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Authors: Neita-Moreno, Jhon César, Oliveira, Charles Martins De, and Morón, Miguel Angel

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LARVAL AND PUPAL DESCRIPTIONS OF TWO *AEGOPSIS* SPECIES (COLEOPTERA: MELOLONTHIDAE: DYNASTINAE)

JHON CÉSAR NEITA-MORENO[1], CHARLES MARTINS DE OLIVEIRA[2*] AND MIGUEL ANGEL MORÓN[3]
[1]Museo Entomología UNAB, Universidad Nacional de Colombia, Ciudadela Universitaria Bloque 500, Bogotá, Colombia

[2]Embrapa Cerrados. C.P. 08223, Planaltina, Brasília/DF, 73310-970, Brazil

[3]Red de Biodiversidad y Sistemática, Instituto de Ecología, A.C. Apdo. Postal 63, Xalapa, Veracruz 91000, México

*Corresponding author; E-mail: charles.oliveira@embrapa.br

ABSTRACT

The third-instar larvae and pupae of *Aegopsis curvicornis* Burmeister, and *A. bolboceridus* (Thomson) are described for the first time based on specimens collected and reared in Cundinamarca, Colombia and Planaltina, DF, Brazil, respectively. A key to the known third-instar larvae of the Agaocephalini is provided. Some data on the biology of both species are also included.

Key Words: Agaocephalini, immature stages, taxonomy, biology, Colombia, Brazil

RESUMEN

Se describen por primera vez las larvas de tercer estadio y las pupas de *Aegopsis curvicornis* Burmeister y *A. bolboceridus* (Thomson) con base en ejemplares colectados y criados en Cundinamarca, Colombia y Planaltina, DF, Brasil, respectivamente. Se proporciona una clave para identificar las larvas de tercer estadio conocidas de las especies de Agaocephalini. También se incluyen algunos datos de la biología de las dos especies.

Palabras Clave: Agaocephalini, estados inmaduros, taxonomía, biología, Colombia, Brazil

The tribe Agaocephalini included 11 genera and 43 species that occur from southern Mexico to Argentina, with one genus and species in the West Indies (Endrödi 1970, 1985; Krajcik 2005). The immature stages of the tribe Agaocephalini were completely unknown until Pardo & Morón (2006) described for the first time the larva and the pupa of *Lycomedes hirtipes* Arrow, from Cauca and Valle departments, Colombia, including some data about the biology of the species.

During 2005 the first author (JCNM) collected some large white grubs under soil litter in La Mesa, Cundinamarca department, Colombia, that after rearing in the laboratory, were identified as *Aegopsis curvicornis* Burmeister (Neita-Moreno 2006). At the same time the second author (CMO) obtained large samples of white grubs feeding the roots of chili-pepper, cucumber, cabbage, egg-plant, maize, sugarcane and other cultures around Planaltina, Distrito Federal, Brazil, that after field and laboratory observations were identified as *A. bolboceridus* (Oliveira 2005; Oliveira et al. 2008).

The aims of our study were to: (1) describe the third-instar larvae and the pupae of *A. curvicornis* and *A. bolboceridus*, (2) contribute to the knowledge of the larval biology and life cycles of these species, and (3) provide a key to the larvae of Agaocephalini.

METHODS AND MATERIALS

Terms and characters used in the description are those of Ritcher (1966), Morón (1987), and Pardo & Morón (2006). Study specimens were deposited at the Universidad Nacional de Colombia, Museo Entomológico, Facultad de Agronomía, Bogotá, Colombia (UNAB), Museu Entomológico da Embrapa Cerrados, Planaltina, DF, Brazil (CPAC), and Colección Entomológica Instituto de Ecología, A. C. Xalapa, México (IEXA).

Systematics

Relative to the 1,600 species of Dynastinae listed from the world, only near 100 larvae represent-

ing 40 genera of Agaocephalini, Cyclocephalini, Dynastini, Oryctini, Oryctoderini, Pentodontini and Phileurini are described at present. Consequently it is difficult to get a set of diagnostic characters that aid in distinguishing the larvae of the tribe Agaocephalini from the larvae of other tribes. But as a preliminary introduction based on Ritcher (1966), Morón (1987), Pardo and Morón (2006), and our recent experience, we propose the following combination of characters as diagnostic for the larvae of Agaocephalini: Labrum sligthly asymmetrical, right lateral margin of epipharynx rounded, left lateral margin briefly angulated. Left mandible with the apex of scissorial teeth 4 entire or bifid. Last antennal segment with 6-10 sensory spots. Ocelli present. Each tarsal claw with 2 setae. Spiracles of abdominal segments 1 and 8 smaller than spiracles 2 to 7.

KEY TO THE THIRD INSTAR LARVAE OF AGAOCEPHALINI (BASED ON PARDO & MORÓN 2006)

1. Last segment of antenna with 2-5 dorsal sensory spots . . . . . some genera of Pentodontini, Oryctini, Cyclocephalini, Phileurini

1' Last segment of antenna with 6 or more dorsal sensory spots 2

2. Each tarsal claw with 2 setae 3

2' Each tarsal claw with 3-4 setae . . . . . *Strategus* and some genera of Dynastini

3. Lateral margins of labrum broadly rounded posteriorly, not angulate . . . . . some genera of Oryctini

3' At least one lateral margin of labrum angulate 4

4. Left mandible with the 4° incisive teeth cleft . . . . . *Podischnus* and some species of *Golofa*

4' Left mandible with the 4° incisive teeth entire 5

5. Respiratory plates of abdominal segments 1-8 progressively enlarged or reduced posteriorly. Both lateral margins of labrum slightly angulate . . . . . some species of *Dynastes* and *Megasoma*

5' Respiratory plates of abdominal segments 1 and 8 smaller than respiratory plates of segments 2 to 7. Only left lateral margin of labrum briefly angulate. Agaocephalini 6

6. Lacinia with 2 unci of similar size. Exterior frontal setae absent 7

6' Lacinia with 3 unci, the intermediate uncus smaller than lateral unci. One exterior frontal setae at each side. *Aegopsis* Burmeister 8

