

DESCRIPTIONS OF IMMATURES OF *EOEURYSA*
FLAVOCAPITATA MUIR FROM TAIWAN
(HOMOPTERA: DELPHACIDAE)

STEPHEN W. WILSON,¹ JAMES H. TSAI,² AND C. C. CHEN³

¹Department of Biology, Central Missouri State University,
Warrensburg, Missouri 64093

²Fort Lauderdale Research and Education Center, University of Florida,
IFAS, Fort Lauderdale, Florida 33314

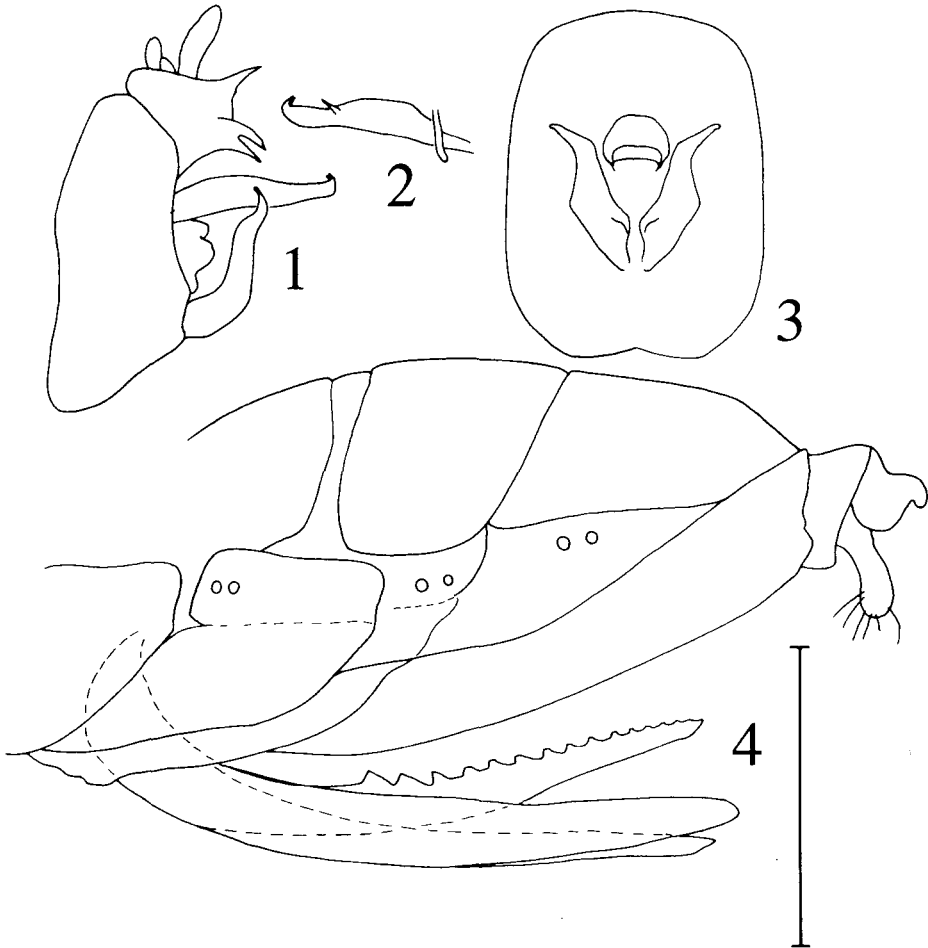
³Taichung District Agricultural Improvement Station, Changhua, Taiwan

Abstract.—Adult male and female genitalia, the egg, and first through fifth instar nymphs of the delphacid planthopper *Eoerysa flavocapitata* Muir, collected from sugarcane (*Saccharum officinarum* L.) from Taiwan are described and illustrated and a key to instars is provided. Features useful in separating nymphal instars include differences in body size and proportions; spination of metatibiae, metatibial spurs, and metatarsomeres; and number of metatarsomeres.

