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## THE GENERA OF AGAOCEPHALINI (COLEOPTERA: SCARABAEIDAE: DYNASTINAE) OF COLOMBIA, WITH DESCRIPTION OF A NEW SPECIES OF *LYCOMEDES* BRÊME

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### ABSTRACT

The six genera of Agaocephalini in Colombia are distinguished in a dichotomous key and illustrated. *Lycomedes enigmaticus* Neita-Moreno and Ratcliffe, **new species**, is described and differentiated by character comparisons with other previously known Colombian species. *Lycomedes lydiae* Arnaud, 2012 is proposed as a **new junior synonym** of *Lycomedes reichei* Brême, 1844.

### RESUMEN

Los seis géneros de Agaocephalini en Colombia son incluidos e ilustrados en una clave dicotómica. Se describe *Lycomedes enigmaticus* Neita-Moreno y Ratcliffe, **especie nueva** y es diferenciada por comparación de caracteres con otras especies previamente conocidas de Colombia. Se propone *Lycomedes lydiae* Arnaud, 2012 como un **nuevo sinónimo junior** de *Lycomedes reichei* Brême, 1844.

Key Words: scarab beetles, taxonomy, nomenclature, identification key, Neotropical

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The tribe Agaocephalini includes 11 genera and 46 species (Endrödi 1970, 1985; Krajcik 2005; Neita-Moreno 2015; Pardo-Locarno *et al.* 2015; Milani 2017) distributed in Central and South America, with one species in the West Indies (Ratcliffe and Cave 2015). The greatest diversity of the group occurs in South America, where there are 11 genera and 88% of the species.

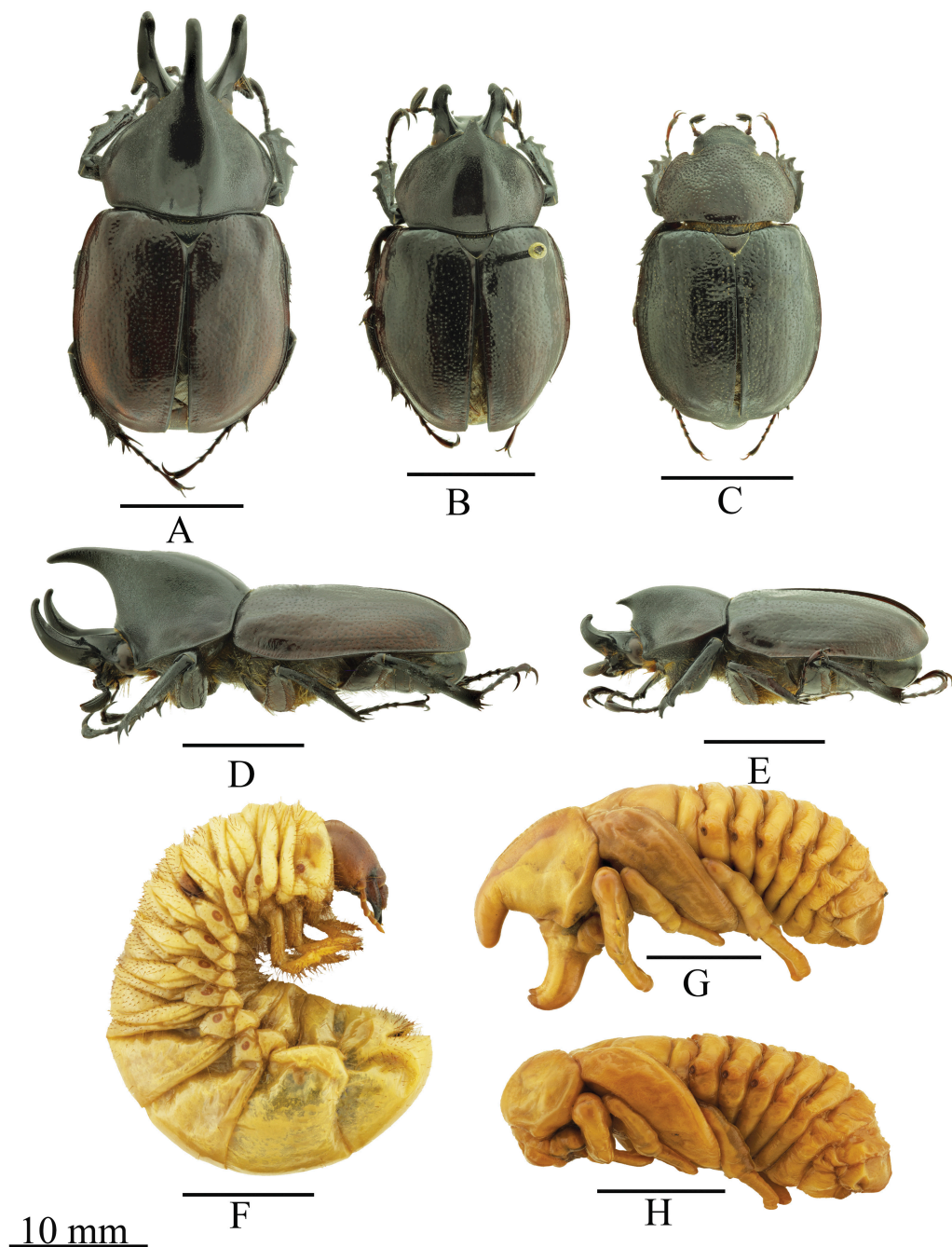
The Agaocephalini are difficult to characterize due to the high degree of variability of characters among several genera (Ratcliffe 2003). Adults are medium size, suboval in form, slightly dorso-ventrally flattened and have a propygidium lacking a stridulatory area and slender meso- and metatarsomeres (Ratcliffe 2003). They are similar to members of Dynastini but have irregular punctures on the elytra (never with punctate striae). Some immature stages were recently described for *Aegopsis* Burmeister (Fig. 1F–H) and *Lycomedes* Brême (Pardo-Locarno and Morón 2006; Neita-Moreno *et al.* 2014). Little is known about the natural history of the species except that adults are attracted to lights and occur in pristine forest habitats. Species of *Aegopsis*, however, have adapted to agricultural

environments: *Aegopsis curvicornis* Burmeister breeds in soils high in organic matter, and *Aegopsis bolbo-ceridus* (Thomson) feeds on the roots of crops in Brazil (Oliveira *et al.* 2008).

Six genera and 14 species of Agaocephalini occur in Colombia (Endrödi 1985; Restrepo-Giraldo *et al.* 2003; Neita-Moreno and Gaigl 2008; Gasca-Álvarez and Amat-García 2010; Milani 2017). They are *Aegopsis* (one species), *Brachysiderus* Waterhouse (one species), *Horridocalia* Endrödi (one species), *Lycomedes* (six species), *Mitracephala* Thomson (one species), and *Spodistes* Burmeister (four species). *Lycomedes* currently contains 10 species (Pardo-Locarno *et al.* 2015; Milani 2017) distributed in Colombia, Ecuador, and Peru; six species occur in Colombia. We describe here one new species, and a new synonymy is proposed.

### MATERIAL AND METHODS

Internal and external morphological characters were studied using a dissecting microscope (6.5–40.0X). For measurements, an ocular micrometer was used. Internal sclerotized structures



**Fig. 1.** *Aegopsis curvicornis*. A, D) Male major, B, E) Male minor, C) Female, F) Third instar, G) Male pupa, H) Female pupa.

were dissected after relaxing the specimen in hot (75°C) water. Heavily sclerotized parts were soaked in a 15% solution of potassium hydroxide and neutralized in a 15% solution of acetic acid. Genitalia were

card-mounted or placed in a glycerin-filled vial beneath the specimen.

