DESCRIPCION DE LOS ESTADOS INMADUROS DE TRES ESPECIES DE CETONINOS AMERICANOS (COLEOPTERA: SCARABAEIDAE: CETONIINAE)

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TITLE:

Description of immature stages of three species of American Cetoniinae (Coleoptera: Scarabaeidae: Cetoniinae)

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ABSTRACT

The larvae and pupae of three Cetoniinae scarab beetles, *Gymnetis pantherina* Blanchard, 1837; *Gymnetis holosericea* (Voet, 1779), and *Euphoria precaria* Janson, 1881 from Colombia are described. Multiple color patterns of adults and key larval characters are illustrated for each species for the first time. The described larvae of *Gymnetis* MacLeay are included in a key to the larvae of the genus, now with five species; and *Euphoria precaria* is added to the extant key of the known *Euphoria* larvae. New distributional records for the country are presented and some comments on the biology of the species in captivity are provided.

RESUMEN

Se describe la larva y la pupa de tres escarabajos cetoninos: Gymnetis pantherina Blanchard, 1837; Gymnetis holosericea (Voet, 1779), y Euphoria precaria Janson, 1881 de Colombia. Los caracteres larvales estudiados y las multiples formas de coloración de los adultos de las especies tratadas son ilustrados por primera vez. Una clave para las larvas de las especies de Gymnetis descritas al momento es elaborada y la clave existente para las larvas de Euphoria es actualizada con la nueva información. El rango distribucional de las especies en Colombia es ampliado con nuevos registros y se presenta información sobre la biología de las especies en cautiverio.

KEY-WORDS

Cetoniinae, *Gymnetis*, *Euphoria*, immature stages, larva, pupa, Neotropical region, Colombia.

INTRODUCTION

The superfamily Scarabaeoidea is one of the best known groups of Coleoptera worldwide with approximately 30,000 species in 2,000 genera described (Delgado *et al*., 2000). The relative species richness, in addition to the wide variety of morphological, ecological and ethological traits exhibits, makes it an excellent group for research in evolutionary biology.

The subfamily Cetoniinae (*sensu* Krikken, 1984) contains nearly 3,100 species and has high levels of endemism within their biogeographical regions. The Afrotropical region is the richest in terms of the number of genera with 230, 94% of them endemic followed by the Oriental region with 118 genera and 77% of endemicity. The Neotropical region has a generic level percentage of endemicity of 89% with 44 genera distributed in four tribes: Gymnetini, Cetoniini, Goliathini, and Cremastocheilini (Krikken, 1984). For the Nearctic region, Smith (2002) listed 104 species in 12 genera (excluding Valginae and Trichinae). No updated revision exists for the Neotropical species of Cetoniinae. In Colombia, 24 species included in 15 genera are reported with 75% in the tribe Gymnetini (Restrepo-Giraldo *et al*., 2003) but it is estimated that 40 species are actually present (Pardo-Locarno & Orozco, 2002). For most species only

information about their presence or absence is given in a known area and this information is frequently not accurate due to the lack of keys, collections, precise descriptions, and expertise.

The larvae of cetonines are C-shaped grubs that had been found living on soil, compost, packrat middens, under dry dung pats, on living tissue of Bromeliaceae, and in ant or termite nests. There has been a recent interest in studying the immature stages of American Cetoniinae in order to solve some of the complex taxonomic problems at the species level. The progress in larvae description has been slow, with just 61 of the 3,100 species of Cetoniinae currently described; in the tribe Gymnetini 16 species in 9 genera of larvae are described at this time. One of the main problems in the study of cetoniines larvae is the difficulty of rearing them and the unfamiliarity with the structures (Micó *et al*., 2001). The pupae are largely unknown aside from the attempt of Morón (1993) to analyze the pupal characters in several groups.

In this paper we describe for the first time the larvae and pupae of *Gymnetis holosericea*, *Gymnetis pantherina,* and *Euphoria precaria;* technical terms are those of Ritcher (1966), Morón (1993), and Micó *et al*. (2001). Studied specimens are deposited in the Coleccion Entomologica Facultad de Agronomia (UNAB) [Universidad Nacional] in Bogota and in the collection of the second author in Palmira, Colombia

MATERIALS AND METHODS

The described larvae and pupae were obtained from adult rearing. The adults were collected using a two-liter plastic bottle with the top cut off filled with rotten “platanos” (*Musa paradiasiaca* L. [Musaceae]). The traps were hanged from a tree branch 3-6 meters from the ground and checked for beetles weekly from a period of 6-14 months. The collected adults were placed in containers for rearing filled with humid “rusque” (humus, dry cow dung, and decaying vegetable matter) and with slices of banana as food. The cage was held at normal room temperature and ordinary lighting conditions. The obtained larvae were maintained with adults until the second instar when they were individually separated in single 16 oz. jars with

"rusque". The studied third instar larvae and pupae were killed in boiling water fixed in Pampel liquid for 24 hours, and preserved in 70% ethanol. Observations were made using a Olympus SZ 4045 at 16x, 40x and 100x of magnification.

