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# IMMATURE STAGES OF SOME WESTERN NEARCTIC AND/OR NEOTROPICAL TABANIDAE (DIPTERA)

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ABSTRACT

Immature stages of *Tabanus colombensis* Macquart, *T. nebulosus* De Geer, and *T. tetropsis* Bigot are described and illustrated. Separation of the immature stages of these species from known immatures of American Tabanidae is discussed.

RESUMEN

Se describen e ilustran estados inmaduros de *Tabanus colembensis* Macquart, *T. nebulosus* De Geer, y de *T. tetroposis* Bigot. Se discute la separación de las etapas inmaduras de estas especies de las conocidas inmaduras americanas de Tabanidae.

Goodwin and Murdoch (1974) summarized the known information on the larvae and pupae of Neotropical Tabanidae. Information was provided on the larval and/or pupal stages of 19 species of *Tabanus*, 9 of which were known only from the Neotropics and 10 having Neotropical-Nearctic distributions. The larvae and pupae of 4, the larvae of 1, and the pupae of 3 species were described for the first time. For the remaining

species these authors provided translations of previously published descriptions (Coscarón 1969, Coscarón and Led 1969) or brief comments and citations to existing English language descriptions (Roberts 1962, Burger 1971). In addition to the above, descriptions of the larvae and pupae of 13 species and 3 species of *Tabanus* exhibiting western Nearctic and/or Neotropical distributions have been provided by Burger (1977) and Lane (1975), respectively.

Below I give descriptions of the larvae and pupae of *T. tetropsis* Bigot and the larvae only of *T. nebulosus* De Geer and *T. colombensis* Macquart. Pupae of the last 2 species were described previously (Goodwin and Murdoch 1974). Of these 3 species, the first is known only from the Nearctic Region, the second only from the Neotropical Region, and the third from both regions. Their separation from other known Neotropical, Neotropical-Nearctic, or western Nearctic larvae and pupae is discussed. The reader is referred to Teskey (1969), Goodwin (1972), Tidwell (1973), Goodwin and Murdoch (1974), Burger (1977), or Lane (1975) for illustrations of the descriptive terminology.

*Tabanus colombensis* Macquart

Mature larva (Fig. 1): Length 23-27 mm, whitish with contrasting brown pubescent markings. Head capsule 3.0-3.4 mm long, greatest width 0.8-0.84 mm. Anal segment 2.0-2.2 mm long, ca. 1/5 greater than maximum width. Respiratory siphon 0.74-0.88 mm long, ca. 1/3 greater than basal diameter; stigmatal spine absent. Striations present only on non-pubescent areas of anal segment and laterally between pubescent extensions on thoracic segments; spacings 0.016-0.022 mm on thoracic segments, 0.022-0.032 mm on anal segment. Anterior pubescence absent from anal segment, elsewhere forming complete annuli which are paler caudally; prothoracic annulus laterally with a single broad fan-shaped caudal projection; meso- and metathoracic annuli each with 4 caudal projections laterally, these crossing 2/3 and 1/2 respectively of the non-pubescent areas of the segments, those of mesothorax, especially middle 2, rather broad. Pseudopodial pubescence forming complete annuli on all pseudopodial segments, united with anterior pubescence ventrolaterally on all, dorsolaterally only on abdominal segments 1-3. Posterior pubescence absent from pro- and mesothorax, elsewhere forming complete annuli which are progressively more distinct caudally, preanal annulus expanded laterally and with 4 short anterior projections. Anal segment with an area of pubescence covering anal lobes and ridges and extending rather broadly dorsally and somewhat anteriorly to near the dorsal surface, this band with both midlateral and dorsolateral posterior projections, the latter well separated from posterior annulus, the former approaching (rarely narrowly uniting with) posterior annulus.

Pupae: The pupal stage has been described previously (Goodwin and Murdoch 1974). The specimens discussed herein agree in general with the previous description.

Collections: Eight larvae, 4 reared, were collected from wet mud and grass roots at the margins of creeks in Bexar, Dewitt and Goliad counties in Texas. Using size as the criterion, all larvae were full grown. Collections were made in February and March.

