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# FIRST RECORD OF *OECETIS FURVA* (RAMBUR, 1842) AND *ORTHOTRICHIA TRAGETTI* (MOSELY, 1930) (INSECTA, TRICHOPTERA) FOR THE CROATIAN FAUNA

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**First record of *Oecetis furva* (Rambur, 1842) and *Orthotrichia tragetti* (Mosely, 1930) (Insecta, Trichoptera) for the Croatian fauna. Nat. Croat., Vol. 25, No. 1, 109–118, 2016, Zagreb.**

Two species, *Oecetis furva* and *Orthotrichia tragetti,* are recorded for the first time in Croatia. Moreover, *O. tragetti* is recorded for the first time in the limno-ecoregion Hungarian Lowlands (ER11). Adult caddisflies were collected from 2010 to 2012 in Kopački rit Nature Park. Sampling was conducted using light traps (15 W UV lamp) that were operated monthly, with the exception of May when two light trap samples were taken. Both species were collected at various habitats, from both perennial and ephemeral bodies of water (river course, lake, channels). *O. furva* was collected on the lower reach of the Drava River, in the eutrophic Lake Sakadaš and in two different channels; Vemeljski dunavac (intermittent channel) and Čarna (perennial reclamation channel). *O. tragetti* was collected in the eutrophic Lake Sakadaš and the Čarna channel. These data represent a significant contribution to the general knowledge of caddisflies in Croatia, and particularly of insufficiently investigated wetlands and lakes in the continental region.

**Key words:** wetlands, lakes, Kopački rit Nature Park, Pannonian region, Hungarian Lowlands ER11

**Novi nalazi tulara (Insecta, Trichoptera) za Hrvatsku: vrste *Oecetisfurva* (Rambur, 1842) and *Orthotrichia tragetti* (Mosely, 1930). Nat. Croat., Vol. 25, No. 1, 109–118, 2016, Zagreb**

Vrste *Oecetis furva* i *Orthotrichia tragetti* po prvi puta su zabilježene za faunu Hrvatske. Osim toga, vrsta *O. tragetti* prvi puta je zabilježena u Panonskoj ekoregiji (ER11 Mađarska nizina). Odrasle jedinke tulara prikupljane su u periodu od 2010. – 2012. godine na području Parka prirode Kopački rit. Uzorkovali smo jednom mjesečno, uz izuzetak svibnja kada smo uzorkovanja obavili dva puta. Kao atraktant koristili smo UV lampu jačine 15 W. Obje su vrste zabilježene na različitim tipovima stalnih i povremenih staništa (riječni tok, jezero, različiti kanali). Vrsta *O. furva* zabilježena je na donjem toku rijeke Drave, zatim na eutrofnom jezeru Sakadaš, te na dva različita tipa kanala; Vemeljski dunavac (povremeni kanal) i Čarna (stalni melioracijski kanal). Vrsta *O. tragetti* zabilježena je na eutrofnom jezeru Sakadaš i kanalu Čarna. Ovi podatci predstavljaju značajan doprinos poznavanju faune tulara Hrvatske općenito, a posebice nedovoljno istraženih močvarnih i jezerskih staništa kontinentalnog dijela Hrvatske.

**Ključne riječi:** močvarna staništa, jezera, Park prirode Kopački rit, Panonska ekoregija, ER11 Mađarska nizina

## INTRODUCTION

The first data for Trichoptera fauna in Croatia date from the second half of the 19$^{th}$century, when approximately 11 species were listed for Dalmatia (Brauer, 1876). The first

