

TEXAS CAENINAE (EPHEMEROPTERA: CAENIDAE), WITH DESCRIPTION OF A NEW SPECIES

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Abstract.—The subfamily Caeninae is examined with respect to its distribution within the state of Texas. Texas fauna includes *Amercaenis ridens* (McDunnough), *Caenis amica* Hagen, *C. arwini*, new species, *C. bajaensis* Allen and Murvosh, *C. hilaris* (Say), *C. diminuta* Walker, *C. latipennis* Banks, and *C. punctata* McDunnough. The report of *C. diminuta* represents a new state record. Some 26 new county records are provided for all species except *C. bajaensis*, and new Texas biotic province records are established for *C. amica* (Chihuahuan), *C. arwini* (southwestern Balconian), *C. diminuta* (Austroriparian and Texan), and *C. hilaris* (Kansan). Species ranges within and without the state are discussed. The highly distinctive *C. arwini* is described from a substantial series of larvae that demonstrate structural affinities primarily with *C. bajaensis*.

Key Words: mayflies, Texas, Caeninae

The only broad-scale account of the Ephemeroptera fauna of Texas has been that of Lugo-Ortiz and McCafferty (1995), where close to 100 now valid species were treated, including five species of Caeninae (family Caenidae). Four of those five Caeninae species had been originally recorded from Texas by Provonsha (1990) in his revision of the genus *Caenis* Stephens in North America, and in fact the Caeninae had been entirely unrecorded in Texas prior to 1990. Lugo-Ortiz and McCafferty (1995) first reported a species of *Amercaenis* Provonsha and McCafferty from Texas, and one additional species of *Caenis* was subsequently reported from Texas by Baumgardner et al. (1997).

Numerous samples of larvae of *Caenis* and *Amercaenis*—the only North American members of the subfamily Caeninae of the family Caenidae (see McCafferty and Wang

2000)—were taken from 19 counties in various regions of Texas between 1975 and 1997 by personnel associated with the Texas Natural Resource Conservation Commission or its predecessor agencies. Eight species were represented in the samples, including a distinctive new species of *Caenis* described herein, as well as a new state record for *C. diminuta*. Of previously known Texas species, only *C. bajaensis* was not represented in the studied samples. In addition to the new species and new state record, 23 new county records were associated with the six species of Caeninae previously known from Texas.

Herein we provide distributional data for each of the eight species of Caeninae now known from Texas, including brief references to the previous records (Provonsha 1990, Lugo-Ortiz and McCafferty 1995, Baumgardner et al. 1997, Wiersema and

McCafferty 1999) and new records detailed in full; brief remarks concerning the ranges of each species within and without the state; and the description of the new species as well as a comparison of it with other North American species of *Caenis*. Material examined of all species are made up of larvae housed in both the J. R. Davis personal collection and the Purdue Entomological Research Collections. Biotic provinces within the state that we refer to are after Blair (1950) (see also Lugo-Ortiz and McCafferty 1995). Preliminary species identifications were verified by A. V. Provonsha.

Amercaenis ridens (McDunnough)

Previous records.—Lugo-Ortiz and McCafferty (1995): Austin Co.

New records.—Colorado Co., San Bernard R. at FM 3013, VII-17-1997, J. R. Davis.

Remarks.—This mainly north-central and northeastern North American species is known from the Austroriparian and Texan biotic provinces of eastern Texas. It should also occur in the Great Plains region of the Kansan biotic province (panhandle of Texas) because it is known typically to inhabit sandy bottom rivers in the plains states (Provonsha and McCafferty 1985).

Caenis amica Hagen

Previous records.—Provonsha (1990): Austin Co., Jasper Co., and Orange Co.; Lugo-Ortiz and McCafferty (1995): Guadalupe Co., Travis Co., and Victoria Co.; Baumgardner et al. (1997): Hardeman Co. and Uvalde Co.

New records.—Presidio Co., Rio Grande, 10.5 km upstream from Presidio, XII-30-1975, J. R. Davis.

