Carrhotus xanthogramma (Latreille, 1819)	Batar (1♂, 23.04.05), Turske livade (2♂, 25.04.07)
Evarcha arcuata (Clerck, 1757)	Poljane (1♂, 22.07.06), Trebljevine (1♀, 22.07.06), Valjevac (1♀, 22.04.07), Banov brod (1♂, 07.08.10), Zovik (1♂, 02.08.10),
Evarcha falcata (Clerck, 1757)	Valjevac (1♂, 22.04.07), Poljane (2♂, 3.08.10), Prekopac (1♂, 05.08.10), Trebljevine (1♀, 05.08.10)
Heliophanus auratus C.L. Koch, 1835	Panjevine (1♂, 16.04.07), Bostanište (1♀, 24.07.07)
Heliophanus cupreus (Walckenaer, 1802)	Poljane (1♀, 03.08.10)
Heliophanus flavipes (Hahn, 1832)	Staniševac (♀, 05.08.09), Trebljevine (♀, 4.08.09)
Marpissa muscosa (Clerck, 1757)	Jovača (1♀, 18.04), Staniševac (1♂, 03.08.04), Banov brod (1♂, 07.08.10)
Mendoza canestrinii (Ninni, 1868) **	Široka bara (1♂, 16.08.06)
Phintella castriesiana (Grube, 1861)	Zovik (1♀, 02.08.10)
Pseudicius encarpatus (Walckenaer, 1802)	Panjevine (1♂, 16.04.07)
Salticus scenicus (Clerck, 1757)	Valjevac (1♀, 04.08.04)
Sibianor aurocinctus (Ohlert, 1865) **	Bostanište (1♂, 24.07.06)

TOTAL	Families	Species	Males	Females
	17	102	122	307

** New data for the Serbian fauna

Cyclosa oculata (Walckenaer, 1802) and *Heriaeus graminicola* (Doleschall, 1852) represent the first records for the Serbian fauna. The species *C. oculata* was found during the student research camps in 2009 and 2010. In the first year, all individuals were caught by sweeping technique on a wet meadow at the Banov brod locality (4♂, 05.08.09). The following year, sweeping also yielded this species on the edge of the flooded forest and dry agricultural fields at the Jovača (1♂, 09.08.10), Bostanište (1♂, 07.08.10) and Zovik (1♂, 02.08.10) localities. Detemination was done according to NENTWIG *et al*. (2011), and the male palps correspond very well to the descriptions in the literature. However, there is a possibility that the species could actually be *C. strandi* or *C. baloghi*, since both species have a south-eastern distribution but are known only from the female. As soon as a female becomes available it should be checked against those species.

According to ROBERTS (1995) *C. oculata* is not a common European species, and can be found in sunny, open areas. According to ZSCHOKKE & BOLZERN (2007) this rarity could be an artifact of collecting methods and not its natural distribution. As a web spider *C. oculata* is rarely caught in pitfall traps or in sweep nets because it lives near the ground. HÄNGGI *et al*. (1995) report that this species could also be found in very different habitats such as fenlands, pine forests, sand meadows, hummock areas and agricultural fields. Our records in the SNR Zasavica also confirmed that the species could be found equally in both wet and dry areas. According to PLATNICK (2011) *C. oculata* has a Paleartic distribution, but it is not widespread in Europe (VAN HELSDINGEN, 2011). It is recorded in countries surrounding Serbia (VAN HELSDINGEN, 2011), so these new records are significant but expected.

Heriaeus graminicola was also collected by sweeping during the same student research camps in 2009 and 2010. It was found at the edge of the flooded forest and agricultural area at the Preseka (1♀, 07.08.09) and Prekopac (1♀, 05.08.10) localities. The epigyne and vulva correspond well with the description and figures in NENTWIG *et al*. (2011) and we are confident that this determination is correct. Nevertheless, as soon as a

male becomes available it should be checked against both *H. simoni* and *H. setiger* as well. According to PLATNICK (2011) *H. graminicola* ranges from Europe to Central Asia, but according to data in the Fauna Europea Database (VAN HELSDINGEN, 2011) this species has a very limited European distribution in the central and eastern countries. This new record of *H. graminicola* in Serbia places the distribution boundary of the species closer to the Adriatic Sea.

