

A CONTRIBUTION TO THE KNOWLEDGE OF DRAGONFLIES (ODONATA) FROM THE AREA OF GORNJI CRNCI - PIPERI (MONTENEGRO)

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Abstract

In this work, an updated list which includes 14 species of the dragonflies (Odonata) of the area Gornji Crnci-Piperi (Montenegro) is given. This research was done in water habitats characteristic of areas of soft karst. There has been no previous research of this kind in areas in Montenegro having this type of geological substratum and characteristic hydrography (including spring areas under anthropogenic influence with following flows and reservoirs). One of the collected species is *Cordulegaster picta* (Sélys, 1854); this species has been registered for the first time in the fauna of Odonata in Montenegro.

KEY WORDS: dragonflies, *Cordulegaster picta*, Gornji Crnci, Montenegro.

Introduction

Although the Odonata order is an important group among insects because of its age, interesting life cycle and active participation in food chains in fresh water habitats, studies of the Odonata fauna in Montenegro are still not fully completed (e.g., ADAMOVIĆ, 1949; ADAMOVIĆ *et al.*, 1996; GLIGOROVIĆ *et al.*, 2007; JOVIĆ *et al.*, 2008). The aim of our research is both to give new insight into the fauna of the country, and to obtain valuable documentation of the occurrence of dragonflies in the previously unstudied area of the Gornji Crnci - Piperi. In the course of this survey, we detected 14 species, among them one species new to the fauna of Montenegro.

Materials and Methods

In 2007 the dragonfly fauna from the 6 sampling sites in the village of Gornji Crnci-Piperi (Studenac springs, Mrtvak and Gospodina voda, a spring at the Iglice sites, a puddle in Radan, a puddle in Nikoljska glavica, a brook in Župina) were studied (Fig. 1). The area of Gornji Crnci-Piperi is situated northwest of Podgorica (geographic coordinates: 42° 32' 45, 13" N; 19° 13' 31, 84" E; altitude: 329 - 397 meters a.s.l.). In this area forest and karsts are codominant ecosystems. The climate is continental.



Figure 1. Map of study area with the sampling sites. G - Spring "Gospodina voda", M - Spring "Mrtvak", I - Sites "Iglice", B - Sites "Brežine", S - Spring "Studenac", R - Sites "Radan".

Odonata specimens were collected with aerial nets. Specimens were put into envelopes and transported to the lab. All the specimens were deposited in the collection of the first author. BESCHOVSKI (1994), BOUDOT (2001) and DIJKSTRA & LEWINGTON (2006) were used for identification of the specimens. Unless otherwise stated, all material was collected by the first author. The composition of the material is given as: males/females/larvae.

Results

Subordo Zygoptera

Fam. Calopterygidae

1. *Calopteryx virgo* (Linnaeus, 1758)

Material: Studenac, 05.05.2007 (0/0/1), 30.06.2007 (2/0/0); Gospodina voda, 18.05.2007 (0/0/1), 21.06.2007 (1/1/1), 13.07.2007 (1/1/0); Mrtvak, 21.07.200 (2/1/0); Iglice, 13.07.2007 (1/1/0).

2. *Calopteryx splendens* (Harris, 1782)

Material: Iglice, 16.04.2007 (0/0/1), 05.05.2007 (1/0/0), 30.06.2007 (1/1/0); Mrtvak, 13.07.2007 (1/1/0), 26.08.2007 (1/1/1); Radan, 21.06.2007 (1/1/1).

Fam. Coenagrionidae

3. *Ischnura pumilio* (Charpentier, 1825)

Material: Studenac, 30.06.2007 (3/2/0).

Subordo Anisoptera

Family Aeshnidae

4. *Anax imperator* Leach, 1815

Material: Studenac, 14.07.2007 (1/1/2); Gospodina voda, 18.05.2007 (0/0/2), 21.06.2007 (2/2/1).

5. *Aeshna cyanea* (Müller, 1764)

Material: Studenac, 14.07.2007 (3/1/2) Mrtvak, 13.07.2007 (2/1/4).

