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Faunistic results from the 2nd Balkan OdonatOlogical Meeting – BOOM 2012, Serbia

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Abstract. As a part of the Balkan odonatological cooperation, the 2nd Balkan OdonatOlogical Meeting (BOOM 2012) was held in Vojvodina (Serbia). Altogether, between 7. and 12. 8. 2012, 24 localities were surveyed and 34 dragonfly species found. This represents more than half of the hitherto recorded dragonfly species for the country. Significant results include the second record and a new locality of *Aeshna grandis* for Serbia and the first confirmation of successful reproduction of *Anax ephippiger* in the country. New data on several species with a comparably low number of previously published records for Vojvodina, i.e. *Somatochlora meridionalis*, *Cordulia aenea*, *Gomphus flavipes*, *Sympetrum flaveolum*, *Sympetrum vulgatum* and *Lestes dryas*, is also presented and briefly discussed.

Key words: dragonflies, Odonata, distribution, Vojvodina, Serbia, the Balkans

Izvleček. Favnistični rezultati 2. Mednarodnega srečanja odonatologov Balkana – BOOM 2012, Srbija – Kot del širšega balkanskega odonatološkega sodelovanja je bilo v Vojvodini (Srbija) organizirano 2. Mednarodno srečanje odonatologov Balkana (BOOM 2012). Na pregledanih 24 lokalitetah je bilo med 7. in 12. 8. 2012 popisanih 34 vrst kačjih pastirjev, kar je več kot polovica vseh znanih vrst kačjih pastirjev Srbije. Pomembnejši rezultati vključujejo drugo nahajališče rjave deve (*Aeshna grandis*) in prvo potrditev uspešnega razmnoževanja afriškega minljivca (*Anax ephippiger*) za državo. Poročamo tudi o novih nahajališčih v Vojvodini redkih vrst kačjih pastirjev. Ti so: sredozemski lesketnik (*Somatochlora meridionalis*), močvirski lebduh (*Cordulia aenea*), rumeni porečnik (*Gomphus flavipes*), rumeni in navadni kamenjak (*Sympetrum flaveolum*, *Sympetrum vulgatum*) in obrežna zverca (*Lestes dryas*).

Ključne besede: kačji pastirji, Odonata, razširjenost, Vojvodina, Srbija, Balkan

Introduction

The dragonfly fauna of Serbia is not sufficiently known in comparison to central and western European countries. Although numerous papers with dragonfly records from the country have been published over the past decade, most of them include only a small number of records or cover only a small portion of this central country of the Balkan Peninsula. For Serbia, Jović (2013) gives a checklist of 67 dragonfly species, although 4 of them are listed with specific remarks.

Becoming a tradition, the 2nd Balkan OdonatOlogical Meeting (BOOM 2012) was organized between 6. and 13. 8. 2012 by the Biology and Ecology Students' Scientific Research Association Josif Pančić (Novi Sad, Serbia) and the Slovene Dragonfly Society (Ljubljana, Slovenia) in the beginning of August 2012 in Serbia – more precisely, mostly in its northern province of Vojvodina. The main concept of BOOM is to gather young odonatologists each year in a different Balkan country. With fieldwork in the focus, BOOM gives the opportunity of gaining experience in dragonfly identification, and to gather new data on dragonfly distribution in selected areas (Vinko 2011a).

One of the main goals of BOOM 2012 was to collect new data on the distribution of dragonfly species in different parts of the Pannonian plain in the northern Serbian province of Vojvodina, including the »Zasavica« Special Nature Reserve, which is partly situated in the southeast of the province. For the territory of the Vojvodina region, Santovac (2007) listed 51 dragonfly species, while an additional 5 were reported by Jović et al. (2007, 2009). For the »Zasavica« Special Nature Reserve, a total of 39 dragonfly species have been reported (Jović et al. 2007, Aranđelović & Miljanović 2009, Rajkov & Šćiban 2012).

Materials and methods

During BOOM 2012 dragonflies and damselflies were surveyed between 7. and 12. 8. 2012, mostly from 9 am to 6 pm. The weather during the survey period was sunny, sometimes with high noon temperatures up to at least 33°C. In general, the weather was very favourable for odonates, and mostly without rain or wind.

