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Pachyrhynchus analynae sp. nov., a new species of easter egg weevil (Coleoptera, Curculionidae, Entiminae, Pachyrhynchini) from Tarragona, Davao Oriental, Mindanao, Philippines

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A new species of *Pachyrhynchus* Germar, 1824 from Tarragona, Davao Oriental, *Pachyrhynchus analynae* Obrial, Agbas, Pajota & Medina sp. nov. named after Dr. Analyn Anzano Cabras, for her significant contribution on the advancement of beetle research and conservation in the Philippines particularly on the tribe Pachyrhynchini. The new species is the recent addition to the *Pachyrhynchus speciosus* species complex. Notes on the species ecology, habitat, distribution, and plant associationare presented.

Keywords: biodiversity, taxonomy, weevils, species groups, new species

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INTRODUCTION

The genus *Pachyrhynchus* Germar, 1824 (Coleoptera: Curculionidae: Entiminae: Pachyrhynchini) is a group of flightless weevils known for their vibrant coloration and intricate scaly patterns on their heavily sclerotized exoskeletons. These characteristics are believed to function as aposematic signals, deterring predators through visual warning cues (Tseng et al., 2014, Medina et al., 2024, Obrial et al., 2024, Agbas et al., 2024). With over 165 species, the genus *Pachyrhynchus* is the second speciose genera under the tribe *Pachyrhynchini*, following *Metapocyrtus* Heller, 1912. With its center of diversity and distribution in the Philippines, 94% of *Pachyrhynchus* are exclusively found across the various islands of the country (Schultze, 1923; Rukmane, 2018; Yoshitake et al., 2019; Bollino, 2022; Cabras et al., 2022a), while few several species were described and documented in neighboring countries such as Taiwan, Indonesia, and Japan (Cabras et al., 2022b).

Unlike the genus *Metapocyrtus*, the species under the *Pachyrhynchus* are not classified into distinct subgenera. Instead, species are grouped into species groups based on morphological characteristics and biogeographic distribution data. One notable species group is the *Pachyrhynchus speciosus* species complex, type species *Pachyrhynchus speciosus* Waterhouse, 1841(Schultze, 1923; Rukmane, 2019). This species complex is characterized by a dark, shiny integument with a golden or greenish tinge, relatively small eyes that are moderately convex from the head outline, and subspherical elytra with at least three crossbands, with the first and third interrupted at the suture. The prothorax features at least one transverse line on the disc and a prominent roundish patch of scales on each lateral side (Rukmane, 2019). With the discovery of *Pachyrhynchus*

panumanon Cabras & Medina, 2022, along with the new species described in this study, the *P. speciosus* species group has now expanded to 15 species, all exclusively inhabiting the Mindanao Pleistocene Aggregate Island Complex (Mindanao-PAIC).

Over the past decade, the surge in coleopterological studies in Mindanao has led to the discovery of numerous weevil species. However, the vast area in Mindanao remains unexplored with numerous species awaiting to be discovered. Notably, the mountains in the southern portion of the Eastern Mindanao Biodiversity Corridor (EMBC) remain largely unstudied regarding its beetle fauna, presenting a promising area for future studies. The EMBC is a chain of forest ecosystems along Mindanao Island's eastern coast, stretching from Dinagat Island in the north and Mt. Hamiguitan Range Wildlife Sanctuary (MHRWS) in the south (PEF, CIP, & DENR, 2008). Among the ecologically significant sites within the southern portion of the EMBC is the remaining pristine forest of Tarragona, Davao Oriental. This mountainous forest ecosystem is comprised of an agroecosystem and secondary-growth dipterocarp forest having a wide elevation range with the highest peak reaching approximately 1800 meters above sea level (masl) (ICCA Registry, 2025). Moreover, this forests ecosystem is under dire threats of anthropogenic activities, which include commercial agriculture, the presence of slash-and-burn farming, and illegal logging (PEF, CIP, and DENR, 2008). Aside from being a part of KBA, it is also situated within the ancestral domain managed by the local tribal group, Mandaya. Unfortunately, no known laws or activities have been instituted for its protection. There is also a minimal number of available published literature on its faunal diversity, specifically on invertebrates, which calls for more biodiversity assessments to better understand the full extent of its species richness and abundance which can be used in establishing policies for its conservation and protection.