The following morphological variables were used for characters:

**Body length:** The length is measured from the apex of the clypeus to the apex of the elytra.

**Puncture density:** Punctures are defined as dense if punctures are nearly confluent or less than two puncture diameters apart; moderately dense if punctures are between 2–6 puncture diameters apart; and sparse if punctures are separated by more than six puncture diameters.

**Setae:** Setae are “hair-like” if slender and erect; “thickened” if slightly thickened and erect or partially decumbent; and “spine-like” if stout and short. Setae are subject to wear and may be abraded.

**Color:** Color is based on dry specimens viewed with magnification and illumination. Nearly all species are black or piceous, while some are dark reddish brown.

**Material Examined.** The results of this study were based on 85 specimens from the following institutions and collections:

**ANDES** Colección de Entomología, Universidad de los Andes, Bogotá, DC, Colombia (Oscar Mahecha).

**CTNI** Colección Taxonómica Nacional de Insectos "Luis Maria Murillo", Corporación Colombiana de Investigación Agropecuaria (Agrosavia), Colombia (Erika Vergara).

**IAvH** Colecciones Biológicas, Sección de Entomología, Instituto de Investigaciones de Recursos Biológicos Alexander von Humboldt, Villa de Leyva, Boyacá, Colombia (Jhon Neita-Moreno).

**ICN–MHN** Colección de Zoología, Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá, DC, Colombia (German Amat-García).

**LGAC** Museo de Historia Natural “Luis Gonzalo Andrade”, Colección Entomológica, Universidad Pedagógica y Tecnológica de Colombia, Tunja, Boyacá, Colombia (Fredy Molano).

**MEFLG** Museo Entomológico “Francisco Luis Gallego”, Universidad Nacional de Colombia, sede Medellín, Antioquia, Colombia (Jhon Alveiro Quiroz).

**MPUJ** Museo Javeriano de Historia Natural “Lorenzo Uribe”, Pontificia Universidad Javeriana, Bogotá, DC, Colombia (Dimitri Forero).

**MUAC** Colección de Ciencias Naturales, Universidad de Antioquia, Medellín, Antioquia, Colombia (Marta Wolf).

**UNAB** Museo Entomológico, Facultad de Agronomía, Universidad Nacional de Colombia, Bogotá, DC, Colombia (Francisco Serna y Erika Vergara).

The distribution map was georeferenced according to specimen label data and then converted into point polygon layers in ArcMap 10.2 (Environmental Systems Research Institute 2013).

## RESULTS

### KEY TO THE GENERA OF ADULT AGAOCEPHALINI FROM COLOMBIA

1. Surface glabrous, weakly shiny (Figs. 1A–E, 2A–B, 3A–C) ..... 2
- 1'. Surface completely covered with grayish brown tomentum (Figs. 2C–E, 3D–F, 8A–C, 9A–C, 11A–D) ..... 4
2. Protibia quadridentate (Fig. 1A–C). Mandibles without external teeth (Fig. 4A–B); galea shorted (Fig. 5A) ..... *Aegopsis* **Burmeister**
- 2'. Protibia tridentate (Figs. 2A–B, 3A–B). Mandibles with 2 external teeth (Figs. 4C–D); galea elongated (Fig. 5B, D) ..... 3
3. Prosternal process developed, apex flattened (Fig. 6B–C) ..... *Mitracephala* **Thomson**
- 3'. Prosternal process undeveloped (Fig. 6A) ..... *Brachysiderus* **Waterhouse**
4. Prosternal process undeveloped (Fig. 6D). Apical maxillary palpomere with sensorial area (Fig. 5E–F) ..... *Spodistes* **Burmeister**
- 4'. Prosternal process present (Fig. 6E–F). Apical maxillary palpomere without sensorial area (Fig. 5C) ..... 5
5. Galea without teeth (e.g., Fig. 5D). Metepisternum divided by a line, basal area smooth, lacking setae (Fig. 7D) ..... *Horridocalia* **Endrödi**
- 5'. Galea with teeth (Fig. 5C). Metepisternum rugopunctate, not divided by a line, basal area with setae (Fig. 7C, E) ..... *Lycomedes* **Brême**

### *Lycomedes enigmaticus* Neita-Moreno and Ratcliffe, new species

Zoobank.org/urn:lsid:zoobank.org:act: B239AAC3-D894-4237-8BC0-BBAC1F9C344E (Figs. 6E, 8A–C, 9B, D, F, 10E–F)

**Type Material.** Holotype and allotype labeled "Colombia, Tolima, Anzoátegui. Vda. Esmeralda. Finca Tabio. 4°37'14.34" N; 75°07'18.66" W. 2406 m. 01.i.2000. A. Osorio". The types are deposited at the Museo Laboratorio de Entomología, Universidad del Tolima, Colombia.

**Description.** **Holotype.** Male (Fig. 8A, C). Length = 29.0 mm; width across humeri = 14.1 mm. Color grayish brown and tan, finely velutinous, with clypeus and part of horns piceous.