At all sites, we searched for adult and teneral individuals, as well as exuviae. Adult and teneral individuals were identified on site, without collecting samples. All obtained records were compiled into species lists after each locality visit. No specific sampling for larvae was done. Dijkstra (2006) field guide was used for identification of adults, while exuviae and larvae were identified with the aid of Gerken & Sternberg (1999) and Kohl (1998).

Results and discussion

Altogether, 185 records of 34 species from 24 localities were collected (Tab. 1, Fig. 1). The list of recorded species with the locality data is presented in Tab. 2, while habitat type for each locality is presented in Tab. 1.

Table 1. List of the localities investigated during the 2nd Balkan OdonatOlogical Meeting (BOOM 2012). For each locality, geographical coordinates and survey dates are given. For localities 11–16, only approximate coordinates are given.
Tabela 1. Seznam preučevanih lokalitet v okviru 2. Mednarodnega srečanja odonatologov Balkana (BOOM 2012). Za vsako lokaliteto sta dodana zapis geografskega položaja in datum preučevanja. Za lokalitete 11–16 je podan le približen geografski položaj.

N	Locality name	Coordinates (WGS84) [Lat., Long.]	Alt. [m]	Date	Habitat type
INLAND SALT MARSHES OF CENTRAL BANAT					
1.	Melenci, Velika Rusanda lake	45.528878°, 20.298627°	72	7.8.2012	Larger part of Rusanda salt lake, 0.5–1.5 m deep, mostly *Phragmites australis* along the shore
2.	Melenci, Mala Rusanda lake	45.513139°, 20.294841°	71	7.8.2012	Smaller part of Rusanda salt lake, with *Bolboschoenus maritimus*
3.	Elemir, Okanj bara	45.465313°, 20.294337°	72	7.8.2012	Salt lake – large (total surface: 1.5 km^2) elongated and shallow (average depth: 1–1.5 m), partly overgrown with *P. australis* and *B. maritimus*
4.	Novi Bečej, »Slano kopovo« Special Nature Reserve	45.616852°, 20.211287°	73	8.8.2012	Shallow, open salt lake, with *B. maritimus* and *P. australis* belts along the shore
»GORNJE PODUNAVLJE« SPECIAL NATURE RESERVE – APATINSKI RIT (APATIN MARSH)					
5.	Apatin, Zverinjak	45.628677°, 18.953118°	82	9.8.2012	Shallow, sunny pool with free water surface and patches of *Schoenoplectus* sp.
6.	Apatin, Petreš	45.613088°, 18.934626°	82	9.8.2012	Wide, shallow channel with floating mats of *Trapa natans*
7.	Apatin, Zverinjak, 4 km from the beginning	45.607529°, 18.945321°	79	9.8.2012	Shallow, sunny pools covered with *Nymphoides peltata* and *Carex* sp. along the shore
8.	Apatin, Osmica	45.590610°, 18.918144°	81	9.8.2012	Larger, deeper marsh, with *Carex* sp. and willow trees along the shore; water surface covered with *T. natans* and *N. peltata*
9.	Apatin, »Bestrement«	45.562617°, 18.954058°	82	9.8.2012	Large (about 1 km long) shallow marsh, overgrown with *P. australis*
10.	Apatin, Srebrenica	45.552262°, 18.942327°	83	9.8.2012	Oxbow, with steep bare banks, partly shaded by forest
»GORNJE PODUNAVLJE« SPECIAL NATURE RESERVE – MONOŠTORSKI RIT (MONOŠTOR MARSH)					
11.	Kupusina, Šargan, oxbow	45.728130°, 18.930281°	83	10.8.2012	Shallow unshaded oxbow at the edge of forest, with dense vegetation
12.	Kupusina, Jama, oxbow	45.728130°, 18.930281°	83	10.8.2012	Shallow unshaded oxbow at the edge of forest, with dense vegetation
13.	Kupusina, road to oxbow	45.728130°, 18.930281°	83	10.8.2012	Tarmac road
14.	Kupusina, oxbow	45.728130°, 18.930281°	83	10.8.2012	Deep oxbow, with steep and mostly bare banks and some *P. australis*, partly shaded by forest
15.	Kupusina, oxbow at the Danube river	45.728130°, 18.930281°	83	10.8.2012	Shallow oxbow at the edge of forest along the Danube
16.	Bar »Smuđ«	45.728130°, 18.930281°	83	10.8.2012	Building, bar near the river shore

