

Research article

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Three new species of the genus *Leucopholis* Dejean, 1833 (Coleoptera, Scarabaeidae, Melolonthinae, Leucopholini) from the Philippines and designation of a neotype for *L. semperi* Brenske, 1896Orlando A. CALCETAS Department of Agriculture, IVA-CALABARZON, Regional Crop Protection Center (DA-RCPC)
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Abstract. Three species of *Leucopholis* Dejean, 1833 chafers from the Philippines are described and illustrated: *Leucopholis stainesi* sp. nov., *L. bezdeki* sp. nov. and *L. ratcliffei* sp. nov. A neotype is designated for *Leucopholis semperi* Brenske, 1896. A revised key to the species of *Leucopholis* in the Philippines is provided.

Keywords. Melolonthinae, *Leucopholis*, scarabs, new species, neotype.

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Introduction

The Philippine members of the genus *Leucopholis* Dejean, 1833 were recently reviewed by Calcetas & Adorada (2017). Five species were reported: *Leucopholis pulverulenta* Burmeister, 1855, *Leucopholis reflexa* Moser, 1924, *Leucopholis bakeri* Moser, 1924, *Leucopholis irrorata* Chevrolat, 1841 and *Leucopholis guevarai* Calcetas & Adorada, 2017. In the present contribution, three new species of *Leucopholis* from the Philippines are added, and *L. semperi* Brenske, 1896 is redescribed and its neotype is designated. *Leucopholis semperi* was not treated in the published review (Calcetas & Adorada 2017) since the authors thought of including it in a new genus.

Brenske (1896) described *Leucopholis semperi* from “Philippinen, Dugang” from the Oberthür’s collection and named it in honor of Carl Gottfried Semper (1832–1893) a German ethnologist and animal ecologist. René Oberthür (1852–1944) was a wealthy French businessman and entomologist specializing in Coleoptera, whose vast collection of five million specimens was deposited in the MNHN, Paris, France (Ball 1982).

Sharp (1876) described *Leucopholis pollens* from Borneo and later Brenske (1894) added records from the Philippines. His original publication and description have no specific locality, only Borneo.

Schultze (1916) examined and catalogued some collected specimens from Silanga (Palawan Island) and concluded that they are conspecific with Sharp's *L. pollens*. Unfortunately, the voucher specimen (17072) was originally deposited in the collection of the Bureau of Science in Manila, which was destroyed during World War II. However, no Philippine specimens of *L. pollens* were collected and examined from local museums even from the University of the Philippines Los Baños, Museum of Natural History (MNH), the largest insect repository in the country. I also made several collecting trips to Palawan and collected mostly large specimens of *Lepidiota munda* Sharp, 1876 and failed to collect specimens of *Leucopholis* with a large and extended metaventral process. Schultze's (1916) claim cannot be simply refuted since *Leucopholis pollens* and *Lepidiota munda* are distinct. Thus, at present the presence of this species from Palawan is still questionable.

The paper aims to describe three new species of *Leucopholis* and specifically to focus on the differential diagnosis of species and their geographic distribution. It also aims to redescribe and designate a neotype for *L. semperi*, type material of which seems to be lost.

Material and methods

Leucopholine specimens were collected in selected localities in the Philippines during the favourable months of the year particularly May and June when there are large swarms of adults. Adult forms were collected using an insect net, light traps and Malaise traps.

Specimens borrowed from various museums were thoroughly examined under a 6–60× magnification, using a 10× wide view eyepiece, or under 6–120× magnification, using a 20× eyepiece Wild Heerbrugg® Wild M5A microscope and an Olympus® SZ40 stereo zoom microscope. Characters were tabulated and summarized using character matrices. Body length was measured from the tip of the clypeus to pygidium and body width was measured on each side at the broadest part of the lateral margin of the elytra. Metaventral process was measured from the anterior tip down to its base (mesal part). Antennal lamellae length was measured from the longest segment, usually lamella II or the middle segment. However, the clypeal angle was measured on the lateral side of the plane of the head. Male genitalia were extracted by soaking the detached abdomen of the specimens in a hot water bath for approximately five minutes. Afterwards, the genitalia were extracted using a forceps, cleaned of any unwanted material, dried, and the base of the phallobase was pasted on the card point tip (upward position) using insect glue or clear nail polish.

Colour images of habitus, metaventral process, and male genitalia were taken using a Nikon®-D7100 DSLR (24.2 megapixels) digital camera equipped with a Nikon Micro 40 mm 1:2.8G lens and mounted on an old microscope arm-track stand. However, insect genitalia specimens were photographed on a Wild Heerbrugg® Wild M5A microscope equipped with an improvised plastic camera adapter. The camera was connected to a Mac® computer and remotely controlled with a mouse using Helicon Remote® software. Time-lapse photography was performed at predetermined intervals while manually adjusting the coarse focus knob of the microscope. This was done to speed up the process and avoid unnecessary movement when pressing the camera's shutter button. Lighting was provided by several units of light emitting diode (LED) ring lights and LED bulbs mounted on a movable study lamp and covered with a Pixco® camera flash diffuser for maximum lighting.

Afterwards, digital photographs were combined using Helicon Remote® and Helicon Focus® stacking software, digitally enhanced and cleaned of any unwanted blemishes using Adobe Photoshop Elements 2020® software and stored in a TIFF format on an Apple/Mac® computer and other backup hard drives.

Digital photos of the various type specimens, along with their corresponding labels, from European museums were also requested and cropped using Adobe Photoshop Elements 2020® software.

Specimens of *Leucopholis* used for the taxonomic study were collected all over the Philippines including specimens sent on loan from several museums and personal collections.

Repositories

- MNHN = Muséum national d'histoire naturelle, Paris, France
PNM = National Museum, Manila, Philippines
UNSM = University of Nebraska State Museum, Lincoln, Nebraska, USA
ZMHB = Museum für Naturkunde, Leibniz-Gemeinschaft, Berlin, Germany

Results

Taxonomy

Class Insecta Linnaeus, 1758
Order Coleoptera Linnaeus, 1758
Family Scarabaeidae Latreille, 1802
Subfamily Melolonthinae Leach, 1819
Tribe Leucopholini Burmeister, 1855
Genus *Leucopholis* Dejean, 1833

Leucopholis stainesi sp. nov.

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Figs 1–6

Differential diagnosis

The new species can be distinguished from all other Philippine *Leucopholis* by the metaventral process that has a subapical constriction and is lanceolate subapically while in *L. bezdeki* sp. nov., *L. semperi* and *L. ratcliffei* sp. nov. it is elongate and nearly parallel-sided and without constriction subapically (Figs 2, 7, 18). The abdominal ventrites are covered mostly with elongate ovoid scales in *L. stainesi* sp. nov. while it is covered mostly with short ovoid scales in all other Philippine *Leucopholis* with the metaventral process extending in front of the prosternal process. The paramere posterior margin is bisinuate and bowl-shaped in *L. stainesi* and *L. semperi*, but it is nearly straight medially in *L. stainesi* while it is slightly concave medially in *L. semperi*. The paramere posterior margin is sinuate, bowl-shaped and slightly concave medially in *L. bezdeki* while it is concave medially and bisinuate in *L. ratcliffei*.

Etymology

This new species is named after Dr Charles Staines, world expert on hispinids at the Smithsonian Environmental Research Center, Edgewater, Maryland, USA.