extensive systematic research of Trichoptera in Croatia based on the collection of adults was carried out at the end of the 20th century in the Plitvice Lakes area (Kučinić 2002; Kučinić *et al.*, 2015). Considerable progress has been made in the study of the caddisfly fauna and its ecology in Croatia in the last 15 years (e.g. Ćuk *et al.*, 2009, 2010; Kučinić *et al.*, 2011; Previšić *et al.*, 2007a, 2007b, 2010, 2013a, b, c.; Šemnički *et al.*, 2011; Vučković *et al.*, 2006). Currently, approximately 200 caddisfly species have been recorded for Croatia (Ćuk *et al.*, 2015; Kučinić *et al.*, 2012, 2015; Previšić *et al.* 2013a, 2013b, 2013c, 2014). However, the eastern part of continental Croatia with various wetland habitats is still insufficiently explored, since most studies were focused on the ecology and faunistics of caddisflies in the karstic area (e.g. Šemnički *et al.*, 2012; Previšić *et al.*, 2010). In 2012, in the area of Papuk Nature Park, the first faunistic survey of caddisflies in eastern Croatia (Pannonian region) was conducted (Previšić *et al.*, 2013a). The study encompassed various stream habitats, and a total of 33 species were recorded, with 7 new records for the Croatian fauna (Previšić *et al.*, 2013a). So far, however, the caddisfly fauna of Kopački rit Nature Park remained completely unexplored.

The natural flood plain along the River Danube belonging te Kopački rit Nature Park (Croatia) represents an internationally important wetland site, providing a diversity of biotopes composed of periodically flooded and permanent water biotopes, mostly channels, oxbows and lakes, surrounded by forests and reed stands and hosting thousands of rare and endangered species (Stević *et al,* 2013). There are two major lakes in the Park – Kopačko jezero and Sakadaš. The latter is the deepest water body in the Park area, with an average depth of 7 meters. Kopački rit is on the list of internationally valuable wetlands of the Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention). It is one of the largest, most importan, and most attractively preserve, intact wetland area in Europe, covering more than 23 $km^2$. On average, the area of the Park is flooded 99 days per year. Part of Kopački rit has been designated as a special zoological reserve.

The objective of this study was to gain some first insights into the caddisfly faunistics and ecology of this diverse wetland site, Kopački rit Nature Park. In this paper we present species that were recorded in Croatia for the first time, *Oecetis furva* (Rambur, 1842) and *Orthotrichia tragetti* (Mosely, 1930), and discuss their ecology and distribution.

## METHODS

### Study sites and sampling of caddisflies

Sampling of caddisflies was conducted throughout three years (2010–2012) on potential Natura 2000 protected areas withie Kopački rit Nature Park (Fig. 1). The sampling covered various habitats: the lower reach of the Drava River, the eutrophic lake Sakadaš, the intermittent channel Vemeljski dunavac and the perennial reclamation channel Čarna (Fig. 2, Tab. 1).

Sampling was carried out on the lower reach of the Drava River, between 13–14 kilometers upstream from its mouth. At this section the river is approximately 180 meters wide, with an average depth of 4 meters. The water pollution indices of most parameters for the lower reach of the Drava River range between I and II (Gvozdić *et al.*, 2011.) The riparian vegetation is well developed (association *Galio Salicetum Alba*e Rauš 1973), while macrophyte communities have not been reported in this area.

Vemeljski dunavac is a Danubs backwater channel, about 20 m wide and with an average depth of 1–3 m. Since it is connected with the Danube, the water is flowing