7. Two anterior frontal setae and without posterior frontal setae. Clypeus without central setae. Last segment of antenna with 6-7 dorsal sensory spots . . . . . *Lycomedes hirtipes* Arrow

7' Anterior frontal setae absent and one posterior frontal seta at each side. Clypeus with 2 central setae. Last segment of antenna with 8 dorsal sensory spots . . . . . *Diloboderus abderus* Sturm

8. Last segment of antenna with 10 dorsal sensory spots. Maxillary stridulatory area with 10 teeth. Raster with 80-95 teges . . . . . *A. curvicornis* Burmeister

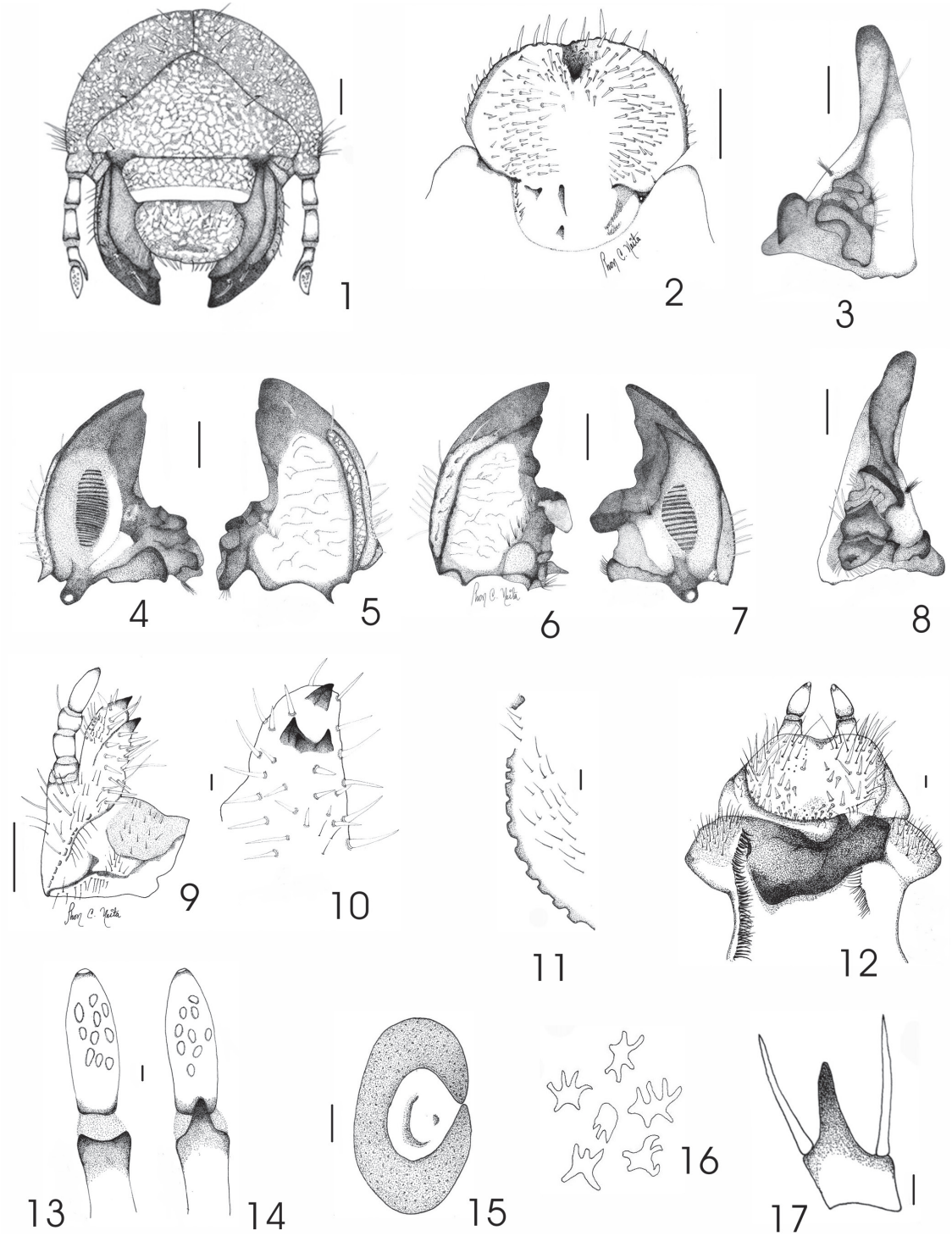
8' Last segment of antenna with 6-7 dorsal sensory spots. Maxillary stridulatory area with 7-8 teeth. Raster with 45-50 teges . . . . . *A. bolboceridus* (Thomson)

LARVAE OF *AEGOPSIS* BURMEISTER

The following characters will separate *Aegopsis* from other known Agaocephalini larvae: anterior frontal setae absent; external frontal setae present; last segment of antenna with 6-10 dorsal sensory spots; clypeus without central setae; apex of 4° incisive mandibular teeth entire, rounded; apex of lacinia with 3 unci, the intermediate uncus smaller than lateral unci.

AEGOPSIS CURVICORNIS BURMEISTER, 1847. THIRD-INSTAR (FIGS. 1-18)

This description is based on four third-instar and five cast skin of third instar reared to pupae or adult stages. Specimens were collected under leaf litter in Colombia, Cundinamarca, La Mesa, Vereda La Esperanza, Finca Los Monjes, 1,250 m, 12-II-2005, J. C. Neita-Moreno (UNAB, IEXA).



Figs. 1-17. Third instar of *Aegopsis curvicornis*. (1) Head capsule, frontal view. (2) Epipharynx. Rigth mandible: (3) Interior view. (4) Ventral view. (5) Dorsal view. Left mandible: (6) Dorsal view. (7) Ventral view. (8) Interior view. (9) Left maxilla, dorsal view. (10) Apex of left maxilla, detail. (11) Maxillary stridulatory area, detail. (12) Hypopharynx. Last antennal segment: (13) Dorsal view. (14) Ventral view. (15) Prothoracic respiratory plate. (16) Respiratory holes, detail. (17) Tarsal claw. Scale bars Figs. 1-9 = 1 mm, Figs. 10-17 = 0.2 mm.

