

GENERIC REVISIONS OF MAYFLY NYMPHS III. *BAETODES* IN
NORTH AND CENTRAL AMERICA (BAETIDAE)

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Abstract.—The 28 described species of *Baetodes* are discussed. Synonymies and other pertinent data are presented for the 15 North and Central American species with an illustrated key to the nymphs, known distributional limits, and nymphal diagnosis or description. *Baetodes bellus* Mayo, *B. furvus* Mayo, and *B. veracruzensis* Mayo are synonymized with *B. deficiens* Cohen & Allen, *B. fuscipes* Cohen & Allen and *B. caritus* Cohen & Allen, respectively. *Baetodes velmae* is described from nymphs collected in Panama.

Part I of these revisions (Allen 1973) dealt with the genus *Traverella* Edmunds, and Part II (Allen & Brusca, in press) with the genus *Thraulodes* Ulmer. This series of generic revisions make available keys and descriptions by which the aquatic stage of the Ephemeroptera can be named and organized. The treatment of each species includes a name, nymphal description or diagnosis, distribution and new collection records, and an illustrated key.

Institutions where specimens are deposited are indicated by the following abbreviations: North Texas State University (NTS); and University of Utah (UU). Specimens without designation are deposited in the collection of California State University, Los Angeles.

Genus *Baetodes* Needham & Murphy

Baetodes Needham & Murphy 1924: 55; Traver 1943: 94; Traver 1944: 20; Edmunds 1950: 203; Demoulin 1955: 20; Packer 1966: 8; Mayo 1968: 251; Koss 1972: 94; Cohen & Allen 1972: 123; Mayo 1972: 226; Mayo 1973: 308.

Baetodes is confined to the New World, is austral in origin, and the most northern limits of the genus is in the Lower North Temperate Zone (between 30°–40° N. latitude; see Allen & Brusca 1973). Collection records are reported from Arizona and Texas in North America north of Mexico, and the most northern record of the genus is near Flagstaff, Arizona (ca. 35°12' N. latitude).

The genus was erected by Needham & Murphy (1924) based upon nymphs of two species collected in Brazil. *Baetodes serratus* was described, named, and designated as the genotype. The other was described and reported as *Baetodes* Nymph No. 1. Traver (1943) reported the adult of the

genus when she described *B. spiniferum* from a male imago and a female subimago collected in Venezuela. In this same paper, she reported an undescribed species from Mexico, and in 1944, published additional records of *B. serratus* from Brazil. Edmunds (1950) reported a nymphal record of the genus from Texas (described as *B. edmundsi* by Koss in 1972), and a second Mexican record from Cuernavaca (mistakenly reported as *Culinevera*), south of Mexico City. Demoulin (1955) described *B. itatiayanus* from nymphs collected in Brazil, and Packer (1966) was the first to report the genus from Central America when he published records from twelve localities in Honduras. Mayo (1968) described two additional species, *B. levis* and *B. spinae*, from nymphs collected in Ecuador. Koss (1972) described *B. arizonensis* and *B. edmundsi* from nymphs collected in north central Arizona, and Allen & Chao (1972) described *B. sigillatus* from eastern Arizona. Cohen & Allen (1972) described nine species from Mexico and Central America. *Baetodes adustus*, *B. inermis* and *B. pictus* from Mexico; *B. caritus*, *B. deficiens*, *B. fuscipes*, *B. pallidus*, and *B. tritus* from Mexico and Central America; and *B. noventus* from Central America. Mayo (1972) described nine species from Mexico, Peru and Brazil. *Baetodes bellus*, *B. fortinensis*, *B. obesus*, and *B. veracrusensis* were collected in Mexico; *B. adamagenis*, *B. chilloni*, *B. solus*, and *B. traversae* were described from Peru; and *B. sancticatarinae* is known only from Brazil. In this same paper, she emended the spelling of *B. spiniferum* to *B. spinifer*. Mayo (1973) described an additional four species from Bolivia, Venezuela, and Mexico. *Baetodes longus* and *B. furvus* are known from Mexico, *B. peniculus* from Venezuela, and *B. projectus* from Bolivia. Edmunds (1974) synonymized *B. sigillatus* with *B. arizonensis*, and noted that the descriptions of both were published in April, 1972, and that *B. arizonensis* has date priority. One species, *B. velmae*, is described herein, and *B. bellus*, *B. furvus*, and *B. veracrusensis* are synonymized with *B. deficiens*, *B. fuscipes*, and *B. caritus*, respectively. There are presently 28 valid species of *Baetodes*, 13 from South America and 15 from North and Central America.

The taxonomy of *Baetodes* is based on the nymphal stage as only *B. edmundsi* and *B. spinifer* are known from the male imago. *Baetodes arizonensis* is known only from male subimagoes and female imagoes in the adult stage.

