

THE FIRST RECORD OF CADDISFLY
SETODES VIRIDIS (FOURCROY, 1785) (INSECTA:
TRICHOPTERA) IN CROATIA

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In the upper course of Korana River in June 2013 the species *Setodes viridis* (Fourcroy, 1785) was recorded for the first time in Croatia.

Key words: Trichoptera, *Setodes viridis*, The Korana River, Croatia

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U gornjem toku rijeke Korane u lipnju 2013. godine tular *Setodes viridis* je po prvi put utvrđen na području Republike Hrvatske.

Ključne riječi: Trichoptera, *Setodes viridis*, rijeka Korana, Hrvatska

INTRODUCTION

Caddisflies (Trichoptera) comprise one of the most diverse groups of aquatic insects (MACKAY & WIGGINS, 1979). Caddisfly larvae are present in almost all water types and different habitats in all continents except Antarctica. Furthermore, caddisflies are one of the groups of aquatic insects that represent ideal bioindicator models, which have a long tradition in many countries (GRAF *et al.*, 2002; 2008a). Caddisfly species have the highest diversity in small rivers and streams and the majority of them live in habitats with specific environmental conditions regarding water temperature, water velocity, substrate composition, availability of food resources, etc. (ROSENBERG & RESH, 1993; DOHET, 2002). The caddisfly fauna comprises over 13 500 recent and cca 650 fossil species (MORSE, 2011).

Systematic investigation of Trichoptera based on studies of adults started only recently in Croatia with fieldwork first in Plitvice Lakes National Park (e.g. KUČINIĆ, 2002; KUČINIĆ & MALICKY, 2002; PREVIŠIĆ *et al.*, 2007a, 2010) and later in different parts of Croatia. e.g. the Krka river (KUČINIĆ *et al.*, 2011), the Cetina river (VUČKOVIĆ, 2011), the Drava river (PREVIŠIĆ *et al.*, 2007b), the Gorski kotar area (CERJANEC, 2012; PREVIŠIĆ & POPIJAČ, 2010), the Banovina area (KUČINIĆ *et al.*, 2010), the Papuk area (PREVIŠIĆ *et al.*, 2013), with some individual researches in the inland part of Croatia.

So far, about 187 species have been documented in Croatia (KUČINIĆ & ILIĆ, 1992/3, 1993; KUČINIĆ, 2002; KUČINIĆ & MALICKY, 2002; KUČINIĆ *et al.*, 1999, 2000, 2008; GRAF *et al.*, 2008b; WARINGER *et al.*, 2009; ĆUK & VUČKOVIĆ, 2009, 2010; MALICKY *et al.*, 2007; MALICKY, 2009; PREVIŠIĆ *et al.*, 2007b, 2010; PREVIŠIĆ & POPIJAČ, 2010, PREVIŠIĆ *et al.*, 2013).

MATERIAL AND METHODS

Research area

The Korana river is situated in the Dinaric ecoregion (ILLIES, 1978). The river has a total length of 134 km, a watershed area of 2,297 km² and it belongs to the Danube drainage area (Black Sea basin) (NARODNE NOVINE, 91/08). It originates from the Plitvice Lakes, flows into the Kupa river at Karlovac and according to its characteristics is a typical karstic river (ŠAFAREK & ŠOLIĆ, 2011).

Regarding typology, the Korana river belongs to two river types; the upper course is classified as "Medium and large montane and upland rivers" (including the studied location at Bogovolja), while downstream of Slunj city as far as the mouth the river belongs among "Medium and large lowland rivers" (NARODNE NOVINE, 73/13).

The dominant substrate at the studied location in the Korana river is lithal, mostly microlithal and akal (gravel and pebble), with small share of boulders, phytal (live plant parts) and xylal (large logs/dead wood) (HR EN 16150, 2012).

Sampling and laboratory methods

Samples of macrozoobenthos were collected by using a hand net with a mesh size of 500 µm according to the AQEM sampling method (HERING *et al.*, 2004). All microhabitats represented with more than 5% coverage were sampled. The collected material was preserved with ethanol in the field and the final concentration was 70%. Determination of benthic invertebrates was done in the laboratory by using a binocular stereomicroscope (Olympus SZX9). For determination the keys of WARINGER & GRAF (2011) and LECHTHALER & STOCKINGER (2007) were used.

In this sample 5 specimens of *Setodes viridis* (Fourcroy, 1785) larvae were determined and have been deposited in the collection of caddisflies in the Central Water Management Laboratory of Hrvatske Vode.