N	Locality name	Coordinates (WGS84) [Lat., Long.]	Alt. [m]	Date	Habitat type
17.	Bezdan, Plazovići, channel, near the bridge	45.813385°, 18.966709°	88	10.8.2012	Small channel with dense submerged vegetation
18.	Bezdan, Štrbac, large seasonal pond	45.819587°, 18.961205°	82	10.8.2012	Large seasonal pond, overgrown with *Carex* sp., dry at the time of visit
19.	Kotur, Bajski kanal, channel	45.894364°, 18.869875°	84	10.8.2012	Large channel with open water surface and *P. australis* along the shores
20.	Bezdan, Baračka channel	45.858963°, 18.874152°	81	10.8.2012	Channel, covered with *Nymphaea alba* and *Nuphar luteum*
FRUŠKA GORA					
21.	Stejanovci, stream	45.047226°, 19.719589°	109	11.8.2012	Open stream, running through agricultural land
»ZASAVICA« SPECIAL NATURE RESERVE					
22.	Modran, Zasavica River	44.966938°, 19.577427°	74	12.8.2012	Channel with *Stratiotes aloides*
23.	Batar, small river	44.927591°, 19.473615°	77	12.8.2012	River, partly dry at the time of visit
DRINA RIVER					
24.	Crna Bara, gravel pits near Drina River	44.863285°, 19.379865°	77	12.8.2012	Gravel pits of various depths and in different succession stadiums

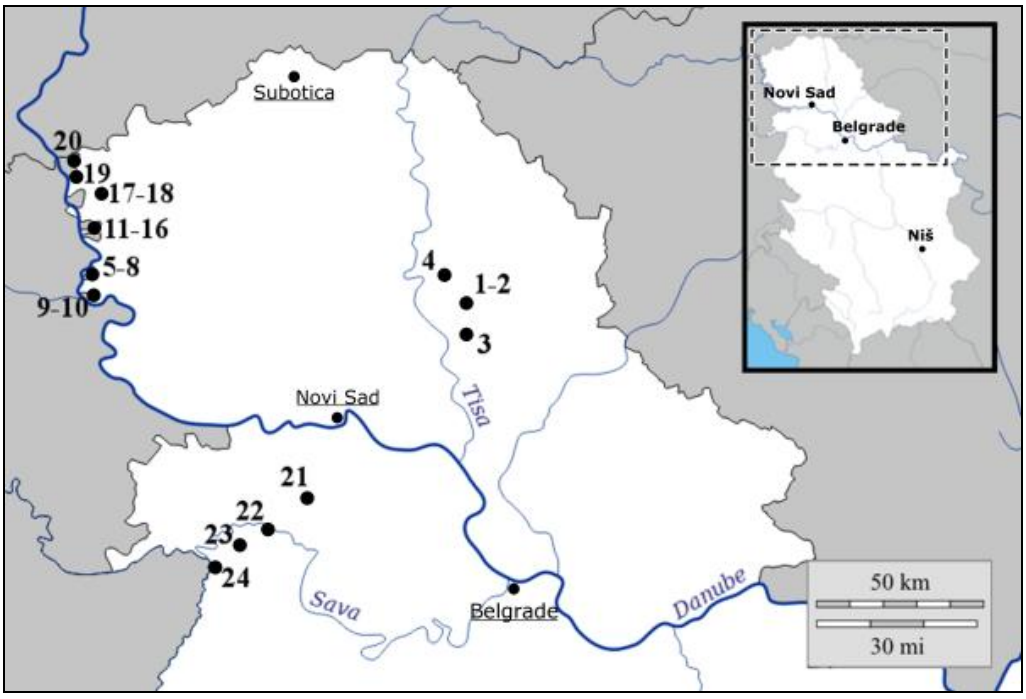

Figure 1. Geographical position of localities investigated during the 2nd Balkan OdonatOlogical Meeting (BOOM 2012).
Slika 1. Geografski položaj lokalitet, preučevanih v okviru 2. Mednarodnega srečanja odonatologov Balkana (BOOM 2012).

