

**NOTES ON THE BIOLOGY OF *NERSIA FLORENS* (HOMOPTERA:
FULGOROIDEA: DICTYOPHARIDAE) WITH DESCRIPTIONS OF
EGGS, AND FIRST, SECOND, AND FIFTH INSTARS¹**

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ABSTRACT

Information on food plants and laboratory rearing of *Nersia florens* Stål is provided, and the eggs and 1st, 2nd, and 5th instars are described.

Nersia florens Stål ranges from South Carolina south to Florida, and west to Kansas and Texas; it has also been recorded from the West Indies, and Central and South America (Metcalf 1946). The only published information on its biology is its occurrence on coarse grasses (Dozier 1928, Van Duzee 1907).

Two 4th and two 5th instars were observed on 1 August 1978, feeding on curly dock (*Rumex crispus* L.) leaves and stems in Thompson Woods, Southern Illinois University at Carbondale (SIUC), Jackson County. These and 14 additional 5th instars, collected on 8 (9 specimens) and 15 August (5 specimens) at the same site, were returned to the laboratory, placed in separate petri dishes in an incubator under a 16L:8D photoperiod at $23 \pm 1.1^\circ\text{C}$, and reared on curly dock leaves. Each dish (9 cm diam, 2 cm depth) was lined on the bottom with a disc of filter paper, covered with plastic secured by an elastic band, and covered with the lid. The specimens were checked daily; the leaves were replaced, and the filter paper was moistened, every 3-4 days.

One 4th instar died after molting to a 5th instar, but the other reached adult (female); the 5th stadium of this latter specimen was 14 days. Eleven of the 16 field-collected 5th instars (including the two collected on 1 August) were reared to adult (4 males, 7 females); the remaining five were preserved for illustration and description. None of the 12 adults copulated or laid eggs. However, an adult female, collected on 12 September 1978 at the same site as the earlier specimens, laid 42 eggs in the laboratory. Since the curly dock had died by this time, this female was maintained on green beans (*Phaseolus vulgaris* L.) in a petri dish prepared similarly to those used for nymphs. The eggs were laid in a scattered pattern on the bottom and walls of the petri dish and on top of the bean; the female appeared to have attempted to insert some eggs in the filter paper. The average incubation period for the 32 eggs that hatched (10 were preserved for illustration and description) was 77.2 days (range = 67-99). The 1st instars were transferred to separate petri dishes, prepared as above, and reared on beans; 30 died within 10 days. The remaining two nymphs molted to the 2nd instar 10 and 15 days after hatching but died during this stadium.

The same SIUC collecting site was inspected weekly in 1979 for *N. florens*, but neither specimens of this dictyopharid nor curly dock plants were found. However, 31 adults (15 males, 16 females) were collected on 5 September 1979 at a nearby location, feeding on white snakeroot (*Eupatorium rugosum* Houttuyn). These were returned to the laboratory and maintained on white snakeroot clippings. However, none copulated or laid eggs.

¹Part of a dissertation submitted to Southern Illinois University at Carbondale by the senior author in partial fulfillment of the requirements of the Ph.D. degree in Zoology.

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DESCRIPTIONS OF IMMATURE STAGES

Specimens to be described were preserved in 95% ethyl alcohol. The description of each stage is based on 10 specimens unless otherwise stated. The 1st instar is described in detail, but only major changes from previous instars are described for subsequent instars. Comparative statements refer to previous instars (e.g., "darker"). Measurements of eggs and nymphs were made with an ocular micrometer; dimensions are expressed in mm as $\bar{x} \pm SE$. For nymphs, length was measured from tip of vertex to tip of abdomen; width was measured across the widest part of the body. Thoracic length was measured along the midline from the anterior margin of the pronotum to the posterior margin of the metanotum; this measurement was included because total length measurements are affected by differences in head shape between specimens and because the abdomen occasionally becomes bloated when preserved in ethyl alcohol due to relatively broad intersegmental membranous areas. Drawings of eggs and nymphs were made with the aid of a camera lucida.

The following descriptions are based on laboratory specimens of eggs, 1st and 2nd instars, and field specimens of 5th instars.

Egg (Fig. 1A). Length 0.85 ± 0.008 ; width 0.42 ± 0.014 . Eggs laid singly; each elongate, oval; pale yellowish; chorion translucent, smooth; cephalic end surrounded by a bundle of slender, elongate processes, central process with an anterior pore.

First instar (Fig. 1B). Length 1.03 ± 0.023 ; thoracic length 0.39 ± 0.005 ; width 0.54 ± 0.007 .

Form elongate, subcylindrical, widest at juncture of meso- and metathoraces. Body dark brown, head white anteriorly, thorax and abdomen infused with red ventrally; antennae, beak and legs white.

