

DISTINGUISHING LARVAE OF NORTH AMERICAN BAETIDAE FROM SIPHLONURIDAE (EPHEMEROPTERA)^{1,2}

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ABSTRACT: Previously published keys to North American families of Ephemeroptera do not adequately distinguish all larvae of Baetidae from those of Siphonuridae. A more efficient means of identifying larvae to one of these families by using caudal filaments and antennae is suggested.

Students of my Aquatic Entomology course historically have had some difficulties in separating mayfly larvae into either the family Baetidae or the closely related Siphonuridae when using available taxonomic keys. This, coupled with several recent inquiries from freshwater biologists in the eastern and midwestern United States concerning this dilemma, has prompted my writing this short paper.

For specialists who are acquainted with genera of these groups it is relatively easy to recognize larval baetids from siphonurids without the use of family keys; however, for nonspecialists who rely on family keys as a first step in identification, problems can arise. Morphological characters used to key larvae to one of these two families, such as those in the popular keys of Edmunds et al. (1976), Merritt and Cummins (1978), Hilsenhoff (1975), Pennak (1978), and Lehmkuhl (1979), do not always hold for certain species and regions of North America, and they can be especially difficult to apply to immature larvae.

The characters in the final key couplet leading to these families (which is the problematic couplet) have involved the length of the antennae relative to head width and the relative development of projections at the posterolateral corners of the distal abdominal segments. Most North American baetid larvae have antennae that are longer than twice the width of the head, but some (e.g., some *Pseudocloeon*) have much shorter antennae. The development of distal abdominal projections also varies among baetids — most lack projections, some have moderately developed projections, and a few have well-developed projections (some *Pseudocloeon* larvae have both short antennae and well-developed projections). All North American siphonurid larvae (the genus *Isonychia* now is excluded) possess short antennae,

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shorter than twice the width of the head, and although most have well-developed posterolateral projections on abdominal segments 8 and 9, such projections are very poorly developed in the genus *Ameletus*.

From the above it is clear that the antennal and abdominal characters, used either singly or in some combination, will not always work to distinguish the families. Supplementary characters appearing in some keys and involving mouthpart structures (Edmunds et al., 1976; Usinger, 1956) will not resolve the identification of larvae in all cases.

The larvae of Baetidae in North America that present problems in family identification because of their antennal and/or abdominal characters happen to all have a highly reduced median terminal filament. Therefore an easier and more effective means to distinguish the families would be to first consider whether larvae possess a developed median terminal filament: those that are "two-tailed" could immediately be placed in Baetidae (there are no "two-tailed" siphonurids); those with a developed median terminal filament ("three-tailed") could then be further examined for antennal length. All siphonurid larvae will have short antennae as described above, and all "three-tailed" baetid larvae will have long antennae as described above. The genus *Isonychia*, which until recently was classified in the Siphonuridae and was considered as such when all the previously mentioned keys were published, does contain larvae with long antennae. This does not present a problem, however, if it is remembered that *Isonychia*, although minnowlike and superficially similar as larvae to baetids and siphonurids, is presently classified in the family Oligoneuriidae (McCafferty and Edmunds, 1979) and can be distinguished from both baetids and siphonurids by the presence of a double row of long filtering setae of the inner surface of the fore legs.

Body size may be helpful when working with mature specimens, since baetid larvae in North America north of Mexico seldom exceed 10 mm (some *Callibaetis* being the major exception), and mature siphonurid larvae are commonly over 10 mm in length. Also, those baetid larvae that tend to be problematic have very small hind wing pads or lack hind wing pads entirely.

In conclusion, I would recommend using the following key couplet to separate baetid and siphonurid larvae (a simplified larval key to the families of Ephemeroptera appears in McCafferty, 1981).

Median terminal filament highly reduced, or if developed then antennae long, more than twice (and usually more than three times) the width of the head Baetidae
 Median terminal filament well developed, and antennae shorter than twice the width of the head. Siphonuridae

REFERENCES

- Edmunds, G.F., Jr., S.L. Jensen and L. Berner 1976. The mayflies of North and Central America. Univ. Minn. Press, Minneapolis. 330 p.
- Hilsenhoff, W.L. 1975. Aquatic insects of Wisconsin. Wisc. Dept. Nat. Res. Tech. Bull. 89:52 p.
- Lehmkuhl, D.M. 1979. How to know the aquatic insects. Wm. C. Brown Co. Publ., Dubuque. 168 p.
- McCafferty, W.P. 1981. Aquatic entomology. Science Books International, Boston. 448 p.
- McCafferty, W.P. and G.F. Edmunds, Jr. 1979. The higher classification of the Ephemeroptera and its evolutionary basis. Ann. Entomol. Soc. Amer. 72:5-12.
- Merritt, R.W. and K.W. Cummins (eds.). 1978. An introduction to the aquatic insects of North America. Kendall/Hunt Publ. Co., Dubuque. 441 p.
- Pennak, R.W. 1978. Fresh-water invertebrates of the United States (2nd ed.). John Wiley & Sons. New York 803 p.
- Usinger, R.L. (ed.), 1956. Aquatic insects of California. Univ. Calif. Press. Berkeley. 508 p.
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