

## The Philippine Stick Insect genus *Eubulides* Stål, 1877 with the description of a new species from Mt. Apo Range, Mindanao Island (Phasmatodea: Heteropterygidae: Obrimini)

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### Abstract

The Philippines is home to three species of *Eubulides* Stål, 1877 distributed in Imugan, Nueva Vizcaya and Polillo Island in Luzon. The first species under the genus, *Eubulides alutaceus* was described by Stål in 1877. The other two species, *E. taylori* and *E. iggorote* were described by Rehn & Rehn in 1939. This paper provides an updated and more detailed description and distribution of *Eubulides* species from the Philippines. A new and endemic species from Mt. Mahuson, Apo Range, North Cotabato is also hereby described and illustrated it represents the fourth species of the genus *Eubulides* from the Philippines and the first species of the genus to be described from Mindanao Island. The new species is distinct from the rest of the *Eubulides* species by the presence of a pair of spinose tubercles in the medial pronotals and postero-median tubercles in the abdominal tergites. The discovery of this new species from Mt. Mahuson provides additional data on the biodiversity in the area and can be used as a basis for proper forest management and policy making to protect the area.

**Keywords:** *Eubulides manobo*, Obriminae, Theramenes-group, Stick Insect, Mt. Mahuson.

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### Introduction

*Eubulides* Stål, 1877 is a Philippine endemic genus under family Heteropterygidae: Obriminae: Obrimini. The genus belongs to the Theramenes-group as assigned by Hennemann *et al.* (2016) together with *Heterocopus* Redtenbacher, 1906, *Mearnsiana* Rehn & Rehn, 1939 and *Theramenes* Stål, 1875 which are grouped based on the simplicity of their body armature, absence of spines in the posterior mesonotum and metanotum, flattened head, and weakly armed to unarmed and increasingly thickened metafemora (Hennemann *et al.*, 2016). The genus *Eubulides* can be distinguished by the unexpanded meso- and metapleura, weakly armed to unarmed meso- and metanotum of male, presence of median specialization in the 7<sup>th</sup>-9<sup>th</sup> abdominal tergite and up-curving

ovipositor in females (Rehn & Rehn, 1939).

Three *Eubulides* species are so far described, *viz.* *E. alutaceus* Stål, 1877, *E. igorrote* Rehn and Rehn, 1939 and *E. taylori* Rehn and Rehn, 1939 which are restrictedly distributed to Imugan, Nueva Vizcaya in Luzon and Polillo Island (Rehn & Rehn, 1939). No record of the genus is known so far from the Mindanao group of islands though several Obrimini are already recorded. Obrimini species from Mindanao include species of *Brasidas* (4 species), *Euobrimus* (6 species), *Mearnsiana* (1 species), *Stenobrimus* (1 species) and *Tisamenus* (1 species).

Our recent expedition in Mt. Mahuson of the Apo Range in Mindanao during October 2020 resulted in the discovery of a noteworthy

new species of Obrimini in the genus *Eubulides*.

Recent fieldworks conducted by researchers from the Central Mindanao University in different mountain ecosystems in Mindanao Island already resulted to the discovery of several new species in different taxa (Amoroso *et al.*, 2020, 2021; Patano *et al.*, 2021). Collection sites in these fieldworks included Mt. Mahuson, one of the remaining forested areas in the Apo Range. This forest is continually threatened by habitat loss and degradation caused by over-exploitation of forest resources, conversion of forest into agricultural land and climate change. The discovery of this new species provides significant information on the unknown biodiversity of Mt. Mahuson which can serve as a basis for proper forest management and policy making for the protection and conservation of the area. This paper is specifically aimed to formally describe this new species of *Eubulides* and provide additional information on the morphology and taxonomy of the genus.

#### Materials and Methods

All recent specimens were collected from Mindanao Island under the Department of Environment and Natural Resources Wildlife Gratuitous Permit (DENR WGP): RXII-2020, No.14.

Examined specimens were from the following institutions:

CMU-CEBREM – Central Mindanao University - Center for Biodiversity Research and Extension in Mindanao.

UPLB-MNH – University of the Philippines - Museum of Natural History, Philippines.

Specimen measurements provided are in millimeters (mm). Glossary used in this manuscript follows Nichols and Schuh (2018), Bragg (1997) for general morphology of Phasmid, Clark-Sellick (1997) for egg morphology and Rehn & Rehn (1939) for acanthotaxy body armatures.

#### Taxonomy

##### *Eubulides alutaceus* Stål 1877

*Eubulides alutaceus* Stål, 1877: lxviii

*Eubalides* (orthographic/typographical error) *alutaceus* Elera, 1895: vol 2, 200

*Eubulides alutaceus* Kirby, 1904: 395

*Eubulides alutaceus* Redtenbacher, 1906: 38

*Eubulides alutaceus* Bruner, 1915: vol 15, no.2, 229

*Eubulides alutaceus* Sjöstedt, 1933: vol 25 A, no.16, 2

*Eubulides alutaceus* Rehn & Rehn, 1939: 403, 407-408

*Eubulides alutaceus* Zompro, 2004: 209

*Eubulides alutaceus* Hennemann, *et al.*, 2016: 18

**Diagnosis:** Type species for genus *Eubulides*, with no exact locality in the Philippines. Presently, no other specimen had been collected neither any information regarding the habitat. Foremost distinguishable character is the development of quadrituberculate spines on pronotal anterior margin (Rehn & Rehn, 1939) or equivalent of two pairs of spines at anterior mesal. This character is congeneric, different from other species group, whereas *E. igorrote*, *E. taylori* and *E. manobo* **sp. n.** has two pairs of anterior mesal at low rounded tubercles.

##### *Eubulides igorrote* Rehn & Rehn, 1939

(Fig.1)

*Eubulides igorrote* Rehn & Rehn, 1939: 403, 408-411, plate 31(fig. 4)

*Eubulides igorrote* Otte, 1978: 79

*Eubulides igorrote* Zompro, 1996: 161-164

*Eubulides igorrote* Sellick, 1998: 208, fig. 8 (c)

*Eubulides igorrote* Zompro, 2004: 209, fig. 11(5)

*Eubulides igorrote* Bank *et al.*, 2021: 15, 17, fig. 2 (f)

**Material examined:** 2 males, 1 female, 3 ova [UPLB-MNH-PHA-00632, male, immature] Philippines, Luzon, Mt. Palali, Nueva Vizcaya, 2007, O.L. Eusebio, S.A.Yap & M.V.C. Yngente; [UPLB-MNH-PHA-00633, male] same locality; [UPLB-MNH-PHA-00634, female] same locality with extracted ova.