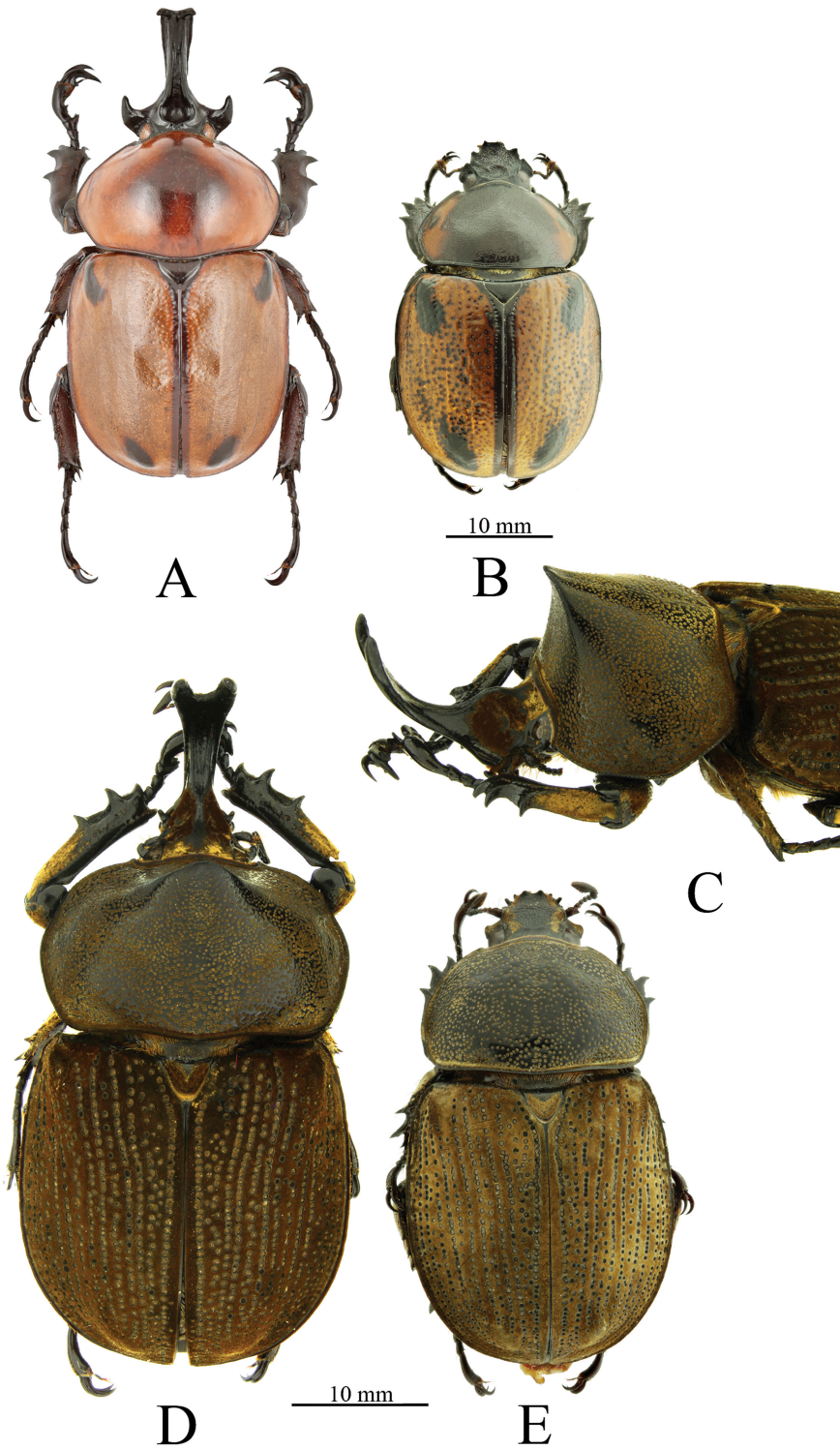
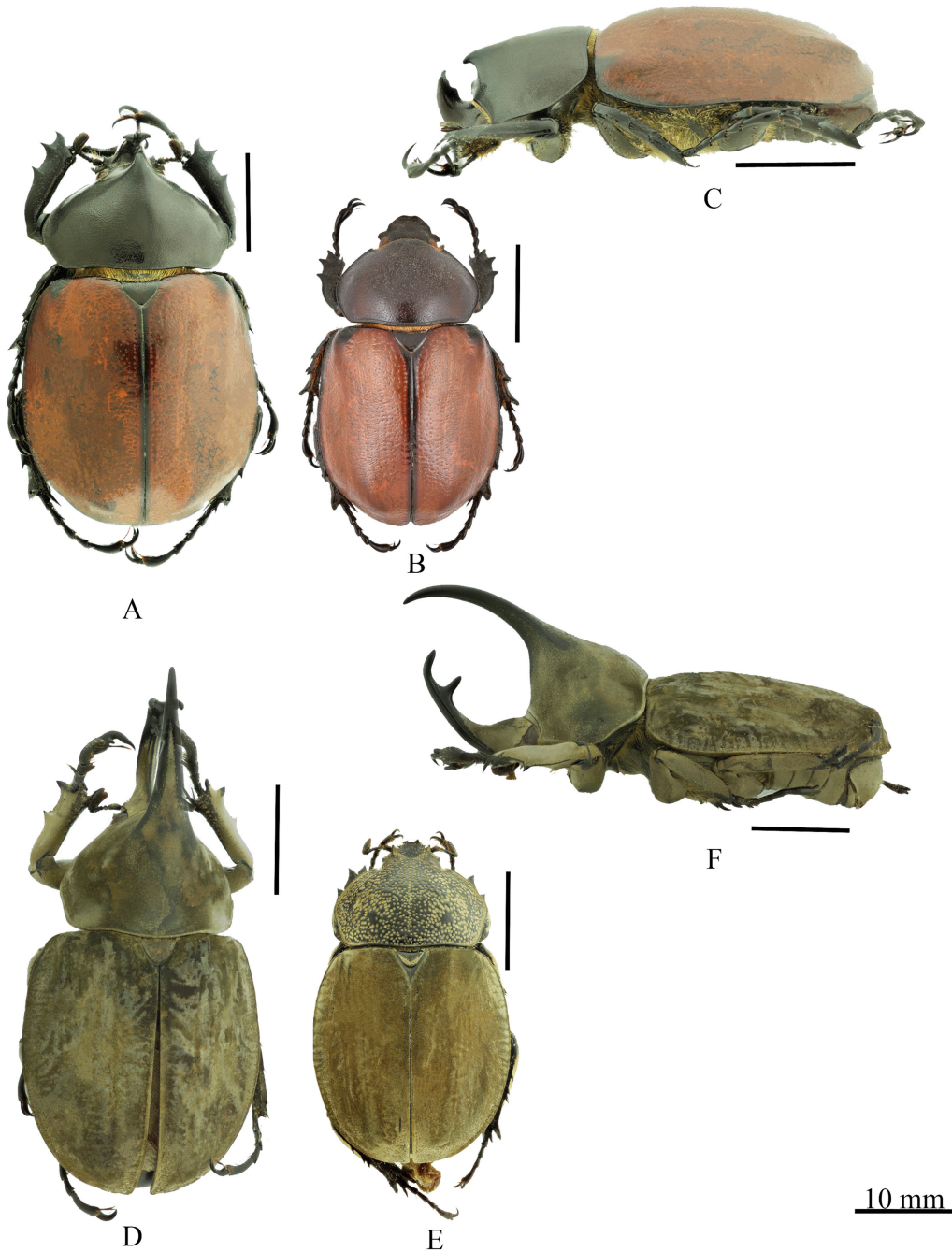


Fig. 2. *Brachysiderus quadrimaculatus*: A) Male, B) Female. *Horridocalia delislei*: C–D) Male, E) Female.



**Fig. 3.** *Mitracephala humboldtii*: A) Male, (B) Female, C) Male, lateral view. *Spodistes hopei*: D) Male, (E) Female, (F) Male, lateral view.

**Head:** Frons with short, erect, slightly recurving horn; apex strongly bifurcate; horn subtriangular in cross-section, apex strongly bifurcate. Ocular canthus acute on apico-lateral corner. Clypeal apex

blunt, continuous with anterior face of horn. Interocular width equals 3.0 transverse eyes diameters. Antenna with 10 antennomeres, club slightly shorter than antennomeres 2–7. Mandibles

