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Psammophilous Ephemeroptera and Plecoptera in Hungary

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ABSTRACT: Hungarian locality data of psammophilous species of Ephemeroptera (*Ametropus fragilis*, *Cercobrachys minutus*, *Procloeon macronyx*, *Pseudocentroptiloides nana*) and Plecoptera (*Isoptena serricornis*) are summarized and mapped, with comments on threats of the species and their habitats. With one figure.

Introduction

While *Ametropus fragilis* Albarda, 1878 is known from Hungary for more than a century (MOCSÁRY 1900), *Procloeon macronyx* Kluge et Novikova, 1992, *Pseudocentroptiloides nana* (Bogoescu, 1951) and *Cercobrachys minutus* (Tshernova, 1952) were found in the country int he last 15 years (KOVÁCS et al. 1998, 2002b). The first specimen of *Isoptena serricornis* (Pictet, 1841) in Hungary was collected in 1970 (WEINZIERL et al. 2001). Further psammophilous European mayfly species such as *Behningia ulmeri* Lestage, 1930 and *Oligoneurisca borysthenica* (Tshernova, 1937) were found in the Latorica river in Slovakia as a locality situated closest to Hungary (SOLDÁN 1981), and *Baetopus wartensis* Keffermüller, 1960 was recorded from the Warta river in Poland (GŁAZACZOW 2004).

Information on biology and distribution of Hungarian psammophilous mayflies and *Isoptena serricornis* are found in GŁAZACZOW (1997, 1998, 1999, 2004) and ZWICK & HOHMANN (2005).

Results

Ametropus fragilis Albarda, 1878

Literature data – KOVÁCS (2005): FU12, XN10, XN20, XN31; KOVÁCS (2006a): EU74, FU12, FU20, XN00, XN10, XN21; KOVÁCS (2006b): FU12, XN00; KOVÁCS (2009): DS35, FU12, FU20, XN31; KOVÁCS & AMBRUS (2001): WN90, XN00, XN10, XN20, XN21, XN31, XN43, XN87; KOVÁCS et al. (1999): BR87, FU12; KOVÁCS et al. (2001): EU93, EU95, FU03, FU12, FU32; KOVÁCS et al. (2002b): DS32, DS35, DT77, EU64, EU85, EU93, EU95, FU03, FU12, FU22; KOVÁCS et al. (2003): BR87, DS32, DS35, DS51, DS61, DT77, EU55, EU85, FU12, XN10, XN20; MÓRA et al. (2005): FU12.

Records of adults are from Budapest (MOCSÁRY 1900) and from Drávasztára, Vejti and Bélavár along the Dráva river (SZIRÁKI 1995, 1998). Larvae are known from the following water courses: Bodrog (KOVÁCS et al. 2003), Dráva (KOVÁCS et al. 1999, 2003), Lapincs (KOVÁCS & AMBRUS 2001), Maros (KOVÁCS et al. 2003), Rába (KOVÁCS 2005, 2006a, 2009, KOVÁCS & AMBRUS 2001, KOVÁCS et al. 2003), Szamos (KOVÁCS 2006a, 2009), Tisza (KOVÁCS 2005, 2006ab, 2009, KOVÁCS et al. 1999, 2001, 2002b, 2003, MÓRA et al. 2005).

Procloeon macronyx Kluge et Novikova, 1992

Literature data – KOVÁCS (2005): FU12, FU32; KOVÁCS (2006a): EU33, EU86, FU12, FU33; KOVÁCS (2009): ES27, EU32, EU32, EU55, EU85, XN20; KOVÁCS & AMBRUS (2002) sub nomen *Centroptilum nanum* Bogoescu,

1951: XN20; KOVÁCS et al. (1998) sub nomen *Pseudocentroptilum nanum* (Bogoescu, 1951): YL08; KOVÁCS et al. (2001) sub nomen *Procloeon nana* (Bogoescu, 1951): FU12, FU22; KOVÁCS et al. (2002a) sub nomen *Centroptilum nanum* Bogoescu, 1951: CU30; KOVÁCS et al. (2002b) sub nomen *Centroptilum nanum* (Bogoescu, 1951): EU11, EU33, EU43, EU54, EU64, EU75, EU85, FU12; KOVÁCS et al. (2003): DS37, DS51, DS71, DU92, ET09, EU43, EU85, EU93, FU03, FU12, FU32.

