

# NEW BAETIDAE FROM THE SOUTHWESTERN UNITED STATES AND NORTHERN MEXICO (EPHEMEROPTERA: INSECTA), WITH NOTES

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## Abstract

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Collections of *Baetis* Leach, *Baetodes* Needham and Murphy, and *Dactylobaetis* Traver and Edmunds from the southwestern United States and northern Mexico included new species and new distribution records. The nymphal stages of *Baetis sonora* n.sp. and *Dactylobaetis sinaloa* n.sp. are described and figured. Species of *Baetis* nymphs that were given informal epithets, even though they were described, keyed, and their taxonomic characters figured, are named, or tentatively associated with a described adult. *Baetis* sp. "A" Morihara and McCafferty is tentatively associated as the nymphal stage of *B. adonis* Traver, *Baetis* sp. "B" Morihara and McCafferty is named *B. libos*, and *Baetis* sp. "C" Morihara and McCafferty is named *B. notos*. New collection records extend the known distributional limits of *Baetis insignificans* McDunnough, *Baetodes edmundsi* Koss, *B. fuscipes* Cohen and Allen, and *Dactylobaetis mexicanus* Traver and Edmunds.

## Résumé

Des collections de *Baetis* Leach, *Baetodes* Needham et Murphy, et *Dactylobaetis* Traver et Edmunds, provenant du sud-ouest des USA et du nord du Mexique, contenaient des nouvelles espèces et des nouvelles mentions. On a décrit et illustré les stades larvaires de *Baetis sonora* n.sp. et *Dactylobaetis sinaloa* n.sp. On a nommé, ou tenté d'associer à une forme adulte déjà décrite, des espèces de larves de *Baetis* qui avaient reçu des épithètes non formelles, bien qu'elles avaient déjà été décrites, fait l'objet de clés, et été illustrées dans leurs détails taxonomiques. *Baetis* sp. "A" Morihara et McCafferty est assimilée à la forme larvaire de *B. adonis* Traver, *Baetis* sp. "B" Morihara et McCafferty est nommée *B. libos*, et *Baetis* sp. "C" Morihara et McCafferty est nommée *B. notos*. Des collections nouvelles permettent détendre les limites de répartition connues de *Baetis insignificans* McDunnough, *Baetodes edmundsi* Koss, *B. fuscipes* Cohen et Allen, et *Dactylobaetis mexicanus* Traver et Edmunds.

## INTRODUCTION

Collections of Baetidae from Arizona, southern California, New Mexico, Texas, and northern Mexico included new species and distribution records of *Baetis* Leach and *Dactylobaetis* Traver and Edmunds, and distribution records of *Baetodes* Needham and Murphy. Collections by the authors are labeled by the initials RKA and CMM, and all specimens are deposited in the collection of the California Academy of Sciences, San Francisco.

## GENUS BAETIS LEACH

Morihara and McCafferty (1979) characterized and keyed all of the North American, north of Mexico, species known from the nymphal stage.

### *Baetis insignificans* McDunnough

*Baetis insignificans* McDunnough 1926: 300; Morihara and McCafferty 1979: 150 (nymph).

**Distribution.** This species is widely distributed in western North America, and is known to occur from Alberta and British Columbia to Arizona, New Mexico, and northern Mexico.

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**New records.** Mexico: Sonora, Hacienda Cochelesi, 40 km SE Aqua Prieta, 12 Jan. 1983, RKA and CMM; Rio Altas @ Tubutama, 13 Jan. 1983, RKA and CMM. The following collection records from Oregon have not been published previously: Deschutes Co., Deschutes R. @ Cline Falls State Park, 25 Aug. 1954, RKA and G.F. Edmunds, Jr.; Douglas Co., Umpqua R., 4.8 km S Canyonville, 25 Aug. 1954, RKA and G.F. Edmunds, Jr.; Malheur Co., Vale, 27 Aug. 1954, RKA and G.F. Edmunds, Jr.

