

NEOMEGAMELANUS ELONGATUS
(HOMOPTERA: DELPHACIDAE):
DESCRIPTIONS OF IMMATURES

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Abstract.—Eggs and first through fifth instar nymphs of *Neomegamelanus elongatus* (Ball) are described and illustrated. Features useful in separating nymphal instars include differences in body size and proportions, spination of metatibiae, metatibial spurs, metatarsomeres, and number of metatarsomeres and body pits.

The genus *Neomegamelanus* was erected by McDermott (1952) for five species of small, slender planthoppers with cone-shaped heads. Four of the species are apparently restricted to coastal plain habitats and range from Massachusetts south to Florida and west to Texas and Mexico (McDermott, 1952; Wilson, pers. obs.). The fifth species, *N. spartini* (Osborn), is recorded from Maine to Florida and Mississippi (Metcalf, 1943) as well as Ohio (Crawford, 1914). This only inland record is quite likely in error as Osborn (1905) recorded *Spartina patens* (Ait.) Muhl., a plant generally restricted to coastal salt marshes (Mobberley, 1956), as the host plant of this species.

Little information is available on the biology of any species of *Neomegamelanus*. *N. dorsalis* (Metcalf) is trivoltine in New Jersey, overwinters as nymphs, feeds on salt meadow cordgrass, *S. patens* (Denno, 1977, 1978, 1980), and has been reported to occur on salt grass, *Distichlis spicata* (L.) Greene (Tallamy and Denno, 1979). *N. elongatus* (Ball) has been collected by sweeping *S. patens* (Denno, 1978). *N. spartini* (Osborn) was collected from flowering heads of *S. patens* (Osborn, 1905). *N. penilautus* McDermott has been swept from *S. spartinae* (Denno, 1978). *N. lautus* (Metcalf) was reported to occur in the "Spartina association" (Dozier, 1926).

This paper presents descriptions and illustrations of the egg and first through fifth instars of *N. elongatus*.

DESCRIPTIONS

Specimens were preserved in 70% ethyl alcohol. The fifth instar is described in detail but only major differences are described for preceding instars. Measurements are given in mm as mean \pm SD. Length was measured from apex of vertex to terminus of abdomen, thoracic length along the midline from anterior margin of the pronotum to posterior margin of the metanotum, and width across the widest part of the body. Specimens of each nymphal instar were cleared in 6% KOH in order to examine distribution and number of body pits.

Eggs were obtained by dissecting them out of a leaf of *Spartina* sp. Pieces of *Spartina*

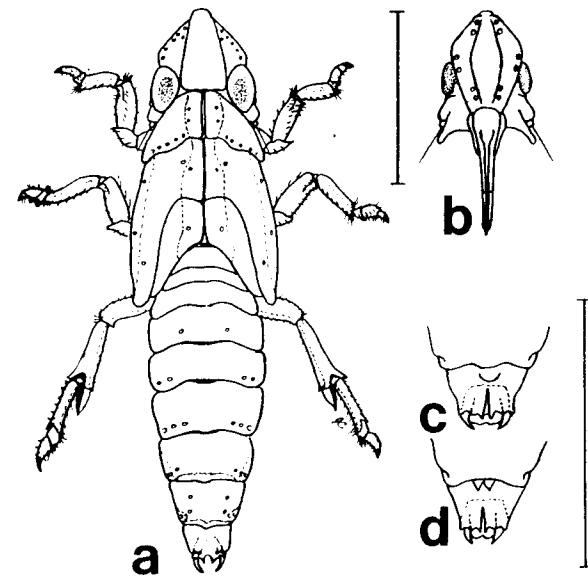


Fig. 1. *N. elongatus* fifth instar. a. Habitus. b. Frontal view of head. c. Ventral view of apex of abdomen of male. d. Ventral view of apex of abdomen of female. Bars = 0.5 mm.

sp. leaves were placed on filter paper in petri dishes in the laboratory. First instars hatched from eggs embedded in these leaves. Second through fifth instars and adults were collected by sweeping the host plants. The data for specimens collected for this study are: FLORIDA: Broward Co., Ft. Lauderdale, 12 December 1985, coll. P. Calvert, ex. *Spartina patens*. 16 male macropters, 24 female brachypters, 20 fifth, 40 fourth, 18 third, 8 second, and 9 first instars, and 2 eggs.

Fifth instar (Fig. 1a). Length 3.07 ± 0.173 ; thoracic length 0.92 ± 0.035 ; width 0.69 ± 0.042 (N = 20).