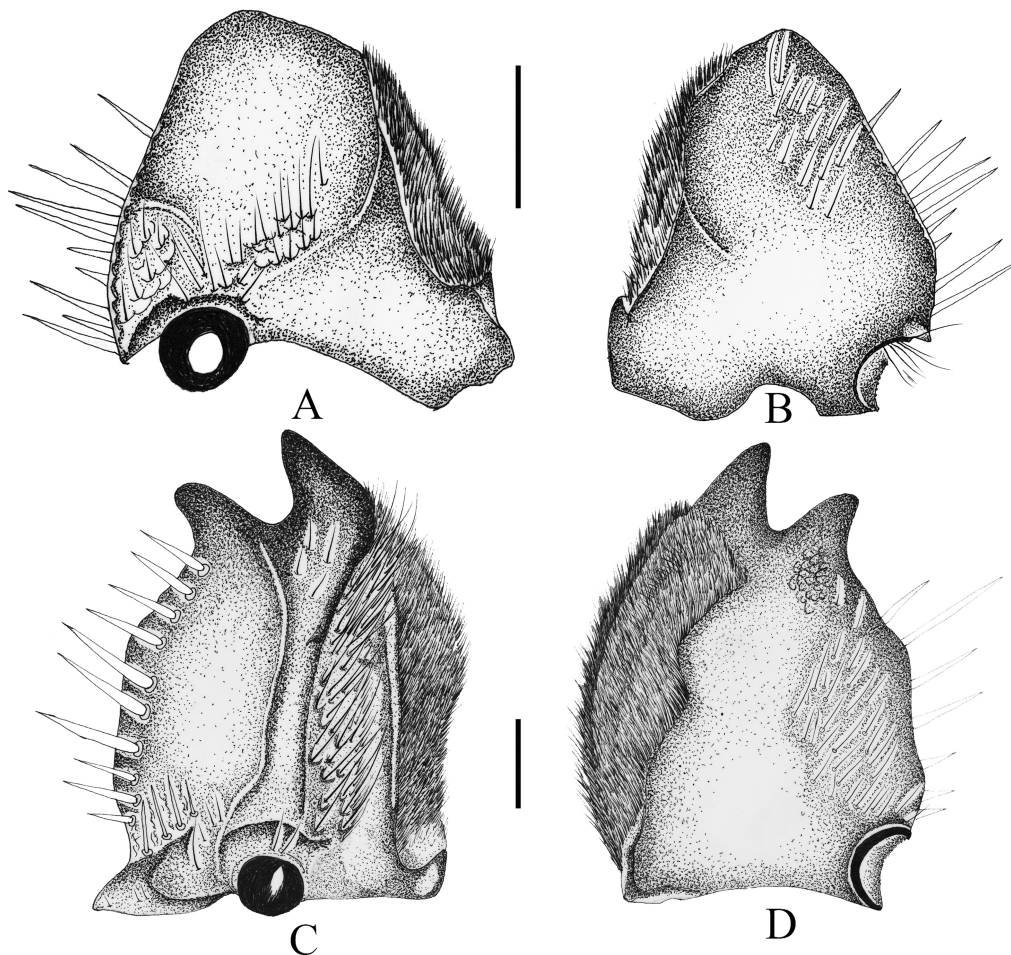
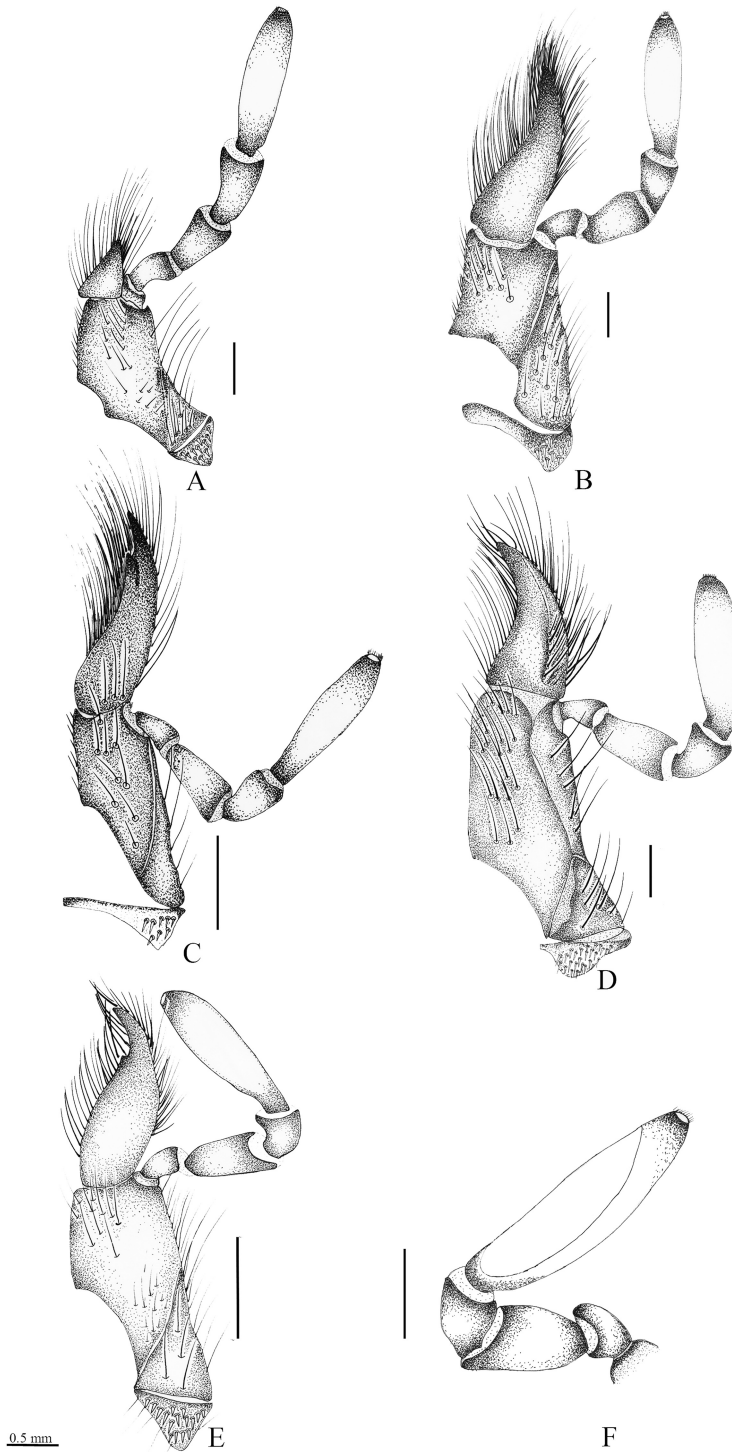


Fig. 4. Mandibles, dorsal and ventral views, respectively. A–B) *Aegopsis curvicornis*, C–D) *Brachysiderus quadrimaculatus*.

strongly bidentate, mostly hidden beneath fringe of setae below apex of clypeus. **Pronotum:** Center of disc with short, erect horn; apex not dilated. Surface with minute, pale, moderately dense, setigerous punctures. Lateral margins widest behind middle. Base with complete marginal bead. **Elytra:** Surface with moderately dense, small, setigerous punctures (most in rows) on velutinous covering; setae minute, pale. Sides explanate, apical umbones prominent (Fig. 8C). **Pygidium:** Surface with short, dense, pale setae. Surface convex in lateral view. **Legs:** Protibia tridentate, basal tooth removed from others. Protarsus enlarged, median claw smooth, without tooth. Apex of metatibia truncate with strong, median angle with single, small spinule. Apex of metatarsomere 1 spiniform, extending to middle of metatarsomere

