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Baetis calcaratus Keffermüller, 1972 new to Hungary, with notes on the distribution of *Baetis tricolor* Tshernova, 1928 (Ephemeroptera: Baetidae)

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Abstract: Applying a new test method, the pharate larvae can be identified to the species level in the case of *Baetis calcaratus* and *B. tricolor*. Re-examination of previously collected materials brought the result that, in addition to *B. tricolor*, *B. calcaratus* also occurs in Hungary. It is a new species in the Hungarian Ephemeroptera fauna, which is now consists of 99 species. Some Lithuanian specimens of the two species are also enumerated.

Introduction

Five species of the subgenus *Baetis* (*Labiobaetis*) are currently known in Europe: *B. atrebatinus*, *B. balcanicus*, *B. calcaratus*, *B. neglectus* and *B. tricolor* (Jacob 2003, Bauernfeind & Soldán 2012). For Central Europe, only *B. calcaratus* and *B. tricolor* have been taken into account by Bauenfeind & Humpesh (2001). The first Hungarian data on *B. tricolor* was reported by Kovács et al. (2001a). In addition, the following articles details the Hungarian distribution of the species, housed in the collection of the Mátra Museum of the Hungarian Natural History Museum (Gyöngyös, Hungary): Kovács 2005, 2006bc, Kovács & Ambrus 2001, 2002, Kovács et al. 2001b, 2002ab, 2003.

Material and methods

The examined material of the Mátra Museum of the Hungarian Natural History Museum (Gyöngyös, Hungary) contains larvae in different stages of development. To distinguish *Baetis calcaratus* and *B. tricolor* from the other European species of the subgenus *Labiobaetis,* the bristles on the ventral side of the labrum were taken into account. The examined material showed the typical 1+3 to 5 patterns characteristic for *B. calcaratus* and *B. tricolor* (Müller-Liebenau 1969, Jacob 2003).

The distinction between the larvae of *B. calcaratus* and *B. tricolor* is possible only in case of pharate last instar. Accordingly, the exuviae of the hind wingpad of the larvae have to be dissected and the presence of a processus costalis controlled: it can be detected in *B.calcaratus* (Fig. 1, 2: Pc = Processus costalis), while it is missing in *B. tricolor* (Keffermüller 1972, Jacob 2003, Bauernfeind & Humpesch 2001, Bauernfeind & Soldán 2012).

Fig. 1. *Baetis calcaratus*, larval hind wing pad; Pc = Processus costalis

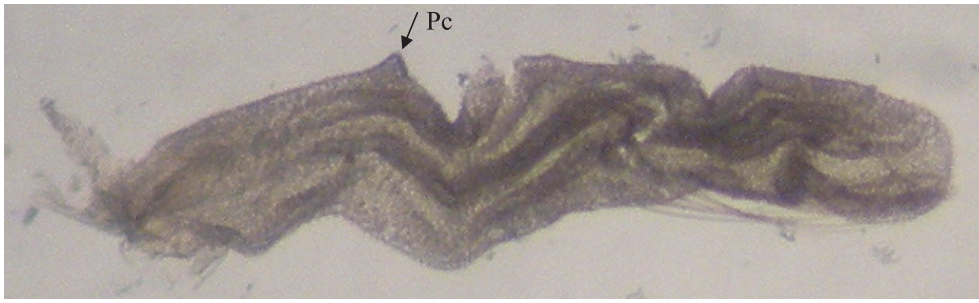

Fig. 2. *Baetis calcaratus*, nymphal hind wing dissected from exuvia; Pc = Processus costalis

Revised data

Baetis calcaratus Keffermüller, 1972

Kovács & Ambrus (2001), sub nomen *Baetis tricolor* Tshernova, 1928:
Körmend: road number 86, Rába, 01.07.1999, 5, AA, KBZs, KT > **1** ♂**, 3** ♀
Szentgotthárd: Lapincs, 01.07.1999, 1, AA, KBZs, KT > **1** ♀

Baetis tricolor Tshernova, 1928

Kovács et al. (2001a):
Kiszombor: Route No. 43, Maros, DS51, 01.09.1997, 1, P. Juhász, B. Kiss, T. Kovács, P. Olajos > **1** ♂
Molnaszecsőd: Road to Döröske, Rába, XN21, 18.08.1998, 7, A. Ambrus, T. Kovács > **3** ♂**, 3** ♀
Nagylak: Maros, DS71, 01.09.1997, 1, P. Juhász, B. Kiss, T. Kovács, P. Olajos > **1** ♀
Rábahídvég: Route No. 8, Rába, XN31, 18.08.1998, 2, A. Ambrus, T. Kovács > **1** ♂
Szatmárcseke: Túrbukó, Tisza, FU22, 27.09.1995, 1, K. Bánkuti, P. Juhász, T. Kovács > **1** ♀
Tarpa: 710 river km, Tisza, FU12, 06.06.1996, 4, T. Kovács > **2** ♀