Nymphal Stage

General Characters.—Body ovate, not flattened dorsoventrally. Head ovate, longer than wide; antennae long; labrum not as wide as head, labrum variable in shape (Figs. 6, 25); maxillae with two-segmented palpi (Fig. 4); mandibles as in Figs. 2–3; labium as in Fig. 5. Pronotum, mesonotum, and/or metanotum with or without median posterior tubercle or elevation;

pronotum convex, anterolateral corners acute; hind wing pads absent; femora long and slender (Figs. 7-8); tarsal claws with marginal row denticles. Abdomen convex dorsally and ventrally; abdominal terga with or without median tubercle (Figs. 9-24); abdominal gills present segments 1-5; gills simple lamellae; coxae with 1 or 2 finger-like gills (Figs. 26-27), or without gills. Caudal filaments without or with short setae; lateral cerci long, terminal filament short.

Systematics

Mayo (1972) used the details of the mouthparts to distinguish the Mexican and South American species, but a detailed study, by us, of North and Central American populations suggests that these morphological structures are of questionable usefulness as taxonomic characters. The spines on the labrum vary in number from specimen to specimen in a single population; the glossae of the labia are subequal in length in all populations examined; the spines on the maxillae appear to be uniform in size and shape in all species; and the structure of the mandibles do not differ from species to species. Mayo, in this same paper, places much emphasis on the the presence or absence of coxal gills. Coxal gills are of limited taxonomic value. In some species they are always present, in others they are always absent, and in others they may be present or absent.

The characters most useful in distinguishing the species of *Baetodes* in the nymphal stage are: (1) the presence or absence, the number, and the degree of development of the median tubercles on the pronotum, mesonotum, metanotum, and abdominal terga; (2) the color of the abdominal segments; (3) the color of the abdominal gills and the thoracic and abdominal sterna; and (4) in some cases, the presence, absence, length, or number of coxal gills.

The following key will serve to distinguish the nymphs of the North and Central American species of *Baetodes*.

Key to the Species

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|---|----|
| 1. Median dorsal abdominal tubercle discernible segments 4-6 (Figs. 9-16) | 2 |
| - Median dorsal abdominal tubercle absent, or barely discernible segments 4-6 (Fig. 24) | 12 |
| 2. Median dorsal abdominal tubercle well developed segment 10 (Figs. 9-10); femora with dark round, median macula (Fig. 7) <i>tritrus</i> | |
| - Median dorsal abdominal tubercle absent segment 10; femora without dark median macula as in Fig. 8 | 3 |
| 3. Known distribution Arizona and/or New Mexico and Texas | 4 |
| - Known distribution Mexico and/or Central America | 5 |

4. Median dorsal abdominal tubercle segments 1-9, tubercles subequal and erect segments 1-5; abdominal terga 1-6 brown with dark anterior margins; coxal gill present; pronotal tubercle well developed *edmundsi*
 - Median dorsal abdominal tubercle segments 1-9, tubercles unequal and directed posteriorly segments 1-5; abdominal terga 1-6 red-brown, often with pale median macula; coxal gill absent; pronotal tubercle absent *arizonensis*
5. Abdominal terga 2-6 with distinct dark median macula (Fig. 11); coxae without finger-like gills *pictus*
 - Abdominal terga 2-6 without distinct dark median macula, with dark anterior and/or posterior transverse markings, or unicolorous; coxae with 1 or 2 finger-like gills as in Figs. 26-27 6
6. Median dorsal abdominal tubercle segments 1-9 (Figs 13-14) *noventus*
 - Median dorsal abdominal tubercle segments 1-6, 1-7, or 1-8 7
7. Abdominal terga with dark anterior triangular markings (Fig. 15), or dark anterior and posterior transverse markings (Fig. 18) 8
 - Abdominal terga without triangular markings or dark anterior and posterior transverse markings, color variable 9
8. Abdominal terga with dark anterior triangular markings (Fig. 15); median dorsal abdominal tubercle segments 1-7 (Fig. 16); sterna with anterior transverse markings (Fig. 17) *inermis*
 - Abdominal terga with dark anterior and posterior transverse markings (Fig. 18); median dorsal abdominal tubercle segments 1-8 (Fig. 19); sterna without transverse markings *pallidus*
9. Abdominal terga dark brown or red-brown as in Figs. 1, 22; labrum narrow as in Fig. 6; coxal gills, if present, subequal coxae length as in Fig. 27 10
 - Abdominal terga pale; labrum broad (Fig. 25); coxal gills longer than coxae length (Fig. 26) *longus*
10. Median dorsal abdominal tubercle segments 1-6 (Figs. 20-21) *velmae*
 - Median dorsal abdominal tubercle segments 1-7 or 1-8 (Figs. 1, 22-23) 11
11. Median dorsal abdominal tubercle segments 1-8, small segment 8 (Fig. 1); abdominal gills suffused with red; coxae with 2 finger-like gills *adustus*
 - Median dorsal abdominal tubercle segments 1-7, often small segment 7 (Figs. 22-23); abdominal gills pale; coxae with only 1 finger-like gill, or gill absent *fuscipes*
12. Middle abdominal terga unicolorous tan; coxae with 2 gills 13
 - Middle abdominal terga brown with distinct dark anterior margins as in Fig. 28; coxae with 1 gill, or gill absent 14

13. Median dorsal abdominal tubercle segments 1-7, tubercles small to barely discernible segments 1-7; pronotum without median elevation *obesus*
 - Median dorsal abdominal tubercle segments 1-2, absent 3-7; pronotum with median elevation *fortinensis*
14. Abdominal terga 3-6 with dark posterior margins (Fig. 28); abdominal and thoracic sterna pale *deficiens*
 - Abdominal terga 3-6 with dark anterior margins; abdominal and thoracic sterna suffused with red (Fig. 29) *caritus*

Baetodes adustus Cohen & Allen

Baetodes adustus Cohen & Allen 1972: 123.

