

DESCRIPTION OF ADULTS OF *LABIOBAETIS*
APACHE (EPHEMEROPTERA: BAETIDAE)
WITH ADDITIONS AND CORRECTIONS TO THE
INVENTORY OF COLORADO MAYFLIES¹

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ABSTRACT: Male and female adults of *Labiobaetis apache* are described from specimens collected in northwestern Colorado, USA. Biological notes for this species are given and a key separating the male adults of the six North American species of *Labiobaetis* is provided. Additional Colorado distributions for *L. dardanus* and *Baetis notos* are given. *Cinygmula tarda* is reported for the first time in Colorado.

McCafferty and Waltz (1995) elevated the subgenus *Labiobaetis* Novikova and Kluge to generic rank. They included five North American species formerly placed in the *Baetis propinquus* species group (Moriyama and McCafferty 1979a) and described a new species, *L. apache*, based on larvae collected in Arizona and Utah. They also provided an illustrated key to the larvae of all six North American species of *Labiobaetis*. Previously, the larvae in this group were treated diagnostically by Moriyama and McCafferty (1979b) and Soluk (1981).

Originally reported as *Baetis propinquus* (Walsh) by McCafferty *et al.* (1993), the larvae collected from Douglas Creek in Rio Blanco Co., Colorado were reexamined and determined to be *L. apache*. Previous to its description, the larvae of *L. apache* would key to *B. propinquus* as characterized by Moriyama and McCafferty (1979b).

A key separating adult males of the five North American species now included under *Labiobaetis* was provided by Moriyama and McCafferty (1979a). At that time *L. apache* was unknown. Herein, we describe the adults of *L. apache*, thus completing the adult taxonomy of all known species of this genus in North America. During July, 1996, we returned to the Douglas Creek site and collected a large series of mature larvae for rearing. The following description is based on reared adults recently preserved in alcohol.

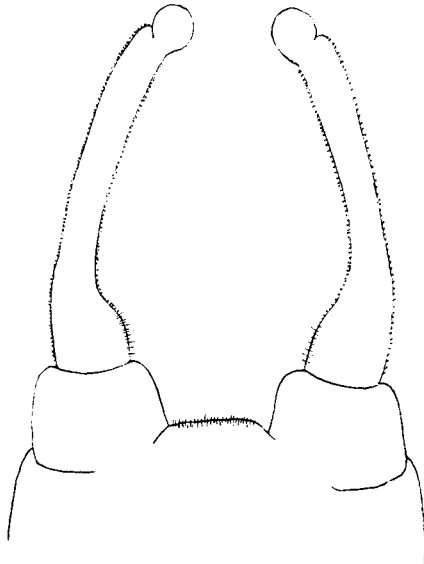
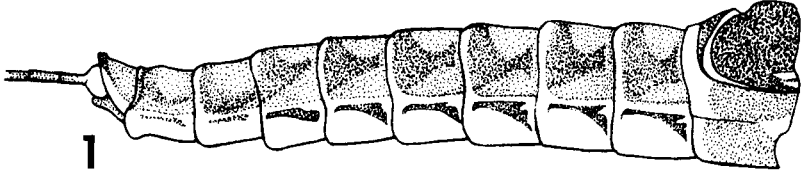
Labiobaetis apache McCafferty and Waltz

Adult male. Body length 5.0-6.0 mm, forewings 5.0-5.5 mm, hindwings 1.0 mm, caudal filaments 9-10 mm. Head brown; antennal scape and pedicel light brown, flagellum light brown basally, pale apically; turbinate eyes orange. Thoracic nota and sterna dark brown, intersegmental areas white,

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some stained with orange: forelegs smoky, apical 1/5 of foretibia pale, middle and hindlegs pale, inner apical margin of 1st and 2nd tarsal segments produced into a spine, all claws slightly darkened: forewings hyaline, basal area stained with brown, veins colorless, stigmatic area cloudy; hindwings hyaline, with two longitudinal veins and lacking a costal projection. Abdominal terga light brown with distinctive brown markings (Fig. 1): first abdominal sternite stained with brown, remaining abdominal sterna pale: sterna 2-9 with prominent red-brown mark laterally (Fig. 1) sometimes only visible on 2-6. Caudal filaments with basal three segments stained with red-brown, articulations of segments 4-6 also stained with red-brown, remainder of filament pale. Forceps white, basal 1/3 of first segment often stained with brown; basal enlargement of second segment as wide as long, terminal segment short and rounded; ventral posteromedian projection between forceps bases covered with setae, shaped as in Fig. 2.



Figures 1-2 *Labiobaetis apache*. Fig. 1 Adult male abdomen, lateral view. Fig. 2, male genitalia, ventral view.

Adult female. Body length 5.5-6.0 mm, forewings 5.0-5.5 mm, hindwings 1.0 mm, caudal filaments 9-10 mm. Head tan; lateral ocelli ringed with dark brown; antennae as in male. Thoracic nota and sterna generally light brown, metanotum and parts of the metasternum darker brown; all legs pale, tarsal spines as in male but present on forelegs as well. Wings similar to male but with lightly shaded longitudinal veins. Abdominal terga tan; abdominal sterna pale. Dorsal and ventral abdominal markings as in male (Fig. 1). Caudal filaments as in male.