Key Words.—Insecta, Homoptera, Delphacidae, *Eoerysa flavocapitata*, immature stages, Taiwan, sugarcane

The delphacid planthopper *Eoerysa flavocapitata* Muir has been recorded from northeastern India, Bangladesh, Malaysia, China, Indonesia, and Taiwan (Chatterjee 1971, Chatterjee & Choudhuri 1979, Chu & Chiang 1975, Metcalf 1943, Mirza & Qadri 1964, Qadri 1963). Adult females insert eggs in, and adults and nymphs feed on, leaves of sugarcane (*Saccharum officinarum* L.). Feeding causes leaf desiccation, development of red streaks on damaged tissue, and growth of sooty mold on the honeydew produced by the planthopper (Chatterjee & Choudhuri 1979, Fennah 1969). Sugarcane is the only recorded host, and *E. flavocapitata* may be monophagous on this grass as are over 20 species of sugarcane delphacids in the genus *Perkinsiella* (Wilson 1988). However, the Neotropical sugarcane pest *Saccharosydne saccharivora* (Westwood) was found to have two species of *Andropogon* as its natural hosts (Metcalf 1969) and apparently included the related grass sugarcane (all in the tribe Andropogoneae [Clayton and Renvoize 1986]) in its range of food plants after introduction of sugarcane to the New World. The only other *Eoerysa*, *E. arundina* Kuoh and Ding, has been found only on *Arundo donax* L. (Yang 1989), another economically important grass, which is not closely related to sugarcane (Clayton & Renvoize 1986).

The biology of *E. flavocapitata* on sugarcane was studied by Chatterjee & Choudhuri (1979) and Jiang (1976) who provided information on oviposition, feeding sites, and duration of stadia. Adults were described and illustrated by Chu & Chiang (1975), Jiang (1976) and Yang (1989). Brief descriptions of immatures were provided by Chatterjee & Choudhuri (1979), who also included somewhat diagrammatic illustrations, and Jiang (1976 [in Chinese]); the fifth instar was described, and partial illustrations provided, by Wu & Yang (1985). The present paper includes detailed descriptions and illustrations of adult male and female genitalia, and the immature stages; it also gives a key for the separation of nymphal instars.



Figures 1–4. *Eoerysa flavocapitata* adult genitalia. Figure 1. Male, left lateral view of complete genitalia. Figure 2. Male, right lateral view of aedeagus. Figure 3. Male, caudal view of pygofer and styles. Figure 4. Female, lateral view of complete genitalia. Scale bar = 0.5 mm.

METHODS

Terminology used in the description of the female genitalia follows Asche (1985) and Heady & Wilson (1990). The fifth instar is described in detail but only major differences are described for fourth through first instars. Arrangement and number of pits is provided for the fifth and fourth instars; this information is not given for earlier instars because the pits are extremely difficult to discern (those that could be observed relatively easily are illustrated). Measurements are given as mean \pm SD. Length was measured from apex of vertex to apex of abdomen, width across the widest part of the body, and thoracic length along the midline from the anterior margin of the pronotum to the posterior margin of the metanotum. Eggs were obtained by excising them with a fine needle from sections of field collected sugarcane leaves.

