

A CONTRIBUTION TO THE KNOWLEDGE OF ODONATA (INSECTA: ODONATA) LARVAE OF THE PUSTA REKA RIVER

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Over the period 1998-1999 limnological investigations of macrozoobenthos of the Pusta Reka River, the left tributary of the South Morava River, were done with special emphasis to Odonata larvae. Out of 11 localities throughout investigated river Odonata larvae were found in 7 localities of pebble-stony and muddy bottom. Dragonflies occur in the zoobenthos of the Pusta Reka River with five species (*Calopteryx splendens* Harris 1782, *Ophiogomphus cecilia* Fourcroy 1785, *Onychogomphus forcipatus* Linne 1758, *Gomphus vulgatissimus* Linne, *Gordulegaster boltoni* Donovan 1807). The most frequent (8.04% in the whole sample) and the most numerous species was *Ophiogomphus cecilia*.

KEY WORDS: zoobenthos, Odonata, spring, stream, Pusta Reka River.

INTRODUCTION

Odonata fauna in Serbia were investigated by KOHAUT, (1896), PONGRACZ, (1944), ADAMOVIĆ (1948, 1949, 1956, 1963, 1966), PETRIK, (1958), TRIPKOVIĆ-ČUBRILOVIĆ, (1960), GRADOJEVIĆ (1963), ANDJUS (1985).

Most of those investigations dealt with adult dragonflies, while studies of larvae as part of bottom community of water ecosystems were performed by fewer authors FILIPOVIĆ, (1954), BARAČKOV, (1973), SIMIĆ (1993), KONTA, (1997), MARKOVIĆ *et al.*, (1997, 1998), MARKOVIĆ (1998, 1999).

MATERIAL AND METHODS

The Kurtiška, Statovačka and Dragodelska Reka Rivers, which have their springs on Mt. Radan, form the Pusta Reka River, near the village Kruškar. From that point the Pusta Reka River flows northwest – south-eastward all the way to Đinđuša, and then turns 90° and continues flowing north – northeastward up to its mouth into the South Morava River. The most important tributaries on the left side are the Magaška, Kamenička and Mrveška Reka Rivers, and on the right side the Konjuvačka Reka River. The river basin of the Pusta Reka River is rather symmetrical, with balanced influx from both sides, the first part being fanlike.

The limnological investigations on the Pusta Reka River have been performed from April 1998 to January 1999. (April, May, June, August, October, and January). Samples were collected from 11 localities, which were distributed along the whole river of 64 km (Fig. 1) on different kinds of bottom surface: stones (K), pebbles (Š), mud (M) and sand (P).

During the investigation period 112 samples were taken for quantitative and 134 for qualitative analysis. Bottom fauna samples were collected by modification of the Suber net with the catching area of up to 300 square cm. The samples were preserved in 76% ethanol and determined later using adequate reference book (ZELENY, 1980).

Dominance and constancy were used for ecological analysis within groups and species. They were calculated using the Tichler's formula (TICHLER, 1949).

Zoogeographical distribution was given after Illies (ILLIES, 1978).

Locality 1 – one of the springs of the Dragodelska Reka River is at 760 m above the sea level. The spring is capped.

Locality 2 – 70 m downstream from locality 1, at 759 m altitude. The riverbed is narrow, shallow and made of small stones covered with moss.

Locality 3 – 200 m downstream from the confluence of the Kurtiška, Statovačka and Dragodelska Rivers, at 440 m altitude in the village of Kruškar. The bottom is covered with large stones and blocks of stones, and the river is characterized by flood flow.

Locality 4 – is 16.5 km downstream from the spring, at 327 m altitude, 200 m in front of the artificial lake Brestovac. The bottom on the left bank

is covered with sand and pebbles and on the right bank with small stones.

Locality 5 – around 200 m behind the artificial lake Brestovac, and 18 km downstream the locality 1 at 295 m altitude. The bottom is covered with stones and blocks of stones overflown by water.

Locality 6 – at 200 m altitude surrounded by plowed fields, 27 km downstream the Dragodelska Reka River. The right bank is overgrown with various herbaceous plants and the river bottom is covered with small pebbles while the left bank is more stony and woody.

Locality 7 – at the exit of the town of Bojnik. It is 28 km downstream the spring at 245 m altitude. In this locality hard waste was met for the first time (car tires, sheet metal). The bottom is covered with stones, and in some places, at the right bank, with small pebbles.

Locality 8 – at 200 m altitude, 45 km downstream the spring. The bottom is covered mainly with small pebbles although there are many undisturbed places at the left bank where sand and mud accumulate. Similar to the previous locality solid waste was present. Plowed fields surround the locality.



Figure 1. Localities studied in the Pusta Reka River

Locality 9 – at 205 m altitude and 100 m downstream the bridge on the near local road Donji Brestovac – Bojnik, 52 km from the spring of the Pusta Reka River. The bottom is covered with pebbles, and in the middle of the riverbed is a small island made of stones and pebbles covered with moss.