***Gymnetis holosericea* (Voet, 1779)**

Gymnetis is a Neotropical genus in the tribe Gymnetini. The species are not easily distinguished since very few diagnostic characters have been found in the adults (Ratcliffe p.c.). Recently Antoine (2000) has suggested nomenclatural changes to some species, but in general a review is urgently needed. Five larvae in this genus are described: *Gymnetis flavomarginata sallei, G.*(*Paragymnetis*) *chalcipes, G. hebraica difficilis, Gymnetis holosericea* (this work) and *G. pantherina* (this work).

Gymnetis holosericea is an easy species to rear. The female deposits the eggs singly within the substrate, the whole cycle takes about 7 months (LII about four weeks, LIII about 12-13 weeks, and pupa from 4-6 weeks). As with other cetoniines, the third instar larvae form a pupal chamber (21-29 mm high 15-19 mm wide) with soil and some feces, and the larval exuvia is maintained at the ventral side of the pupa just in front of the abdominal sternites. The adults are long-lived with the reared ones dying 6-8 weeks after the offspring emerge. Mutilation is common in nature and in the laboratory but its origin is unknown. Feeding habits of larvae and adults in nature are not well understood.

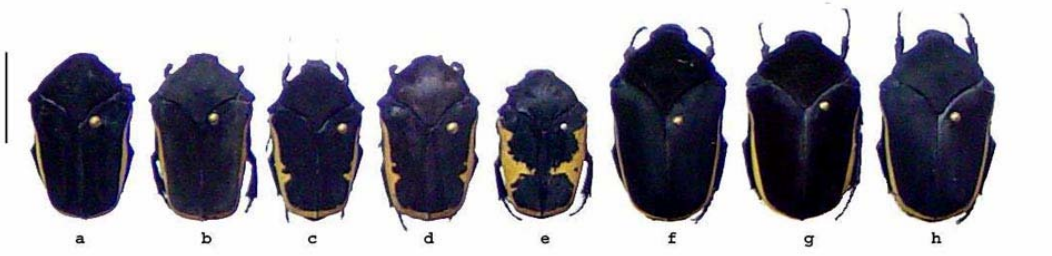

Figure 1. a-d. *Gymnetis holosericea* (a-b, males; c-d, females), e. chevrolat form (male), f-h. magnifica form (f-g, males; h, female). Scale line = 1 cm

The studied population corresponds to a medium size form (17.5-20 mm). In most of the cases the males have a very fine yellow stripe along the extension of the elytra without insertions and the coloration of the abdomen is matte or opaque while the females have slight yellow insertions at the posterior middle of the elytra and the ventral area of the abdomen is glossy (Figure 1, a-d). This species is very similar to two other "populations" found in western Colombia, differing mainly in the size and in the yellow stripe pattern on the elytra. For practical purposes we refer to one of them (21.8-22.9 mm) with the yellow stripe without insertions in both sexes as "magnifica" (Fig. 1, f-h) and to another with two strong yellow insertions without defined margins (16.5 mm) as "chevrolat" (Fig. 1, e). It is not clear if these "populations" correspond to different species or not but we hope that larval descriptions will help to define the taxonomic boundaries between species in this group.

Third instar larva. This description is based on 50 larvae reared from adults collected in a disturbed tropical dry forest near a city. Locality data: COLOMBIA: Santander, Bucaramanga, Vía Chimitá; 12-XI-02, 730m; Orozco, J. Leg. The vegetation of the zone is mainly composed by *Pithecellobium dulce* (Roxb.)(Mimosaceae), *Erythrina* sp. (Fabaceae), *Bambusa vulgaris* Schrad. (Poaceae), *Cecropia* sp. (Cecropiaceae), *Ricinus communis* L. (Euphorbiaceae), *Psidium guajava* L. (Myrtaceae), and *Mangifera indica* L. (Anacardiaceae). This is the first record of this species from Santander.

Head: (Fig. 2, a) Maximum width of head capsule 4.1-4.3 mm. *Cranium:* Smooth; color yellowish brown. Frons with a median longitudinal depression, a single posterior frontal seta, and a single anterior angle seta. Dorsoepicranium with one large and 4-5 small setae in a line diverging from mediobasal portion of head and, one lateral line of 3-6 short setae at each side. Tentorial pits evident. Ocelli absent. *Clypeus:* Shape subtrapezoidal with one posterior clypeal seta and 0-3 exterior clypeal setae. Preclypeus weakly sclerotized and without setae. *Labrum*:

Anterior border trilobed, clithra present. *Epipharynx:* (Fig. 2,b) Plegmata absent. Corypha with 4 long stout setae. Haptomeral region with cone-like process with a curved row of 12-14 heli and 6-8 stout, spine-like setae irregularly placed behind row. Acanthoparia with 6-8 short setae. Chaetoparia with 18-34 setae on each side. Dexiotorma long and pternotorma small and rounded. Laetorma short and pternotorma small and rounded. Nesia with sensorial cone. Haptolachus without sensillae below the cone. *Mandibles:* Right mandible (Fig. 2,d) with one