Remarks.—The new county record of this widespread species also represents a first record for the Chihuahuan biotic province of far western Texas. The species is now known from all six biotic provinces within the state. The new Rio Grande record, being shared with Mexico, also serves as a new Mexican record, although the re-

cent report of *C. punctata* from Nuevo Leon, Mexico by Wiersema and Baumgardner (2000), is possibly attributable to *C. amica* (see also remarks under *C. punctata*, below). Larvae of the two species may be easily confused (Provonsha, personal communication).

Caenis arwini McCafferty and Davis,
new species
(Figs. 1–4)

Larva.—Body length 3.0–4.0 mm. *Head*: Dorsal color pattern often as in Fig. 1; pair of relatively large more or less light spots well defined posterior to lateral ocelli; single large, light, ovate spot bordering posterior median stalk of epicranial suture; and single light spot anterior of epicranial suture branches between antennal bases. Antenna generally pale. *Thorax*: Dorsum with light to medium brown ground color (Fig. 1). Venter pale, cream, in some slight indication of light brown on prosternum. Pronotum (Fig. 1) with pale lateral borders. Mesonotum (Fig. 1) with conspicuous light spots, most with rounded margins (spots sometimes less apparent on wingpads). All legs pale except for brown coxal bases, and in some slight indication of distal-posterior, light brown dash on femora (Fig. 1). Forefemur (Figs. 1–2) with transverse row of spatulate setae in distal half (about one third distance from apex); posterior edge with moderately stout, sharp setae intermixed with short, fine, simple, hairlike setae; anterior edge with short, fine, simple, hairlike setae in basal half. Inner margin of foretibia (Fig. 2) with rows of marginal and submarginal stout setae. Hindtarsus (Fig. 3) with row of 8–10 stout, sharp, simple setae and row of 8–10 stout, fimbriate setae along inner (ventral) margin. Hindclaw with 15–20 minute marginal denticles. *Abdomen*: Tergum 1 usually light brown throughout; terga 2–9 with broad, pale lateral margins; terga 7–9 with broad, light, medial area; tergum 10 pale medially and light brown laterally. Sterna pale; sternum 9 (Fig. 4) with broadly notched distal margin (somewhat