Head (Fig. 1)

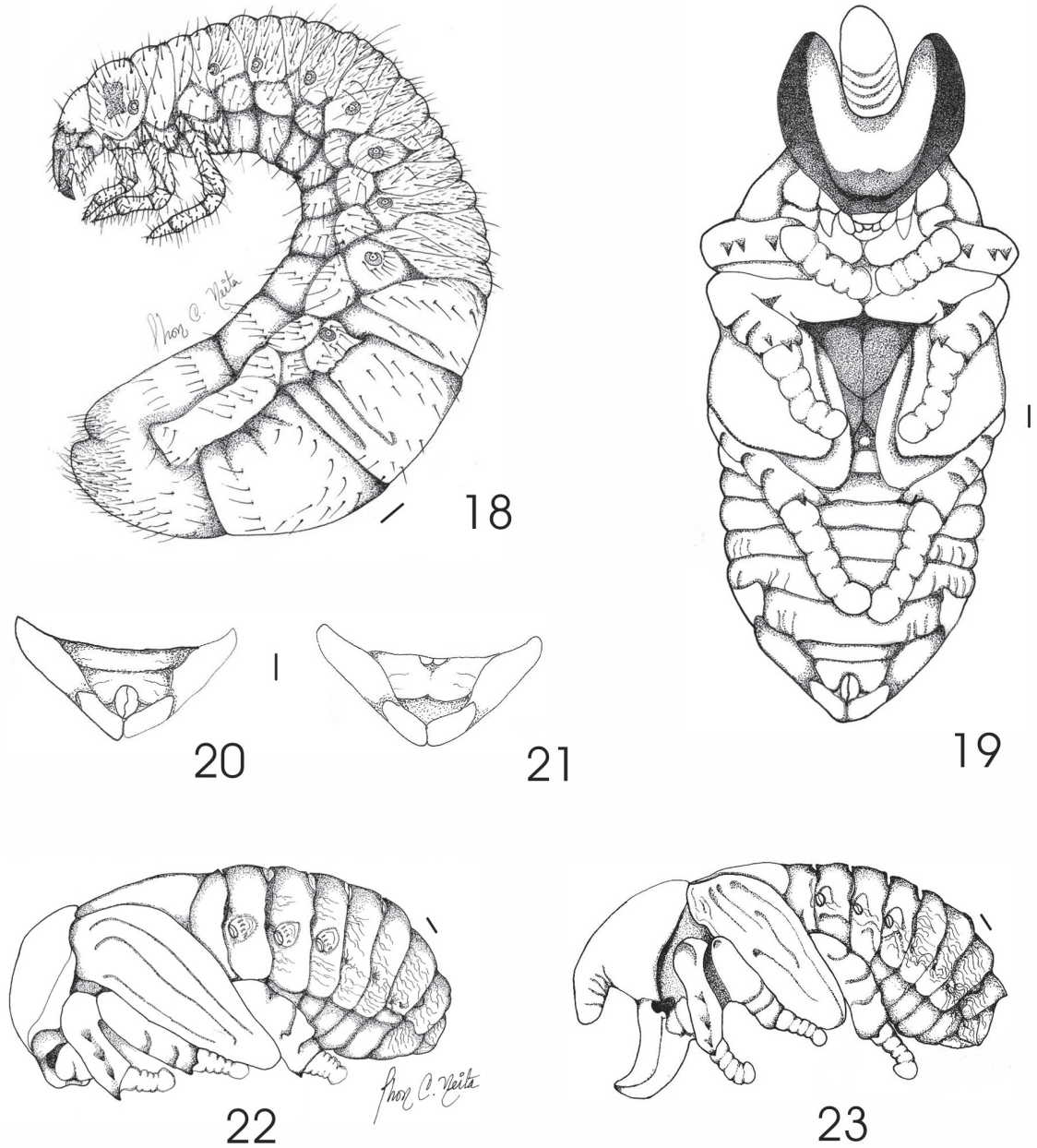
Width of head capsule 7.97 mm. Surface reddish brown, finely punctate. Frontal suture and clypeofrontal suture distinct. Frons (Fig. 1): with 1 exterior frontal seta and 1 posterior frontal seta on each side; each anterior angle of frons with 3 setae, and anterior frontal setae absent; remaining cranial surface with 4 dorso-epicranial setae, 10 epicranial setae, 12-13 para-ocellar setae on each side. Ocellus present. Clypeus: Form trapezoidal. Surface of postclypeus reddish-brown, well sclerotized and densely punctuate; surface of preclypeus light brown with 1 lateral seta and central seta absent. Labrum rugo-punctate, slightly asymmetrical, 8 posterior setae, 5 lateral setae on each side and 2 central setae. Epipharynx (Fig. 2): Form suboval, wider than long, asymmetrical, left lateral edge angulate. Haptomeral process of epipharynx prominent and entire; right chaetoparia with 67 setae; left chaetoparia with 63 setae, without sensillae; acroparia each with 25 straight, long, thick setae; rigth acanthoparia with 9 short, curved, spine-like setae; left acanthoparia with 11 short, curved, spine-like setae; pedium wide, ovate. Dexiotorma narrow and elongate; laeotorma slightly shorter than dexiotorma; epitorma curvate toward apex, pternotorma rounded. Dexiophoba absent; laephoba poorly developed between haptolechus and inner side of laeotorma, formed by 41-43 slightly slender setae. Sclerotized plate of right nesium long, elongate and truncate at apex; sense cone on left nesium represented by longitudinal, well-sclerotized plate, apex with 4 sensilla. Crepis poorly defined. Right mandible (Figs. 3-5): scissorial area with, blade-like apical tooth (S_1 + S_2) and 1 rounded tooth (S_3) after scissorial notch well defined; scrobe with 11 slender, long setae. Dorsal surface with row of 16 slender, long setae. Ventral surface with elongate-oval stridulatory area formed by 25 narrowly separated ridges; ventral process well-developed, rounded, with many asperities. Brustia with 5 stout, long setae. Calx large, 9 basolateral setae. Molar area with 3 wide, convex, ridged lobes (M_1-$_3$) and with 9 slender, long setae. Left mandible (Figs. 6-8). Form falcate. Scissorial region with 4 teeth, basal tooth separated from teeth 1-3; teeth 1 and 2 separated from tooth 3 by scissorial notch. Scrobe with 8 slender, long setae. Dorsal surface with row of 23 slender, moderately long setae; acia well-developed, sharp, and apical setae absent, 23 basolateral setae. Ventral surface with elongate-oval stridulatory area formed by 27 narrowly separated ridges; ventral process well-developed, rounded, with many asperities; dorsomolar area with row of 9 stout, slender, moderately long setae; brustia with 11 stout, "U" shaped, long setae. Molar area with 3 lobes, first molar lobe (M_1) large. Maxilla (Fig. 9). 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), basally fused (Fig. 10). Maxillary palpus 4-segmented, segment 4 two time longer than segment 2. Stridulatory area with 10 blunt, truncate rigdes and anterior truncate process (Fig. 11). Hypopharynx (Fig. 12). Glosa with 54 slender, long setae and 40 stout, short setae. Hypopharyngeal sclerome asymmetrical, concave medially, sharp process produced dorsally; left lateral lobe with 44 slender, moderately long setae; right lateral lobe with 42 slender, moderaterly long setae. Left margin with row of 16 stout, moderately long setae directed toward center of sclerome and 9 basal setae at sclerome. Antenna: 4 segmented, segment 2 and 3 about 0.25 time longer than segments 1 and 4; apical segment slightly longer than segment 1. Apical segment oval in dorsal and ventral view, almond-shaped in lateral view; dorsal surface with 10 sensory spots (Fig. 13); ventral surface with 9 sensory spots (Fig. 14).