***Baetis sonora* n.sp.**

**Mature nymph.** Length: body 2.5–3.5 mm; caudal filaments 1.0–2.0 mm. General color light brown to brown with dark brown markings. Head light brown; antennal scapes simple, without distal lobe; maxillary palpi extending to galea-lacina; maxillary palpi with apical excavation; labial palpi second segment with straight inner margin; labial palpi second segment with 30–40 spines; labial palpi second segment slender, length twice the width at base. Thorax brown, dark brown at sutures; pronotum uniformly brown; mesonotum pale with brown transverse band across wing pad base; thoracic sterna pale; legs pale; anterior margins of femora with single row 20–25 long spines; posterior margins with single row 10–15 long spines; tibiae and tarsi with single row small spines on inner margin; claws with 8–11 denticles. Abdominal terga pale to dark brown; tergum 1 pale; terga 2–3 dark to reddish brown; terga 4–5 pale to light brown; terga 6–7 dark to reddish brown; terga 8–9 pale; tergum 10 pale, posterior margin with brown transverse marking (Fig. 5); gills obovate with dark trachea; gill margins with small spines. Caudal filaments light brown; terminal filament 60–80% length of cerci.

**Types.** Holotype: mature female nymph, Rio Cuchujaqui, 15.6 km SE Alamos, Sonora, Mexico, 16 Jan. 1983, RKA and CMM. Paratopotypes: five female nymphs, same data as holotype.

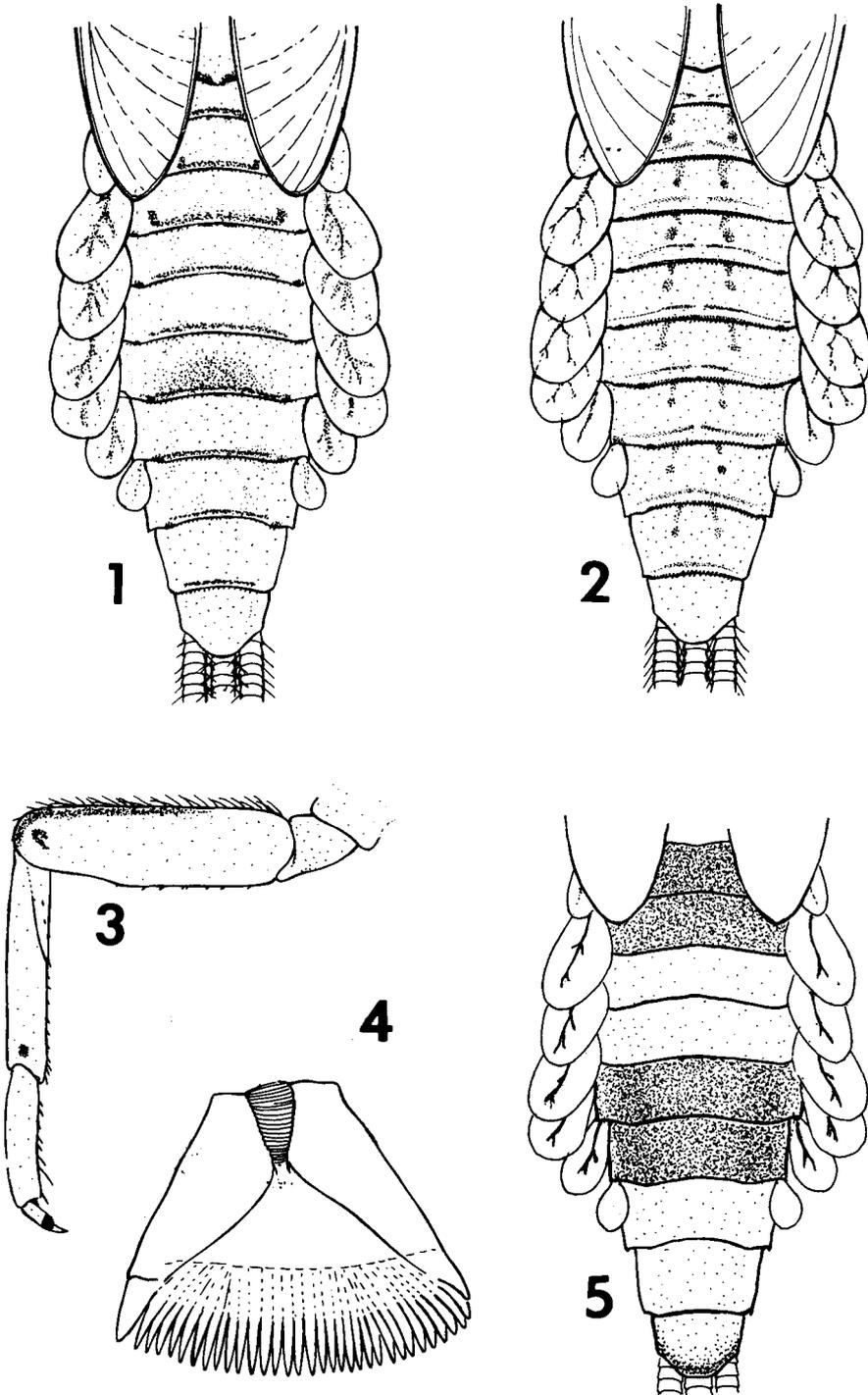
**Remarks.** When keying the nymphs of *B. sonora* in Morihara and McCafferty, one will come to an impasse at couplet 20 as the inner margin of the second segment of the labial palpi is nearly straight. If the margin of the segment is interpreted as being convex, specimens will key to *B. alius* Day, from central California. If it is interpreted as being concave, nymphs will key to *B. brunneicolor* McDunnough, known only from northeastern North America, or to *B. tricaudatus* Dodds, which is pancontinental in distribution, but not known from Mexico. *Baetis sonora* is distinguished from nymphs of the above mentioned species by the following combination of characters: (1) pronotum with distinctive markings; (2) abdominal terga 2–3 and 6–7 dark reddish-brown, and tergum 10 with a brown marking on posterior margin (Fig. 5); and (3) gill margins without robust setae.