Material examined

Holotype

PHILIPPINES • ♂; South Cotabato, Tiboli, Salacapa, Mt. Parker; Apr. 1993; V. Samarita leg.; PNM.

Type locality

Philippines (Mindanao, South Cotabato).

Description

BODY LENGTH. 35.0 mm.

BODY WIDTH. 17.0 mm.

COLOUR. Dorsum dichromatic, head, pronotum, scutellum, elytra and legs blackish; with brownish tinge on posterior margin of elytra; body covered with yellowish white scales. Venter dichromatic blackish with little shade of brown (Fig. 1).

HEAD. Clypeus with medial anterior margin nearly straight anteriorly; slightly cleft, slanted at 60° angle laterally; anterior surface lustrous, glabrous, impunctate subanteriorly; above clypeo-labral suture rugose medially; with row of large, rounded to rugose punctures adjacent to posterior margin; each puncture with

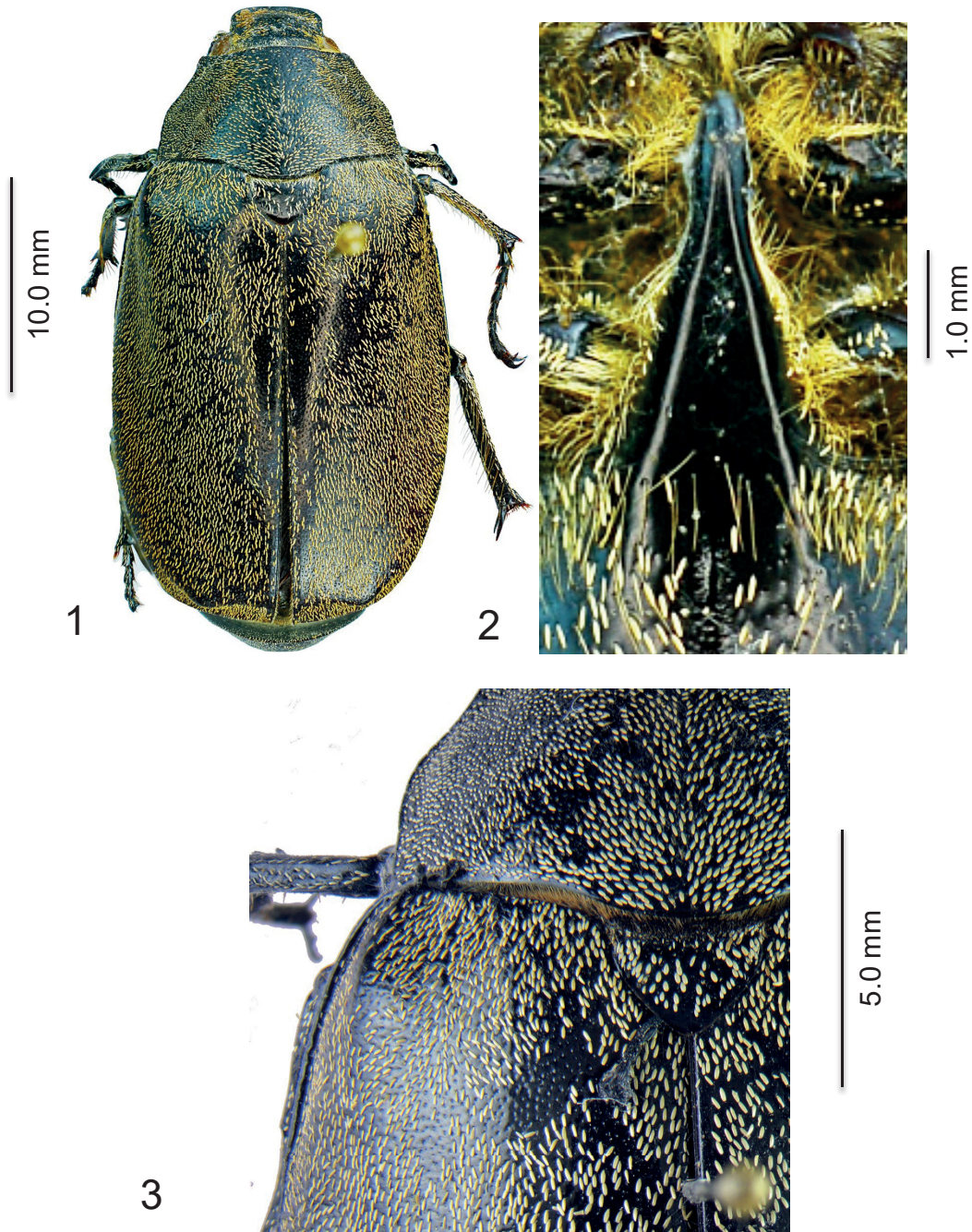


Fig. 1–3. *Leucopholis stainesi* sp. nov., holotype, ♂ (PNM). 1. Habitus, dorsal aspect. 2. Metaventral process, dorsal aspect. 3. Elytron, anterior margin and anterior angle.

stiff brownish hair or seta; anterior and lateral margins widely carinate dorsally; with slight medial cleft laterally; anterior angle widely rounded laterally; dorsal surface covered with short, narrow, elongate, parallel-sided, acicular-like, tapered, blunt apically yellowish white scales; scales slightly bent downward. Apical maxillary palpomere rice grain-like, with oval flattened area. Mentum pot-shaped, lustrous, glabrous; with very few hair brushes on each side of medial cleft subanteriorly; with nearly flattened surface medially. Antennal lamellae length 3.2 mm, longer than entire length of antennomeres II–VII.

PRONOTUM. Anterior margin moderately concave, distinctly long nearly straight margin medially; anterior angle obtuse; without lustrous, glabrous, impunctate callosity subapically; rounded, carinate apically; lateral margin widely convex medially; anterolateral margin at $\sim 45^\circ$ angle, crenulate; posterolateral margin distinctly wedge-shaped, slightly crenulate; posterior angle at 90° angle, strongly sinuate, rounded