Thorax (Fig. 18)

Pronotum wide, irregularly and weakly sclerotized, with 8 slender, long setae. Prothoracic spiracle (Fig. 15) 0.55 mm long, 0.41 mm wide; respiratory plate dark brown, regularly shaped as a closed "C", bulla prominent; distance between respiratory lobes less than diameter of bulla; plate with 33 holes across diameter at middle, holes with irregular edges (Fig. 16). Dorsum of prothorax with transverse row of 23 long, slender setae and spine-like setae absent. Mesoprescutum with transverse, irregular row of 11 long, slender setae; mesoscutellum with transverse row of 12 long, slender setae and spine-like setae absent. Metaprescutum with 13 long, slender setae and spine-like setae absent; metaescutellum with 16 long, slender setae and 6 stout, spine-like setae. Legs (Fig. 18): Tarsal claws with enlarged apical process, 1 basoexternal seta, and 1 internal, preapical seta (Fig. 17). Tarsal claw on meso and metathoracic legs shorter than those of prothoracic legs. Coxa, trochanter, and tibiotarsus of all legs with many stout setae.

Abdomen (Fig. 18)

Abdominal spiracles I 0.56 mm long and 0.41 mm wide, shorter than spiracles II-VIII. Spiracles on segments II and VI equal in size (0.66 mm long and 0.46 mm wide); spiracles on segment VII slightly wider than preceding (0.55 mm long and 0.49 mm wide) and spiracles on segment VIII shorter than spiracles II-VII (0.47 mm long and 0.42 mm wide). Abdominal segment I on prescutum with 4 long, slender setae and 25 short, spine-like setae; subscutum with 9 long, slender setae, without short



Figs. 18-23. *Aegopsis curvicornis*. (18) Third instar, whole body, lateral view. (19) Male pupa, ventral view. Apex abdomen of pupa, ventral view: (20) Male. (21) Female. Pupa, whole body, lateral view. (22) Female. (23) Male. Scale bars = 1 mm.

setae; scutum with about 45 short, spine-like setae and 10 long, slender setae; scutellum with about 12 short, spine-like setae and 39 long, slender setae. All spiracular areas with 17 long, slender setae and 22 short, spine-like setae. Abdominal segment II on prescutum with 2 long, slender setae and 45 short, spine-like setae; subscutum with 12 long setae, without short setae; scutum with 22 long, slender setae and 72 short, spine-like setae; scutellum with 10 long, slender setae and 47 short, spine-like setae. Abdominal segment III on prescutum with 2 long, slender setae and 41 short spine-like setae; subscutum with 12 long, slender setae, without short setae; scutum with 20 long, slender setae and 66 short spine-like setae; scutellum with 10 long, slender setae and 65 short spine-like setae. Abdominal segment IV on prescutum with 2 long, slender setae and 49 short spine-like setae; subscutum with

12 long, slender setae, without short setae; scutum with 16 long, slender setae and 69 short spine-like setae; scutellum with 8 long, slender setae and 69 short spine-like setae. Abdominal segment V on prescutum with 2 long, slender setae and 48 short spine-like setae; subscutum with 12 long, slender setae, without short setae; scutum with 16 long, slender setae and 67 short spine-like setae; scutellum with 8 long, slender setae and 70 short spine-like setae. Abdominal segment VI on prescutum with 2 long, slender setae and 63 short spine-like setae; subscutum with 12 long, slender setae, without short setae; scutum with about 16 long, slender setae and 55 short spine-like setae; scutellum with 10 long, slender setae and 35 short spine-like setae. Abdominal segment VII with 1 row of 12 slender, long setae and 39 short, spine-like setae mixed. Abdominal segment VIII with 2 rows of 8 slender, long setae and 8 short, spine-like setae mixed. Abdominal segment IX with 2 rows of 6 slender, long setae and 7 short, spine-like setae mixed. Abdominal segment X with approximately 43 moderate to long, slender setae and 69 short, spine-like setae mixed. Pleural lobes with 21 long, slender setae and 4 stout, short setae. Raster: without palidia; campus with 6 slender, long setae; teges with 80-95 short setae, barbula with 84-96 long, slender setae. Anal slit transverse. Approximate dorsal body length 48-55 mm.

Aegopsis Curvicornis Burmeister, 1847. Pupa (Figs. 19-23)

Male (Figs. 19 and 23). Length 27-36 mm. Widest width 14-16 mm. Body shape elongate, oval, stout, exarate. Color dark reddish orange. Entire body with fine, velvety-gold vestiture.

Head

Bent sharply beneath thorax, mounthparts directed ventrally; antennae, labrum, mandibles, maxillae and palps discernible; antennal theca expanded, stout with apex rounded. Compound eyes sunken, scarcely visible. Frontoclypeus with two strong, wide, massive horn-like process bent upward at distal third.

