

ORIGINAL ARTICLE

Description of immature stages of *Agelanius cortesi* (González) from central Chile (Diptera: Tabanidae)

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Abstract

The immature stages of *Agelanius cortesi* are described and illustrated from immatures collected in Quebrada Los Almendros, Río Clarillo National Reserve, Cordillera Province, central Chile, and reared in the laboratory. Larvae of *A. cortesi* were found below the soil surface associated with other invertebrates.

Resumen

Se describe e ilustra los estados inmaduros de *Agelanius cortesi* colectados en la Quebrada Los Almendros, Reserva Nacional Río Clarillo, Provincia Cordillera de Chile central, los cuales fueron criados en el laboratorio. Las larvas de *A. cortesi* fueron encontradas bajo la superficie del suelo asociadas con otros invertebrados.

Keywords: Chile, Diachlorini, horse flies, immature stages, tabanids

Introduction

A total of 1172 species of Tabanidae are catalogued for the Neotropical Region (Fairchild & Burger, 1994). The genus *Agelanius* was erected by Rondani (1863) as a monotypic genus, including only *A. meridianus* Rondani. Eleven species have been placed in this genus (González, 1999, 2004a, 2004b), but the immature stages of only one species, *A. fuscus* González, are known.

The genus *Agelanius* is part of the most primitive group within the tribe Diachlorini characteristic of southern temperate Neotropical fauna, occurring predominantly in southern South America in the Andean Patagonian regions (Morrone, 2006). In Chile, species are distributed from the provinces of Santiago to Aysén (González & Henry, 1996). In Argentina, they are distributed from the provinces of Neuquén to Chubut (González, 1999).

The greatest difficulty in studying the preimaginal forms of Neotropical species is the specialized habitats of the larvae, making them difficult to locate (Burger, 1977). The preimaginal stages of only 60 Neotropical species of Tabanidae (less than 5%)

have been adequately described (Goodwin & Murdoch, 1974; Coscarón et al., 1996; González, 1998; Bermúdez & Bermúdez, 1999). Goodwin & Murdoch (1974) described the larvae and pupae of 22 species not previously known, particularly from Central America. Coscarón (1969, 1991) and González (2002) described the immatures of some species of *Dasybasis*. Coscarón & Philip (1967) described the larva and pupa of *Dasybasis fairchildi* Coscarón & Philip. Coscarón & González (1989) described the larva and pupa of *Scaptia* (*S.*) *lata* (Guérin-Méneville), a terrestrial Scionini. Recently, Coscarón et al. (1996) described the immature stages of *Myiotabanus barrettoii* Fairchild from Argentina. Coscarón et al. (1998) described the preimaginal stages of *Cryptotylus unicolor* (Wiedemann) and *Tabanus nebulosus ornativentris* Kröber from northern Argentina. Finally, González (1998) described the immature stages of *Protodasyapha* (*P.*) *hirtuosa* (Philippi), a terrestrial Pangoniini from central Chile.

In only one species of *Agelanius* have the immature stages been described (González, 2004a). The known preimaginal stages live in terrestrial habitats

and are associated with larvae of insects and other invertebrates (Annelida).

