

**ONTOGENY OF THE TIBIAL SPUR IN *MEGAMELUS DAVISI*
(HOMOPTERA: DELPHACIDAE) AND ITS BEARING ON
DELPHACID CLASSIFICATION**

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ABSTRACT

The forms of the nymphal tibial spur in *Megamelus davisii* Van Duzee, and their relation to Muir's classification of delphacid subfamilies and tribes, are discussed.

The evolutionary relationships among fulgoroid taxa, in our opinion, are not clearly understood. Although some attempts have been made to clarify these relationships on the basis of adult morphology (e.g., Muir 1930), the morphology of nymphs, including the ontogeny of anatomical features, has been virtually ignored.

The delphacid tibial spur has been used in taxonomic treatments of members of this family (Muir 1915, 1923, 1930). Delphacid nymphs and adults are distinguished from other planthoppers by the presence of a metatibial spur, which appears to have developed from an apical tibial spine (Metcalf 1969). Muir (1915) based his arrangement of the delphacid subgroups on the different forms of the spur, which he felt represented a sequence of primitive to advanced states (i.e., thick and spike-like to thin and flattened). The subfamily Asiracinae is characterized by a spike-like spur that lacks teeth (Fig. 1), and the subfamily Delphacinae by a flattened spur with or without teeth (Figs. 2-4). Within the Delphacinae, the tribe Alohini is characterized by a thickened spur convex on both sides (Fig. 2), the tribe Tropidocephalini by a thinner spur convex on one side and concave on the other (Fig. 3), and the tribe Delphacini by a laminate spur (Fig. 4). Muir (1915) considered the Asiracinae primitive and the Delphacinae advanced; within the Delphacinae, he felt the Alohini, Tropidocephalini and Delphacini to be progressively more advanced.

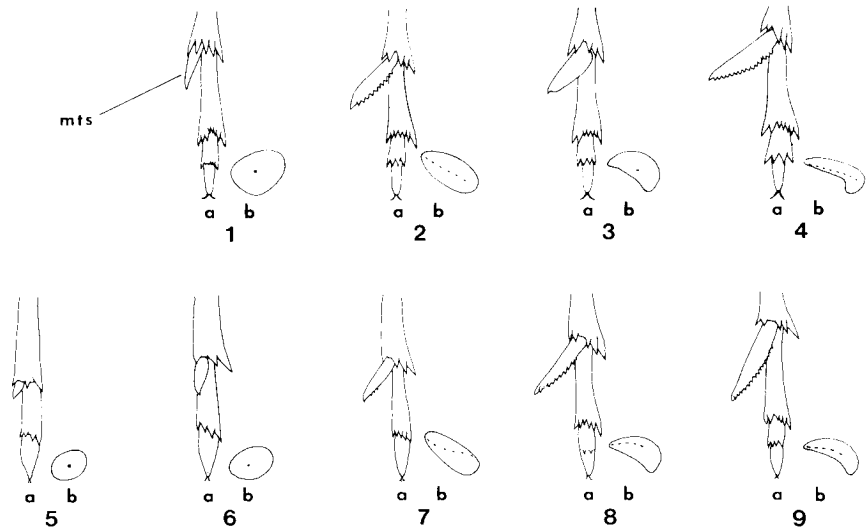
During a study of the biology of *Megamelus davisii* Van Duzee conducted from February through November 1979 (see Wilson 1980), we obtained specimens of all nymphal instars of this planthopper; *M. davisii* is a member of the Delphacini, and occurs on waterlily (*Nuphar advena* [Aiton]). The spur forms mentioned above appear to be present in these instars. The spur of 1st instars (Fig. 5) is similar in size and shape to the apical tibial spine. Second instars (Fig. 6) have a spike-like spur similar to that found in the Asiracinae. Third, 4th and 5th instars (Figs. 7-9) have spurs somewhat similar to those found in the Alohini, Tropidocephalini, and Delphacini, respectively. Thus, there is a progression of forms in *M. davisii* from a spike-like to a laminate spur. During nymphal development of more primitive delphacids, it is probable that the spur develops to a particular stage that is retained by adults. If so, then the ontogeny of the spur would support the evolutionary relationships reflected in Muir's (1915, 1923, 1930) classification of delphacid subfamilies and tribes.

LITERATURE CITED

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Figs. 1-9. Ventral view (a) and cross-section (b) of metatibial spur (mts) of: (1) *Pentagramma variegata* Penner (Asiracinae); (2) *Stobaera tricarinata* (Say) (Delphacinae: Alohini); (3) *Liburniella ornata* Stål (Delphacinae: Tropidocephalini); (4) *Prokelisia crocea* (Van Duzee) (Delphacinae: Delphacini); *M. davisii* (Delphacinae: Delphacini), (5) 1st instar, (6) 2nd instar, (7) 3rd instar, (8) 4th instar, (9) 5th instar.

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