Material examined. Colorado: Rio Blanco Co., Douglas Creek at Rt. 64. 19 July 1996. B. Kondratieff and R. Durfee, 26 males 23 females and 10 male and 9 female subimagos (reared), deposited in the C. P. Gillette Museum of Arthropod Diversity, Colorado State University, Fort Collins, Colorado.

Diagnosis: The abdominal markings (Fig. 1) of both the male and female adults of *L. apache* readily distinguish it from the other North American *Labiobaetis*. These markings are so distinctive that field identification of adults and subimagos is possible. In alcohol preserved specimens these color patterns may fade, particularly the dorsal markings on the male. Male genitalia of *L. apache* are very similar to *L. dardanus* (McDunnough). Specimens of *L. dardanus* from the Arkansas River, Pueblo Co., Colorado and the Niobrara River, Sioux Co., Nebraska were compared to *L. apache* and no major differences in the male genitalia were noted.

We modify the following key to the adult males of North American *Labiobaetis* by Morihara and McCafferty (1979a) to include *L. apache*.

1. Ventral posteromedian projection between forceps bases covered with setae (Morihara and McCafferty, 1979a; Figs. 12, 13, 15, 18) 2
 Ventral posteromedian projection bare, often well sclerotized and pigmented (Morihara and McCafferty, 1979a; Fig. 14) *L. ephippiatus*
2. Ventral posteromedian projection between forceps bases broadly rounded to broadly truncate (Morihara and McCafferty, 1979a; Figs. 12, 15, 18); abdominal segments 2-6 pale translucent, opaque brown or with distinct pattern 3
 Ventral projection slightly constricted basally (Morihara and McCafferty, 1979a; Fig. 13); abdominal segments 2-6 pale translucent *L. longipalpus*
3. Basal enlargement of forceps short and robust (Fig. 2); no chitinous internal spine between forceps bases 4
 Basal enlargement of forceps slender (Morihara and McCafferty, 1979a; Figs. 15, 18); chitinous internal spine usually visible 5
4. Abdominal tergites 2-6 with distinct pattern (Fig. 1) *L. apache*
 Abdominal tergites 2-6 light brown to yellow without distinct pattern *L. dardanus*
5. Basal enlargement of forceps simple, subquadrate from ventral perspective (Morihara and McCafferty, 1979a; Fig. 15); abdominal segments 2-6 usually opaque brown *L. frondalis*
 Basal enlargement of forceps with distal, medially directed, acute projection (Morihara and McCafferty, 1979a; Fig. 18); abdominal segments 2-6 usually pale translucent ... *L. propinquus*

DISCUSSION

McCafferty and Waltz (1995) speculated that the adults of *L. apache* may key out near *L. propinquus* if a close relationship between these two species could be assumed based on similar larval morphology. However, *L. apache*

appears to be most closely related to *L. dardanus* based on similarities of the male genitalia. In addition, both *L. apache* and *L. dardanus* have broad overlapping distributions in western North America and may share a common ancestor. *Labiobaetis propinquus* is widely distributed throughout eastern North America (Moriyama and McCafferty 1979b) and has been reported from as far west as Texas (Lugo-Ortiz and McCafferty 1995) and eastern New Mexico (W.P. McCafferty, personal communication). Peters and Edmunds (1961) reported this species from the Navajo Reservoir basin, New Mexico, however, that was before the species description of *L. apache*. We have not examined the material from this study, but based on the geographical proximity, we suspect this record to be either *L. apache* or *L. dardanus*.

Douglas Creek becomes highly turbid during precipitation events. Substrate is primarily sand with some gravel. Most mayfly larvae were collected from debris snags near the stream margin. This general habitat description is very similar to the type locality of *L. apache*, the Little Colorado River near St. Johns, Arizona. Other mayflies collected with *L. apache* from Douglas Creek included *Choroterpes inornata* Eaton, *Heptagenia elegantula* Eaton, and *Tricorythodes minutus* Traver. McCafferty and Waltz (1995) indicated that *C. inornata* and *L. apache* may be characteristic species of the Colorado Plateau.

Two species of *Labiobaetis* are currently known from Colorado. *L. apache* and *L. dardanus*. In Colorado, *L. apache* has only been collected from Douglas Creek near Rangely and may be restricted to streams of the Colorado Plateau. *Labiobaetis dardanus* had previously been reported from the Green River in Moffat Co. as *Baetis dardanus* (Durfee and Kondratieff 1994). Additionally, the authors have examined specimens of *L. dardanus* from the Conejos River in Conejos Co, the Arkansas River in Pueblo Co., and the South Platte River in Douglas Co. Although not commonly collected, this species appears to be widespread throughout Colorado.

Baetis notos Allen and Murvosh was previously reported in Colorado from the Gunnison River (McCafferty *et al.* 1993). We have examined specimens from Four Mile Creek in Fremont Co. and the Arkansas River in Pueblo Co. A southwestern species with Mexican affinities, *B. notos* apparently reaches its northernmost limit in Colorado.

A male adult of *Cingymula tarda* (McDunnough) was recently collected from a mating swarm on the South Fork of the South Platte River in Park Co. (elev. 1840 m). Previously recorded from Alberta and Montana (McDunnough 1929), Idaho (Jensen 1966) and northern Utah (Edmunds 1954), the discovery of this species in central Colorado extends its range southward.

With the addition of *C. tarda* and the elevation of *Labiobaetis* to generic rank, a total of 44 genera and 102 species of mayflies are now recorded for Colorado.

ACKNOWLEDGMENT

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