Thorax

Pronotum: Form nearly transverse, with wide, anteromedial massive tubercle with rounded apex. Meso- and metanotum well-differentiated. Elytral and posterior wing theca closely appressed, curved ventrally around body; elytral theca extending to middle of abdominal segment III; posterior wing theca extending to middle of abdominal segment IV. Protibia with 3 distinct teeth on external edge. Meso- and metatibiae with inner and external spines well-developed at apex.

Abdomen

Segments I-X (dorsal view) with 6 pairs of dioneiform organs, well sclerotized between segments I-II, II-III, III-IV, IV-V and V-VI, weakly sclerotized between segments VI-VII. 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 and short setae. Segments III-X (ventral view) well-defined. Segment VII slightly longer than preceding and VIII 0.25 times longer than segment VII; segments VIII and IX fused. Segment X with genital ampulla small slightly prominent (Fig. 20).

Female (Fig. 22). Length 29 mm. widest width 13 mm. Head. Without massive tubercle or horn-like structure. Segment X without genital ampulla (Fig. 21).

Remarks

The following characters will separate *A. curvicornis* from other known Dynastinae larvae: frons with 1 exterior frontal seta and 1 posterior frontal seta on each side; each anterior angle of frons with 3 setae, and anterior frontal setae absent. Clypeus without central setae. Stridulatory area of maxilla with 10 blunt, truncate ridges and anterior truncate process. The apical segment of antenna with 10 dorsal sensory spots. Abdominal spiracles I smaller than spiracles II-VIII. Spiracles on segments II and VI equal in size; spiracles on segment VII slightly wider than preceding and spiracles on segment VIII smaller than spiracles II-VIII.

Biological data

Aegopsis curvicornis is a yearly cycle species. Larvae are associated to decomposition of leaf litter. The larvae are found between 12-25 mm of depth in the organic soil. Before pupation, larva builds a cocoon with organic matter, and remains in it as prepupa for about 20-25 days. Pupal instar requires 45-52 days. When the adult is formed remains inside until complete their sexual maturity. The first to emerge are the males waiting for the females. The mating activity is on the branches of trees, and after mate the female return under organic soil to lay eggs. This is the reason why the females are not easy captured, and they are rare in collections. The male flies from 19:00 hr to 02:00 hr attracted to light (J. C. Neita-Moreno, Universidad Nacional de Colombia, Colombia, personal communication).

Distribution

This species is found in Costa Rica, Panamá, Colombia, Ecuador, Venezuela, Trinidad and

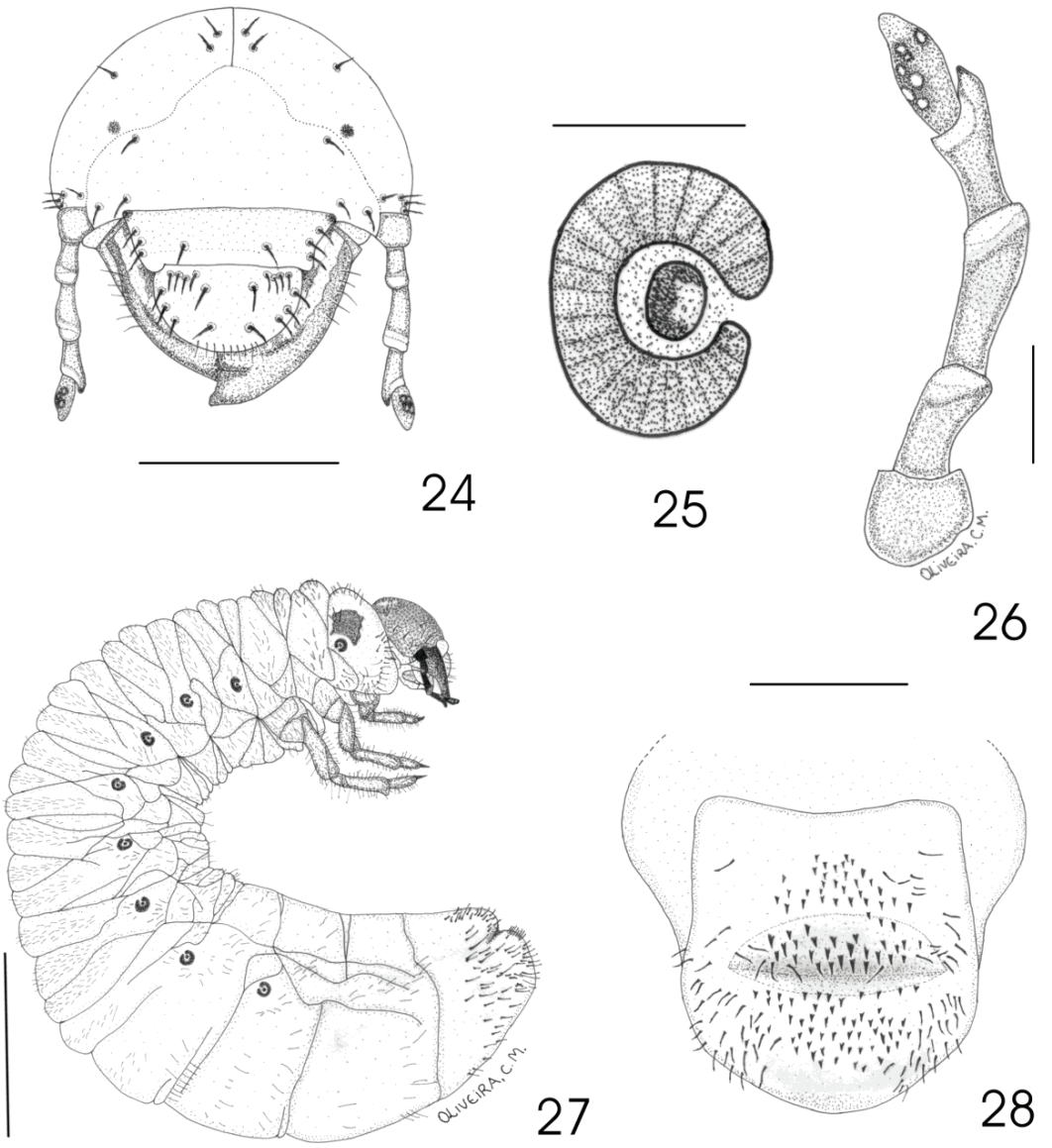
northern Brazil (Endrödi 1970, 1985, Ratcliffe 2003).