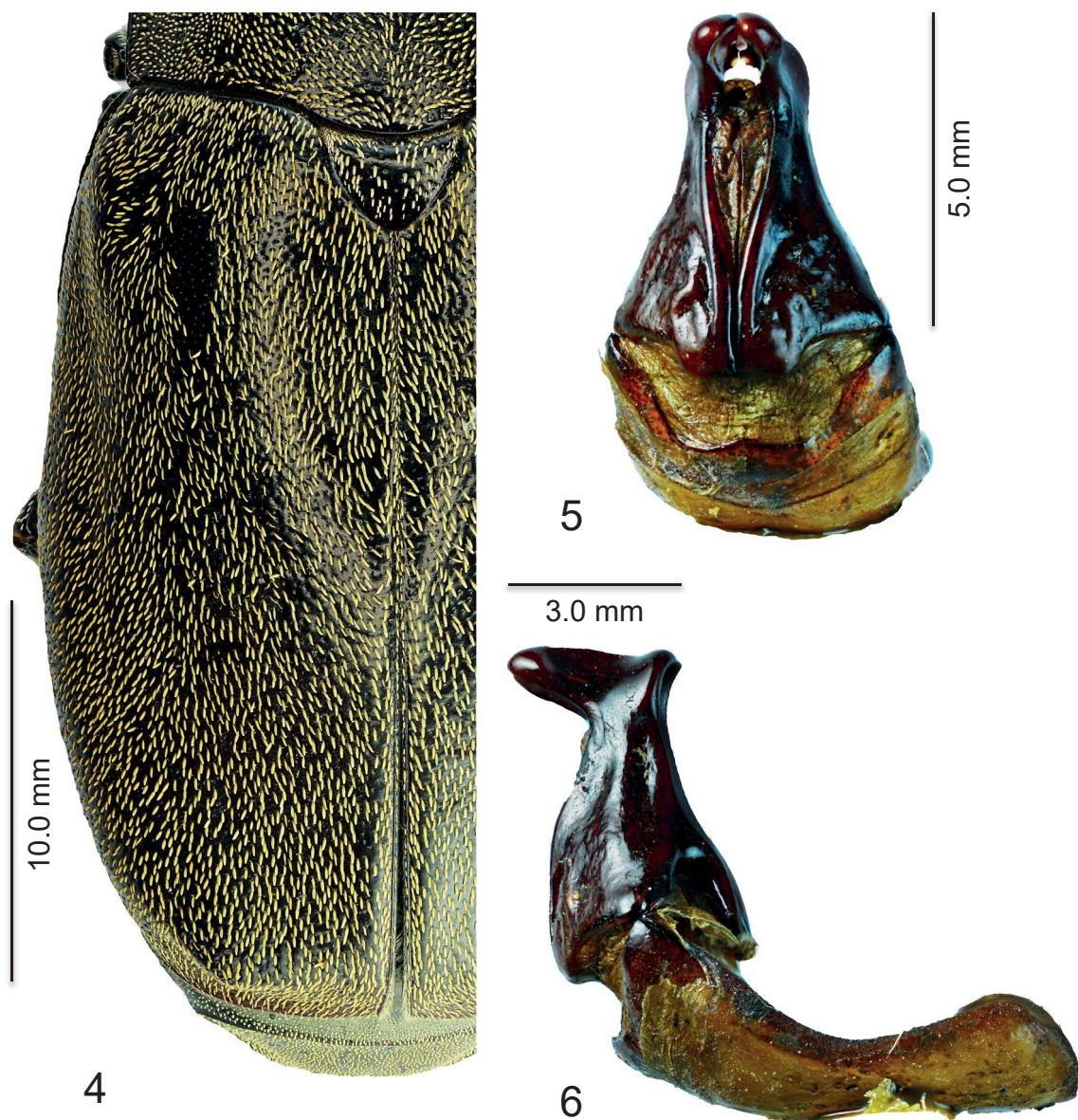


Fig. 4–6. *Leucopholis stainesi* sp. nov., holotype, ♂ (PNM). 4. Elytron, dorsal aspect. 5. Male genitalia, dorsal aspect. 6. Male genitalia, lateral aspect.

apically; posterior margin bisinuate; with deep, rounded margin medially; margin distinctly extended posteriorly; surface covered with variable scales; covered mostly with short, narrow, spindle-shaped, tapered to blunt apically scales medio-subanteriorly; with elongate, very narrow, nearly parallel-sided spindle-shaped, tapered apically scales medio-subposteriorly; with short, narrow, lanceolate, tapered apically scales submedially; with short, ovoid, rounded apex scales on each side adjacent to lateral margin.

VENTRAL SIDE OF THORAX. Prosternal process mound-shaped to nearly isosceles triangulate, widely rounded apically; with flattened, lustrous, impunctate area dorsally (Fig. 2). Metaventral process length 5.0 mm; distinctly wide, triangulate basally; elongate apically; constricted subapically; sublateral margin lanceolate; narrow rounded apically; lustrous, glabrous, impunctate dorsally; with straight, narrow, faint, longitudinal dark line medially; faint line much distinct in metasternum (Fig. 2). Metasternum with medial depression; depression on each side of metaventral process covered with very thin, acicular-like white scales; metasternum covered mostly with short, spindle-shaped, apically blunt scales.

LEG. Foretibia bidentate, widely rounded apex; posterior metatibia with 20 spicules.

SCUTELLUM. Covered with large, moderate, spindle-shaped to ovoid whitish scales; with elongate, parallel-sided acicular whitish scales; lustrous, impunctate medially, with very few rounded punctures on each side.

ELYTRON. Anterior margin distinctly wedge-shaped towards scutellum; anterior angle widely rounded; thickly carinate, explanate (Fig. 3); with narrow suture towards anterior angle; margin evanescent medially; posterolateral margin vertically flattened towards posterior angle; posterior angle obtuse, widely rounded, minutely explanate; with thin crust-like margin; posterior margin smooth, slightly sinuate towards sutural angle; sutural angle approximately at 90° angle; sutural margin medially and towards sutural angle; distinctly carinate towards scutellum, inflexed, not carinate (Fig. 4); each side near sutural angle covered with short, fringed hairs; surface mostly covered with variable sized inverted lanceolate, tapered apically, bent medially yellowish white scales.

ABDOMEN. Abdominal sternites I–V covered with short, inverted lanceolate, tapered basally, rounded apically scales; sternites III and IV each with small patch of scales medially; patch of scales on sternite III much closer compared to IV; with very few elongated, narrow, parallel-sided scales; scales larger mesally compared to each side; sternite VI with minute to small scales.

PYGIDIUM. Anterolateral margin thickly carinate towards anterior angle; disappearing medially; with narrow explanate margin medially, much distinct and wide towards posterior margin; posterior margin widely rounded, narrowly explanate, depressed medially; convex laterally; subposterior margin sloping downward laterally; surface rugosely punctured; covered with short, narrow, minute to small spindle-shaped to parallel-sided scales.

MALE GENITALIA. Genitalia length 9.8 mm. Phallobase with dorsal apical margin wide, bowl-shaped, distinctly convex medially (Fig. 5). Parameres with dorsal basal margin bowl-shaped, slightly convex medially. Apical process length 2.8 mm, distinctly shorter than phallobase; dog head-like, short, triangulate towards apex, rounded apically; with deep, wide, horse saddle-shaped depression medially; basal margin widely explanate. Lateral margin of paramere with very shallow longitudinal depression on each side (Fig. 6).

Distribution

Philippines (Mindanao).

Leucopholis bezdeki sp. nov.

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Figs 7–10

Differential diagnosis

The new species can be distinguished from all other Philippine *Leucopholis* by the paramere with the apical process bird bill-like, distinctly shorter than the phallobase, tapering towards the apex and narrowly rounded apically. The pronotum has the posterior angle obtuse, rounded apically and slightly sinuate in *L. bezdeki* sp. nov. while it is either nearly or slightly above 90° angle and distinctly sinuate in the other six species of Philippine *Leucopholis* with the metaventral process extending in front of the prosternal process. The posterolateral margin of the elytron near the posterior angle is distinctly inflexed in *L. bezdeki* and *L. ratcliffei* sp. nov. while it is vertically flattened laterally in *L. stainesi* sp. nov. and *L. semperi*.

Etymology

This new species is named after Dr Aleš Bezděk (Biology Centre CAS, České Budějovice, Czech Republic), a specialist on Asian melolonthines.

Material examined

Holotype

PHILIPPINES • ♂; Zamboanga City, Watershed Camp-II; Jun. 1993; V. Samarita leg.; PNM.