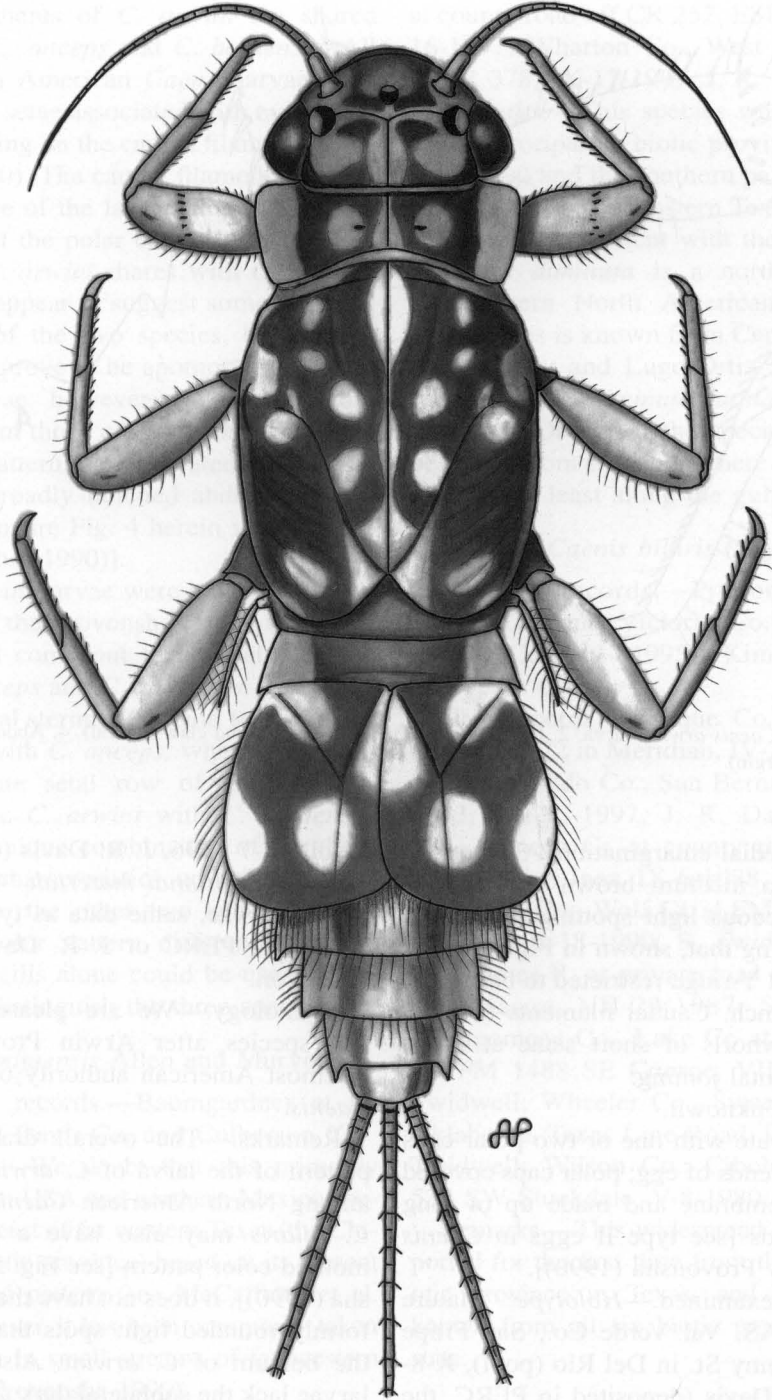
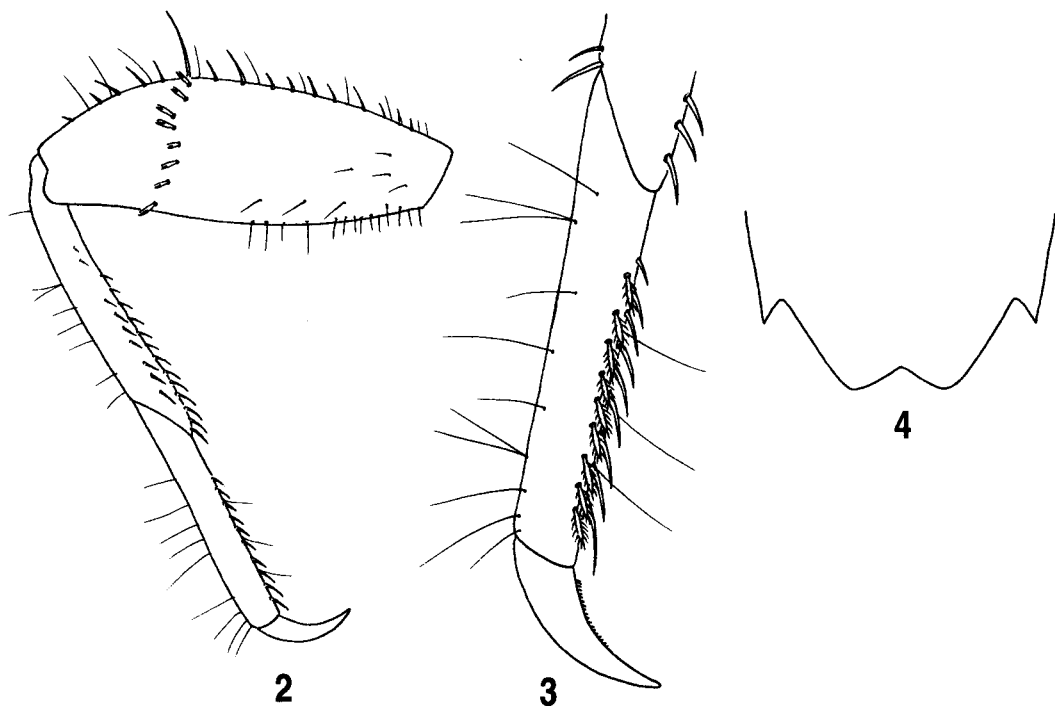


Fig. 1. *Caenis arwini*, larval habitus.



Figs. 2-4. *Caenis arwini*, larva. 2, Foreleg (dorsal). 3, Hindtarsus and claw (lateral). 4, Abdominal sternum 9 (posterior margin).

V-shaped medial emargination). Operculate gills light to medium brown and usually with conspicuous light spotting similar to, or approaching that, shown in Figure 1; setae on dorsal Y-ridge restricted to basal half of inner branch. Caudal filaments (Fig. 1) pale, with whorls of short setae at every other segmental joining.