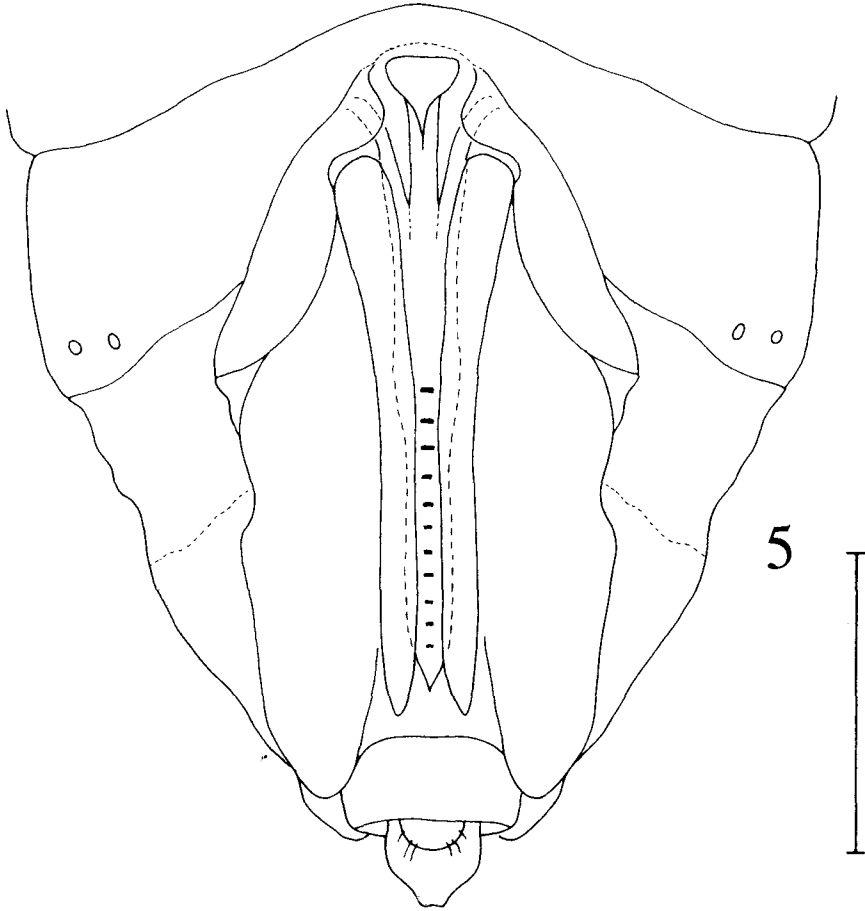


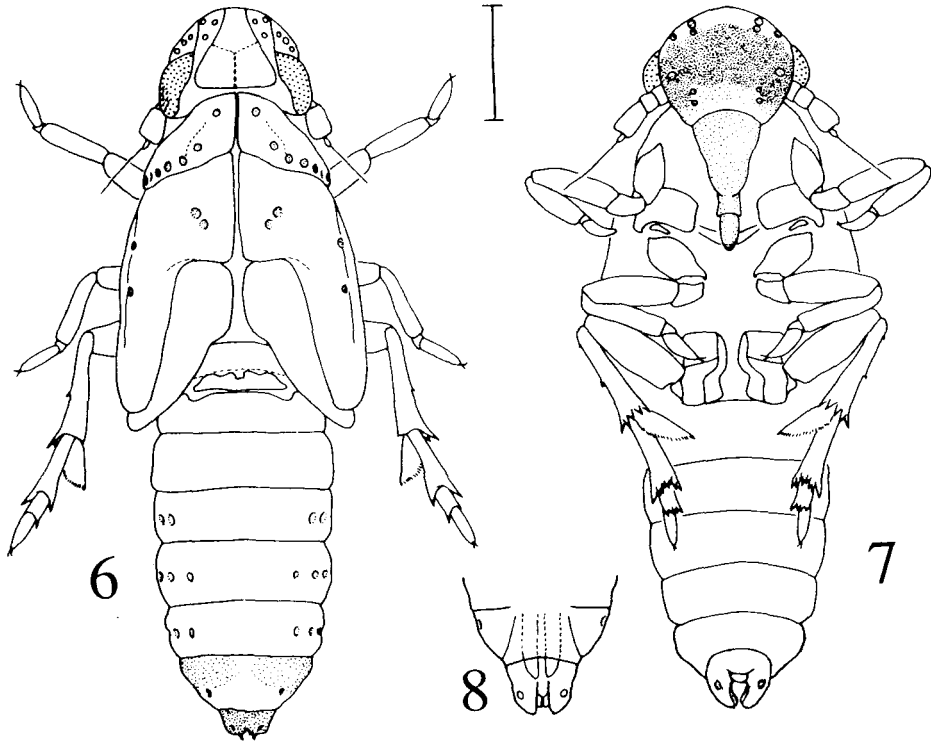
Figure 5. *Eoeurysa flavocapitata* female, ventral view of complete genitalia. Scale bar = 0.5 mm.

EOEURYSA FLAVOCAPITATA MUIR

Descriptions.—*Adults* (Figs. 1–5). Adult *E. flavocapitata* were briefly described by Muir (1913); detailed descriptions and illustrations provided by Jiang (1976) and Yang (1989) should be referred to for non-genitalic adult morphology.

