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Posted on 15/01/2021

DOI: https://doi.org/10.3897/arphapreprints.e63201

Two new species of the genus *Metapocyrtus* Heller 1912 (Coleoptera, Curculionidae, Entiminae, Pachyrynchini), subgenus *Orthocyrtus* Heller 1912, from Mindanao Island, Philippines

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Not peer-reviewed, not copy-edited manuscript.

Two new species of the genus *Metapocyrtus* Heller 1912 (Coleoptera, Curculionidae, Entiminae, Pachyrynchini), subgenus *Orthocyrtus* Heller 1912, from Mindanao Island, Philippines

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Abstract

Two new *Metapocyrtus* Heller, 1912, subgenus *Orthocyrtus* Heller, 1912 (Coleoptera: Curculionidae: Entiminae: Pachyrhynchini) are described and illustrated from Mindanao Island, Philippines. The species are *Metapocyrtus (Orthocyrtus) davaoensis* sp.n. and *Metapocyrtus (Orthocyrtus) hirakui* sp.n. from Davao City and Bukidnon respectively. Brief bionomical notes and phenotypic characters compared to their sympatric Entiminae counterparts are also reported. The discovery of *M. (O.) davaoensis* sp.n. in Davao City confirms how understudied coleoptera are in Mindanao, and underlines the potential for the discovery of new species even in highly urbanized areas.

Keywords
Bukidnon, Davao City, Mindanao Island, Pachyrhynchini, urban biodiversity, weevils

Introduction

The tribe Pachyrhynchini has achieved notoriety for its beautiful iridescent markings making its species conspicuous and one of the most well known beetle taxa in the Philippines. It currently counts 16 genera with roughly 500+ described species. Being wingless, most Pachyrhynchini have a very narrow geographic range, mostly being endemic to an island or a mountain range. According to the Forest Management Bureau of the Philippine Department of Environment and Natural Resources, forest cover in the Philippines has dropped by 70%, from 21 million hectares in 1900 to approximately 6.5 million hectares in 2007, consequently making the majority of the species to be listed as Vulnerable in the latest national assessment of the Department of Environment and Natural Resources (DAO, 2017). The genus *Metapocyrtus* Heller, 1912 is endemic in the Philippines, and is the most specious and the most complex within the tribe (Schultze, 1923; Yap, 2008; Cabras et al., 2018; Bollino et al., 2020). *Metapocyrtus* subgenus *Orthocyrtus* Heller, 1912 currently counts more than 36 species distributed all over the Philippines: 18 species were described from Luzon, 4 species and 1 subspecies from Visayas, 12 species from Mindanao Island, and 3 were generically described from the Philippines only, (Schultze, 1925; Cabras et al., 2018; Cabras & Medina, 2019).

Mindanao Island is the second largest island in the Philippines with a total area of 97,530 km2 divided into 6 political regions, and 4 distinct biogeographic subregions. The unique geologic

history of Mindanao Island which was formed as a by-product of paleo-island accretion in identified suture zones (Yumul, 2003), and its recent connectivity to several shallow-water neighboring islands during the last Pleistocene sea-level fluctuations (e.g., Samar, Leyte, Bohol, Dinagat and Siargao) which led to the formation of the identified Greater Mindanao Pleistocene Aggregate Island Complex, allowed faunal exchange and gene flow (Brown and Diesmos 2001, Rohling et al., 1998). Despite the recent efforts in documenting its coleopterological fauna, many species remained unclassified including two new taxa recently collected in Davao City and Bukidnon respectively. Upon examination, the new species have been found to belong to the subgenus *Orthocyrtus* Heller, 1912 based on characters indicated by Cabras et al. (2018). Both species and their habitats will be described and illustrated here below, and their habitat briefly described; we include also some comments about sympatric beetles apparently belonging to the same mimetic ring.

MATERIALS AND METHODS

The specimens deposited in the University of Mindanao Coleoptera Research Center were collected through sheet beating and hand picking and killed in vials with ethyl acetate. Morphological characters were observed under Luxeo 4D and Nikon SMZ745T stereomicroscopes. Images of the habitus were taken with Nikon D5300 digital camera plus Sigma 18–250 macro lens, and images of genitalia were taken with Ricoh WG-50. All images were stacked and processed using a licensed version of Photoshop CS6 Portable software. Label data are indicated verbatim. Measurements mentioned in this paper are abbreviated as follows:

/ different lines

// different labels

â: arithmetic mean rounded to one decimal place

LB body length, from the apical margin of pronotum to the apex of elytra;

LE elytral length, from the level of the basal margins to the apex of elytra;

WE maximum width across the elytra;

LP pronotal length, from the base to apex along the midline;

WP maximum width across the pronotum;

LR length of rostrum; WR maximum width across the rostrum.