AEGOPSIS BOLBOCERIDUS (THOMSON, 1860). THIRD-INSTAR (FIGS. 24-28)

This description is based on ten third-instar and ten cast skin of third instar reared to pupae or adult stages. Specimens were collected in soil under roots of cabagge, chili pepper, cauliflower and egg-plant fields in Brazil, Federal District, Planaltina, Núcleo Rural Taquara, Chácara 70, 1045 m, 10-II-2005, C. M. Oliveira (CPAC, IEXA).

Head (Fig. 24)

Width of head capsule 8.2 mm. Surface reddish brown, finely punctate. Frontal suture and cly-



Figs. 24-28. Third instar *Aegopsis bolboceridus*. (24) Head capsule, frontal view. (25) Prothoracic respiratory plate. (26) Antenna, lateral view. (27) Whole body, lateral view. (28) Raster. Scale bars: Figs. 24 and 28 = 5 mm, Figs. 25 and 26 = 0.5 mm, Fig. 27 = 10 mm.

peofrontal suture distinct. Frons (Fig. 24): with 1 exterior frontal seta and 1 posterior frontal seta on each side; each anterior angle of frons with 1 seta, and anterior frontal setae absent; remaining cranial surface with 2 dorso-epicranial setae, 1 epicranial seta, 3-4 para-ocellar setae on each side. Ocellus present. Clypeus: Form trapezoidal. Surface of postclypeus reddish-brown, well sclerotized and densely punctuate; surface of preclypeus light brown with 3 lateral setae and central seta absent. Labrum rugo-punctate, slightly asymmetrical, 8 posterior setae, 3 lateral setae on each side and 2 central setae. Epipharynx: Form suboval, wider than long, asymmetrical, left lateral edge angulate. Haptomeral process of epipharynx prominent and entire; right chaetoparia with 70 setae; left chaetoparia with 60 setae, without sensillae; acroparia each with 22 straight, long, thick setae; rigth acanthoparia with 9 short, curved, spine-like setae; left acanthoparia with 10 short, curved, spine-like setae; pedium wide, ovate. Dexiotorma narrow and elongate; laeotorma slightly shorter than dexiotorma; epitorma curvate toward apex, pternotorma rounded. Dexiophoba absent; laephoba poorly developed between haptolachus and inner side of laeotorma, formed by 38-40 slender setae. Sclerotized plate of right nesium long, elongate and truncate at apex; sense cone on left nesium represented by longitudinal, well-sclerotized plate, apex with 3 sensilla. Crepis poorly defined. Right mandible: scissorial area with, blade-like apical tooth (S_1 + S_2) and 1 rounded tooth (S_3) after scissorial notch well defined; scrobe with 10 slender, long setae. Dorsal surface with row of 18 slender, long setae. Ventral surface with elongate-oval stridulatory area formed by 23 narrowly separated ridges; ventral process well-developed, rounded, with many asperities. Brustia with 5 stout, long setae. Calx large, 8 basolateral setae. Molar area with 3 wide, convex, ridged lobes (M_1-$_3$) and with 10 slender, long setae. Left mandible. Form falcate. Scissorial region with 4 teeth, basal tooth separated from teeth 1-3; teeth 1 and 2 separated from tooth 3 by scissorial notch. Scrobe with 9 slender, long setae. Dorsal surface with row of 20 slender, moderately long setae; acia well-developed, sharp, and apical setae absent, 18 basolateral setae. Ventral surface with elongate-oval stridulatory area formed by 24 narrowly separated ridges; ventral process well-developed, rounded, with many asperites; dorsomolar area with row of 10 stout, moderately long setae; brustia with 9 stout, long setae. Molar area with 3 lobes, first molar lobe (M_1) large. Maxilla. 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), basally fused. Maxillary palpus 4-segmented, segment 4 two times longer than segment 2. Stridulatory area with 10 blunt, truncate rigdes and anterior truncate process. Hypopharynx. Glosa with 50 slender, long setae and 36 stout, short setae. Hypopharyngeal sclerome asymmetrical, concave medially, sharp process produced dorsally; left lateral lobe with 34 slender, long setae; right lateral lobe with 38 slender, long setae. Left margin with row of 14 stout, long setae directed toward center of sclerome and 6 basal short setae at sclerome. Antenna (Fig. 26): 4 segmented, segment 1 as long as segment 3; apical segment as long as segment 1. Apical segment oval in dorsal and ventral view, dorsal surface with 6-7 sensory spots; ventral surface with 6 sensory spots.

Thorax (Fig. 27)

Pronotum wide, irregularly and weakly sclerotized, with 6 slender, long setae. Prothoracic spiracle (Fig. 25) 1.10 mm long, 0.71 mm wide; respiratory plate dark brown, regularly shaped as a closed "C", bulla prominent; distance between respiratory lobes less than diameter of bulla; plate with 30 holes across diameter at middle, holes with irregular edges. Dorsum of prothorax with transverse row of 20 long, slender setae and spine-like setae absent. Mesoprescutum with transverse, irregular row of 10 long, slender setae; mesoscutellum with transverse row of 10 long, slender setae and spine-like setae absent. Metaprescutum with 10 long, slender setae and spine-like setae absent; metaescutellum with 12 long, slender setae and 6 stout, spine-like setae. Legs (Fig. 27): Tarsal claws with enlarged apical process, 1 basoexternal seta, and 1 internal, preapical seta. Tarsal claw on meso and metathoracic legs shorter than those of prothoracic legs. Coxa, trochanter, and tibiotarsus of all legs with many stout, long setae.