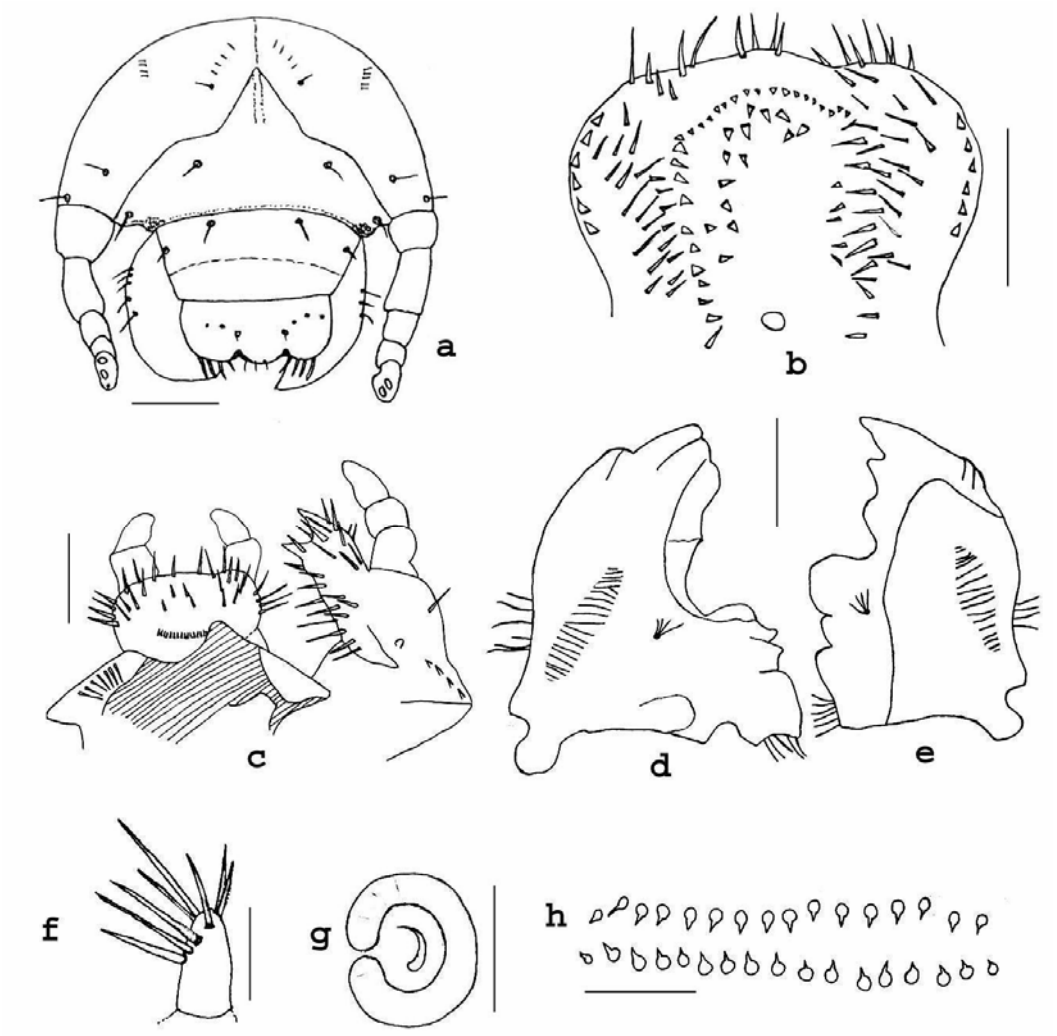

Figure 2. *Gymnetis holosericea*, larva. a. head, b. epipharynx, c. labium-maxilla, d. right mandible, e. left mandible, f. tarsungulus, g. respiratory plate, h. raster. Scale lines = 0.5 mm, except fig. 2a = 1 mm

scissorial tooth anterior to scissorial notch and two weakly defined scissorial teeth posterior to notch. Stridulatory area elongate, length over three times its width. Molar area trilobed, lateral edge with seven setae, dorsal surface in apical half with two setae. Brustia formed by five setae. Left mandible (Fig. 2, e) with one scissorial tooth anterior to scissorial notch and two well-defined scissorial teeth posterior to notch. Molar area trilobed, lateral edge with five setae, dorsal surface in apical half with one seta. Basomedian angle with brustia consisting of eight setae. *Maxilla* (Fig. 2,c) Mala with large uncus at apex and one subterminal bifid uncus. Stridulatory area with row of 4-5 curved acute teeth and a distal, truncate process. *Labium:* (Fig. 2,c) Hipopharyngeal scleroma asymmetrical, left side with 7-10 setae, right side more prominent and sclerotized and without setae. *Antennae:* First antennomere longer than the two following antennomeres together. Surface of last antennomere with two dorsal and 2-3 ventral sensory spots.

Thorax: Thoracic spiracles (Fig. 2,g) with C-shaped respiratory plate, size 0.82 mm high and 0.65 mm wide. Dorsal area of thoracic segments with abundant setae. *Legs*: Tarsungulus cylindrical (Fig. 2,f) rounded apically, possessing 10-11 setae.

