

A CONTRIBUTION TO THE STUDY OF THE TRICHOPTERA (INSECTA) FAUNA IN THE TOPLICA RIVER

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The explorations of the Trichoptera (Insecta) larvae were conducted seasonally in the period from April 2000 until January 2001 in the Toplica River, the right tributary of the Kolubara River, on eight localities. 20 taxa were ascertained (*Anabolia nervosa* Curtis 1834, *Potamophylax latipennis* Curtis 1834, *Hydropsyche angustipennis* Curtis 1834, *H. contubernalis* McLachlan 1865, *H. dissimulata* Kumanski i Botosaneanu 1974, *H. instabilisi* Curtis 1834, *H. saxonica* McLachlan 1865, *H. pellucidula* Curtis 1834, *Ryacophila pascoei* McLachlan 1879, *R. nubila* Zetterstet, 1840, *Athripsodes bilineatus* Linne 1758, *Polycentropus flavomaculatus* Pictet 1834, *Lepidostoma hirtum* Fabricius 1775, *Odontocerum albicorne* Scopoli 1763, *Sericostoma personatum* Spence 1826, *Allogamus*, *Stenophylax*, *Glossosoma*, *Helicopsyche*, *Hydropsyche*) classified into 10 families. The average number of the Trichoptera larvae in a wide range, from the specimens in which larvae were not ascertained (localities T1, T4, T8 in April, T6 and T7 in July, T5, T6 and T7 in October and all localities in January, except on locality T3) to 1832 ind/m² (locality T4 in October). The species from the *Allogamus* genus were most often found (on 5 localities), and the most numerous species is *Hydropsyche angustipennis* (1099 ind/m²). The species of the *Helicopsyche* genus have so far been ascertained in the springs in West Serbia and South - west Serbia, while in the Toplica River they were found in the upper and middle stream.

KEY WORDS: Zoobenthos, Trichoptera, Toplica River.

INTRODUCTION

From 895 species of Trichoptera in total (ILLIES, 1978) that are registered in the European fauna, 135 species are known in our country (MARINKOVIĆ-GOSPODNETIĆ 1975, 1980). Another 19 species, described in the studies by Radovanović (RADOVANOVIĆ 1931, 1935, 1953) should be added to the number. The reason for this is probably insufficient exploration of this insect group, adults as well as larvae, on the territory of Serbia.

Adults are less visible than larvae, because of the protective coloring, nocturnal and relatively short life, spent in the proximity of water. Trichoptera larvae develop in sweet – water ecosystems, from springs, small mountain streams and rivers to lakes, and only some live on (*Enoicyla pusilla* Burmeister, whose larvae develop on leaves). The study of their biology has practical importance, as well as fundamental, because they occupy an important place in the secondary production of zoobenthos and represent food for benthophagic fish.

On the territory of Serbia, larvae were explored only within the study of macrozoobenthos, in the mountain streams and rivers: Katušnica (FILIPOVIĆ, 1954), Lisinski stream (FILIPOVIĆ, 1965), Grošnička River (BARAČKOV, 1973), Lomnička River (KONTA, 1997), Đetinja (MARKOVIĆ, 1995), Kriveljska River (MARKOVIĆ & MILJANOVIĆ, 1995), Banja River (MARKOVIĆ *et al.*, 1997), Obnica (MARKOVIĆ *et al.*, 1997a; MILJANOVIĆ, 2001), Veternica (MARTINOVIĆ-VITANOVIĆ *et al.*, 1998), Jablanica (MARKOVIĆ *et al.*, 1998; MILJANOVIĆ, 2001), Kolubara (MARKOVIĆ *et al.*, 1999), Svrlijski and Trgoviški Timok (SIMIĆ, 1993), Pusta River (STRAHINIĆ, 2000), Vlasina (PAUNOVIĆ, 2001), Crvena River (ŽIVIĆ *et al.*, 2001). Fewer authors, MARINKOVIĆ-GOSPODNETIĆ (1975, 1980) and RADOVANOVIĆ (1931, 1935, 1953), explored the Trichoptera adults in Serbia.