Paratypes

PHILIPPINES • 3 ♀♀; Zamboanga City, Watershed Camp-II; Jun. 1993; V. Samarita leg.; PNM.

Type locality

Philippines (Mindanao, Zamboanga City).

Description

BODY LENGTH. 38.2 mm.

BODY WIDTH. 19.1 mm.

COLOUR. Dorsum and venter monochromatic black; covered with yellowish white scales (Fig. 7).

HEAD. Clypeus with medial anterior margin nearly straight anteriorly; moderately cleft laterally, slanted at 60° angle; above clypeo-labral suture with row of large, rounded to rugose punctures adjacent to posterior margin; each puncture with stiff brownish hair or seta; surface directly above clypeo-labral suture lustrous, glabrous; anterior and lateral margins carinate dorsally, distinctly concave medially; anterior angle widely rounded dorsally; dorsal surface covered with short or long, narrow, elongate, nearly parallel-sided, rounded, apically scales; scales slightly bent downward. Apical maxillary palpomere rice grain-like with spindle-shaped flattened area. Mentum pot-shaped, lustrous, glabrous; with nearly flattened surface; with very few hair brushes on each side of medial cleft subanteriorly. Antennal lamellae length 2.9 mm, distinctly longer than entire length of antennomeres II–VII.

PRONOTUM. Anterior margin widely concave; with short, nearly straight margin medially; anterior angle obtuse, lustrous, glabrous, triangulate, impunctate subapically; with rounded callosity apically; anterolateral margin wedge-shaped at 45° angle, crenulate; medial margin widely rounded, crenulate; posterolateral margin slightly wedge-shaped, smooth; posterior angle distinctly obtuse; slightly sinuate, rounded, apically; above it with small glabrous, impunctate callosity; posterior margin evenly wedge-shaped downward on each side; widely concave, medial margin slightly extended posteriorly; surface

with very narrow impunctate longitudinal medial callosity, disappearing subanteriorly and subposteriorly; surface covered with variable scales; covered mostly with elongate, ovoid, medially stout, rounded apically scales medio-subanteriorly; covered mostly with elongate, spindle-shaped, rounded apically scales medio-subposteriorly; covered mostly with elongate, nearly parallel-sided, inverted-lanceolate, rounded apically scales submedially; covered mostly with elongate, inverted lanceolate, widely rounded apically scales adjacent to lateral margin.

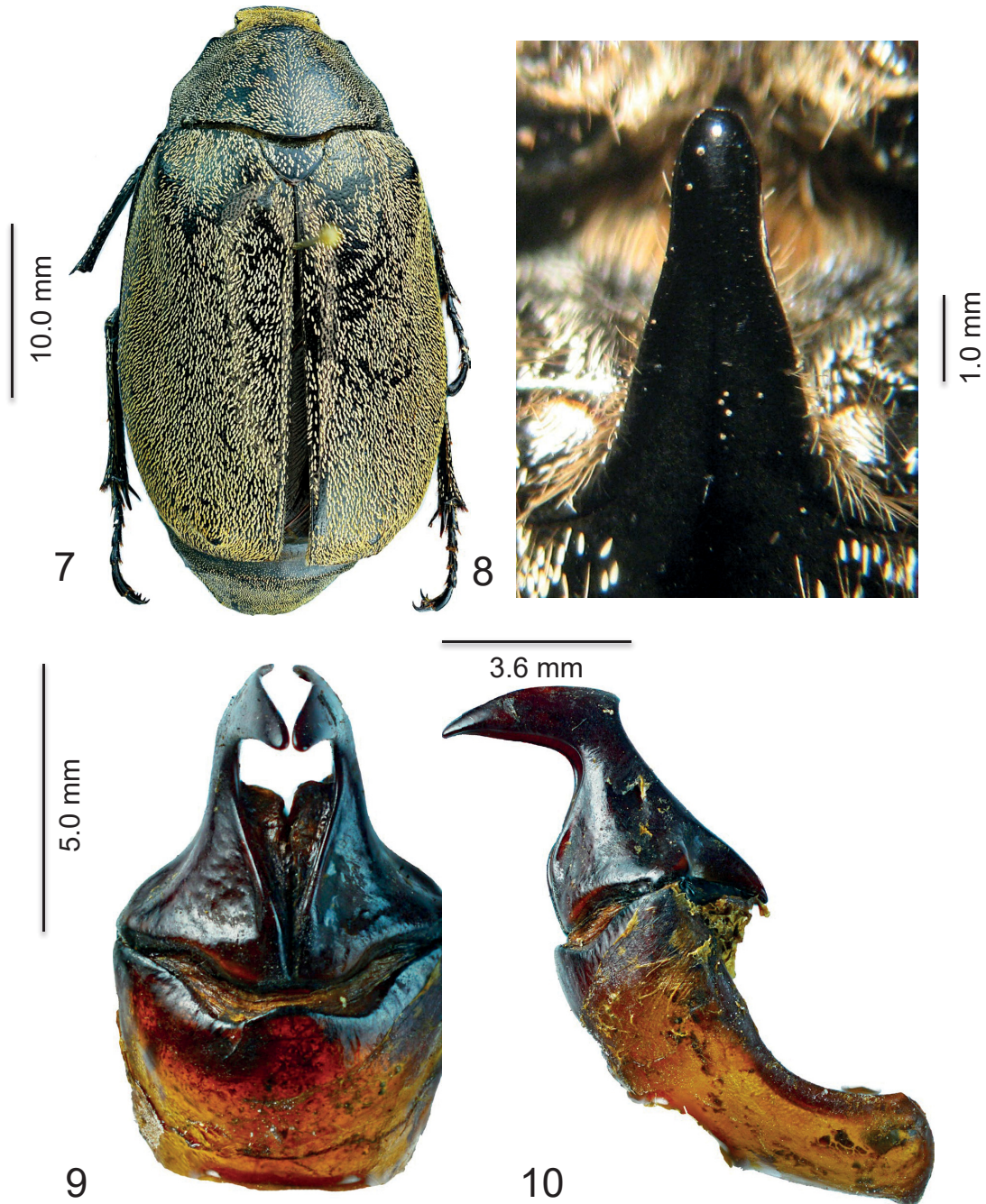


Fig. 7–10. *Leucopholis bezdeki* sp. nov., holotype, ♂ (PNM). 7. Habitus, dorsal aspect. 8. Metaventral process, dorsal aspect. 9. Male genitalia, dorsal aspect. 10. Male genitalia, lateral aspect.

VENTRAL SIDE OF THORAX. Prosternal process mound-shaped to nearly isosceles triangulate; wedge-shaped subapically; widely rounded apically; with flattened impunctate area medially and apically; with very few scales and hairy on each side and posteriorly. Metaventral process length 4.6 mm; distinctly wide, triangulate basally, elongate towards apex; not constricted subapically; subapical lateral margin distinctly long, nearly parallel-sided; moderately rounded apically; lustrous, glabrous, impunctate dorsally; each side covered with scales of variable shapes and sizes along each depression; with very narrow, faint, longitudinal dark line dividing metaventral process and metasternum medially; faint line much distinct in metasternum (Fig. 8). Metasternum with shallow medial depression, covered mostly with short, inverted lanceolate scales.

LEG. Foretibia bidentate; with narrow rounded apex; posterior metatibia with 22–24 spicules.

