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Immature Stages of *Aspidolea singularis* (Coleoptera: Scarabaeidae: Cyclocephalini)

Estados inmaduros de *Aspidolea singularis* (Coleoptera: Scarabaeidae: Cyclocephalini)

JHON CÉSAR NEITA MORENO[1], BRETT RATCLIFFE[2], GERMAN CALBERTO[3]

Abstract: The larva and pupa of *Aspidolea singularis* (Scarabaeidae: Dynastinae: Cyclocephalini) are described for first time based on specimens from Colombia. A key to the known third instar larvae of genera in the tribe Cyclocephalini is included. Data on the larval biology of *Aspidolea singularis* are provided.

Key words: Dynastinae. Larvae. Pupa. Key. Biology.

Resumen: Se describen por primera vez la larva y la pupa de *Aspidolea singularis* (Scarabaeidae: Dynastinae: Cyclocephalini) con base en especimenes procedentes de Colombia. Se incluye una clave para las larvas de tercer instar conocidas de los géneros de la tribu Cyclocephalini. Se proveen datos de la biología larval de la especie *Aspidolea singularis*.

Palabras clave: Dynastinae. Larvas. Pupa. Clave. Biología.

Introduction

The tribe Cyclocephalini contains 14 genera that occur in the New World except for one species of *Cyclocephala* introduced into Australia and *Ruteloryctes morio* (Fabricius, 1798), which occurs in western Africa from Guinea to Angola (Endrödi 1985; Jameson *et al*. 2002). Although species in the tribe Cyclocephalini are well-represented in collections, the larvae have been described for only a few species, and most of those were Nearctic. Accordingly, it is not yet possible to characterize larvae at the tribe level. Larvae of 11 species in three genera in the tribe Cyclocephalini have been previously described (Ritcher 1966; Morelli 1991; Morelli and Alzugaray 1994; Vincini *et al*. 2000; Ramírez *et al*. 2004). Our results show that the larvae of Cyclocephalini are distinguished from other American dynastine larvae by the following combination of characters: epipharynx with haptomeral process not entire (but entire in all species of *Dyscinetus* and in *Ancognatha manca* LeConte, 1866); plegmatia absent (except wide in *Cyclocephala testacea* Burmeister, 1847 and narrow in *Aspidolea singularis* Bates, 1888); dorsal surface of last antennal segment with two sensory spots; ocelli present and often pigmented (all species of *Cyclocephala*); each tarsal claw with two setae; raster without palidia (with palidia in *C. modesta* Burmeister, 1847 and *C. testacea*). The genus *Aspidolea* Bates contains 25 species that occur from Mexico to Argentina (Endrödi 1985; Ratcliffe 1977, 2003; Martínez 1975; Dechambre 1992). The aims of study were to: 1.) Describe the immature stages of genus *Aspidolea* (Based on *A. singularis* Bates, 1888). 2.) Contribute to the knowledge of the larval biology and life cycle of specie *A. singularis* 3.) provide a key to know third-stage larvae of genera in the tribe Cyclocephalini.

Materials and Methods

Terms and characters used in the description are those of Ritcher (1966), Morón (1987), and Morón and Ratcliffe (1990). Specimens were deposited at the Universidad Nacional de Colombia, Museo Entomológico, Facultad de Agronomía, Bogotá, Colombia (UNAB).

Results

Aspidolea singularis Bates, 1888.
(Figs. 1-14) Third-Instar

This description is based on four first-instar, three second-instar, five third-instar, two cast skins of the third-instar larvae and five pupae reared to the adult stage from: COLOMBIA, Cauca, Caldono. 2°47'50"N; 76°29'00"W. 1920 m. In soil of crop (*Manihot esculenta* Crantz, Euphorbiaceae). 12 Nov 2005. Calvert G. and Neita J. (UNAB).