Form elongate, subcylindrical, slightly flattened dorsoventrally, widest across mesothoracic wingpads. Body whitish with no distinguishing coloration; legs white, tarsi with dark brown to black apices.

Head conical. Vertex elongate, triangular, posterior margin almost straight with rounded corners narrowing anteriorly, lateral margins straight, smooth; carina on each side extending anteromedially from inner margin of compound eye and continuing onto frons as inner carina. Frons widest in posterior $\frac{1}{2}$; lateral margins convex and carinate (outer carinae), extending from vertex to near clypeal border and paralleled by pair of inner carinae; 5–7 pits on gena between each frontal outer carina and eye. Clypeus narrowing distally, consisting of subconical basal postclypeus and cylindrical distal anteclypeus. Beak extending almost to bases of metacoxae; 3-segmented, segment 1 obscured by anteclypeus, segment 2 ca. $1.5 \times$ length of segment 3, segment 3 with black apex. Eyes red. Antennae 3-segmented; scape cylindrical, slightly longer than wide; pedicel subcylindrical, ca. $4 \times$ length of scape, with 5–8

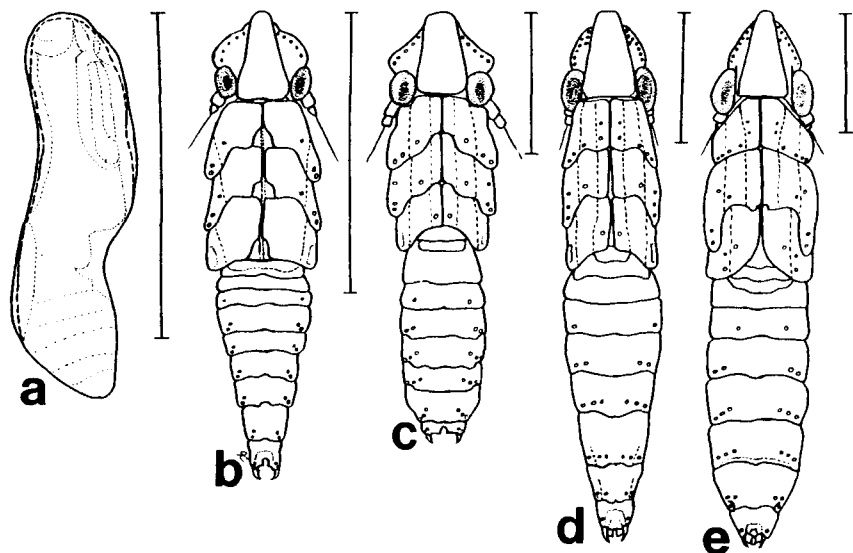


Fig. 2. *N. elongatus* immatures. a. Egg. b. First instar. c. Second instar. d. Third instar. e. Fourth instar. Bars = 0.5 mm.

pitlike sensoria; flagellum bulbous basally, with elongate, bristle-like extension distally, bulbous base ca. $0.25 \times$ length of pedicel.

Thoracic nota divided by middorsal line into three pairs of plates. Pronotal plates subrectangular; anterior margin following posterior margin of vertex and eye, posterior border sinuate; each plate with slightly curved, oblique posterolaterally directed carina originating on anterior margin in median $\frac{1}{3}$ and terminating in lateral $\frac{1}{3}$; area between carinae elevated and subtriangular; carina bordered along inner margin by row of 7 pits extending posterolaterally to lateral border of plate (lateralmost pits not visible in dorsal view). Mesonotal median length ca. $1.5\text{--}2 \times$ that of pronotum; each plate bearing an elongate lobate wingpad extending nearly to apex of metanotal wingpad; with 2 weak longitudinal carinae, inner carina originating on anterior margin in median $\frac{1}{4}$ and terminating on posterior margin in median $\frac{1}{3}$, outer carina originating on anterior margin in lateral $\frac{1}{4}$, paralleling lateral border and terminating on posterior margin; area between inner carinae elevated; 2 pits near inner carina and 3 pits in lateral $\frac{1}{4}$. Metanotal median length subequal to that of mesonotum; each plate bearing an elongate lobate wingpad extending almost to anterior margin of tergite 3; with posterolaterally directed carina originating on anterior margin in median $\frac{1}{4}$ and terminating on posterior margin in lateral $\frac{1}{2}$; 1 pit in middle of each plate. Pro- and mesocoxae elongate, posteromedially directed; metacoxae fused to sternum. Metatrochanter short and subcylindrical. Pro- and mesofemora and tibiae each with 2 ventral longitudinal rows of setae. Metatibia with 2 black-tipped spines on lateral aspect of shaft, an apical transverse row of 5 black-tipped spines on ventral