**Recorded specimens:** [Hebard Collection, Type no. 1292, male] Holotype, Philippines, Luzon, Nueva Vizcaya, 01 May 1912, W. Boettcher; 1 male, 1 female, Philippines, Luzon, Mt. Banahaw de Tayabas, River Alitao, 600m, 24.VIII.1995, O. Zompro; 1 male, 1 female (L<sub>5</sub>), same locality, 29.August.1995. O. Zompro.

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**Diagnosis:** This species is endemic to Luzon Island. Relatively small in size compared to *E. manobo* sp. n. Autapomorphic character is the presence of four prominent spinous tubercles on anterior mesonotum. Moreover, apparently more prominent in the male species. Congeneric typically with low pointed tubercles to rounded tubercles.

The egg micropylar lateral extension arms not reaching polar region almost near to *E. manobo* sp. n. but differ to *E. taylori* where the extension reaches posterior polar region. Zompro's (1996) descriptions of both sexes including egg agree to every part of characters.

**Description:** Small sized obrimini; male relatively slender while female stout and longer; female general body surface with dense granular, while male less dense granular; foretibial areolate almost one-eighth shorter than foretibia, distal margin of areolate area on respective tibiae slightly produced to distinctly spinose.

**Female:** *Head:* longer than wide; eyes projecting almost hemispherical; antennae if bent backwards reaches metanotum, 28 antennomeres, scape longer than wide and dorso-ventrally compressed, pedicel and succeeding flagellomeres subcylindrical; posterior marginal end with median and lateral coronals distinctly spinoso-tuberculate.

*Pronotum:* Slightly longer than wide; almost one-third shorter than head; antero-lateral spinoso-tuberculate; paired posterior mesal low rounded tubercles; posterior pronotals prominently spinoso-tuberculate.

*Mesonotum:* Distinctly longer than wide; almost three times longer than pronotum; dorsal lateral outline diverging posteriorly; another spine in line with anterior mesal mesonotals, prominent spinoso-tubercle; anterior mesal slightly shorter spinoso-tubercle; antero-lateral shorter than anterior mesal and with spinoso-tubercle; laterals with series of tubercles.

*Metanotum:* longer than wide; almost half length of mesonotum; dorsal lateral outline slightly diverging posteriorly; lateral metanotals with series of tubercles.

*Abdomen:* Median segment dorsally with anterior margin nearly arcuate, median segment towards III abdominal tergites broadening, tergite IV towards supraanal plate

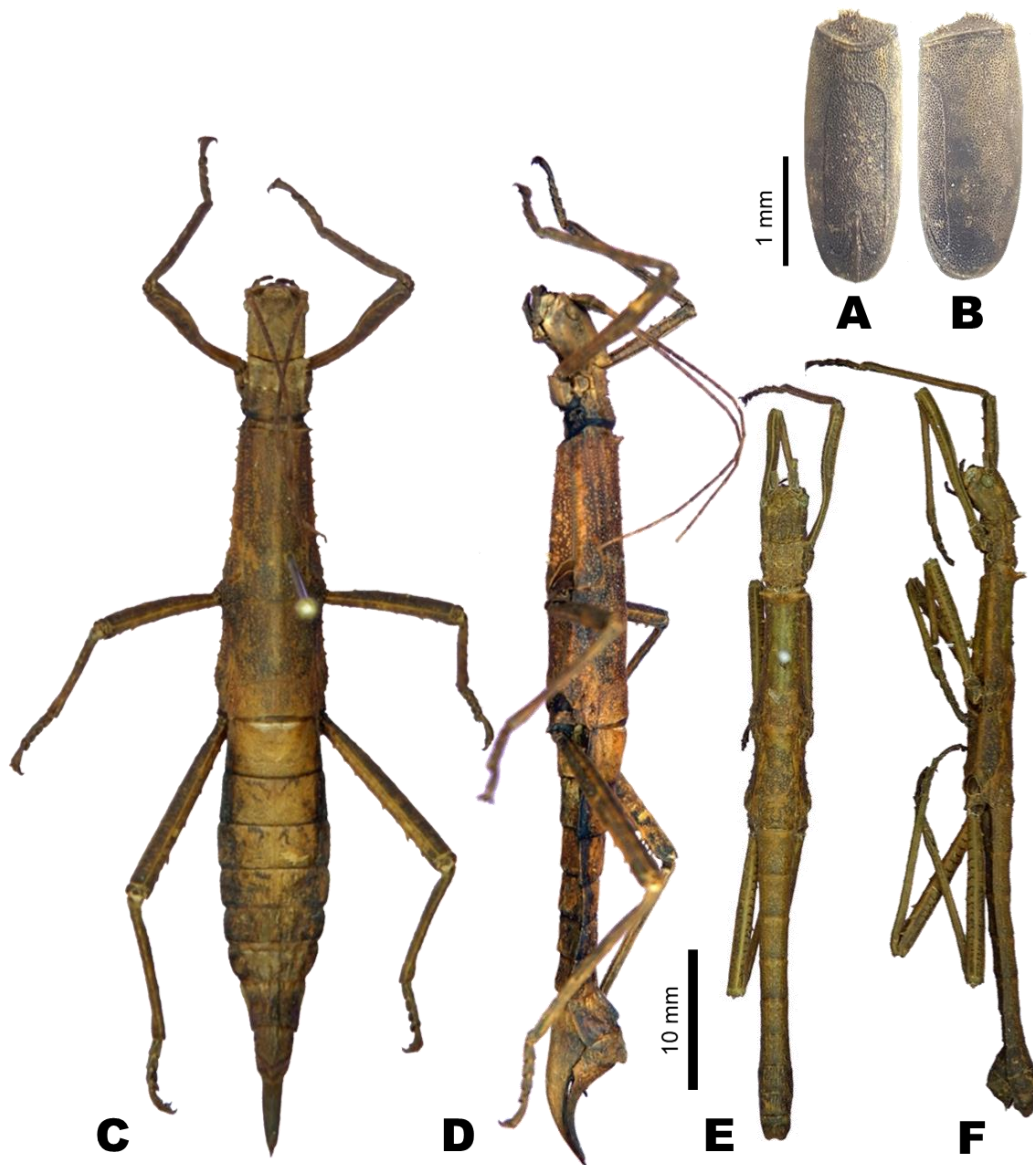
gradually converging; tergite VIII and IX with medioposteriors, medioposterior carina on respective tergites apparently elevating and begins at anterior margin apex onwards but terminating before reaching marginal posterior end; supraanal plate as long as tergite IX and anal segment combined, lateral outline arcuate, apex round and not surpassing subgenital plate's apical end; subgenital plate lanceolate, begin projecting at sternite VIII, correspond on lateral outline of supraanal plate, apical end distinctly acute.