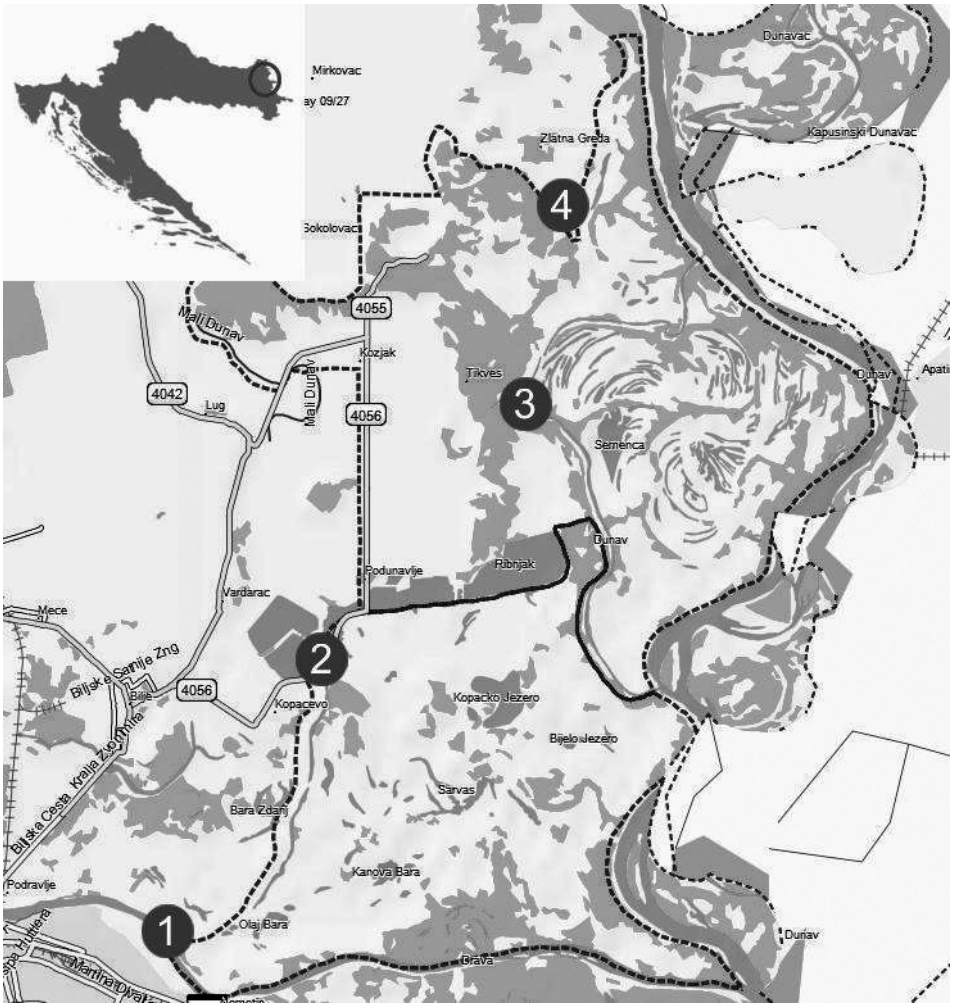


**Fig. 1.** Map of Kopački rit Nature Park with the location of sites where caddisflies were collected; 1 – Drava River, 2 – Lake Sakadaš, 3 – Vemeljski dunavac, 4 – Čarna channel. Dotted line – boundary of Kopački rit Nature Park.

throughout the largest part of the year and the habitat resembles typical lowland rivers. During low water levels however, some parts dry out. Macrophyte vegetation is present in some parts.

Lake Sakadaš is a 5–6 meters deep, eutrophic lake with a highly abundant phytoplankton community and frequent algal blooms during the summer months (Mihaljević *et al.*, 2011). Macrophytes are well developed, with dominant species such as *Ceratophyllum demersum* L., *Myriophyllum spicatum* L., *Potamogeton gramineus* L., *Trapa natans* L., *Nymphoides peltata* Kuntze, *Polygonum amphibium* L., *Spirodela polyrhiza* (L.) Schleid. and *Lemna* sp. (Vidaković *et al.*, 2007). The littoral zone is mostly covered with reed stands (*Phragmites* sp.).


**Fig. 2.** Habitats where caddisflies were collected in Kopački rit Nature Park: 1) lower reach of the Drava River, 2) the eutrophic Lake Sakadaš, 3) Vemeljski dunavac, 4) Čarna channel.

**Tab. 1.** Four sampling sites in Kopački rit Nature Park where caddisflies were collected in the period of 2010–2012.

| | 1) Drava River | 2) Lake Sakadaš | 3) Vemeljski dunavac | 4) Čarna channel |
|---|---|---|---|---|
| Geographic coordinates | N 45º 33 '44.71" E18º 44' 50.84" | N 45º 36 '43.46" E18º 47' 58.46" | N 45º 41 '25.8" E18º 50' 34.1" | N 45º 42 '23:55" E18º 52' 9.13" |
| Habitat type | lower reach of the river | eutrophic lake (perennial) | intermittent channel | perennial reclamation channel |
| Substrate composition | sand, mud | sand, macrophytes | sand, mud | mud, macrophytes |
| Surrounding vegetation | *As. Galio-Salicetum albae* Rauš 1973 | *As. Galio-Salicetum albae* Rauš 1973 | *Leucojo-Fraxinetum angustifoliae* Glavač 1959 | *As. Populetum nigro-albae* Slavnić 1952 |
| Riparian canopy | closed | closed | closed | closed/open |

