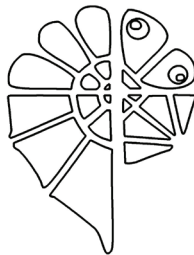


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Biology

***LEUCORRHINIA CAUDALIS* (CHARPENTIER, 1840) –
– A NEW OR AN EX DRAGONFLY SPECIES
IN SERBIAN FAUNA?**

MILOŠ JOVIĆ¹, SVETOZAR SANTOVAC² AND LJILJANA ANDJUS¹

¹ Natural History Museum, Njegojeva 51, 11000 Belgrade, Serbia,
E-mail: milos.jovic@nhmbeo.rs, ljiljaan@nhmbeo.rs

² National Museum in Zrenjanin, Subotičeva 1, 23000 Zrenjanin, Serbia
E-mail: muzejzr.santovac@gmail.com

The discovery of 11 specimens (4♂♂, 7♀♀) of *Leucorrhinia caudalis* in the entomological collection of the National Museum in Zrenjanin is presented. This material from the early 1970's represents the first reliable data about the occurrence of this species in Serbian territory and should, therefore, be considered a new species of Serbian fauna. Contemporary literature data about this endangered species in the region are discussed. Attempts to find a present population in the locality cited on the specimen's labels remained unsuccessful. Both the original list of the species collected together with the specimens *L. caudalis* and the list of those collected in the same locality thirty-five years later are given and commented upon. Remarks about habitat destruction and the possibilities of survival of this species in N Serbia are also presented.

Key words: Odonata, Serbia, *Leucorrhinia caudalis*

INTRODUCTION

Investigations of the Odonata in Serbia never revealed a continual character. The amount of data dealing with the odonate fauna is relatively poor because there were few periods of intensive research, but also and especially because most investigations covered only a minor part of the Serbian territory. Lack of communication between explorers (both temporally and spatially distant) led to fragmentation of faunistic data. Nevertheless, entomological collections may allow the detection and rediscovery of some forgotten or omitted data, as illustrated by the recent discovery of *Leucorrhinia caudalis* (Charpentier 1840).

L. caudalis is one of the 'less fortunate' species of dragonfly. Habitat changes in general and its specific needs have made it so very rare and vulnerable throughout Europe that it is one of the 16 species strictly protected by the Bern Convention (1979). As a consequence, it was included in Annex 4 of the EU Habitats Directive (Council Directive



Fig. 1. - *Leucorrhinia caudalis* (Charp.) ♀.

92/43/EEC). It breeds in mesotrophic to eutrophic, acid to neutral waters, sedgy moors (Askew 2004), oxbows and backwaters (Kotarac 1997) with lots of submerged and floating vegetation (e.g. *Nymphaea* sp., *Potamogeton* sp.). Adults of this species can be encountered from early to mid-May until the beginning of July (Askew 2004). A paddle-shaped abdomen (especially conspicuous in males), basal dark marks

on the hind wings (Fig. 1) as well as its habit of perching on the surface of floating water lily leaves make this species easily recognizable and the possibility of overlooking it near the banks is minute.

The ‘first’ written data about the presence of *L. caudalis* in Serbia was presented by Franković (1991). He prepared a review of findings of the *Leucorrhinia* species in successor states of SFR Yugoslavia. Citing Ujhelyi (1957), Franković advocated Apatin (NW Serbia) as a locality where *L. caudalis* was found. In the mentioned paper Ujhelyi commented on the distribution of this species in Hungary and wrote:



Fig. 2. - Pančevački rit. The drawing of the area with the position of the investigated locality.

“... Nálunk ritka, csak Apatinból és Izsákról ismertes” [In our country it is rare, it is known only from Apatin (?) and Izsak]. However, this statement was not supported by any additional data about exact locality, date of record, number of collected specimens or name of legator. Nor is there reference to any eventual citation of specified data. Those circumstances may have been the reason for the exclusion of this species from previous reviews (Andjus 1985; Vijatov 2000) and from the checklist of Serbian odonate fauna (Andjus 2001).

MATERIAL AND METHODS

The entomological material used for this study is disposed in the collections of both the National Museum in Zrenjanin and the Natural History Museum in Belgrade (NHM 600 Beo 595.7333). It was collected by various explorers. Material from the early 1970's (including *Leucorrhinia caudalis* specimens) was collected by Dr Ljubodrag Mihajlović and originated from Bara Reva –specifically, the backwaters of the Danube River near the Reva settlement. It is a part of Pančevački Rit (UTM mark 34TDQ66), an area between the Danube River and its tributary, the Tamiš River, in N Belgrade (Fig. 2). These rivers feed Pančevački Rit with water. In the past it was a marshy area but now it is drained by a number of canals. A strong human impact on this wetland complex is now evident through the development of settlements, industry and agriculture.

RESULTS

During the inspection of the Odonata collection in the National Museum in Zrenjanin, we found 11 specimens of *L. caudalis*. All were collected in the early 1970's. Thirty-five years later, in 2005 and 2006, we tried unsuccessfully to find this species in Bara Reva, the locality specified on the labels. The complete lists of the material from Reva, deposited in the NM in Zrenjanin, and of the recently collected Odonata specimens, disposed in the NHM in Belgrade, are given in Tab. 1.