Comments. The larva of *T. colombensis* would key to *T. albocirculus* Hine in Goodwin and Murdoch (1974). It can be separated from *T. albocirculus* as follows: in *T.*

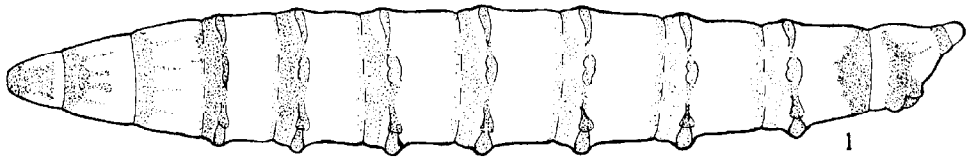

Fig. 1. Lateral view of the larva of *Tabanus colombensis*.

*albocirculus* all posterior projections from the anterior mesothoracic annulus are slender and pointed, and on the anal segment the dorsal pubescent extension from the pubescence of the anal ridge curves posteriorly midlaterally, whereas in *T. colombensis* the 2 middle posterior projections from the anterior mesothoracic annuli are inflated and have rounded or blunt apices, and on the anal segment the dorsal pubescent extension from the pubescence of the anal ridges arches anterodorsally mid-laterally. The combination of the single broad fan-shaped posterior extension from the prothoracic annulus and the presence of both a dorsolateral and a lateral posterior projection from the vertical extension of the pubescence of the anal ridges in *T. colombensis* separates it from all species treated by Burger (1977) and Lane (1975) except *T. monoensis* Philip. Separation from *T. monoensis* can be made as follows: "Pseudopodial pubescence encircling segments 4-10 with very short, posterior extensions dorso- and ventrolaterally on segments 4 or 5-10" and posterior pubescence "with very short anterior extensions dorso- and ventrolaterally on segments 6 or 7-10" (Lane 1975: 817-18), whereas in *T. colombensis* pseudopodial pubescence lacks any evidence of posterior extensions and anterior extensions are absent from posterior pubescence on all segments except preanal (10th). Although Teskey (1969) dealt with the immature stages of predominantly eastern North American species, some of these have ranges which approach or overlap that of *T. colombensis*. The same is true for some species discussed by Goodwin (1973, 1976). However, the same 2 characters noted above to separate *T. colombensis* from species treated by Burger (1977) and Lane (1975) plus the absence of a stigmatal spine in this species will separate it from all known eastern North American species except *T. lineola* Fabricius and *T. reinwardtii* Wiedemann. Separation of *T. colombensis* and *T. lineola* is dealt with in Goodwin and Murdoch (1974). *Tabanus colombensis* can be separated from *T. reinwardtii* by the fact that there are 1 or more isolated dorsolateral pubescent spots on the anal segment in the latter species, and no such spots are present in the former. Finally, *T. colombensis* can be separated from *T. tetropsis* (see below) by the obvious differences in the pubescence pattern of the anal segment.

No attempt is made to provide points of separation for the pupal stages of *T. colombensis* from those of other similar species. In their key to *Tabanus* pupae Goodwin and Murdoch (1974) were unable to separate *T. colombensis* from *T. occidentalis* Linn. (as *dorsiger*) var. *dorsovittatus* Macquart. Goodwin and Murdoch (1974) suggest that these 2 species are members of a complex including at least 6 other species with Neotropical or Neotropical-Nearctic ranges, namely *T. triangulum* Wiedemann, *T. subsimilis subsimilis* Bellardi, *T. lineola* Fabricius, *T. pungens* Wiedemann, *T. commixtus* Walker (as *truquii* Bellardi), and *T. claripennis* (Bigot). To these 8 species can be added *T. similis* Macquart based on characters of the immatures as described by Teskey (1969), Lane (1975) and Burger (1977), and *T. tetropsis* Bigot described below. Comparisons of the pupae of this group indicate that the range of variation within each species is often greater than differences between many of the species, hence an attempt to devise a scheme for separation of the species on the basis of pupal characters is not practical at this time. Fairchild (1983) reviewed the status of the adults of the above and several similar species.

