

OCCURRENCE OF RARE CADDISFLY (TRICHOPTERA) SPECIES AT THE CATCHMENT AREA OF LAKE BALATON

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RITKA TEGZESFAJOK ELŐFORDULÁSA A BALATON VÍZGYŰJTŐJÉN (TRICHOPTERA)

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ABSTRACT: Although the caddisfly fauna of previously undiscovered regions in Hungary have adequately been explored, there are many regions (e.g. Great Hungarian Plain) and water types (e.g. backwaters of rivers, springs) whose caddisfly fauna is poorly known so far. In addition, occurrence of new species can be recorded in relatively well known regions as well. Although caddisfly fauna of catchment area of Lake Balaton is relatively well explored, during the most recent intensive faunistical investigations several rare and endangered caddisfly species were found. In this paper a compilation of formerly published results and new larval data are given on the following rare caddisfly species in Hungary: *Synagapetus krawanyi*, *Hydropsyche siltalai*, *Apatania muliebris*, *Limnephilus elegans*, *Silo nigricornis*, *Adicella reducta*, *Beraea maurus*.

Key words: endangered species, springs, *Synagapetus krawanyi*, *Hydropsyche siltalai*, *Apatania muliebris*, *Limnephilus elegans*, *Silo nigricornis*, *Adicella reducta*, *Beraea maurus*

KIVONAT: Habár a korábban kevésbé ismert hazai régiók tegzesfaunája mára már kielégítően feltárt, még mindig vannak olyan területek (pl.: Nagy Alföld) és víztér típusok (pl.: folyók holtágai, források), melyek tegzesfaunájáról igen kevés információval rendelkezünk. Emellett a viszonylag alaposan feltárt területeken is kerülnek elő új fajok. A Balaton vízgyűjtőjén a legújabb, intenzív faunisztikai munkáink során számos ritka és veszélyeztetett tegzesfaj új előfordulását sikerült kimutatni annak ellenére, hogy a terület tegzesfaunája jól ismertnek tekinthető. Dolgozatunkban átfogó irodalmi áttekintést adunk és új előfordulási adatokat közlünk az alábbi, hazánkban ritka tegzesfajokról: *Synagapetus krawanyi*,

Hydropsyche siltalai, *Apatania muliebris*, *Limnephilus elegans*, *Silo nigricornis*, *Adicella reducta*, *Beraea maurus*.

Kulcsszavak: veszélyeztetett fajok, források, *Synagapetus krawanyi*, *Hydropsyche siltalai*, *Apatania muliebris*, *Limnephilus elegans*, *Silo nigricornis*, *Adicella reducta*, *Beraea maurus*

Introduction

Until the end of 1970's the examination of the Hungarian caddisfly (Trichoptera) fauna was insufficient, with about 150 species recorded from Hungary by that time (NÓGRÁDI and UHERKOVICH 2002a). Furthermore caddisfly fauna of most regions of the country were poorly known or totally unknown. At the beginning of the 1980's, intensive collecting works were started, resulted in that 211 species are known from Hungary up to now (NÓGRÁDI and UHERKOVICH 2002a). Caddisfly fauna of previously undiscovered regions have adequately been explored and new important data have been available on ecology and distribution of many Hungarian species (NÓGRÁDI and UHERKOVICH 2002a). However, there are many regions (e.g. Great Hungarian Plain) and water types (e.g. backwaters of rivers, springs) whose caddisfly fauna is poorly known so far. In addition, occurrence of new species can be recorded in relatively well known regions as well.

The majority of our knowledge on the Hungarian caddisfly fauna is based on collection of imagines (NÓGRÁDI and UHERKOVICH 2002a and see other references in the mentioned publication), and few faunistical investigations were carried out on the basis of larvae (e.g. MÓRA and CSABAI 2002a, 2002b; MÓRA et al. 2006). It was caused by the lack of useful and exact identification keys for larvae. Collection of imagines can be no representative for individual waters, because the specimens captured by light traps could come far from their larval habitats. Thus collection of larvae is important when the aim is to explore the caddisfly fauna of an individual water (and not only a certain area). Of course, the collection of larvae is not adequate to all aspects. Larvae of some species are not distinguishable by morphological characters, and fewer species can be found arising from the nature of the method (SCHMERA and KISS 2000). Despite of these deficiencies, investigations on larvae is most appropriate to explore the accurate distribution of a certain species.