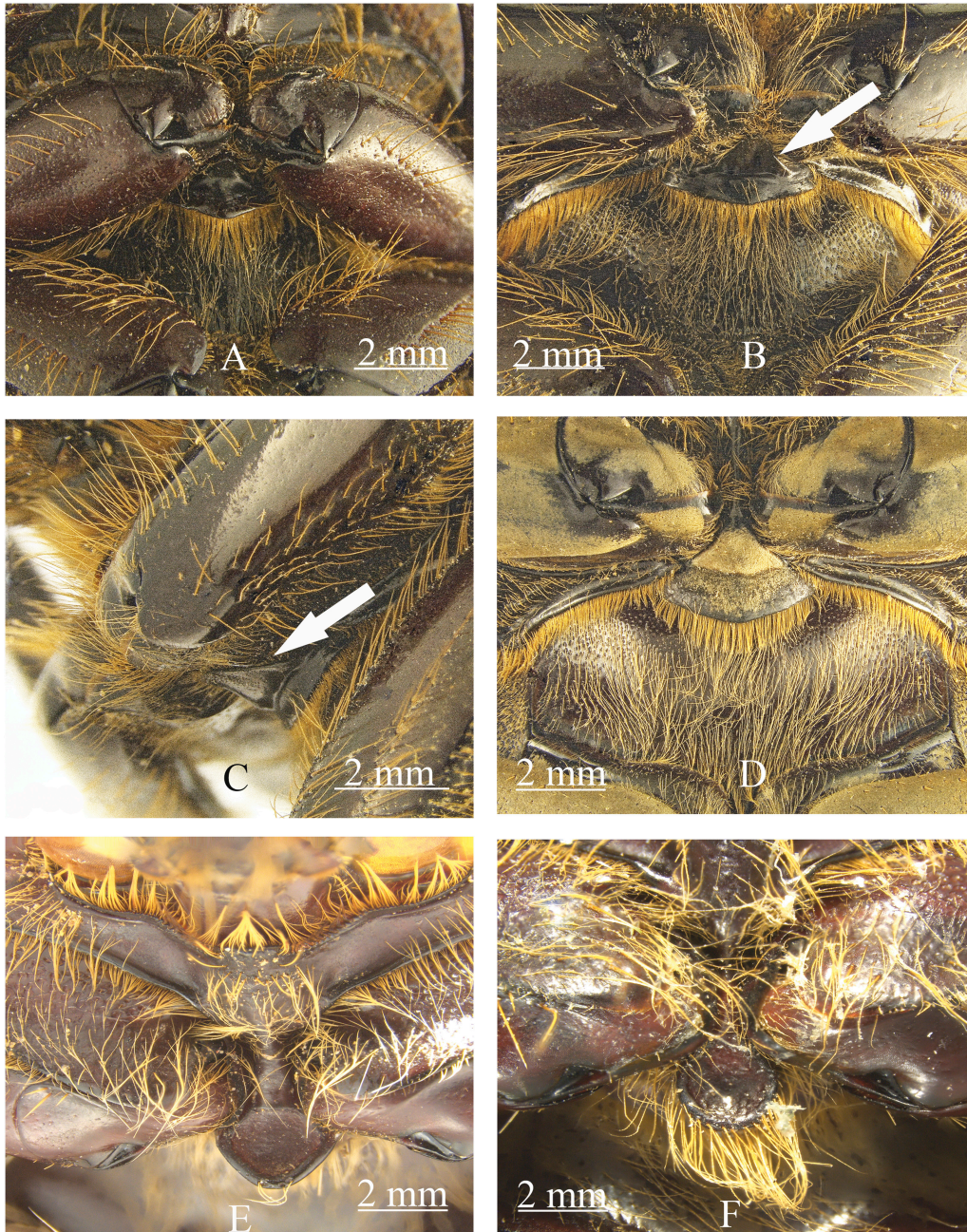
2 (Fig. 8C). **Venter:** Prosternal process parabolic, apex with long, tawny setae (Figs. 6E, 9F). **Par-ameres:** As in Fig. 10E–F.

**Allotype.** Female (Fig. 8B). Length 26.0 = mm; width across humeri = 13.0 mm. As male except in the following respects. **Head:** Horn absent. Frons and clypeus slightly concave; surface with large, often confluent punctures. Lateral edge of clypeus at anterior edge of ocular canthus sharply elevated into laminate, triangular ridge. Clypeus attenuate, apex narrow (subequal to width of eye), emarginate, with distinct tooth either side of emargination, reflexed (Fig. 8B). Mandibles more exposed. **Pronotum:** Horn absent. Surface reddish brown, covered by large, dense, round, velutinous punctures; punctures often confluent and with a minute, pale seta at center of each. Anterior margin



**Fig. 5.** Maxillae, dorsal view. A) *Aegopsis curvicornis*, B) *Brachysiderus quadrimaculatus*, C) *Lycomedes hirtipes*, (D) *Mitracephala humboldtii*, E) *Spodistes grandis* Sternberg, F) Apical maxillary palpomere of *S. grandis*.



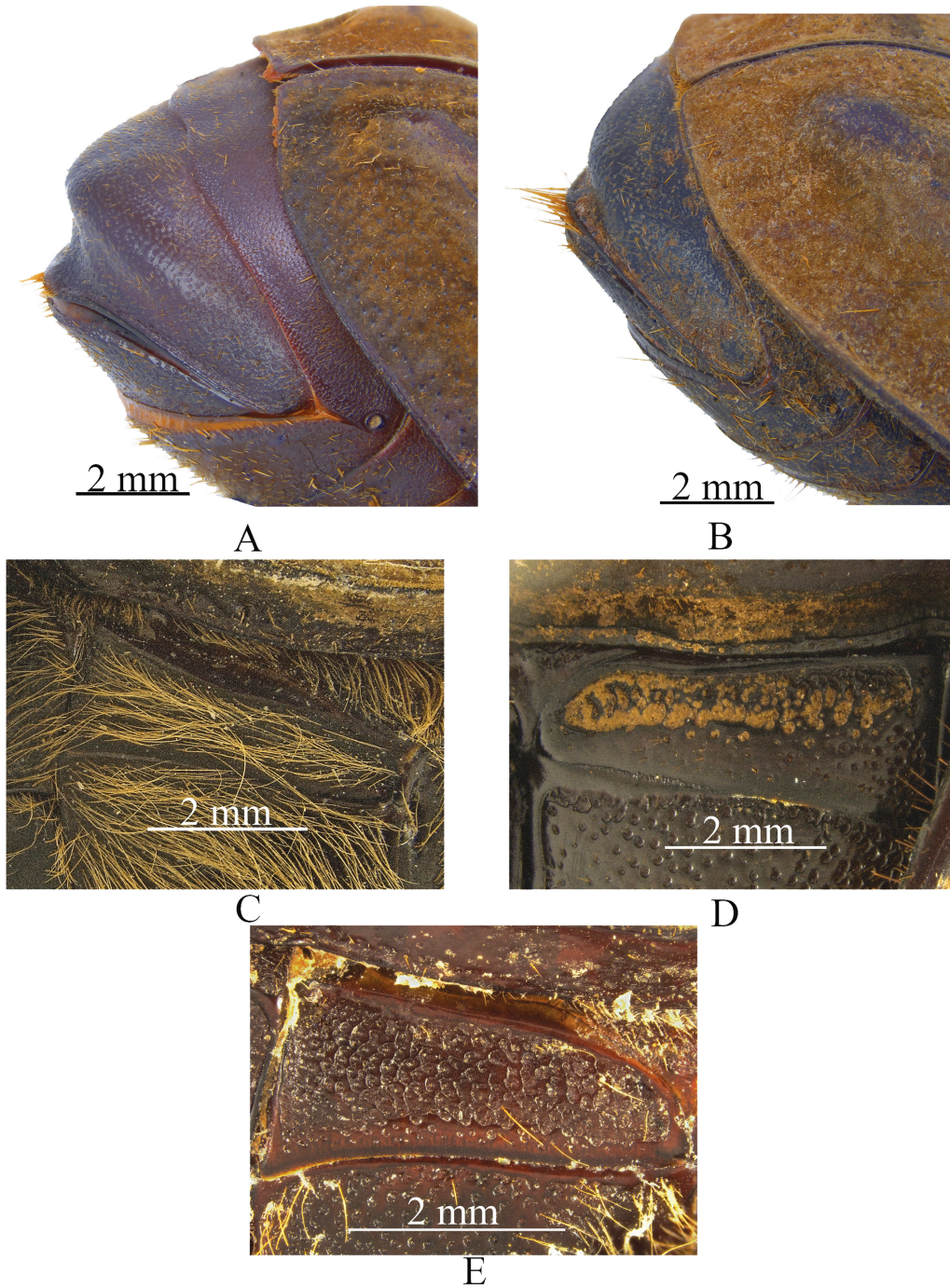


**Fig. 6.** Prosternal processes. A) *Brachysiderus quadrimaculatus*, B–C) *Mitracephala humboldtii* (arrows point to developed processes), D) *Spodistes grandis*, E) *Lycomedes enigmaticus* F) *L. hirtipes*.

at middle tumescent. **Pygidium:** Surface nearly flat in lateral view. **Legs:** Protarsus not enlarged, claws subequal in size, not toothed. Median angle at apex of metatibia pronounced, with 2 small spinules.