In this paper, a new species of weevil belonging to the *P. speciosus* species complex from the pristine forest in Barangay Limot, Tarragona, Davao Oriental, is described and illustrated. Notes on the species ecology, habitat, distribution and plant association are also presented.

MATERIALS AND METHODS

Morphological characters were observed under Trinocular Zoom Stereo Microscopes and Nikon SMZ745T stereomicroscopes. The treatment of the genitals follows the protocol of Yoshitake (2011). Images of the habitus were taken using a Canon EOS 6D digital camera equipped with an MP-E 65-mm macro lens. Images were stacked and processed using a licensed version of Helicon Focus 6.7.0; then, the contrasts were adjusted in Photoshop CS6 Portable software. Label data are indicated verbatim.

Abbreviations and symbols mentioned are abbreviated as follows:
/ different lines;
// different labels;
LB body length, from the apical margin of pronotum to the apex of elytra;
LR length of rostrum;
LP pronotal length, from the base to apex along the midline;
LE elytral length, from the level of the basal margins to the apex of elytra;
WR maximum width across the rostrum;
WP maximum width across the pronotum;
WE maximum width across the elytra.

Comparative materials and specimens used in the study are deposited in the following institutional collections:

AAC - Personal collection of Analyn Cabras, Davao City, Philippines.
BMNH - British Museum of Natural History, London, United Kingdom.
DGC – Private Collection of Daven Agbas and Graden Obrial, Mati City, Philippines.
DUBC - Daugavpils University Beetle Collection, Daugavpils, Latvia.
MMCP - Milton Medina Collections, Tagum City, Philippines.
NIAES - National Institute for Agro-Environmental Sciences, Tsukuba, Japan.
PNM - National Museum of Natural History (PNMNH) under the National Museum of the Philippines.
SMTD - Senckenberg Natural History Collections, Dresden, Germany
TIRL - Terrestrial Invertebrate Research Laboratory, Davao Oriental State University, City of Mati, Philippines.
UMCRC - University of Mindanao Coleoptera Research Center, Davao City, Philippines

TAXONOMY

Pachyrhynchus analynae Obrial, Agbas, Pajota & Medina sp. nov. (Figure 1, A–D)

Holotype (Figure 1, A, B), male: Philippines– Mindanao Island, Davao Oriental, Municipality of Tarragona / 11, ii. 2025 / Leg. G. Obrial, D. Agbas & R. Añuber / (typed on white card) // HOLOTYPE male / *Pachyrhynchus analynae* / OBRIAL, AGBAS, PAJOTA, & MEDINA 2025 (typed on red card). Presently in TIRL, to be deposited in the Philippine National Museum of Natural History (PNMNH) under the National Museum of the Philippines (NMP). **Paratype** (6 ♂♂, 4 ♀♀); 1 female, same data with holotype. 2 male, 2 female, Philippines– Mindanao Island, Davao Oriental, Lupon, / iii. 2024 / Lg. local collector. 2 male, 1 female, Philippines– Mindanao Island, Davao Oriental, Lupon, / 29. iii. 2024 / Lg. local collector. (Presently in TIRL. 3 male, 2 female, deposited at DGC. 1 male, 1 female, to be deposited at UMCRC. 1 male, AAC. 1 male, MMCP. 1 female, to be deposited at SMTD).

Diagnosis *Pachyrhynchus analynae* sp. nov. belongs to the *P. speciosus* species group. In general appearance, this novel species conspicuously resembles a cross between *P. miltoni* Cabras & Rukmane, 2016, from Marilog, Davao City, and *P. cabrasae* Rukmane, 2016, from Mt. Kalatungan, Bukidnon. It exhibits a combination of scaly maculations found in both congeners: the longitudinal scaly bands at pronotum which resembles *P. miltoni*, while reticulate scales at elytra resembles *P. cabrasae*. However, *P. analynae* sp. nov. differs with *P. miltoni* based on the following characteristics: amygdaloid elytral shape, narrower in profile, and tapers apically; elytra bears reticulate net-like maculations that merge and sparsely covered with setae from the apical declivity towards the apex (vs stouter elytra with minute setae only along the lateral margin; with open-and closed-banded variations, with three contiguous scaly bands, with open-banded variation that retains the three scaly bands in *P. miltoni*).