During the six-day survey, the number of observed species comprised more than half of all known dragonfly species in the country.

Previous BOOM, organized in Slovenia in 2011, has set the expected results pretty high, with a clear concept to comprehensively show the odonate diversity of the region at all altitudes, and a total of 50 recorded dragonfly species (Vinko 2011b). On the other hand, a late summer, the only lowland approach for BOOM 2012 chosen in Serbia, together with an extremely dry year, resulted in a more modest total number of recorded species – 34 (Tab. 2).

Table 2. Checklist of Odonata species recorded during the 2nd Balkan OdonatolOgical Meeting (BOOM 2012). References for localities, where each species was observed, are given (see Tab. 1).
Tabela 2. Seznam vrst kačjih pastirjev, najdenih v okviru 2. Mednarodnega srečanja odonatologov Balkana (BOOM 2012). Zapisu vrste je dodan seznam lokalitet, na katerih je bila vrsta najdena (glej Tab. 1).

	Species	**Locality numbers**
	CALOPTERYGIDAE	
1.	*Calopteryx splendens* (Harris, 1782)	21
	LESTIDAE	
2.	*Lestes barbarus* (Fabricius, 1798)	1–4, 9, 18
3.	*Lestes dryas* Kirby, 1890	1, 4, 12
4.	*Chalcolestes parvidens* (Artobolevskii, 1929)	4, 9, 14, 20, 23
5.	*Lestes virens* (Charpentier, 1825)	1, 4
6.	*Sympecma fusca* (Vander Linden, 1820)	10, 11, 18
	COENAGRIONIDAE	
7.	*Ischnura elegans* (Vander Linden, 1820)	1–8, 11, 12, 14, 17, 19, 20–24
8.	*Ischnura pumilio* (Charpentier, 1825)	3, 4, 11
9.	*Enallagma cyathigerum* Charpentier, 1840	1–4
10.	*Coenagrion puella* (Linnaeus, 1758)	11
11.	*Erythromma viridulum* (Charpentier, 1840)	8, 11, 12, 14, 17, 19, 20, 22, 24
	PLATYCNEMIDIDAE	
12.	*Platycnemis pennipes* (Pallas, 1771)	1, 11, 19, 20, 24
	AESHNIDAE	
13.	*Aeshna affinis* Vander Linden, 1820	2, 4, 5, 8, 9, 11, 12, 14, 23, 24
14.	*Aeshna grandis* (Linnaeus, 1758)	14
15.	*Aeshna isoceles* (Müller, 1767)	3
16.	*Aeshna mixta* Latreille, 1805	12, 22
17.	*Anax ephippiger* (Burmeister, 1839)	7, 12
18.	*Anax imperator* Leach, 1815	2, 5–7, 11, 12, 19, 24
19.	*Anax parthenope* (Selys, 1839)	2, 3, 6, 8, 11, 12, 19, 20, 24
	GOMPHIDAE	
20.	*Gomphus flavipes* (Charpentier, 1825)	4, 8, 15
	CORDULIIDAE	
21.	*Cordulia aenea* (Linnaeus, 1758)	15 (larva)
22.	*Somatochlora meridionalis* Nielsen, 1935	10
	LIBELLULIDAE	
23.	*Libellula fulva* (Müller, 1764)	22
24.	*Orthetrum albistylum* (Selys, 1848)	1, 3, 5–8, 11–13, 17–19, 24
25.	*Orthetrum brunneum* (Fonscolombe, 1837)	24
26.	*Orthetrum cancellatum* (Linnaeus, 1758)	1, 3, 4, 15, 17–20, 24
27.	*Orthetrum coerulescens* (Fabricius, 1798)	21
28.	*Sympetrum sanguineum* (Müller, 1764)	1, 4–9, 11, 12, 14, 17–20, 22–24
29.	*Sympetrum fonscolombii* (Selys, 1840)	1, 3, 4, 7, 8, 18, 23, 24
30.	*Sympetrum meridionale* (Selys, 1841)	1–10, 12, 14, 18, 24
31.	*Sympetrum vulgatum* (Linnaeus, 1758)	13, 19, 20, 24
32.	*Sympetrum striolatum* (Charpentier, 1840)	10, 16, 17, 19
33.	*Sympetrum flaveolum* (Linnaeus, 1758)	1, 3
34.	*Crocothemis erythraea* (Brullé, 1832)	1, 2, 6, 7, 8, 11, 12, 17–20, 22, 24