**Etymology.** The specific epithet *enigmaticus* is used here in reference to the rarity of this new species as well as its morphological similarity with *Lycomedes hirtipes* Arrow. The name is masculine





**Fig. 7.** Pygidia: A) *Lycomedes reichei*, female, dorsolateral view, B) *Lycomedes hirtipes*, female, dorsolateral view. Metepisterna: C) *Lycomedes reichei*, D) *Horridocalia delislei*, E) *L. hirtipes*.

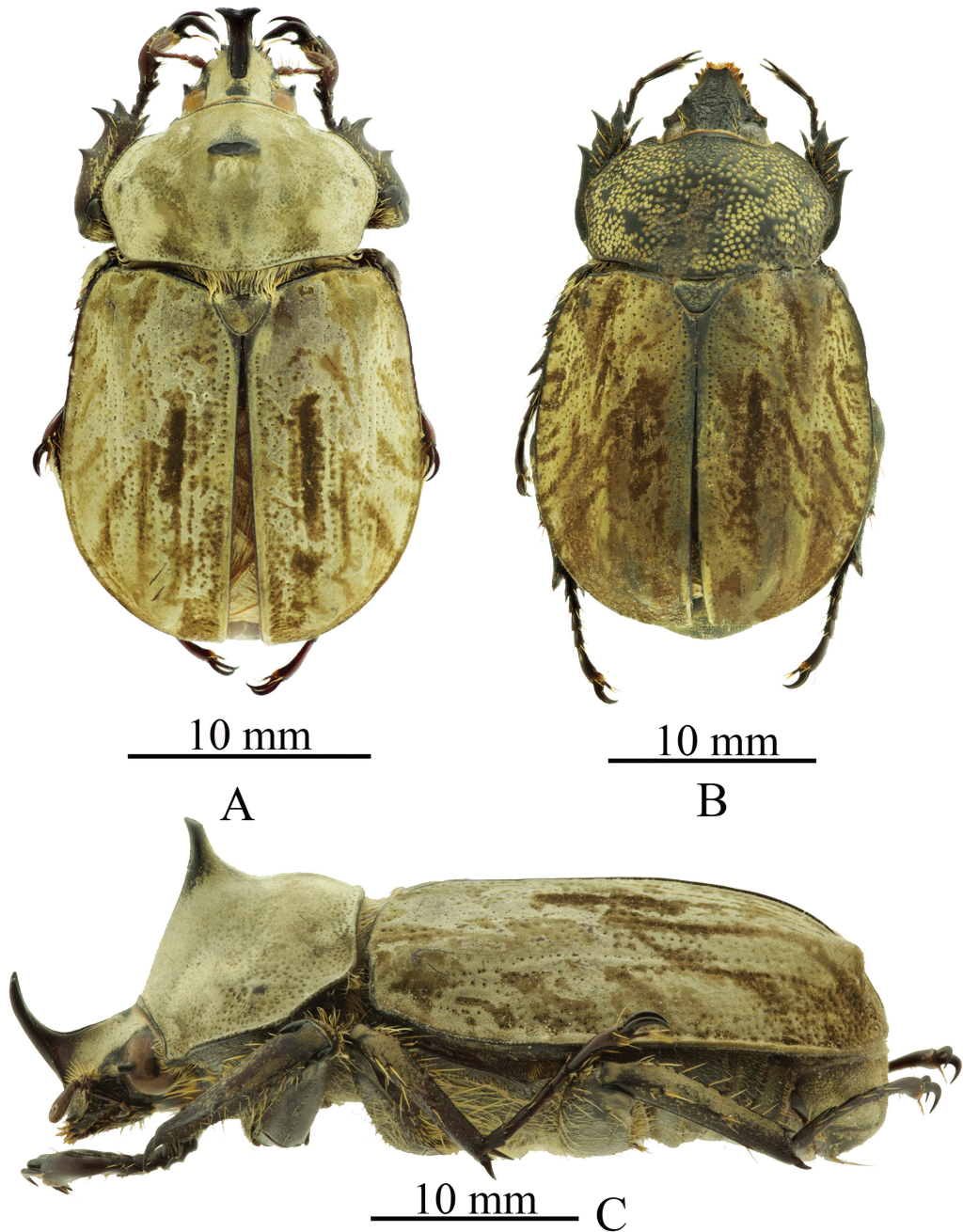


Fig. 8. *Lycomedes enigmaticus*. A) Male, dorsal view, B) Female, dorsal view, C) Male, lateral view.

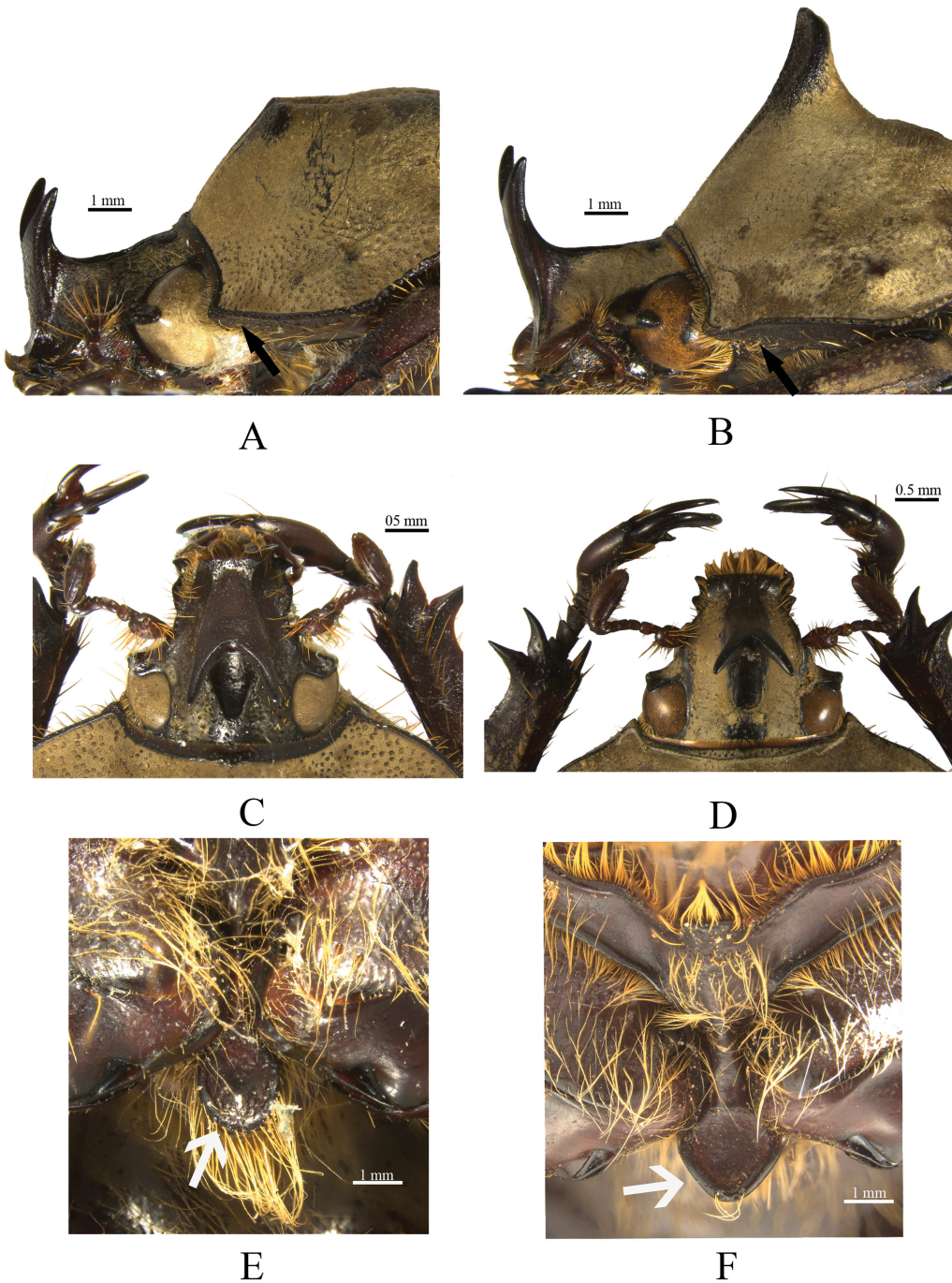
to match the gender of the genus, which was named after a mythological king of Troy.