This species was described from a small series of nymphs collected in southeastern Mexico.

Nymph.—Length: body 5.0-6.0 mm. General color brown with darker brown, red and pale markings. Pronotum with median elevation; mesonotum without median tubercle or elevation; metanotum with moderately developed median tubercle; coxae with 2 finger-like gills; tarsal claws with 7 denticles. Abdominal terga brown to red-brown (Fig. 1); terga 1-8 with median tubercle, tubercle moderately developed 1-7, small on 8; abdominal gills suffused with red; abdominal sterna with pink to red-brown lateral markings. Caudal filaments pale.

Type locality. Stream 5 mi. S. Ciudad Mendoza, Veracruz, Mexico.

Type deposition. California Academy of Sciences, San Francisco.

Distribution. *Baetodes adustus* is known from Panama (ca. 8°57' N. latitude) to Veracruz, Mexico (ca. 19°-20° N. latitude).

New Record. CANAL ZONE: Rio Guanabano, 3 mi. N. Fort Clayton on Chiva Chiva Rd., 9-IX-63, W. L. Peters (UU).

Baetodes arizonensis Koss

Baetodes arizonensis Koss 1972: 96; Edmunds 1974: 289 (= *sigillatus*).

Baetodes sigillatus Allen & Chao 1972: 52.

Baetodes arizonensis was described from male subimagoes, female imagoes, and a long series of nymphs collected in Arizona. This species and *B. sigillatus* were published during the same month in 1972 and *B. arizonensis* has date priority.

Nymph.—Length: body 4.5-5.5 mm. General color brown with dark markings. Pronotum and mesonotum with small median dorsal tubercle; coxae without gills; tarsal claws with 9-12 denticles. Abdominal terga dark red-brown, often with pale markings; abdominal terga 1-9 with median tubercle, tubercle small on 1-6, barely discernible 7-9; abdominal gills pale;

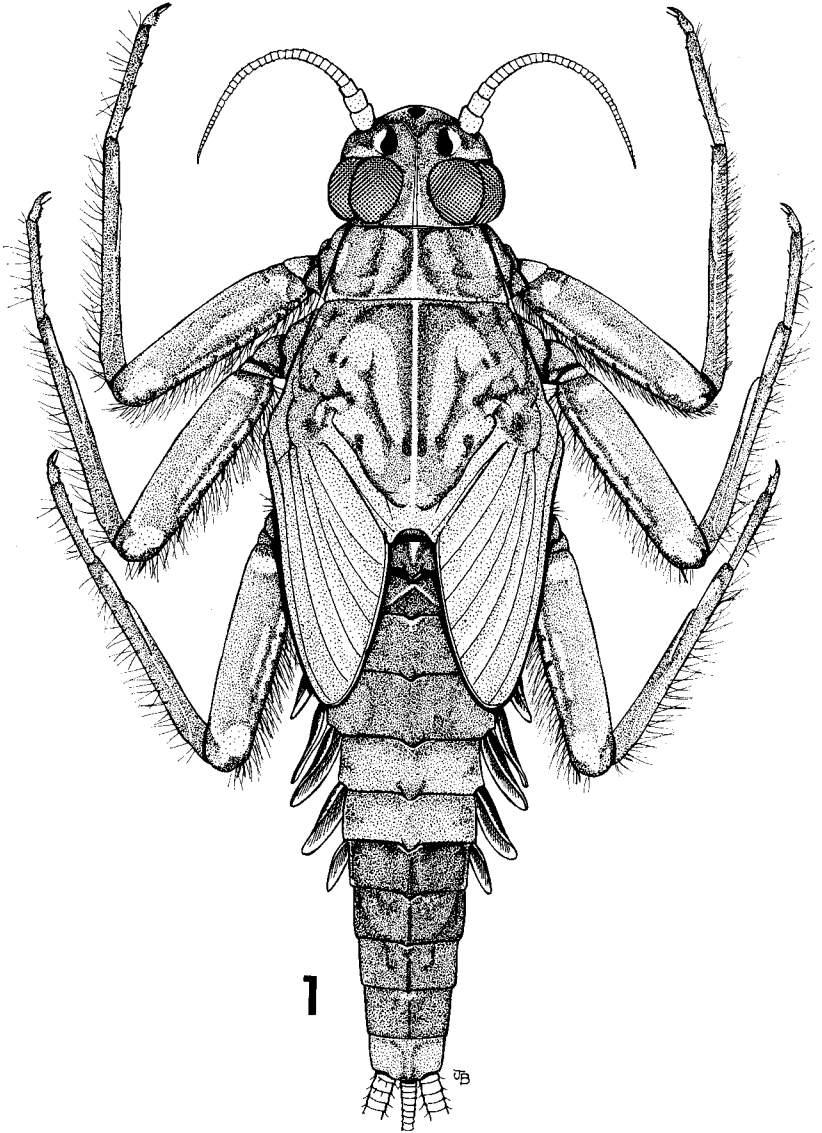


Fig. 1. *Baetodes adustus*, mature male nymph, dorsal view.

abdominal sterna pale, often with anterior red-brown markings. Caudal filaments pale.