Abdomen: Spiracles of abdominal segments I-VIII similar in size, distance between the two lobes of respiratory plate of spiracles much less than the dorsoventral diameter of the bulla. Dorsal surface of segment I-X with abundant long and short setae irregularly placed, longer as posterior. Dorsum of segment VII with two annulets. Segments IX and X fused, covered with short and long setae. Spiracular area of abdominal segments I-VIII with 34-41 setae. *Raster:* (Fig. 2,h) Palidia monostichous, open posteriorly and anteriorly, each palidium consisting of a row of 10-16 spiniform pali. Septula elongate, length 10 times its width. Lower anal lip with many short and medium size setae proximally to the anal aperture and many long setae distally.

Pupa

Description based in 8 pupae. Length 21.3-24.5 mm. Shape subovate, stout, exarate. Color cream-white yellowish without microtrichia in abdominal segments.

Head: Glabrous, bent downward, mouthparts separated. Frons with slight depressions. Clypeus trapezoid slightly concave.

Thorax: Pronotum glabrous, convex, subheptagonal in shape with two rounded protuberances at each side just in front of the pteroteca. Pteroteca free, compressed around the body, hind wing teca longer reaching the abdominal sternite IV. Meso-metasternal process large, between the pro and mesocoxa, with a strong process at the middle projected strongly to the front, apex not rounded sometimes with two ending points. Protibia with one apical spur and three protuberances vaguely defined or absent in most of the cases. Meso and metatibia with two apical spurs.

Abdomen: Tergites II-VI with tergo-lateral tubercles surrounded by fine rugae, segment VII with tubercle vague or absent. Spiracle I with sclerotized peritreme covered by the hind wing pteroteca and protected by a fleshy fold. Spiracles II-IV rounded, prominent. Spiracles V-VIII closed. Last tergite without urogomphi, genital ampulla bilobed. Female without bilobed ampulla.

Gymnetis holosericea larvae differs from other *Gymnetis* larvae by the following combination of characters: Tentorial pits evident, dorsoepicranium with central row of 5-6 setae, last antennomere longer that the two following segments together, surface of last antennomere with 2- 3 ventral sensory spots, spiracles of abdominal segments similar in size and palidium with 10-16 spiniform pali.

***Gymnetis pantherina* Blanchard, 1837**

Gymnetis pantherina is a species with high variability in their elytra patterns and body color but easy to separate from the other species in the genus. The marks on the body are variable in size, distribution and margin, but they are always black. The upper color of the body varies from brown yellowish to gray greenish and the black marks are present with or without fine yellow margins (Figure 3); the sternum ranges from shinny black in females to opaque gray, cream or

yellowish in males. This is not an easy species to rear as the collected adults took 8-12 weeks before ovipositing and the larvae were highly cannibalistic. *G. pantherina* is the most common species in the entomological collections of Colombia since it is frequently found in urban landscapes in the Andean region without using any traps.

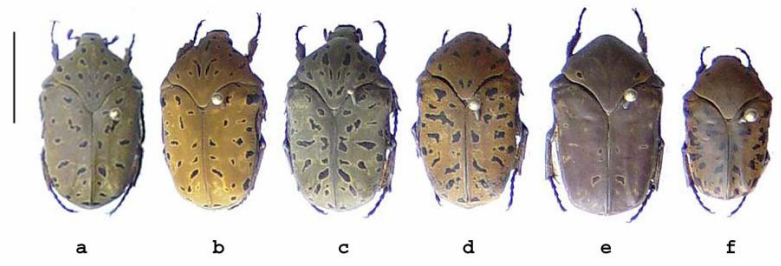

Figure 3. *Gymnetis pantherina*. a-e Ocaña, Norte de Santander; f Bucaramanga, Santander. a-c; males; d-e, females. Scale line = 1 cm.

Third instar larva. This description is based on larvae reared from adults collected in disturbed tropical dry forest. Locality data: COLOMBIA: Norte de Santander, Ocaña, Vereda La Pradera; 30-IV-03, 1100 m; Orozco, J. & Perez M. Leg. Vegetation mainly composed by *Piper aduncum* L. (Piperaceae), *Tecoma* sp. (Bignoniaceae), *Spondias purpurea* L. (Anacardiaceae), *Calliandra* sp. (Mimosaceae), *Psidium guajava* L. (Myrtaceae), and *Mangifera indica* L. (Anacardiaceae). First record to Norte de Santander: Ocaña (1100m), La Playa (1200m), Abrego (1320m) and Santander: Bucaramanga (960m), Girón (750m), Los Santos (1510m). The individuals from Norte de Santander are larger than the Santander ones (Figure 3). Antioquia, Boyacá, Casanare, Cundinamarca, Meta, Norte de Santander, Quindio, Santander, Tolima, and Valle del Cauca are the departments with known distribution in Colombia.