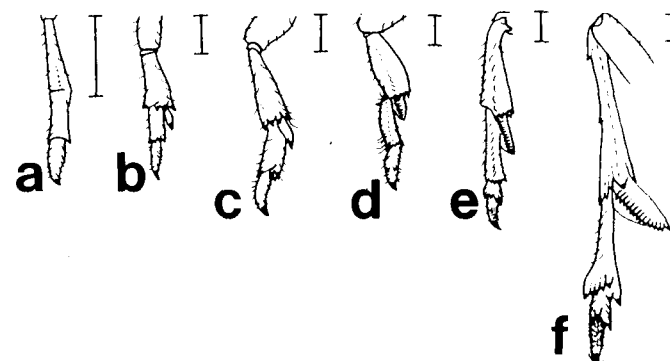


Fig. 3. *N. elongatus* apices of metathoracic legs, plantar surface. a. First instar. b. Second instar. c. Third instar. d. Fourth instar. e. Fifth instar. f. Adult. Bars = 0.1 mm.

aspect and a subtriangular, flattened movable spur with row of 10–13 teeth on posterior margin. Pro- and mesotarsi with 2 tarsomeres; tarsomere 1 wedge-shaped; tarsomere 2 subconical, curved, ca. $3 \times$ length of tarsomere 1 and with pair of apical claws and median membranous pulvillus. Metatarsi with 3 tarsomeres; tarsomere 1 cylindrical with apical transverse row of 6–7 black-tipped spines on plantar surface; tarsomere 2 cylindrical, ca. $0.25 \times$ length of tarsomere 1, with apical transverse row of 4 black-tipped spines on plantar surface; tarsomere 3 subconical, ca. $1.5 \times$ length of tarsomere 2 and with pair of apical claws and median pulvillus.

Abdomen 9 segmented; slightly flattened dorsoventrally, widest across 5th abdominal segment. Tergite 1 small, subtriangular; 2 subtriangular, $2.3 \times$ width of 1; tergites 4–8 with following number of pits on either side of midline (lateralmost pits not visible in dorsal view in some cases due to curving of tergites onto ventral aspect): tergite 4 with 1, 5 with 1–2, 6 with 3, 7 with 3, 8 with 3. Segment 9 surrounding anus; with 3 pits on each side; female with 1 pair of subacute dark brown processes extending caudally from juncture of sternites 8 and 9; males lacking processes.

Fourth instar (Fig. 2e). Length 2.56 ± 0.150 ; thoracic length 0.70 ± 0.190 ; width 0.52 ± 0.028 ($N = 20$).

Antennal pedicel with 5–8 pitlike sensoria. Flagellum ca. $.25 \times$ length of pedicel.

Pronotal pits very obscure, nearly invisible in some specimens. Mesonotal wingpads shorter, covering $\frac{2}{3}$ of metanotal wingpad laterally. Mesonotal median length subequal to that of mesonotum; carinae weaker; wingpad extending to tergite 2. Metatibial spur slightly smaller, with 4 teeth on margin. Metatarsi with 2 tarsomeres; tarsomere 1 with apical transverse row of 6 black-tipped spines on plantar surface; tarsomere 2 subconical, partially subdivided, with 2 black-tipped spines in middle of plantar surface.

Abdominal tergites with the following number pits on either side of midline (lateralmost pits not visible in dorsal view due to curving of tergites onto ventral aspect): tergite 4 with 1, 5 with 2, 6 with 3, 7 with 3, 8 with 3.

Third instar (Fig. 2d). Length 1.98 ± 0.130 ; thoracic length 0.59 ± 0.027 ; width 0.39 ± 0.040 (N = 18).

Antennal pedicel with 4 very weak pitlike sensoria; bulbous portion of flagellum subequal to length of pedicel.

Pronotal plates each with row of 4 pits. Mesonotal wingpads shorter, covering $\frac{1}{3}$ of metanotal wingpad laterally. Metanotal wingpad extending to juncture of tergites 1 and 2. Metatibial spur smaller, with 2 teeth on margin. Metatarsomere 1 with apical transverse row of 4 black-tipped spines on plantar surface; tarsomere 2 lacking spines.

Abdominal tergites with the following number of pits on either side of midline (lateralmost pits not visible in dorsal view due to curving of tergites onto ventral aspect): tergite 4 with 1, 5 with 2, 6–8 with 2–3.