*Legs:* Forefemora almost as long as mesonotum, incurved at anterior half; foretibia slightly shorter than forefemora; probasitarsus almost one-eleventh of foretibia, t2 slightly shorter than probasitarsus; t3 slightly shorter than t2; t4 one-fourth of t3; t5 as long as probasitarsus and t2 combined; mesofemora shorter than forefemora, mesotibia shorter than mesofemora; metafemora longer than forefemora, metatibia slightly longer than metafemora; meso-meta-tarsomeres almost comparable to pro-tarsomeres.

Measurements: Total Length: 58.00; Head: 6.00; Prothorax: 4.20; Mesothorax: 11.70; Metathorax: 5.20; Median Segment: 3.10. Forelegs: Femur: 11.90; Tibia: 11.30. Midlegs: Femur: 9.60; Tibia: 8.80. Hind Legs: Femur: 13.10; Tibia: 13.20.

**Male:** Similar to female except: Body slenderer and shorter; body surface with granules but less dense; pronotum distinctly longer than wide, dorsal outline gradually converging posteriorly; four spines at mesonotum anterior margin remarkably prominent, median mesonotals tuberculate; dorsal outline of abdominal tergite II to V gently narrowing, tergite VI to VIII gradually widening but tergite IX to anal segment narrowing; anal segment apex retuse; poculum posteriorly projecting almost as length as anal segment, posterior half with median carina, apical margin with flange; forefemora slightly longer than mesonotum; probasitarsus almost one-tenth of foretibia.

Measurements: Total Length: 44.00; Head: 3.80; Prothorax: 3.00; Mesothorax: 9.40; Metathorax: 4.70; Median Segment: 2.20. Forelegs: Femur: 9.80; Tibia: 10.00. Midlegs: Femur: 8.10; Tibia: 7.70. Hind Legs: Femur: 11.50; Tibia: 10.40.



**Figure 1.** *Eubulides igorrote* Rehn & Rehn, 1939: Egg: (A) lateral; (B) dorsal; Female: (C) dorsal; (D) lateral; Male: (E) dorsal; (F) lateral.

**Egg:** Capsule bullet-shaped, longer than wide, sub-cylindrical to oval-shaped in cross-section, opercular angle incline downward from ventral side toward dorsal; surface generally punctuate; micropylar anterior margin arcuate, lateral impressions parallel-sided, posteriorly bifid producing two extension extending almost one-third length of micropylar, both extensions projecting posteriorly but not reaching polar region, apically round; micropylar cup distinct; median line distinctly running posteriorly and reaching posterior pole; operculum slightly raised on middle region, almost all middle region overlaid with hair-like forms.

Measurements: Length: 4.3-4.5; Height: 1.8-1.9; Width: 1.5-1.8.

*Eubulides taylori* Rehn & Rehn 1939  
(Fig.2)

*Eubulides taylori* Rehn & Rehn, 1939: 410 – 412, pl. 31 (figs. 1, 2, 10)

*Eubulides taylori* Otte, 1978: 79

*Eubulides taylori* Zompro, 2004: 209

*Eubulides taylori* Lit & Eusebio, 2008: 121

*Eubulides taylori* Baker, 2015: 3 & 5

**Material examined:** 4 males, 4 females: Quezon province, Polillo island: [UPLB-MNH-PHA-00438, female] Brgy. Tamulaya, Sitio Anibong April 2005, M.V.C. Yngente; [UPLB-MNH-PHA-00441, male, immature]

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Burdeos, Bulalon, 14°49.72'N, 121°57.90'E, 22-26 October 2003, O.L.Eusebio & I.L.Lit Jr; [UPLB-MNH-PHA-00439, female] Polillo Island, Burdeos, Bulalon, 23-26 October 2003, O.L.Eusebio & I.L.Lit Jr, with extracted ova; [UPLB-MNH-PHA-00470, female] Pinaglubayan watershed area, April 2010, O.L. Eusebio, with extracted ova; [UPLB-MNH-PHA-00464, male, immature] same latter locality, 7 April 2006, M.V.C. Yngente; [UPLB-MNH-PHA-00437 female] same latter locality, 9 November 2006, M.A.Capricho, with extracted ova; [UPLB-MNH-PHA-00468, male] Puting Bato, Burdeos, 12-15 June 2008, O.L. Eusebio; [UPLB-MNH-PHA-00440, male] Sibulan watershed, 23-27 April 2003, O.L.Eusebio & I.L.Lit Jr.

**Recorded specimens:** [Hebard Collection, Type no. 1251, female] Holotype, Philippines, Polillo Island, (undated) Taylor; [Hebard Collection, male] Allotype, same as latter data.

**Diagnosis:** This species can be differentiated from *E. alutaceus* by comparing the pronotal anterior margin armature with two pairs of anterior mesal at the state of distinct tuberculate, whereas *E. taylori* as well as *E. igorrote* and *E. manobo* **sp. n.** has their respective pronotal anterior margin armature reduced to tubercles to low rounded node. It differs from *E. igorrote* for bearing mesonotal margin armature with tuberculated to low round tubercles rather than spinous tubercles. *E. taylori* bears medial pronotals with low rounded tubercles differs to *E. manobo* for having a pair of prominent spines.

The egg micropylar outlines of *E. taylori* is different from *E. igorrote* and *E. manobo* considering that having extensions reaching at posterior pole and apices acute.

**Description:** Medium sized Obrimini, female relative longer and larger than male; yellowish brown to brown; body surface granulose.

**Female:** *Head:* longer than wide; eyes projecting hemispherical; antennae if bent backwards reaching median segment, averaging 27 antennomeres, scape longer than wide and dorso-ventrally compressed, pedicel and succeeding flagellomeres subcylindrical and progressively longer; vertex posterior marginal end with median and lateral coronals distinctly rounded spinoso-tuberculate.