Pachyrhynchus analynae differs from *P. cabrasae* based on the following characteristics: pronotal markings, feature evenly thick median longitudinal bands extending from the anterior to the posterior margin (vs. with transverse and curved scaly bands forming sub-cruciform scaly markings in *P. cabrasae*). Reticulate maculation of *P. analynae's* elytra is thicker (vs. thinner in *P. cabrasae*). The first reticulate interval basally extending only to striae I in *P. analynae* sp. nov. (vs. reaches suture in *P. cabrasae*). *Pachyrhynchus cabrasae* have prothorax with golden-red metallic integuments and greenish-black integuments at elytra (vs. purplish black

integuments both at prothorax and elytra in *P. analynae* sp. nov.). Furthermore, *P. analynae* differs from both congeners based on the shape of aedeagus, with a slightly broader lamella of medium length that forms blunt apex, whereas *P. miltoni* have narrower and longer lamella with a pointed apex, and *P. cabrasae* with shorter and broader lamella with a rounder apex.

Description. Dimensions, 3 males: LB: 10.0–12.0 (holotype 10.0 mm). LR: 2.0–2.5 (holotype 2.0 mm). WR: 1.5–1.8 (holotype 1.5 mm). LP: 3.5–4.0 (holotype 3.5 mm). WP: 3.8– (holotype 3.8 mm). LE: 7.0–8.0 (holotype 7.0mm). WE: 5.5–6.0 (holotype 5.5mm).

Integument metallic purplish black with a coppery and greenish sheen; antennal scape, funicles, tarsomeres, and mandibles matte black; Head, rostrum, pronotum, legs and elytra glossy, ventral surface moderately lustrous.

Head flattish with shallow concavity at middle, minutely and irregularly punctured, lateral sides weakly corrugated, with two prominent scaly markings composed of iridescent pale yellow, and turquoise recumbent and contiguous rounded scales; a) a large scaly patch on dorsal surface between eyes, from base of rostrum to forehead extending towards anterior margin of pronotum, b) lateral sides below eyes with large scaly patch, piliform towards ventrad;

Eyes medium-sized, as viewed dorsally weakly convex not protruding from outline of head.

Rostrum longer than wide (LR/WR: 2.0 mm; 1.5 mm), basal half elevated at distal margin, slightly elevated than forehead between eyes forming distinct narrow subtriangular concavity at middle, apical half swollen with shallow narrow depression at middle; dorsal contour slightly convex both on basal and apical half towards apex, weakly sinuate at middle, lateral contour in dorsal view weakly arcuate widest before middle and slightly narrower at base; dorsolateral edge rounded, with scar on each side near base; dorsal surface punctate, finely punctate at apical half towards apex, lateral side below antennal scrobe with fine and coarse punctures with scaly patch composed of iridescent pale yellow and turquoise recumbent elliptic and piliform scales, and long suberect light yellow setae at anterolateral surface. Antennal scape slightly shorter than funicle, strongly clavate with fine punctures with suberect yellowish long and fine setae. Funicle with suberect yellowish long and fine setae. Funicular segment I and II nearly 1.5 times longer than wide; segments III-VI as long as wide; segment VII as long as wide, longer and wider than segments III-VI; club sub-ovoid, nearly twice longer than wide.

Prothorax subglobular, truncated at base, wider than long (LP/WP: 3.5 mm; 3.8 mm), with fine irregular punctures, weakly corrugated on lateral sides, dorsal contour in lateral view flattish, lateral contour in dorsal view, uniformly arcuate, widest at middle; With the following scaly markings composed of iridescent pale yellow and turquoise recumbent, round scales: a) central disc of pronotum with long median longitudinal band extending from anterior margin to posterior margin, b) dorsolateral sides of prothorax with scaly band extended anteriorly and posteriorly, confluent on sides to a c) thick band on lateral side before coxa.