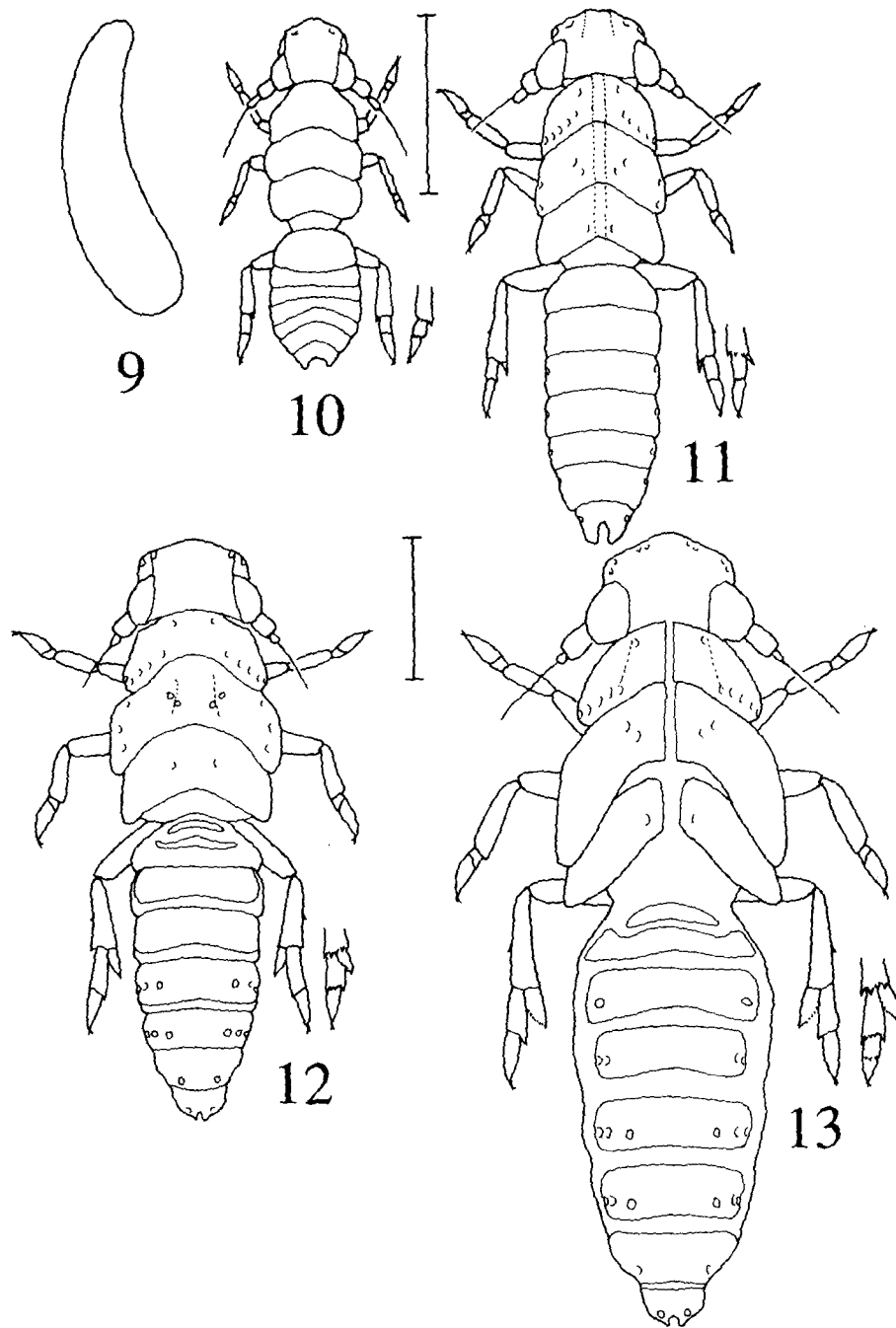
Male genitalia (Figs. 1–3).—Pygofer, in lateral view, subquadrate, with broadly produced diaphragm armature. Anal tube, in lateral view, with a single spinose process originating at the dorsocaudal aspect of the tube, and a pair of bifid spinose processes each originating at the ventrocaudal aspect of the tube. Styles, in caudal view, broadest across basal one-third, narrowing and strongly divergent in apical one-third. Aedeagus subcylindrical, with a dorsally directed terminal bifid tooth and a dorso-caudally directed process in apical one-third on right side.