The specimens are deposited in the following collections:

UMCRC University of Mindanao Coleoptera Research Center, Davao City Philippines

MBLI private collection of Maurizio Bollino, Lecce, Italy

ZMPC private collect of Zhao Ming, Guangzhou, China

RESULTS

***Metapocyrtus (Orthocyrtus) davaoensis* sp.nov.** (Fig. 1-4)

Holotype (Fig. 1,3), male: Philippines- Mindanao / Calinan / Davao City / March.2018 / coll. Medina (typed on white card) // HOLOTYPE male / *Metapocyrtus (Orthocyrtus) davaoensis* / CABRAS, MEDINA & BOLLINO, 2021 (typed on red card). Presently in CRC, will be deposited in National Museum of Natural History (NMNH) under the National Museum of the Philippines. **Paratypes** (2♂♂, 5♀♀): 1♂, 4♀♀, Philippines – Calinan, Davao City, Mindanao Island / March 2018/ coll. Cabras, presently in UMCRC; 1♂, 1♀, Philippines - Gumitan, Davao del Sur, Mindanao Island/ XI, 2019/ Leg-local collector/, in coll. ZMPC; all in MBLI. All paratypes with additional red label: PARATYPE / *Metapocyrtus (Orthocyrtus) davaoensis* / CABRAS, MEDINA, & BOLLINO, 2021

Diagnosis: *Metapocyrtus (Orthocyrtus) davaoensis* sp.nov. resembles in general morphology *Metapocyrtus (Orthocyrtus) mansaka* Cabras, Bollino & Medina, 2018 from Davao de Oro, South Cotabato and Agusan del Sur, but differs for its unique elytral ornamentation, and the transverse markings on the pronotum.

Description :
Dimensions : LB : 10.0-10.3 (holotype 10.0 mm, â :10.15). LR : 1.8-1.9 (1.8 mm, â:1.85). WR : 1.5-1.6 (1.5 mm, â :1.55). LP : 3.0-3.3 (3.0 mm, â :3.15). WP: 3.3-3.4 (3.3 mm, â:3.35). LE: 6.4-6.6 (6.4, â:6.5). WE: 4.7-4.9 (4.7mm, â:4.8). N=2.

Integument black. Body surface, rostrum, head, and underside with a weak luster.

Body subglabrous. **Head** glabrous, sparsely minutely pubescent on ventral side, with metallic pale-yellow ochre elliptic scales on lateral side and turquoise hairlike scales on lateroventral parts; forehead between eyes covered with metallic light-yellow ochre-colored round scales. **Rostrum** strongly rugose, longer than wide (LR/WR: 1.2), bearing minute yellow-ochre adpressed hairs on the lateral surface, and lateroventral sides below antennal scrobe covered with long light-colored hairs; transverse basal groove distinct; longitudinal groove along midline distinct, creating a shallow depression beset with metallic golden yellow round scales; lateral sides with round to elliptic light yellow-ochre scales; dorsum finely punctured; dorsal surface weakly convex. Eyes medium-sized and feebly convex. Antennal scape and funicle of almost the same length, moderately covered with fine light-colored hairs. Funicular segments I and II almost of the same length, twice times longer than wide; segments III-VII nearly as long as wide; club sub-ellipsoidal, nearly 3 times longer than wide. **Prothorax** sub-globular, slightly longer than wide (LP/WP: 1.0), finely punctured, widest at middle, weakly convex, sparsely covered with turquoise and light yellow ochre round scales on basal half of dorsum, and with the following scaly markings of metallic light yellow ochre, and turquoise round scales: a) thin band at the anterior margin, b) transverse band in the entire width in middle, c) thin band at the posterior margin, and d) broad lateroventral stripe before the coxa confluent with the anterior and posterior marginal bands. **Elytra** obovate (LE/WE:1.36), slightly wider and moderately longer than prothorax (WE/WP: 1.42, LE/LP: 2.13), body surface black with sparse golden yellow and turquoise round scales, sub-glabrous, finely punctured, moderately convex; apex with sparse