*Tabanus nebulosus* De Geer

Mature larva (Fig. 2): Length 33-36 mm, whitish with distinct contrasting brown pubescent pattern. Head capsule 5.27-5.35 mm long, greatest width 1.28-1.34 mm. Anal segment 3.72-3.78 mm long, only a little longer than greatest width. Respiratory siphon 1.62-1.68 mm long, only slightly longer than broad basally; stigmatal spine absent. Striations absent. Anterior pubescence absent from anal segment, restricted to mid-

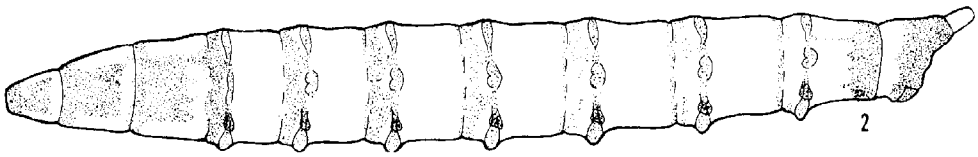

Fig. 2. Lateral view of the larva of *Tabanus nebulosus*.

ventral and dorsolateral spots on preanal segment and to dorsal and ventral transverse straps on abdominal segments 5 and 6, elsewhere forming complete annuli; prothoracic annulus with a single fan-shaped caudal projection laterally; meso- and metathoracic annuli also with single caudal projections laterally, these extending at least faintly to posterior margins of segments. Pseudopodial pubescence forming complete annuli on all pseudopodial segments, united with anterior pubescence dorsolaterally on abdominal segments 1-6, ventrolaterally on 1-4. Posterior pubescence present on all but pro- and mesothorax, forming complete annuli on last 5 segments, absent midlaterally from other segments, absent also middorsally and midventrally from metathorax and abdominal segment 1; preanal annulus expanded laterally and with 4 anterior projections, the most dorsal traversing segment to unite with pseudopodial pubescence. Anal segment with entire posterior 2/3 pubescent except for small midventral non-pubescent area just posterior to anal ridge.

Pupae: The pupal stage has been described previously (Goodwin and Murdoch 1974). The specimens discussed herein agree in general with this earlier description.

Collections: Two larvae, both reared, were collected in March from wet organic mud at the edge of a marshy area near Balboa (Canal Zone, Panama).

Comments: The larva of *T. nebulosus* can be separated from all known Neotropical and Nearctic larvae, except those of *T. abditus* Philip, by the following combination of characters: all thoracic segments with single broad posterior projections from anterior annuli, that of prothorax fan-shaped, those of meso- and metathorax extending across segments dorsolaterally and crossing at least 3/4 and 2/3 of respective lengths midlaterally and posterior 2/3 of anal segment entirely pubescent except for small mid-ventral non-pubescent area just posterior to anal ridges. Separation of larvae of *T abditus* Philip, as described by Burger (1977), from those of *T. nebulosus* can be made as follows: "pseudopodia long, tubular, armed with long, recurved reticular hooks in a penellipse . . ." and "pseudopodial pubescence completely encircling segment I, interrupted laterally on II-IV, laterally and ventrally on V-VII and bearing broad, mid-dorsal, caudal projection on V-VII" (Burger 1977: 216-17) in *T. abditus*, whereas in *T. nebulosus* the pseudopodia are not unusually long and tubular and lack recurved hooks, pseudopodial pubescence typically encircles segments I-VII, and mid-dorsal caudal projections from pseudopodial pubescence are absent. The pupae can be separated from all other known Neotropical and Nearctic species by the same characters used by Goodwin and Murdoch (1974) in their key (i.e. aster with usual 3 pairs of outwardly directed tubercles + 2 additional facing pairs along vertical midline in *T. nebulosus* in contrast to only the usual 3 pairs of tubercles for all other species).

*Tabanus tetropsis* Bigot

Mature larva (Fig. 3): Length 18-20 mm, yellowish white with contrasting brown pubescent pattern. Head capsule 2.64-2.98 mm long, greatest width 0.68-0.82 mm. Anal segment 1.32-1.48 mm long, only slightly exceeding greatest width. Respiratory siphon 0.68-0.80 mm long, ca. 1/3 greater than basal diameter; stigmatal spine absent. Striations present on non-pubescent areas of anal segment and laterally only elsewhere;

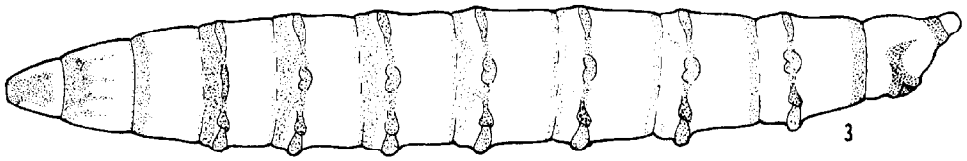


Fig. 3. Lateral view of the larva of *Tabanus tetropsis*.