*Pronotum:* longer than wide; shorter than

head; anterior margin with anterior mesal and another pair of tubercles forming low tubercles; antero lateral spinoso-tuberculate but posterior mesal bearing low rounded tubercles; posterior pronotals spinoso-tubercles.

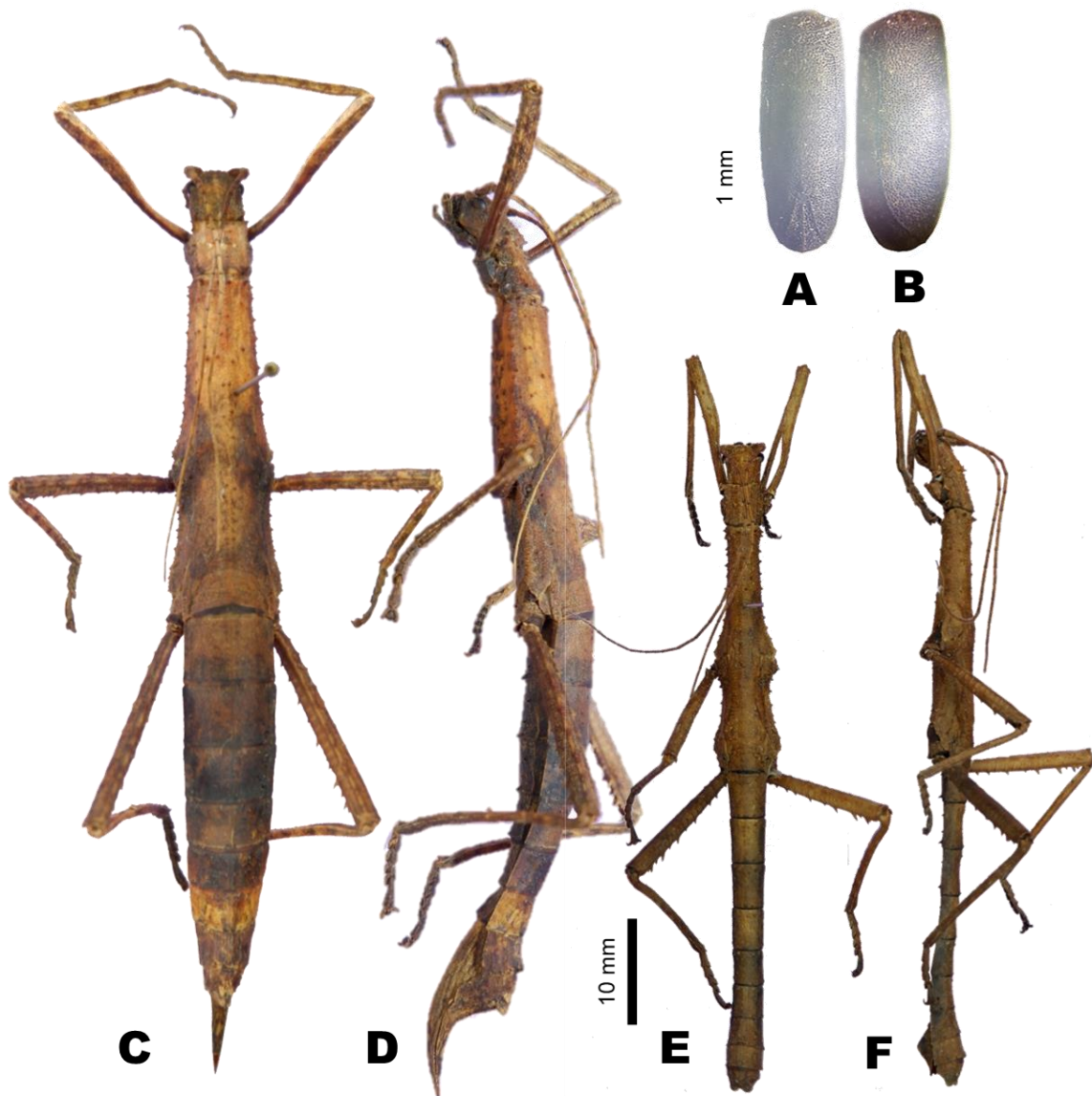
*Mesonotum:* Distinctly longer than wide; about three times longer than pronotum; dorsal lateral outline gradually diverging posteriorly; anterior mesal with one to two pairs of tubercles but more the lateral relatively prominent; median mesonotals low rounded tubercle; series of eight to ten paired low rounded tubercles slightly lateral of median line occupies approximately from anterior fifth to posterior fifth; laterals with series of tubercles.

*Metanotum:* Longer than wide; almost half of mesonotum; dorsal lateral outline slightly expanding posteriorly; lateral metanotals with series of tubercles.

*Abdomen:* Median segment wider than long, dorsally anterior margin nearly arcuate; dorsal outline tergite II onwards supraanal plate forming lanceolate; tergite VIII and IX lateral outline on median carina from anterior towards posterior marginal end apparently elevating, tergite IX median carina projecting beyond posterior marginal end; supraanal plate slightly longer than tergite IX and anal segment combined, lateral outline arcuately projecting posteriorly, apex emarginate to broadly round and not surpassing subgenital plate; subgenital plate lanceolate, projecting posteriorly more or less one-fourth longer than supraanal plate, lateral outline arcuately correspond on supraanal plate.

*Legs:* Forefemora slightly shorter than mesonotum, incurved at anterior half; foretibia shorter than forefemora; probasitarsus seven to eight times shorter than foretibia, t2 slightly shorter than probasitarsus; t3 slightly shorter than t2; t4 approximately one-fourth of t3; t5 as long as probasitarsus and t2 and t4 combined; mesofemora shorter than forefemora; mesotibia shorter than mesofemora; metafemora distinctly longer than forefemora, metatibia shorter than metafemora; meso-meta-tarsomeres more or less as pro-tarsomeres.

Measurements: Total length: 68.65–79.25; Head: 5.65–9.55; Prothorax: 5.50–5.15; Mesothorax: 13.90–15.65; Metathorax: 6.55–7.45; Median segment: 3.20–4.65; Forelegs: Femur: 12.40–13.50; Tibia: 10.80–11.50;



**Figure 2.** *Eubulides taylori* Rehn & Rehn, 1939: Egg: (A) lateral; (B) dorsal; Female: (C) dorsal; (D) lateral; Male: (E) dorsal; (F) lateral.