Larvae are known from the following water courses: Bodrog (KOVÁCS 2009), Dráva (KOVÁCS et al. 1998), Fekete-Körös (KOVÁCS 2009), Hármas-Körös (KOVÁCS et al. 2003), Hernád (KOVÁCS et al. 2003), Ipoly (KOVÁCS et al. 2002a), Maros (KOVÁCS et al. 2003), Rába (KOVÁCS 2009, KOVÁCS & AMBRUS 2002), Tisza (KOVÁCS 2005, KOVÁCS 2006a, 2009, KOVÁCS et al. 2001, 2002b, 2003).

Pseudocentroptiloides nana (Bogoescu, 1951)

Literature data – KOVÁCS & sr. KOVÁCS (2006) sub nomen *Centroptilum nanum* Bogoescu, 1951: CU72; KOVÁCS et al. (2002b) sub nomen *Pseudocentroptiloides shadini* (Kazlauskas, 1964): EU85.

Larvae are known from the following water courses: Ipoly (KOVÁCS & sr. KOVÁCS 2006), Tisza (KOVÁCS et al. 2002b).

Cercobrachys minutus (Tshernova, 1952)

Literature data – KOVÁCS (2005) sub nomen *Brachycercus minutus* Tshernova, 1952: FU12; KOVÁCS (2006a) sub nomen *Brachycercus minutus* Tshernova, 1952: EU53, EU74, EU85, FU12, XN10, XN20, XN98; KOVÁCS (2006b) sub nomen *Brachycercus minutus* Tshernova, 1952: DS51; KOVÁCS (2009) sub nomen *Brachycercus minutus* Tshernova, 1952: DU92, EU85, XN31, XN56, XN87 (the record of "Tiszabecs: Batár torkolat, Tisza, 16.04.2007, 1, KT" is erroneous, it is based on the misinterpretation of the abbreviation of Bm; in fact, it refers to *Baetis muticus* (Linnaeus, 1758)); KOVÁCS & AMBRUS (2001): XN10, XN21, XN31, XN42, XN43, XN65, XN75, XN87; KOVÁCS & AMBRUS (2002): XN20; KOVÁCS et al. (1998) sub nomen *Brachycercus minutus* Tshernova, 1952: BR87, FU12; KOVÁCS et al. (2001): FU12; KOVÁCS et al. (2002b): EU64, EU85, EU93, EU95, FU03, FU12; KOVÁCS et al. (2003) sub nomen *Brachycercus minutus* Tshernova, 1952: BR77, DS51, DS61, DU92, EU55, EU64, EU85, EU93, FU03, FU12, FU32, XN10, XN20, XN31; MÓRA et al. (2005) sub nomen *Brachycercus minutus* Tshernova, 1952: DS51.

It is known from the following water courses: Bodrog (KOVÁCS et al. 2003), Dráva (KOVÁCS et al. 1998, 2003), Hernád (KOVÁCS 2009, KOVÁCS et al. 2003), Kis-Rába (KOVÁCS 2009), Maros (KOVÁCS 2006b, KOVÁCS et al. 2003, MÓRA et al. 2005), Rába (KOVÁCS 2006a, 2009, KOVÁCS & AMBRUS 2001, 2002, KOVÁCS et al. 2003), Tisza (KOVÁCS 2005, KOVÁCS 2006a, 2009, KOVÁCS et al. 1998, 2001, 2002b, 2003).

Isoptena serricornis (Pictet, 1841)

Literature data – KOVÁCS et al. (2002c): YL37; UJHELYI (1979): CT45; WEINZIERL et al. (2001): EU43.

Adults are known from the following water courses: Dráva (KOVÁCS et al. 2002c), Duna (UJHELYI 1979), Tisza (WEINZIERL et al. 2001).

DISCUSSION

Distribution of the 199 records (196 of Ephemeroptera larvae and 3 Plecoptera adults) is the following: *Ametropus fragilis* Albarda, 1878 – 82 data, 7 water courses; *Procloeon macronyx* Kluge et Novikova, 1992 – 47 data, 9 water courses; *Pseudocentroptiloides nana* (Bogoescu, 1951) – 2 data, 2 water courses; *Cercobrachys minutus* (Tshernova, 1952) – 65 data, 7 water courses; *Isoptena serricornis* (Pictet, 1841) – 3 data, 3 water courses.