6. *Aeshna mixta* Latreille, 1805

Material: Studenac, 14.07.2007 (5/3/2).

Family Cordulegastridae

7. *Cordulegaster picta* Sélys, 1854 (Fig. 2)

Material: Studenac, 16.04.2007 (0/0/2), 05.05.2007 (0/0/1), 13.07.2007 (2/1/0), 21.07.2007 (2/0/0), 26.08.2007 (0/1/0).

Fam. Corduliidae

8. *Somatochlora meridionalis* Nielsen, 1935

Material: Iglice, 30.06.2007 leg. Zeković (2/1/0), 13.07.2007 (2/1/0).

Fam. Libellulidae

9. *Libellula depressa* Linnaeus, 1758

Material: Studenac, 14.07.2007 (3/1/2). 13.07.2007 (2/1/4), Gospodina voda, 8.07.2007 (2/0/2), Mrtvak, 13.07.2007 (3/1/0).

10. *Orthetrum brunneum* (Fonscolombe, 1837)

Material: Studenac, 13.07.2007 (2/1/1), (2/0/0).

11. *Orthetrum coerulescens* (Fabricius, 1798)

Material: Iglice, 15.07.2007 (2/0/0).

12. *Sympetrum flaveolum* (Linnaeus, 1758)

Material: Radan, 13.07.2007 (2/0/0), 21.07.2007 (2/1/1).

Family Gomphidae

13. *Gomphus vulgatissimus* (Linnaeus, 1758)

Material: Radan, 21.06.2007 leg. Zeković (2/0/0); Iglice, 21.06.2007 (1/2/2).

14. *Onychogomphus forcipatus* (Linnaeus, 1758)

Material: Brežine, 16.04.2007 (1/0/0), 21.06.2007 (1/2/0); Radan, 30.06.2007 (1/1/1), 13.07.2007 (1/2/1); Iglice, 18.05.2007 (1/1/1).

Discussion

In the freshwater habitats of the Gornji Crnci - Piperi area, 14 species of dragonflies (Odonata) belonging to 11 genera and 7 families were recorded at 6 sites. Of these, one species, *Cordulegaster picta* (Sélys, 1854) (Fig. 2), is recorded in Montenegro for the first time.

The total number of specimens of dragonflies collected on the Gornji Crnci - Piperi is 136. Nine species are dominant (> 5% total abundance): *Calopteryx virgo*, *Calopteryx splendens*, *Anax imperator*, *Aeshna cyanea*, *Aeshna mixta*, *Cordulegaster picta*, *Libellula depressa*, *Onychogomphus forcipatus* and *Gomphus vulgatissimus*. Four species are subdominant (abundance 2-5%): *Ischnura pumilio*, *Somatochlora meridionalis*, *Orthetrum brunneum* and *Sympetrum flaveolum*. One species, *Orthetrum coerulescens*, is rare (Tab. I, Fig. 3).



Figure 2. *Cordulegaster picta* Sélys, male (Photo: B. Gligorović)

Table 1. Abundance of the collected sample in the area Gornji Crnci, Piperi D = dominant (> 5% total abundance), SD = subdominant (2-5% total abundance), R = rare (< 2% total abundance).

Species	Number of collected specimens	Relative abundance in the sample (%)	Dominancy in the sample
<i>Calopteryx virgo</i> (Linnaeus)	14	10,4	D
<i>Calopteryx splendens</i> (Harris)	12	8,9	D
<i>Ischnura pumilio</i> (Charpentier)	5	3,7	S
<i>Anax imperator</i> Leach	11	8,2	D
<i>Aeshna cyanea</i> (Müller)	13	9,7	D
<i>Aeshna mixta</i> Latreille	10	7,4	D
<i>Cordulegaster picta</i> Sélys	9	6,7	D
<i>Somatochlora meridionalis</i> Nielsen	6	4,4	S
<i>Libellula depressa</i> Linnaeus	21	15,6	D
<i>Orthetrum brunneum</i> (Fonscolombe)	6	4,4	S
<i>Orthetrum coerulescens</i> (Fabricius)	2	1,5	R
<i>Sympetrum flaveolum</i> (Linnaeus)	6	4,4	S
<i>Gomphus vulgatisimus</i> (Linnaeus)	7	5,2	D
<i>Onychogomphus forcipatus</i> (Linnaeus)	14	10,4	D