DISCUSSION

Finding *L. caudalis* in Serbia was expected. It is a Eurosiberian species which, according to St. Quentin (1960), belongs to the “invasion fauna”. Specimens collected in Reva probably were a part of a population that once occupied a fragment of the southern distributional limit of the species. Habitat degradation and fragmentation as constant pressures represented extreme threats to it. The recovery of such a population and/or recolonisation of the area may be assured only if corridors connecting it with the main range of the species in Europe are maintained. In this part of Europe these corridors (nets of suitable habitats) would be areas around:

- Danube flows [records from Čičov and Medved'ov in Slovakia (Kudela *et al.* 2004), as well as from Tatabánya (Ambrus *et al.* 1996c) in Hungary];

- Tisa [records from Tisza-tó (Jakab *et al.* 2002; Jakab *et al.* 2005a; 2005b), Tiszadorogma (Ambrus *et al.* 1996a; Olajos & Kiss 1999), Tiszadada (Müller *et al.* 2006) and Sárospatak (Dévai *et al.* 1976) all in Hungary, and Bot'any, backwater of the Latorica River, tribute of Tisa, in Slovakia (David & Tóthová 2004)];

- Sava [records from Lonjsko polje in Croatia (Schneider-Jacoby & Franković 1990; Franković 1991)] and

- Drava [records from Somogy (Toth 2001; Ambrus *et al.* 1996c; Kovács *et al.* 2004; Tóth 1995; 1998) and Zala (Ambrus *et al.* 1996b; Tóth 1995; 1998) counties in Hungary and Prekmurje region in Slovenia – basin of the River Mura (Bedjanič 1995; 2000; Božič 2000; Gal 2003; Kotarac 1997, 2001; Pirnat 2001)] (Map 1).



Map 1. - *Leucorrhinia caudalis* (Charp.) records in Serbia and neighboring countries. Gray surfaces – countries with records mentioned in this paper (black dots). Pale gray surfaces – countries with recent and/or extinct populations of *L. caudalis* (records not mentioned in this paper). Dark gray surfaces – countries with no records of *L. caudalis*.

Table 1. - Review of Odonata material from Bara Reva used for this study.

Species	1968-1972		2005-2006	
	No. of spec.	Date	No. of spec.	Date
<i>Aeshna affinis</i> Vander Linden, 1820	1♂, 1♀	1970-08-19	1♂	2005-06-25
<i>Aeshna isoceles</i> (Müller, 1767)	1♂	1971-05-07		
	1♀	1970-05-15	1♂	2005-05-17
	1♂, 1♀	1971-05-07	4♀	2006-05-13
	1♀	1971-05-13	2♂	2006-05-16
<i>Aeshna mixta</i> Latreille, 1805			1♂	2006-05-23
	1♀	1968-09-01	2♂	2005-10-27
<i>Anax imperator</i> Leach, 1815	2♂	1970-05-15	1♂	2005-05-17
	1♀	1972-06-11	1♂	2005-06-25
			1♂	2006-05-23
<i>Brachytron pratense</i> (Müller, 1764)	1♀	1971-05-07	2♂, 1♀	2006-05-13
	4♂, 2♀	1971-05-13	1♀	2006-05-16
<i>Coenagrion puella</i> (Linnaeus, 1758)	2♀	1972-05-15	1♂	2006-05-23
	1♂	1972-05-22	2♂, 3♀	2005-05-17
			3♂	2005-06-25
			2♂, 2♀	2006-04-26
			3♂, 1♀	2006-05-13
			4♂, 1♀	2006-05-16
<i>Coenagrion pulchellum</i> (Vander Linden, 1823)	1♂	1972-05-05	2♂	2006-05-23
	3♂, 1♀	1972-05-15	2♂, 2♀	2006-05-16
<i>Cordulia aenea</i> (Linnaeus, 1758)	1♂	1970-05-15	2♂	2006-05-16
	1♂	1971-05-10	1♂	2006-05-23
	1♀	1971-07-07		
<i>Crocothemis erythraea</i> (Brulle, 1832)	1♂	1970-07-14	3♂, 1♀	2005-06-25
			1♂	2006-05-16
<i>Erythromma najas</i> (Hansemann, 1823)			2♀	2006-05-23
	1♀	1972-05-05		
<i>Erythromma viridulum</i> (Charpentier, 1840)	1♂	1972-06-06	6♂	2005-06-25
<i>Gomphus flavipes</i> (Charpentier, 1825)			1♂	2005-06-25
<i>Ischnura elegans</i> (Vander Linden, 1820)			1♀	2005-05-17
			1♂	2005-06-25
			1♂, 1♀	2006-04-26
		2♂, 2♀	2006-05-13	