Caddisfly fauna of catchment area of Lake Balaton is relatively well explored based on collecting adults (NÓGRÁDI and UHERKOVICH 1994) as well as larvae (KÁLMÁN et al. 2006; MÓRA et al. 2007, 2008). During the most recent intensive faunistical investigations several rare and endangered caddisfly species were found in this region. Distributional data for *Hydropsyche siltalai* and *Limnephilus elegans* were already published (MÓRA et al. 2007, 2008), but due to the rarity of these species we also emphasize their occurrence in this work.

Materials and methods

Caddisfly larvae were captured by pond-net and manual selection during faunistical investigations between 2006 and 2008. Furthermore, quantitative samplings were carried out according to the AQEM protocol (AQEM CONSORTIUM

2002; HERING et al. 2004) in 2007 and 2008. Keys by WALLACE et al. (1990) and WARINGER and GRAF (1997) were used for identification of larvae. Distributional and ecological informations are given for all species on the basis of NÓGRÁDI and UHERKOVICH (2002a) and GRAF et al. (2002).

In Table 1 names of sampling sites are given with their administrative units in brackets, the accurate geographical co-ordinates (WGS-84) and the 10×10 km UTM-grid codes. In cases of some geographical terms we left the original Hungarian form for the localities being more identifiable: árok = valley, erdészet = forestry, forrás = spring, gátőrház = dike watchman's house, hegy = mount/hill, kert = garden, kút = spring, part(ja) = bank, patak = stream, víz = stream, völgy = valley.

All known literature data are given with the localities and the publications where they were mentioned. New records are given as follows: localities (with administration unit), date of sampling, total number of individuals and abbreviations of collectors' names in alphabetical order: IK – Katalin IHÁSZ, MA – Arnold MÓRA, SzA – András SZIVÁK, SzI – Ildikó SZIVÁK, except in cases of *Hydropsyche siltalai* and *Limnephilus elegans*.

Table 1. Sampling sites for new records at the catchment area of Lake Balaton with exact geographical co-ordinates (WGS-84) and 10×10 km UTM grid codes

Name of the sampling sites	Lat. (N)	Lon. (E)	UTM
1. Örvényesi-séd, Zádor-hegy (Pécsely)	46°58'14"	17°46'34"	YN 10
2. Széles-forrás (Monostorapáti)	46°56'06"	17°35'02"	XN 90
3. Tetves-patak (Védapuszta)	46°36'11"	17°48'22"	YM 16
4. Zádor-kút (Pécsely)	46°58'31"	17°46' 6"	YN 10
5. Zala (Csöde)	46°50'21"	16°32'30"	XM 18
6. Zala (Pókaszeptek)	46°55'21"	16°58'15"	XM 59
7. Zala (Zalaegerszeg)	46°51'02"	16°50'44"	XM 49
8. Zala (Zalalövő)	46°50'57"	16°37'36"	XM 18
9. Zala (Zalaszentgyörgy)	46°52'10"	16°42'43"	XM 29
10. Zala, Szentgrót (Zalaszentgrót)	46°56'33"	17°04'16"	XN 50
11. Zala, Zalakoppány (Zalaszentgrót)	46°53'15"	17°05'14"	XM 59

Results

Synagapetus krawanyi (Ulmer, 1938)

Literature data: Kisújbánya: Pásztor-forrás, Vár-völgy (NÓGRÁDI 1984, 1987b); Kőszeg: Hármás-patak (NÓGRÁDI and UHERKOVICH 1989); Magyaregregy: Egregyi-völgy (UHERKOVICH and NÓGRÁDI 2006); Óbánya (NÓGRÁDI 1987b; NÓGRÁDI and UHERKOVICH 1991); Pécs: Melegmányi-völgy, Nagy-Mély-völgy (UHERKOVICH and NÓGRÁDI 2006); Vékény: Iharos-kút, Vár-völgy (NÓGRÁDI 1984, 1987b; UHERKOVICH and NÓGRÁDI 2006); Velem: Hosszú-völgy, Szent-Vid-patak (NÓGRÁDI and UHERKOVICH 1989).