Head: (Fig. 4,a) Maximum width of head capsule 3.4-3.9 mm. *Cranium*: Smooth, sometimes rugose in the frons; color yellowish brown. Frons with a median longitudinal depression, a single posterior frontal seta, and a single anterior angle seta. One small anterior frontal seta and a exterior frontal seta are sometimes observed. Dorsoepicranium with one large and 8-12 small

setae in a line diverging from mediobasal portion of head and one lateral line of 4-5 short setae at each side. Tentorial pits evident. Ocelli absent. *Clypeus*: Shape subtrapezoidal, with one posterior clypeal seta and two exterior clypeal setae. Preclypeus weakly sclerotized, without setae. *Labrum*: Anterior border trilobed, clithra present. *Epipharynx*: (Fig. 4,b) Plegmata absent. Corypha with 4-5 long stout setae. Haptomeral region with cone-like process with a curved row of 8-14 heli; 10-13 long and medium size setae irregularly placed behind row. Acanthoparia with 5-9 setae that vary in size from small to medium. Chaetoparia with 28-41 setae on each side with a row of 8-12 long setae delimiting the central area of epipharynx. Dexiotorma long and pternotorma small and rounded. Laetorma short and pternotorma small and rounded. Nesia with sensorial cone. Haptolachus without sensillae below the cone. *Mandibles:* Right mandible (Fig. 4,c) with one scissorial tooth anterior to scissorial notch and two scissorial teeth posterior to notch, the first well defined the last weakly evident or absent. Stridulatory area elongate, narrow at the base and wide at the apex, length over four times its width. Molar area trilobed.

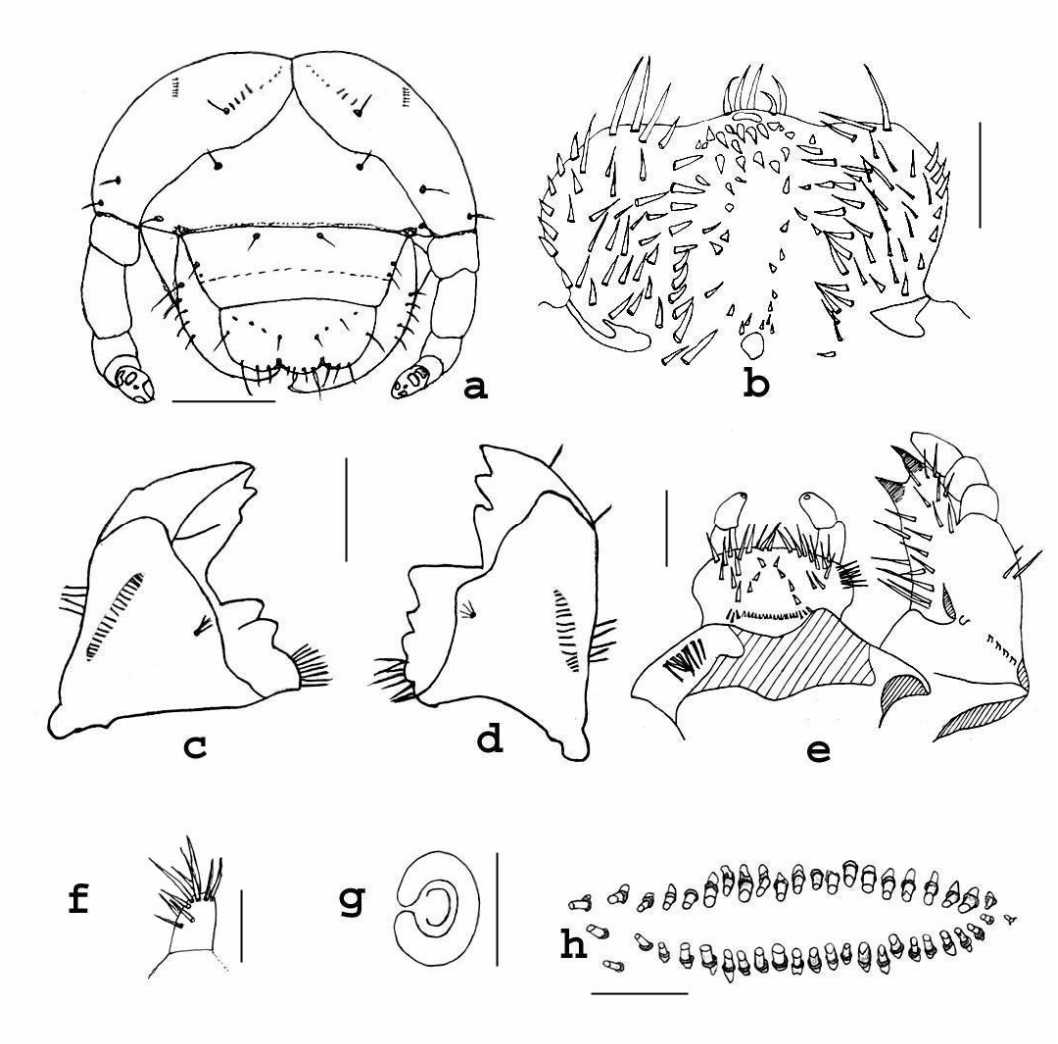

Figure 4. *Gymnetis pantherina*, larva. a. head, b. epipharynx, c. labium-maxilla, d. right mandible, e. left mandible, f. tarsungulus, g. respiratory plate, h. raster. Scale lines = 0.5 mm, except fig. 4a = 1 mm

Lateral edge with 5-6 setae. Dorsal surface in apical half with two setae. Brustia formed by 10-14 setae. Left mandible (Fig. 4,d) with one scissorial tooth anterior to scissorial notch and two well-defined scissorial teeth posterior to notch. Molar area trilobed, first lobe larger than others, lateral edge with five setae, dorsal surface in apical half with two seta. Basomedian angle with brustia consisting of 7-13 setae. *Maxilla*: (Fig 4,e) Mala with large uncus at apex and one subterminal uncus. Stridulatory area with a row of 4-5 curved acute teeth and a distal truncate

process. *Labium*: (Fig. 4,e) Hipopharyngeal scleroma asymmetrical, right side more prominent and sclerotized. *Antennae*: First antennomere longer than the two following segments together. Surface of last antennomere with two dorsal and 3-5 ventral sensory spots.