Species	1968-1972		2005-2006	
	No. of spec.	Date	No. of spec.	Date
<i>Lestes parvidens</i> (Artobolevski, 1929)			1♂, 1♀	2006-05-16
			1♂	2005-10-27
<i>Leucorrhinia caudalis</i> (Charpentier, 1840)	1♂, 1♀	1970-05-15		
	1♂, 6♀	1971-05-10		
	2♂	1971-05-26		
<i>Libellula depressa</i> Linnaeus, 1758			1♀	2006-04-26
<i>Libellula quadrimaculata</i> Linnaeus, 1758	1♂	1971-05-26	1♂	2006-05-16
<i>Sympetrum meridionale</i> (Selys, 1841)	1♂	1970-08-19		
<i>Sympetrum sanguineum</i> (Müller, 1764)	3♂, 1♀	1970-08-19	3♂	2005-06-25
<i>Sympetrum striolatum</i> (Charpentier, 1840)	1♂, 1♀	2005-10-27		

Large rivers of Pannonia produce a number of types of meso- and eutrophic standing waters along their banks and therefore could be considered as some kind of dragonfly ‘highways’. It is possible that *L. caudalis* once occupied an even wider area, including the N Bosnian lowlands and the right-hand banks of the Danube and Sava Rivers in Serbia. It is interesting, however, that despite intensive odonatological research the species has not been reported along the lower Drava River in Croatia and in Kopački Rit on the Croatian-Serbian border (Bogdanović 2001). Apparently, the recent occurrence of the species on the southern border of its range is very scattered.

Habitats suitable for the breeding of *L. caudalis* were rather frequent along the lowland rivers in Vojvodina (N Serbia) in the past. Today they are notably sparser. Reasons for this are numerous and include extensive agriculture, and the spread of industrial areas and settlement. Only a few decades ago Pančevački Rit was a marshy area between the Danube and the Tamiš Rivers. Now it is highly denatured and less suitable for habitation by many Odonata species (including *L. caudalis*). It is very easy to imagine and perceive the effects of the oil refinery in the vicinity of Bara Reva and to understand the risks produced by the existence of a dump (solid waste) and construction works recently taking place on the border of the Bara Reva water body.

Bearing in mind all these facts, it is not surprising that we were unable to record a current presence of *L. caudalis* on the Bara Reva. However, we can still assume that northern parts of Serbia may be inhabited by this species.

Adamović (1949) listed 18 Odonata species collected on the Bara Reva during the 1940's. Eight of these were not found again in subsequent years: *Enallagma cyathigerum* (Charpentier, 1840), *Lestes barbarus* (Fabricius, 1798), *Lestes macrostigma* (Eversmann, 1836), *Lestes sponsa* (Hansemann, 1823), *Lestes virens* (Charpentier, 1825), *Orthetrum albistylum* (Sélys, 1848), *Orthetrum cancellatum* (Linnaeus, 1758) and *Sympecma fusca* (Vander Linden, 1820).

The odonate fauna of the Bara Reva cannot be considered apart from the whole complex of the Pančevački Rit wetland. It is mainly composed of species typical of standing or slow-flowing waters in Central Europe.

It seems that Pančevački Rit presents an extremely important area for dragonflies in N Serbia. This implies the need for further investigations and additional efforts to protect the wetlands in Serbia.

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We would like to thank Prof. Dr. Ljubodrag Mihajlović for the generous donation of his Odonata collection, as well as for the valuable information and advice he provided us. Our special thanks go to our colleagues Kovacs Tibor (Hungary) for providing us with data on larvae and exuviae records of *L. caudalis* from Hungary; and Stanislav David (Slovakia), Matija Franković (Croatia) and Matjaž Bedjanič (Slovenia) for data from their national records on *L. caudalis*. Jean-Pierre Boudot and Matjaž Bedjanič helped us with their sharp eyes and useful comments and considerably improved the quality of this paper.

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***LEUCORRHINIA CAUDALIS* (CHARPENTIER, 1840) –
– НОВА ИЛИ ИШЧЕЗЛА ВРСТА ВИЛИНСКИХ КОЊИЦА
У ФАУНИ СРБИЈЕ?**

МИЛОШ ЈОВИЋ, СВЕТОЗАР САНТОВАЦ И ЈБИЈАНА АНЂУС

РЕЗИМЕ

У овом раду је представљен налаз 11 примерака врсте *Leucorrhinia caudalis* у ентомолошкој збирци Народног музеја у Зрењанину. Наведени материјал који потиче из 70-их година ХХ века, представља прве поуздане (материјално поткрепљене) податке о присуству ове врсте на територији Србије. На основу тога, *Leucorrhinia caudalis* је уврштена у списак врста вилинских коњица Србије. Савремени литературни подаци о присуству ове угрожене врсте у суседним државама су дискутовани. Покушаји проналажења рецентне популације на локацији која се наводи на етикетама нису били успешни. У раду је дата листа врста чији су примерци сакупљени заједно са примерцима *L. caudalis*, списак врста забележених на истој локацији 35 година касније, као и списак врста које на том месту нису пронађене од 40-их година ХХ века. Дате су напомене о нарушавању станишта и могућностима опстанка ове врсте у северном делу Србије.