



### New combinations for the Australian species of *Baetis* (Ephemeroptera: Baetidae), with a new synonym

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The Australian small minnow mayfly fauna remains poorly known with only 21 described species (Webb & Suter 2010). Four species were described in the genus *Baetis* Leach: *B. baddamsae* Harker, 1950; *B. confluens* Harker, 1950; *B. frater* Tillyard, 1936; and *B. soror* Ulmer, 1908. *Baetis soror* and *B. frater* were both placed in *Offadens* Lugo-Ortiz & McCafferty (Lugo-Ortiz & McCafferty 1998, Suter 2000), but the two remaining species are still included in *Baetis*. Revisionary work of the last few decades has clarified the concept of *Baetis* and related genera and showed that older concepts of the genus were highly polyphyletic (i.e. Waltz & McCafferty 1987). Examination of larvae and adults of all known baetids occurring in Australia showed that true *Baetis* does not occur and that the generic placement of *B. baddamsae* and *B. confluens* should be changed. Both species have hindwings and double marginal intercalaries in the forewings, indicating they belong to either *Offadens* or *Edmundsiops* Lugo-Ortiz & McCafferty, which are equivalent to Genus 1 and Genus 2 *sensu* Suter (1997), respectively.

Only the holotype male adult of *B. baddamsae* remains of the type series in the Australian Museum (AM) and it is in poor condition. Identification of adults of *Edmundsiops* and *Offadens* cannot generally be made with any confidence without freshly collected specimens as colour pattern is the only reliable character. Harker's (1950) description of the adults are too vague to be of much diagnostic value, but her figure of the right mandible (Harker 1950: Fig 87) of the larva indicates the anterior margin of the right mandible is flat. The most common species with a flat right mandible we've collected from the area of the type locality in northern New South Wales is the widespread morphospecies *Edmundsiops* spMV6 *sensu* Suter (1997, as Genus 2 spMV6) and we are confident it is equivalent to *B. baddamsae*. The other species with a flat anterior margin of the right mandible, *E. hickmani* Suter, 2000, has a distinctive row of long robust setae on the tibiae and tarsi, but it is unlikely to be *B. baddamsae* as Harker (1950) did not mention this characteristic and *E. hickmani* only appears to occur in higher gradient streams east of the type locality. Furthermore, we have examined the type series of *Edmundsiops instigatus* Lugo-Ortiz & McCafferty, 1999 housed at the Purdue Entomological Research Collection (PERC) and Australian National Insect Collection (ANIC) and found the holotype also to be equivalent to *B. baddamsae*. The type series of *E. instigatus* also included several other morphospecies identified by Suter (1997, as Genus 2), including *Edmundsiops* spMV1, *E. spMV2*, and a member of the *E. hickmani* complex. The identifications of each paratype is indicated in the material examined, below. *Edmundsiops baddamsae* n.comb. is common and abundant in streams from southeast Queensland to Victoria and Tasmania, although the Tasmanian populations are genetically divergent from mainland populations (Webb and Suter unpublished).

The holotype of *Baetis confluens* is missing from the Australian Museum and is thought to be lost. The type series is represented only by a single female allotype collected from the type locality in Armidale, NSW, but it is in very poor condition and cannot be differentiated from other species. The descriptions of the male adult and larvae by Harker (1950, 1954) are vague and of little diagnostic value. However, she states the thorax, abdomen, and legs of the male are light brown with sparse markings. In northern New South Wales, the only *Offadens* and *Edmundsiops* species known are *E. baddamsae*, a species of the *E. hickmani* complex, *O. spArmidale1 sensu* Webb and Suter (in press), *O. spMV5 sensu* Suter (1997, as Genus 1 spMV5, in part), *O. sp20 sensu* Webb and Suter (in press), and *O. sobrinus* Lugo-Ortiz & McCafferty, 1998. Male adults of *E. baddamsae* and *E. hickmani* differ from *B. confluens* as described by Harker (1950) by having a black transverse line on the posterior margins of the abdominal terga, and those of *O. spArmidale1* have white rather than brown terga 2–6; the adults of *O. sobrinus* are unknown. Males of both *O. spMV5* and *O. sp20* are primarily brown without distinct markings but it is most likely that *B. confluens* is equivalent to *O. sp20* as recent collections of larvae from the type locality (Dumaresq Creek, Armidale, NSW) are all either *O. sp20* or *E. baddamsae*,

and male adults collected from Armidale in 1953 appear to be *O. sp20*. Because the holotype of *B. confluens* is missing and the one remaining paratype is a badly damaged female, we are designating a late instar female larva collected approximately 80Km north of Armidale as a neotype to be deposited in the Australian Museum. *Offadens confluens* n. comb. is known to occur throughout eastern NSW and in the Australian Capitol Territory and also likely occurs in northern Victoria and southeast Queensland.

