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NEW LARVAL VARIANTS AND DISTRIBUTIONAL RECORDS FOR  
*PLAUDITUS CESTUS* (EPHEMEROPTERA: BAETIDAE)C. R. Lugo-Ortiz and W. P. McCafferty<sup>1</sup>

## ABSTRACT

The larval stage of *Plauditus cestus* (Ephemeroptera: Baetidae) is re-described to incorporate mouthpart, leg, and abdominal characteristics not previously accounted for. The examination of populations not studied previously shows abdominal coloration and morphology to vary considerably. Additional distributional records from North America are provided.

Provonsha and McCafferty (1982) originally described *Pseudocloeon cestum* from larvae and male and female adults from Indiana populations. McCafferty and Waltz (1990) later transferred the species to *Barbaetis* Waltz and McCafferty. Lugo-Ortiz and McCafferty (1998) recently erected the genus *Plauditus* for all North American species assigned to *Baetis* Leach that lack hind wings or hindwingpads as larvae; *P. cestus* demonstrates its natural affinities with this genus and was placed within it. The original species description of *P. cestus* was relatively incomplete with respect to the larval stage. It did not cover several characters that are now known to be important, and did not take into account atypical individual variability that has been discovered recently in additional populations from eastern North America.

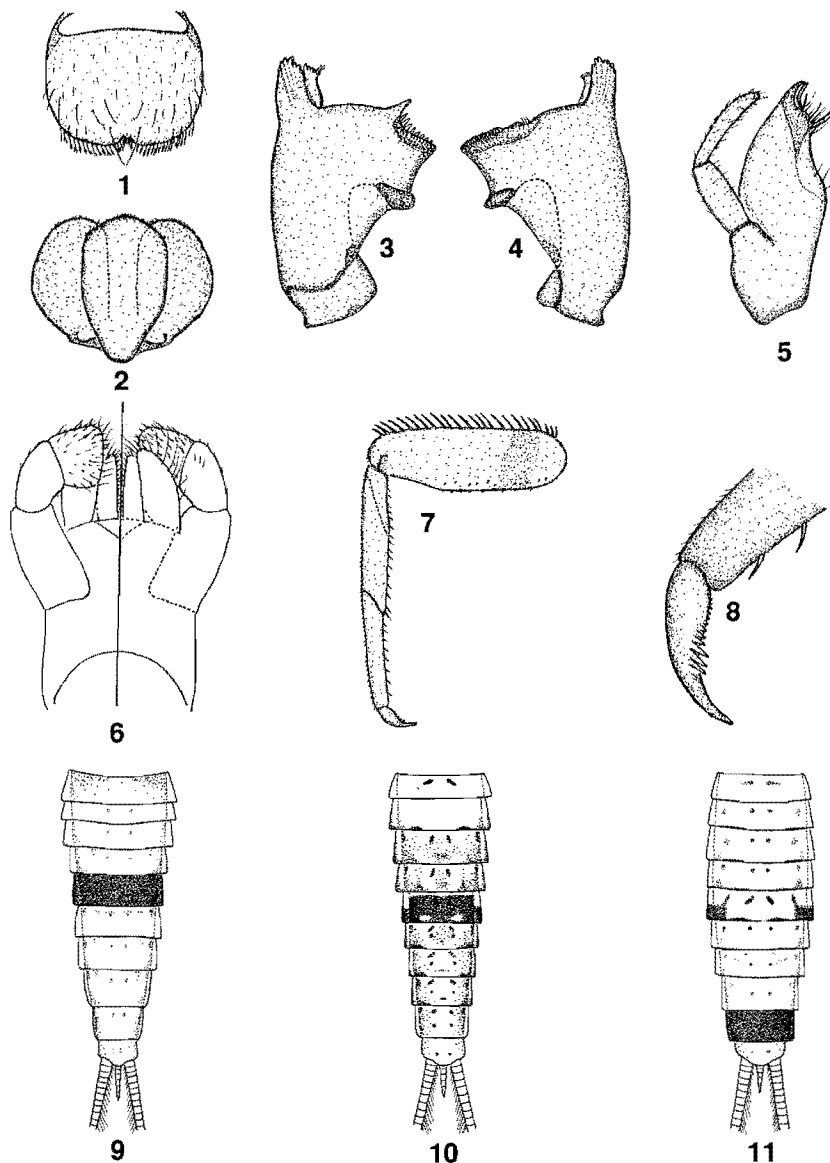
We herein provide a redescription of the larva of *P. cestus* that will allow its comparative assessment within *Plauditus* and that will also allow atypical geographic populations to be diagnosed correctly. We additionally provide distributional records that considerably extend the known range of the species in North America. Except where otherwise noted, the material examined is housed in the Purdue Entomological Research Collection, West Lafayette, Indiana.

***Plauditus cestus* (Provonsha and McCafferty)**

*Larva.* Body length: 3.5–4.5 mm; caudal filaments length: 1.7–2.1 mm.