SCUTELLUM. Covered with large and small, elongate, inverted lanceolate, ovoid, nearly parallel-sided scales; lustrous, impunctate, without scales around posterior margin.

ELYTRON. Anterior margin distinctly wedge-shaped towards scutellum; anterior angle widely rounded; thickly carinate, explanate; with narrow suture towards anterior angle; margin evanescent medially; posterolateral margin distinctly inflexed towards posterior angle; posterior angle obtuse, widely rounded; posterior margin weakly explanate, not carinate; wedge-shaped laterally; sutural angle widely obtuse; sutural margin towards sutural angle and scutellum distinctly carinate, covered with minute fringed hairs; surface covered mostly with short, inverted lanceolate, rounded to truncate apically scales.

ABDOMEN. Abdominal sternites I–IV covered with short, ovoid lanceolate, widely rounded basally, rounded apically scales; abdominal sternite V covered mostly with elongate lanceolate to elongate ovoid scales.

PYGIDIUM. Anterolateral margin thickly carinate towards anterior angle; disappearing medially; with narrow explanate margin medially, very distinct and wide towards posterior margin; posterior margin slightly concave, narrowly explanate, distinctly depressed medially; convex laterally; subposterior margin vertically flattened laterally; surface covered mostly with minute, elongate ovoid, parallel-sided scales.

MALE GENITALIA. Genitalia 14.9 mm long. Phallobase dorsal apical margin bisinuate, W-shaped, moderately convex medially, distinctly concave on each side and slightly convex towards lateral margin (Fig. 9). Paramere dorsal basal margin bowl-shaped, widely concave medially; distinctly extended posteriorly; each side sinuate. Apical process length 3.6 mm, distinctly shorter than phallobase; distinctly elongate, bird bill-like, tapered towards apex; rounded apically; anterior posterior margin widely rounded. Lateral margin of paramere with wide, shallow longitudinal depression on each side (Fig. 10).

FEMALE. Length 41.0–42.0 mm, width 19.8–20.5 mm. Clypeal anterior margin strongly convex medially, anterior angle widely rounded dorsally; medial cleft slanted at 60° angle laterally. Lamellae length 2.3–2.5 mm, nearly as long as entire length of antennomeres II–VII. Metaventral process length 4.5–4.8 mm. Posterior metatibiae with 26–34 spicules.

Distribution

Philippines (Mindanao).

***Leucopholis semperi* Brenske, 1896** Figs 11–16

Leucopholus [sic!] *Semperi* Brenske, 1896: 194 (incorrect original spelling).

Leucopholis semperi – Dalla Torre 1912: 178 (catalogue). — Schultze 1916: 179 (catalogue).

Differential diagnosis

The metaventral process is barely or not constricted subapically. The pronotum has the medio-subanterior portion with very few to no scales (easily detached) and is mostly covered with ovoid scales. The elytron is covered mostly with narrow spindle-shaped to lanceolate scales. The species can be distinguished from all other species of *Leucopholis* in the Philippines by the paramere with the apical process being bird bill-like and rounded apically. Both *L. semperi* and *L. stainesi* sp. nov. have a shorter apical processes and distinctly shorter phallobase while they are long and spatulate apically in *L. ratcliffei* sp. nov., and long and tapered apically in *L. bezdeki* sp. nov. The depression on each side of the lateral margin of the paramere is shallow and with a rugose surface in *L. semperi*, *L. bezdeki*, *L. ratcliffei* and *L. stainesi* or with a distinct deep depression in *L. ratcliffei* and *L. stainesi*. The metaventral process is also extended in front of the prosternal process in all four above mentioned species while it is slightly extended in all other species of Philippine *Leucopholis*. The abdominal scales of *L. semperi* are short ovoid and with longitudinal furrows while these furrows are absent in *L. bezdeki*, *L. ratcliffei* and *L. stainesi*. The posterolateral margin of the elytron of *L. semperi* and *L. stainesi* are vertically flattened laterally.

Material examined

Neotype (here designated)

PHILIPPINES • ♂; “Surigao, Mindanao, Baker”; “*Leucopholis semperi* Brenske”; “NEOTYPE ♂, *Leucopholis semperi* Brenske, des. O.A. Calcetas, 2022”; MNHN-16275.

Additional material

PHILIPPINES • 2 ♀♀; Philippinen, Leyte, Burauen; 16 Apr. 1915; S. Antln leg.; ZMHB • 1 ♀; same collection data as for preceding; 20 Apr. 1915; ZMHB.

Type locality

Philippines: Surigao

Redescription of the neotype

BODY LENGTH. 36.0 mm.

BODY WIDTH. 17.0 mm.

COLOUR. Dorsum monochromatic blackish. Head, pronotum, scutellum, elytra, legs, blackish; covered with yellowish white scales (Fig. 11). Venter blackish, covered with whitish scales (Fig. 12).

HEAD. Clypeus with medial anterior margin nearly straight anteriorly; slightly cleft, slanted at 60° angle laterally; anterior surface uneven, lustrous, impunctate subanteriorly; above clypeo-labral suture with row of moderate-sized, rounded to rugose punctures adjacent to posterior margin; each puncture with stiff brownish hair or seta; anterior and lateral margins carinate dorsally, slightly concave medially; anterior angle widely rounded; dorsal surface covered with short or long, elongate, lanceolate, rounded to tapered apically scales. Apical maxillary palpomere rice grain-like, with spindle-shaped to oval flattened area. Mentum pot-shaped, lustrous, glabrous; with very few hairbrushes on each side of medial cleft subanteriorly; with slightly sunken surface on each four corners. Antennal lamellae length 3.2 mm, distinctly longer than entire length of antennomeres II–VII.

PRONOTUM. Anterior margin evenly, widely concave, nearly straight medially; anterior angle obtuse, with lustrous, glabrous, impunctate callosity subapically; rounded apically; lateral margin widely convex; anterolateral at 45° angle, crenulate; medial margin crenulate; posterolateral margin wedge-shaped, slightly crenulate; posterior angle at 90° angle, strongly sinuate, rounded apically; posterior margin widely concave, deeply rounded medially, distinctly extended posteriorly; surface covered with variable

scales; covered mostly with short, ovoid, elongate, rounded apically scales medio-subanteriorly; covered mostly with elongate, spindle-shaped, tapered apically scales medio-subposteriorly; covered mostly with elongate, lanceolate, tapered apically scales submedially; covered mostly with short, ovoid, stout medially, rounded apically scales adjacent to lateral margin.