white fine hairs. Each elytron with the following scaly markings of metallic light yellow ochre to turquoise round scales: a) short stripe from behind base to before middle of stria II, b) short stripe from behind base to basal third of interval IV, basally confluent with stripe on stria II, c) thin median transverse band starting from interval I towards lateral margin, d) distorted subtriangular stripe on apical third extending from stria I to interval IV, e) small dot on interval V at apical fourth, at times confluent with the distorted subtriangular stripe, f) long stripe from behind base to apex along lateral margin, confluent with basal, median and apical stripes. **Legs** with strong clavate femora. Femora sparsely covered with light-colored hairs, with apical half covered with turquoise elliptic scales. Tibiae covered with subrecumbent light colored bristles and metallic turquoise and golden yellow elliptic scales towards apical part, weakly serrate along inner edge. Fore tibiae bear a mucro at apex. Tarsomeres covered with sparse pubescence. Coxae barely pubescent with very sparse turquoise hairlike scales. Mesosternum covered with light colored adpressed bristles. Metasternum with light colored adpressed bristles and sparse light yellow-ochre round scales at lateral sides. Ventrite 1 depressed on disc, with light yellow-ochre and turquoise round scales towards lateral margin. Ventrite 2 to 5 sparsely covered with adpressed bristles especially towards margin. Ventrite V flattened, apical half finely densely punctured, interspersed sparsely with bluish hair-like scales. Ventrite 1 to 5 with dense and long light brown bristles, laterally sparse light green bristles.

Male genitalia as shown in Figure 2 A-C.

Due to the low number of males available (only 3, excluding the HT), we were unable to obtain even a partial evertion of the endophallus (read below for more comments).

Female.

Dimensions: LB: 12.0-12.7mm (â:12.33): LR: 2.0.-2.1mm (â:2.05): WR: 1.7-1.8 (â:1.75). LP: 3.0-3.2 (â:3.08). WP: 4.2-4.5 (â:4.33). LE: 9.0-9.5 (â:9.23). WE: 6.9-7.5 (â:7.18). N=4.

Habitus as shown in Figure 1D-F.

The differences concerning males are: a) pronotum wider than long (LP/WP: 0.71), slightly shorter than in male; b) pronotum imperfectly sub-globular, and c) elytra imperfectly obovate (LE/WE: 1.27-1.3), longer and wider (WE/WP: 1.64-1.67, LE/LP: 2.97-3.0) than in male, widest before middle; d) ventrite 1 flattened or slightly convex on disc. Otherwise mentioned, similar to the male.

Etymology

The new species is named after its type locality- Davao City.

Distribution

Metapocyrtus (*Orthocyrtus*) *davaoensis* sp.nov. is known from Calinan, Davao City and Gumitan, Davao del Sur.