Female genitalia (Figs. 4, 5).—Tergite nine oriented anteroventrally (see Asche 1985), elongate, longitudinally concave in ventral midline. Anal tube subcylindrical, style somewhat bulbous. Genital scale (or atrium plate) subtriangular. Valvifers of segment eight each covering approximately one-third of tergite nine anterolaterally; medial margin deeply notched in anterior one-third. Lateral gonapophyses of segment nine elongate, broadly rounded posteriorly. In lateral view, median gonapophyses of segment nine saber-shaped, with approximately 15 strong teeth on dorsal margin in distal one-half (not all teeth apparent in ventral view). Gonapophyses of segment eight slender, subacute apically.



Figures 6–8. *Eoerysa flavocapitata* fifth instar. Figure 6. Habitus, dorsal view. Figure 7. Ventral view of male. Figure 8. Apical part of venter of female abdomen. Scale bar = 0.5 mm.

Fifth instar nymph (Figs. 6–8).—Length 3.6 ± 0.17 mm; thoracic length 1.1 ± 0.06 mm; width 1.2 ± 0.08 mm ($n = 10$). Body white with gray to fuscous markings on frons, clypeus, and apex of abdomen. Form elongate, subcylindrical, flattened dorsoventrally, widest across mesothoracic wingpads. Vertex subtriangular; posterior margin nearly straight, narrowing anteriorly. Frons border with clypeus concave; lateral margins strongly convex and carinate (outer carinae) and paralleled by second pair of very weak carinae (inner carinae) continuous with lateral margins of vertex; area between inner and outer carinae with nine pits on each side (six visible in ventral aspect, three in dorsal aspect); three pits between each outer carina and eye. Clypeus subconical, narrowing distally. Beak three-segmented, cylindrical, segment one hidden by anteclypeus, segment two subequal in length to segment three, segment three with black apex. Antennae three-segmented; scape short, cylindrical; pedicel subcylindrical, $2.0 \times$ length of scape; flagellum bulbous basally, with elongate bristle-like extension distally, bulbous base approximately $0.3 \times$ length of pedicel. Thoracic nota divided by middorsal line into three pairs of plates. Pronotal plates subtriangular (in dorsal view); anterior margin convex; posterior border sinuate; each plate with a weak posterolaterally directed carina and seven pits extending anteriorly from near middorsal line posterolaterally to lateral margin (lateralmost pits often not visible in dorsal view). Mesonotum with median length $2.0 \times$ that of pronotum; elongate lobate wingpads almost extending to tips of metanotal wingpads; each plate with very weak posterolaterally directed carina (not illustrated); two pits near middle of non-lobate portion of plate and two pits near lateral margin. Metanotum with median length approximately $0.7 \times$ that of mesonotum; lobate wingpads extending to fourth tergite; each plate with one very weak pit near middle of plate (not illustrated). Pro- and mesocoxae elongated and directed posteromedially; metacoxae fused to sternum. Metatrochanter short and subcylindrical. Metatibia with two spines on lateral aspect of shaft, an apical transverse row of five black-tipped spines on plantar surface and a subtriangular flattened movable spur with one apical tooth and 13–15 other teeth on posterior margin. Pro- and mesotarsi with two



Figures 9–13. *Eoeurysa flavocapitata* immature stages. Figure 9. Egg. Figure 10. First instar. Figure 11. Second instar. Figure 12. Third instar. Figure 13. Fourth instar. Scale bars = 0.5 mm (top = 9–11, bottom = 12, 13).

tarsomeres, tarsomere one wedge-shaped; tarsomere two subconical, with pair of apical claws and median membranous pulvillus. Metatarsi with three tarsomeres; tarsomere one with apical transverse row of eight black-tipped spines; tarsomere two cylindrical, approximately $3.5 \times$ length of tarsomere one, with apical transverse row of four black-tipped spines on plantar surface; tarsomere three subconical, slightly longer than tarsomere two, with pair of apical claws and median pulvillus. Abdomen nine segmented; flattened dorsoventrally; widest across fourth abdominal segment. Tergite one small, subtriangular, hidden by juncture of thorax and abdomen (not visible in illustration); two subrectangular, not extending to lateral aspect of segment; tergites five to eight each with three pits on each side (lateralmost pits not always visible in dorsal view). Segment nine surrounding anus, with three pits on each side; female with one pair of acute processes extending from juncture of sternites eight and nine; males lacking processes.