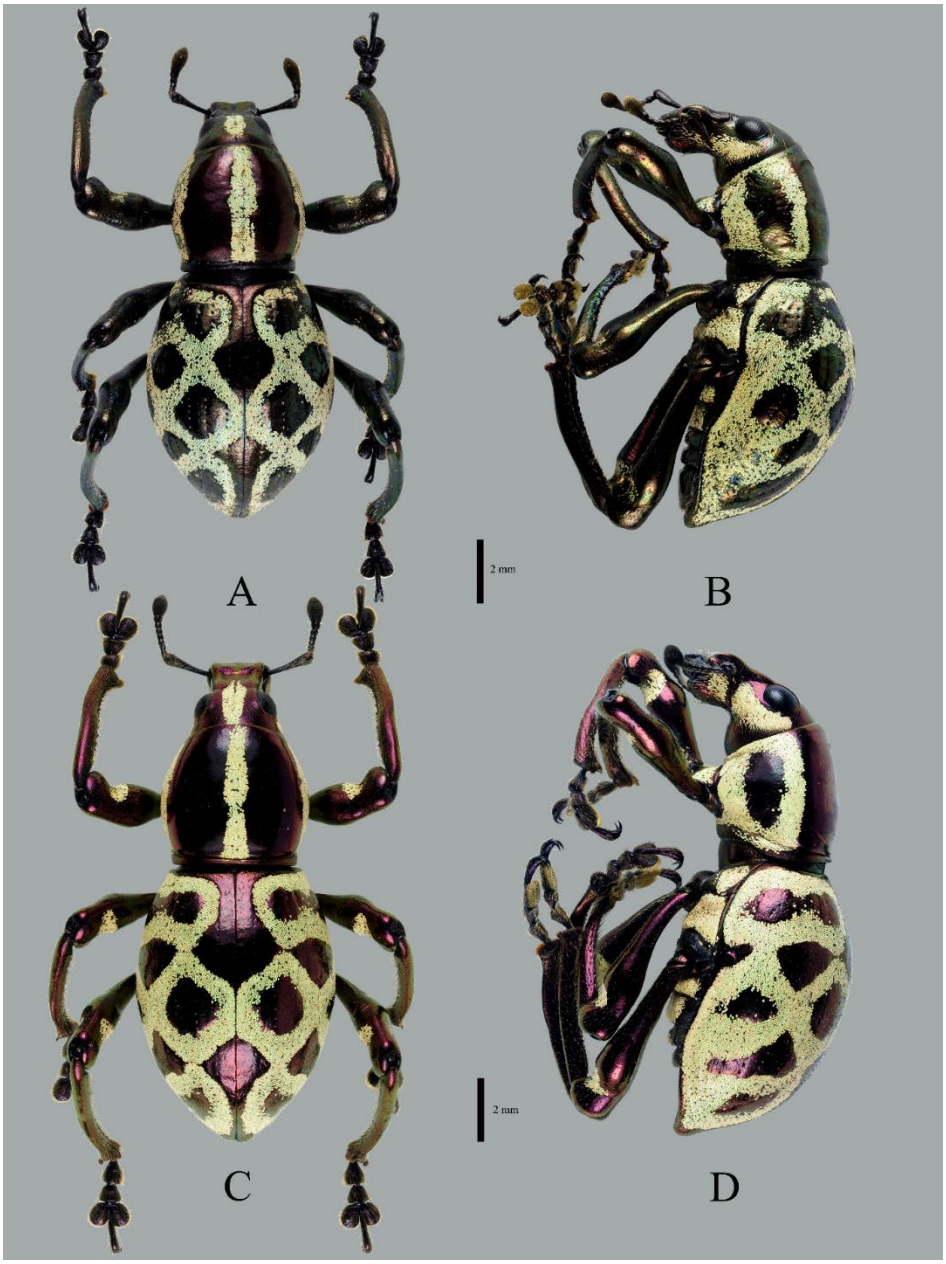

Fig. 1 A–D. *Pachyrhynchus analynae* Obrial, Agbas, Pajota & Medina sp. nov.: A– B, Holotype male; A. dorsal view, B. lateral view. C– D, Female; C. dorsal view, D. lateral view. Scale bar: 2 mm.