Thorax: Thoracic spiracles with C-shaped respiratory plate (Fig. 4,g), size 0.53 mm high and 0.42 mm wide. Dorsal area of thoracic segments with abundant setae. *Legs*: Tarsungulus cylindrical (Fig. 4,f), rounded apically, possessing 9-13 setae.

Abdomen: Spiracles of abdominal segments I-VIII similar in size. Distance between the two lobes of respiratory plate of spiracles less than the dorsoventral diameter of the bulla. Dorsal surface of segment I-X with abundant long and short setae irregularly placed, longer towards posterior. Dorsum of segment VII with two annulets. Segments IX and X fused, covered with short and long setae. Spiracular area of abdominal segments I-VIII with 52-65 setae. *Raster*: (Fig. 4,h) Palidia monostichous, open posteriorly and closed anteriorly, sometimes open anteriorly; each palidium consisting of a row of 18-23 medium size with flattened apex pali. Septula elongate, length seven times its width. Lower anal lip with many short and medium size setae proximally to the anal aperture and many long setae distally.

Pupa

Description based in 6 male pupa. Length 20.3-22.5 mm. Shape subovate, stout, exarate. Color cream-white yellowish without microtrichia in abdominal segments.

Head: Glabrous, bent downward, mouthparts separated. Frons with slight depressions and protuberances. Clypeus trapezoid slightly concave.

Thorax: Pronotum glabrous, convex, with well defined margins, subheptagonal in shape with two rounded protuberances at each side just in front of the pteroteca. Pteroteca free, compressed around the body, hind wing teca longer reaching the abdominal sternite IV. Meso-metasternal process small, with rounded apex emerging between the pro and mesocoxa. Protibia with three protuberances well defined in most of the cases but sometimes weakly defined or absent, one apical spur. Meso and metatibia with two apical spurs.

Abdomen: Tergites II-VI with tergo-lateral tubercles surrounded by fine rugae, segment VII with tubercle vague or absent. Spiracle I ovalated with sclerotized peritreme covered by the hind wing pteroteca and protected by a fleshy fold. Spiracles II-IV ovalated, prominent. Spiracles V-VIII closed. Last tergite without urogomphi.

Gymnetis pantherina larvae differs from other *Gymnetis* larvae by the following combination of characters: Tentorial pits evident, dorsoepicranium with central row of 9-13 setae, surface of last antennomere with 3-5 ventral sensory spots, spiracles of abdominal segments similar in size and palidium with a row of 18-26 pali

Key to the known third stage larvae of *Gymnetis* MacLeay

1 Surface of last antennomere with four dorsal sensory spots. Each palidium consisting of a row of 13-14 pali. Tarsungulus of leg bearing six setae……*G.* (*Paragymnetis*) *chalcipes* (Gory & Percheron)

- Surface of last antennomere with 2-3 dorsal sensory spots. Each palidium consisting of a row of 10-26 pali. Tarsungulus with 8-13 setae …….. 2

2 Tentorial pits absent. Spiracles of abdominal segments slightly increasing in size towards posterior segments……....*Gymnetis hebraica difficilis* Burmeister

- Tentorial pits evident. Spiracles of abdominal segments similar in size…….....3

3 Dorsoepicranium with central row of 9-13 setae. Surface of last antennomere with 3-5 ventral sensory spots (Fig. 4,a). Each palidium with a row of 18-26 pali (Fig. 4,h) ...……..…..…… ……....*Gymnetis pantherina* Blanchard

- Dorsoepicranium with central row of 5-7 setae. Surface of last antennomere with 2- 3 ventral sensory spots. Palidium with 10-16 pali……..……....4

4 First antennomere slightly shorter than the two following segments together. Palidium joined anteriorly …….....….*Gymnetis flavomarginata sallei* Schaum

- First antennomere longer than the two following segments together (Fig. 2,a). Palidium open anteriorly (Fig 2,h) ……..…..*Gymnetis holosericea* Voet

***Euphoria precaria* Janson, 1881**

Euphoria is a diverse genus of the tribe Cetoniini, with nearly 80 species distributed from Canada to Argentina, the majority of them occurring in Central America (Blackwelder 1944, Hardy 1988). The larvae shows a high variety of feeding habits among the seven species that have been described (Micó *et al*., 2000). Two species are found in Colombia, *E. precaria* and *E. lurida* and both of these larvae are now known.

The adults of *E. precaria* (Figure 5) are long lived showing little activity in captivity but the larvae have an interesting behavior when disturbed, ceasing all mobility and activity for a period of time. The distribution of this species in Colombia is poorly known and has so far only been found in Cundinamarca and Santander.