Head brown, white anteriorly. Vertex white with brown lateral borders; subtriangular, narrowing apically, concave medially, lateral margins carinate. Frons white, brown in ventral 1/3, pits white bordered by brown; subrectangular, longer than wide, broadest just beneath eyes, lateral margins convex; each lateral margin carinate (outer carina) and paralleled by a second carina (inner carina) 1/3-1/2 distance from midline to outer carina; two longitudinal rows of 16 pits between each inner and outer carina; area between inner carinae concave. Clypeus brown with white apex; narrowing distally, consisting of a subconical, basal postclypeus and a beak-like cylindrical, distal anteclypeus. Beak 3-segmented, white with brown apex, extending to apex of abdomen; segment 1 covered by anteclypeus; segments 2 and 3 subequal. Eyes red. Antennae 3-segmented, white; segment 1 short, cylindrical; segment 2 subcylindrical; segment 3 bulbous basally, with an elongate bristle-like extension apically.

Thoracic nota dark brown, membranous areas infused with red; divided by a longitudinal mid-dorsal line into three pairs of plates. Pronotum longest medially, produced anteriorly beyond posterior margin of eyes, extending laterally to ventral level of antennae; each plate subtriangular, narrowing laterally, anterior margin arcuate forming a weak ridge extending from midline of pronotum posterolaterally to level of lateral border of eye, posterior border slightly sinuate, with a row of 10 pits which parallels the anterior margin (lateralmost pits not visible in dorsal view). Mesonotum longest medially, median length ca. 1 1/2 times that of pronotum; each plate subrectangular, posterior margin arcuate with an oblique carina originating near midline of mesonotum and extending obliquely to about middle of posterior margin of plate, with two pits between carina and lateral margin of mesonotum and two pits (often not visible in dorsal view) near lateral margin of mesonotum. Metanotum longest laterally, median length ca. 3/4 that of mesonotum; each plate subrectangular, posterior margin arcuate, with a longitudinal carina ca. 1/3 the distance from midline of metanotum to lateral margin of metanotum, with one small pit between midline of metanotum and carina, two small pits between carina and lateral margin of metanotum, and one small pit (often not visible in dorsal view) in posterolateral corner of metanotum. Coxae brown basally, infused with red apically; elongate, subcylindrical, posteromedially directed; remaining segments of legs white with very fine setae (not illustrated). Metatibia bearing an apical row of four black-tipped spines ventrally. Tarsi 2-segmented; pro- and mesotarsi with segment 1 wedge-shaped; metatarsi with segment 1 cylindrical and bearing an apical row of four black-tipped spines ventrally; all tarsi with segment 2 subconical and slightly curved, with a pair of brown claws and white pulvillus apically.

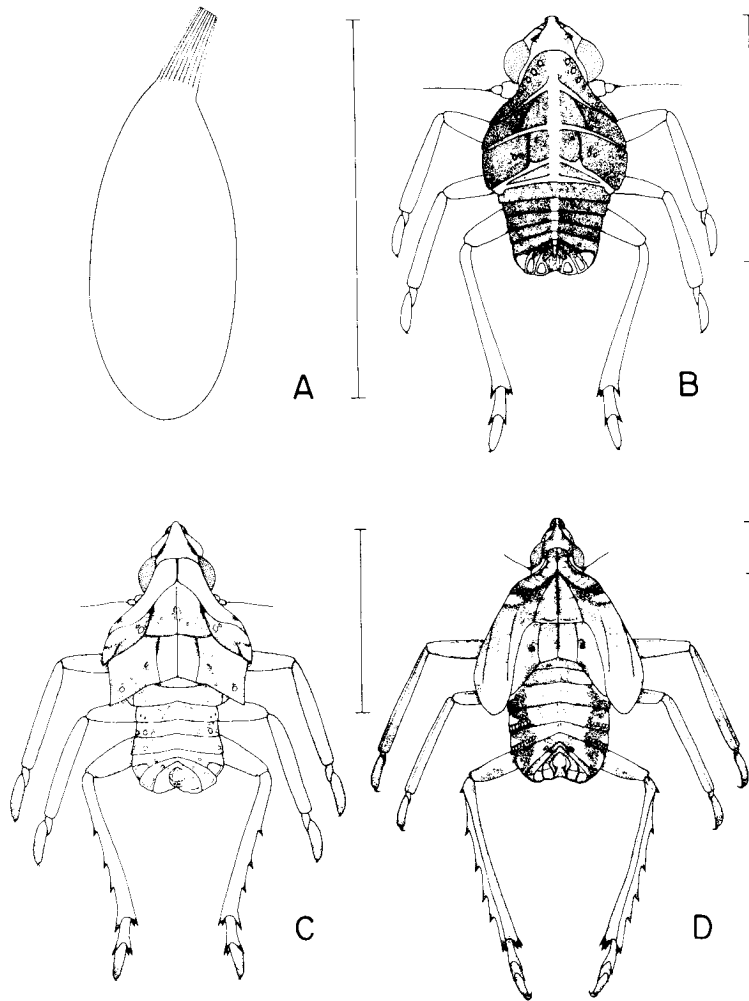


Fig. 1. Immature stages of *Nersia florens*. (A) egg; (B) 1st instar; (C) 2nd instar; (D) 5th instar. Vertical bar = 1.0 mm.