The commonest species were *Ischnura elegans* and *Sympetrum sanguineum*, both found at 17 localities (71% of all investigated localities). *Sympetrum meridionale* was found at 14 localities (58% of all investigated localities) and *Crocothemis erythraea* and *Orthetrum albistylum* at 13 (54% of all investigated localities). Nine species, i.e. *Calopteryx splendens*, *Coenagrion puella*, *Aeshna grandis*, *Aeshna isoceles*, *Cordulia aenea*, *Somatochlora meridionalis*, *Libellula fulva*, *Orthetrum brunneum* and *Orthetrum coerulescens*, were observed at only one of the sites. Even though no specific sampling for larvae was done, one larva of *Cordulia aenea* was identified using 10× hand magnifying glass with the identification keys on a single site (L 15).

With 13 species recorded for the Slano kopovo Special Nature Reserve (L 4), results of this study present the first known published data on dragonfly fauna for this area. Prior to this study, Svetozar Santovac (pers. comm.) recorded 9 dragonfly species from Slano kopovo, but these records were published under a much wider locality of Novi Bečej (Santovac 2007). Altogether, the dragonfly fauna of Slano kopovo comprises 19 species.

The records collected for the »Gornje Podunavlje« Special Nature Reserve are especially significant as they represent the very first data on dragonfly fauna of this area after a period of more than 60 years without systematic research. Main references for nearby Apatin date back to the 1940s (Pongracz 1944, Adamović 1949; cited in Santovac 2007). Moreover, the two very significant findings within the meeting were made in this Reserve. Firstly, there is the observation of several teneral individuals of *Anax ephippiger* (Fig. 2) at shallow pools along the embankment at Zverinjak locality (L 7). This is the first confirmation of the species' successful reproduction in Serbia. Swarms of *A. ephippiger* have been observed and documented in the country on only two occasions (Jović et al. 2009), although they have been reported more often from Hungary (Dijsktra 2006), with reproduction also confirmed (Ambrus et al. 1996a). Secondly, there is the observation of two adult individuals of *Aeshna grandis*, which is the second finding of this species in Serbia and the first record for Vojvodina province. Its presence in Serbia has only recently been discovered – in 2009, at a locality near the Drina River, south of Zasavica (Jović et al. 2010). The nearest known localities in the Pannonian basin are along the Drava River in Hungary (Toth 2001) and in Podravina, Croatia, with records becoming more frequent further west towards Slovenia (Jović et al. 2010). In Hungary, *A. grandis* has otherwise been recorded only in the west, near the Slovenian border (Ambrus et al. 1992) and in the far northwest of the country, near the Austrian-Slovakian border (Ambrus et al. 1992, 1996b, Dijsktra 2006).

Figure 2. Sighting of fresh *Anax ephippiger* confirms successful reproduction of this species in Serbia (photo: M. Vrhovnik).
Slika 2. Najdba svežih osebkov afriškega minljivca (*Anax ephippiger*) potrjuje uspešno razmnoževanje te vrste v Srbiji (foto: M. Vrhovnik).

Somatochlora meridionalis is another species new for the fauna of Gornje Podunavlje. Although it typically breeds in running waters (Dijkstra 2006), a single male specimen was found patrolling along a channel with completely stagnant water (L 10). Other characteristics of the water body (partly shaded, devoid of aquatic vegetation, muddy bottom) seem to match the requirements of *S. meridionalis*. In Vojvodina, the species had previously been reported only from Zasavica (Jović et al. 2007, Rajkov & Šćiban 2012). The species has also been recorded along the edges of the Pannonian basin in Croatia (Perović & Perović 2007, Štih et al. 2011, Grgić 2013), Hungary (Ambrus et al. 1992, Wildermuth 2008), Slovenia (Kotarac 1997), Austria (Höttinger 2008), Slovakia (Dijkstra 2006) and Romania (Manci 2012).