New record: Széles-forrás (Monostorapáti): 20/04/2008, 8I, IK-MA-SzI.

Synagapetus krawanyi has narrow distribution in Europe occurring in Eastern Alps and Southern Europe. Hungarian populations show southeastern Alpine connection with the most southeastern occurrence in Mecsek Mountains. Previously no data were known between the Alps (Kőszegi Mountains) and Mecsek Mountains (Fig. 1). Larvae live in xeno- and oligosaprobic springs and small brooklets. *S. krawanyi* is regarded as endangered caddisfly species in Hungary (NÓGRÁDI and UHERKOVICH 1999, 2002a).

***Hydropsyche siltalai* Döhler, 1963**

Literature data: Bükkösd: Szentdomján (UHERKOVICH and NÓGRÁDI 2006); Dobri: Kerka (UHERKOVICH 2004); Gyepükaján: Meleg-víz (UHERKOVICH and NÓGRÁDI 1999); Káptalanfa: Kígyós-patak (UHERKOVICH and NÓGRÁDI 1999); Kercaszomor: Kerka (UHERKOVICH 2004); Kőszeg: Chernel-kert, Keresztkút, Malom-árok (NÓGRÁDI 1988; NÓGRÁDI and UHERKOVICH 1992); Magyarföld: Kerka (UHERKOVICH 2004); Nagyvisnyó: Nagy-völgy (KISS 1991; KISS et al. 2002a; NÓGRÁDI et al. 1996); Órtilos: Dráva-part, (UHERKOVICH 2005); Szalafő (NÓGRÁDI and UHERKOVICH 1994); Szentpéterfőlde: Erdészet, Szécsisziget: Kerka (NÓGRÁDI and UHERKOVICH 2002b); Velem (NÓGRÁDI 1988); Vízvár: Dráva-part (UHERKOVICH 2005).

New records: Zala [Pókaszepek, Zalaegerszeg, Zalaölvő, Zalaszentgyörgy, Szentgrót (Zalaszentgrót), Zalakoppány (Zalaszentgrót)] (for details see MÓRA et al. 2008)

Hydropsyche siltalai is widely distributed in Europe, but only sporadic data are known from Eastern and Central Europe. In Hungary, it occurs mostly in the Transdanubian region, where can locally be frequent (Fig. 2). Some records are known from Bükk Mountains as well. Larvae of *H. siltalai* live in oligo- and mesosaprobic streams. In Hungary, *H. siltalai* belongs to endangered species (NÓGRÁDI and UHERKOVICH 1999, 2002a). However, according to our recent investigations, *H. siltalai* seems to be a dominant *Hydropsyche* species in the middle reaches of Zala River (see MÓRA et al. 2008).

***Apatania muliebris* McLachlan, 1866**

Literature data: Kám: Jeli Arborétum (NÓGRÁDI 1994).

New records: Zádor-kút (Pécsely): 04/10/2006 – 19/10/2007, 150l, SzA-Szl.

