

**ADULTS OF *CAMELOBAETIDIUS WALTZI***  
**(EPHEMEROPTERA: BAETIDAE),**  
**WITH FIELD NOTES<sup>1</sup>**

Thomas H. Klubertanz<sup>2</sup>, Darrin M. Jones<sup>3</sup>

**ABSTRACT:** Adult males and females of *Camelobaetidius waltzi* (Ephemeroptera: Baetidae) are described for the first time. Previously, the species was known from larvae collected in Indiana, Iowa, and Texas. Adults were reared from populations in southeast Nebraska. Although the reliability of species-level characters in adult *Camelobaetidius* is uncertain, males of *C. waltzi* appear separable from sympatric species based on shape and color of the turbinate eyes and on abdominal coloration. Females are similar to males in wing and femoral coloration. Larvae were found in areas with current velocities greater than 0.52 m/sec and with a pH range of 8.5 to 9.0. Subimagos were observed emerging from eddies within riffle areas at dusk.

Eight nominal species of *Camelobaetidius* (Ephemeroptera: Baetidae) are known from North America; five are known from the United States (Lugo-Ortiz and McCafferty 1995, Wiersema 1998). Larvae of *C. waltzi* McCafferty were described by McCafferty and Klubertanz (1994) based on specimens from Iowa and Indiana. Recently, Baumgardner and Wiersema (1998) reported this species from Texas. McCafferty and Klubertanz (1994) also provided limited information about larval ecology and habitat. Although adults of four other species of North American *Camelobaetidius* are known, adults of *C. waltzi* have not been described. Recently, we found large populations of *C. waltzi* in southeast Nebraska and successfully reared adults. This paper describes male and female *C. waltzi* for the first time and includes new data regarding the larval ecology and emergence of the species.

Larvae were taken from southeast Nebraska and reared in the laboratory. The coloration of live adults was observed, and then specimens were preserved in alcohol. Wings were dry-mounted on slides. Genitalia were cleared briefly in dilute potassium hydroxide, dehydrated, and mounted in Lipshaw's medium (soluble in xylene). Voucher specimens have been deposited in the Purdue Entomological Research Collection.

*Camelobaetidius waltzi* McCafferty

**Larva.** Described in McCafferty and Klubertanz (1994).

**Adult male** (live or in alcohol). Body length 5-6 mm, forewings 4-5 mm, hindwing 1 mm,

<sup>1</sup> Received March 24, 1998. Accepted May 10, 1988.

<sup>2</sup> Department of Biological Sciences; University of Wisconsin – Rock County, 2909 Kellogg Ave., Janesville, WI, 53546.

<sup>3</sup> Division of Science and Technology, Peru State College, Peru, NE 68421.

caudal filaments 9 mm. Head mostly pale; dorsum slightly darker than venter; dark brown stripe along anterior margin of head between compound eyes and base of antennae. Ocelli white. Turbinate portions of eyes brown-orange, well developed, oval in dorsal view and obstructing view of lateral portion of the eyes and the pronotum; anterior portions separated by distance nearly equal to width of lateral ocelli; posterior portions variably separated but never touching. Antennae gray-brown, first segment slightly paler than second. Thorax gray, yellow-brown, and orange; pronotum mostly gray; mesonotum pale yellow-brown medially, gray-brown laterally, with thin black line along meson; mesoscutellum yellow; metanotum gray-brown; intersegmental areas in meso- and metathorax bright orange, fading to white in alcohol; prosternum entirely white, mesosternum and metasternum gray. Legs yellowish-white; irregular, dorsal lemon-yellow patch on distal end of femora, fading quickly in alcohol; foretibial length 1.1 times length of foretarsus. Wings as in Figure 1, membrane and veins mostly hyaline; forewings of live specimens slightly yellow at base and in costal and subcostal interspaces, tip of wing sometimes with 0.5 mm wide yellow band; usually seven slanting, stigmatic crossveins; marginal intercalaries paired, except last three near wing base. Hindwings (Fig. 1b) with two longitudinal veins; costal process long, acute, and occasionally yellow; undulation of wing margin distal to costal process subtle and visible only in anterior, edge-on view. Abdomen mostly pale; segments 1-6 hyaline, terga variably marked yellow in live specimens, occasionally as a medial stripe; trachea not pigmented; segments 7-10 brown to yellow-brown, tergum 7 slightly paler, sterna 7-10 chalky white. Genitalia white and as in Figure 1c; slightly clubbed setae on posterior margin of sternum 9, similar setae medially on second segment of forceps; basal segment of forceps with rounded medial projection; terminal segment of forceps 3 to 4 times longer than wide,