Midlegs: Femur: 11.15–11.40; Tibia: 9.45–9.55; Hindlegs: Femur: 15.50–16.50; Tibia: 13.20–13.35.

**Male:** Most of morphological characters are comparable to female except: Body slenderer and shorter; armature more pronounced; averaging 25 antennomeres; head almost as long or slightly longer than pronotum; dorsal outline from abdominal II to V almost parallel-sided, VI to anal segment gently expanding; tergite VIII and IX with medioposterior tubercle but IX projecting posteriorly; anal segment apex distinctly emarginate; poculum lateral outline navicular; median carina distinct; apical margin with flange.

Measurements: Total length: 55.75–57.40; Head: 4.10–4.95; Prothorax: 3.85–4.15; Mesothorax: 12.05–12.50; Metathorax: 6.40–7.55; Median segment: 3.00–3.15; Forelegs: Femur: 11.10–13.15; Tibia: 10.20–13.00; Midlegs: Femur: 9.60–11.00; Tibia: 8.10–10.00; Hindlegs: Femur: 12.70–13.95; Tibia: 11.10–13.80.

**Egg:** Bullet-form, longer than wide, dorsal and ventral aspect sub-parallel, cross-section sub-cylindrical to oval-shaped, opercular angle distinctly inclining downward from ventral side towards dorsal; surface generally punctate; micropylar boundary with impression, almost occupy dorsal area,

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anterior margin gently emarginate to weakly arcuate, both laterals border impression run parallel-sided from anterior but gradually sloping and diverging in direction towards latero-posterior, ending and reaching posterior pole, apices acute; micropylar cup distinct placed at posterior fourth, operculum weakly blunt conical form.

Measurements: Length: 4.70– 5.50; Height: 2.02 – 2.15; Width: 1.75– 1.85.

*Eubulides manobo* Acola, Naredo & Eusebio  
**sp.n.**  
(Fig. 3)

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**Material examined:** 4 males, 1 female. HOLOTYPE, female: Philippines: Mindanao Island, Mt. Mahuson, Apo Range, Sitio V, Brgy. Mahungkog, Magpet, North Cotabato. (accession no. CMU-MZ 51000). PARATYPES: males: Philippines: Mindanao Island, Mt. Mahuson, Apo Range, Sitio V, Brgy. Mahungkog, Magpet, North Cotabato (Accession no. CMU-MZ 51001, CMU-MZ 51002, CMU-MZ 51003, CMU-MZ 51004).

**Diagnosis:** *E. manobo* is readily distinguishable from other species of *Eubulides* by the presence of medioposterior tubercles at abdominal tergites, and the prominent pair of spines at medial pronotals.

Morphological character of egg capsule remains synapomorphic to genus *Eubulides* (longer than wide, laterals parallel-sided, resembling bullet form). Capsule shape manifests remarkable similarity to all congeners but comparably smaller from *E. taylori* and larger than *E. igorroto*. Micropylar laterals distinctly different from *E. igorroto* but close to *E. taylori* as lateral arms extensions along most of its length reaches posterior pole while *E. igorroto* lateral arms extensions ends at posterior third. In *E. taylori* micropylar lateral extension arms distinctly reaching posterior pole and extend its length to ventro-posterior of posterior pole while *E. manobo* lateral arms ends near posterior pole.

### **Description:**

**Female:** *Body:* Relatively smaller compared to other obrimini species, not expanded laterally, smooth to minutely tuberculate in the pronotum, mesonotum, metanotum and

abdominal segments. General colour dark brown.

*Head:* Longer than wide with prominent, yellow, rounded eyes, surface rugose; median and lateral coronals in the occiput spinoso-tuberculate; gulars indistinct; antennae with 28 antennomeres, longer than profemora, almost reaching the median segment.

*Pronotum:* Longer than wide, surface rugose, pair of distinct spinose median pronotals with smaller supplementary tubercles, transverse sulcus weak, mesal two pairs of smaller less distinct spinose tubercles on each side of the anterior and posterior pronotals, anterior half portion of medial pronotals with pair of prominent spinoso-tuberculate, lateral pronotals rugose; antero and postero-lateral pronotals spinoso-tuberculate, inter-posterior smooth to granulose; prosternum broadly transverse, with two inter-coxal raised sensory areas, general surface slightly rugose with few tubercles at the posterior.

*Mesonotum:* More than twice as the length of pronotum, surface smooth to minutely granulose; meso-pleura slightly expanded laterally at the posterior; antero-lateral mesonotals spinoso-tuberculate, antero-laterals and anterior mesal with pair of tubercles generally spinose-tuberculate but lower than medial pronotals; lateral mesonotals granulose with 4-6 spinose tubercles; distinct carina running vertically along the tergites of meso, metanotum and median segment; mesosternum rugose, with four pairs of spinoso-tuberculate meso-sternals; distinct carina run vertically along the meso and meta-sternum.

*Metanotum:* Twice longer than wide, slightly expanding posteriorly, surface smooth to minutely tuberculate; 2 pairs of spinoso-tuberculate posterior metanotals, less distinct than male; metapleura slightly expanding laterally, rugose with few minute tubercles; metasternum rugose with few minute tubercles.

*Abdomen:* Median segment rugose, with a postero-median tubercle; generally abdominal tergites smooth to rugose; segments II-V parallel-sided, tergites raised, arched; tergite II with a pair of medioposterior, spinose tubercle; tergites III–V with single medioposterior, spinose-tubercle, size of tubercle is reduced in segment V; segment VI–VII wider than long, tergites flattened; segments VIII–IX slightly narrowed posteriorly; median carina distinct with

medioposteriors; supraanal plate lanceolate, longer than tergite IX and anal segment combined, up-curving, apex rounded, shorter than subgenital plate; subgenital plate lanceolate, acute, up-curving, margins with minute hairs, slightly longer than supraanal plate.