Type locality. Oak Creek, Banjo Bill Campground, Oak Creek Canyon, S. Flagstaff, Coconino Co., Arizona.

Type deposition. University of Utah, Salt Lake City.

Distribution. This species is known from three localities (between 33°–35° N. latitude) in Arizona.

Baetodes caritus Cohen & Allen

Baetodes caritus Cohen & Allen 1972: 124.

Baetodes veracruzensis Mayo 1972: 239. NEW SYNONYMY.

Baetodes caritus was described from series of nymphs collected in Guatemala, El Salvador, Honduras, and southern Mexico, including Veracruz. Mayo (1972) described *B. veracruzensis* from a single nymph collected in El Fortin, Veracruz. Mayo distinguished this nominal species by the absence of abdominal tubercles, and the presence of small coxal gills. Examination of the holotype nymph reveals that the differences proposed by Mayo fit well within the morphological variability of *B. caritus*. *Baetodes veracruzensis* is regarded as a junior synonym of *B. caritus*.

Nymph.—Length: body 3.0–4.0 mm. General color brown with dark brown, red and pale markings. Pronotum and mesonotum without median elevation or tubercle; metanotum with small tubercle, tubercle barely discernible; coxae with finger-like gill; femora as in Fig. 27; tarsal claws with 6–8 denticles. Abdominal terga brown; terga 1–2 usually brown, 3–6 with dark anterior markings and pale posterior margins; abdominal terga without tubercle, often barely discernible elevation present 1–3; abdominal gills pale; abdominal sterna suffused with red (Fig. 29). Caudal filaments pale.

Type locality. Rio Latoma at km. 181 on Hwy 2, Guatemala.

Type deposition. California Academy of Sciences, San Francisco.

Distribution. *Baetodes caritus* has a broad latitudinal distribution compared to some other species of the genus. It is known from Honduras (ca. 14°05' N. latitude) to near Poza Rica, Veracruz, Mexico (ca. 20°34' N. latitude).

Baetodes deficiens Cohen & Allen

Baetodes deficiens Cohen & Allen 1972: 126.

Baetodes bellus Mayo 1972: 236. NEW SYNONYMY.

This species was described from nymphs collected from Honduras to central Mexico, including Veracruz. Mayo (1972) described *B. bellus* from a single nymph collected from El Fortin, Veracruz, Mexico, and distinguished this nominal species by the absence of coxal gills and the possession of a yellow sternum. Careful examination of the holotype of *B. bellus* reveals the presence of a single finger-like gill on each coxa. Other morphological characters fit well within the morphological variability of

B. deficiens, and the former name is herein considered to be a junior synonym of the latter.

Nymph.—Length: body 3.5–4.5 mm. General color light brown to pale with dark brown markings. Pronotum and mesonotum without median elevation or tubercle; metanotum with small tubercle, tubercle barely discernible; coxae usually with gill; tarsal claws with 5–7 denticles. Abdominal terga brown with dark markings; terga 1–2 usually brown, 3–6 with dark anterior and posterior margins (Fig. 28); terga 1–3 with small, barely discernible elevation; abdominal gills pale; abdominal sterna pale, often with light brown longitudinal streaks. Caudal filaments pale.

Type locality. Rio Clarrita at San Morano on Hwy 4, Dept. El Paraiso, Honduras.

Type deposition. California Academy of Sciences, San Francisco.

Distribution. The distribution of *B. deficiens* is almost completely sympatric with that of *B. caritus*, and both are known to occur from Honduras (ca. 14°05' N. latitude) to northern Veracruz, Mexico (ca. 20°34' N. latitude).

Baetodes edmundsi Koss

Baetodes sp. Edmunds 1950: 203.

Baetodes edmundsi Koss 1972: 98.

This species was described from male and female imagoes, and nymphs collected in Arizona, additional nymphs were reported from New Mexico and Texas.

Nymph.—Length: body 4.0–5.0 mm. General color brown. Pronotum, mesonotum, and metanotum with well developed median tubercle; coxae with finger-like gill; tarsal claws with 6–9 denticles. Abdominal terga brown; terga 1–6 with dark anterior margins; abdominal terga 1–9 with median tubercle, tubercle moderately developed 1–7, small 8–9; abdominal gills pale; abdominal sterna pale. Caudal filaments pale.

Type locality. Verde River, N. Clarksdale, off Hwy 89A, Yavapai Co., Arizona.

Type deposition. University of Utah, Salt Lake City.

Distribution. *Baetodes edmundsi* has a narrow latitudinal range from southwestern Texas (ca. 25°29' N. latitude) to central Arizona (ca. 34°00' N. latitude).

New Record. Texas: *Presidio Co.* Bill Middleton Ranch, Capote Canyon N. Sandalava, 16-V-73, R. G. McClure (NTS).

Baetodes fortinensis Mayo

Baetodes fortinensis Mayo 1972: 238.