Abdomen (Fig. 27)

Abdominal spiracles I 1.10 mm long and 0.70 mm wide, shorter than spiracles II-VIII. Spiracles on segments II and VI nearly equal in size (1.20-1.30 mm long and 0.80-0.95 mm wide); spiracles on segment VII slightly smaller than preceding (1.10 mm long and 0.95 mm wide) and spiracles on segment VIII shorter than spiracles II-VII (1.00 mm long and 0.80 mm wide). Abdominal segment I on prescutum with 4 long, slender setae and 20 short, spine-like setae; subscutum with 7 long, slender setae, without short setae; scutum with about 40 short, spine-like setae and 8 long, slender setae; scutellum with 10 short, spine-like setae and 30 long, slender setae. All spiracular areas with 12 long, slender setae and 20 short, spine-like setae. Abdominal segment II on prescutum with 2 long, slender setae and 35 short, spine-like setae; subscutum with 8 long setae,

without short setae; scutum with 20 long, slender setae and 60 short, spine-like setae; scutellum with 8 long, slender setae and 30 short, spine-like setae. Abdominal segment III on prescutum with 2 long, slender setae and 34 short spine-like setae; subscutum with 12 long, slender setae, without short setae; scutum with 20 long, slender setae and 60 short spine-like setae; scutellum with 10 long, slender setae and 50 short spine-like setae. Abdominal segment IV on prescutum with 2 long, slender setae and 40 short spine-like setae; subscutum with 10 long, slender setae, without short setae; scutum with 14 long, slender setae and 56 short spine-like; scutellum with 8 long, slender setae and 50 short spine-like setae. Abdominal segment V on prescutum with 2 long, slender setae and 40 short spine-like setae; subscutum with 10 long, slender seta, without short setae; scutum with 14 long, slender setae and 52 short spine-like setae; scutellum with 8 long, slender setae and 50 short spine-like setae. Abdominal segment VI on prescutum with 2 long, slender setae and 44 short spine-like setae; subscutum with 10 long, slender setae, without short setae; scutum with 16 long, slender setae and 40 short spine-like setae; scutellum with 8 long, slender setae and 30 short spine-like setae. Abdominal segment VII with 1 row with mixed 10 slender, long setae and 32 short, spine-like. Abdominal segment VIII with 2 rows with mixture of 8 slender, long setae and 8 short, spine-like setae. Abdominal segment IX with 2 rows of 6 slender, long setae and 8 short, spine-like setae. Abdominal segment X with approximately 48 moderate to long, slender setae and 60 short, spine-like setae. Pleural lobes with 18 long, slender setae and 6 stout, short setae. Raster (Fig. 28): Surface without palidia; campus with 6 slender, long setae; teges with 70-78 short setae distributed also on lower anal lip, barbula with 46-52 long, slender setae. Anal slit transverse. Approximate dorsal body length 86-95 mm. Length of metacoxa: 5.05-5.25 mm.

Second instar

Description based on 40 second-instar reared from eggs laid by females collected in Brazil, Federal District, Planaltina, Núcleo Rural Taquara, Chácara 70, 1045 m, IX-2005, C. M. de Oliveira (CPAC, IEXA). Similar to third-instar except as follows: maximum width of head capsule: 5.1-5.5 mm; dorso-ventral diameter of prothoracic spiracle: 0.59-0.61 mm; length of metacoxa: 3.18-3.22 mm.

First instar

Description based on 32 first-instar reared from eggs laid by females collected in the same locality, IX-2005, C. M. de Oliveira (CPAC, IEXA). Similar to second-instar except as follows: maximum width of head capsule: 2.9-3.1 mm; respiratory plates of thoracic and abdominal spiracles kidney shaped; dorso-ventral diameter of prothoracic spiracle: 0.26 mm; one small eclosion spine (0.12 mm) at each side of metanotum; length of metacoxa: 1.25-1.30 mm.

Aegopsis Bolboceridus (Thomson, 1860). Pupa (Figs. 29-34)

Male (Figs. 29-30 and 33). Length 32-35 mm. Widest width 16-18 mm. Body shape elongate, oval, stout, exarate. Color dark reddish orange. Entire body with fine, velvety-gold vestiture.

Head

Bent sharply beneath thorax, mounthparts directed ventrally; antennae, labrum, mandibles, maxillae and palps discernible; antennal theca expanded, stout with apex rounded. Compound eyes sunken, scarcely visible. Frontoclypeus with two strong, wide, massive horn-like process bent upward at distal third.