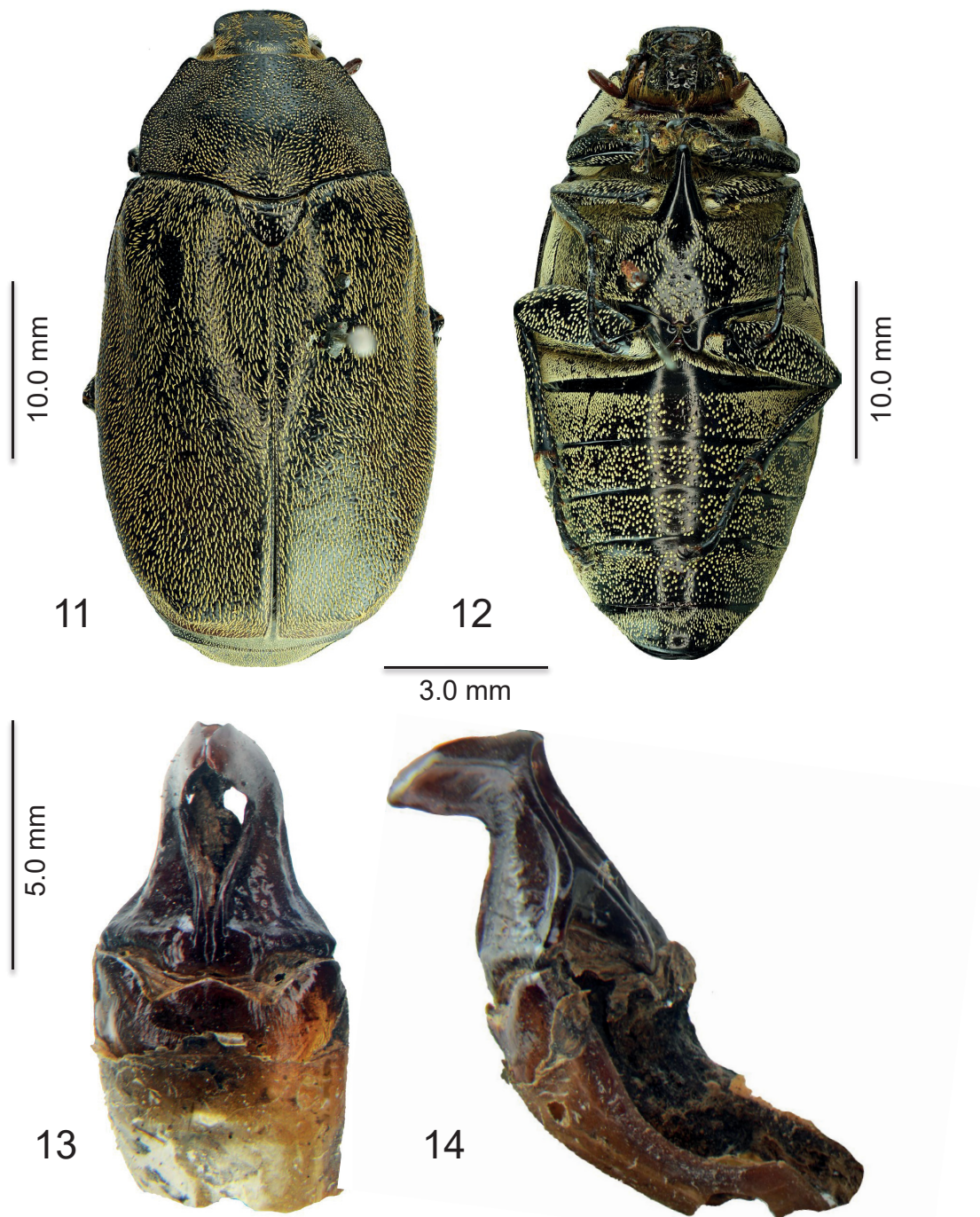


Fig. 11–14. *Leucopholis semperi* Brenske, 1896, neotype, ♂ (MNHN). **11.** Habitus, dorsal aspect. **12.** Metaventral process, dorsal aspect. **13.** Male genitalia, dorsal aspect. **14.** Male genitalia, lateral aspect.

VENTRAL SIDE OF THORAX. Prosternal process short, nearly isosceles triangulate; widely rounded apically; with flattened impunctate area medially and apically; covered with very few hairs or seta, with very few elongate, thin, narrow, parallel-sided, tapered apically scales. Metaventral process length 4.8 mm; distinctly wide, triangulate basally, elongate towards apex; not constricted subapically; subapical lateral margin



15



16

Fig. 15–16. *Leucopholis semperi* Brenske, 1896. 15. Neotype, ♂ (MNHN), metaventral process, dorsal aspect. 16. Nontypes, ♀♀, dorsal aspect (photograph of Brenske’s non-type series from ZMHB courtesy of Dr Joachim Willers).

distinctly long, nearly parallel-sided; widely rounded apically; surface lustrous, glabrous, impunctate dorsally; with faint, longitudinal thin dark line medially; dark line much distinct in metasternum; each side and ventrally covered with scales of variable shapes and sizes; covered with very long stiff hairs (Fig. 15). Metasternum with medial depression, covered mostly with elongate, ovoid, stout medially, tapered apically scales.

LEG. Foretibia bidentate, widely rounded apically; posterior metatibia with 22 spicules.

SCUTELLUM. Covered with small, moderate-sized to long, elongate, ovoid, slightly stout medially, rounded apically scales; lustrous, impunctate, without scales medially and around posterior margin.

ELYTRON. Anterior margin slightly wedge-shaped; anterior angle widely rounded; thickly carinate, explanate; with narrow suture towards anterior angle; margin, evanescent medially; posterolateral margin vertically flattened towards posterior angle; posterior angle obtuse, widely rounded, moderately explanate, evanescent towards sutural angle; posterior margin smooth, slightly concave towards sutural angle; sutural angle slightly obtuse; sutural margin medially and towards sutural angle distinctly carinate, towards scutellum inflexed, not carinate; surface mostly covered with elongate, narrow, spindle-shaped to lanceolate, tapered to round, bent apically scales.

ABDOMEN. Abdominal sternites I–V covered mostly with short, ovoid, inverted-lanceolate, tapered basally, widely rounded to truncate apically scales; scales with distinct longitudinal grooves or furrows starting basally and terminating medially; sternite VI covered with variable shapes and sizes scales.

PYGIDIUM. Anterolateral margin thickly carinate towards anterior angle, disappearing medially; posterolateral margin widely explanate medially towards posterior margin; posterior margin slightly concave, narrowly explanate, depressed medially; subposterior margin sloping downward laterally; surface covered mostly with large, elongate spindle-shaped, stout medially scales.

MALE GENITALIA. Genitalia length 12.8 mm; phallobase with dorsal anterior margin W-shaped, moderately convex medially (Fig. 13). Paramere with dorsal basal margin bisinuate, bowl-shaped, slightly concave medially. Apical process length 3.0 mm, distinctly shorter than phallobase; bird bill-like, with widely rounded apex; apical margin bisinuate; posterior margin slightly extended, rounded apically. Lateral margin of paramere with wide, shallow, rugose surface longitudinal depression on each side (Fig. 14).

FEMALE. Anterior margin of clypeus slightly slanted medially at 45° angle laterally. Antennal lamellae nearly as long as antennomeres II–VII. Posterior metatibiae with 24–32 spicules.

Distribution

Philippines (Visayas, Mindanao).

Remarks

Brenske (1896) described *L. semperi* probably from a single male specimen from: “Philippinen, Dugang (Semper, 4.-10. Juli 1864)”. However, there is no place in the Philippines with the name ‘Dugang’, it is a Waray word for ‘additional’, probably it is a case of miscommunication about the locale during that time. Moreover, it is highly probable that the type locality of the specimen is in the Visayas region particularly, in the Leyte area since Waray is the local dialect of the people.