**Distribution.** *Lycomedes enigmaticus* is known from Tolima in Colombia (Fig. 12).

**Diagnosis.** *Lycomedes enigmaticus* is similar to *L. hirtipes*, but *L. enigmaticus* is distinguished by

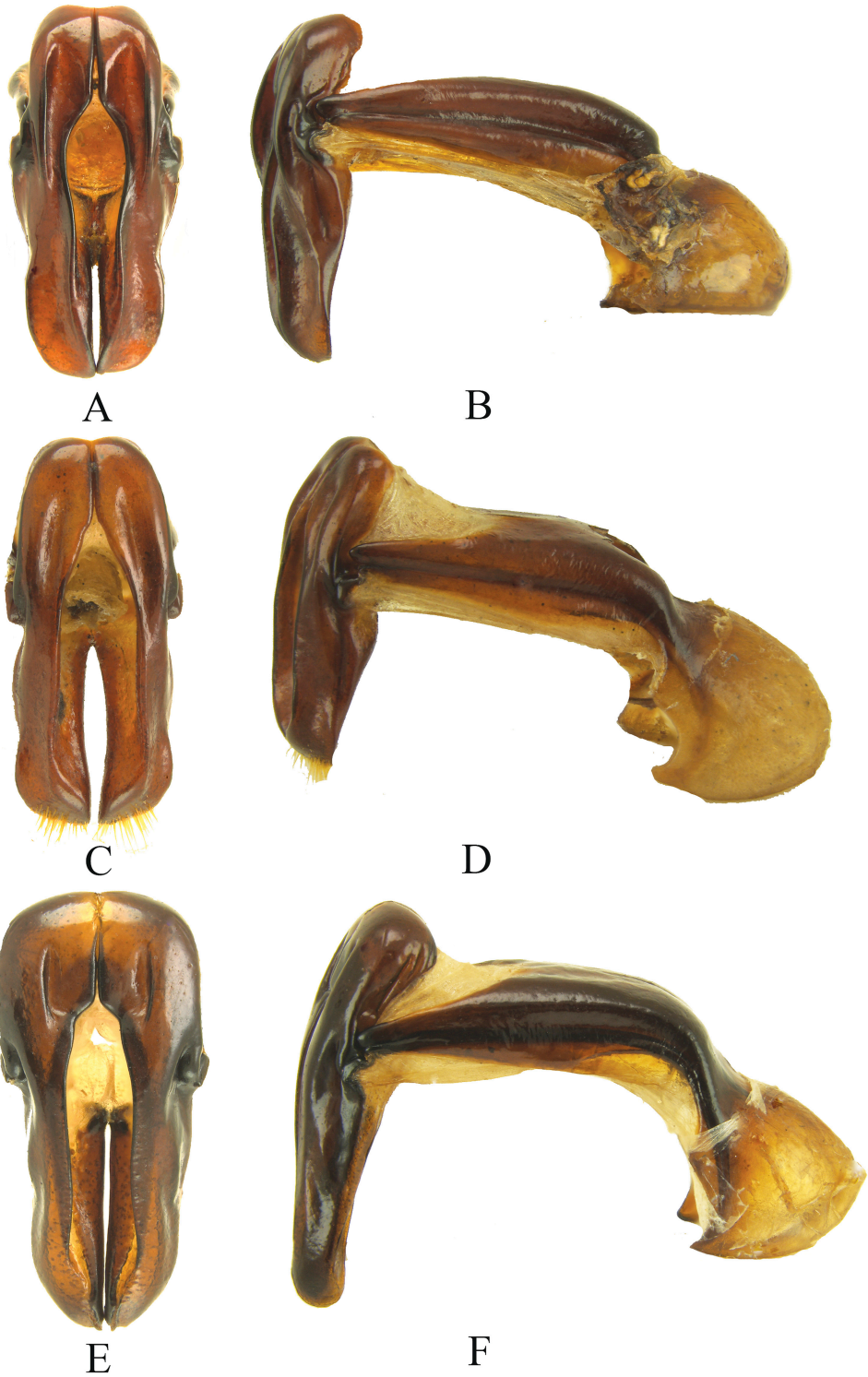
the following character combination: male with each side of clypeal apex projecting slightly laterad (Fig. 9D); frons with elongate groove behind horn (groove subtriangular in *L. hirtipes* (Fig. 9C) or a narrow line as in *Lycomedes reichei* Brême (Fig. 11A, C)); anterior pronotal margin with a small keel (Fig.