*Head:* Coloration cream to medium yellow-brown, with medium brown to red-brown specks and markings. Labrum (Fig. 1) with branched, marginal setae, submarginal pair of long, fine, simple setae, and row of long, fine, simple setae near middle. Hypopharynx as in Figure 2. Left mandible (Fig. 3) with six denticles. Right mandible (Fig. 4) with seven denticles. Maxillae (Fig. 5) with palp segment 1 not reaching apex of galealacinae; palp segment 2 slightly longer than segment 1, with minute, fine, simple setae scattered

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Figures 1-11. *Plauditus cestus*, larva. 1. Labrum. 2. Hypopharynx. 3. Left mandible. 4. Right mandible. 5. Left maxilla. 6. Labium (left-ventral; right-dorsal). 7. Right foreleg. 8. Tarsal claw. 9. Abdominal color pattern (common). 10. Abdominal color pattern (mature South Carolina specimen). 11. Abdominal color pattern (immature South Carolina specimen).

over surface; three short, fine, simple setae near medial hump, and one short, fine, simple seta on opposing face. Labium (Fig. 6) with palp segment 2 with three to four short, fine, simple setae dorsally; palp segment 3 with abundant short, fine, simple setae scattered over surface.

*Thorax:* Coloration yellow-brown to light brown, with medium brown to red-brown speckling scattered over surface. Hindwingpads absent. Legs (Fig. 7) cream; femora with faint red-brown to pale brown band subproximally; tarsal claws (Fig. 8) with one row of 10–11 denticles.

*Abdomen* (Figs. 9–11): Ground coloration pale to medium yellow-brown, with medium brown to red-brown speckling; terga 1 and 10 usually pale to medium yellow-brown; terga 2–4 and 6–10 usually with paired submedial medium brown to red-brown specks; segment 5 usually dark brown dorsally and ventrally; tergum 9 usually medium yellow-brown to light brown. Sterna sometimes with small subdermal medium to dark brown spots medially. Cerci with medium to dark brown band slightly beyond middle. Medial caudal filament cream, with four to five short segments.

*Material examined:* Canada. Ontario Prov.: Nottawasaga R., at Simcoe Side Rd. 10, 16-VI-1997, R. W. Griffiths and C. Jones, two larvae. USA. Idaho: Madison Co., Henry's Fork, nr. Rexburg, VIII-1993, three larvae (deposited in the Colorado State University Collection, Fort Collins); Kentucky: Carter Co., Big Sinking Cr., 1 mi upstream from confluence with Little Sandy R., 31-V-1978; South Carolina: Edgefield Co., double branch of Horn Cr., at SR-52, 3-VI-1997, J. F. Napolitano, two larvae (mouthparts and forelegs of one larva mounted on slide [medium: Euparal]); Greenville Co., Big Durbin Cr., at S-23-191, about 2 mi N of Fountain Inn, 18-VII-1979, J. B. Glover, two larvae; Spartanburg Co., Maple Cr., at Co. Rd. 644, 22-VIII-1983, J. B. Glover, larva; Union Co., Henry Cr., at Co. Rd. 29, 13-VI-1983, J. B. Glover, two larvae; York Co., Allison Cr., at SC Hwy 49, about 7 mi SE of Clover, 12-VI-1980, J. B. Glover, six larvae (one larva mounted on slide [medium: Euparal]); York Co., Calabash Cr., at S-46-414, 2.5 mi SE of Clover, J. B. Glover, three larvae; Vermont: Windhams Co., North Brook at west edge of Wilmington, 20-VI-1976, W. P. McCafferty, A. V. Provonsha, M. Minno, larva.

*Species variability:* Larvae of *P. cestus* show considerable variation in abdominal coloration. The most common pattern is shown in Fig. 9 (see also Provonsha and McCafferty [1982]: Fig. 8), where segment 5 is uniformly dark. However, we have seen a mature larval specimen from South Carolina that is distinct in having more extensive speckling and markings dorsally (Fig. 10) and a pale sternum 5 that is only laterally darkened. The abdomen of other mature larval specimens from South Carolina is distinctive in that it is uniformly cream and lacks all banding. One of the immature larval specimens from South Carolina is even more striking because tergum 5 is mostly cream with dark brown distolateral markings and segment 9 is uniformly dark brown (banded) (Fig. 11). In addition, some specimens from South Carolina have sterna with small subdermal medial spots, whereas most specimens lack those spots. Because *P. cestus* co-occurs with *P. gloveri* McCafferty and Waltz in South Carolina (McCafferty and Waltz 1998), morphological differences rather than color pattern should be used to distinguish their larvae.

We have also discovered that the appearance of the abdominal shape of *P. cestus* can vary significantly. The most commonly collected specimens have a somewhat dorsoventrally compressed abdomen (Figs. 9, 11; see also Provonsha and McCafferty [1982]: Fig. 8). However, the abdomen of some specimens may appear distended and thus more slender and fusiform (Fig. 10). As far as we know, this distention occurs at the time of fixation and therefore may be an artifact of preservation. We have seen similar shape distortion in some

other species of *Plauditus*. Observation of live material is now required to confirm this.

*Habitat*: Provonsha and McCafferty (1982) indicated that larvae of *P. cestus* are found in pea gravel in shallow waters (3–35 cm) of third to fourth order streams with slow to moderate currents. The abdominal and cercal banding of larval *P. cestus* break up their body form against the backdrop of such of a substrate, making them extremely difficult to see in the field. Their small size requires a very thin mesh to capture by kickscreen.

*Distribution*: *Plauditus cestus* was previously known from Arkansas, Colorado, Illinois, Indiana, Iowa, and Missouri (Provonsha and McCafferty 1982, McCafferty et al. 1993, Klubertanz 1995, Sarver and Kondratieff 1997). The new records given herein (see material examined above) indicate that the species is quite widespread in North America.

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