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The First Record of the Micro-caddisfly Genus *Oxyethira* Eaton, 1873 (Trichoptera: Hydroptilidae) from Serbia

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Abstract: We report the first record of the genus *Oxyethira* Eaton, 1873 from Serbia. This finding increases the number of known hydroptilid genera from Serbia to four. A total of 14 larval specimens were collected in November 2015 from a small stream at the town of Inđija (SW Vojvodina, Serbia). Since there are no descriptions of larvae of *Oxyethira* spp., it is not possible to identify the collected specimens at the species level.

Key words: micro-caddisfly, first report, small stream, Inđija Region

Introduction

The family Hydroptilidae, known as „micro-caddisflies" due to their small size (a few mm only), are often overlooked during aquatic macroinvertebrate sampling and processing. In Serbia, only three micro-caddisfly genera (*Hydroptila* Dalman, 1819*, Agraylea* Curtis, 1834 and *Ithytrichia* Eaton, 1873) have been found (Stojanovic et al. 2015). Besides *Hydroptila*, *Oxyethira* Eaton, 1873 is one of the most diverse genera in this group. According to Holzenthal et al. (2007), the genus *Oxyethira* has worldwide distribution and comprises up to 200 species. However, the taxonomy of this genus is rather controversial. Kelly (1984), in his revision of *Oxyethira* based on adult morphology, defined ten subgenera and, by adding species previously placed in other genera, recognised 98 species in this genus. Furthermore, the same author distinguished 31 Holarctic and oriental species within the subgenus *Oxyethira*, whose larvae prefer lotic habitats (Kelly 1985). In Europe, there are 20 (Graf et al. 2008) or 22 species (Malicky 2015).

A few species of *Oxyethira* are widespread throughout Europe. Among these, the following could be found in the region: *Oxyethira falcata* Morton, 1893, *O. flavicornis* Pictet, 1834, *O. frici* Klapalek, 1891 and *O. simplex* Ris, 1897 (Kumanski 1985, Graf et al. 2008, Malicky 2015). Details regarding distribution and ecological preferences of *Oxyethira* are provided by Graf et al. (2008). In respect to habitat preferences, *O. falcata* as a cold stenotherm prefers eucrenal to metarhitral habitats, usually at higher attitudes (common above 150 m a.s.l but could be found in mountains as well). *Oxyethira frici* has rather similar ecological preferences, being found commonly in the hiporithral to epipotamal at higher attitudes (up to submontane regions). *Oxyethira flavicornis* and *O. simplex* usually could be found at lower attitudes (planar and hilly regions up to 300 m a.s.l). While *O. flavicornis*, as a warm stenotherm (preferring temperatures above 18°C) could be described as eupotamal to metapotamal taxon, *O. simplex* has the widest habitat range among known European species of this genus, ranging from eucrenal to hipopotamal habitats. Furthermore, unlike the other three species, which are limnophilous (preferring standing or slowly

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flowing waters), *O. simplex* is classified as "indifferent" in regards to current preferences. It should be noted that all assessed species are linked exclusively with aquatic macrophytes, as preferred microhabitats. Having in mind the above-mentioned ecological preferences of *O. simplex*, it is surprising that this species, although widespread in Europe, has rather scarce findings, for example in the Netherlands it has been confirmed only once in the second half of XX century (Botosaneanu 2005).

MacDostald (1950) described larvae of *O. simplex* from Britain (Scotland) and Hickin (1967) provided description of *O. flavicornis* larvae but till date according to our knowledge there is no reliable identification key for larval stages of this genus.

Materials and Methods

The sampling of aquatic macroinvertebrates was performed on 09.11.2015 in a small tributary of the Danube catchment near the small town of Inđija (Srem, SW Vojvodina; Fig. 1) using a standard benthological hand-net (25 x 25 cm, 500 µm mesh size) . The sample was preserved in 60-80% ethanol and further processed in the laboratory of the Department of Hydroecology and Water Protection of the Institute for biological research „Siniša Stanković", University of Belgrade. The identification was done using the identification key of Waringer & Graf (2011). To provide a better insight into the ecological status of the locality, analysis of the recorded aquatic macroinvertebrate community was done using the ASTERICS software (AQEM 2002).

Results

A total of 14 larvae of *Oxyethira* sp. (Fig. 2) were found, making it the most abundant caddisfly in the sample (2% of the total catch). In addition, *Hydropsyche angustipennis* (Curtis, 1834) and *Tinodes assimilis* (McLachlan, 1865) were also collected. The benthic community consisted of 43 taxa, with Coleoptera, Oligochaeta and Diptera as the most diverse groups. In terms of relative abundance, the macroinvertebrate community was dominated by small bivalves (*Pisidium* sp.), non-biting midges (Chironomidae), crustaceans [*Asellus aquaticus* (L., 1758) and *Synurella ambulans* (F. Müller, 1846)] and mayflies (Baetidae). The saprobic index (SI, see Zelinka & Marvan 1961) was 2.72, indicating moderate organic pollution. Combined with a dominance of alpha-mesosaprobic organisms, the site could be classified as a site with moderate ecological status.