The aims of the exploration were to ascertain the diversity, diffusion and number of the Trichoptera larvae in the Toplica River, which so far has not been included in the biological explorations.

MATERIAL AND METHODS

The Toplica River, the right tributary of the Kolubara River, originates at 540 meters above sea level on Berkovačka glava on the hillside Suvobora. It is formed by joining of the Berkovački and Popadić streams in the village Popadić. The most important right tributaries are the Dubrovac and Nanomirnica rivers.

The explorations of the Trichoptera fauna in the Toplica River were conducted seasonally in the period from April 2000 until January 2001, on eight localities (Fig. 1), with a net according to Surber, spreading over the area of 300 cm².

Locality T1 – is one of the springs of the Toplica, at 340 meters above sea level, above the village Ignjatijevići. The bottom is composed of small stones. The average depth varies 0,08 m (July) to 0,20 m (January), and the width from 0,55 m (July) to 0,70 m (October, January). The water temperature varied from 9°C (January) to 14°C (July).

Locality T2 – is 150 m downstream from the spring, at 295 meters above sea level. The bottom is rocky and shallow (0,03 do 0,07m). The width varies from

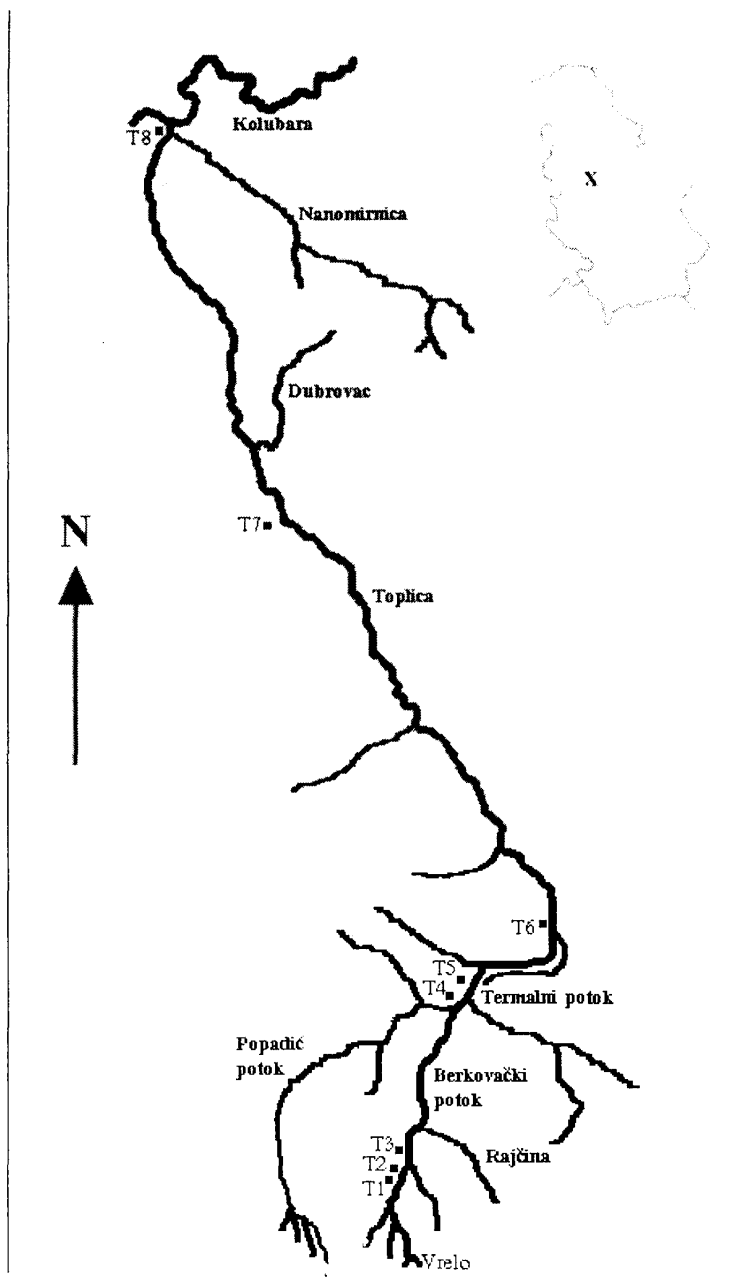


Fig. 1. Explored localities in the Toplica River

1,35 m (January) to 2,00 m (April). The water temperature varies from 9°C (January) to 14°C (April). According to the classification by Huet (HUET, 1961), The stream is slow - 0,25 m/s (April) and moderate (0,33 - 0,36 m/s).

Locality T3 - is 20 m downstream from the place where the river Rajčina flows in, at 290 meters above sea level. The bottom is rocky. The width of the riverbed varies from 1,3 m (October) to 2,5 m (July), and the depth from 0,04 m (October) to 0,07 m (April, January). The stream is quite slow (0,22 - 0,28 m/s). The lowest water temperature (9°C) was measured in January, and the highest (16°C) in July.