The record of *Sympetrum flaveolum* at Okanj bara (L 3) is the third known site for the species in Vojvodina province (Santovac 2007, Santovac & Anđus 1995–98 cited in Santovac 2007), with all three closely located in Central Banat. One of the two previously published records for locality Belo Blato remains questionable – it is only listed in Santovac (2007), but not in the original cited source, Santovac & Anđus (1995–98). A review of the material in the collections could help resolve this issue.

Gomphus flavipes, a species from Annex IV of the Habitats Directive, has been recorded at new sites along the Danube River (L 8, L 15), and these records are the first for the »Gornje Podunavlje« Reserve. *G. flavipes* is nationally protected in Serbia, but is rather common along the Danube, Sava and Tisa Rivers (Adamović 1949, Anđus 1992, Santovac 2007, Rajkov & Šćiban 2012, Đurđević & Rajkov 2012). The species is included in Annex IV of the Habitats

Directive, but is no longer considered threatened in Europe, with the populations increasing (Kalkman et al. 2010).

For several more species with a comparably low number of previously published records for Vojvodina province – *Lestes dryas*, *Cordulia aenea* and *Sympetrum vulgatum* – new localities have been discovered. *Sympetrum vulgatum* is also considered rare in Serbia (Jović et al. 2009).

During the survey, a special effort was given to confirm the presence of two enigmatic species, *Aeshna viridis* and *Lestes macrostigma*, for which reliable recent records are lacking.

A. viridis was reported from Vojvodina (Hajdukovo, near Subotica) by Gergelji & Hulo (1995). The same record was also listed by Santovac (2007), and again by Jović (2013) as the only one for Serbia, with a comment that revision of voucher specimens was not possible. Having in mind that there are no known suitable habitats for *A. viridis* in the wider area of the locality – stangant waters covered with mats of water soldier (*Stratiotes aloides*) (Vukov et al. 2004) – the record can be considered questionable.

Efforts made to find *A. viridis* within the meeting proved unsuccessful. Two localities were visited as plausible candidates for either the presence of this dragonfly or the associated plant, *S. aloides*. A small part of Baračka channel at »Gornje Podunavlje« Special Nature Reserve (L 20) was examined for the presence of *S. aloides.* An earlier record of submerged populations of *S. aloides* nearby is the only recent data for the entire Reserve (Vukov et al. 2004), so this gave hope that there are some suitable habitats for *A. viridis.* Unfortunately, the part of the channel at the locality seems to be mostly covered by *Nymphaea alba* and *Nuphar luteum* – no *S. aloides* has been observed. On the other hand, the visit to the Zasavica River (L 22) resulted in finding only one exuvia of another *Aeshna* species, *A. mixta*, in spite the presence of strong populations of *S. aloides*, covering most of the water surface at the locality. It must, though, be pointed out that the recent clear cutting of shrubs and trees along the banks, together with hot and sunny weather at the time of visit, could have had a negative effect on the presence and activity of *A. viridis* adults.

For *L. macrostigma*, the published records from the Pannonian part of Serbia are also very scarce (Adamović 1949, Gergelji & Hulo 1995), while a museum specimen exists only for the record by Adamović (1949) from the vicinity of Belgrade. Even though the flight period of the species was over, we tried to assess the suitability of habitats for *L. macrostigma* available at salt lakes Mala Rusanda, Slano kopovo and Okanj bara (L 2–4). The vegetation suitable for oviposition – *Bolboschoenus maritimus* (Dijkstra 2006) – is present at these localities. Furthermore, there are recent records of *L. macrostigma* for Okanj bara and Mala Rusanda lakes, made by Provincial Institute for Nature Conservation, Novi Sad (Nataša Pil, pers. comm.), that are still awaiting verification and present good enough grounds for future investigations.

In total, the faunistic results of BOOM 2012 present a significant improvement in the knowledge of the dragonfly fauna in Vojvodina (Serbia), and confirm the importance of the meeting as part of odonatological research in the Balkans.

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