This species was described from a single nymph collected in Veracruz,

Mexico. The holotype was described as being without dorsal abdominal tubercles, but a careful examination of the specimen reveals small, barely discernible, tubercles on terga 1-2. This species was described from the same type locality as *B. obesus*, and is distinguished from the latter by the presence or absence of small median tubercles or elevations on the pronotum and abdominal terga. When long series of nymphs are collected that are assignable to either *B. fortinensis* or *B. obesus* it may be found that they belong to the same species.

Nymph.—Length: body 3.0 mm. General color tan with dark markings. Pronotum with small median elevation; mesonotum without median elevation or tubercle; metanotum with median tubercle; coxae with finger-like gills; tarsal claws with 6 denticles. Abdominal terga unicolorous tan; terga 1-2 with barely discernible tubercle; abdominal gills pale; abdominal sterna yellow-brown. Caudal filaments pale.

Type locality. Rio Tenndido, 3 km. N. El Fortin, Veracruz, Mexico.

Type deposition. University of Utah, Salt Lake City.

Distribution. Known only from the type locality.

Baetodes fuscipes Cohen & Allen

Baetodes fuscipes Cohen & Allen 1972: 128.

Baetodes furvus Mayo 1973: 313. NEW SYNONYMY.

This species was described from nymphs collected in Honduras and eastern Mexico.

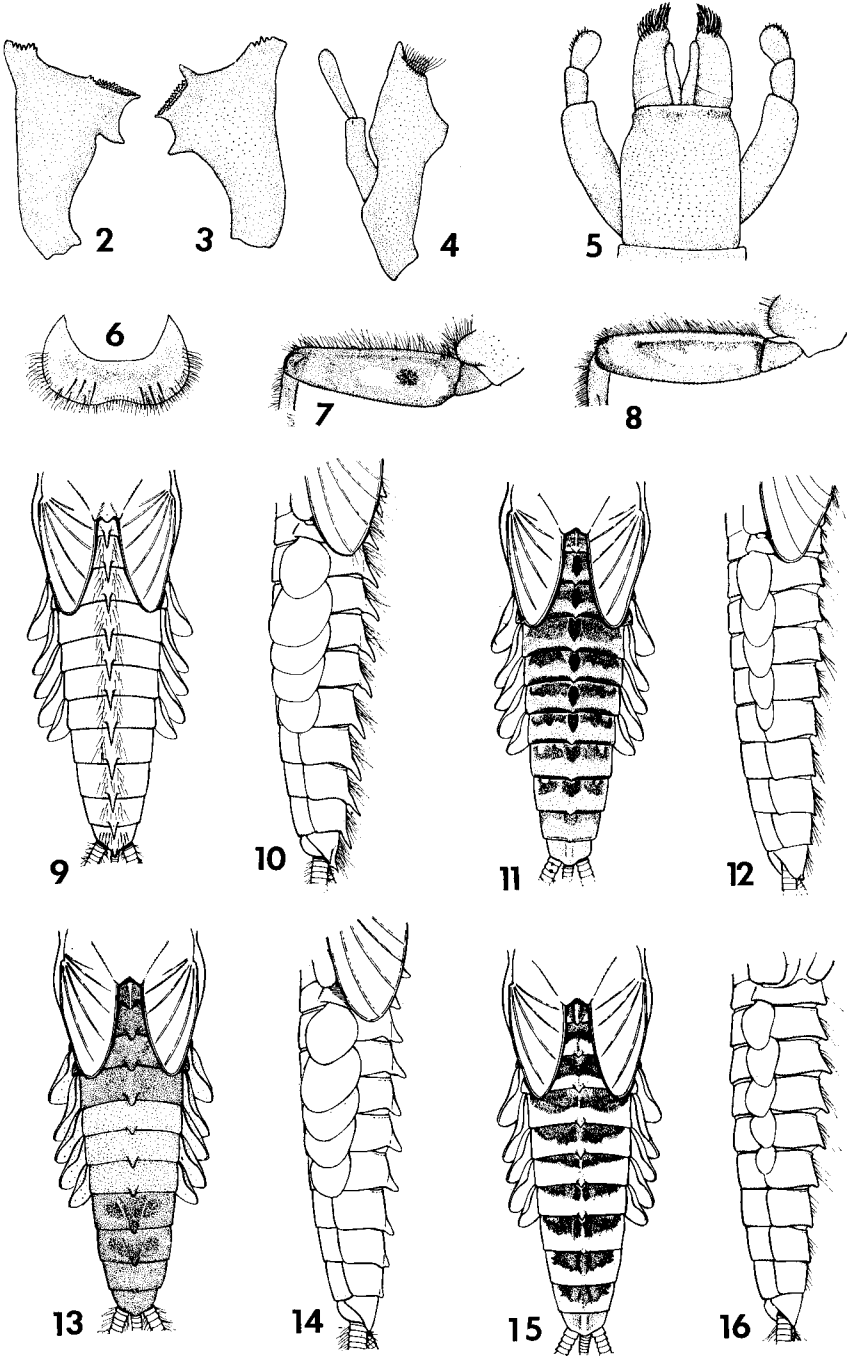
Nymph.—Length: body 3.0-4.0 mm. General color red-brown. Mouthparts as in Figs. 2-6. Pronotum and mesonotum without median elevation or tubercle; metanotum with median tubercle; coxae with or without gill; tarsal claws with 7 denticles. Abdominal terga dark red-brown (Figs. 22-23); terga 1-7 with median tubercle, moderately developed 1-6, poorly developed 7; abdominal gills pale; abdominal sterna with pink to red-brown lateral markings. Caudal filaments pale.