Abdomen 9-segmented, subcylindrical, widest basally; segments 7–9 partially telescoped anteriorly giving abdomen a truncate flattened appearance caudally; segment 9 elongate vertically, surrounding anus, with an elongate vertical subtriangular white process on either side of midline. Segments 3–8 with tergites curving around lateral margin to ventral side; segment 9 with dorsum not visible because of telescoping. Each segment with the following number of pits and wax pads on either side of midline (lateralmost and caudal pits often not visible in dorsal view): segments 4–5 each with four lateral pits on tergite, segments 6–8 each with two lateral pits on tergite, segment 9 with one caudal pit; segments 6–8 each with a caudal, elongate, vertical, oval white wax pad, segment 9 without pads.

Second instar (Fig. 1C). Length 1.64 ± 0.120 ; thoracic length 0.62 ± 0.007 ; width 0.86 ± 0.020 ; two specimens examined.

Form slightly dorsoventrally flattened, widest across mesothorax. Body white with brown markings.

Frons white, light brown basally and apically with two transverse rows of obscure pits between each inner and outer carina.

Pronotum white with brown lateral markings; pits obscure, more numerous. Mesonotum white, heavily marked with brown; with a median longitudinal carina; each plate with three pits near oblique carina lying between it and lateral margin of mesonotum, and with one incomplete oblique carina near posterolateral border of mesonotum. Metanotum white with brown markings anteriorly near bases of carinae, and in posterolateral corners; with a median longitudinal carina. Coxae white with a few flecks of light brown; remaining segments of legs white marked with light brown. Metatibia bearing three black-tipped spines on lateral margin and an apical row of five black-tipped spines ventrally. Metatarsi with segment 1 bearing an apical row of five black-tipped spines ventrally.

Abdomen with brown markings laterally.

Otherwise, approximating 1st instar.

Fifth instar (Fig. 1D). Length 5.76 ± 0.296 ; thoracic length 2.20 ± 0.071 ; width 3.22 ± 0.116 ; five specimens examined.

Body yellow to whitish with brown markings when preserved in alcohol, green with brown and dark green markings in life.

Frons yellow to whitish, mottled with light brown dorsally and laterally, with a brown transverse stripe ventrally; with a weak median carina; broadest above eyes, outer carinae subparallel beneath eyes; with 42-47 pits between each inner and outer carina; concave area between inner carinae lanceolate. Clypeus white, heavily marked with brown medially; with a median carina extending from frontoclypeal suture to apex of anteclypeus, and with a pair of lateral carinae extending obliquely from frontoclypeal suture to juncture of post- and anteclypei. Beak with segment 3, $2/3-3/4$ length of segment 2. Eyes white, infused with red. Antennae with segment 2 bearing ca. 20 pits, each pit surrounded by a ring of short black teeth.

Each plate of pronotum with 33-38 obscure white pits (lateralmost pits not visible dorsally). Mesonotum with median length $2-2\frac{1}{2}$ times that of pronotum; each plate with 5-7 obscure pits near oblique carina lying between it and lateral margin of mesonotum; wingpad broadly expanded, extending beyond apex of metanotal wingpad. Metanotum with median length $1/2-2/3$ that of mesonotum; each plate with 6-8 pits near longitudinal carina lying between it and lateral margin of metanotum; wingpad extending to 3rd or 4th abdominal tergite. Metatibia bearing 4-5 black-tipped spines on lateral margin and an apical row of eight black-tipped spines ventrally. Pro- and mesotarsi 2-segmented; metatarsi 3-segmented, segment 1 bearing apical row of 8-9 black-tipped spines ventrally, segment 2 bearing an apical row of seven black-tipped spines ventrally, segment 3 similar to segment 2 of 2nd instar.

Abdomen with a mid-dorsolongitudinal carina on tergites 1-7. Segment 9 with the same number of pits as 2nd instar; other segments with the following number of pits on either side of midline (lateralmost pits often not visible in dorsal view): segment 4 with 11-16 lateral pits on tergite, segment 5 with 11-13 lateral pits on tergite, segment 6 with 5-7 lateral pits on tergite, segments 7-8 each with 5-6 lateral pits on tergite. Segment 6 with wax pads lacking.

Otherwise, approximating 2nd instar.

ACKNOWLEDGMENTS

We wish to thank the following faculty members of Southern Illinois University at Carbondale (SIUC) for their critical reviews of the manuscript: Drs. R. A. Brandon, B. M. Burr, W. G. Dyer, Department of Zoology, and R. H. Mohlenbrock, Department of Botany. We also thank Mr. J. A. Richardson, Scientific Photography, Department of Botany, SIUC, for his valuable advice in preparing the illustrations.

LITERATURE CITED

- Dozier, H. L. 1928. The Fulgoridae or planthoppers of Mississippi, including those of possible occurrence. A taxonomic, biological, ecological, and economic study. Tech. Bull. Mississippi Agric. Exp. Sta. 14:1-152.
- Metcalf, Z. P. 1946. General catalogue of the Hemiptera. Fasc. IV. Fulgoroidea. Part 8. Dictyopharidae.
- Van Duzee, E. P. 1907. Studies in North American Fulgoridae. Proc. Acad. Natur. Sci. Philadelphia. 59:467-498.