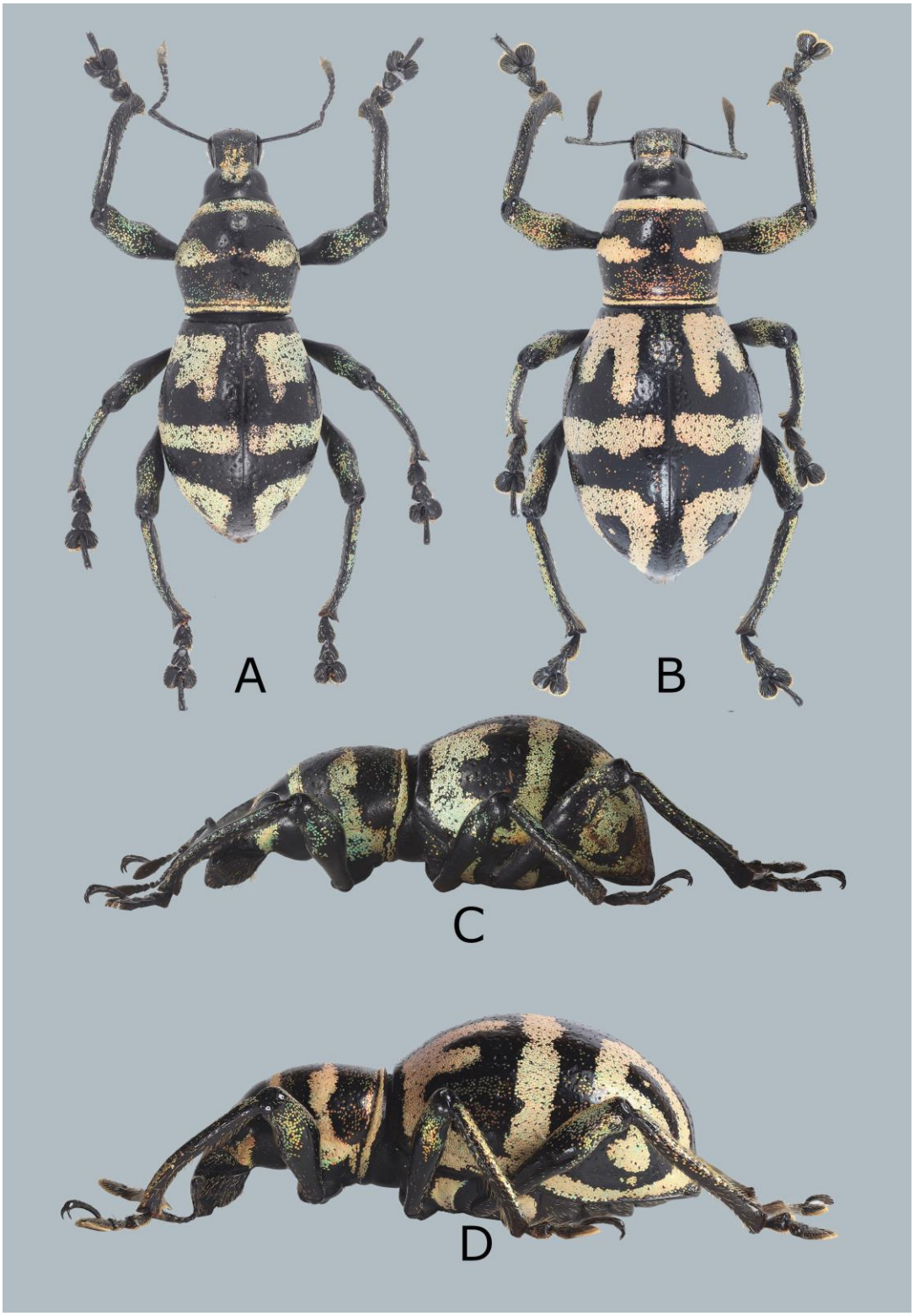


Figure 1. *Metapocyrtus (Orthocyrtus) davaoensis* sp.nov. **A** male holotype, dorsal view **B** female, dorsal view **C** ditto, lateral view **D** ditto, lateral view

***Metapocyrtus (Orthocyrtus) hirakui* sp.nov. (Fig. 5-8)**

Holotype (Fig. 1A, B), male: Philippines – Mindanao / Bukidnon / Lantapan / July 2018 / coll. Medina (typed on white card) // HOLOTYPE male / *Metapocyrtus (Orthocyrtus) hirakui* / CABRAS, MEDINA & BOLLINO, 2021 (typed on red card) Presently in UMCRC, it will be deposited in Philippine National Museum of Natural History (PNMNH) under the National Museum of the Philippines (NMP). **Paratypes.** 28♂♂, 39 ♀♀: 3♂♂, 15 ♀♀, Philippines - Mindanao/ Bukidnon / Lantapan / V-VII.2018 / coll. Medina; 7♂♂, 4 ♀♀, Philippines- Mindanao/ Bukidnon/ Talakag/ VII. 2018/ Leg, L.C. All in UMCRC; 7♂♂, 2♀♀: Philippines – Mindanao / Cabanglasan – Bukidnon / III-IV.2013 / m. 800-1000 – Leg. Loc. people / coll. M. Bollino; 7♂♂, 14♀♀: Philippines – Mindanao / Cabanglasan (Bukidnon) / September 2013 / ex. N. Mohagan / Lg. local people – coll. Bollino; 1♂, 1♀: Philippines – Mindanao / Cabanglasan / (Bukidnon) / December 2018 – January 2019 / Lgt. local people – coll. Bollino; 1♂: Philippines – Mindanao / Kalatungan / (Bukidnon) / X.2015 / ex I.Lumawig – coll. Bollino; 2♂♂, 3 ♀♀: Philippines – Mindanao / San Fernando – Bukidnon / X.2013 / ex Lumawig / lg. Local people – coll. Bollino, all in MBLI. All paratypes with additional red label: PARATYPE / *Metapocyrtus (Orthocyrtus) hirakui* / CABRAS, MEDINA & BOLLINO, 2021

Diagnosis: *Metapocyrtus (Orthocyrtus) hirakui* sp.nov. differs from all other species of the subgenus for its unique elytral ornamentation.

Description :
Dimensions : LB: 10.6-10.9 (holotype 10.9 mm, â:10.75). LR: 1.9- 2.0 (holotype 2.0 mm, â: 1.95). WR: 1.3-1.5 (holotype 1.5 mm, â:1.4). LP: 3.0-3.1 (holotype 3.0 mm, â:3.05). WP: 3.0-3.1 (holotype 3.0 mm, â:3.05). LE: 6.9-7.0 (holotype 6.9, â:6.95). WE: 4.9- 5.0 (holotype 5.0, â:4.95). N=4.

Integument black. Body surface, rostrum, head, and underside subopaque.