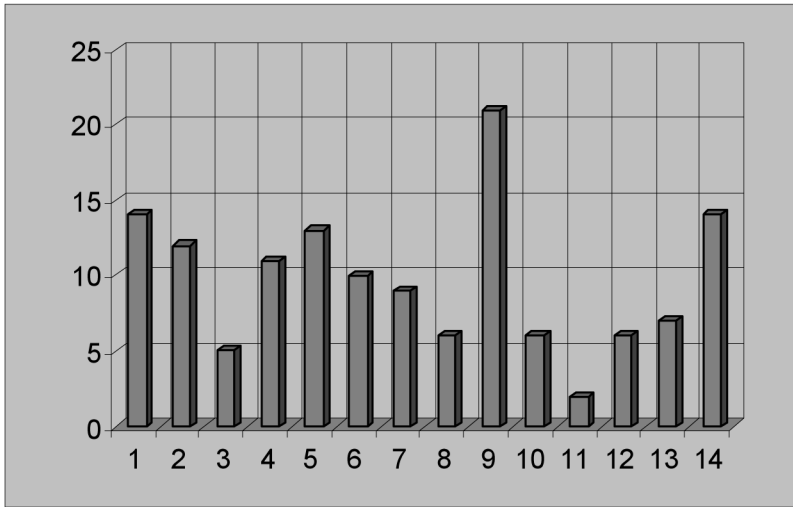


Figure 3. Abundance of the collected sample: D = dominant (> 5% total abundance), SD = subdominant (2-5% total abundance), R = rare (< 2% total abundance). Numbers of columns correspond with the ordinal numbers of species.

The highest number of the species was recorded at the Studenac sites (8 spp.), followed by the Igljice sampling sites (5 spp.), Mrtvak and Radan (4 spp.), Gospođina voda (3 spp.) and Brežine (1 sp.).

Further studies aiming to improve our knowledge of Montenegrin dragonflies should focus on collecting in unexplored areas.

Annotation

Finding the species *Cordulegaster picta* represents a very important record. According to literary sources and data, this species formerly pertained to the area of Turkey and the Black Sea shore of Bulgaria and was thought to be replacing *Cordulegaster heros* (Theischinger, 1979) in the southeast Balkans and in Turkey. Finding this species in Montenegro shifted the borders of its distribution (BOUDOT, 2001) by more than 300 km to the northwest. In Montenegro, overlapping of areals of *C. picta* and *C. heros* has been found [the latter was found in Buljarica, some 40km SW of Gornji Crnci (JOVIĆ *et al.*, 2008)], which is very important in ecological terms because the ecological niches are the same, and in terms of the taxonomy of these two species, i.e., their speciation/separation, as well. In future research work, it is expected that both species will be found in the same investigated localities.

It is not known if *C. picta* is a relict or if it represents an invasion species.

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ПРИЛОГ ПОЗНАВАЊУ ФАУНЕ ВИЛИНСКИХ КОЊИЦА (ODONATA) У ОБЛАСТИ ГОРЊИ ЦРНЦИ – ПИПЕРИ (ЦРНА ГОРА)

БОГИЋ ГЛИГОРОВИЋ, ВЛАДИМИР ПЕШИЋ И АЛЕКСАНДРА ЗЕКОВИЋ

Извод

У раду је дата листа вилинских коњица (Odonata) области Горњи Црнци – Пипери, која обухвата 14 врста. Истраживање је вршено на воденим стаништима карактеристичним за подручје меког карста. На подручју Црне Горе до сада није вршено истраживање у подручјима са геолошком подлогом овог типа који имају карактеристичну хидрографију. Истражена је фауна Odonata извора под израженим антропогеним утицајем са пратећим токовима и акумулацијама, као и околина наведених вода. Сакупљена је нова врста за фауну Црне Горе, *Cordulegaster picta* Sélys, 1854.

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