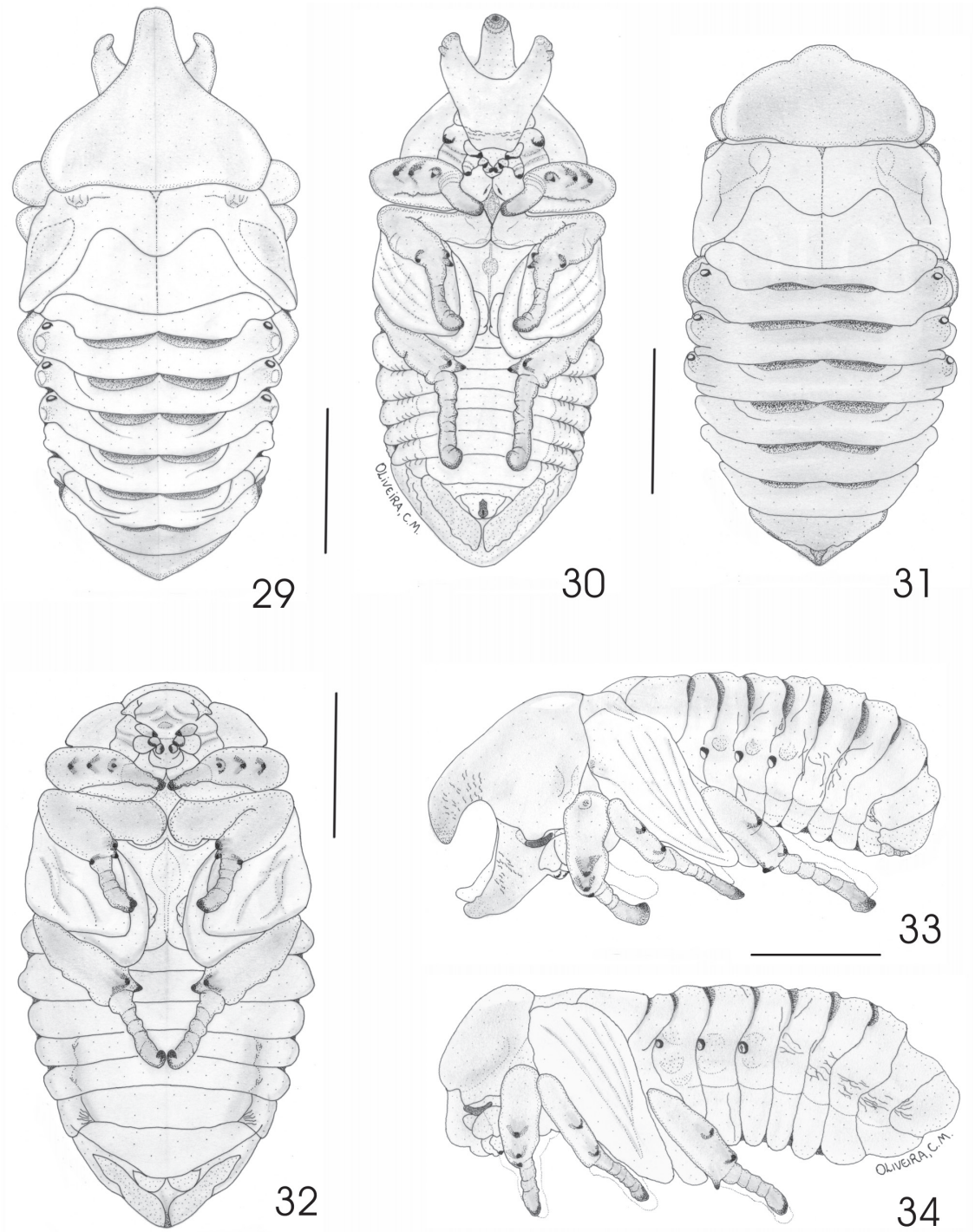
Thorax

Pronotum: Form nearly transverse, with wide, anteromedial massive tubercle with rounded apex. Meso- and metanotum well-differentiated. Elytral and posterior wing theca closely appressed, curved ventrally around body; elytral theca extending to middle of abdominal segment III; posterior wing theca extending to middle of abdominal segment IV. Protibia with 3 distinct teeth on external edge. Meso- and metatibiae with inner and external spines well-developed at apex.

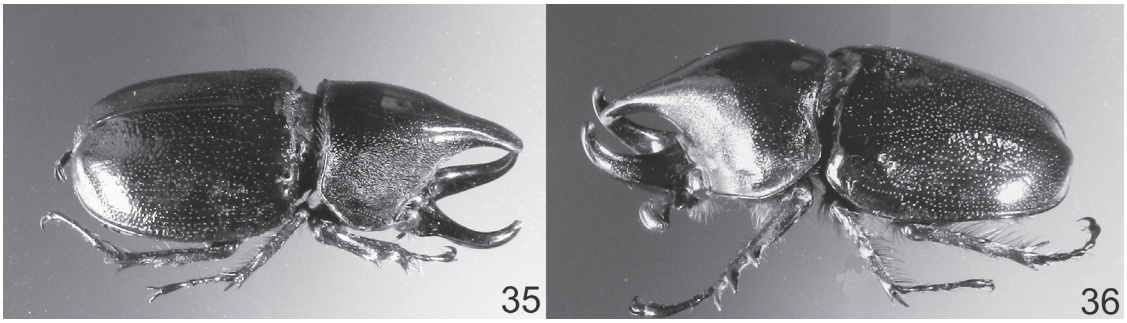
Abdomen

Segments I-X (dorsal view) with 6 pairs of dioneiform organs, well sclerotized between segments I-II, II-III, III-IV, IV-V, V-VI, and weakly sclerotized between segments VI-VII. 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 and short setae. Segments III-X (ventral view) well-defined. Segment VII slightly longer than preceding and VIII slightly longer than segment VII; segments VIII and IX fused. Segment X with genital ampulla small, slightly prominent (Fig. 30).

Female (Figs. 31-32 and 34). Length 24.2-29.1 mm. Widest width 16.4-17.2 mm. Head. Without massive tubercle or horn-like structure. Segment X without genital ampulla (Fig. 32).



Figs. 29-34. Pupae *Aegopsis bolboceridus*. Male: (29) dorsal view. (30) ventral view. Female: (31) Dorsal view. (32) Ventral view. Whole body, lateral view: (33) Male. (34) Female. Scale bars = 10 mm.



Figs. 35 and 36. Adult males of *Aegopsis* species. Dorso lateral view. (35) *A. curvicornis*. (36) *A. bolboceridus*.

Remarks

The following characters will separate *A. bolboceridus* from other known Dynastinae larvae: frons with 1 exterior frontal seta and 1 posterior frontal seta on each side; each anterior angle of frons with 1 seta, and anterior frontal setae absent. Clypeus without central setae. Stridulatory area of maxilla with 7-8 blunt, truncate rigdes and anterior truncate process. The apical segment of antenna with 6-7 dorsal sensory spots. Abdominal spiracles I smaller than spiracles II-VIII. Spiracles on segments II and VI equal in size; spiracles on segment VII slightly wider than preceding and spiracles on segment VIII smaller than spiracles II-VIII.

Biological Data

Aegopsis bolboceridus was considered as a rarity, but during early years of XXI century was recorded as an important pest for diverse vegetables and corn in central Brazil (Oliveira et al. 2008). Is a yearly cycle species, larvae are found between 10-20 cm of depth under roots of host plants. Before pupation, larva builds a cocoon with organic fibers, soil particles and its own excrements, and remains in it as prepupa during May. Pupal instar requires 40-60 days. When the adult is formed remains inside cocoon during 2-3 months until complete their sexual maturity (Oliveira & Frizzas, 2013). Adults are active during September-October, eggs are lay during October-November, but in cultivated fields the different instars may be overlapped, so that first instar is present during October to December, second instar is active during November to February, and third instar is growing from December to May (Oliveira 2005; Oliveira & Frizzas 2013). Adults of *A. bolboceridus* and *A. curvicornis* are very similar (Figs. 35-36), with females almost indistinguishable morphologically.

Distribution

This species is found only in central Brazil (Endrödi 1970, 1985).

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