Figure 5. *Euphoria precaria*, adults. a –d, males, e-i, females. Scale line = 1 cm

Third instar larva. This description is based on 12 larvae reared from adults collected in a secondary sub-Andean forest. Locality data: COLOMBIA: Santander, Los Santos, Vereda El Mico; 6-IV-03, 1530 m; Orozco, J. & Esparza A. Leg. The vegetation of the study zone is mainly composed of *Ocotea calophylla* Mez. (Lauraceae), *Clusia* sp. (Clusiaceae), *Siparuna* sp.

(Monimiaceae), *Miconia dodecandra* (Desr.)(Melastomataceae), *Miconia* sp., *Ochroma pyramidale* Cav. (Bombacaceae), *Elleanthus* sp. (Orchidaceae), and *Palicourea* sp. (Rubiaceae).

Head: (Fig. 6,a) Maximum width of head capsule 3.4-3.9 mm. *Cranium:* Smooth; color yellowish brown. Frons without depression, with one posterior frontal seta and one anterior angle seta, sometimes a single exterior frontal seta is presented. Dorsoepicranium with one large and 0-5 small setae in a line diverging from mediobasal portion of head. Tentorial pits evident. Ocelli present. *Clypeus*: Shape subtrapezoidal, with one posterior clypeal seta and one exterior clypeal seta. Preclypeus weakly sclerotized without setae. *Labrum*: Anterior border trilobed, clithra present. *Epipharynx*: (Fig. 6,b) Plegmata absent. Corypha with four long stout setae. Haptomeral region with a curved row of 12-14 heli; 8-14 stout setae irregularly placed behind row. Acanthoparia with six short or medium size setae. Left chaetoparia with 22-27 setae, right chaetoparia with 36-45 setae. Dexiotorma long and pternotorma small and rounded. Laetorma short and pternotorma small and rounded. Nesia with sensorial cone. *Mandibles:* Right mandible (Fig. 6,c) with one scissorial tooth anterior to scissorial notch and two scissorial teeth posterior to notch, last sometimes weakly developed. Stridulatory area elongate, length over four times its width. Molar area trilobed. Lateral edge with seven setae. Dorsal surface in apical half with two setae. Brustia with 4-6 setae. Left mandible (Fig. 6,d) with one scissorial tooth anterior to scissorial notch, one posterior scissorial notch, and two scissorial notches in the premolar area. Molar area trilobed. Lateral edge with 3-5 setae. Dorsal surface in apical half with two setae. Basomedian angle with brustia consisting of 14 setae. *Maxilla:* (Fig. 6,e) Mala with large uncus at apex and one subterminal (sometimes weakly) bifid uncus at base. Stridulatory area with row of four curved acute teeth and a distal, truncate process. *Labium:* (Fig. 6,e) Hipopharyngeal scleroma asymmetrical, left side with 4-6 setae, right side more prominent and sclerotized and with eight setae. *Antennae*: First antennomere long as the two following antennomeres combined or slightly longer. Surface of last antennal segment with 2-3 dorsal and three ventral sensory spots.

Thorax: Thoracic spiracles with C-shaped respiratory plate, size 0.44 mm long and 0.43 mm wide (Fig. 6,g). Dorsal area of thoracic segments with abundant setae. *Legs*: Tarsungulus cylindrical (Fig. 6,f), rounded apically, possessing 8-11 setae.

Abdomen: Spiracles of abdominal segments I-VII similar in size those of segment VIII smaller, distance between the two lobes of respiratory plate of spiracles much less than the dorsoventral diameter of the bulla. Segments IX and X fused, covered with short and long setae. Spiracular area of abdominal segments I-VIII with 10-14 short and medium size setae. *Raster:* (Fig. 6,h)