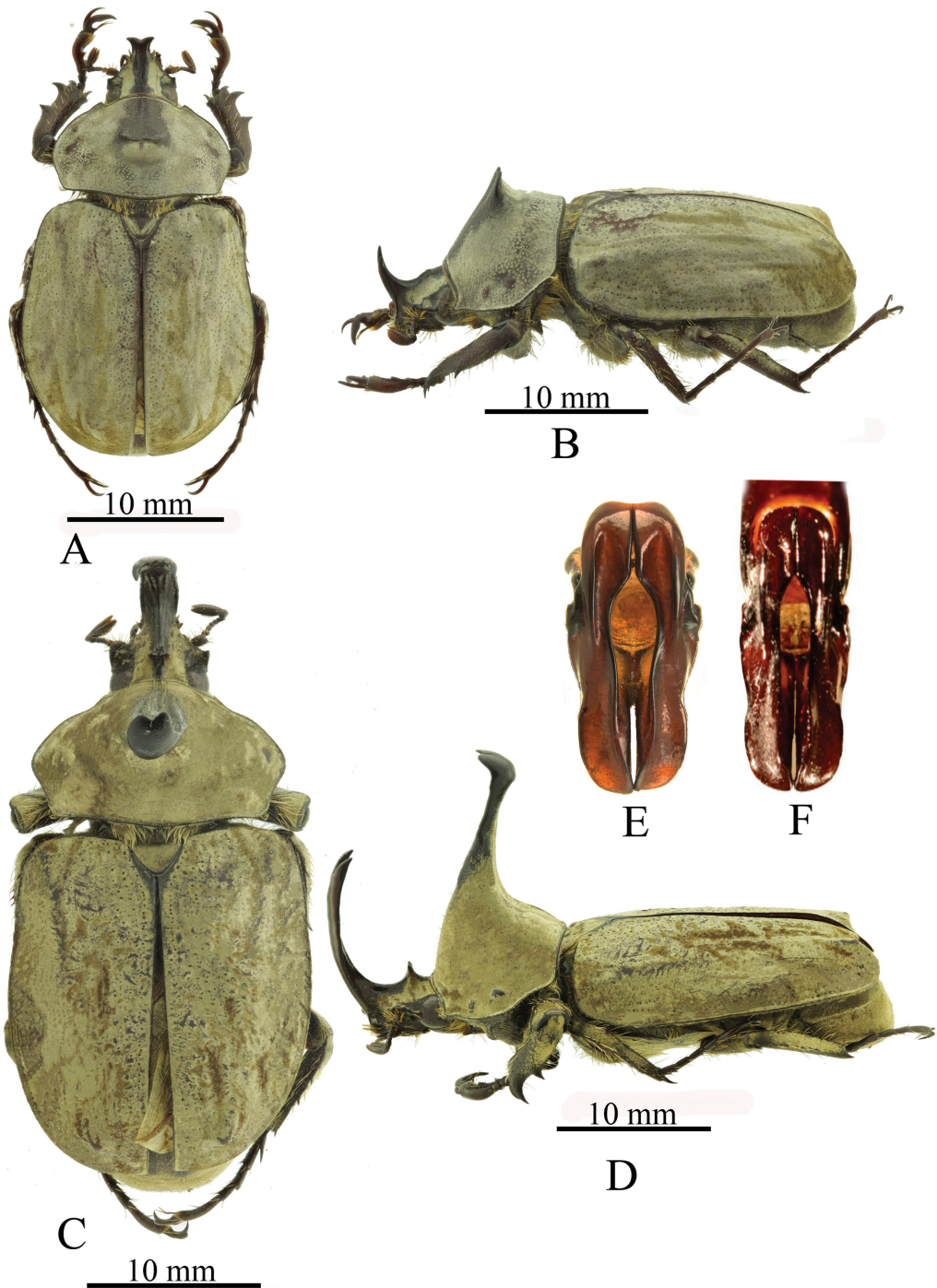


**Fig. 9.** *Lycomedes* species. *L. hirtipes*: A) Head and pronotum, lateral view, C) Head showing subtriangular fovea, E) Prosternal process (arrow). *L. enigmaticus*: B) Head and pronotum, lateral view, D) Head showing elongate fovea, F) Prosternal process (arrow).





**Fig. 10.** *Lycomedes* species, parameres. A–B) *L. reichei*, C–D) *L. hirtipes*, E–F) *L. enigmaticus*.



**Fig. 11.** *Lycomedes reichei*: A–B) Male minor, dorsal and lateral views, respectively, C–D) Male major, dorsal and lateral views, E) parameres. F) *Lycomedes lydiae*, parameres.



Fig. 12. Location of the type locality of *Lycomedes enigmaticus* in Colombia.

9B) (keel absent in *L. hirtipes* and *L. reichei* (Fig. 9A)); and apex of prosternal process slightly parabolic (Figs. 6E, 9F) (rounded in *L. hirtipes* (Figs. 6F, 9E)). The female is similar to other species of *Lycomedes*, but the prosternal process is similar to the male and different from the processes of *L. hirtipes* and *L. reichei*. Lastly, the form of the parameres is unique (Fig. 10E–F, with the apices lacking setae (compare with *L. hirtipes* (Fig. 10C–D) and *L. reichei* (Fig. 10A–B)).

***Lycomedes reichei* Brême, 1844**

(Figs. 7A, 10A–B, 11A–E)

*Lycomedes reichei* Brême 1844: 299 (original combination)

*Lycomedes lydiae* Arnaud 2012: 2. **New synonymy.**

Specimens ( $n = 17$ ) of *L. reichei* (Fig. 11A–D) from Colombian collections were studied by the first author, and we conclude that *L. lydiae* is conspecific. The parameres of both taxa are similar (compare Fig. 11E vs. Fig. 11F). The two "species" are sympatric, and we believe that *L. lydiae* is simply a variation of the population of *L. reichei*.

**Colombian Distribution.** Boyacá, Toguí, En: Pseudotallo de plátano (*Musa* sp.-Musaceae), 28.ii.1976, R. Vespara, det. as *Spodistes* sp. by R.

Gordon in 1976 (15 specimens, CTNI-13240. Boyacá, Villa de Leyva, Centro del pueblo, Captura Manual, 5° 37' 56.55" N, 73° 31' 24.08" W, 2,150 m, 28.xi.2017, J. C. Neita leg. (2 females, IAvH-E-215590 and IAvH-E-215591). Santander, La belleza/Alrede, Casco Urbano/Junio 2004, 2,204 msnm/Cols. Estudiantes G-8vo/Colegio Juan Bosco, /ICN 024097/ *Lycomedes reichei* Brême 1844. Det. J. C. Neita. 2007 (1 specimen).

**KEY TO THE SPECIES OF ADULT MALE  
*LYCOMEDES* OF COLOMBIA**

(Modified from Pardo-Locarno *et al.* 2015)

1. Cephalic horn trifurcate at apex and with additional tall, erect, bifurcate horn at base. Pronotal horn short, erect. Cundinamarca . . . . . ***L. ramosus* Arrow**
- 1'. Cephalic horn bifurcate at apex . . . . . 2
2. Cephalic horn longitudinally furrowed on dorsal edge, each side of furrow keel-like . . . . . 3
- 2'. Cephalic horn lacking furrow on dorsal edge . . . . . 4
3. Anterior pronotal margin with a small keel. Tolima . . . . . ***L. enigmaticus* Neita-Moreno and Ratcliffe, new species**
- 3'. Anterior pronotal margin without a keel. Boyacá, Caldas, Cauca, Huila, Tolima, Huila, Valle . . . . . ***L. hirtipes* Arrow**
4. Frons with central longitudinal furrow narrow, shallow. Boyacá and Santander . . . . . ***L. reichei* Brême**
- 4'. Frons lacking central furrow, instead with a rounded dilation . . . . . 5
5. Pronotum completely covered with large, irregular punctures, some coalescent. Cephalic horn at base expanded laterally on each side into subtriangular projection. Santander . . . . . ***L. salazari* Pardo-Locarno, Villalobos-Moreno, and Stechauner**
- 5'. Pronotum with small, sparse punctures. Cephalic horn at base lacking subtriangular projection. Antioquia . . . . . ***L. burmeisteri* Waterhouse**

**KEY TO THE SPECIES OF ADULT FEMALE  
*LYCOMEDES* OF COLOMBIA**

(Modified from Pardo-Locarno *et al.* 2015)  
(Females of *L. ramosus* Arrow are unknown or unavailable.)

1. Clypeus short, width at base of ocular canthi nearly twice as wide as long, apex slightly narrowed . . . . . ***L. salazari* Pardo-Locarno, Villalobos-Moreno, and Stechauner**
- 1'. Clypeus long, narrower at base, markedly narrowed towards apex . . . . . 2

2. Head broadly, shallowly depressed along middle ..... 3  
 2'. Head not depressed along middle .....  
 ..... *L. burmeisteri* Waterhouse  
 3. Pygidium strongly protuberant at middle and strongly concave on apical half (Fig. 7A) ....  
 ..... *L. reichei* Brême  
 3'. Pygidium convex at middle, not strongly protuberant, apical third concave (Fig. 7B) ..... 4  
 4. Clypeal apex broad. Prosternal process short (Fig. 6E) ..... *L. enigmaticus* Neita-Moreno and Ratcliffe, new species  
 4'. Clypeal apex narrow. Prosternal process moderately long (Fig. 6F) .....  
 ..... *L. hirtipes* Arrow

#### ACKNOWLEDGMENTS

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