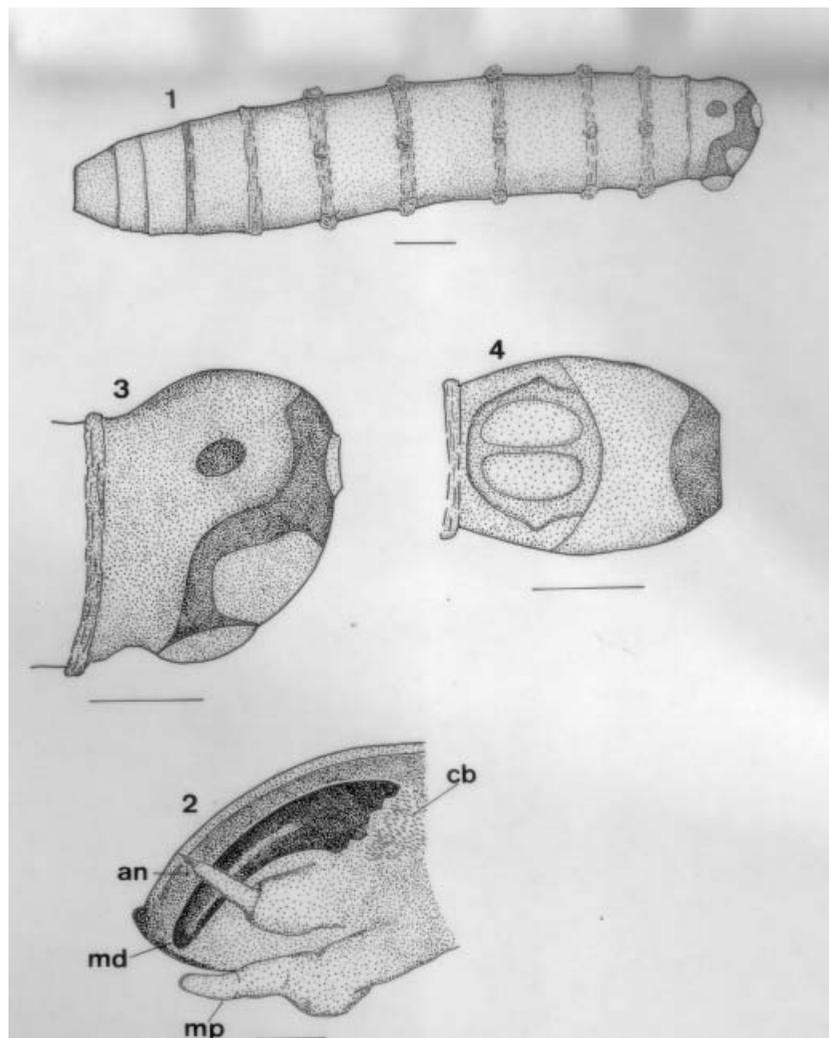
In this contribution the immature stages of *Agelanius cortesi* are described, based on reared specimens collected from Cordillera Province, Chile. The species is known only from the type locality.

Materials and methods

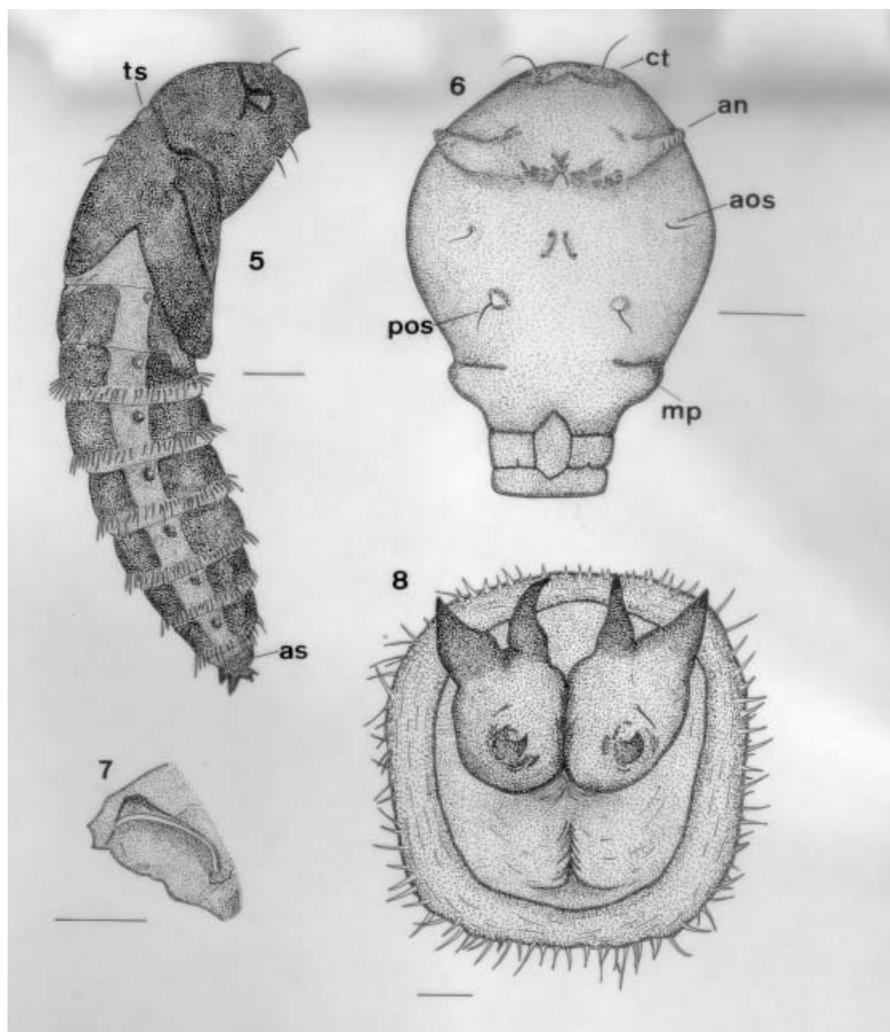
Fifteen larvae of *A. cortesi* were found 2–8 cm beneath the soil surface near a small stream and with abundant *Gunnera chilensis* Lam. in the Río Clarillo National Reserve (33°41'S, 70°34'W). This area has a Mediterranean climate with 7 months of dry conditions and 5 months with rains. Broad sclerophyll evergreen trees and shrubs dominate the vegetation. Immature stages were collected with a hand trowel. Specimens were transported to the laboratory and kept in individual plastic boxes with a

