TROPICAL LEPIDOPTERA, 2(2): 103-106

IMMATURE STAGES OF *ANTHANASSA TEXANA SEMINOLE* (LEPIDOPTERA: NYMPHALIDAE)

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ABSTRACT.– The immature stages of *Anthanassa texana seminole* (Skinner) in Florida are described. Eggs and larvae were collected on *Justicia ovata* (Walt.) Linau. There are five larval instars and development at 28°C from egg hatching to adult emergence averaged 22 days. Small but consistent differences between larvae of *A. t. texana* and *A. t. seminole* occur in coloration, length and number of secondary setae on the head and stemmatal arrangement.

KEY WORDS: Acanthaceae, Asteraceae, biology, life history, Compositae, *Eresia*, Florida, Hymenoptera, larva, life history, Nearctic, parasites, *Phyciodes*, Scrophulariaceae, Texas, *Trichogramma*, Trichogrammatidae, USA.

The Seminole Crescent, *Anthanassa texana seminole* (Skinner), is found in scattered local colonies throughout the lower southeast coast area. Very little is known about its biology. Available information appears to be based on the nominate subspecies *A. texana texana* (W. H. Edwards). The larva of *A. texana texana* was first described by Edwards (1879) (as *Eresia*) from live specimens received from Texas. He reared them on *Actinomeris squarrosa* Nutt (= *Verbesina alternifolia* (L.) Britt) (Asteraceae) and described the young and mature larvae and chyrsalid. The larvae did not feed on *Aster* (Asteraceae), or *Chelonia barbata* Cav. (= *Penstemon barbatus* (Cav.) Roth) (Scrophulariaceae). Later, Edwards (1881) reported that the larvae did feed on *Aster*. Coquillett (1881) briefly described *A. t. texana* (also as *Eresia*) and gave the same host plant information. Kendall (1959) reported larvae feeding on *Jacobinia carnea* (Lindl.) Nichols (= *Justicia carnea* (Lindl.)) (Acanthaceae) but they died before completing development. However, he successfully reared them on *Beloperone guttata* Brandegee (= *Justicia brandegeana* Wassh & L. B. Sm.), *Siphonoglossa pilosella* (Nees) Toor., *Ruellia occidentalis* (A. Gray) Tharp and Barkl. and *R. drummondiana* (Nees) A. Gray, all Acanthaceae. In 1964, Kendall added *Dicliptera brachiata* (Pursh) Spreng. as a host plant and suggested that perhaps all genera of Acanthaceae might be acceptable food plants. Baggett (1980) suggested that *Ruellia carolinensis* (J. F. Gmel.) Steud. was the host plant and that *A. texana seminole* (as *Phyciodes*) was a good species instead of a subspecies.

MATERIALS AND METHODS

Newnan's Lake, in Alachua County, Florida, is one of the few known localities where *Anthanassa texana seminole* can be frequently collected. In early November the butterflies were flying in large numbers and feeding on *Bidens mitis* (Michaeux) (Asteraceae) flowers in open areas of the mixed marsh and swamp. Numerous eggs and third instar larvae were collected on *Justicia ovata* (Walt.) Linau (Acanthaceae). Eggs, larvae and plants were taken to the laboratory where the larvae were reared and observations made on life history. The eggs, larvae, and potted host plants were placed in a 12" x 24" x 12" glass aquarium covered with cheesecloth. The temperature was ca. 28°C. Examples of pupae and all larval instars were preserved. Head capsule measurements were based on preserved larvae. Drawings were made using a dissecting microscope with an ocular scale.

DESCRIPTION OF STAGES

EGG: height, 0.7mm; width, 0.6mm (n = 10).

Conical, creamy yellow, reticulated dorsally. Twenty-five to thirty weak ridges extending downward from micropyle, becoming less evident ventrally.

FIRST INSTAR: length, 2.2-2.3mm; width at seventh abdominal segment, 0.4-0.5mm (n = 5).

Body watery-yellow, chalazae creamy white. After feeding, mid-dorsally with dark greenish black line. Head black with numerous fine black setae, width 0.34-0.38mm; mean = 0.35 + 0.01mm. Body cylindrical, each segment with chalazae. Thoracic segments with dorsal, subdorsal, and lateral pair of chalazae; abdominal segments 1-8 with mid-dorsal chalazae in addition to other pairs. Setae curved forward.

SECOND INSTAR: length, 5.0mm; width at seventh abdominal segment, 1.3mm (n = 2).