Three more species were not recorded in Serbia until the present study. Those are *Mendoza canestrinii* (Ninni, 1868), *Philodromus albidus* Kulczynski, 1911, and *Sibianor aurocinctus* (Ohlert, 1865). The third author of this manuscript accidentally found those species during his day-to-day check of the protected area. They were collected by hand and only basic locality information is available (Table II). The identification of *M. canestrini* (1♂, 16.08.06) followed NENTWIG *et al*. (2011) and LOGUNOV (1999). The epigyne and vulva correspond well with literature, and we are confident that the determination is correct. The habitat "flooded meadow and forest" at our Široka bara locality corresponds with known literature data, and its distribution in Europe (VAN HELSDINGEN, 2011) also suggests that the species should occur in Serbia.

Sibianor aurocinctus was found at the Bostanište locality (1♂, 24.07.06) dominated by a flooded forest. Identification follows NENTWIG *et al*. (2011) and LOGUNOV (2000), and the palp corresponds well to the literature description. Even though the differences between species in this genus are quite small and the habitat is not as given in the literature findings, we consider this determination correct. The known distribution of *S. aurocinctus* in Europe (VAN HELSDINGEN, 2011) further supports our interpretation, but future material will be needed for an unequivocal determination.

Philodromus albidus was found at the Turske livade locality (1♀, 31.07.08), where flooded and non-flooded forests predominate. Identification follows SEGERS (1989) and ROBERTS (1995), and the *epigyne* and *vulva* correspond well to the literature descriptions and figures. It was clearly different from the similar species *P. rufus*: thus we consider our determination correct. The known distribution of the species *P. albidus* in Europe (VAN HELSDINGEN, 2011) is in western and central countries, with no data in the southeastern part, and the data from Hungary is considered doubtful. This distribution pattern could be the result of the intensive investigation that was conducted in those parts of Europe, rather than natural distribution. Furthermore, according to SEGERS (1989), the similarity between the *P. rufus* and *P. albidus* means that a reexamination of records considered to be *P. rufus* is important because the real distribution of these two species is still not clear. The *P. rufus* was previously recorded in Serbia (DELTSHEV *et al*., 2003) but interpretation of historical Serbian records is not possible without a reexamination of the original material.

With a view towards special faunistic aspects and a discussion of possible nature protection measures some other species should also be mentioned; for example the fen raft spider *Dolomedes plantarius* (Clerck, 1757). This very large semi-aquatic species is one of 2 Dolomede species living in Europe. Obviously closely related to the congener *D. fimbriatus* it is often misidentified, and distribution data are often doubtful (DUFFEY, 1995). In western and central Europe it is considered very rare (DUFFEY, 1995), and listed as an endangered or vulnerable species (VUGDELIC *et al*., 2003). According to data given by DELTSHEV *et al*. (2003) it is not possible to determine the true state of *D. plantarius* in Serbia. The only data entries were in 1907, 1936, and 1981. Recent data doesn't exist. Its dependence on lowland aquatic habitats that are usually subject to human degradation in Serbia makes this species a candidate for extinction. Therefore its rediscovery in the protected area of the SNR Zasavica could be highly relevant to its conservation.

A very similar situation affects *Cresmatoneta mutinensis* (Canestrini, 1868). Two species of the genus *Cresmatoneta* live in Europe. *C. eleonorae* (Costa, 1883) is only known from Sardinia; *C. mutinensis* has a Paleartic distribution (PLATNICK, 2011). However, according to data in the Fauna Europea Database (VAN

HELSDINGEN, 2011) *C. mutinensis* is not widespread in Europe, but recorded only from several southern countries. Distribution of this species in Serbia is restricted historically to one site listed by STOJIĆEVIĆ (1929). No recently published data are available apart from sporadic records at woodland edges on the Fruška Gora Mountain (G. GRBIĆ, personal collection, unpublished). Subjectively, it could be said that this is not a common species, but is very rare, and should thus be considered for nature conservation.