The following three nymphal species were described, keyed, their taxonomically important morphological characters figured, and their taxonomy and distribution discussed by Morihara and McCafferty. The three were given informal epithets as the nymphs were not associated with described adults. Herein, one species is only tentatively associated with a named adult, and the other two are formally named, as follows:

***Baetis* sp. "A" Morihara and McCafferty**

*Baetis* sp. "A" Morihara and McCafferty 1979: 160, fig. 19.

**Remarks.** This nymphal species is not named as it may eventually be found to be the immature stage of *B. adonis* Traver. The nymph called *Baetis* sp. "A" is common in the San Gabriel River, in southern California, and the San Gabriel Canyon is also the type locality of *B. adonis*. Furthermore, both stages belong to the *rhodani*-group of species. Rearing studies are currently in progress.



FIGS. 1-5. 1, abdominal terga, *Dactylobaetis sinaloa*; 2, abdominal terga, *D. salinus*; 3, right foreleg, *D. sinaloa*; 4, claw, *D. salinus*; 5, abdominal terga, *Baetis sonora*.

***Baetis libos* n.sp.**

*Baetis* sp. "B" Morihara and McCafferty 1979: 161, fig. 20.

**Holotype nymph.** Specimen from: Hall Cr. on Hwy 373, Apache Nat. For., Apache Co., Arizona, 3 July 1964, R.K. Allen.

**Remarks.** This species is known only from Arizona and New Mexico, and belongs to the *rhodani*-group of species. Three species that belong to this species-group are undescribed from the nymphal stage and occur in western North America, but none of them, except *B. adonis*, are known to occur in the southwestern United States. These species are *B. moffati* Dodds from Colorado, *B. palisadi* Mayo from central California, and *B. parallelus* Banks from central Nevada, and all of them are known only from their respective type localities. The probability of future synonymy is remote based on our knowledge of the distribution of mayflies in western North America.

***Baetis notos* n.sp.**

*Baetis* sp. "C" Morihara and McCafferty 1979: 177, fig. 26a-e.