Our collection site was a small stream, with substrate consisting of mud and plants. Unfortunately, the larval stages of majority of *Oxyethira* species are not yet described in detail, so a valid taxonomic key

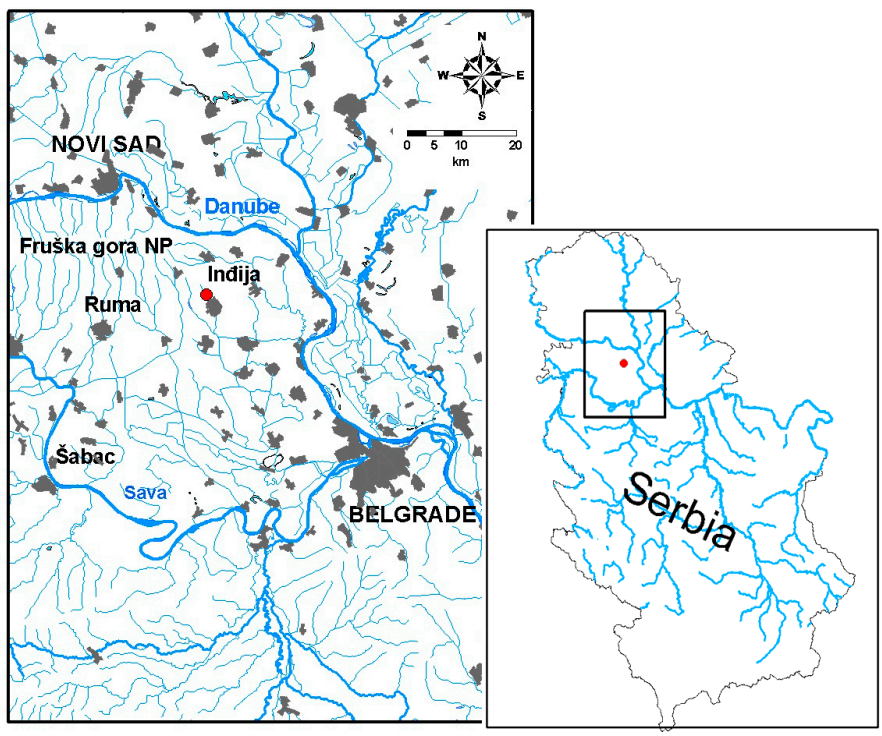

Fig. 1. Sampling locality (marked as red dot on the map): The Inđijski Potok Stream (N45°3'59.96"; E 20°3'40.62"; elevation 108 m a.s.l).

Fig. 2. *Oxyethira* sp. larva from the Inđijski Potok Stream.

is still lacking (Marshall 1978, Salokannel et al. 2012, Waringer & Graf 2011). Based on distribution and ecological preferences of the known species of this genus in Europe (Graf et al. 2008), we could speculate that the found larval specimens probably belong to one of four widespread species (mentioned in the introduction). As *O. falcata* and *O. frici* are more common at higher attitudes (above 150 m a.s.l) and in colder waters, and as our collection site is at the lower attitude (slopes of Fruška Gora Mountain, 108 m a.s.l) with warmer water temperature (first author observation), these two species are unlikely candidates. *Oxyethira flavicornis* and *O. simplex* could be more suitable candidates, based on their ecological preferences.

Based on the available morphological descriptions of the last larval instar (the fifth) of *O. flavicornis* and *O. simplex* larvae, the appearance of our specimens (Fig. 2) showed higher resemblance to *O. simplex*. The size of larvae and cases, with the majority of larvae being about 2.5 mm long (the smallest specimen was 1.8 mm, while the largest was 3.2 mm long), and with length of cases ranging from 1.7 mm to 3.7 mm (av. 3 mm) corresponded to the size relation (larva/case) typical of *O. simplex* (MacDostald 1950). *Oxyethira flavicornis* is characterised by notably larger/longer cases, up to 8 mm (Hickin 1967). Although the colour of ethanol-fixed specimens could change in comparison to live specimens, it should be noted that the yellow- brown colour of larvae with whitish abdomen and the absence of greenish membranous parts, match the description of *O. simplex* (MacDostald 1950). Moreover, viewed laterally the larvae appear to be the broadest at abdominal segments IV and V, while in *O. flavicornis* larvae the broadest is abdominal segment V (Hickin 1967).

Discussion

Drainage, stream bed degradation and removal/deterioration of banks are the most important risks for *Oxyethira* habitats (Mey 2005). Although being widespread (and not on the IUCN Red List), *O. falcata* and *O. flavicornis* are considered as vulnerable in the national lists of some neighbouring countries, such as Hungary (Nogradi & Uherkovich 1999).

The locality of finding is influenced by negative anthropogenic activities. One of the main anthropogenic impacts affecting local aquatic macroinvertebrate communities is streambed sediment removal which is made every few years. In addition, the stream is situated in a small valley, which is used extensively for agriculture and gardening and continually is a subject to various smaller anthropogenic impacts.

Further investigations are needed, involving the collection of both adult and larval stages as well as molecular genetic analyses in order to understand

the species diversity of the genus *Oxyethira* in the region. Nearby forest streams in the Fruška Gora National Park, a hilly, mountainous area, could present additional suitable habitats for *Oxyethira* spp.

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