Locality T4 - is 20 m downstream from the place where the Berkovački stream and the Popadić stream join, at 190 meters above sea level. The width of the river is from 1,4 to 2,5 m, while the depth is from 0,04 m to 0,09 m. The bottom is rocky. Regarding the speed, it belongs to the category of moderate river, in all months of the exploration, except in January (0,66 m/s). The water temperature varied from 8°C (January) to 23°C (July).

Locality T5 - is 100 m upstream from the spa Vrujci, at 180 meters above sea level. The riverbed is put in order, the width is from 1,4 to 4 m, and the depth is from 0,04 m (July) to 0,09 m (April, January). Across the rocky bottom water flows at the speed of 0,30 m/s. Water was the coldest in January (8°C), and the warmest (28°C) in July.

Locality T6 - is 10 m downstream from the place where the thermal stream from the spa Vrujci flows in, at 170 meters above sea level. The bottom is composed of small stones. The width of the riverbed varies from 2,5 m (October) to 5 m (January), and the depth from 0,17 m (April) to 0,20 m (October, January). The speed of water is moderate in all months of the investigation, except in April (0,65 m/s). The water temperature varied from 17°C (January) to 26°C (April, July).

Locality T7 - is in the village Gornji Mušić, at 150 meters above sea level. The bottom is rocky, and along the right bank is muddy. The width is from 3,5 to 6 m while the depth is 0,28 m. The speed of the stream varies from very slow in January, to slow in July and October. The lowest water temperature (12°C) was measured in January, and the highest (24°C) in July.

Locality T8 - is 100 m upstream from the mouth of the Toplica River (into the Kolubara River), at 125 meters above sea level. The bottom is rocky, while mud accumulates along the right bank. The width of the riverbed is from 3,5 m (July) to 6 m (January), and the depth is from 0,10 m (October) to 0,28 m (April). The speed varies from 0,12 m/s (April, January) to 0,24 m/s (October), and the water temperature from 10°C (January) to 19°C (April).

Table II
 Qualitative composition of the Trichoptera fauna in the Toplica River.