The small species *Hypsosinga heri* (Hahn, 1831) could also be the subject of conservation discussions. BRESJANČEVA (1907) gave the last reliable data for this species in Serbia (in DELTSHEV *et al*., 2003). Here we present the first rediscovery since then. In some European countries it is already considered very rare or maybe even extinct (ROBERTS, 1995). Because it usually inhabits low plants near water (ROBERTS, 1995; NENTWIG *et al*., 2011), and because such places in Serbia suffer from destructive human activities, attention should be paid to this species.

A further species of special interest for the preserved wetlands in Serbia is *Argyroneta aquatica* the only spider species that spends its entire life underwater. Generally, it can be found in bogs, marshes, lakes, ponds, moors and canals (HÄNGGI *et al*., 1995; AAKRA & DOLMEN, 2003; DE BAKKER *et al*., 2006; SEYYAR & DEMIR, 2009), but also in running water (AAKRA & DOLMEN, 2003; SEYYAR & DEMIR, 2009), where it lives between water plants. According to the literature (AAKRA & DOLMEN, 2003; SEYYAR & DEMIR, 2009), the presence of *Sphagnum* spp. is an important factor for this spider. We found it on the roots of the *Salvinia natans* at the Bostanište locality, and on *Myriophyllum* spp. at the Bogaz locality (Mladen HORVATOVIĆ, pers.comm.). *Sphagnum* spp. is not present at either locality. Therefore we assumed, as AAKRA & DOLMEN (2003) already did, that the species is able to adapt to different water bodies, as long as some vegetation is present.

Like the species mentioned above, distribution data for *A. aquatica* in Serbia are very old. According to DELTSHEV *et al*. (2003) it was recorded in 1907, 1929, 1936 and 1981 at 5 localities, mostly in central Serbia. In 1936 DRENSKY recorded the species at the Crna Bara (Zasavica) locality (in DELTSHEV *et al*., 2003). Here we present the first modern rediscovery. Because of its specific way of life, this species should be more carefully observed. It even could be a focus species (i.e. a flagship species) for future ecological investigation towards the improvement of nature protection measures.

Conclusions

Arachnological investigations in the Special Nature Reserve (SNR) Zasavica are far from complete. Based on literature data and preliminary investigations a total of 104 spider species have been recorded. Even capture records were not based on an extensive scientific inventory. Four historical literature records were confirmed, but the presence of *D. braccata* and *X. lanio* was not confirmed.

The species *C. oculata*, *M. canestrinii*, *Ph. albidus*, *H. graminicola* and *S. aurocinctus* represent the first records for the Serbian fauna. Rediscovery of *D. plantarius*, *C. mutinensis*, *H. heri* and *A. aquatica* represent important results, which could be used as possible guidelines for future ecological studies with the purpose of successful protection and conservation measures in the SNR Zasavica.

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ФАУНА ПАУКОВА (ARACHNIDA, ARANEAE) СПЕЦИЈАЛНОГ РЕЗЕРВАТА ПРИРОДЕ "ЗАСАВИЦА" – ПРЕЛИМИНАРНА РАЗМАТРАЊА

ГОРДАНА ГРБИЋ, ИГОР ГАЈИЋ и МИХАЈЛО СТАНКОВИЋ

Извод

На основу литературних података и прелиминарног истраживања укупно је установљено 104 врсте паукова на простору Специјалног резервата природе (СРП) "Засавица". Пет врста, а то су *Cyclosa oculata* (Walckenaer, 1802), *Mendoza canestrinii* (Ninni, 1868), *Philodromus albidus* Kulczynski, 1911, *Heriaeus graminicola* (Doleschall, 1852) и *Sibianor aurocinctus* (Ohlert, 1865) нису биле забележене у Србији пре ове студије и представљају потпуно нове налазе. Врсте као што су *Dolomedes plantarius* (Clerck, 1757), *Cresmatoneta mutinensis* (Canestrini, 1868), *Hypsosinga heri* (Hahn, 1831) и *Argyroneta aquatica* (Clerck, 1757) су поново забележене после више десетина година и представљају важан резултат који би могао да се употреби као смерница за будућа фаунистичка и еколошка истраживања, са циљем усавршавања мера заштите и очувања биодиверзитета у СРП "Засавица".

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