Adult.—Unknown.

Egg.—Ovate with one or two polar caps restricted to ends of egg; polar caps covered by thick membrane and made up of long coiled threads [see type II eggs in *Caenis* discussed by Provonsha (1990)].

Material examined.—*Holotype*: Mature larva, TEXAS, Val Verde Co., San Felipe Cr. at Academy St. in Del Rio (pool), X-8-1996, J. R. Davis (deposited in PERC, the Purdue Entomological Research Collection, West Lafayette, Indiana). *Paratypes*: Six mature larvae, same data and deposition as holotype; an additional six mature larvae, Val Verde Co., San Felipe Cr. at US 277

(pool), X-7-1996, J. R. Davis (deposited in PERC). *Additional material*: 45 variously mature larvae, same data as types and deposited in PERC or J. R. Davis personal collection.

Etymology.—We are pleased to name this species after Arwin Provonsha, the foremost American authority on the genus *Caenis*.

Remarks.—The overall dramatic color pattern of the larva of *C. arwini* is unique among North American *Caenis*. Although *C. hilaris* may also have a distinctively mottled color pattern [see Fig. 5 in Provonsha (1990)], it does not have the almost uniformly rounded light spots that appear on the dorsum of *C. arwini*. Also *C. arwini* larvae lack the sublateral dark dashes on the abdominal terga that are found on many *C. hilaris* larvae. Structurally, the larvae of *C. arwini* and *C. hilaris* are highly dissimilar.

The short whorls of setae associated with only every other segmental joining on the

caudal filaments of *C. arwini* are shared only with *C. anceps* and *C. bajaensis*. All other North American *Caenis* larvae have long lateral setae associated with every segmental joining on the caudal filaments (Provonsha 1990). The caudal filament setation, leg armature of the larvae, and the characterization of the polar caps of the eggs, all of which *C. arwini* shares with *C. bajaensis*, would appear to suggest some close relationship of the two species, but only if these traits prove to be apomorphic. *Caenis arwini* larvae, however, are easily distinguished from those of *C. bajaensis* by both the color pattern, as elaborated above, and the more broadly notched abdominal sternum 9 [compare Fig. 4 herein with Fig. 45 of Provonsha (1990)].

If *C. arwini* larvae were being keyed out with use of the Provonsha (1990: 810) key, they would come out to couplet 3, along with *C. anceps* and *C. bajaensis*. The notch of abdominal sternum 9 would tend to place *C. arwini* with *C. anceps*, whereas the longer fimbriate setal row of the hindtarsi would place *C. arwini* with *C. bajaensis*. Thus, the unique combination of these two latter characteristics will diagnose *C. arwini* from the other two species. However, the color pattern differences of the operculate gills alone could be used to immediately distinguish the three species.

Caenis bajaensis Allen and Murvosh

Previous records.—Baumgardner et al. (1997): Jeff Davis Co. and Culberson Co.

Remarks.—We doubt that this primarily southwestern USA and northern Mexico species ranges east of far western Texas (the Chihuahuan biotic province) based on its present distributional pattern (see McCafferty et al. 1997); however, it has been commonly taken to the north in small streams of far western Nebraska (Provonsha 1990).

Caenis diminuta diminuta Walker

New records.—Titus Co., Tankersky Cr. at FM 899, W Mt. Pleasant, IX-9-1997, J. R. Davis; Wharton Co., West Bernard Cr.

at county road off CR 252, ESE Lissie, VII-16-1997; Wharton Co., West Mustang Cr. at CR 378, IX-17-1997, J. R. Davis.

Remarks.—This species was taken from the Austroriparian biotic province (far eastern Texas) and the southern part of the Texan biotic province (eastern Texas). This distribution is consistent with the fact that *C. diminuta diminuta* is a northeastern and southeastern North American subspecies. The species is known from Central America (McCafferty and Lugo-Ortiz 1992) as the subspecies *C. diminuta latina* McCafferty and Lugo-Ortiz, but the species has yet to be taken from Mexico, where we expect it to range at least along the gulf corridor.

Caenis hilaris (Say)

Previous records.—Provonsha (1990): Austin Co. and Victoria Co.; Lugo-Ortiz and McCafferty (1995): Kimble Co. and Val Verde Co.