Elytra amygdaloid, longer than wide, wider and twice longer than prothorax (LE/LP: 7.0 mm; 3.5 mm. WE/WP 5.5 mm; 3.8 mm), striate-punctate, with fine short suberect iridescent setae from apical declivity to apex; dorsal contour in lateral view uniformly convex in profile with gradual apical declivity, lateral contour in dorsal view moderately convex, widest at middle then tapers off towards pointed apex. Elytra with reticulate, net-like rings composed of iridescent pale yellow and turquoise recumbent, contiguous, round, and subelliptical scales. Each elytron with three intervals of reticulate scaly rings that merged, forming six irregular bare spots; a) first scaly interval at basal fourth, extending from stria I to lateral margin, with one long irregular bare spot, b) second scaly interval medially, extending from suture to lateral margin, with two bare spots, c) third scaly interval at apical fourth which extends from striae I to apicad and lateral margin, with one bare spot; two bare spots formed in between the three scaly interval, one bare spot between first and second interval, and one bare spot between second and third interval.
Legs with strongly clavate femora. Femora with minute punctures and weak corrugations, apical third with deep concavity along inner margin covered with appressed, contiguous, round, elliptic and piliform scales of iridescent pale yellow and turquoise. Tibiae moderately punctate, with minute fine and short suberect white setae, weakly serrated along inner margin, with yellowish, brown suberect medium length setae. Fore, mid, and hind tibiae bear a mucro at apex. Tarsomeres with fine and coarse punctures, with long suberect yellowish setae. Tarsomere I and II short, triangular, and simple without sharp projections at apical corners, tarsomere 3 bilobed, tarsomere V long and narrow; tarsal claws free.

Coxae with fine punctures and sparse fine setae. Forecoxa partially covered anteriorly with iridescent pale yellow and turquoise round and elliptic scales. Mesoventrite with a scaly patch of iridescent pale yellow and turquoise round and elliptical scales. Metaventrite strongly depressed at middle covered with iridescent pale yellow and turquoise round, elliptic and piliform scales, thicker on distal ends near lateral margin of elytra. Ventrite I strongly depressed on disc and coarsely rugose, with the same set of scales on distal ends near apical margin. Ventrite II with fine punctures covered with the same set of scales except middle of disc. Ventrites III-V with sparse short white and yellowish setae and coarsely punctured on distal ends. Apical half of Ventrite V with sparse white and yellowish setae, mostly coarsely punctured and weakly rugose.

Male genitalia and sternite XI as shown in Figure 2 A–C.

Female Dimensions, 3 females: LB: 9.5–12.8 mm: LR:–2.5 mm: WR:–2.0 mm. LP: 2.9–4.0 mm. WP: 3.3–4.9 mm. LE: 6.3–8.5 mm. WE: 4.5–6.5 mm.

Habitus as shown in Figure 1 C & D.

Female (Figure 1 C, D) differ from the male in the following characters: a) Larger in size (LB: 12.8mm) b) wider and longer pronotum and elytra (LP/LE: 4.0mm/8.5mm, WP/WE: 4.9mm/6.5mm), c) integuments lighter purplish black, d) Ventrites II-V moderately bulging, e) apex of elytra slightly extended with a blunt protrusion. Otherwise, female is similar to the male.

Etymology. The species is named after Dr. Analyn Anzano Cabras, 'the Queen of Philippine weevils', for her significant contribution to the advancement of beetle research and conservation of Philippine beetles, particularly the group Pachyrhynchini.

Distribution. *Pachyrhynchus analynae* sp. nov. is known so far from the pristine forest of Tarragona, Davao Oriental.

Fig. 2 A–F. Male genitalia of *Pachyrhynchus analynae* Obrial, Agbas, Pajota & Medina sp. nov. aedeagus in dorsal view A, idem in lateral view B, sternite IX in dorsal view C. Scale bar: 1 mm.

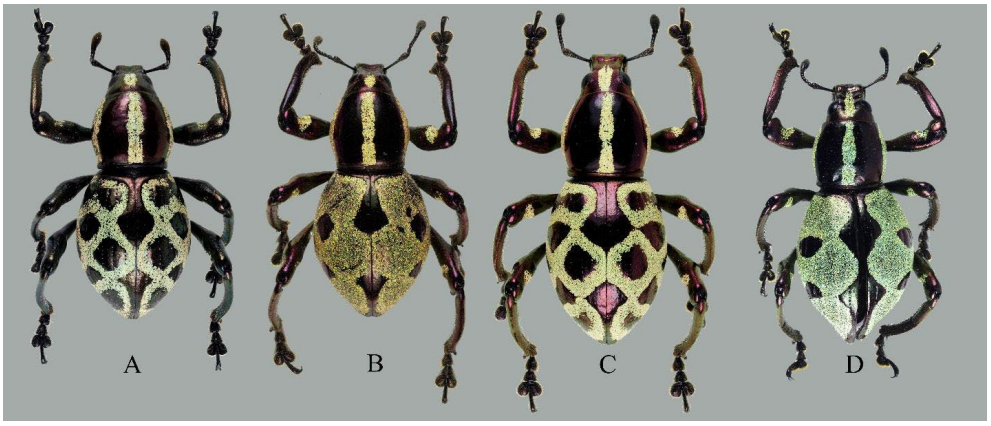

Fig. 5 A–F. Variability of *Pachyrhynchus analynae* Obrial, Agbas, Pajota & Medina sp. nov.: A) open-banded, holotype male, B) filled-banded, paratype male C) unfilled-banded, paratype, female, D) filled-banded, paratype female.