Apatania muliebris is a parthenogenetic species due to only females are known. Several forms and subspecies were described for this morphologically various species, sometimes under synonymic species names (BARNARD and O'CONNOR 1987; SOLEM 1985). It is widely distributed in Northern Europe and the Alps, with the localities in Tyrol (Austria) being closest to Hungary. In Hungary, three females were previously captured at 'Hét-forrás' spring of the Jeli Arborétum, near Kám village (NÓGRÁDI 1994) (Fig. 3). SÁTORI (1939) mentioned *Apatania fimbriata* (Pictet, 1834) from a spring near Balatonhenye, but voucher specimens for this species are not available. However, this old data likely apply to *A. muliebris*. JUHÁSZ and KOVÁCS (1997) recorded *A. muliebris* from Jósza (Szinpetri, NE Hungary), but no voucher specimens are available for this record. Due to the conditions of the collecting sites, *A. muliebris* could unlikely occur in that stream. Larvae live in cool, unpolluted springs with permanent temperature and low concentrations of inorganic ions and organic matter. In early spring, larvae of this species were found in "Zádor-kút" spring (near Pécsely) in high abundance. *A. muliebris* is a postglacial relict, endangered species and protected by law in Hungary (NÓGRÁDI and UHERKOVICH 1999, 2002a).

***Limnephilus elegans* Curtis, 1834**

Literature data: Bükk-hegység: Disznókút (KISS 1978a, 1978b, 1979; KISS et al. 2003); Győrzámoly: Duna, Patkányosmajor, gátórház (NÓGRÁDI 1994); Lipótfő (NÓGRÁDI 1988); Magyarszombatfa (UJHELYI 1981, NÓGRÁDI 1986).

New record: Tetves-patak (Vadépuszta) (see MÓRA et al. 2007).

Limnephilus elegans is a widespread species in Western and Northern Europe, with its most eastern occurrence in Hungary. It was firstly reported as larvae from Bükk Mountains, NE Hungary (KISS 1978a), while adults were collected in the same year from a *Sphagnum* swamp at Magyarszombatfa, W Hungary (UJHELYI 1981) (Fig. 4).

Habitats of the species are vulnerable such *L. elegans* is endangered and protected by law in Hungary (NÓGRÁDI and UHERKOVICH 1999, 2002a).

***Silo nigricornis* (Pictet, 1834)**

Literature data: Felsőtárkány: Egeres-völgy, Toldi-kút, Vörös-kő-völgy, (KISS 1984a, 1984b, 1991; NÓGRÁDI et al. 1996); Gyepükaján: Meleg-víz (UHERKOVICH and NÓGRÁDI 1999); Halászi: Mosoni-Duna partja (UHERKOVICH and NÓGRÁDI 2004); Lillafüred: Garadna-patak (SÁTORI 1938); Parádfürdő: Ilona-völgy (KISS 1980, 1981); Püski: Zátunyi-Holt-Duna (NÓGRÁDI 2001); Szigetköz: Cikolasziget, gátórház (UHERKOVICH and NÓGRÁDI 2003); Vízvár: Dráva part (NÓGRÁDI 2001, NÓGRÁDI and UHERKOVICH 2001).

New record: Széles-forrás (Monostorapáti): 20/04/2008, 1I, IK-MA-Szl.

Silo nigricornis can be found all over the Palaearctic region, but sporadically distributed in Central Europe. It is a rare caddisfly species in Hungary (Fig. 5), but can locally be relatively frequent (UHERKOVICH and NÓGRÁDI 2003). Larvae of *S. nigricornis* inhabit hypocrenal and rithral zones of streams. According to its rarity and vulnerable habitats, *S. nigricornis* is regarded as endangered species in Hungary (NÓGRÁDI and UHERKOVICH 1999, 2002a).

***Adicella reducta* (McLachlan, 1865)**

Literature data: Aszófő (UJHELYI 1971); Kercaszomor: Kerca (UHERKOVICH 2004).

New record: Zala (Csöde): 30/07/2008, 3I, AQEM.

Adicella reducta is widely distributed in Europe, but true rarity in Hungary due to only two adult males have been captured so far (UHERKOVICH 2004, UJHELYI 1971) (Fig. 6). *Adicella reducta* was also mentioned in some other publication (NÓGRÁDI 1989b, NÓGRÁDI and UHERKOVICH 1989, NÓGRÁDI 1995), but due to a revision, all of these specimens proved to be *Adicella filicornis* (Pictet, 1834) (see NÓGRÁDI and UHERKOVICH 2002a). *A. reducta* larvae live in oligo- and β -mesosaprobic, cobble covered mountain streams. According to its rarity, conservation status of the species has been unknown (NÓGRÁDI and UHERKOVICH 1999, 2002a), but the new larval record suggests that *A. reducta* is an endangered species in Hungary.