Type locality. Stream 5 mi. S. Ciudad Mendoza, Veracruz, Mexico.

Type deposition. California Academy of Sciences, San Francisco.

Distribution. This species is known from Honduras (ca. 14°05' N. latitude) in central Mexico, and Veracruz (ca. 19°11' N. latitude) in eastern Mexico.

Remarks.—The types of *B. furvus* Mayo, 1973, have been examined and the name is considered to be a junior synonym of *B. fuscipes*. The nymphs of both of these nominal populations bear a moderately to poorly developed hump on the posterior margin of the pronotum, and a moderately to poorly developed tubercle on tergum 7. Also, they have identical color patterns, a similar number of denticles on the tarsal claws, and they bear long coxal gills. Mayo (1973), in establishing the type locality of the nominal *B. furvus*,



cited the record as "Culinavara, Mexico, 1 January 1948, collector unknown." The locality and data is corrected to read, "Cuernavaca, Morelos, Mexico, 1-I-48, S. Mulaik (UU)."

Baetodes inermis Cohen & Allen

Baetodes inermis Cohen & Allen 1972: 129.

This species was described from a long series of nymphs collected from several localities in Mexico.

Nymph.—Length: body 4.0–5.0 mm. General color pale with dark markings. Pronotum and mesonotum with median tubercle or elevation; metanotum with small median tubercle; coxae with or without gills; tarsal claws with 7 denticles. Abdominal terga pale with dark anterior triangular markings, posterior margins pale; abdominal terga 1–7 with small median tubercle (Figs. 15–16); abdominal gills pale; abdominal sterna pale with anterior transverse markings (Fig. 17). Caudal filaments pale.

Type locality. Rio San Marcos near Ciudad Victoria, Tamaulipas, Mexico.

Type deposition. California Academy of Sciences, San Francisco.

Distribution. *Baetodes inermis* has a narrow latitudinal distribution in Mexico. Records are known from near Oaxaca (ca. 17°05' N. latitude) to Ciudad Victoria (23°43' N. latitude).

New Records. MEXICO: Tamaulipas. Rio Frio, 24-XII-39, L. Berner (UU); Rio Guayalejo, 22-XI-39, L. Berner (UU).

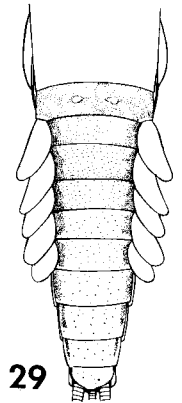
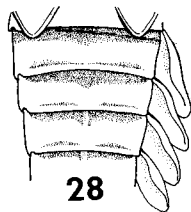
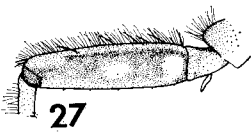
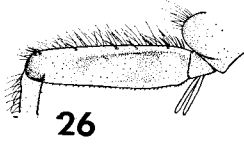
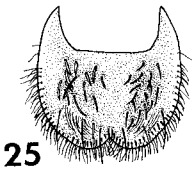
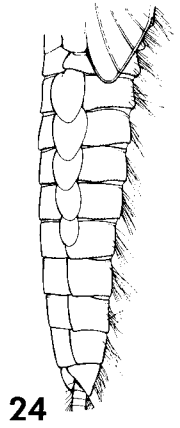
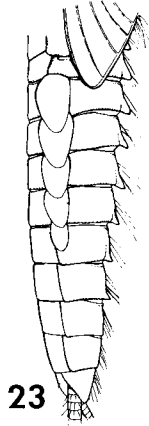
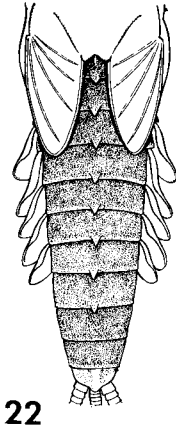
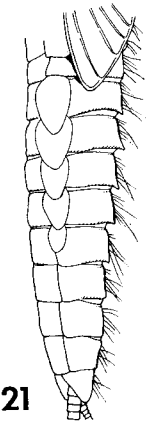
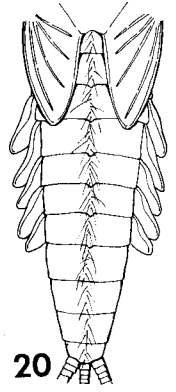
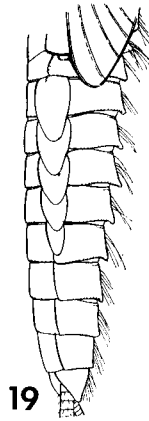
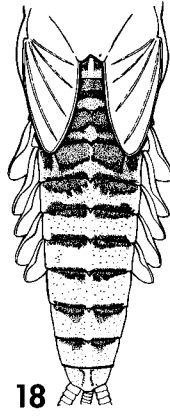
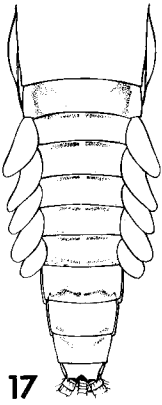
Baetodes longus Mayo

Baetodes longus Mayo 1973: 311.