| Trichoptera | Localities | | | | | | | |
|-------------------------------------|------------|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Limnephilidae | | | | | | | | |
| <i>Anabolia nervosa</i> | | + | + | | | | | |
| <i>Allogamus sp.</i> | + | + | + | | + | + | | |
| <i>Stenophylax sp.</i> | | | | + | | | | |
| <i>Potamophylax latipennis</i> | + | | + | | | | | |
| Glossosomatidae | | | | | | | | |
| <i>Glossosoma sp.</i> | + | + | | | | | | |
| Helicopsychidae | | | | | | | | |
| <i>Helicopsyche sp.</i> | | + | + | + | | | + | |
| Hydropsychidae | | | | | | | | |
| <i>Hydropsyche sp.</i> | | + | + | | | | | |
| <i>H. angustipennis</i> | | + | + | + | | + | | |
| <i>H. contubernalis</i> | | | | + | | + | | |
| <i>H. dissimulata</i> | | | | + | + | | | |
| <i>H. instabilis</i> | | | | | + | | | |
| <i>H. saxonica</i> | | | | + | | | | |
| <i>H. pellucidula</i> | | | | + | + | | | |
| Rhyacophilidae | | | | | | | | |
| <i>Ryacophila pascoei</i> | | | + | + | | | | |
| <i>Ryacophila nubila</i> | | | + | + | | | | |
| Leptoceridae | | | | | | | | |
| <i>Athripsodes bilineatus</i> | | | + | | | | | + |
| Polycentropodidae | | | | | | | | |
| <i>Polycentropus flavomaculatus</i> | + | | | | | | | |
| Lepidostomatidae | | | | | | | | |
| <i>Lepidostoma hirtum</i> | | | | | + | | | |
| Odontoceridae | | | | | | | | |
| <i>Odontocerum albicorne</i> | | | | | | | | + |
| Sericostomatidae | | | | | | | | |
| <i>Sericostoma personatum</i> | | | + | | | | | |

The identification of the Trichoptera larvae was conducted using the keys for determination: LEPNEVA (1964, 1966), HICKEN (1967), SEDLAK (in Roskošny, ed. 1980), EDIGTON & HILDREW (1981).

RESULTS AND DISCUSSION

In the macrozoobenthos of the Toplica River, the Trichoptera fauna (Table I) is represented by 20 taxa (at the level of species or genus) from 10 families: Limnephilidae, Glossosomatidae, Helicopsychidae, Hydropsychidae, Ryacophilidae, Leptoceridae, Polycentropodidae, Lepidostomatidae, Odontoceridae and Sericostomatidae. The Hydropsychidae family is the most diverse (6 species), while the families Glossosomatidae, Helicopsychidae, Leptoceridae, Polycentropodidae, Lepidostomatidae, Odontoceridae and Sericostomatidae are represented by one taxon each. The Trichoptera larvae are the most diverse on the localities T3 (10 taxa from 6 families) and T4 (9 taxa from 4 families), and the least diverse on the T7 locality (1 taxon). The representatives of the *Allogamus* genus are found most often (on five localities).

The average number of the Trichoptera larvae in the Toplica River (Fig. 2) varied from the specimens in which larvae were not found (localities T1, T4, T8 in April, T6 and T7 in July, T5, T6 and T7 in October and all localities in January, except on locality T3) to 1832 ind/m² (locality T4 in October, where the *Hydropsyche angustipennis* species is dominant – 1019 ind/m² and *H. pellucidula* is dominant – 633 ind/m²).

SISTEMATIC SURVEY OF THE SPECIES FOUND

Family: Glossosomatidae
Genus: Glossosoma

Family a: Helicopsychidae
Genus: Helicopsyche

Family: Hydropsychidae
Genus: Hydropsyche
Hydropsyche angustipennis Curtis, 1834
Hydropsyche contubernalis McLachlan, 1865
Hydropsyche dissimulata Kumanski i Botosaneanu, 1974
Hydropsyche instabilis Curtis, 1834
Hydropsyche saxonica McLachlan, 1884
Hydropsyche pellucidula Curtis, 1834