Fourth instar nymph (Fig. 13).—Length 2.8 ± 0.18 mm; thoracic length 0.8 ± 0.04 mm; width 0.08 ± 0.04 mm ($n = 10$). Antennal flagellum with basal portion approximately $0.5 \times$ length of pedicel. Mesonotal wingpads shorter, each covering approximately two-thirds of metanotal wingpad laterally. Metanotal median length $1.5 \times$ that of mesonotum; wingpad extending to tergite two. Metatibial spur slightly smaller, with one apical tooth and eight teeth on margin. Metatarsi with two tarsomeres; tarsomere one with apical transverse row of seven black-tipped spines; tarsomere two subconical with three black-tipped spines in middle of tarsomere on plantar surface. Abdominal segments four to eight each with the following number of pits on either side of midline: tergite four with one pit, five with two, six to eight each with three, segment nine with three.

Third instar nymph (Fig. 12).—Length 2.0 ± 0.12 mm; thoracic length 0.6 ± 0.02 mm; width 0.6 ± 0.03 mm ($n = 10$). Mesonotal wingpads shorter, each covering one-third of metanotal wingpad laterally. Metanotal wingpad extending to tergite one. Metatibial spur smaller; with one apical and one or two marginal teeth. Metatarsomere one with apical transverse row of six black-tipped spines on plantar surface.

Second instar nymph (Fig. 11).—Length 1.5 ± 0.06 mm; thoracic length 0.5 ± 0.01 mm; width 0.4 ± 0.02 mm ($n = 10$). Mesonotal median length subequal to that of pronotum; wingpads undeveloped. Metanotal median length subequal to that of mesonotum; wingpads undeveloped. Metatibia with apical row of three black-tipped spines; spur small with no marginal teeth, approximately $3.0 \times$ length of longest metatibial spine; metatarsomere one with four apical black-tipped spines.

First instar nymph (Fig. 10).—Length 1.0 ± 0.06 mm; thoracic length 0.4 ± 0.02 mm; width 0.3 ± 0.02 mm ($n = 10$). Bulbous base of antennal flagellum subequal in length to that of pedicel. Metatibia lacking spines on shaft; metatibial spur smaller, approximately $1.5 \times$ length of longest metatibial spine.

Egg (Fig. 9).—Length 0.8 ± 0.05 mm; width 0.2 ± 0.02 mm ($n = 5$). Eggs laid singly; white, cylindrical, narrower at apical end; chorion translucent, smooth.

Material Examined.—Specimens used for description have the following data: REPUBLIC OF CHINA. TAIWAN: Taichung, 5 Dec 1989, ex sugarcane, (10 males, 12 females, 5 eggs, 19 first instars, 14 second instars, 15 third instars, 25 fourth instars, 19 fifth instars).

Key to *E. flavocapitata* Nymphal Instars

1. Metatibial spur with more than five marginal teeth (Figs. 7, 13); mesonotal wingpads overlapping more than one-half length of metanotal wingpads (Figs. 6, 13) 2
- Metatibial spur with fewer than five marginal teeth; mesonotal wingpads overlap less than one-half length of metanotal wingpads (Figs. 10–12) 3
- 2(1). Metatarsi with three tarsomeres; metatibial spur with more than 10 marginal teeth; mesonotal wingpads extending to or almost to apex of metanotal wingpads (Figs. 6, 7) fifth instar
- Metatarsi with two tarsomeres; metatibial spur with eight marginal teeth; mesonotal wingpads not extending to apex of metanotal wingpads (Fig. 13) fourth instar
- 3(2). Metatibia with transverse row of four apical spines, spur with one or two marginal teeth (Fig. 12) third instar

- Metatibia with transverse row of three apical spines, spur lacking marginal teeth (Figs. 10, 11) 4
- 4(3). Metatibia with lateral spine near middle on outer surface; spur approximately $3.0\times$ length of longest metatibial apical spine (Fig. 11) second instar
- Metatibia without lateral spines; spur approximately $2.0\times$ or less length of longest metatibial apical spine (Fig. 10) first instar

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