*Legs:* Forefemora longer than mesonotum, slightly incurved basally, dorsal and median carina distinct, rugose, ventro-anterior carina with three distinct spines; foretibia slightly longer than forefemora, dorsal and ventral carina distinct, rugose with few minute tubercles. Probasitarsus less than one-twentieth of foretibia, longer than wide, t2-t4 shorter than t1, of equal sizes, t5 longer than t1, curved, with short erect hairs; mesofemora almost as long as forefemora, dorsal carina rugose to tuberculate, ventral carina with distinct spines, larger near the distal extremity; mesotibia shorter than mesofemora, dorsal carina weakly tuberculate, ventro-anterior carina with 4-5 small spinose tubercles; mesobasitarsus slightly longer than probasitarsus, longer than wide, t2-t4 shorter than t1, of equal sizes, t5 longer than t1, curved, with short erect hairs; metafemora longer than forefemora, dorsal and median carina tuberculate, ventral carina spinose, spines more distinct than in the pro- and mesofemora; metatibia longer than metafemora, dorsal and marginal carina weakly tuberculate, ventral carina with minute spines; metabasitarsus as long as probasitarsus, t2-t4 shorter than t1, of equal sizes, t5 twice as long as t1, slightly curved basally, with short erect hairs.

Measurements: Total Length: 60.00; Head: 6.00; Prothorax: 4.20; Mesothorax: 9.80; Metathorax: 4.80; Median Segment: 2.70; Forelegs: Femur: 10.10; Tibia: 10.85. Mid-Legs: Femur: 10.00; Tibia: 9.55. Hind Legs: Femur: 13.15; Tibia: 14.00.

**Male:** *Body:* Relatively small, not expanded laterally, smooth to minutely tuberculate in the pronotum, mesonotum, metanotum and abdominal segments. General colour dark brown, tips of tubercles and spines are yellowish.

*Head:* Longer than wide; eyes rounded, prominent; surface rugose, lateral and median coronals spinoso-tuberculate, gulars indistinct; antennae with 22 antennomeres, longer than profemora.

*Pronotum:* Longer than wide, surface rugose; antero-lateral and interposterior tuberculate; a pair of medial pronotals situated on anterior half, pronotal disk right after transverse sulcus, prominent spinoso-tuberculate, more anterior another pair of low rounded tubercles; posterior half with medial pronotals with low rounded tubercles; posterior pronotals supplemented with pair of tubercles situated more anteriorly; generally spinoso-tuberculate but these elements lower than anterior half medials.

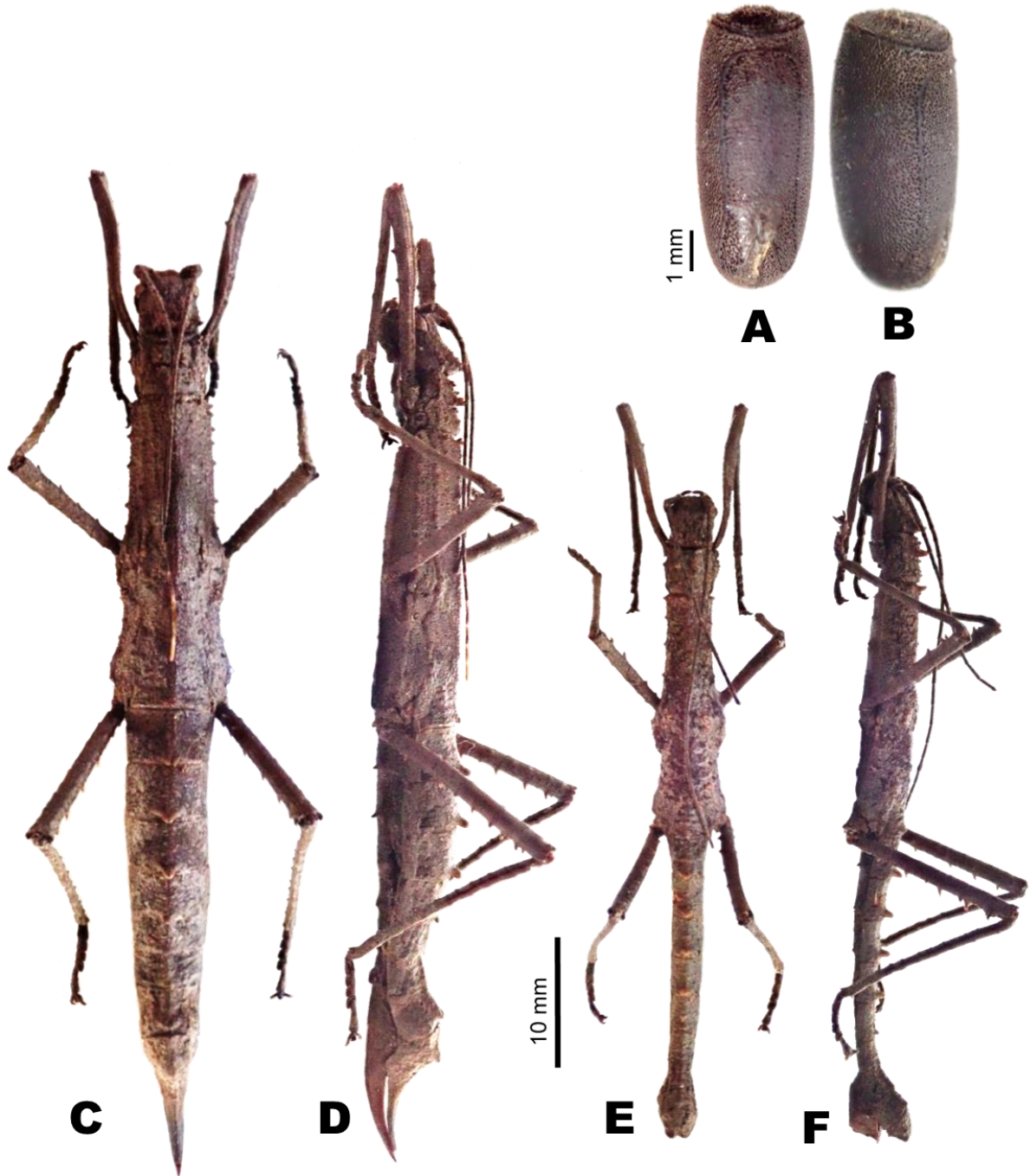
*Mesonotum:* Longer than wide, slightly expanding posteriorly; anterior margin with antero-laterals, anterior mesal and a pair tubercles situated in between both elements, generally spinose-tuberculate, 2 pairs of adjacent spinoso-tuberculate posterior mesonotals, three tuberculate median mesonotals, 4-6 spinoso-tuberculate lateral mesonotals present; distinct carina running vertically along the tergites of mesonotum, metanotum and median segment; mesosternum rugose, with four pairs of spinoso-tuberculate meso-sternals; distinct carina run vertically along the meso and meta-sternum.