Head (Fig. 1). Maximum width of head capsule 4.3 mm. Surface of cranium yellowish, finely punctate. ***Frons***. Each side with 2 posterior frontal setae, 1 anterior frontal seta, and 3-2 anterior angle frontal setae; cranial surface with 3 dorsoepicranial setae, 3 epicranial setae, and 7 paraocellar setae on each side. Clypeus with 1 exterior clypeal seta and 2 anterior clypeal setae. Labrum slightly asymmetrical with 2 anterior labral setae, 4 posterior lateral setae on each side, apex with 3 setae, posterior setae absent. Ocelli present, not pigmented. ***Epipharynx*** (Fig. 2). Haptomeral process notched forming 2 teeth; heli absent; plegmatia narrow, formed by 14-15 plegmata; right chaetoparia with 67 spine-like setae; left chaetoparia with 55 spine-like setae, without any sensillae; acroparia each with

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11 straight, long, thick setae; each acanthoparia with 15 short, curved, spine-like setae; pedium short, ovate. Dexiotorma narrow and elongate; laeotorma slightly shorter than dexiotorma and elongated toward apex, pternotorma rounded. Dexiophoba absent; laeophoba well-developed between haptolachus and inner side of laeotorma, formed by nine slightly slender setae. Sclerotized plate of right nesium long, elongated and truncate at apex; sense cone on left nesium represented by longitudinal, well-sclerotised plate, apex with two sensilla. Crepis not defined. ***Mandibles***. *Right mandible* (Fig. 3A-C): scissorial area with, blade-like apical tooth (S_1 + S_2) and 1 rounded tooth (S_3) after scissorial notch; scrobe with 6 slender, long setae. Dorsal surface with line of 7 slender, long setae. Ventral surface with elongate-oval stridulatory area formed by 48 narrowly separated ridges; ventral process well-developed, rounded, with many asperites. Brustia with 6 stout, long setae. Calyx large, basolateral setae absent. Molar area with 3 wide, convex, ridged lobes (M_1-$_3$) and with 7 slender, long setae. *Left mandible* (Fig. 4A-C): scissorial area with sinuate, blade-like apical tooth (S_1+S_2) and 1 rounded tooth (S_3) after scissorial notch. Scrobe with 6 slender, long setae. Dorsal surface with line of about 10 slender, moderately long setae; acia well-developed, sharp, with 4 setae at apex. Basolateral setae absent. Ventral surface with elongate-oval stridulatory area formed by 46, narrowly separated ridges; ventral process well-developed, rounded, with many asperites; dorsomolar area with row of 6 stout, slender, moderately long setae; brustia with 12 stout, long setae. Molar area with 3 lobes, first molar lobe (M_1) large. ***Maxila*** (Fig. 5A-B). Cardo subrectangular. Stipes larger than wide. Galea with many stout setae and 1 well-developed uncus at apex. Lacinia with many stout setae and 3 unci (middle uncus shorter than others), base fused. Maxillary palpus 4-segmented, segments 1 and 3 subequal in length, segment 4 slightly longer than segment 2. Stridulatory area with 7 blunt, truncate ridges (Fig. 6) and anterior truncate process. ***Hypopharynx*** (Fig. 7). Glossa with 55 slender, long setae and 14 stout, short setae. Hypopharyngeal sclerome asymmetrical, concave medially, sharp process produced dorsally; left lateral lobe with 15 slender, moderately long setae; right lateral lobe with 10 slender, moderately long setae. Left margin of sclerome with row of 28 stout, moderately long setae. ***Antennae*.** Dorsal surface of last segment with 2 irregularly-shaped, dorsal sensory spots (Fig. 8). Ventral surface of last segment with 2 irregularly-shaped sensory spots (Fig. 9).

Thorax. Prothoracic spiracle (Fig. 10) 0.28 mm long, 0.18 mm wide; respiratory plate yellowish, regularly shaped as a closed "C", bulla not prominent; distance between respiratory lobes less than diameter of bulla; plate with 21 holes across diameter at middle, holes with irregular edges (Fig. 11). Dorsum of prothorax with transverse row of 9 long, slender setae. Mesoprescutum with transverse, irregular row of 6 long, slender setae; mesoscutellum with transverse row of 4 long, slender setae and 2 stout, spine-like setae. Metaprescutum with 10 long, slender setae and 4 stout, spine-like setae; metaescutellum with 4 long, slender setae and 2 stout, spine-like setae. *Legs* (Fig. 12A-B): Tarsal claws with enlarged apical process, 1 basoexternal seta, and 1 internal, preapical seta. Tarsal claw on pro-and metathoracic legs shorter than those of mesothoracic legs. Coxa, trochanter, and tibiotarsus of all legs with many fine, stout setae.

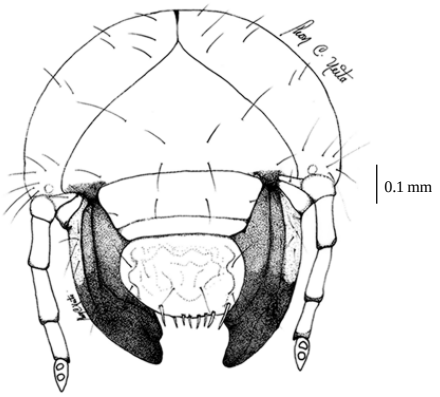

Figure 1. Head, frontal view.