Family: Limnephilidae
 Genus: Anabolia
Anabolia nervosa Curtis, 1834

Genus: Potamophylax
Potamophylax latipennis Curtis, 1834

Genus: Allogamus

Genus: Stenophylax

Family: Lepidostomatidae
 Genus: Lepidostoma
Lepidostoma hirtum Fabricius, 1775

Family: Leptoceridae
 Genus: Athripsodes
Athripsodes bilineatus Linne, 1758

Family: Odontoceridae
 Genus: Odontocerum
Odontocerum albicorne Scopoli, 1763

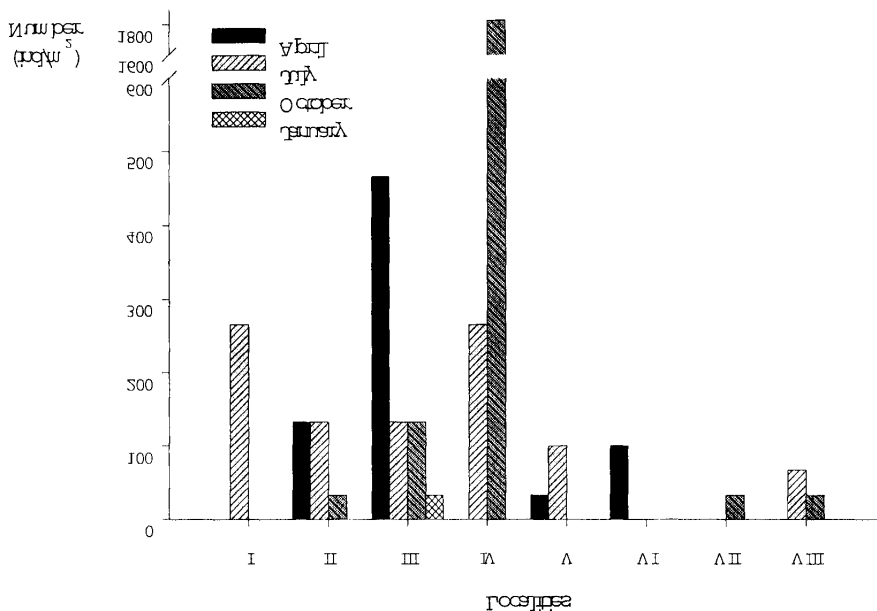


Fig. 1. Average number of Trichoptera on each locality of the exploration.

Family: Polycentropodidae
Genus: Polycentropus
Polycentropus flavomaculatus Pictet, 1834

Family: Rhyacophilidae
Genus: Rhyacophila
Rhyacophila pascoei McLachlan, 1879
Rhyacophila nubila Zetterstet, 1840

Family: Sericostomatidae
Genus: Sericostoma
Sericostoma personatum Spence, 1826

In zoogeographical regard (ILLIES, 1978), all Trichoptera species found have a wide European distribution, except the *Hydropsyche dissimulata* species, which is spread in South and South-eastern Europe. In Serbia, a greater number of the noted taxa is widely spread, and the species *Athripsodes bilineatus* (MARINKOVIĆ-GOSPODNETIĆ, 1975), *Hydropsyche dissimulata* (MARINKOVIĆ-GOSPODNETIĆ, 1980), *Hydropsyche instabilis* (PAUNOVIĆ, 2001), *Hydropsyche contubernalis* (MARKOVIĆ *et al.*, 1999), *Lepidostoma hirtum* (MARKOVIĆ, 1998) and *Ryacophila pascoei* (STRAHINIĆ, 2000) have so far been noted only on one locality. The species of the *Helicopsyche* genus have so far been ascertained in the springs in West Serbia (MARKOVIĆ, 1998) and Southwest Serbia (FILIPOVIĆ, 1965), while in the Toplica River they were found in the upper and middle stream.

Bearing in mind the uniformity of the foundation (rock), great diversity of Trichoptera larvae was ascertained (15 species from 10 families were noted). In comparison with the explored rivers in Serbia: Katušnica (FILIPOVIĆ, 1954), Grošnička River (BARAČKOV, 1973), Banja River (MARKOVIĆ *et al.*, 1997), Obnica (MARKOVIĆ *et al.*, 1997; MILJANOVIĆ, 2001), Jablanica (MARKOVIĆ *et al.*, 1998; MILJANOVIĆ, 2001), Kolubara (MARKOVIĆ *et al.*, 1999), Kriveljska River (MARKOVIĆ & MILJANOVIĆ, 1995), Veternica (MARTINOVIĆ-VITANOVIĆ *et al.*, 1998), Pusta River (STRAHINIĆ, 2000), Crvena River (ŽIVIĆ *et al.*, 2001), in the Toplica River greater diversity was ascertained, and comparison Đetinja (MARKOVIĆ, 1995), Svrljiški and Trgoviški Timok (SIMIĆ, 1993), Lisinski stream (FILIPOVIĆ, 1965) and Vlasina (PAUNOVIĆ, 2001), less diversity of the Trichoptera fauna was ascertained, which is a consequence of the specific conditions of the environment in every water ecosystem.