Locality 10 – is in the village Pukovac 56 km from the locality 1, 300 m away from the overpass across the railway Beograd-Niš, at 192 m altitude. The bottom is mainly covered with sand but in a few places mud accumulates.

Locality 11 – about 150 m upstream of the mouth of the Pusta Reka River into the South Morava River. The locality is at 192 m altitude. The bottom is mostly covered with pebbles and in some places of the left bank with mud.

RESULTS AND DISCUSSION

Odonata larvae were found in 13 samples in 7 localities with frequency of 57.14%. During the investigation period 4 accidental species were registered, while in locality 7, in August and October the species *Calopteryx splendens* was registered only in a qualitative sample (Table I). *Gomphus vulgatissimus* was found in one sample (locality 8) and *Cordulegaster boltoni* in two samples (localities 2 and 8). *Onychogomphus forcipatus* was registered in 1.78% samples and *Ophiogomphus cecilia* in

Table I

Quantitative and qualitative composition of Odonata of the Pusta Reka River

ODONATA	LOCALITIES																Constancy in quantitative samples (%)						
	I		II		III		IV		V		VI		VII		VIII			IX		X		XI	
	K1	K2	K1	K2	[1	[2	K1	K2	K1	K2	K	[M	[[1	[2		P	M	[M		
Calopterygidae																							
<i>Calopteryx splendens</i> Harris, 1782													+	*									
Gomphidae																							
<i>Ophiogomphus cecilia</i> Fourcroy, 1785									+		+				+	+	+	+					8.04
<i>Onychogomphus forcipatus</i> Linne, 1758															+	+	*						1.78
<i>Gomphus vulgatissimus</i> Linne																	+						0.89
Cordulegasteridae																							
<i>Cordulegaster boltoni</i> Donovan, 1807			+														+						1.78

NOTE: +* found in qualitative samples.

8.04%.

Odonata were the most numerous and frequent in localities 8 and 9, in the pebbly bottom. Odonata larvae were mainly found in few samples, *Ophiogomphus cecilia* being most frequent (8.04%) and most numerous.

Dragonflies were represented in benthofauna of the Pusta Reka River with 5 species from 3 families.

Suborder Zygoptera

Family Calopterygidae

Genus *Calopteryx*

Calopteryx splendens Harris, 1782;

Calopteryx splendens was the only species found from the suborder Zygoptera. It was found in the stony bottom in the locality 8. Specimens of this species were registered in Apatin (PONGRACZ, 1944), Požarevac (ADAMOVIĆ, 1948), Košutnjak, Ada Ciganlija, Rakovica, Umka, Obrenovac, Krupačko jezero, Vlasina, Sićevačka klisura, Debeli lug, Temska, Topli do (ADAMOVIĆ, 1949).

Šumska domena Majdanpeka (ŽIVOJINOVIĆ, 1950), Obedska bara (ADAMOVIĆ & ANDJUS, 1983), Rajac, Ribnica, Divčibare, Velika Ada Ciganlija, Grocka, Mala Ada Ciganlija, Bačka Palanka, Šalinac, Bujanj potok, Vranje, Rogača, Sićevačka klisura, Lanište, Zaplanje, Donji Dušnik, Kanjiža, Jastrebac and Mali rit (ANDJUS, 1985), Krupačko jezero (ADAMOVIĆ, 1993), Carska bara (SANTOVAC & ANDJUS, 1995-98).

It is distributed all over Europe excluding the Iberian Peninsula, Perinea, Iceland, Tundra, North Sweden and Taiga.

Suborder Anisoptera

Family Cordulegastridae

Genus *Cordulegaster*

Gordulegaster boltoni Donovan, 1807 (= *Cordulegaster annulatus* Laterrille, 1805);

This species was found in the upper part of the river on a rocky bottom (locality 2) and in the mud in locality 8, in number of 33 individuals per square metre.

It has been registered in Serbia in: Požarevac, Rudnik, Stara Planina (ADAMOVIĆ, 1949), Šumska domena Majdanpeka (ŽIVOJINOVIĆ, 1950), Račanska reka (ANDJUS, 1992), Lomnička reka (KONTA, 1997), the River Banja and the stream Pocibrave (MARKOVIĆ *et al.*, 1997), spring of Lađevac, well near Slovac (MARKOVIĆ 1998).

It is distributed all over Europe except for Ireland, England, Iceland and Tundra.

Family Gomphidae

Genus *Gomphus*

Gomphus vulgatissimus Linne;

Gomphus vulgatissimus was found in the locality 8 in the mud.

It has been registered in Serbia in: Obedska bara (ADAMOVIĆ & ANDJUS, 1983), Velika Ada Ciganlija (ANDJUS, 1992), Krupačko jezero (ADAMOVIĆ, 1993), Lomnička reka (KONTA, 1997), Obnica (MARKOVIĆ *et al.*, 1997), Jablanica (MARKOVIĆ *et al.*, 1998), Kolubara (MARKOVIĆ *et al.*, 1999).