According to primary description, the type series was deposited in the collection of René Oberthür. During and after the Covid-19 pandemic of 2020–2021 several request attempts were made to MNHN for the whereabouts of the type material of *L. semperi*, but curators at MNHN did not find it. No type specimen was found in the collection of Ernst Brenske (now housed at ZMHB, Berlin, Germany). Thus,

it is probable, that original type material of *L. semperi* is lost. To avoid ambiguity about the identity of *L. semperi*, a neotype specimen is designated in the present paper. Fortunately, in Brenske's collection, one male specimen collected by Charles Baker in Surigao, Mindanao and three female specimens from Burauen, Leyte identified as *L. semperi* were found. The male (Fig. 16) perfectly fits the original description of *L. semperi* and was collected near the original type locality. That is why, this specimen was selected as the neotype. The neotype specimen is currently on loan from ZMHB, Berlin, Germany, and will be deposited at Oberthür's collection at MNHN, Paris, France for stability and upon consultation with experts.

Leucopholis ratcliffei sp. nov.

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Figs 17–20

Differential diagnosis

The new species can be distinguished from all other Philippine *Leucopholis* by the paramere of the apical process of the male genitalia, which is distinctly elongate, curved downward and broadly spatulate apically. The apical process of the male genitalia of *L. ratcliffei* sp. nov. is nearly as long as the phallobase while all other species of Philippine *Leucopholis* with the metaventral process extending in front of the prosternal process have the apical process either short or distinctly shorter than the phallobase. The anterior margin of the phallobase of the male genitalia of both *L. ratcliffei* and *L. stainesi* sp. nov. is bowl-shaped, but its medial margin is slightly convex in *L. ratcliffei* while it is distinctly convex medially in *L. stainesi*. Also, the apical process apex is spatulate in *L. ratcliffei* while it is short and rounded in *L. stainesi* and *L. semperi*, and long and tapered in *L. bezdeki* sp. nov. The medial anterior margin of the pronotum in *L. ratcliffei* is slightly convex while it is nearly straight in all other species of Philippine *Leucopholis* with the metaventral process extending in front of the prosternal process.

Etymology

This new species is named after Dr Brett Ratcliffe, Curator of Insects at the University of Nebraska State Museum and a Professor in the Department of Entomology. He is a specialist in the taxonomy, biology, ecology, and biogeography of scarab beetles, especially those of the Neotropics.

Material examined

Holotype

PHILIPPINES • 1 ♂; Cagayan de Oro City; 5 Dec. 1932; H.L. Philipps leg.; UNSM.

Type locality

Philippines (Mindanao, Misamis Oriental, Cagayan de Oro City)

Description

BODY LENGTH. 42.5 mm.

BODY WIDTH. 22.5 mm.

COLOUR. Dorsum dichromatic, head, pronotum, scutellum and legs black to blackish brown; elytra and abdomen dark reddish brown to brownish. Venter monochromatic brown (Fig. 17).

HEAD. Clypeus with medial anterior margin slightly convex anteriorly; slightly cleft, slanted at 60° angle laterally; with row of irregular rugose punctures adjacent to posterior margin; each puncture with stiff brownish hair or seta; surface directly above clypeo-labral suture, lustrous, glabrous, impunctate; anterior and lateral margins carinate dorsally; lateral margin thickly carinate; nearly straight medially; anterior angle widely rounded dorsally; dorsal surface covered with yellowish white scales; scales short

or long, narrow, elongate, parallel-sided, rounded apically; scales apex slightly bent downward; base of scales with rounded punctures. Apical maxillary palpomere with oval flattened area. Mentum pot-shaped, lustrous, glabrous; with very few hair brushes on each side of medial cleft subanteriorly; with nearly flattened surface, slightly depressed medially. Antennal lamellae length 3.0 mm, nearly as long as entire length of antennomeres II–VII.



Fig. 17–20. *Leucopholis ratcliffei* sp. nov., holotype, ♂ (UNSM). 17. Habitus, dorsal aspect. 18. Metaventral process, dorsal aspect. 19. Male genitalia, dorsal aspect. 20. Male genitalia, lateral aspect.

PRONOTUM. Anterior margin widely concave, slightly convex medially; anterior angle obtuse, widely rounded; with lustrous, glabrous, impunctate callosity apically; lateral margin widely convex medially; anterolateral margin slightly concave, nearly at 45° angle, crenulate; postero lateral margin wedge-shaped, slightly crenulate; posterior angle obtuse, strongly sinuate, rounded apically; posterior margin bisinuate, widely concave; deeply rounded, margin distinctly extended posteriorly; each side slightly carinate except medially; surface covered with scales of variable shapes and sizes; covered mostly with elongate, spindle-shaped, tapered apically scales medio-subanteriorly and medio subposteriorly; covered mostly with narrow, lanceolate, tapered apically scales submedially; covered mostly with elongate, spindle-shaped, rounded apically scales adjacent to lateral margin.

VENTRAL SIDE OF THORAX. Prosternal process nearly isosceles triangulate, widely rounded apically; surface with flattened impunctate area dorsally. Metaventral process length 4.5 mm, distinctly wide, triangulate basally; elongate towards apex; not constricted subapically; subapical lateral margin distinctly long, nearly parallel-sided; widely rounded apically; lustrous, glabrous, impunctate dorsally; distinctly wide, triangulate basally; elongate, parallel-sided towards apex; rounded apically without subapical constriction; lustrous, glabrous, impunctate, with faint dark line dividing metasternum (Fig. 18); ventral and sides covered with hairs and scales.

LEG. Foretibia bidentate, narrowly rounded apically; posterior metatibia with 23 spicules.

SCUTELLUM. Covered with large and small, elongate, parallel-sided scales; lustrous, impunctate, without scales around posterior margin.

ELYTRON. Anterior margin distinctly wedge-shaped; anterior angle rounded, widely explanate, thickly carinate; upper lateral margin widely explanate, thickly carinate towards anterior angle; lower lateral margin towards posterior angle not explanate; posterolateral margin distinctly inflexed towards posterior angle; posterior angle widely rounded; posterior margin slightly sinuate to nearly straight; sutural angle approximately at 90° angle; sutural margin medially and towards sutural angle distinctly carinate; towards scutellum not carinate; each side near sutural angle covered with fringed hairs; surface covered with same scales in pronotum; most scales truncate apically.

ABDOMEN. Abdominal sternites I–IV covered with short, ovoid lanceolate, rounded or truncate basally, scales tapered apically; abdominal sternite V covered mostly with elongate spindle-shaped scales.

PYGIDIUM. Posterior margin bisinuate, concave medially; shortly concave medially; posterior margin slightly concave, narrowly explanate; distinctly depressed medially; subposterior margin vertically flattened laterally; surface covered with minute, elongate ovoid scales.

MALE GENITALIA. Genitalia length 18.5 mm. Phallobase dorsal apical margin wide, bowl-shaped, slightly convex medially (Fig. 19). Paramere with dorsal basal margin bisinuate. Apical process length 6.9 mm, nearly as long as phallobase; distinctly elongate, flattened; curved downward, spatulate apically. Lateral margin of paramere with wide, shallow longitudinal depression on each side (Fig. 20).

Distribution

Philippines (Mindanao).