*Metanotum:* Twice longer than wide, slightly expanding posteriorly; surface rugose; 2 pairs of spinoso-tuberculate posterior metanotals; metapleura slightly expanding laterally, rugose with few minute tubercles; metasternum rugose with few minute tubercles.

*Abdomen:* Median segment rugose, posterior mesal and first paired posteriors distinctly low rounded tubercles; abdominal tergites generally smooth to rugose, segments II-VI longer than broad, gradually narrowed distally; medioposterior spinose tubercles in tergites II-VI with 2 smaller supplementary tubercles present on each side, spinose-tubercles slightly strong in tergites II-IV and reduced in segments V-VI; pleural segment VII-IX slightly expanding laterally at posteriors with an indistinct carina running vertically along posteriors of segments VII-IX; abdominal sternites rugose with 2 pairs of visible spines in the anteriors and posteriors of each sternites of segments II-VI, sizes of spines decreasing distally; anal segment apex retuse; poculum up-curving, shorter than the anal segment, posterior half with median carina.

*Legs:* Forefemora longer than mesonotum, incurved basally, dorsal and median carina rugose to minutely tuberculate, ventro-anterior carina spinose; foretibia longer than





**Figure 3.** *Eubulides manobo* sp. n.: Egg: (A) lateral; (B) dorsal; Female: (C) dorsal; (D) lateral; Male: (E) dorsal; (F) lateral.

forefemora, rugose, carina indistinct, minute hairs present; probasitarsus almost one-eighteenth of foretibia, t2-t4 shorter than t1, of the same sizes, t5 longer than t1, slightly curved with minute hairs; mesofemora shorter than forefemora, dorsal and median carina rugose to tuberculate, ventral carina spinose; mesotibia shorter than mesofemora, rugose to tuberculate, carina indistinct; mesobasitarsus slightly longer than forebasitarsus, t2-t4

shorter than t1, of equal sizes, t5 longer than t1, with minute hairs; metafemora longer than forefemora, dorsal and median carina rugose to tuberculate, ventral carina with distinct spines; metatibia almost as long as metafemora, dorsal and median carina indistinct, rugose to tuberculate, ventral carina with minute spines; metabasitarsus as long as forebasitarsus, t2-t4 shorter than t1, of the same

sizes, t5 longer than t1, slightly curved with minute hairs.

Measurements: Total Length: 41.15; Head: 02.86; Prothorax: 02.30; Mesothorax: 07.56; Metathorax: 03.43; Median Segment: 01.60. Forelegs: Femur: 08.85; Tibia: 09.05. Mid-Legs: Femur: 07.95; Tibia: 06.65. Hind Legs: Femur: 10.05; Tibia: 10.01.

**Eggs:** Capsule typical *Eubulides*; surface generally punctuate; longer than wide, dorsal aspect almost parallel, ventral gently convex, dorsal view both laterals aspect sub-parallel; cross-section almost round to elliptical; opercular angle distinctly inclined from ventral side downwardly towards dorsal region; micropylar border with distinct fine impression, anterior portion weakly arcuate almost reaching opercular rim, both laterals border impressions continue towards posterior and gently narrowing until reaching posterior fourth of capsule, in line of micropylar cup both borders impression subsequently expanding posteriad, diverging and producing two branches extension, slanting posteriad terminates before posterior pole, apices round; micropylar cup small; median line distinctly extends posteriad and reaching posterior pole; operculum elliptical, practically flat surface, middle portion slightly raised forming ellipsoid mount and overlaid with short curly hair-like form.

Measurements: Length: 5.2-5.50; Height: 2.75-3.0; Width: 1.80-2.25.

#### Keys to species of genus *Eubulides*

##### Females

1. Medial pronotals with series of tubercles, III to V abdominal tergites without medioposteriors.....2
  - Medial pronotals with pair of prominent spines, III to V abdominal tergites with medioposteriors [Mindanao Island] .....*E. manobo* Acola, Naredo & Eusebio **sp. n.**
2. Pronotum anterior margin with paired anterior mesal, four large tubercles ..... *E. alutaceus* Stål 1877
  - Pronotum anterior margin with paired anterior mesal, two to four small tubercle.....3
3. Anterior mesal mesonotals spinous tubercles and sub-equal the lateral pair [Luzon Island].....*E. iggorote* Rehn & Rehn, 1939

- Anterior mesal mesonotals small tubercles and lateral pair larger [Polillo Island].....*E. taylori* Rehn & Rehn, 1939

##### Males

1. Pronotum anterior margin with paired anterior mesal, four large tubercles.....  
.....*E. alutaceus* Stål 1877
  - Pronotum anterior margin with paired anterior mesal, two to four small tubercles .....2
2. Mesonotum anterior margin with very small tubercles [Polillo Island]....*E. taylori* Rehn & Rehn, 1939
  - Mesonotum anterior margin with large prominent spinous tubercles..... 3
3. Abdominal tergites with medioposteriors [Mindanao Island].....*E. manobo* Acola, Naredo & Eusebio **sp. n.**
  - Abdominal tergites without medioposteriors [Luzon Island].....*E. iggorote* Rehn & Rehn, 1939

##### Discussion

The general body armature of genus *Eubulides* is simple having a flattened head, weakly armed to unarmed mesonotum and metanotum, unexpanded meso- and metapleura, presence of median specialization in the 7th - 9th tergite and up-curving ovipositor in females. Among the species under the Theramenes-group, genus *Eubulides* Stål, 1877 is closely related to *Theramenes*, Stål, 1875 by the strongly up-curving ovipositor but is distinguished by the unexpanded meso- and metapleura, absence of large median tubercle in meso- and metanotum of male and the presence of median specialization in the 7th-9th tergite (Hennemann *et al.*, 2016, Rehn & Rehn, 1939). The four described species among the genus *Eubulides* can be distinguished by the differences in the armature of its pronotum, mesonotum and abdominal segments (Table 1). In terms of pronotal morphology, all four species have two pairs of anterior mesal, tuberculate in *E. alutaceus* while low rounded tubercles for *E. iggorote*, *E. taylori* and *E. manobo* **sp. n.**. The medial pronotals of *E. alutaceus*, *E. taylori*, and *E. iggorote* lays bare series of tubercles while *E. manobo* **sp. n.** has a pair of prominent spines and small supplementary tubercles which is distinct for the species. *E. alutaceus* is distinct among the four species for having an unarmed mesonotal