**Holotype nymph.** Specimen from: Gila R., Catron Co., New Mexico, 29 Aug. 1969, R.W. Koss.

**Remarks.** This species, known from only Arizona and New Mexico, belongs to the *fuscata*-group of species, and *B. caurinus* Edmunds and Allen, known only from the type locality in northern Oregon, is the only other western North American species that is unknown in the nymphal stage and belongs to this species-group. Also, these species are strikingly different in coloration. *Baetis notos* has distinctive dark color patterns on the thoracic nota and abdominal terga, whereas *B. caurinus* is without thoracic markings, and the abdominal terga have only narrow purple anterior lines on some segments.

**GENUS BAETODES NEEDHAM AND MURPHY**

The nymphal stages of the North American species were revised by Cohen and Allen (1978).

***Baetodes edmundsi* Koss**

*Baetodes edmundsi* Koss 1972: 98.

**Distribution.** This species was described from Arizona, New Mexico, and central Texas, and it is now known from northern Mexico.

**New records.** Mexico: Sonora, Rio Cuchujaque, 15.7 km SE Alamos, 16 Jan. 1983, RKA and CMM; Sinaloa, Stream, 1.6 km N El Viola, 18 Jan. 1983, RKA and CMM. Texas: Presidio Co., Bill Middleton Ranch, Capote Canyon nr. Sandalaria, 16 May 1973, R.G. McClure.

***Baetodes fuscipes* Cohen and Allen**

*Baetodes fuscipes* Cohen and Allen 1972: 128; Cohen and Allen 1978: 261 (= *fuscus*).  
*Baetodes fuscus* Mayo 1973: 313.

**Distribution.** This species is now known from Honduras (14°N), Veracruz, Cuernavaca, Sinaloa, and Sonora, Mexico (29°12'N).

**New records.** Mexico: Sonora, Rio Cuchujaque, 15.7 km SE Alamos, 16 Jan. 1983, RKA and CMM; Sinaloa, Stream, 1.6 km N El Viola, 18 Jan. 1983, RKA and CMM.

**GENUS DACTYLOBAETIS TRAVER AND EDMUNDS**

The nymphal stages of all known North American species have been described.

*Dactylobaetis mexicanus* Traver and Edmunds

*Dactylobaetis mexicanus* Traver and Edmunds 1968: 662.

**Distribution.** This is a northern Mexican species which is known to occur from Veracruz (19°N) to Monterrey (25°N) on the east coast, and in Sinaloa and Sonora (29°N) on the west coast.

**New records.** Mexico: Sonora, Rio Sonora, 3.2 km SE Rte 21 between Uras and Mazacahui, 14 Jan. 1983, RKA and CMM; Sinaloa, Rio Baluarte, Rosarito, 18 Jan. 1983, RKA and CMM.

*Dactylobaetis sinaloa* n.sp.

**Mature nymph.** Length: body 2.5–3.5 mm; caudal filaments 1.0–2.0 mm. General color pale with brown and dark brown markings. Head brown; occiput brown, pale around compound eyes and pale longitudinal stripe. Thoracic nota pale with irregular brown markings; legs pale with dark brown markings; femora pale with dark brown line along posterior and apical margins and with dark brown subapical spot (Fig. 3); tibiae pale with dark brown subapical spot (Fig. 3); tarsi pale; claws the *musseri*-type with 30–40 denticles (as in Fig. 4). Abdominal terga uniformly brown with dark brown transverse line along posterior margin on terga 1–9, brown transverse line with a shallow U-shape on terga 2–3 (Fig. 1); tergum 6 with median brown macula (Fig. 1); abdominal gills pale, tracheae dark with moderate branching; abdominal sterna pale, dark submarginal tracheae on sterna 2–8. Caudal filaments pale.

**Types.** Holotype: mature female nymph, Rio Baluarte, Rosarito, Sinaloa, Mexico, 18 Jan. 1983, RKA and CMM. Paratopotype: one mature female nymph, same data as holotype.

**Remarks.** These nymphs have *musseri*-type claws like *D. salinus* Allen and Chao (Fig. 4), which is known only from Arizona. They appear to be related to the latter mentioned species, but they are distinguished from them by the absence of submedian markings on abdominal terga 2–8 (Figs. 1–2), and by the presence of dark markings on the femora and tibiae (Fig. 3).

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