It is distributed all over Europe except for Perinea, Iceland, Boreal plain, Tundra and Tajga.

Genus *Ophiogomphus*

Ophiogomphus cecilia Fourcroy, 1785; (= *Ophiogomphus serpentinus* Charpentier, 1825);

The most frequently found species of dragonflies in the Pusta Reka River. It was registered in localities 5, 6, 8 and 9 in different kinds of bottom surface (stone, pebble and mud). The number of specimens was fluctuating from 33 ind/m² (localities 3, 5, 6 and 9) to 67 ind/m² in the locality 8.

In Serbia *Ophiogomphus cecilia* has been registered in the following places: Bela Crkva and Požarevac (ADAMOVIĆ, 1948), Obnica (MARKOVIĆ *et al.*, 1997), the River Banja and the stream Pocibrave (MARKOVIĆ *et al.*, 1997), Jablanica (MARKOVIĆ *et al.*, 1998), Kolubara (MARKOVIĆ *et al.*, 1999).

It is distributed all over Europe except for Perinea, Greek west Balkans, Ireland, England, Iceland, Boreal plain and Tundra.

Genus *Onychogomphus*

Onychogomphus forcipatus Linne, 1758;

Onychogomphus forcipatus was found in localities 3 and 8 on pebbly-stony bottom in number of 33 ind/m².

It has been registered in Serbia in the following places: Ribnica, Zlatibor, Požarevac, Niš (ADAMOVIĆ, 1948), Košutnjak, Obrenovac, Rogot, Rudnik, Temska, Topli do, Krupačko jezero (ADAMOVIĆ, 1949), Šumska domena Majdanpek (ŽIVOJINOVIĆ, 1950), Katušnica (FILIPOVIĆ, 1954), Jastrebac, Tara, Divčibare, Vranje, Rogač, Sićevačka klisura (ANDJUS, 1985), Svrljiški and Trgoviški Timok (SIMIĆ, 1993), Obnica (MARKOVIĆ *et al.*, 1997), Kolubara (MARKOVIĆ *et al.*, 1999).

It is distributed all over Europe except for Ireland, England, Iceland, Boreal highland and Tundra.

Although found in 7 out of 11 localities (57.43%) it may be concluded that dragonflies are of small importance for benthocenosa of the Pusta Reka River, in respect to small number of specimens and the frequency of occurrence (only in 13 samples). However, greater diversity of Odonata was found in the Pusta Reka River when compared with the rivers Grošnička Reka (BARAČKOV, 1973), Svrljiški and Trgoviški Timok (SIMIĆ, 1993), Lomnička Reka (KONTA, 1997), Obnica River (MARKOVIĆ *et al.*, 1997), the River Banja and stream Pocibrave (MARKOVIĆ *et al.*, 1997), Jablanica (MARKOVIĆ *et al.*, 1998) and Kolubara River (MARKOVIĆ *et al.*, 1999).

CONCLUSIONS

Investigations on Odonata fauna in 11 localities of the Pusta Reka River were carried out during 1998 and 1999 (April, May, June, August, October and January).

Larvae of 5 species (*Calopteryx splendens*, *Ophiogomphus cecilia*, *Onychogomphus forcipatus*, *Gomphus vulgatissimus*, *Gordulegaster boltoni*) from 3 families (Calopterygidae, Gordulegastridae and Gomphidae) were found.

The greatest number of dragonflies species was registered in locality 8 (*Onychogomphus forcipatus*, *Gomphus vulgatissimus*, *Gordulegaster boltoni* were registered) in mud.

The most frequent (8.04% in the whole sample) and the most numerous species was *Ophiogomphus cecilia*.

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ПРИЛОГ ПОЗНАВАЊУ ЛАРВИ ОДОНАТА
(INSECTA: ODONATA) ПУСТЕ РЕКЕ

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И з в о д

У току 1998-1999. године извршена су лимнолошка истраживања макрозообентоса Пусте реке, леве притоке Јужне Мораве, са посебним освртом на ларве врста из реда Odonata. Од укупно 11 локалитета дуж испитиваног тока, ларве Odonata констатоване су на 7 локалитета на каменито-шљунковитој подлози и у муљу. Вилински коњици заступљени су у зообентосу Пусте реке са 5 врста (*Calopteryx splendens* Harris 1782, *Ophiogomphus cecilia* Fourcroy 1785, *Onychogomphus forcipatus* Linne 1758, *Gomphus vulgatissimus* Linne, *Gordulegaster boltoni* Donovan 1807) класификованих у 3 фамилије. Најчешћа (8.04% заступљености у укупном узорку) и најбројнија је врста *Ophiogomphus cecilia*.

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