wet paper towel to maintain conditions like those of the larval habitat and to prevent predation and desiccation. *A. cortesi* larvae were fed living lepidopterous larvae in the laboratory.

Morphological studies were made with a stereoscopic microscope on living larvae that were immobilized and relaxed in ice water. In addition, some larvae were killed by placing them in hot water at 80–90°C and preserved in 70% alcohol. For microscopic studies, structures (larval exuviae, head capsule and measurements of the anal segment) were mounted on slides in Canadian balsam. Preserved larvae were also examined to determine the pattern of pubescence and shape of the anal segment. The color of the integument and pattern of pupae were noted in living specimens. Morphological details of the larvae were studied with a compound microscope. Drawings were made with a camera lucida by the author.



Figures 1–4. *Agelanius cortesi*, larva. (1) General aspect of mature larva in lateral view. (2) Part of cephalic capsule showing the antennae, mandible and maxillary palpi. an, antennae; cb, cephalic brushes; md, mandible; mp, maxillary palpi. (3) Posterior end of the larva in lateral view. (4) Posterior end of the larva in ventral view. Scale bars: 1 mm (1, 3, 4); 0.1 mm (2).



Figures 5–8. *Agelanius cortesi*, pupa. (5) General aspect of pupa in lateral view. as, aster; ts, thoracic spiracle. (6) Frontal plate in ventral view. an: antennae; aos, anterior orbital setae; ct, callus tubercle; mp, maxillary palpi; pos, posterior orbital setae. (7) Thoracic spiracle in lateral view. (8) Anal segment in posterior view. Scale bars: 1 mm (5, 6, 8); 0.5 mm (7).

The terminology of adults follows that of McAlpine (1981), larvae and pupae follows that of Teskey (1969) and Lane (1975). The specimens are deposited in the Instituto de Entomología of the Universidad Metropolitana de Ciencias de la Educación, Santiago, Chile.

Results

Description of immature stages

Mature larva. Length 16.0–18.0 mm, whitish. Body without trichomes, pseudopodia developed and concolourous; body fully striated, semi-transparent (Figure 1). Cephalic capsule brown, 2.9–3.0 mm long; greatest width 0.7–0.81 mm. Clypeus pale brown, terminating in an upturned labrum. Mandibles dark brown, slender, curved, with seven to eight serrations ventrally, length 0.7–0.85 mm (Figure 2). Antenna three-segmented; basal segment

broad; second elongate and slender, 0.35 and 0.19 mm, respectively; third segment short, bifid, 0.06 mm long (Figure 2). Maxillary palpi elongate, broad basally; third segment 0.12 mm long; second segment 0.20 mm long (Figure 2). Cephalic brushes present, with abundant micro pubescence. Prothorax bearing sparse pubescence. Cuticular striations on all body segments. Prothorax with dorsal striations separated by 0.079 mm; lateral striations by 0.087 mm. Meso- and metathoracic segments with striations separated by 0.080–0.083 mm dorsally and 0.086 mm ventrally. Segments IV–XI with striations separated by 0.072–0.077 mm laterally, 0.092–0.096 mm dorsally and 0.093–0.096 mm ventrally. Pubescence on all body segments but not measured, and with light pigmentation. Anterior pubescence forming a narrow ring on pro-, meso- and metathorax. Anterior pubescence complete on segment IV; incomplete on segments V–X. Posterior abdominal pubescence