Second instar (Fig. 2c). Length 1.45 ± 0.820 ; thoracic length 0.42 ± 0.016 ; width 0.24 ± 0.016 (N = 8).

Frons with 5 pits between outer carina and eye. Antennal pedicel apparently lacking sensoria.

Mesonotal plates each with 4 pits; wingpads not developed. Metanotal wingpads not developed. Metatibia with apical transverse row of 4 black-tipped spines on plantar surface; spur much smaller, ca. $2 \times$ length of longest metatibial spine, without marginal teeth, with black-tipped tooth at apex. Abdominal tergites with the following number of pits on either side of midline (lateralmost pits not visible in dorsal view due to curving of tergites onto ventral aspect): tergite 4 with 1, 5 with 2, tergite 6–8 with 3.

First instar (Fig. 2b). Length 1.02 ± 0.080 ; thoracic length 0.33 ± 0.018 ; width 0.19 ± 0.013 (N = 9).

Body and legs white; pits very obscure.

Pronotal plates each with 3–4 pits. Mesonotal plates with 3 pits. Metanotal plates with weak ridges on lateralmost edge. Metatibia lacking lateral spines on shaft; spur not developed.

Abdominal tergite 4 with 1 pit and 5–8 each with 2 pits.

Egg (Fig. 2a). Length 0.65; width 0.18 (N = 2).

Egg ovoid, white (in alcohol), chorion smooth.

KEY TO NYMPHAL INSTARS

1. Metatarsi with 3 tarsomeres or with tarsomere 2 partially subdivided and bearing 2 weak spines in middle on plantar surface (Fig. 3d, e) 2
- Metatarsi with 2 tarsomeres; tarsomere 2 lacking spines (Fig. 3a–c) 3
2. Metatibial spur with 10 or more teeth; metatarsi with 3 tarsomeres, tarsomere 2 with apical transverse row of 4 spines (Fig. 3e) Fifth instar
- Metatibial spur with 4 teeth; metatarsi with 2 tarsomeres, tarsomere 2 partially subdivided and with 2 weak spines in middle (Fig. 3d) Fourth instar
3. Metatibial spur with 2 marginal teeth and 1 apical tooth (Fig. 3c) Third instar
- Metatibial spur lacking marginal teeth, with 1 apical tooth (Fig. 3a, b) 4
4. Metatibial spur ca. $2 \times$ length of longest metatibial spine (Fig. 3b); metatibia with 2 lateral spines on shaft Second instar
- Metatibial spur less than $2 \times$ length of longest metatibial spine (Fig. 3a); metatibia lacking lateral spines on shaft First instar

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LITERATURE CITED

- Crawford, D. L. 1914. A contribution toward a monograph of the homopterous insects of the family Delphacidae of North and South America. Proc. U.S. Nat. Mus. 46:557–640.
- Denno, R. F. 1977. Comparison of the assemblages of sap-feeding insects (Homoptera-Hemiptera) inhabiting two structurally different salt marsh grasses in the genus *Spartina*. Environ. Entomol. 6:359–372.
- Denno, R. F. 1978. The optimum population strategy for planthoppers (Homoptera: Delphacidae) in stable marsh habitats. Can. Entomol. 110:135–142.
- Denno, R. F. 1980. Ecotype differentiation in a guild of sap-feeding insects on the salt marsh grass, *Spartina patens*. Ecology 61:702–714.
- Dozier, H. L. 1926. The Fulgoridae or planthoppers of Mississippi, including those of possible occurrence. A taxonomic, biological, ecological, and economic study. Tech. Bull. Mississippi Agric. Exp. Stn. 14:1–152.
- McDermott, B. T. 1952. A revision of the genus *Megamelanus* and its allies (Homoptera, Fulgoridae, Delphacinae). J. Kansas Entomol. Soc. 25:41–59.
- Metcalf, Z. P. 1943. General catalogue of the Hemiptera. Fasc. IV. Fulgoroidea, Part 3. Aracopidae (Delphacidae), 552 pp.
- Mobberley, D. G. 1956. Taxonomy and distribution of the genus *Spartina*. J. Sci. Iowa State Coll. 30:471–574.
- Osborn, H. 1905. Descriptions of new North American Fulgoridae. Ohio Nat. 5:373–376.
- Tallamy, D. W. and R. F. Denno. 1979. Responses of sap-feeding insects (Homoptera: Hemiptera) to simplification of host plant structure. Environ. Entomol. 8:1021–1028.

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