## A new species of genus *Eubulides* Stal from Mt. Apo Range, Mindanao Island

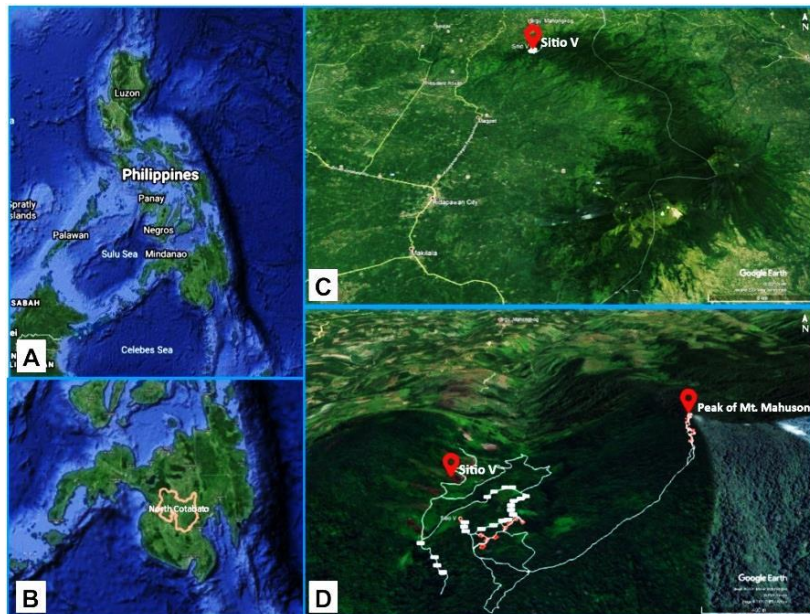
anterior margin in both male and female species (Stål, 1877), the rest of the species have two pairs of spinoso-tubercles in the anterior mesal. Abdominal segments of all species have median specializations in 7th-9th tergite while the presence of postero-median tubercles in the abdominal segments of *E. manobo* distinguishes this species from the rest of the *Eubulides* species.

The tribe Obrimini from Family Heteropterygidae: Obriminae is restricted to the Philippine Islands, Palawan and Northern Borneo, but the great majority of taxa is endemic to the Philippines (Conle, 2006). One member of the tribe is the genus *Eubulides* which is represented by three species (Hennemann *et al.*, 2016; Rehn & Rehn, 1939, Stål, 1877). The newly described species herein added the number of *Eubulides* species from the Philippines to four. Also, the new species is the first species of *Eubulides* to be described from Mindanao Island. *E. manobo* was collected from Mt. Mahuson which is one of the remaining unexplored ranges of Mt. Apo. Mt Apo is the Philippines highest peak and is known for its rich flora and fauna including some endemic stick insects such as the site endemic *Mearnsiana bullosa* Rehn & Rehn, 1939, and Mindanao endemic

*Spinophetes spinotergum* Zompro & Eusebio, 2000. The other two species of *Eubulides* was described from Luzon regions (Fig. 5). *E. iggorote* was described from Mt. Palali, Nueva Vizcaya and Mt. Banahaw de Tayabas, Quezon Province while *E. taylori* was described from Polillo Island (Hennemann *et al.*, 2016; Rehn & Rehn, 1939, Stål, 1877). Meanwhile, *E. alutaceus* has no exact locality described and has never been sighted since its last description by Stål in 1877.

**Etymology:** The specific epithet is named in honor of the Manobo tribe of Sitio V who are in the frontline in protecting the sacred forests of Mt. Mahuson as part of their ancestral domain.

**Distribution and Ecology:** Endemic to Mt. Mahuson, Apo Range, Sitio V, Magpet, North Cotabato. The species was collected in a lower montane forest, having *Saurauia* sp. as its host. Other associated trees include *Lithocarpus* sp. and *Shorea astylosa* Foxw. Ferns such as *Angiopteris evecta* (G.Forst.) Hoffm and *Sphaeropteris glauca* (Blume) R.M. Tryon are also abundant in the area where the specimen was collected.



**Figure 4.** A. Map of the Philippines; B. Location of North Cotabato Province in Mindanao, Philippines; C. Location of Sitio V; D. Location of Sitio V showing the peak of Mt. Mahuson.



**Figure 5.** Species distribution of *Eubulides* in Philippine Islands: **A.** *E. igorroto*, Mt. Palali, Nueva Vizcaya (upper) and Mt. Banahaw de Tayabas, Quezon Province (lower); **B.** *E. taylori*, Polillo Island, Quezon Province; **C.** *E. manobo* sp. n., Mt. Mahuson, North Cotabato Province.

**Table 1. Differential diagnosis of *Eubulides* species**

Characteristics	<i>E. alutaceus</i>	<i>E. igorroto</i>	<i>E. taylori</i>	<i>E. manobo</i> sp. n.
♀♂Pronotal anterior margin armature	Two pairs of anterior mesal tubercles	Two pairs of anterior mesal low rounded tubercles	Two pairs of anterior mesal low rounded tubercles	Two pairs of anterior mesal low rounded tubercles
♀♂Medial pronotals	Low rounded series of tubercles	Low rounded series of tubercles	Low rounded series of tubercles	Anterior half with a pair of prominent spines, posterior half small tubercles
♀Mesonotal anterior margin armature	Unarmed (Stål, 1877)	Anterior mesal with two pairs of spinoso-tuberculate	Anterior mesal with two pairs of tubercles, another smaller pair located laterad	Anterior mesal with two pairs of spinoso-tuberculate
♂Mesonotal anterior margin armature	Unarmed (Stål, 1877)	Anterior mesal with two pairs of spinoso-tuberculate	Anterior mesal with a pair of small tubercles, a larger pair located laterad	Anterior mesal with two pairs of spinoso-tuberculate
♀Abdominal terga II to V medioposteriors	Absent	Absent	Absent	Present
Egg capsule micropylar impression	Unknown	Not reaching posterior pole, apices round	Reaching posterior pole, apices acute	Not reaching posterior pole, apices round

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