Nymph.—Length: body 3.0–5.0 mm; caudal filaments 4.0–6.0 mm. General color pale with light brown markings. Head light brown, pale at sutures; occiput without setae. Thoracic nota pale with light brown markings; pronotum with small, barely discernible, median hump; mesonotum without median elevation; metanotum with moderately developed erect median tubercle; thoracic nota without setae; thoracic sterna pale, often with dark lines around leg bases; legs pale, often brown at apices; coxae with 2 long finger-like gills, gill length twice length coxae (Fig. 26); tarsal claws with 7–9 denticles. Abdominal terga pale; terga 1–8 often light

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Figs. 2–6. *Baetodes fuscipes*, mouthparts. 2, left mandible; 3, right mandible; 4, maxilla; 5, labium; 6, labrum. Figs. 7–8. Femora. 7, *B. tritus*; 8, *B. pictus*. Figs. 9–16. Abdomens. 9, *B. tritus*, dorsal view; 10, *B. tritus*, lateral view; 11, *B. pictus*, dorsal view; 12, *B. pictus*, lateral view; 13, *B. noventus*, dorsal view; 14, *B. noventus*, lateral view; 15, *B. inermis*, dorsal view; 16, *B. inermis*, lateral view.



brown at anterior margins; terga 9-10 pale; terga 1-8 with median tubercles, 1-6 moderately developed, 7 small, 8 barely discernible; terga without setae; abdominal gills pale; abdominal sterna pale. Caudal filaments pale.

Type locality. Rio Frio, Tamaulipas, Mexico.

Type deposition. University of Utah, Salt Lake City.

Distribution. This species is known only from two localities in Tamaulipas, Mexico.

Baetodes noventus Cohen & Allen

Baetodes noventus Cohen & Allen 1972: 130.

This species was described from nymphs collected in Central America.

Nymph.—Length: body 3.5-4.5 mm. General color tan with brown markings. Pronotum with well developed median tubercle; mesonotum without median elevation or tubercle; metanotum with moderately developed median tubercle; coxae with finger-like gill; tarsal claws with 6 denticles. Abdominal terga 1-3 unicolorous brown, 4-6 pale, 7-8 brown; abdominal terga 1-9 with median tubercle, tubercle well developed 1-7, moderately developed 8-9 (Figs. 13-14); abdominal gills pale with red markings; abdominal sterna pale with sublateral markings. Caudal filaments pale.

Type locality. Rio Mizata, 27 mi. W. La Libertad, El Salvador.

Type deposition. California Academy of Sciences, San Francisco.

Distribution.—*Baetodes noventus* has a very narrow latitudinal distribution in Guatemala, El Salvador, and Honduras (between 13°-15° N. latitude).

New Record. HONDURAS: *Dept. Comayagua*. S. Comayon, 17-X-64, J. S. Packer (UU).

Baetodes obesus Mayo

Baetodes obesus Mayo 1972: 233.

This species was described from two nymphs collected in eastern Mexico from the same type locality as *B. fortinensis*. Mayo reports this species as being without a dorsal tubercle on the abdominal segments, but careful

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Figs. 17-24. Abdomens. 17, *B. inermis*, ventral view; 18, *B. pallidus*, dorsal view; 19, *B. pallidus*, lateral view; 20, *B. velmae*, dorsal view; 21, *B. velmae*, lateral view; 22, *B. fuscipes*, dorsal view; 23, *B. fuscipes*, lateral view; 24, *B. deficiens*, lateral view. Figs. 25-29. Nymphal parts. 25, *B. longus*, labrum; 26, *B. longus*, femur; 27, *B. caritus*, femur; 28, *B. deficiens*, abdominal terga 3-5; 29, *B. caritus*, abdominal sterna.

examination of the type reveals small, barely discernible tubercles terga 1-7. This species differs from the above mentioned species only by minor morphological characters and future collections may disclose that they belong to the same population.

Nymph.—Length: body 3.0 mm. General color tan to brown. Pronotum and mesonotum without median elevation or tubercle; metanotum with median tubercle; coxae with finger-like gill; tarsal claws with 5 denticles. Abdominal terga 1-3 unicolorous tan, 4-6 pale, 7-8 with dark markings; abdominal terga 1-3 with small median elevation, elevation 4-7 barely discernible; abdominal sterna pale yellow, tinged with brown anteriorly. Caudal filaments pale.

Type locality. Rio Tenndido, 3 km. N. El Fortin, Veracruz, Mexico.

Type deposition. University of Utah, Salt Lake City.

Distribution. Known only from the type locality.

Baetodes pallidus Cohen & Allen

Baetodes pallidus Cohen & Allen 1972: 132.

This species was described from nymphs collected from Honduras and Mexico.