Head black, vertex with reddish brown spot, setae as above; width 0.45-0.54mm; mean = 0.51 + 0.02mm. Body cylindrical. Chalazae replaced by scoli. Mid-dorsal line as before. Mid-dorsal and dorsal scoli milky-white with black spines, area between watery-yellow; area from dorsal scoli to subdorsal scoli light brown, subdorsal scoli light brown with light tip and black spines, creamy-white band anterior and posterior to dorsal scoli starting from thoracic segments and ending on the penultimate abdominal segment; remainder below the subdorsal scoli

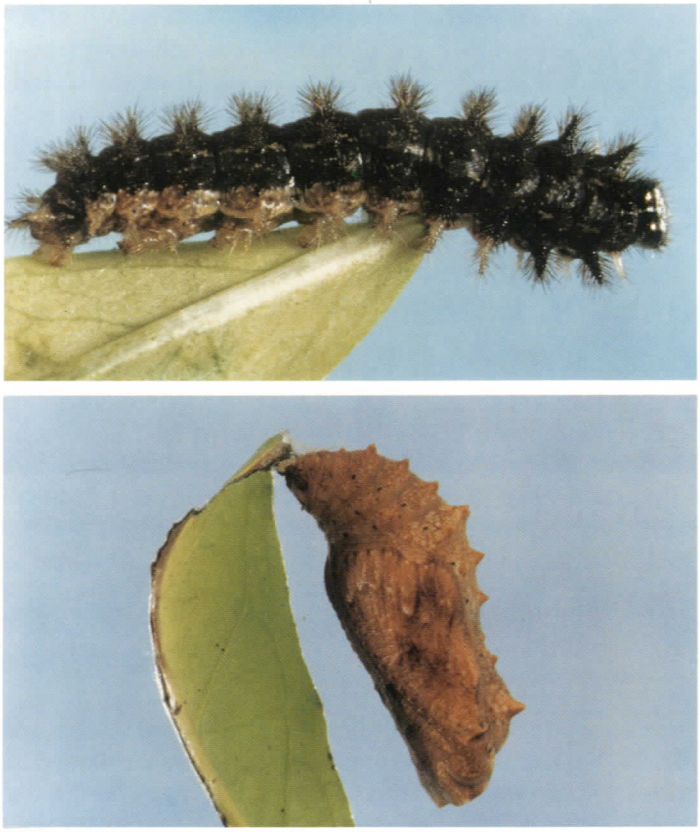

Fig. 1-2. *Anthanassa texana seminole*: 1. Fifth instar larva; 2. Pupa (Gainesville, FL).

watery-white, remainder of scoli watery-white with white spines; dark greenish black mid-dorsal line persistent.

THIRD INSTAR: length, 7.0-8.0mm; width at seventh abdominal segment, 1.7-2.0mm (n = 100).

Head as before, width 0.66-0.88mm; mean = 0.80 + 0.04mm. Body shape as before. Mid-dorsal line as in earlier instars, mid-dorsal scoli watery-green; from mid-dorsal scoli to dorsal scoli watery-green, dorsal scoli creamy-white with black spines, dorsal band as before, three pair of anterior creamy-white spots and one pair of posterior creamy-white spots usually present on each segment; from dorsal scoli to subdorsal scoli chocolate brown, subdorsal scoli black with black spines; from subdorsal scoli to lateral scoli creamy-white, lateral scoli creamy-white, subventral scoli watery-white with white spines.

FOURTH INSTAR: head as before, width 1.00-1.30mm; mean = 1.23 + 0.07mm (n=100).

Body shape and color as before.

FIFTH INSTAR (Fig. 1, 3, and 5): length at beginning of stadium 11.3 mm, at end of stadium 18.0-25.3mm; width at beginning of stadium 2.5 mm, at end of stadium 4.7-5.4mm (n = 100).

Head width, 1.88-2.28mm; mean = 2.07 + 0.11mm; with many secondary setae, solid black, except for midportion of frons, clypeus and labrum which are light brown; apical margin of labrum dark brown. Frons extending halfway, adfrontal three-fifths way to vertex. Stemmata 3 and 5 larger than others, stemma 6 nearer 1 than 5, 3 and 4 closer together than others, 1 and 6 appear whiter than others. Labral notch extending halfway to base. Mandible reddish-brown with 6 dark brown teeth.

Body shape as before. Mid-dorsal line as before; 9 mid-dorsal light brown scoli, one on A1-7 and 2 on segment A9; area between dorsal scoli light brown, dorsal scoli light brown with black spines, dorsal band as before. Area between dorsal scoli and subdorsal scoli chocolate brown, subdorsal scoli dark with black spines. Numerous creamy-white spots between mid-dorsal scoli and lateral scoli. Lateral scoli yellow-brown with dark and light spines. Area from A3-6 lateral scoli to subventral scoli light pinkish-brown, subventral scoli, single on all segments but yellowish-brown with creamy spines. A few creamy-white spots between lateral scoli and subventral scoli. Area below subventral scoli pinkish. Thoracic legs brown. Spiracles dark brown to black, those on T1 and A8 largest, only slightly elliptical, almost as wide as high. A very small sclerite posterior-ventral of spiracles; distance between sclerite and spiracle equal to or slightly greater than distance between spiracle and subdorsal scolus. Crochets in irregular triordinal mesoseries on A3-6. Scattered secondary setae most numerous inside prolegs. A10 with numerous dorsally pointing spicules apically below anal shield.