Tiszabecs: Mázsáló, Tisza, FU33, 28.09.1995, 1, K. Bánkuti, T. Kovács > **1** ♀
Tiszabecs: Szabó-füzes, Border stone No. 109, Tisza, FU33, 03.08.1995, 2, P. Juhász, T. Kovács > **2** ♂
Vésztő: Road to Újiráz, Sebes-Körös, ET20, 02.09.1997, 7, P. Juhász, B. Kiss, T. Kovács, P. Olajos > **1**♂**, 1**♀

Kovács & Ambrus (2001):
Győr: road number 10, Rába, 26.08.1999, 6, AA, JP, KT**> 1** ♀
Molnaszecsőd: road to Döröske, Rába, 21.07.2000, 4, AA, KD, KT > **2** ♂
Vág: road to Kemenesszentpéter, Rába, 10.08.1999, 1, KT > **1** ♀
Várkesző: road to Szany, Rába, 10.08.1999, 1, KT > **1** ♂

Kovács et al. (2001b):
Szatmárcseke: Irtványos, 24.09.1997, 1, JP, KT, KV, TI > **1** ♀
Tarpa: 710 river kilometre, 08.09.1999, 1, JP, KT > **1** ♀
Tiszaújváros: road number 35, 09.09.1999, 3, KT, VA > **1** ♂

Kovács & Ambrus (2002):
Körmend: 86-os út, Rába, 2001.VII.11, [1] AA-KT > **1** ♂

Kovács et al. (2002b)
Döge: dike-reeve's house, 2000. VI. 03., 3, KT > **2** ♀
Tiszabecs: lido, 2000. VI. 03., 5, KT > **2** ♂
Tiszatelek: Tiszahát, 2000. IX. 09., 3, KT > **1** ♀

Kovács et al. (2003)
Alsóberecki: sátoraljaújhelyi út, Bodrog, 2001.06.11., 5, CsB > **1** ♂
Apátfalva: volt nagycsanádi (Cenad) út, Maros, 1999.06.10., 3, sKT-KT > **1** ♀
Berzék: Szemere-legelő, Hernád, 1999.08.27., 1, KT-VA > **1** ♂
Berzék: Szemere-legelő, Hernád, 1999.10.13., 1, KT-VA >**1** ♀
Berzék: Szemere-legelő, Hernád, 2000.08.30., 4, KT-VA > **1** ♂
Bőcs: sajóládi út, Hernád, 1999.08.27., 4, KT-VA > **2** ♂**, 1** ♀
Dombrád: Üdülőterület, Tisza, 2001.10.07., 4, pg, CsB-JP-KV > **2** ♀
Felsőberecki: rév, Bodrog, 1999.08.21., 7, HG-KT > **2** ♂**, 3** ♀
Felsőberecki: rév, Bodrog, 2001.08.12., 3, JP-KV > **1** ♀
Gávavencsellő: Lomos, Tisza, 2001.08.16., 3, AA-KT > **2** ♂
Gyula: sarkadi út, Fekete-Körös, 2001.08.22., 1, JP-KV > **1** ♂
Kiszombor: 43-as út, Maros, 2001.06.05., 2, JP > **1** ♀
Kiszombor: szivattyútelep, Maros, 1999.06.10., 2, sKT-KT >**1** ♂**, 1** ♀
Makó: strand, Maros, 2000.05.25., 4, AA-JP-KT-KV > **2** ♂
Makó: strand, Maros, 2000.10.14., 5, AA-OP > **1** ♂
Nagylak: Maros, 1999.06.10., 2, sKT-KT > **2** ♂
Nagylak: Maros, 2001.06.05., 6, JP > **2** ♂**, 3** ♀
Szeged: Belvárosi híd, Tisza, 2001.07.16., 4, CsB > **1** ♀
Tiszabecs: strand, Tisza, 2001.06.14., 1, AA >**1** ♀
Tiszabecs: strand, Tisza, 2001.06.18., 6, CsB > **2** ♂**, 2** ♀
Tiszabecs: strand, Tisza, 2002.06.24., 6, KT > **2** ♂**, 3** ♀
Tivadar: strand, Tisza, 2001.10.08., 2, CsB-JP-KV > **1** ♀
Tunyogmatolcs: 491-es út, Szamos, 2001.10.08., 1, CsB-JP-KV > **1** ♂

Kovács (2005):
Berzék: Szemere-legelő, Hernád, 2003.09.25., 1, KT-VA > **1** ♀
Ipolydamásd: volt határátkelő, Ipoly, 2003.08.14., 3, AA-JP-KT-VI > **1** ♂

Kovács (2006b):
Berzék: Gaga, Hernád, 2006.07.24., 1, JP, Q > **1** ♂
Bőcs: Asó-berek, Hernád, 2006.07.24., 1, JP, Q > **3** ♂
Hernádnémeti: Gyalog-legelő, Hernád, 2006.07.24., 1, JP, Q > **1** ♂

