

The Larva and Pupa of *Culicoides bambusicola* Lutz Observed with SEM, and Additional Notes on the Adult (Diptera Ceratopogonidae)

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ABSTRACT

The larva and pupa of *Culicoides bambusicola* are redescribed and illustrated, including photomicrographies, based on the examination with both Scanning Electron Microscopy (SEM) and phase-contrast stereoscope. The larva exhibits the characters stated by previous authors for larvae of tree hole breeding species. A diagnosis and illustrations of the adult stage from type material and specimens emerged in laboratory is also provided. The specimens were collected breeding in tacuara canes internodes in northeastern Argentina.

INTRODUCTION

The biting midges of the genus *Culicoides* Latreille are notorious bloodsucking pests of man and animals throughout the World. Wirth et al. (1988) recognized 246 species for the Neotropical region, and since then 25 species were described and/or recorded for this area, bringing the total number of species inhabiting the Neotropics to 271. These species are mainly known by their adults, especially females, being only described the larvae of 12 and the pupae of 22 species.

The bamboo breeder species *Culicoides bambusicola* Lutz was originally described based on females from Rio de Janeiro and San Pablo, Brazil, giving as well brief references to larva and pupa (Lutz, 1913). Although these immatures stages were posteriorly redescribed by Lane (1947), Barbosa (1952) and Forattini (1957), the knowledge of its morphology, especially the larva, has not been adequately achieved.

During a monthly sampling program of hematophagous Diptera in the area influenced by the Yacyreta dam lake in the Parana river, between Argentina and Paraguay, several larvae and pupae of *C. bambusicola* were found breeding in holes of tacuara cane (*Gadua tinii* (Nees) Nees ex Rupr).

The purpose of this paper is to provide redescrptions of larva and pupa of *C. bambusicola*, which were performed on the examination

through both, Scanning Electron Microscopy (SEM) and phase-contrast stereoscope, as well as to give a diagnosis of the adult stage from type material and specimens emerged in laboratory during the present study.

MATERIALS AND METHODS

Larvae were collected by using suction pipetae in tacuara cane holes and carried to the laboratory in tubes containing water from their natural environment. They were observed daily for recording pupal development.

For the observation with phase-contrast stereoscope at oil immersion, some larvae were slide mounted in Canada balsam with their ventral side upward to facilitate examination of the epipharyngeal combs within the head capsule. Others were mounted dorsally and laterally to examine the chaetotaxy of the head capsule.

For the examination and microphotographies with SEM, the one of the Museo de La Plata (JOEL T100) was used. For that purpose, larvae and pupae were mounted by using the technique of Ronderos et al. (Ms)

For terminology of larvae see Murphree & Mullen (1991), Lamberson et al. (1992) and Nevil & Dyce (1994) for pupae, and Downes & Wirth (1981) for adults.

The following measurements and ratios of larvae were taken and/or calculated: total length (TL), head length (HL), head width (HW), subgenal width (SWG), mandible length (ML), distance between the tips of the lateral arms of epipharynx (LAW), width of the individual dorsal-comb sclerites of epipharynx (DCW), length of setae "o" (OL), and the distance between their bases (ODLR), head ratio (HR: HL/HW), and subgenal ratio (SGR: HW/SWG). The following measurements for pupae were taken and/or calculated: operculum length (OL), operculum width (OW), pedicel/horn ratio (P/H), operculum width/operculum length ratio (OW/OL).

The studied material is deposited in the collection of the Museo de La Plata, Argentina.

Culicoides bambusicola Lutz

Figs. 1-36

Culicoides bambusicola Lutz, 1913: 62 (female, larva; Rio de Janeiro and Sao Paulo, Brazil); Barretto, 1944: 95 (male; Sao Paulo); Lane, 1947: 166 (redescr. pupa, larva; Brazil); Barbosa, 1952: 11 (figs. larva, pupa; Rio de Janeiro, Sao Paulo); Forattini, 1957: 321 (redescr. adult, pupa, larva; syn.: bahiensis; type-locality stated; distr.); Wirth et al., 1988: 55 (atlas; wing photo; distr.); Ronderos & Spinelli, in press (Argentina record).

Culicoides bahiensis Barbosa, 1947: 11 (female, male; Bahia, Brazil).

Culicoides gabaldoni: Forattini, 1957: 322 (erroneous syn.)

Culicoides germanus: Forattini, 1957: 322 (Guatemala record; erroneous syn.)

Larva. - TL 2.95 (2.91-3.00, n=5) mm.