RESULTS AND DISCUSSION

From all the available data, it can be seen that two species of the genus *Setodes* have been recorded in Croatia, *S. punctatus* (Fabricius, 1793) and *S. bulgaricus* Kumanski 1976, while *S. viridis* (Fourcroy, 1785) has not been recorded so far (MALICKY & BERNARD, 2009). Although this new record of *S. viridis* refers to the larval stage, its unique morphology can hardly be misinterpreted, which makes the record reliable. The pronotum and mesonotum are pale in colour, without any dark pattern (Fig. 2b, c) and the posterior margin of the mesonotum lacks a pair of dark projections (Fig. 2c), which is characteristic for some Leptoceridae genera (*Athripsodes*, *Ceraclea*). The dark colouration on pale head capsule is confined to the ventral apotome (Fig. 2d). One row of curved spines, which is interrupted, is situated on the anal proleg (Fig. 2e, arrows).

According to GRAF *et al.* (2008), *S. viridis* is widely distributed throughout Europe, except in the Iberian peninsula and northern Europe (Fig. 3). It inhabits mostly metapo-

tamal and epipotamal regions and regarding altitude preference it is mostly a species of plateaus (<300 m in high mountain ecoregions and <150 m in low mountain ecoregions). It prefers akal (fine to medium-sized gravel) and psammal (sand substrates). The emergence (flight period) is short (approximately <2 months).

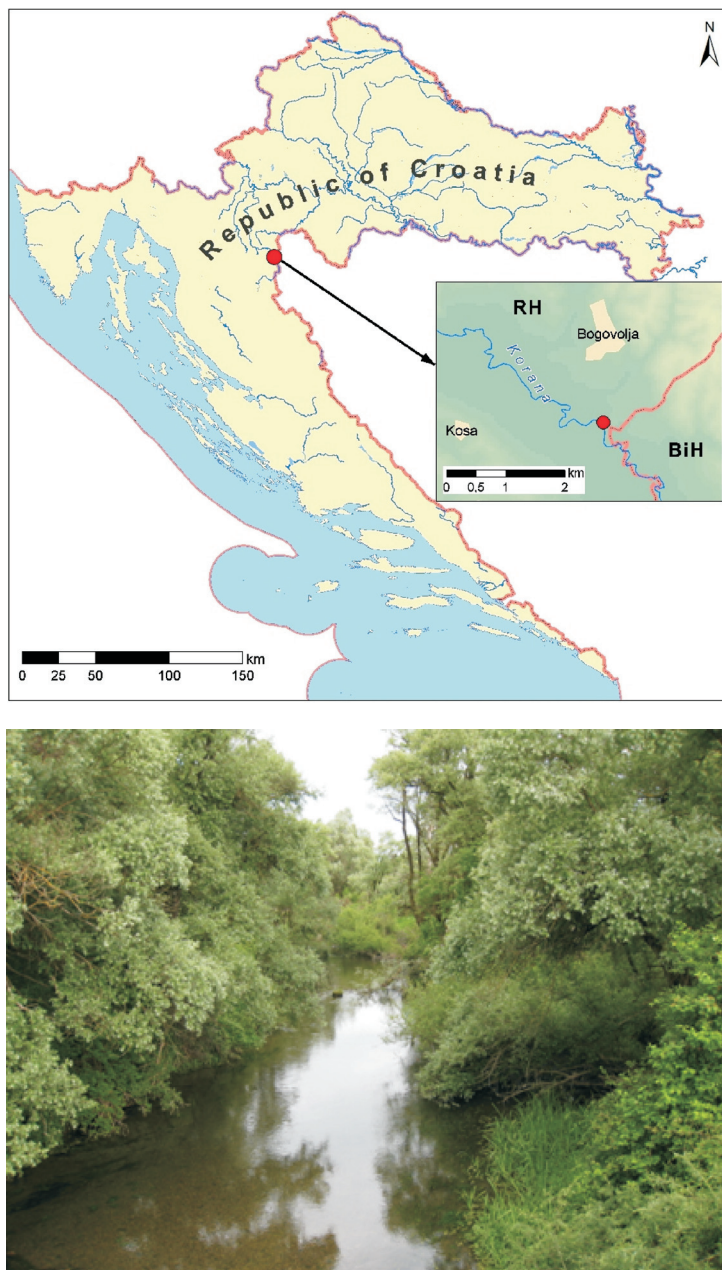


Fig. 1. a) a map of Croatia with a detail of studied area; b) the Korana River near Bogovolja