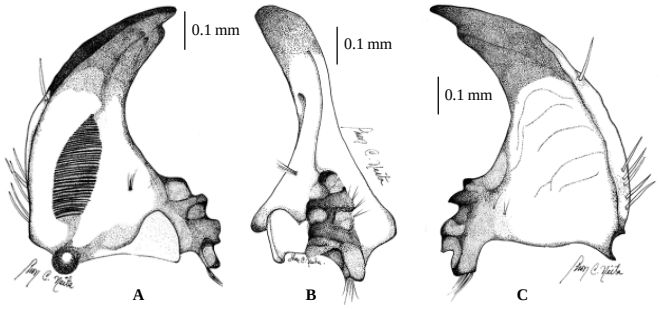

Figure 3. Right mandible. **A.** ventral view. **B.** inner view. **C.** dorsal view.

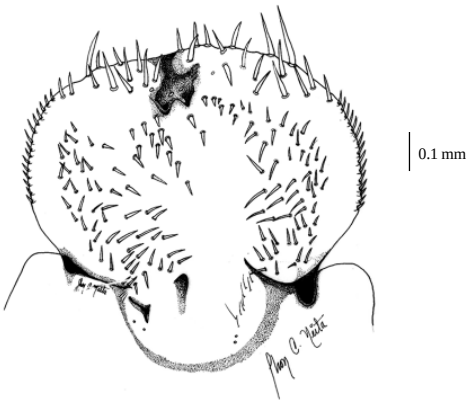

Figure 2. Epipharynx.

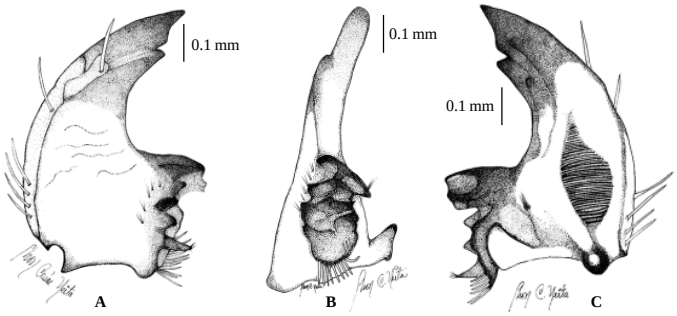

Figure 4. Left mandible. **A.** dorsal view. **B.** inner view. **C.** ventral view.

Abdomen. Abdominal spiracles I 0.18 mm long and 0.12 mm wide, shorter than spiracles II-VIII. Spiracles on segments II and IV equal in size (0.19 mm long and 0.13 mm wide); spiracles on segments V and VI equal in size (0.19 mm long and 0.19 mm wide); spiracle of segments VII and VIII larger than preceding spiracles (0.2 mm long and 0.22 mm wide). Chaetotaxia on abdominal segments (Table 1).

Raster. Surface without palidia; campus with 8 slender, long setae; teges with 53-55 short setae, barbula with 18 long, slender setae. Anal slit transverse. Approximate dorsal body length 19.5-20.5 mm (Fig. 13).

First-instar. Description based on 6 first-instar larvae taken in soil surrounding cassava crop (*Manihot esculenta* Crantz. Euphorbiaceae). Similar to second and third-instar larvae, except width of head capsule 1.9-2.3 mm) and body size smaller. Larvae of first and second-instars lack the anterior frontal setae.

Second-instar. Description based on 5 second-instar larvae reared from the first-instar larvae. Similar to third-instar, except width of head capsule 3.5-3.7 mm and body size smaller.

Table 1. Chaetotaxia on abdominal segments.