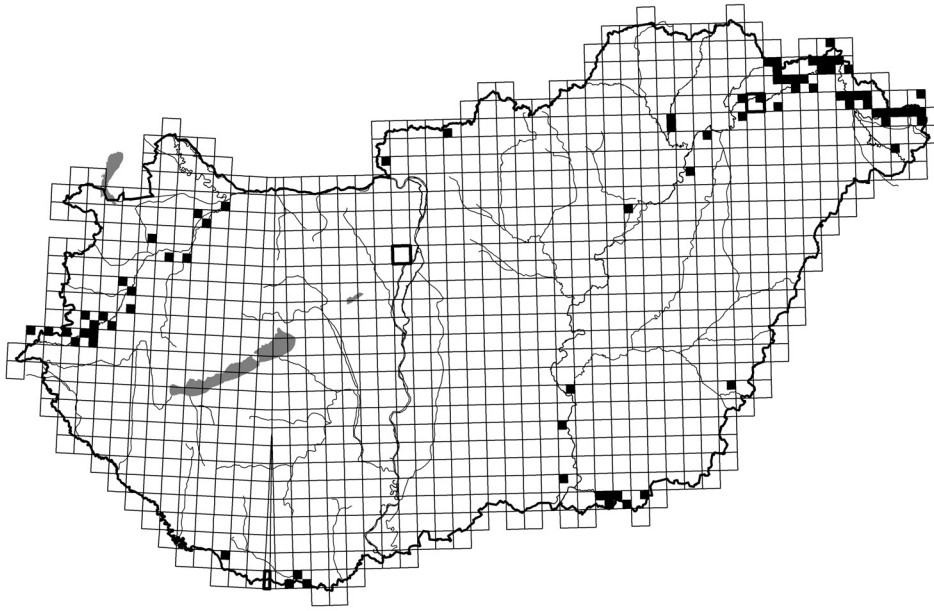

Fig. 1. Hungarian localities of larvae of *Ametropus fragilis* (top left), *Procloeon macronyx* (top right), *Pseudocentroptiloides nana* (bottom left) *Cercobrachys minutus* (bottom right) and adults of *Isoptena serricornis* (dark frame)

Table 1. Occurrences of psammophilous Ephemeroptera and Plecoptera in Hungarian water courses. O = data of adults older than 50 years, O?= data of adults older than 30 but not older than 50 years, + = data of larvae not older than 30 years

	Bodrog	Dráva	Duna	Fekete-Körös	Hármas-Körös	Hernád	Ipoly	Kis-Rába	Lapincs	Maros	Rába	Szamos	Tisza
A. fragilis	+	+	O	–	–	–	–	–	+	+	+	+	+
P. macronyx	+	+	–	+	+	+	+	–	–	+	+	–	+
P. nana	–	–	–	–	–	–	+	–	–	–	–	–	+
C. minutus	+	+	–	–	–	+	–	+	–	+	+	–	+
I. serricornis	–	+	O?	–	–	–	–	–	–	–	–	–	+

Table 2. Monthly distribution of collecting data of Ephemeroptera larvae. * = no sampling occurred

	I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**XI**	**XII**
Ametropus fragilis	1	10	11	14	3			11	13	13	6	*
Procloeon macronyx					1	15	5	15	10	1		
Pseudocentroptiloides nana						1		1				
Cercobrachys minutus						15	2	26	14	7	1	

The Hungarian localities are shown in Fig. 1. The water courses in which the species were found are listed in Table 1. Monthly distribution of collecting data of mayfly larvae are summarized in Table 2. The Tisza is the only river in Hungary where all the five psammophilous species occur sympatrically, but this is true only for a certain strech, from Tuzsér to Tiszabercel. Four species occur in the Dráva, and three in the Bodrog, the Maros and the Rába. *Ametropus fragilis* is extinct in the Danube, and the last record of *Isoptena serricornis* from the Danube is more than 40 years old. The monthly distribution of collecting data of Ephemeroptera larvae corresponds almost completely with the situation in Poland (cf. GŁAZACZOW 2004).

Regression of the psammophilous species is apparent from the second half of the 20th century. Causes include habitat destructions by river regulation and biological and chemical deterioration of water because of pollution. Uniquely in Europe, in the 1960s all the seven psammophilous mayfly species occurred in the Warta river, but no one is present today (GŁAZACZOW 1999). *Behningia ulmeri* is not found since 1979. So, it is understandable that psammophilous species appear in Red Lists of several countries, cf. FIAŁKOWSKI & SOWA (2002), KŁONOWSKA-OLEJNIK (2002, 2004), KRNO (1996, 2000), REUSCH & WEINZIERL (1998), RUSSEV (1992), SOLDÁN et al. (1998). In Poland, all mayfly species occurring also in Hungary are listed as endangered.

The Polish fauna of psammophilous mayflies is the richest in Europe (cf. GŁAZACZOW 1999, 2004, GŁAZACZOW et al. 2009). Recent studies show that Lithuania (cf. KOVÁCS et al. 2008) and Hungary play an important role in conservation of psammophilous species and their habitats. However, further research is needed even in these countries, not to mention regions of Eastern Europe, which seem to be very important on the basis of earlier records but lack fresh data.

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