PUPA (Fig. 2, 7): Length, 14.0-14.5mm; width at widest point, 5.5mm (n = 100).

Beige with orange-brown markings as in figure 2. Antennae and proboscis longer than forewings but not hindwings. T2, 3 each with pair of dorsal tubercles. A2-8 with mid-dorsal and a dorsal pair of tubercles; those on A8 less than one fourth the size of others with pair of subdorsal tubercles. Spiracles present laterally on A2-8, those on A8 without distinct opening.

NOTES

The nominate subspecies, *A. t. texana* differs from *A. t. seminole* by the following characters. The head capsule in *A. t. texana* is light to dark brown with a pale reddish spot on the vertex (preserved specimens). According to Edwards (1879) the head capsule is uniformly dark. In *A. t. seminole* the midportion of the frons, clypeus and the labrum (except for the apical dark margin) are light brown to cream. The stemmata of *A. t. texana* (Fig. 4) are in a more elliptical arrangement than *A. t. seminole* (Fig. 3) (which tends to be more ovoid) and stemma 6 is more than 3X its width from 5 (less than or equal to 3X in *A. t. seminole*). The secondary setae on the head capsule tend to be shorter than those in *A. t. seminole*. In *A. t. texana* the halves of the head capsule appear more triangular when viewed from above. They appear more trapezoidal in *A. t. seminole*. The scoli are shorter and slightly thinner above the spiracles with less armament in *A. t. texana*; longer and thinner below the spiracle in *A. t. seminole* (Fig. 5-5a). The color pattern though faded in the preserved *A. t. texana* that were compared appears lighter with more numerous white spots scattered over the surface. Hence the pattern of bands seen in *A. t. seminole* is less apparent. The light brown spiracles are smaller and more elliptic in *A. t. texana*; larger, rounder and dark brown to black in *A. t. seminole*. The true legs are light brown in *A. t. texana* and dark brown in *A. t. seminole*.

Pupae are very similar but differ in at least two aspects. The vertex of *seminole* is slightly concave (Fig. 7) but straight across or slightly convex in *A. t. texana* (Fig. 8). The latter has three tubercles dorsally (Fig. 10) on abdominal segment one whereas *A. t. seminole* has only two (Fig. 9).

BIOLOGY

The eggs are deposited on the underside of the leaf in groups up to 50 and are spaced equidistant, sometimes touching, but