Fig. 2. (a) larva in the case; (b) lateral view of head and thorax; (c) dorsal view of head and thorax (d) ventral apotome of the head; (e) anal proleg

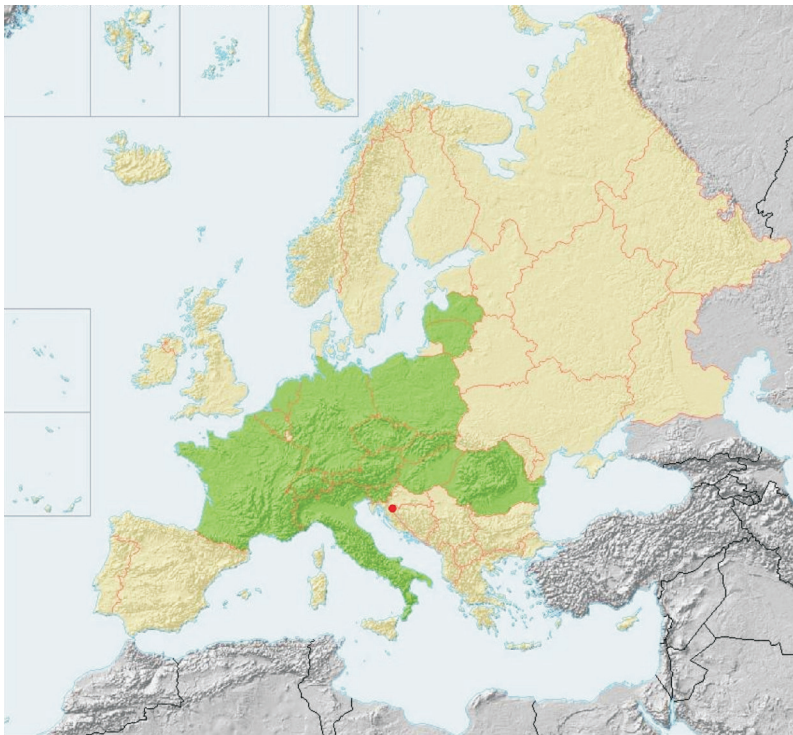


Fig. 3. Distribution of caddisfly *Setodes viridis* in Europe (green) (MALICKY & BARNARD, 2009) with the location of the first record in Croatia (red spot)

The values of 50% percentile of the most investigated physico-chemical parameters at the investigated location (pH = 8,0; COD-Mn = 2,4 mgO₂/l; BOD₅ = 1,4 mgO₂/l; ammonium = 0,04 mgN/l; total nitrogen = 1,026 mgN/l; ortophosphates = 0,0172 mgP/l;) indicate high water status while nitrates (0,768 mgN/l) and total phosphorous (0,0803 mgP/l) indicate good water status (NARODNE NOVINE, 73/13).

The saprobic index (PANTLE & BUCK, 1955) was calculated according to the saprobic indicator taxa list proposed by MIHALJEVIĆ *et al.* (2011) and later modified (Z. Mihaljević, personal communication, November 15, 2014). Saprobic index value was 1.93 which indicates the good water status of the sampling site (MIHALJEVIĆ *et al.*, 2011).

Some of the most frequent benthic macroinvertebrate taxa found together with *S. viridis* were *Simulium* sp., *Serratella ignita* (Poda 1761) and *Gammarus fossarum* Koch, in Panzer 1835. Caddisflies identified in this macroinvertebrate sample include *Cheumatopsyche lepida* (Pictet 1834), *Hydropsyche* sp., *Halesus digitatus* (von Paula Schrank 1781), *Athripsodes albifrons* (Linnaeus 1758), *Lepidostoma hirtum* (Fabricius 1775), *Ceraclea riparia* (Albarda 1874), *Leptocerus interruptus* (Fabricius 1775) and *Athripsodes cinereus* (Curtis 1834).

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SAŽETAK**Prvi nalaz tulara *Setodes viridis* (Fourcroy, 1785) (Insecta: Trichoptera) u Hrvatskoj**

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Fauna tulara u Hrvatskoj je samo djelomično istražena. Posljednjih 20-ak godina počinju detaljnija istraživanja (Plitvice, Krka, Cetina, Drava, Gorski kotar, Banovina, Papuk itd.) kojima su utvrđene nove vrste za faunu Hrvatske. U gornjem toku rijeke Korane kod mjesta Bogovolja 2013. godine prvi je put na području Republike Hrvatske zabilježena vrsta *Setodes viridis* (Fourcroy, 1785) iz porodice Leptoceridae. Vrsta je utvrđena na temelju prikupljenih ličinki.