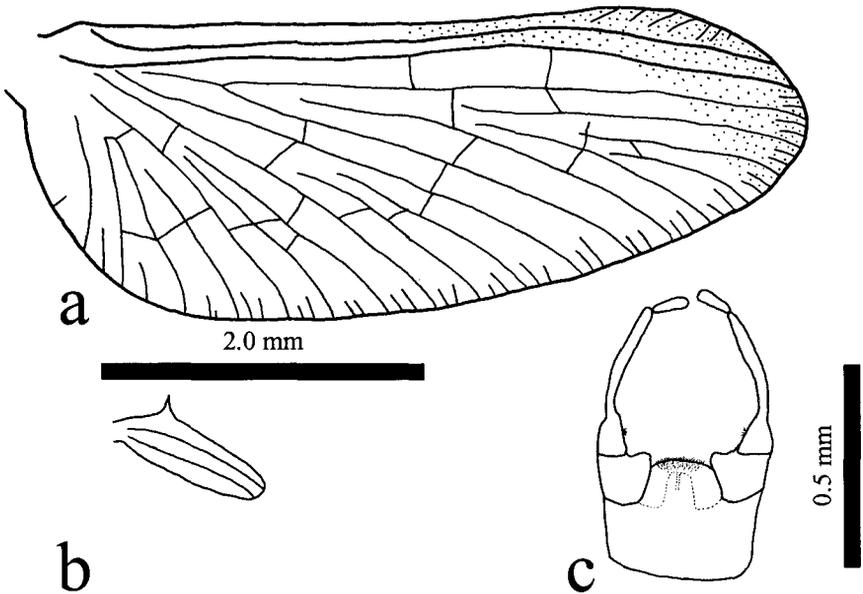


Figure 1. *Camelobaetidius waltzi*, adult male: a. forewing; b. hindwing; c. genitalia (ventral view).

slightly wider at tip. Tails white.

**Adult female** (live or in alcohol). Size similar to male, but coloration more uniformly yellow-brown. Head without dark, transverse band under eyes. Thoracic coloration similar to male. Legs of fresh specimens pale, dorsal yellow band at distal end of femora as in male. Wings hyaline, yellow color more restricted than in male. Abdomen brown to yellow-brown; terga pale brown medially, nearly orange-brown laterally; sterna paler than terga. Tails white.

**Material examined** (reared adults). North Fork of Big Nemaha River, 6.4 km N of Table Rock, Pawnee Co., NE, IX-3-1997 (9 ♂♂, 6 ♀♀), IX-7-1997 (2 ♀♀), T. Klubertanz, and D. Jones. South Fork of Big Nemaha River, Hwy 8, 12.9 km SW of Humboldt, Richardson Co., NE, VII-23-1997 (1 ♀), T. Klubertanz, VIII-3-1997 (4 ♂♂, 1 ♀), T. Klubertanz and D. Jones.

**Diagnosis.** Species identification of *Camelobaetidius* adults is made difficult by the lack of reliable characters. In the *C. waltzi* we examined, the color and shape of the turbinate eyes, the distribution and shade of color on the thorax and abdomen, and the shape of the hind wings were consistent.

*C. variabilis* and *C. waltzi* occur together in Texas (Baumgardner and Wiersema 1988). Adults of *C. variabilis* from Texas were examined and compared to *C. waltzi* from Nebraska. *C. waltzi* is slightly smaller and has shorter wings. Its turbinate eyes are larger, broader, and far more elevated above the head than in *C. variabilis*. The latter also has paler eyes than *C. waltzi*. The abdominal terga of *C. variabilis* are uniformly brown, with darkly pigmented trachea. In *C. waltzi*, the anterior segments of the abdomen are pale, and the trachea are not visible.