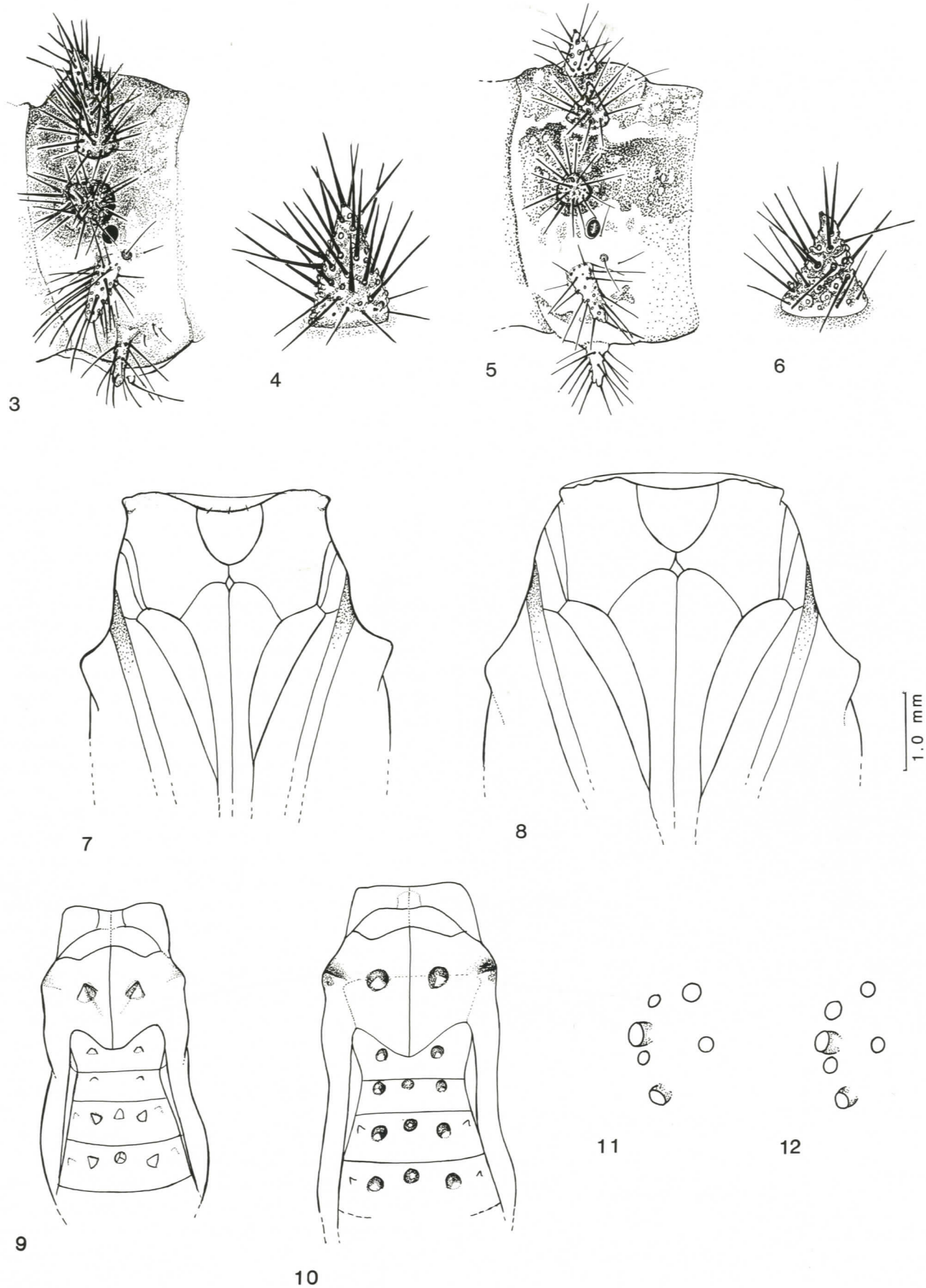

Fig. 3-12. Larva and pupa of *Anthanassa texana* subspecies: 3. Lateral view of abdominal segment 2 of *A. t. seminole*. 4. Enlargement of scolus on abdominal segment 2 of *A. t. seminole*. 5. Lateral view of abdominal segment 2 of *A. t. texana*. 6. Enlargement of scolus on abdominal segment 2 on A. *t. texana*. 7. Anterior of *A. t. seminole* pupa ventral view. 8. Anterior of *A. t. texana* pupa ventral view. 9. Cephalic segments and anterior abdominal segments of pupa of *A. t. seminole*. 10. Cephalic segments and anterior abdominal segments of pupa of *A. t. texana*. 11. Stemmatal arrangement of *A. t. seminole*. 12. Stemmatal arrangement of *A. t. texana* (*A. t. texana*, Garland, TX; *A. t. seminole*, Gainesville, FL).

always less than an egg diameter from each other. Some eggs were parasitized by *Trichogramma* sp (Hymenoptera: Trichogrammatidae). Parasitized eggs appear black, but when viewed under the microscope are actually shiny lead gray. The egg stage lasted at least five to six days. Upon hatching, the larvae consumed part of the egg shell. Young larvae fed gregariously on the underside of the terminal leaves. The first, second and third instars lasted approximately two, three and four days respectively. The third instar larvae were easy to find since they devoured everything except the upper dermis of the leaf. The fourth and fifth instar larvae consumed all but the petiole and midvein of the leaves. The fourth instar larvae required two to four days and the fifth instar larvae required 7-17 days to complete development. The pupal stage required 9-19 days. Eclosion of adults occurred mainly in the early afternoon mostly before 1600 hrs EST. More than 130 adults were reared. Males emerged two to three days earlier than the females under laboratory conditions. There was some indication from a few larvae reared individually that larvae developed faster if they were not separated immediately after hatching.

DISCUSSION

The small but consistent differences in the larvae and pupae of the two subspecies of *A. texana* support the suggestion by H.D. Baggett (1980) that *A. t. seminole* and *A. t. texana* are distinct species. *Anthanassa t. seminole* is found only in very restricted swampy situations where its host plant *Justicia ovata* grows, while *A. t. texana* can be found even in urban situations far from wetlands. Additional studies on the biology and morphology of all stages of this insect will likely support the elevation of these subspecies to species status.

ACKNOWLEDGMENTS

We wish to thank the following people: Takuji Hayakawa and Judy Gillmore (both Dept. of Entomology & Nematology, University of Florida) for helping collect larvae and host plants; David Hall (Dept. of Botany, University of Florida) for the identification of the host plant and assistance with plant names; Steven Passoa (USDA, APHIS, Reynoldsburg, OH) for furnishing some literature; Margo Duncan (University of Florida) for the illustrations; and H. David Baggett (Palatka, FL) and Roy Kendall (Garland, TX) for reviewing the manuscript and the latter for furnishing *A. texana texana* larvae. Florida Agricultural Experiment Station Journal Series No. R-01845.

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