The Čarna channes is connected with a larger network of reclamation channels within the Kopački rit area. It is up to 10 m wide and between 1 and 3 m deep. As typical for such habitats, aquatic vegetation is well developed and consistg of floating-leaved plants (association *Nymphoidetum peltatae* (Allorge 1922) Oberd. et Müller 1960) and submerged plants (association *Ceratophylletum demersi* (Soó 27) Hild. 1956) (Antonić *et al.*, 2005). Towars the riparian zone, stands of the association *Scirpo-Phragmitetum* (W. Koch 1926) dominate (Antonić *et al.*, 2005). At this sampling site, three protected plant species were recorded (*Nuphar lutea* L. Sm., *Typha latifolia* L. and *Iris pseudacorus* L.) On the lower re-

ach of the Drava River, sampling was conducted over the whole three-yeas-period, whereas only one of the remaining habitats was sampled in a given year (lake Sakadaš in 2010, Vemeljski dunavac in 2011 and Čarna channel in 2012).

Adult caddisflies were collected monthly during the new moon, with the exception of May, when sampling was conducted twice a month with an interval of two weeks. For sampling, we used a 15W ultraviolet (UV) fluorescent tube powered by a 12 V portable lead-acid battery, operated at selected sites for two hours and starting half an hour after sunset (Uherkovich *et al.*, 2007). The collected material was preserved in 80% ethyl alcohol and stored in the Zoological collection of the Department of Biology, University of Osijek. Adult caddisflies were identified using Malicky (2004) and Neu *et al.* (2004).

## RESULTS AND DISCUSSION

In the current study, two species were recorded for the first time in Croatia, *Oecetis furva* (Leptoceridae; Fig. 3.1) and *Orthotrichia tragetti* (Hydroptilidae; Fig. 3.2). Ten species of the genus *Oectis* McLachlan, 1877 are known from Europe (Malicky, 2004, 2005). So far, 4 *Oecetis* species have been recorded in Croatia: *Oecetis lacustris* (Pictet 1834) (Previšić *et al.*, 2010), *Oecetis notata* (Rambur 1842) (Kučinić *et al.*, 2015), *Oecetis ochracea* (Curtis 1825) (Previšić *et al.*, 2007a, b) and *Oecetis testacea* (Curtis 1834) (Kučinić 2002, Previšić *et al.*, 2010a, b).

In general, dwellers of potamal river sections like Leptoceridae are widely distributed (Graf *et al.*, 2008). *O. furva* is found all over Europe with the exception of the Iberian Peninsula and some regions in France and the Western Balkans (Graf *et al.*, 2008, 2016). In some ecoregions it is considered rare (ER 20, Borealic Uplands, *sensu* Illies 1978) and it is red-listed in several countries (Sweden, Norway; Graf *et al.*, 2008, 2016). It is rare, but possibly also overlooked because its typical habitats are rarely investigated (Gullefors, 1988). In Croatia it has most likely not been recorded simply because its typical


**Fig. 3.** Adult males of 1) *Oecetis furva* and 2) *Orthotrichia tragetti* collected in Kopački rit Nature Park. Body sizes are not shown to scale; on average *O. furva* males are 7-8 mm, and *O. tragetti* males 2.5-3 mm long.