Key to the species of *Leucopholis* of the Philippines

1. Metaventral process distinctly long, extending in front of prosternal process (Fig. 2); large to very large sized species, length 35.0–42.5 mm; prosternal process mound-shaped, triangulate; pronotal

- scales variable in shape and size; body scales elongate ovoid, not flattened, slanted at 45° angle, base of scale only attached to surface 2
- Metaventral process distinctly short not extending in front of prosternal process; moderate to small sized species, length 22.5–29.5 mm; prosternal process ovoid to spindle-shaped anteriorly; pronotal scales nearly uniform in shape and size; body scales distinctly ovoid, flattened, not slanted at 45° angle, entire scale strongly attached to surface 5
2. Metaventral process lanceolate, constricted subapically (Fig. 2); abdomen covered mostly with elongate ovoid scales; length 35.0 mm *L. stainesi* sp. nov.
- Metaventral process not lanceolate, not constricted subapically (Figs 8, 15, 18); abdomen covered mostly with short ovoid scales 3
3. Paramere apical process of male genitalia not distinctly elongate; bird bill-like; apical process of male genitalia tapered or rounded apically (Figs 5–6, 13–14) 4
- Paramere apical process of male genitalia distinctly elongate; not bird bill-like; apical process of male genitalia spatulate apically (Figs 19–20); length 42.5 mm *L. ratcliffei* sp. nov.
4. Paramere apical process of male genitalia tapered apically; paramere basal margin of male genitalia sinuate; paramere lateral margin of male genitalia surface rugose (Figs 9–10); medial posterior margin of pronotum slightly extended posteriorly; posterolateral margin of elytron near posterior angle distinctly inflexed laterally; pygidium with vertical flattened margin subposteriorly; length 38.2 mm *L. bezdeki* sp. nov.
- Paramere apical process of male genitalia rounded apically; paramere basal margin of male genitalia bisinuate; paramere lateral margin of male genitalia surface rugose (Figs 13–14); medial posterior margin of pronotum distinctly extended posteriorly; posterolateral margin of elytron near posterior angle vertically flattened laterally; pygidium without vertical flattened margin subposteriorly, with sloping downward margin. length 36.0 mm *L. semperi* Brenske, 1896
5. Scales on elytra nearly uniform in size 6
- Scales on elytra variable in size; length 23.5–29.5 mm *L. pulverulenta* Burmeister, 1855
6. Clypeus without medial cleft 7
- Clypeus with medial cleft 8
7. Clypeus strongly convex in males, weakly convex in females, wider than labrum in males, narrow in females; length 28.5–32.5 mm *L. reflexa* Moser, 1924
- Clypeus weakly convex in males, strongly convex in females, nearly as wide as labrum in both sex; length 22.5–25.1 mm *L. bakeri* Moser, 1924
8. Protibial spur long, extending beyond anterior angle of protibia; length 25.5–30 mm *L. irrorata* Chevrolat, 1841
- Protibial spur distinctly shorter, not extending beyond anterior angle of protibia; length 21–22.5 mm *L. guevarai* Calcetas & Adorada, 2017

Discussion

There are currently 10 species of *Leucopholis* in the Philippines (Calcetas & Adorada 2017; this article). The geographical distribution map of *Leucopholis* in the Philippines is presented in Fig. 21. Both *L. irrorata* and *L. pulverulenta* are the most economically important scarab species in the country, while the economic status of other species has not yet been assessed (Quimio *et al.* 2001). Therefore, an integrative taxonomic study (morphological and molecular) of scarabs in the country for both the

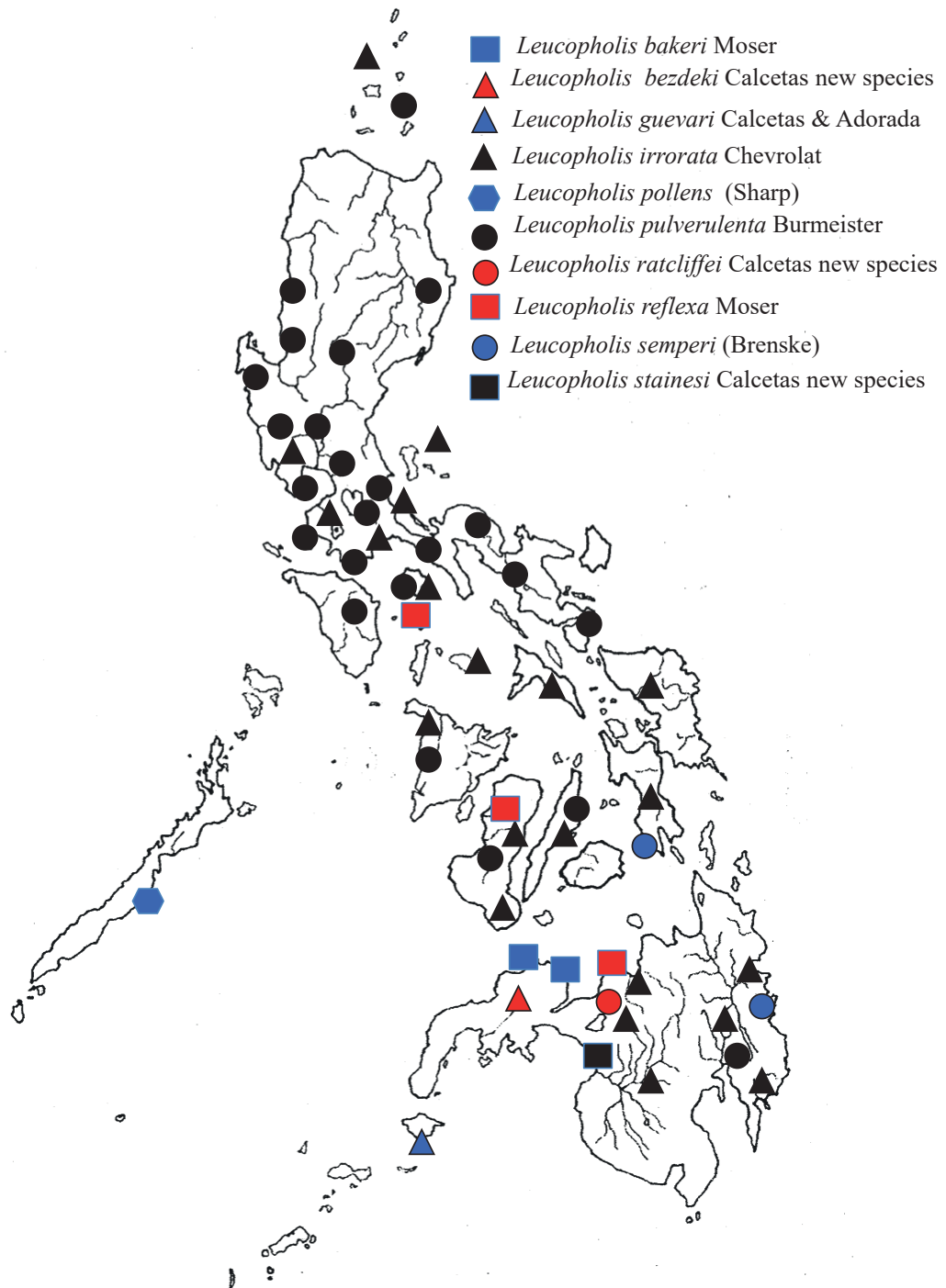


Fig. 21. Geographical distribution map of genus *Leucopholis* Dejean, 1833 in the Philippines. (Map courtesy of Dr Sheryl A. Yap of IWEP-UPLB, Los Baños, Laguna, unpublished thesis 2004).

immature (white grubs) and adult forms should be undertaken. This research will determine their host range, economic value and other roles in the ecosystem, and will expand the molecular database of scarabs in the Philippines, especially for the benefit of crop protection managers.

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