***Beraea maurus* (Curtis, 1834)**

Literature data: Bükk-hegység: Hárskút, Répáshutai-forráspatak (KISS 1979); Jósvalő: Nagy-Tohonya-forrás (OLÁH 1967); Kőszeg: Hármás-patak, Hét-forrás (NÓGRÁDI and UHERKOVICH 1989, 1992); Mátraháza (NÓGRÁDI 1989a); Szilvásvár: Szalajka-völgy (KISS 1991; KISS et al 2002a, 2002b; NÓGRÁDI et al. 1996); Szőce (NÓGRÁDI 1987a, 1989b).

New records: Örvényesi-séd, Zádor-hegy (Pécsely): 04/10/2006 – 19/10/2007, 64I, SzA-Szl.

Beraea maurus is a widespread species in Europe, but rare in Hungary, especially in the Transdanubian region (Fig. 7). During our investigations, larvae were collected in relatively high abundance at upper reaches of Örvényesi-creek (near Pécsely), in late spring and early summer. Larvae of this species prefer xeno- and oligosaprobic waters in eucrenal and hypocrenal regions of streams. *B. maurus* belongs to endangered species in Hungary (NÓGRÁDI and UHERKOVICH 1999, 2002a).

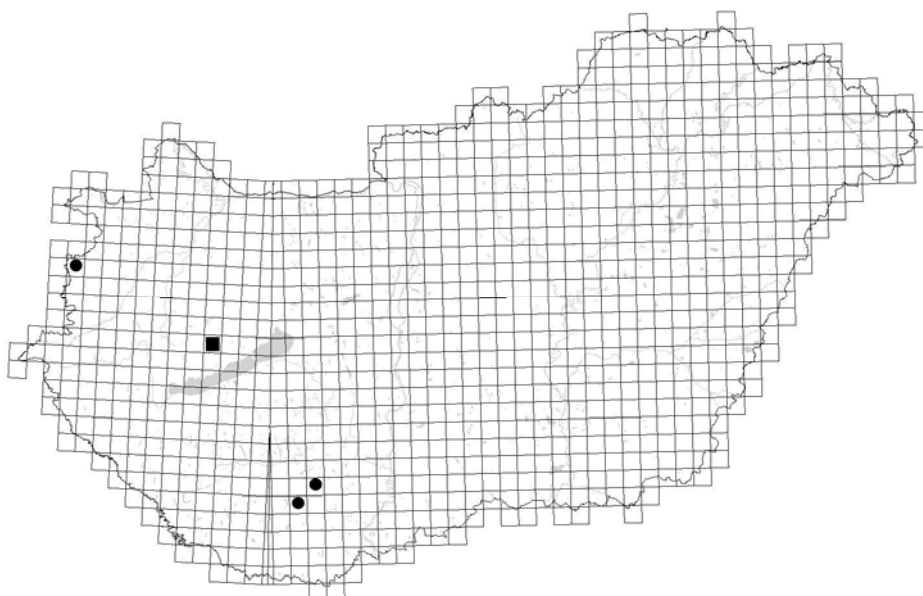


Fig. 1. Distribution of *Synagapetus krawanyi* (Ulmer, 1938) in Hungary (point: literature data, square: new data)