***Edmundsiops baddamsae* (Harker, 1950) n. comb.**

*Edmundsiops instigatus* Lugo-Ortiz & McCafferty, 1999:66 n. syn

*Baetis baddamsae* Harker, 1950:21

Genus 2 spMV6; Suter, 1997:24

**Material examined.** *Edmundsiops instigatus*: HOLOTYPE: larva, Australia, New South Wales, Commissioner's Water, 4 mi E of Armidale, 19-Feb-1966, G. F. Edmunds (PERC). PARATYPES: AUSTRALIA, New South Wales: two larvae, stream at Wilsons Valley, Mt Kosciusko, 10-Nov-1966, G. F. Edmunds (ANIC)[=Genus 2 spMV2 *sensu* Suter (1997)]; three larvae, tributary of Piper Cr, nr jct with Piper Cr, Mt. Kosciusko, 5250 feet, 10-Feb-1966, G. F. Edmunds (mouthparts, forelegs, tergum 4, gill 4, and paraprot of one larva mounted on slide in Euparal) (PERC) [=Genus 2 spMV1 *sensu* Suter (1997)]; two larvae, small stream nr Pt Lookout, New England Natl Pk, 5000 ft, 20-Feb-1966, G. F. Edmunds (PERC) [= *E. hickmani* complex]; larva, Chandler R, 26 mi E of Armidale, no date, G. F. Edmunds (PERC) [= *E. baddamsae*]; Tasmania: Three larvae, Derwent R, 4 mi S of Ouse, 27-Jan-1966, G. F. Edmunds (PERC) [= *E. baddamsae*].

*Baetis baddamsae*: HOLOTYPE: male imago (in poor condition), Australia, New South Wales, Guyra, 12-Sept-1948, coll. G. Baddams (AM accession number K 263935).

***Offadens confluens* (Harker, 1950) n. comb.**

*Baetis confluens* Harker, 1950:23

Genus 1 spMV5, in part; Suter, 1997

*Offadens* sp20; Webb and Suter, in press

**Material examined.** *Baetis confluens*: NEOTYPE: female larva, Australia, New South Wales, Marowan Creek at New England Highway, -29.933° 151.7234°, 1-Dec-2007, coll. J. M. Webb and D. Black (AM); ALLOTYPE: 1 female adult, Australia, New South Wales, Dumaresq Creek, Armidale, 3300 feet, Mar-1948, coll. J. Harker (AM accession number K 263934). Additional Material: 4 male adults, Armidale, New South Wales, 15-Apr-1953, coll. E. F. Riek (ANIC).

**References**

- Harker, J.E. (1950) Australian Ephemeroptera. Part I. Taxonomy of New South Wales species and evaluation of taxonomic characters. *Proceedings of the Linnean Society of New South Wales*, 75, 1–34.
- Harker, J.E. (1954) The Ephemeroptera of eastern Australia. *Transactions of the Royal Entomological Society of London*, 105, 241–268.
- Lugo-Ortiz, C.R. & McCafferty, W.P. (1998) *Offadens*, a new genus of small minnow mayflies (Ephemeroptera: Baetidae) from Australia. *Proceedings of the Entomological Society of Washington*, 100, 306–309.
- Lugo-Ortiz, C.R. & McCafferty, W.P. (1999) *Edmundsiops instigatus*: a new genus and species of small minnow mayflies (Ephemeroptera: Baetidae) from Australia. *Entomological News*, 110, 65–69.
- Suter, P. (1997) Preliminary guide to the identification of nymphs of Australian baetid mayflies (Insecta: Ephemeroptera) found in flowing waters. *Co-Operative Research Centre for Freshwater Ecology Identification Guide*, 14, 1–36.
- Suter, P. (2000) *Edmundsiops hickmani* sp. nov., *Offadens frater* (Tillyard) nov. comb. and description of the nymph of *Cloeon tasmaniae* Tillyard (Ephemeroptera: Baetidae) from Tasmania. *Papers and Proceedings of the Royal Society of Tasmania*, 134, 63–74.
- Tillyard, R.J. (1936) The trout-food insects of Tasmania. Part II. A monograph of the mayflies of Tasmania. *Papers and Proceedings of the Royal Society of Tasmania*, 1935, 23–59.
- Ulmer, G. (1908) Trichopterae und Ephemeridae. In Michaelson, W. & Hartmeyer, R. (Eds.) *Die Fauna Südwest-*

*Australiens Ergebnisse der Hamburger südwest-australischen Forschungsreise 1905. Pt 3*, Jena, Fischer Vol. 2 pp. 25–46.

Waltz, R.J. & McCafferty, W.P. (1987) New genera of Baetidae for some Nearctic species previously included in *Baetis* Leach (Ephemeroptera). *Annals of the Entomological Society of America*, 80, 667–670.

Webb, J.M. & Suter, P. (2010) Revalidation and redescription of *Bungona illiesi* (Lugo-Ortiz & McCafferty) (Ephemeroptera: Baetidae) from Australia, based on mitochondrial and morphological evidence. *Zootaxa*, 51, 37–51.

Webb, J.M. & Suter, P. (In press) Identification of Australian Baetidae. *Museum Victoria Science Reports*.