The turbinate eyes of *C. waltzi* are similar in shape, but not in color, to those of *C. mexicanus* (Traver and Edmunds) described in McCafferty and Provonsha (1993). Although *C. penai* (Traver and Edmunds) larvae from Argentina have labial palpi similar to *C. waltzi*, the turbinate eyes in adults of that species are contiguous dorsally (Traver and Edmunds 1968). None of the males or females of *C. waltzi* show purplish abdominal markings often found on *C. arriaga* (Traver and Edmunds).

The yellow pigment on the wings, femora, and abdomen were useful in separating *C. waltzi* from other baetids in our bulk samples. However, since they fade rapidly, they are not useful for identifying preserved specimens at either the generic and species level.

**Field Notes.** Ecological data for *C. waltzi* have been published only in McCafferty and Klubertanz (1994). This species is known from the Des Moines River (Iowa), the Wabash River (Indiana), and from Texas (Baumgardner and Wiersema 1998). The Des Moines and Wabash Rivers are larger than either the North or South Fork of the Big Nemaha River of Nebraska. In 1996, one larva also was taken from Muddy Creek, a much smaller river in southeast Nebraska (Richardson Co.). During August and September, 1997, we monitored depth,

current velocity, and pH of the North and South Forks of the Big Nemaha River. Larvae were common in current velocities between 0.52 and 1.19 m/sec, the greatest velocity recorded at any site. These conditions frequently were found in riffle areas where the water was only 0.3 to 1.0 m deep. Water pH where larvae were found ranged from 8.5 to 9.0. Larvae typically were found on the upper surface of rocks that were covered with mats of filamentous algae.

McCafferty and Klubertanz (1994) listed mayflies found with *C. waltzi* in the Des Moines River. However, the sites along the North and South Forks of the Big Nemaha River have been more thoroughly sampled. In the North Fork of the Big Nemaha River, *Isonychia sicca* (Walsh) was the most common mayfly, whereas *Baetis intercalaris* was the most common mayfly found with *C. waltzi* at the South Fork site. Other species commonly found with *C. waltzi* were *Fallceon quilleri* (Dodds), *Tricorythodes* sp., and *Stenonema terminatum* (Walsh). Hydropsychid caddisfly genera abundant on rocks with *C. waltzi* were *Hydropsyche*, *Cheumatopsyche*, *Ceratopsyche*, and *Potamyia*.

**Adult Emergence.** Emergence of five subimagos was observed at dusk, 12.9 km N of Table Rock in Pawnee County, NE, on IX-7-1997. Emergence was from a small eddy (1 m in diameter) within a riffle area with high current. Subimagos emerged directly from the water surface and quickly ascended before being netted. Two of the captured subimagos (females) successfully were reared to confirm species identification.

#### ACKNOWLEDGMENTS

We thank R. E. Clopton (Peru State College) and L. G. Higley (University of Nebraska - Lincoln) for suggestions and critique of the manuscript. We also are grateful to R. E. Clopton for assistance with photomicroscopy. Finally, we thank D. A. DeWitt for field assistance.

#### LITERATURE CITED

- Baumgardner, D. E. and N. A. Wiersema. 1998. Additions to the inventory of Texas mayflies (Ephemeroptera). *Entomol. News* 110: 70-71.
- Lugo-Ortiz, C. R. and W. P. McCafferty. 1995. Taxonomy of the North and Central American species of *Camelobaetidius* (Ephemeroptera: Baetidae). *Entomol. News* 106: 178-192.
- McCafferty, W. P. and T. H. Klubertanz. 1994. *Camelobaetidius* (Ephemeroptera: Baetidae) in Indiana and Iowa: new species and range extension. *Proc. Entomol. Soc. Wash.* 96: 37-43.
- McCafferty, W. P. and A. V. Provonsha. 1993. New species, subspecies, and stage descriptions of Texas Baetidae (Ephemeroptera). *Proc. Entomol. Soc. Wash.* 95: 59-69.
- Traver, J. R. and G. F. Edmunds, Jr. 1968. A revision of Baetidae with spatulate-clawed nymphs (Ephemeroptera). *Pac. Insects* 10: 629-677.
- Wiersema, N. A. 1998. *Camelobaetidius variabilis* (Ephemeroptera: Baetidae), a new species from Texas, Oklahoma and Mexico. *Entomol. News* 109: 21-26.