Nymph.—Length: body 3.5-4.5 mm. General color pale with dark brown markings. Pronotum and mesonotum without median elevation or tubercle; metanotum with moderately developed median tubercle; coxae usually with gill; tarsal claws with 6 denticles. Abdominal terga pale with dark anterior and posterior margins; terga 1-8 with median tubercle, moderately developed 1-7, barely discernible 8 (Figs. 18-19). Abdominal gills pale; abdominal sterna pale. Caudal filaments pale.

Type locality. Rio Clarrita at San Morano on Hwy 4, Dept. El Paraiso, Honduras.

Type deposition. California Academy of Sciences, San Francisco.

Distribution. *Baetodes pallidus* has a narrow latitudinal distribution from near Tegucigalpa, Honduras (ca. 14°05' N. latitude) to west central Mexico (ca. 20°30' N. latitude).

Baetodes pictus Cohen & Allen

Baetodes pictus Cohen & Allen 1972: 133.

This species was described from a single nymph collected in eastern Mexico.

Nymph.—Length: body 5.5-6.5 mm. General color brown with dark markings. Pronotum with well developed tubercle; mesonotum with small, barely discernible elevation; metanotum with small tubercle; coxae

without gills; femora without distinct median macula (Fig. 8); tarsal claws with 6 denticles. Abdominal terga brown, 2-6 with dark brown median macula; abdominal terga 1-9 with median tubercle; poorly developed 1-7, barely discernible 8-9 (Figs. 11-12); abdominal gills pale; abdominal sterna pale. Caudal filaments pale.

Type locality. Stream 5 mi. S. Ciudad Mendoza, Veracruz, Mexico.

Type deposition. California Academy of Sciences, San Francisco.

Distribution. Known only from three localities in Veracruz, Mexico.

New Records. Mexico: *Veracruz*. Rio Tenndido, 3 km. N. El Fortin, 1-VI-55, R. B. & J. M. Selander (UU); Rio Jamapa, 3 mi. NE Coscomatepec, 8-XI-64, R. K. Allen.

Baetodes tritus Cohen & Allen

Baetodes tritus Cohen & Allen 1972: 133.

This species was described from a long series of nymphs collected in Central America and Mexico.

Nymph.—Length: body 6.0-8.0 mm. General color tan with brown markings. Pronotum without median elevation or tubercle; mesonotum with moderately developed median tubercle; metanotum with well developed tubercle; coxae without gills; femora with dark anterior macula (Fig. 7); tarsal claws with 7-8 denticles. Abdominal terga tan, usually brown anterior markings; abdominal terga 1-10 with well developed median tubercle (Figs. 9-10); abdominal gills red with pale margins; abdominal sterna tan with brown paired sublateral longitudinal streaks. Caudal filaments pale.

Type locality. Rio Tecolapan near Santiago Tuxtla on Hwy 180, Veracruz, Mexico.

Type deposition. California Academy of Sciences, San Francisco.

Distribution. *Baetodes tritus* has the widest latitudinal distribution of any described species in the genus. Specimens have been collected from Panama (ca. 8°57' N. latitude) to Nuevo Leon, Mexico (ca. 25°40' N. latitude).

New Records. PANAMA: *Chiriqui Prov.* Boquita, 28-XII-69, L. T. Nielsen (UU). MEXICO: *Nuevo Leon*. Rio Ramos, 20-XII-39, L. Berner (UU).

Baetodes velmae n. sp.

Nymph.—Length: body 5.0-7.0 mm; caudal filaments 7.0-9.0 mm. General color dark brown with dark purple-brown markings. Head brown to dark brown with dark markings; occiput with setae. Thoracic nota brown with dark brown markings; pronotum without posterior median

elevation; anterior and posterior margins pronotum fringed with setae; mesonotum without median elevation; median margins wing-pads fringed with sparse setae; metanotum with small median tubercle; thoracic sterna brown to purple-brown; legs brown with darker brown markings, often pale medially; legs fringed with setae; coxae without gills; tarsal claws with 8 denticles. Abdominal terga brown often with variable brown markings, tergum 10 lighter brown; terga 1-6 with small median tubercles, tubercle segment 6 barely discernible (Figs. 20-21); terga with median row long setae; abdominal gills pale, often suffused with brown medially; abdominal sterna dark brown, 9-10 often pale. Caudal filaments pale.

Types.—Holotype: female nymph, small stream, Cerro Punta, Chiriqui Prov., Panama, 28-VII-69, L. T. Nielsen, in collection University of Utah, Salt Lake City, Paratopotypes: 4 female nymphs, same data as holotype, 2 nymphs in collection California State University, Los Angeles, remainder in collection University of Utah. Paratypes: 3 male and 5 female nymphs, small stream, Boquita Highlands, Chiriqui Prov., Panama, 28-XII-69, L. T. Nielsen, in collection University of Utah.

Remarks.—This species is named in honor of the late Velma Knox Mayo in recognition of her contributions to the knowledge of the nymphal taxonomy of *Baetodes*, and for her contributions to the knowledge of New World mayflies.

Acknowledgments

We thank G. F. Edmunds, Jr., University of Utah, and K. L. Stewart and R. G. McClure, North Texas State University, for the loan of specimens.

The research and writing upon which this report is based was supported by National Science Foundation grants.

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Received for publication 28 September 1977.

JOURNAL OF THE KANSAS ENTOMOLOGICAL SOCIETY
51(2), 1978, p. 269

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