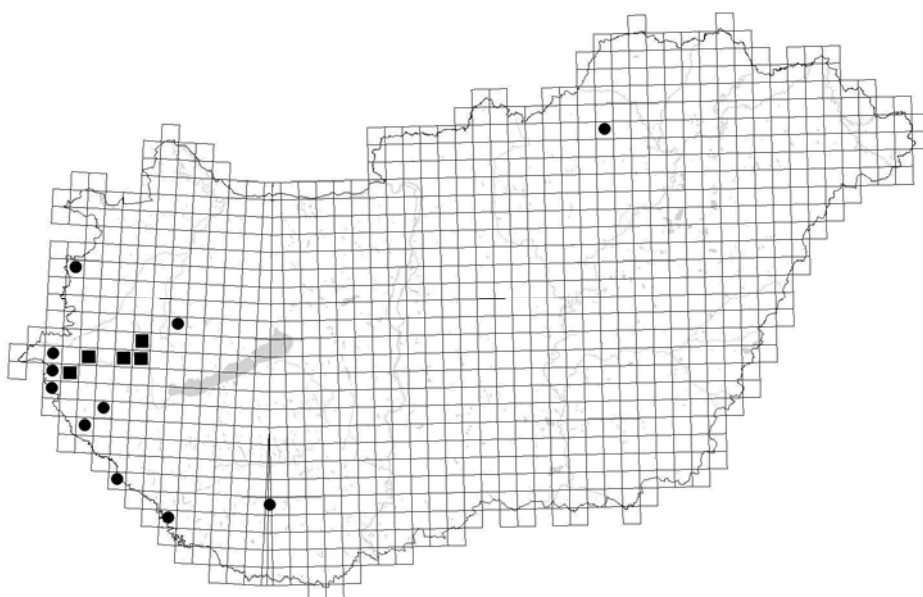


Fig. 2. Distribution of *Hydropsyche siltalai* Döhler, 1963 in Hungary (point: literature data, square: new data)

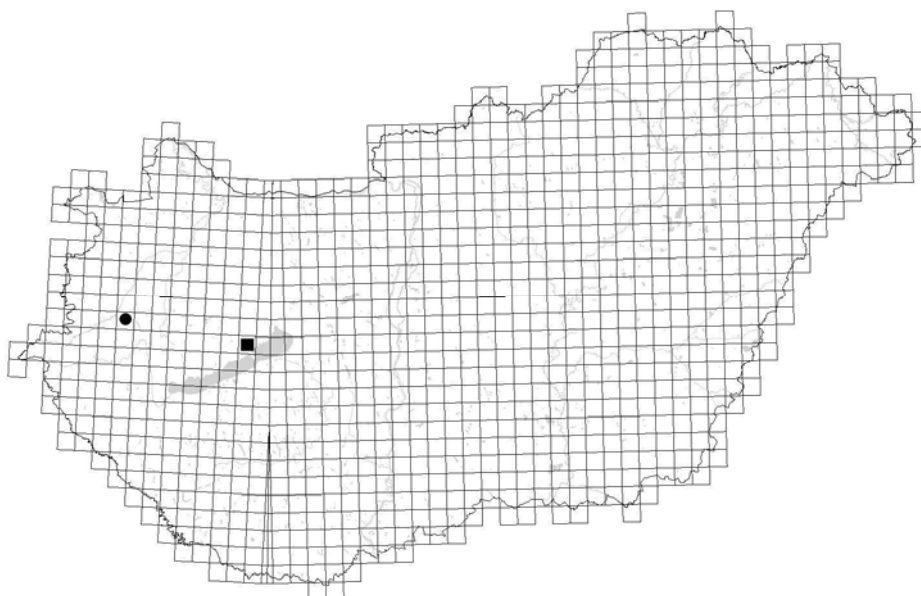


Fig. 3. Distribution of *Apatania muliebris* McLachlan, 1866 in Hungary (point: literature data, square: new data)