Fig. 4. A–D Habitat and plant associations of *Pachyrhynchus analynae* Obrial, Agbas, Pajota & Medina sp. nov.: (A & B) Habitat of *P. analynae*, at an elevation of 1600+ meters above sea level (masl), C) the plant where the new species was collected, *Antherostele grandistipula* (Rubiaceae), D) in situ photograph of the new species collected through beating sheet. [Photo credit: Rylle G. Añuber].

Notes on Variability. The new species elytral scaly markings vary from unfilled-banded and filled-banded (Figure 5, A—D). The unfilled-banded variation forms the reticulate net-like shaped scaly markings in the elytra, and filled-banded variation forms an interval of three scaly markings merged together (Figure 5, A—D). The color of scales also varies from pale yellow, cream yellow, turquoise, iridescent golden yellow, and pale yellow (Figure 5, A—D

Ecology of *Pachyrhynchus analynae* sp. nov. Barangay Limot in the municipality of Tarragona, Davao Oriental is an area majorly composed of mountainous landscape that is part of the Eastern Mindanao Biodiversity Corridor (EMBC). In this area the lower montane forest starts at an elevation of 1,600 meters above sea level (masl) and extends up to 1,796 masl, which is the highest peak elevation. The dominant tree family in this area is Podocarpaceae, with notable species including *Dacrycarpus imbricatus* (Igem) and *Dacrydium beccarii* (Lokinai). However, both species under the genus *Dacrycarpus* and *Dacrydium* are locally referred to as "Sedar" or "Sedro" by the Mandaya people. *Pachyrhynchus analynae* sp. nov. was collected in an area with a vegetation cover of 80–100% (figure 4. A, B). This area is dominated by gymnosperms and is classified as a lower montane forest based on the latest

classification of Philippine ecosystem diversity types in a terrestrial setting (DENR – NBSAP 1997). These forests occur at elevations between 1,000 and 2,000 meters. Within this ecosystem, species in the family Fagaceae (oaks) increase in number, along with members of Araliaceae, Staphyleaceae, and Lauraceae. Tree ferns and epiphytes, such as orchids, ferns, and their allies, also become more abundant (Baguinon et al., 2003). Furthermore, the newly discovered species was collected through beating sheet on the plant, *Antherostele grandistipula* (Figure 4. C, D), and belongs to the family Rubiaceae, it is classified as an Endangered species under DENR Administrative Order (DAO) No. 11, Series of 2017. Additionally, it is listed as Vulnerable based on the most recent assessment on December 24, 2020, in IUCN V.2024-2. This classification suggests that the newly discovered species of *Pachyrhynchus* are at risk if their host plant undergoes an unprecedented decline.

DISCUSSION

The *Pachyrhynchus speciosus* species group was first established by Schultze in his early monograph on the genus *Pachyrhynchus* Germar, 1824. This group is notably diverse, with its distribution following the Mindanao Pleistocene Aggregate Island Complex (Mindanao-PAIC) (Rukmane-Barbale, 2019). However, some species initially included in this group, such as *P. absurdus*, were later found to be morphologically distinct. With additional data available, Rukmane (2017) reclassified *P. absurdus*, assigning it as a separate species group. This taxonomic reassignment was further supported by Van Dam et al. (2021) through phylogenetic analysis of the genus *Pachyrhynchus*, confirming *P. absurdus* as distinct from the *P. speciosus* group, but belongs to the same clade. Van Dam et al. (2021) also highlighted the high variability in the scaly markings of the group, ranging from "close-banded" to "open-banded" versions. This variability is evident in species such as *P. miltoni* Cabras & Rukmane, 2016, and *P. panumanon* Cabras & Medina, 2022 (Cabras & Rukmane, 2016; Cabras et al., 2022). Due to the synapomorphic characteristics shared among its members and the high degree of variation, accurate identification of species is often challenging and, in some cases, species with very close forms is often misidentified, and the only way to determine is when the locality is disclosed or with detailed examination of external and aedeagal morphology. Van Dam et al. (2021) also noted this issue, as specimens of *P. miltoni* with "open bands" have often been mislabeled as *P. speciosus* in collections. This finding challenges the assumption that elytral markings alone is sufficient enough for species delineation, particularly in highly variable taxa.