**Tab. 2.** Number of specimens (N) of *Oecetis furva* and *Orthotrichia tragetti* collected each month at four sampling sites in the Kopački rit NP from 2010 to 2012. Drava River was sampled during all three years and the remaining sites only in one year. m = males, f = females.

| *Oecetis furva* (Rambur, 1842) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1) Drava River | 2) Lake Sakadaš | | | 3) Vemeljski dunavac | 4) Čarna channel | | | Total |
| 2010 | Jul | May | Jun | Jul | | | | | |
| N | 1 m, 1 f | 3 f | 3 m, 7 f | 5 m, 1 f | | | | | 9 m, 12 f |
| 2011 | Aug | | | | May | | | | |
| N | 1 m | | | | 1 f | | | | 1 m, 1 f |
| 2012 | | | | | | Jun | Jul | Aug | |
| N | | | | | | 2 m, 5 f | 9 m, 2 f | 9 m, 4 f | 20 m, 11 f |
| Total | 2 m, 1 f | 8 m, 11 f | | | 1 f | 20 m, 11 f | | | 30 m, 24 f |

| *Orthotrichia tragetti* (Mosely, 1930) | | | | | | |
|---|---|---|---|---|---|---|
| | 2) Lake Sakadaš | 4) Čarna channel | | | | Total |
| 2010 | Jul | | | | | |
| N | 1 m, 1 f | | | | | 1 m, 1 f |
| 2012 | | May | Jun | Jul | Aug | |
| N | | 1 f | 5 f | 11 m, 33f | 1 m, 4 f | 12 m, 43 f |
| Total | 1 m, 1 f | 12 m, 43 f | | | | 13 m, 44 f |

habitats in the inland part of the country were not encompassed in previous faunistic surveys of caddisflies. Moreover, it is distributed in the ecoregion Hungarian Lowlands (ER11 *sensu* Illies 1978) and in neighbouring Hungary (Graf *et al.*, 2008, 2016).

*O. furva* was recorded in Kopački rit NP it all four habitat types, but not during the whole study period. On the lower reach of the Drava River, which was sampled all three years, it was recorded in 2010 and 2012 (Tab. 2). The number of specimens collected varied considerably among sites and the three years, with highest numbers collected in the Čarna channel in 2012, followed by lake Sakadaš in 2010 and lowest in the Drava River and Vemeljski dunavac in 2011 (Tab. 2).

As most Leptoceridae live in lowland wetlands, lakes or slowly flowing running waters with well-developed submerged vegetation, *O. furva* also prefers such habitats (i.e. metapotamal river sections and littoral; Graf *et al.*, 2008, 2016). The larvae live among vegetation in lakes and large ponds. The species is a shredder and predator primarily feeding on chironomid larvae (Gullefors, 1988; Graf *et al.*, 2008, 2016). Considering the overall habitat characteristics of sampling sites in this study, lake Sakadaš and Čarna channel represent ideal habitat types for this species (Tab. 1).

Within this study *O. furva* was recorded during the spring and summer months, with flight periods of 3 months at lake Sakadaš (May-July 2010) and the Čarna channel (June-August 2012, Tab. 2). At the sites Drava River and Vemeljski dunavac it was only recor-

ded in one month a year, with low numbers of specimens. *O. furva* typically has a short flight period, extending from spring to autumn, with the majority of specimens emerging during the summer (Graf *et al.*, 2008, 2016). Obviously, in suitable habitats the emergence/flight periods may be slightly prolonged if there are optimal environmental conditions. Flight periods of most Leptoceridae last from May to September, occasionally into October. Adults swarm in dense aggregations, and different species utilise different niches (Waringer *et al*., 2011).

*Orthotrichia tragetti* (Fig. 3.2.) belongs to one of the most successful genera in Hydroptilidae, with an almost continuous world-wide distribution (Marshall, 1978). Overall, hydoptilids are amongst the most widely distributed caddisflies, probably due to aerial drift (Waringer *et al.,* 2011). There are 203 *Orthotrichia* species currently known globally, with species from all biogeographic regions except the Antarctic (Morse 2009). However, only one species from the genus *Orthotrichia* has been recorded in Croatia so far, *Orthotrichia angustella* McLachlan, 1865 (Kučinić *et al.,* 2012). Most likely, the common and widespread *Orthotrichia costalis* (Curtis, 1834) is also present in Croatia, bue micro-caddisflies are generally rarely collected (Waringer *et al.,* 2011), and typical habitats of these species have not been properly investigated in Croatia.

