

SCIENTIFIC NAME: *Desmona bethula*
COMMON NAME: Amphibious caddisfly
CLASS, FAMILY: Insecta, Limnephilidae

ORIGINAL DESCRIPTION: D.G. Denning 1954. Journal of the Kansas Entomological Society 27: 62-63, fig. 8A-E (lateral view, forewing, dorsal view of eighth tergite, dorsal view of clasper, aedeagus, lateral view of female genitalia).

TYPE MATERIAL: *Holotype:* Adult male - California: Sierra County; Snag Lake, 7 miles north of Sierra City, 26 Oct 1952, R. L. Usinger; deposited in California Academy of Sciences, type #16167, on indefinite loan from Essig Museum, U.C. Berkeley. *Allotype:* Adult female - same data as holotype. *Paratypes:* Two adult males - Plumas Co.; Almanor Fish Hatchery, 1-15 Oct. 1948, H.P. Chandler. Depositories of allotype and paratypes unknown.

RANKING/STATUS: G1G3S1S3 (NatureServe-CNDDDB).

GENERAL DESCRIPTION: Adult male, 14 mm long; adult female 13 mm long; brownish yellow in overall color with wings reddish-brown, apex darker. The wings have a partly translucent area, thus appearing to have a silver stripe through the dark apical area. Larvae measure up to 15 mm in length.

DIAGNOSTIC CHARACTERS: Last-instar larvae can be recognized by the two small, ring-shaped sclerites at the bases of each lateral hump on the first abdominal segment. Structural characters for the genus and species are given in Denning's original description, and in Wiggins and Wisseman's generic revision.

OTHER ILLUSTRATIONS:

Wiggins, 1996. Fig. 20.11A-D: lateral view of larva, dorsal view of head and thorax, case, dorsal view of abdominal segments VIII and IX.
Wiggins and Wisseman, 1990. Fig. 2: Wing venation, right forewing and hindwing of male. Fig. 3A-D: lateral, dorsal, and ventral views of male genitalia, lateral and dorsal views of phallus. Fig. 5A-B: lateral and ventral views of female genitalia. Figs. 7-10, same as Fig. 20.11A-D in Wiggins 1996.

DISTRIBUTION: Sierra Nevada, including Madera, Mariposa, Mono, Nevada, Placer, Plumas, and Sierra counties, and Sequoia National Park

HABITAT: Larvae live in small spring streams with slow currents in wet meadows. A population was also found in a beaver pond in Sagehen Creek; the pond also had a slow current through it.

LIFE HISTORY/BEHAVIOR: Most of the information regarding the biology of this species was published by Erman (1981). Eggs and first and second instar larvae of *Desmona bethula* are typically found beginning in January, though early instar larvae

can be encountered as late as April. Newly-hatched first instar larvae immediately begin constructing cases, from either coarse sand grains and/or organic debris, depending upon the availability of building material in their environment. Laboratory experiments indicate that when available, sand is the preferred case-making material.

The last instar larvae of *Desmona bethula* are unusual because they leave the water to feed nocturnally, and return to the water after feeding. Migration out of the water begins shortly after the sun leaves a stream section, and as darkness increases, more larvae leave the stream to crawl higher on the leaves and stems of the aquatic and semi-aquatic plants upon which they feed. Depending on the temperature, larvae may remain out of the water from a few hours to sunrise; on nights when the air temperature drops to near freezing, they return earlier to the water. During rainy days, larvae have been observed to feed at midday, and on very warm, windy days, they may not feed at all.

Larvae of *Desmona bethula* have been recorded feeding on *Carex nebraskensis*, *C. praegracilis*, *C. rostrata*, *Calamagrostis canadensis* (both leaves and flower buds), *Veronica americana*, *Saxifraga oregana*, *Dodecatheon alpinum* (developing fruits), and *Polygonum bistortoides*. The tender tips and edges of the leaves are the preferred food. Fifth (last) instar larvae have also been observed eating oligocheate worms.

Larvae are frequently found buried in bottom sediments. Prior to pupation, the larvae move upstream along the edges of the stream bank. This behavior may guard against desiccation later in the season when lower portions of the stream recede. Stranded larvae are subject not only to drying, but also to predation by ants.

In mid-summer, fully grown larvae sometimes fill both ends of their cases with debris, perhaps in preparation for a summer diapause. Pupation occurs in late August, after larvae burrow underwater, head-first, into the stream bank. Pupal cases, like larval cases, are also constructed of sand and/or debris. Adult emergence peaks in early October, with scattered adults found from late August to early December. Emergence occurs during the warmest part of the day, and adults immediately fly up to lodgepole pines and rest on branches. Mating occurs soon afterwards and the cycle repeats.

SELECTED REFERENCES:

- Erman, N.A. 1981. Terrestrial feeding migration and life history of the stream-dwelling caddisfly, *Desmona bethula* (Trichoptera: Limnephilidae). *Canadian Journal of Zoology* 59:1658-1665.
- Wiggins, G.B. 1996. Larvae of the North American caddisfly genera. 2nd Edition. University of Toronto Press, Toronto. 457 pp.
- Wiggins, G.B. and R.W. Wisseman. 1990. Revision of the North American caddisfly genus *Desmona* (Trichoptera: Limnephilidae). *Annals of the Entomological Society of America* 83(2):155-161

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