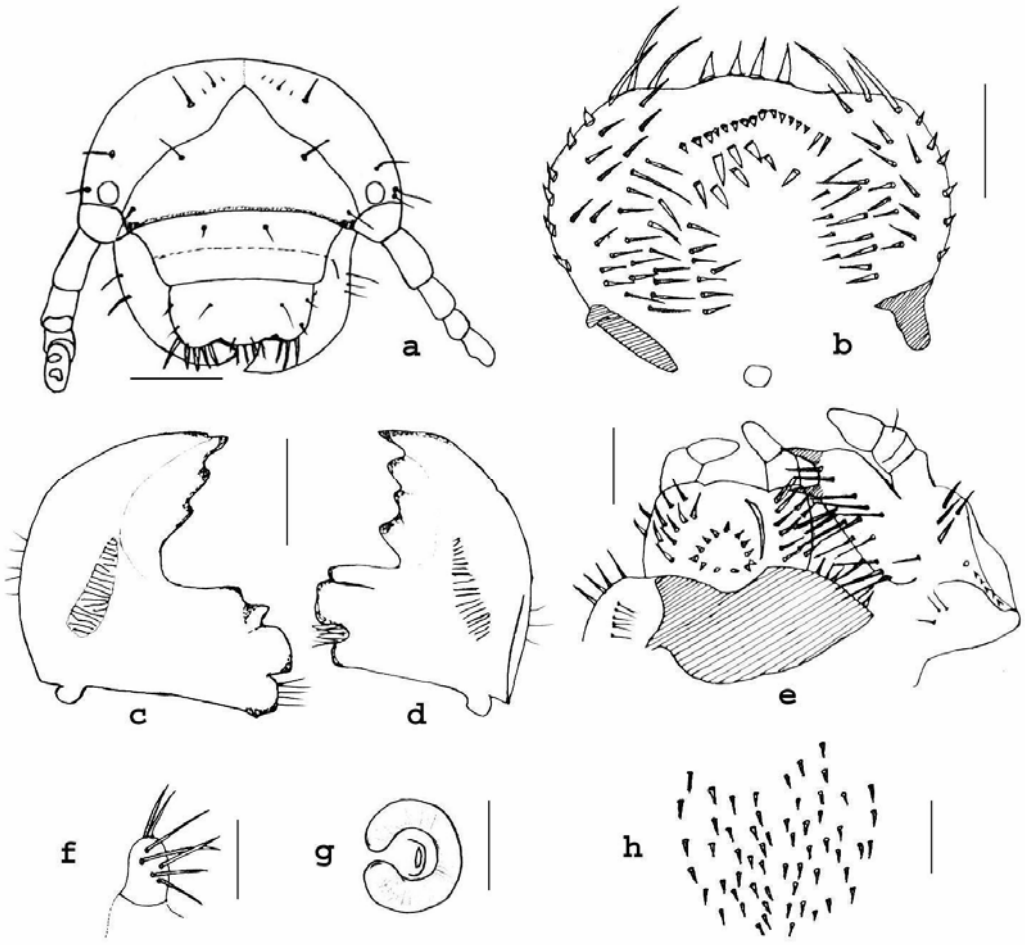

Figure 6. *Euphoria precaria*, larva. a. head, b. epipharynx, c. labium-maxilla, d. right mandible, e. left mandible, f. tarsungulus, g. respiratory plate, h. raster. Scale lines = 0.5 mm, except fig. 6a = 1 mm

Palidia polystichous, palidium with 19-29 long pali. Septula diffuse, not well defined. Lower anal lip with 1-2 rows of short setae and one row of long setae.

Pupa

Description based on a male pupa. Length 15.3 mm. Shape subovate, stout, exarate. Color creamy-white to yellowish.

Head: Glabrous, bent downward, mouthparts separated. Frons with slight depressions and protuberances. Clypeus rounded.

Thorax: Pronotum glabrous, convex, subheptagonal in shape. Pteroteca free, compressed around the body, hind wing teca longer reaching the abdominal sternite IV. Meso-metasternal process small, rounded at apex, between the pro and mesocoxa. Protibia with one protuberance weakly defined or absent and with one apical spur. Meso and metatibia with two spurs.

Abdomen: Tergites II-VI with tergo-lateral tubercles surrounded by fine rugae. Spiracle I-V with ring-like sclerotized peritreme. Spiracle I covered by the hind wing pteroteca and protected by a fleshy fold. Spiracles I-IV ovated, prominent, spiracle V partially closed, spiracles VI-VIII closed. Genital ampulla bilobed, last tergite without urogomphi.

The *Euphoria precaria* larvae differs from other known *Euphoria* larvae mainly by the polystichous palidia, a new couplet was added to the Micó et al. (2000) key to the known third instar larvae of the genus:

Key to the known third instar larvae of the genus *Euphoria* Burmeister

[Modified from Micó et al. (2000)]

1 Spiracles of the abdominal segments similar in size…….. 2

- Spiracles of the abdominal segments I-VII similar in size, those of the abdominal segment VIII slightly smaller …… 5

2 Raster without palidia ……..….. 3

- Raster with palidia …….…… 4

3 Cranium with exterior frontal setae and anterior angle setae present ……
……. *Euphoria hirtipes* Horn

- Cranium with exterior frontal setae and anterior angle setae absent ... *Euphoria inda* (L.)

4 Lower anal lip with ≈25 long setae. Thoracic spiracles ≈0.50 mm long and ≈0.34 mm wide. Respiratory plate with maximum of ≈30 holes along any diameter ….. *Euphoria fulgida* (F.)

- Lower anal lip with ≈60 short setae. Thoracic spiracles ≈0.26 mm long and ≈0.19 mm wide. Respiratory plate with maximum of ≈14 holes along any diameter……..
……. ……...*Euphoria devulsa* (Horn)

5 Palidia monostichous..... 6

- Palidia polystichous (Fig. 6,h)..... *Euphoria precaria* Janson

6 Each palidium of raster with >12 pali. Palidia joined anteriorly, parallel or slightly diverging posteriorly 7

- Each palidium of raster with <12 pali. Palidia parallel ..... *Euphoria herbacea* (Olivier)

7 Each palidium of raster with 15-19 pali. Thoracic spiracles with distance between two lobes of respiratory plate much less than diameter of the plate at middle …….
…… *Euphoria lurida* (F.)

- Each palidium of raster with 12-16 pali. Thoracic spiracles with distance between two lobes of respiratory plate wider than diameter of the plate at middle ...……..
……..... *Euphoria sepulcralis* (F.)

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