Organ	Long, siender setae	Short, spine-like setae
Abdominal segment I		
Prescutum	4	2
Subscutum	Absent	Absent
Scutum	8	16
Scutellum	10	10
Abdominal segment II		
Prescutum	4	16
Subscutum	1	3
Scutum	10	35
Scutellum	7	28
Abdominal segment III		
Prescutum	4	22
Subscutum	1	3
Scutum	8	44
Scutellum	8	31
Abdominal segment IV		
Prescutum	24	4
Subscutum	1	3
Scutum	8	39
Scutellum	10	33
Abdominal segment V		
Prescutum	4	25
Subscutum	1	3
Scutum	19	40
Scutellum	10	34
Abdominal segment VI		
Prescutum	4	33
Subscutum	1	3
Scutum	19	28
Scutellum	10	15
Abdominal segment VII		
(2 row).	8	13
Abdominal segment VIII (2 row)	10-13	Absent
Abdominal segment IX (2 row)	10	Absent

* Note: Abdominal segment X with approximately 80 moderate to long, slender setae.
All spiracular areas with 3 long, slender setae and 1 short, spine-like seta.
Pleural lobes with 5 long, slender setae and 2 stout, short setae.

Pupa (Fig. 14A-B).
Description Female (Fig. 14 A-B). Length 15 mm. Widest width 7.5 mm. ***Head.*** Surface glabrous, strongly deflexed; antennaa, labrum, mandibles, maxillae and palps discernible; antennal tecae expanded, stout with apex rounded. **Thorax.** Surface glabrous. Pronotum convex, anterior and posterior angles clearly defined. Meso- and metanotum well-differentiated. Elytral and posterior wing tecae closely appressed, curved ventrally around body; elytral tecae extending to middle of abdominal segment IV; posterior wing tecae extending to middle of abdominal segment V. Protibia with 3 distinct teeth on external edge. Meso- and metatibiae with inner and external spines well-developed at apex. **Abdomen.** Segments I-VII (ventral view) well-defined. Segment VII and VIII separated; segments VII and IX fused. Segment X with genital ampulla small (male) and slightly prominent. Segments I-VII (dorsal view) with well-defined, dioneiform organs, the first very sclerotized. Pleural lobes rounded. Spiracle I elongate, with fine peritreme and covered by wing thecae; spiracles II-IV ovate, prominent, with strongly sclerotized peritreme; spiracle V-VIII closed. Abdominal apex rounded, with fine, short setae.

Remarks. The following characters will separate *A. singularis* from other known Cyclocephalini larvae: Frons with 2 posterior frontal setae, 1 anterior frontal seta, and 2-3 anterior angle frontal setae. Ocelli not pigmented. Epipharynx without sensillae among setae. Tarsal claw on pro- and metathoracic legs shorter than those of mesothoracic legs. Abdominal spiracles I shorter than spiracles II-VIII; spiracles on segments II and IV equal in size; spiracles on segments V and VI equal in size; spiracle of segments VII and VIII larger than preceding spiracles.

Biological data. The adults of both sexes were found in the soil during March and April. Adults are attracted to lights at

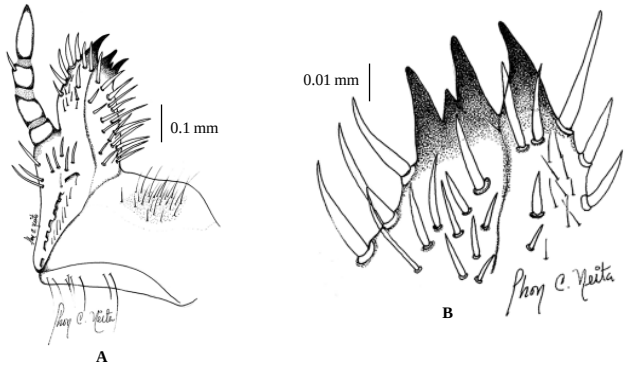

Figure 5. Maxila. **A.** ventral view. **B.** uncu and unci.

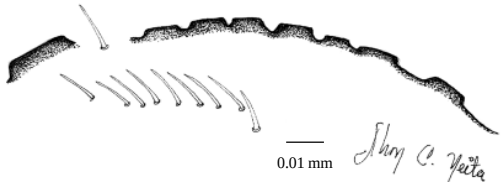

Figure 6. Detail of maxillary stridulatory area.

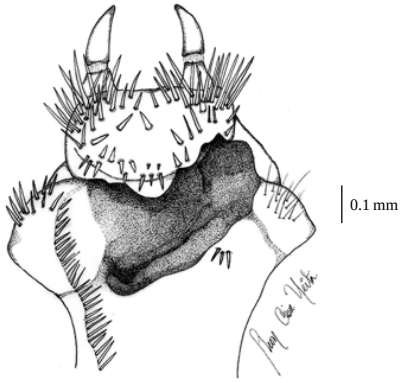

Figure 7. Hypopharynx.