In Europe, *O. tragetti* is widely distributed in Central and Northern Europe and absent in the Iberian, Apennine and Balkan Peninsulas, in the Carpathians and Hungarian Lowlands (ER11) (Graf *et al.,* 2008, 2016). Thus, the current record from the Kopački rit NP is not only the first record of this species for Croatia, but also for the ecoregion Hungarian Lowlands (ER11; Graf *et al.,* 2008, 2016). Moreover, it is a rare species and it is listed in red lists of some countries, e.g. Sweden (Graf *et al.,* 2016). According to the Finnish Red List, the species is near threatened in Finland (Rassi *et al.,* 2010.). In Germany it is included in the red list of Trichoptera as critically endangered (CR; Neu, 2013). Due to its rarity and the lack of studies, further records of this species can be expected in the Pannonian part of Croatia and in ER11 in general. Similarly, in Poland *O. tragetti* was recorded for the first time in 2003 (Serafin, 2003).

In general, hydroptilids live in slowly running, macrophyte-rich waters or in littoral zones of standing waters, but the family is very heterogeneous in ecological terms (Waringer *et al*., 2011). Larvae of *Orthotrichia* are inhabitants of standing waters associated with aquatic vegetation (Marshall, 1979). Their typical habitats are nutrient rich lakes, and they are highly adapted for feeding on the cell contents of green filamentous algae (Marshall 1978, Graf *et al*., 2008). *Orthotrichia* larvae attach the eggs in a cement matrix on submersed macrophytes. In the current study, *O. tragetti* was recorded in lake Sakadaš (in 2010) and the channel Čarna in 2012 (Tab. 2), typical habitats for this species with abundant macrophyte vegetation. In the Čarna channel, the number of specimens was markedly higher, and the flight period extended to four months (Tab. 2). The majority of specimens were collected in July; however, a small number of specimens were collected in the spring and late summer (Tab. 2). This is in accordance with its typical flight/emergence period during the summer, however somewhat extended in length (Graf *et al*., 2008, 2016).

Even though this paper provides only limited insight into the caddisfly faunistics of the Kopački rit NP, it gives the first information on this group of insects for lowland wetland habitats in Croatia. Moreover, it gives information on the distribution and ecology of some rare species typical for lowland wetland habitats. Since wetlands are largely influenced and altered habitats, a further systematic survey of caddisflies of the Kopački rit NP is necessary.

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## SAŽETAK

### Novi nalazi tulara (Insecta, Trichoptera) za Hrvatsku: vrste *Oecetis furva* (Rambur, 1842) and *Orthotrichia tragetti* (Mosely, 1930)

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Fauna tulara (Trichoptera) u istočnom dijelu kontinentalne Hrvatske do sada nije bila istraživana. Tulari su uzorkovani tijekom tri godine na području Parka prirode Kopački rit. Kopački rit jedino poplavno područje u ovom dijelu Europe, zbog svoje je iznimne prirodne vrijednosti 1993. godine uvršten na Popis Ramsarskih područja. Ovim radom odrasle jedinke vrsta *Oecetis furva* i *Orthotrichia tragetti* po prvi puta su zabilježene za faunu Hrvatske. Obje vrste zabilježene su na različitim tipovima stalnih i povremenih staništa u parku (riječni tok, jezero, različiti kanali). Istraživanjem dobivamo uvid o ekologiji navedenih vrsta ali i o specifičnim staništima koja naseljavaju, te o njihovoj rasprostranjenosti na području Europe. Dok se vrsta *O. furva* smatra rijetkom na području Europe, vrsta *O. tragetti* je po prvi puta zabilježena u Panonskoj ekoregiji (ER11 Mađarska nizina). Osim što je rijetka, Vrsta *O. tragetti* navedena je na crvenim popisima nekih zemalja kao što su Švedska, Finska i Njemačka. Ovi podatci ukazuju da je istraživanje ovih rijetkih i ugroženih vrsta itekako potrebno.