Ipolydamásd: volt határátkelő, Ipoly, 2006.07.26., 1, MZ, Q > **5♂, 1♀**
Komlódtótfalu: komp, Szamos, 2005.10.07., 1, JP-KT > **1** ♀
Nagyhódos: határra vezető út, Túr, 2006.10.03., 1, JP-KT> **1** ♀
Vág: kemenesszentpéteri út, Rába, 2005.09.09., 1, JP-KT > **1** ♀

Results and discussion

Based on the examined larvae, the distribution of the species in Hungary is shown in Fig. 3. *Baetis calcaratus* is confirmed from the Lapincs and Rába, while *B. tricolor* lives in the following watercourses: Bodrog, Bodrog, Fekete-Körös, Hernád, Ipoly, Maros, Rába, Sebes-Körös, Szamos, Tisza, Túr. There are additional sampling sites on the following rivers where the developmental stage of the collected larvae did not allows separation of the two species: Bodrog, Fekete-Körös, Hármas-Körös, Hernád, Ipoly, Lapincs, Maros, Rába, Sebes-Körös, Szamos, Tisza. Both species occur at a single locality in the Rába at Körmend.
The latest checklist of the Hungarian Ephemeroptera fauna lists 91 species (Kovács & Bauernfeind 2003). Since then, the following species were added to the list: *Ecdyonurus macani* Thomas & Sowa, 1970 (Oertel et al. 2005); *Electrogena quadrilineata* (Landa, 1970), *Rhithrogena carpatoalpina* Klonowska, Olechowska, Sartori & Weichselbaumer, 1987 (Cser 2005, Cser & Erős 2005, Erős et al. 2005); *Cloeon petropolitanum* Kluge & Novikova, 1992 (Kovács 2006a); *Baetis liebenauae* Keffermüller, 1974 (Kovács 2006c), *Baetis melanonyx* (Pictet, 1843) (Kovács 2007); *Ecdyonurus picteti* (Meyer-Dür, 1864) (Cser & Akác 2010). *Baetis calcaratus* is the 99th species of the Hungarian Ephemeroptera fauna.

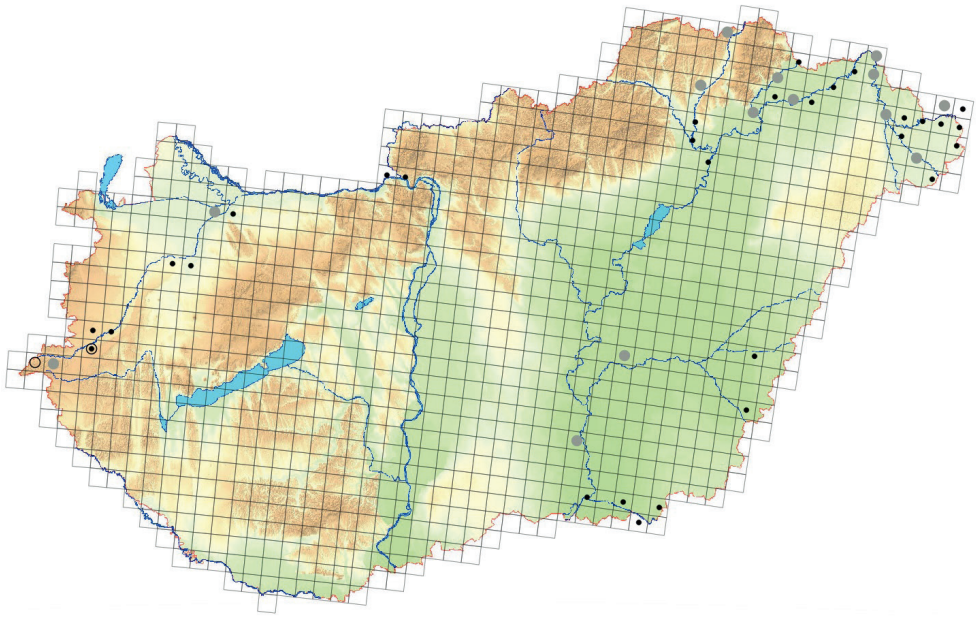

Fig. 3. Hungarian collecting sites of *Baetis calcaratus* = ○, *B. tricolor* = •, and *B. calcaratus/tricolor* = ●

Publishing mayflies from Lithuania, Kovács et al. (2008, 2011) indicated that identification of some specimens of *Labiobaetis* is still in progress. The results of these are:
Baetis calcaratus Keffermüller, 1972 – Jadagoniai: Nemunas, 12.07.2011, 1 ♀, KT-NH-OP – Merkiné: Merkys, 10.07.2011, 1m,1 ♀, KT-NH-OP – Seredzius: Dubysa, 11.07.2011, 1 ♀, KT-NH-OP – Trasninkas: mouth of Skroblus, Merkys, 03.07.2008, 1 ♀, AA-KT-NH-OP.
Baetis tricolor Tshernova, 1928 – Druskininkai: Baltašiške, Nemunas, 03.07.2008, 2 ♀, AA-KT-NH-OP.

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