Pachyrhynchus analynae sp. nov., is undoubtedly a member of the P. speciosus group, possessing a unique combination of characters. It is easily distinguishable from its two congeners based on both external and aedagal morphology as well as elytral markings (see differential diagnosis). Dr. Analyn A. Cabras first encountered this species from specimens donated by a local enthusiast near the range where the novel species was later discovered. The donated specimen is a “filled-banded” version (Figure 5. B, D), leading Dr. Cabras to initially note its resemblance to a filled-banded variant of *P. cabrasae*, a version absent in the latter species. She speculated that an open-banded form might also exist. Despite recognizing several distinguishing characters suggesting its novelty, Dr. Cabras refrained from describing the species due to its superficial resemblance to *P. miltoni*. However, during an expedition in collaboration with the Coleoptera Research Center of the University of Mindanao, an open-banded form of *P. analynae* was collected, further confirming its novelty. This discovery validated Dr. Cabras' keen

observations, reflecting her exceptional expertise as a beetle (weevil) taxonomist. While this finding is bittersweet considering Dr. Cabras' untimely passing, it underscores her remarkable contributions to Philippine Coleopterology.

The most recent checklist of the *P. speciosus* group was published by Rukmane-Barbale in 2019, recognizing 13 species, all inhabiting the mountainous regions of the Mindanao-PAIC (Mindanao, Samar, Leyte, and Bohol Islands). The paper also provided additional distributional data and revised the group with new taxonomic information and a key (Rukmane-Barbale, 2019). While the key does not fully adhere to conventional taxonomic key standards, it remains a valuable resource, adding to the growing body of knowledge that enhances the understanding of the group's taxonomy. To date, two additional species, including *P. analynae* sp. nov., will be added to the group. Thus, an updated checklist is provided.

Updated checklist of *Pachyrhynchus specious* species group:

1. ***Pachyrhynchus analynae* Obrial, Agbas, Pajota & Medina sp. nov.**
   Distribution: Mainland Mindanao, Davao Oriental, Municipality of Tarragona

2. ***Pachyrhynchus cabrasae* Rukmane & Barševskis, 2016**
   DUBC
   Distribution: Mainland Mindanao, Bukidnon, Mt. Kalatungan

3. ***Pachyrhynchus circulimaculatus* Yoshitake, 2019**
   NIAES
   Distribution: Mainland Mindanao, Northern Mindanao Region

4. ***Pachyrhynchus davaoensis* Schultze, 1934**
   SMTD
   Distribution: Mainland Mindanao, Bukidnon; Mt. Apo

5. ***Pachyrhynchus kraslavae* Rukmane & Barševskis, 2016**
   DUBC
   Distribution: Mainland Mindanao, Compostela Valley, Mabini

6. ***Pachyrhynchus miltoni* Cabras & Rukmane, 2016**
   UMCRC
   Distribution: Mainland Mindanao, Davao City, Marilog District

7. ***Pachyrhynchus notocruciatus* Yoshitake, 2017**
   NIAES
   Distribution: Mainland Mindanao, Mt. Apo

8. ***Pachyrhynchus octoannulatus* Yoshitake, Bollino, & Sandel, 2019**
   NIAES
   Distribution: Mindanao, Lanao del Sur, Wao

9. ***Pachyrhynchus panumanon* Cabras & Medina, 2022**
   UMCRC
   Distribution: Mainland Mindanao, Misamis Oriental, Gingoog City

10. ***Pachyrhynchus postpubescens* Schultze, 1922**
    SMTD
    Distribution: Mindanao, Bukidnon, Lindaban

11. ***Pachyrhynchus regius* Schultze, 1922**
    SMTD
    Distribution: Leyte Island, Mountains near Cabalian