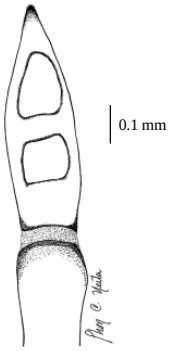

Figure 8. Last antennal segment, dorsal surface.

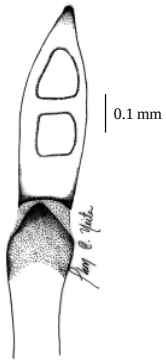

Figure 9. Last antennal segment, ventral surface.

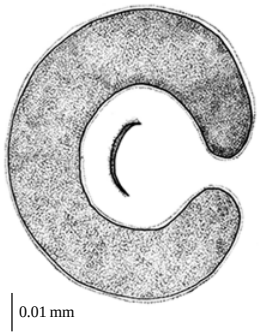

Figure 10. Prothoracic spiracle.

Figure 11. Microstructure of respiratory plate.

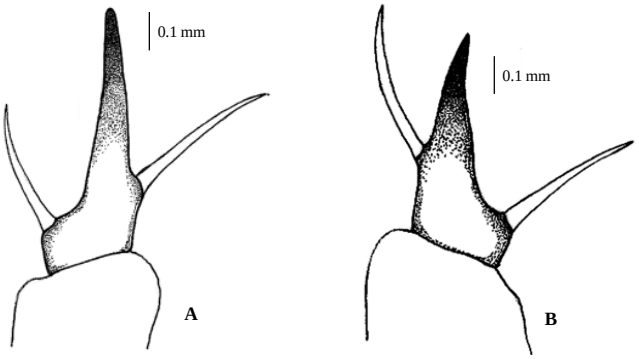

Figure 12. A. Mesothoracic claws, external view. **B.** Metathoracic claws, external view.

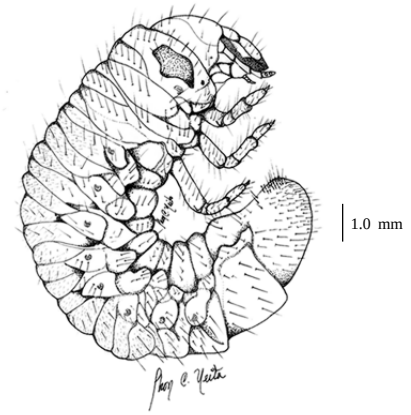

Figure 13. Third instar, lateral view.

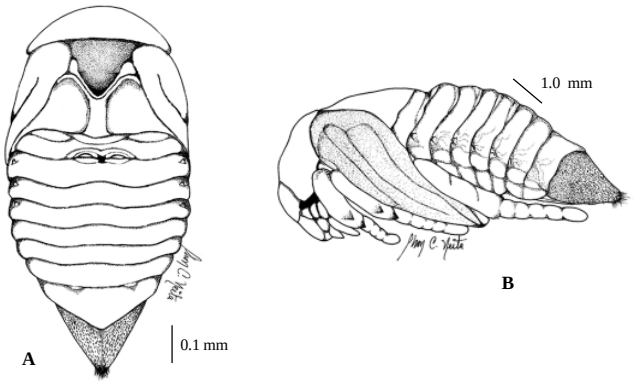

Figure 14. Pupa Female. **A.** Dorsal view. **B.** Lateral view.

night, especially from May to June. The larvae are saprophagous and live in soil with organic matter. First-instar larvae were collected in July. From January to February, pupae form weak cells within the soil. This species has a one-year life cycle.

Distribution. *Aspidolea singularis* is broadly distributed from Mexico to Venezuela, Colombia and Ecuador (Ratcliffe 2003).

Key to the Known Third-instar Larvae of Cyclocephalini

(Modified from Ritcher 1966)

1. Left mandible lacking 4th scissorial tooth……..... 3
1'. Left mandible with 4 scissorial teeth 2

2. Cranium with posterior frontal seta present. Haptomeral process of epipharynx prominent and entire ..... *Dyscinetus* Harold
2'. Cranium with posterior frontal seta absent. Haptomeral process of epipharynx notched, forming 2 teeth (entire in *Ancognatha manca* LeConte) ..... *Ancognatha* Erichson

3. Ocelli not pigmented. Epipharynx without sensillae among setae ..... *Aspidolea* Bates
3'. Ocelli pigmented. Epipharynx with many sensillae among setae ..... *Cyclocephala* Dejean

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