New records.—Bosque Co., N. Bosque R. at Hwy 22 in Meridian, IV-25-78, D. Petrick; Colorado Co., San Bernard R. at FM 3013, VII-18-1997, J. R. Davis; Jackson Co., Arenosa Cr. at county road off Hwy 59, 3.5 mi N Inez, IX-6-1988, S. Twidwell; Lipscomb Co., Wolf Cr. at FM 1454 E Lipscomb, VII-18-1990, S. Twidwell; Mason Co., James R. at private road off FM 2389 SW Mason, VII-23-1987, S. Twidwell; Montgomery Co., Lake Cr. at private road off FM 1488 SE Conroe, VII-20-1988, S. Twidwell; Wheeler Co., Sweetwater Cr. at Oklahoma-Texas Line Road, IX-9-1987, S. Twidwell; Wilson Co., Cibolo Cr. at FM 537 SW Stockdale, V-8-1980, J. R. Davis.

Remarks.—This widespread species is reported for the first time from the Kansan biotic province in Texas, and thus is now known from all six biotic provinces in the state.

Caenis latipennis Banks

Previous records.—Provonsha (1990): Austin Co., Jasper Co., La Salle Co., Palo Pinto Co., and Webb Co.; Lugo-Ortiz and McCafferty (1995): Blanco Co., Kerr Co.,

Kimble Co., and Travis Co.; Baumgardner et al. (1997): Reeves Co.; Wiersema and McCafferty (1999): Victoria Co.

New records.—Bosque Co., N. Bosque R. at Hwy 22 in Meridian, IV-25-78, D. Petrick; Cameron Co., Rio Grande 0.3 km downstream from El Jardin intake SE Brownsville, I-14-1993, J. R. Davis; Donley Co., Lelia Lake Cr. at FM 2471 NE Lelia Lake, VIII-17-1989, S. Twidwell; Harris Co., Greens Bayou at Hardy Road in Aldine, VI-27-1995, J. R. Davis; Lipscomb Co., Wolf Cr. at FM 1454 E Lipscomb, VII-18-1990, S. Twidwell; Mason Co., James R. at private road off FM 2389 SW Mason, VII-23-1987, S. Twidwell; Newton Co., Big Cypress Cr. at SH 87 NW Deweyville, IX-12-1989, S. Twidwell; Val Verde Co., San Felipe Cr. at US 277 in Del Rio (pool), X-7-1996, J. R. Davis; Wheeler Co., Sweetwater Cr. at Oklahoma-Texas Line Road, IX-9-1987, S. Twidwell.

Remarks.—This widespread species has been known from all of the biotic provinces in Texas, and the new county records further demonstrate its somewhat ubiquitous nature. *Caenis latipennis* is also known from all of the Mexican states bordering Texas (Randolph and McCafferty 2000).

Caenis punctata McDunnough

Previous records.—Provonsha (1990): Jasper Co.; Lugo-Ortiz and McCafferty (1995); Kimble Co., Lavaca Co., Mason Co., Travis Co., and Victoria Co.; Baumgardner et al. (1997): Crosby Co. and Tom Green Co.

New records.—Bosque Co., N. Bosque R. at Hwy 22 in Meridian, IV-25-78, D. Petrick; Galveston Co., Dickinson Bayou near American Canal, SE League City, X-5-1987, S. Twidwell; Harris Co., Greens Bayou at Hardy Road in Aldine, VI-27-1995, J. R. Davis; Harris Co., Buffalo Bayou at Shepherd Dr. in Houston, VII-17-1985, J. R. Davis; Jackson Co., Arenosa Cr. at county road off U.S. 59, 3.5 mi N Inez, IX-6-1988, S. Twidwell; Randall Co., Prairie

Dog Town Fork Red R. below Tanglewood Dam, NE Canyon, V-13-1992, S. Twidwell.

Remarks.—This northeastern and southeastern North American species is known from all biotic provinces in Texas except the Tamaulipan (far south) and Chihuahuan (far west). If it occurs in Mexico, it more than likely dispersed southward via the Gulf of Mexico Maritime Corridor (see Lugo-Ortiz and McCafferty 1995).

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