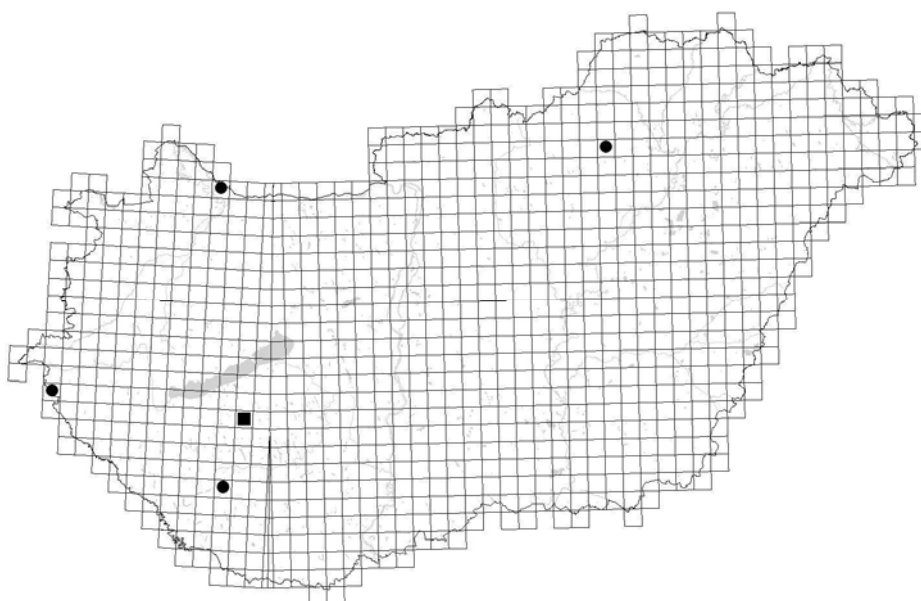


Fig. 4. Distribution of *Limnephilus elegans* Curtis, 1834 in Hungary (point: literature data, square: new data)

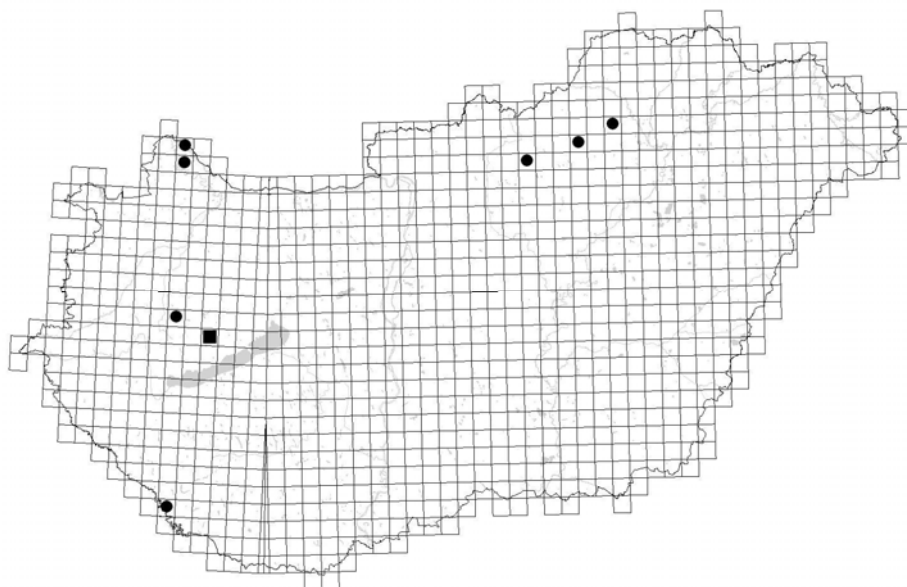


Fig. 5. Distribution of *Silo nigricornis* (Pictet, 1834) in Hungary (point: literature data, square: new data)