spacings 0.017-0.021 mm on thoracic segments, 0.012-0.015 mm on abdominal segments, 0.021-0.025 mm on anal segment. Anterior pubescence absent from anal and preanal segments, restricted to a dorsolateral spot and a narrow transverse ventral band on abdominal segment 6, elsewhere forming complete annuli which are darker anteriorly; prothoracic annulus with a single broad fan-shaped caudal projection laterally: mesothorax with 4 slender caudal projections laterally, these crossing about 2/3 of non-pubescent area; metathorax with only hints of 4 caudal projections laterally. Pseudopodial pubescence forming complete annuli on all pseudopodial segments, united with anterior pubescence dorsolaterally on abdominal segments 1-3 and ventrolaterally on 1-4. Posterior pubescence absent from pro- and mesothorax, elsewhere forming complete annuli, these narrow and indistinct on anterior segments, progressively darker and wider caudally; annulus of preanal segment not noticeably broadened laterally and lacking anterior projections. Anal segment with pubescence covering anal ridge and lobes and extending dorsally to middle of segment where it bends rearward as a short blunt projection which does not unite with posterior annulus; isolated pubescent spots absent.

Pupa: Length 15-16 mm, yellowish brown but darker on head and thorax. Antennal ridges separated into median and lateral portions by a shallow notch and difference in elevation; median portions sharply ridged, crescentic, elevated 0.12-014 mm; lateral portions more rounded apically and about 1/2 as high. Callus tubercles unisetose, more or less circular in basal outline, elevated 0.08-0.11 mm, highest in middle where seta is located. Paired frontal tubercles elevated ca. 0.03 mm, separated along midline by depression. Antennal sheaths 0.40-0.44 mm long and wide not exceeding epicranial suture, with a poorly developed midbasal tubercle. Vertical and orbital setae tuberculate, none obliquely compressed. Setae of meso- and metathoracic and lst abdominal segments on small tubercles. Thoracic spiracle 0.68-0.70 mm long, C-shaped; spiracular prominence exceeding dorsal thoracic margin 0.30-0.40 mm. Abdominal segments II-VII encircled by biseriate fringes, those of anterior series less than 1/2 the length of posterior on same segment, reduced ventrally mainly in size; fringe of tergite VII of 34-48 spines, the posterior series reduced to a dorsal and 3-4 sublateral pairs. Dorsal preanal combs absent; lateral, ventrolateral or ventral composed of 2-5, 3-4 or 14-16 spines respectively, those of ventral and ventrolateral combs stoutly developed. Dorsal, lateral and ventral tubercles of aster 0.40, 0.50, 0.30 mm long respectively; in side view dorsal and lateral tubercles on same plane basally but at least tips, and sometimes apical 1/4 of dorsals clearly visible; all tubercles with pointed apices.

Collections: Thirteen fullgrown larvae, 7 reared, were collected in April from wet mud and grass roots at the margin of a shallow water-filled depression near the eastern perimeter of Hill Air Force Base, Davis Co., Utah. Sub-surface seepage is a known characteristic of the area. Cattail (*Iypha* sp.) was abundant, but no other aquatic vegetation was noted. The coliection site is at an elevation of approximately 1600 m.

Comments: The larva of this species keys to *T. lineola* in Goodwin and Murdoch (1974) from which it can be separated as follows: in *T. lineola* 1 or 2 isolated dorsolateral pubescent spots are present on the anal segment and posterior pubescence encircles only the last 4 segments, whereas in *T. tetropsis* isolated pubscent spots are absent

from the anal segment and posterior pubescence encircles at least last 6 abdominal segments. In Teskey (1969) and Tidwell (1973), larvae of *T. tetropsis would key to T. lineola* from which they can be separated by the absence of isolated pubescent spots dorsolaterally on anal segment which are present in *T. lineola*. Separation from *T. colombensis* described above can be done easily on the basis of differences in pubescence pattern. Larvae of *T. tetropsis* should not be confused with any species other than those mentioned above. Pupae are inseparable from other known related species (see comments on *T. colombensis* pupa above).

## Endnote

Contribution No. 632, Bureau of Entomology, Division of Plant Industry, Florida Dept. of Agriculture and Consumer Services, Gainesville, FL 32602.

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