forming a complete ring on segment X, reduced on segments III–IX. Pubescence of pseudopodia complete on segments IV–X but with slight interruptions. Anal segment 1.6–1.7 mm long, height 1.6 mm (Figure 3), spherical and with spots and lateral stripes. Anal ridge with sparse pubescence (Figure 4). Respiratory siphon very short, 0.16–0.22 mm long, width 0.29–0.33 mm. Tracheal trunks not measured and Graber's organ not visible in living larvae.

Pupa. Maximum length 13.0–15.0 mm, light brown, darker near frontal tubercles, thoracic spiracles and aster (Figure 5). Frontal tubercles wrinkled and separated, scarcely elevated 0.12–0.14 mm. Antennal ridge undivided, median and lateral portions not well separated. Antennal sheaths reaching epicranial suture and well annulated, 0.59–0.63 mm long, 0.40 mm wide (Figure 6). Callus tubercle subcircular, wrinkled, elevated, well sclerotized, length 0.18–0.20 mm, each bearing one seta 0.26–0.28 mm long (Figure 6). Vertical setae 0.25–0.27 mm long; one pair of lateral orbital setae 0.30–0.32 mm long; anterior orbital setae 0.21–0.23 mm long, posterior orbital setae 0.24–0.26 mm long. Thoracic spiracles small, 0.51–0.53 mm long, shape as shown (Figure 7) and situated very close to epicranial suture; spiracular prominences not exceeding anterodorsal margin of thorax. One pair of basalalar setae present, 0.39–0.41 mm long and one pair of anterior mesonotal setae 0.29 mm long; one pair of posterior mesonotal setae 0.27 mm long. Three pairs of metanotal setae present sublaterally, 0.28–0.30 mm long, quite close together, one pair situated anterolaterally at the basal angle of the wing sheaths, 0.16–0.18 mm long. First abdominal segment with one pair of tergal setae, 0.14–0.17 mm long and three pairs of pleural setae, 0.23–0.25 mm long, quite close together, and situated near anterior margin. Abdominal fringe spines biseriata; spines of posterior series longer and thicker than spines of anterior series. Pleural spines longer than tergal and sternal spines on all segments. Tergum of abdominal segments II–VI with about 30–38 well-developed spines on the posterior border, biseriata and variable in size, anterior series smaller than posterior series, longest 0.15–0.17 mm long. Abdominal segment VII with 41–52 spines, longer than on other segments, the longest 0.26–0.28 mm long. Aster 0.59–0.61 mm long, with sharply pointed, sclerotized tubercles; lateral tubercles well developed; dorsal tubercles divergent, oriented dorsally 0.23–0.25 mm long, smaller than lateral and ventral tubercles; lateral tubercles widely divergent, oriented laterally, 0.30–0.32 mm long; ventral tubercles divergent, oriented posteriorly, 0.20–0.22 mm long (Figure 8). Anal tubercles protuberant in the male and with ventral

preanal comb of 25–30 spines uninterrupted. Dorsolateral preanal comb with two to three spines; lateral preanal comb with three spines.

Discussion

The immature stages of *A. cortesi* resemble the general appearance of *A. fuscus* González in the length and shape of the cephalic capsule, length and width of mandible, arrangement of micro pubescence of cephalic brushes, shape of antennae and maxillary palps, meso- and metathoracic dorsal striations, and number of dorsolateral spines on the preanal comb (González, 2004a), but differ in the spots and lateral stripes of anal segment, number of mandible serrations, smaller thoracic spiracle, integument more transparent, smaller pseudopodia, anal segment more spherical, anal ridge with scanty pubescence, callus tubercles less elevated, antennal ridge less evident, and smaller ventral tubercles of aster.

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