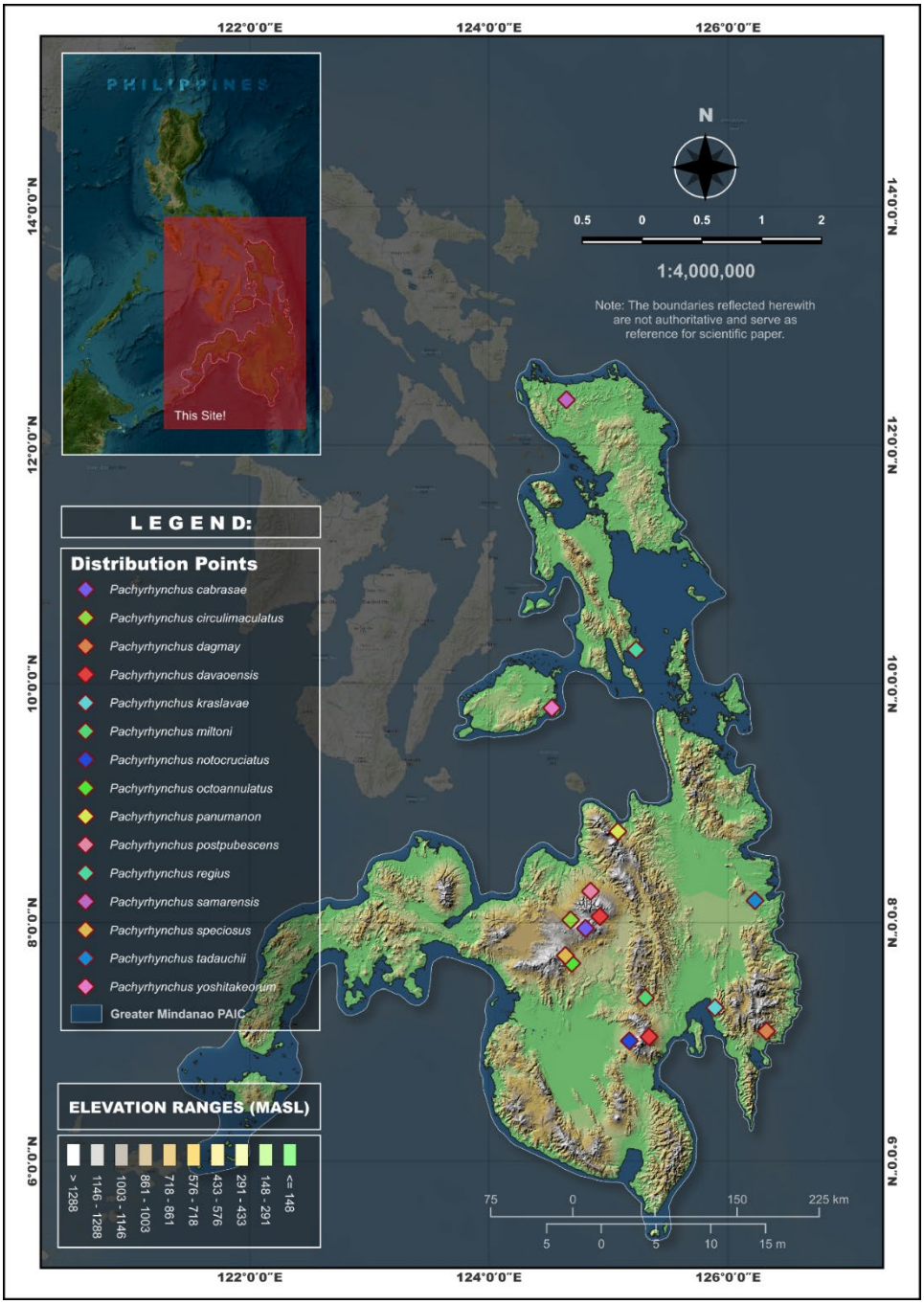

Fig. 5. Mindanao-PAIC map with Distribution of *Pachyrhynchus speciosus* species complex.

12. ***Pachyrhynchus samarensis*** **Schultze, 1924**
SMTD
Distribution: Samar Island, Catarman

13. ***Pachyrhynchus speciosus*** **Waterhouse, 1841**
BMNH
Distribution: Mindanao Island

14. ***Pachyrhynchus tadauchii*** **Yoshitake, 2012**
NIAES
Distribution: Mainland Mindanao, Surigao, Bislig

15. ***Pachyrhynchus yoshitakeorum*** **Yoshitake, Bollino, & Sandel, 2019**
NIAES
Distribution: Bohol Island, Duero, Brgy. Payao, Sitio Pangpang

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