Although the Trichoptera larvae, in comparison with the Ephemeroptera and Plecoptera larvae, are less sensitive to pollution, there are clear differences between them. The Hydropsychidae family is distinguished from other families by a higher level of tolerance to pollution. Precisely in the Toplica River, whose water corresponds to the II class of quality (unpublished data), a great diversity of the

species from the Hydropsychidae family was noted, while the relative uniformity of the families Glossosomatidae, Leptoceridae, Lepidostomatidae, Odontoceridae and Sericostomatidae is a consequence of the fact that the species from these families can only be found in waters that are less charged by organic pollution.

CONCLUSIONS

Limnological explorations of the Toplica River, the right tributary of the Kolubara River, were conducted seasonally in the period from April 2000 until January 2001 on eight localities.

20 taxa were ascertained (at the level of species or genus) from 10 families (Limnephilidae, Glossosomatidae, Helicopsychidae, Hydropsychidae, Ryacophilidae, Leptoceridae, Polycentropodidae, Lepidostomatidae, Odontoceridae and Sericostomatidae).

The average number of the Trichoptera larvae in a wide range, from the specimens in which larvae were not ascertained (localities T1, T4, T8 in April, T6 and T7 in July, T5, T6 and T7 in October and all localities in January, except on locality T3) to 1832 ind/m² (locality T4 in October).

The species from the *Allogamus* genus were most often found (on 5 localities), and the most numerous species is *Hydropsyche angustipennis* (1099 ind/m²).

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ПРИЛОГ ПОЗНАВАЊУ ФАУНЕ ТРИХОПТЕРА (INSECTA)
РЕКЕ ТОПЛИЦЕ

И. ЖИВИЋ, З. МАРКОВИЋ И М. БРАЈКОВИЋ

И з в о д

Истраживања ларви Trichoptera (Insecta) обављена су сезонски у периоду од априла 2000. до јануара 2001. године. у реци Топлици, десној притоци Колубаре, на осам локалитета. Констатовано је 20 таксона (*Anabolia nervosa* Curtis 1834, *Potamophylax latipennis* Curtis 1834, *Hydropsyche angustipennis* Curtis 1834, *H. contubernalis* McLachlan 1865, *H. dissimulata* Kumanski i Botosaneanu 1974, *H. instabilisi* Curtis 1834, *H. saxonica* McLachlan 1865, *H. pellucidula* Curtis 1834, *Ryacophila pascoei* McLachlan 1879, *R. nubila* Zetterstet, 1840, *Athripsodes bilineatus* Linne 1758, *Polycentropus flavomaculatus* Pictet 1834, *Lepidostoma hirtum* Fabricius 1775, *Odontocerum albicorne* Scopoli 1763, *Sericostoma personatum* Spence 1826, *Allogamus*, *Stenophylax*, *Glossosoma*, *Helicopsyche*, *Hydropsyche*) класификованих у 10 фамилија. Просечна бројност ларви Trichoptera варира је у широком опсегу, од узорака где ларве нису констатоване (локалитети Т1, Т4, Т8 у априлу, Т6 и Т7 у јулу, Т5, Т6 и Т7 у октобру и сви локалитети у јануару, осим на локалитету Т3) до 1832 инд/м² (локалитет Т4 у октобру). Најчешће су налажене врсте рода *Allogamus* (на 5 локалитета), а најбројнија врста је *Hydropsyche angustipennis* (1099 инд/м²). Врсте рода *Helicopsyche* до сада су констатоване у изворима Западне Србије и Југозападне Србије, док су у реци Топлици налажене у горњем и средњем току.

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