Head capsule (figs. 1-3, 23-25) yellowish brown, elongated, apex rounded. HL 0.16 mm (=5), HW 0.10 (0.08-0.13, n=5) mm, HR 1.50 (1.23-2.00, n=5) mm, SGW 0.09 (0.08-0.10, n=3) mm, SGR 1.26 (1.11-1.37, n=3) mm. Labrum (Fig. 4) membranose; messors (figs. 4, 27) poorly sclerotized with prominent teeth; 5 well developed scopae (figs. 4, 27). Mandible (figs. 5, 26) of medium length, ML 0.18 mm (n=2), strongly sclerotized with slender pointed tip; basal articulations blunt, 4 basal setae; with a row of 11-12 prominent angular teeth along the inner margin. Epipharynx (Fig. 6) with 2 combs present (2 and 4); dorsal-comb sclerites enlarged, 0.5 as long as greatest breadth, teeth pointed sharp and subequal; DCW 0.012 mm (n=2); LAW 0.057 (0.055-0.060, n=2) mm; comb 4 with 2 angular, long lateral teeth; lateral curtains large with 20-30 pointed long teeth; comb 2 very short with 8-9 lanceolate, subequal teeth. Hypostoma (figs. 7, 24, 25) with a rounded medial elevation and unequal 3-4 angular teeth laterally. Chaetotaxy of head as in figs. 1-3, 23-25, 28.

Thoracic pigmentation: a diffuse yellowish brown pigment present over entire dorsum. Chaetotaxy as in figs. 8-9, 28-29.

Caudal segment (Fig. 10, 30) short and broad; CSL, CSW y CSR no measurements taken. Ten caudal setae; setae "o" very long, OL 0.011 mm; bases close together, ODLR 0.004 mm.

Pupa. - Length 2.20 (2.10-2.37, n=4) mm. Cephalothorax pale brown.

Respiratory horn (figs. 11, 31) brown, stout; P/H 0.31 (0.22-0.37, n=2); scarelike pointed spinules on 2/3 proximal and on laterals; lateral spiracles protuberances 2, and 7-8 apical spiracular openings. Operculum (Fig. 12) light yellow brown, with 2 well developed anteromarginal tubercles (am); OL 0.12 mm; OW 0.11 mm; OW/OL 0.91; a few large spines in a row along laterals, medial from basal margins and more of central disk in the base; no spines on central disk from the middle to proximal margin. Abdominal segments 3-7 pale brown, with a few scattered small spines; tubercles not strongly developed: 5 dorsal posteromarginal (dpm), 1 dorsal anterosubmarginal (dasm), 2 laterosubmarginal (lasm) and 3 ventralposteromarginal (vpm), as in figs. 13-14, 32; abdominal segment 8: 5 dorsalposteromarginal (dpm) and 3 ventroposteromarginal (vpm), as in fig 15-16. Abdominal segment 9 (= caudal) of male brown, with anterior rounded tubercles (Fig. 17), - 2.25 times as long as anterior breadth; dorsal surface with a few small spinules only present at base of the apicolateral processes, absent apically (Fig. 33); ventral surface with spinules extending to the apex (figs. 34-35).

Adult diagnosis. - Wing length 0.63 mm; eyes pubescent; antennal sensillar pattern 3,-7-10; AR 1.05; mandible (Fig. 18) with 7 teeth; 3rd palpal segment (Fig. 19) globose with deep pit; PR 1.63; P/H 0.64; wing

with inconspicuous pale spots as in Fig. 20; CR 0.61; halter pale brown; 2 globose spermathecae, rudimentary third and sclerotized ring present. Male genitalia (Fig. 21) with slender apicolateral processes in tergite 9; cerci pilose; aedeagus triangular, distal portion with a lateral pair of pointed processes; parameres (Fig. 22) each with slender stem tapered to simple filiform tip, ventral lobe absent.

Distribution (Fig. 36).—Argentina (Corrientes, Misiones), Brazil (Bahia, Espírito Santo, Rio de Janeiro, São Paulo), Colombia.

Material examined in Canada balsam.—Argentina, Corrientes, Garapè, 17-VI-1999, F. Krsticevic, 4 larvae, 3 pupae, 3 males (reared in laboratory from pupae) (MLP); Misiones, Corpus, Puerto Maní, 23-IX-1997, L. Hes, 3 larvae, 2 pupae, 2 females, 2 males (reared in laboratory) (MLP); Brazil, Rio de Janeiro, Petropolis, 1911, A. Lutz (slide # 3174, FIOC); São Paulo, Casa Grande, IX-1940, M. Barretto, 2 males (slides # 3171-3172, FIOC).

Material examined in SEM.—Argentina, Corrientes, Garapè, 17-VI-1999, F. Krsticevic, 5 larvae 2 pupae.

Discussion.—The larva of *C. bambusicola* exhibits the same characters stated by Murphree & Mullen (1991) for larvae of tree hole breeding species: diffuse yellowish brown thoracic pigmentation, large setae of caudal segment, particularly the "o" and "i" setae, and the extensive epipharyngeal lateral curtains.

During the Yacyretá project, the two CDC light traps that were settled during two years near tacuara canes in Corpus, did not collect specimens of *C. bambusicola*, suggesting that the species is poorly attracted by light. This is in accordance to most of the already valid records for *C. bambusicola*, which are based on specimens collected in canes internodes.

The records for Guatemala and Venezuela stated by Forattini (1957) correspond to erroneous synonymies with *C. germanus* Macfie and *C. gabaldoni*, respectively.

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