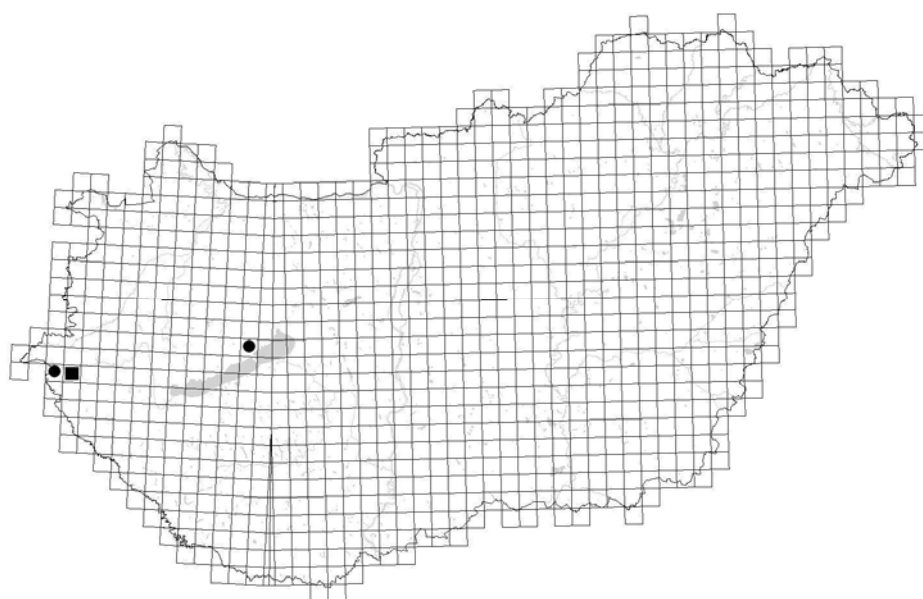


Fig. 6. Distribution of *Adicella reducta* (McLachlan, 1865) in Hungary (point: literature data, square: new data)

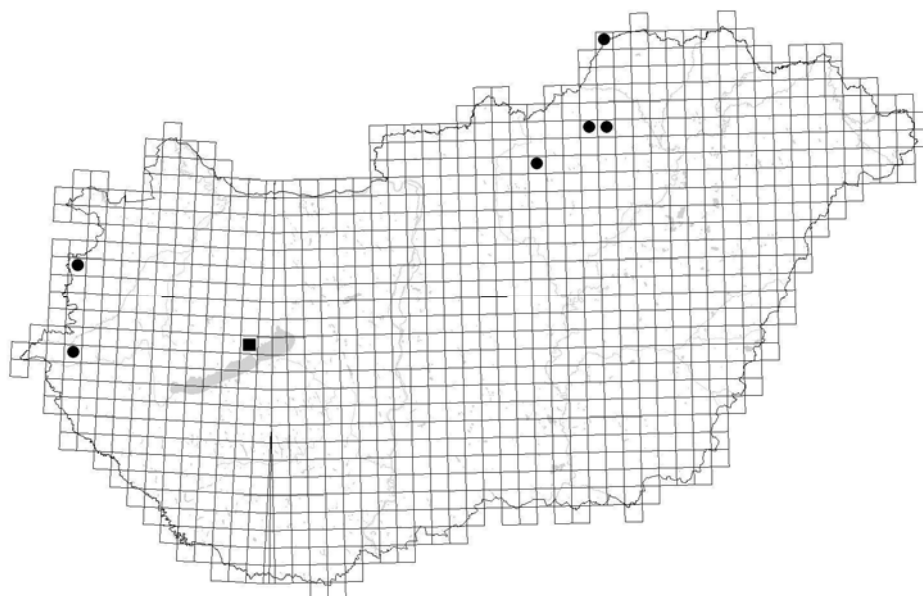


Fig. 7. Distribution of *Beraea maurus* (Curtis, 1834) in Hungary (point: literature data, square: new data)

Discussion

All examined species are sporadically distributed in Hungary. It is likely due to a narrow range of environmental factors are suitable for them (NÓGRÁDI and UHERKOVICH 2002a, GRAF et al. 2002). However, our knowledge on ecology of these species is still poor and needs further investigations. In all probability small and vulnerable populations of these species can only be found in Hungary, such all new records are essential information for conservation of these caddisflies. Four of the seven species were captured in and/or at very close to springs. The springs with their cool and clear water and low trophical status represent special habitats and are rather different from the other sections of streams (VANNOTE et al. 1980). Although springs are characterized by unique assemblages, as it is also suggested by the new records of the rare and specialized caddisfly species, but they are inadequately investigated in Hungary. Springs are vulnerable habitats, such further investigations on them are very important tasks for future hydrobiological studies.

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