Body subglabrous. **Head** subglabrous, sparsely minutely pubescent, with light yellow ochre round scales interspersed with metallic white hair-like elliptic scales on lateroventral parts; forehead between eyes partially covered with metallic light-yellow ochre round scales; median groove barely distinct, not reaching the vertex. **Rostrum** sparsely minutely pubescent, slightly longer than wide (LR/WR: 1.33), dorsum faintly minutely punctured bearing minute yellowish colored hairs, white recumbent hairlike scales in the lateral surface, and long light brown hairs at the anterolateral margin; transverse basal groove distinct; basal half with shallow depression covered with metallic yellow-ochre colored round and elliptic scales; lateroventral part behind antennal scrobe densely covered with round to elliptic white and yellow ochre scales interspersed sparsely with short hair-like white scales; dorsal surface weakly convex. Eyes medium-sized and feebly convex. Antenna moderately clavate, scape slightly shorter than funicle, moderately covered with fine light-colored hairs. Funicular segments I and II almost of the same length, nearly 3 times longer than wide; segments III-VII slightly longer than wide; club sub-ovoid, nearly 3 times longer than wide. **Prothorax** subglobular, as long as wide (LP/WP: 1.0), faintly punctured with sparse minute hairs, widest at middle, weakly convex, with a faint groove along midline reaching the middle, and with the following scaly markings of metallic light yellow

ochre, and shagreen round scales: a) thin band at the anterior margin, b) transverse band in the entire width in middle, and c) lateroventral stripe before the coxa confluent with the anterior margin and transverse band at middle. **Elytra** strongly obovate (LE/WE:1.38), wider and longer than prothorax (WE/WP: 1.67, LE/LP: 2.3), black, sub-glabrous, strongly convex with very minute and sparse setiferous punctures, each puncture with light colored short seta. Elytra with scaly bands of metallic light-yellow ochre, turquoise and blue colored round scales covering stria I-IX, beginning shortly from anterior margin and extending towards apex, sometimes stria I interrupted at middle creating a sub-circular broad black glossy spot without scales. Stria I- IX confluent at anterior margin; stria I, II, III, VIII and IX confluent at the apex. Stria IV and V confluent at apical ¼. Apex with light colored hair. **Legs** with moderately clavate femora. Femora covered with light-colored hair and sparse pale blue elliptic and hair like scales towards apical part. Tibiae covered with subrecumbent light colored bristles, and weakly serrate along inner edge. Fore and mid tibiae bear a mucro at apex, and hind tibiae with apical mucrones vestigial. Tarsomeres covered with sparse pubescence. Procoxae with light colored hair covered with pale green and light yellow-ochre round to elliptic scales on the anterior side interspersed with white hair like scales. Mesocoxae and metacoxae with light green hairs and sparsely covered on the anterior side with pale blue hairlike and round scales, less dense on metacoxae. Mesosternum covered with light colored adpressed bristles. Metasternum with light colored adpressed bristles and sparse light yellow-ochre round scales at lateral sides. Ventrite 1 depressed on disc with light colored adpressed bristles and sparse light yellow-ochre round scales towards lateral margin interspersed with white colored hair like scales. Ventrite 2 with long light brown adpressed bristles, shorter towards margin. Ventrites 3-5 with sparse light-colored short bristles. Ventrite 5 flattened, apical half finely densely punctured.

Male genitalia as shown in Figure 2 A-C.

Endophallus as shown in Fig. 3. Cabras, Bollino & Medina (2018) underlined that obtaining the complete eversion of the endophalus in the subgenus *Orthocyrtus* is particularly complicated due to the long flagellar diverticul, and attempts are very often subject to partial failure because the flagellar diverticulum itself tends to remain invaginated. Long series of males are needed to hope for a complete or even just a partial but acceptable evertion, as it was in this case (18 males available, 0 full, 9 partial, but only 5 acceptable partial evertions obtained).

Even if the number of completely everted endophalluses belonging to taxa of the subgenus *Orthocyrtus* is still very low, it is possible to try to put forward some hypotheses on the taxonomic value of this genitalic structure. From what we have been able to observe up to now, in fact, the flagellar diverticulum does not seem to have a species-specific morphology and to be quite uniform both in shape and in length, contrary to what happens, for example, in the subgenus *Artapocyrtus* (Bollino, Sandel & Yoshitake, 2019). On the other hand, what appears to be significant for the purposes of a taxonomic diagnosis is the shape and presence / absence of the basal, baso-lateral and median diverticula. Considering that, studying the *Orthocyrtus*, the percentage of partial successes is around 30% of the samples examined, and even though it is possible to obtain a complete evertion in approximately 1% of the samples, it will still take a long time before we can reach conclusions that are not just working hypotheses.

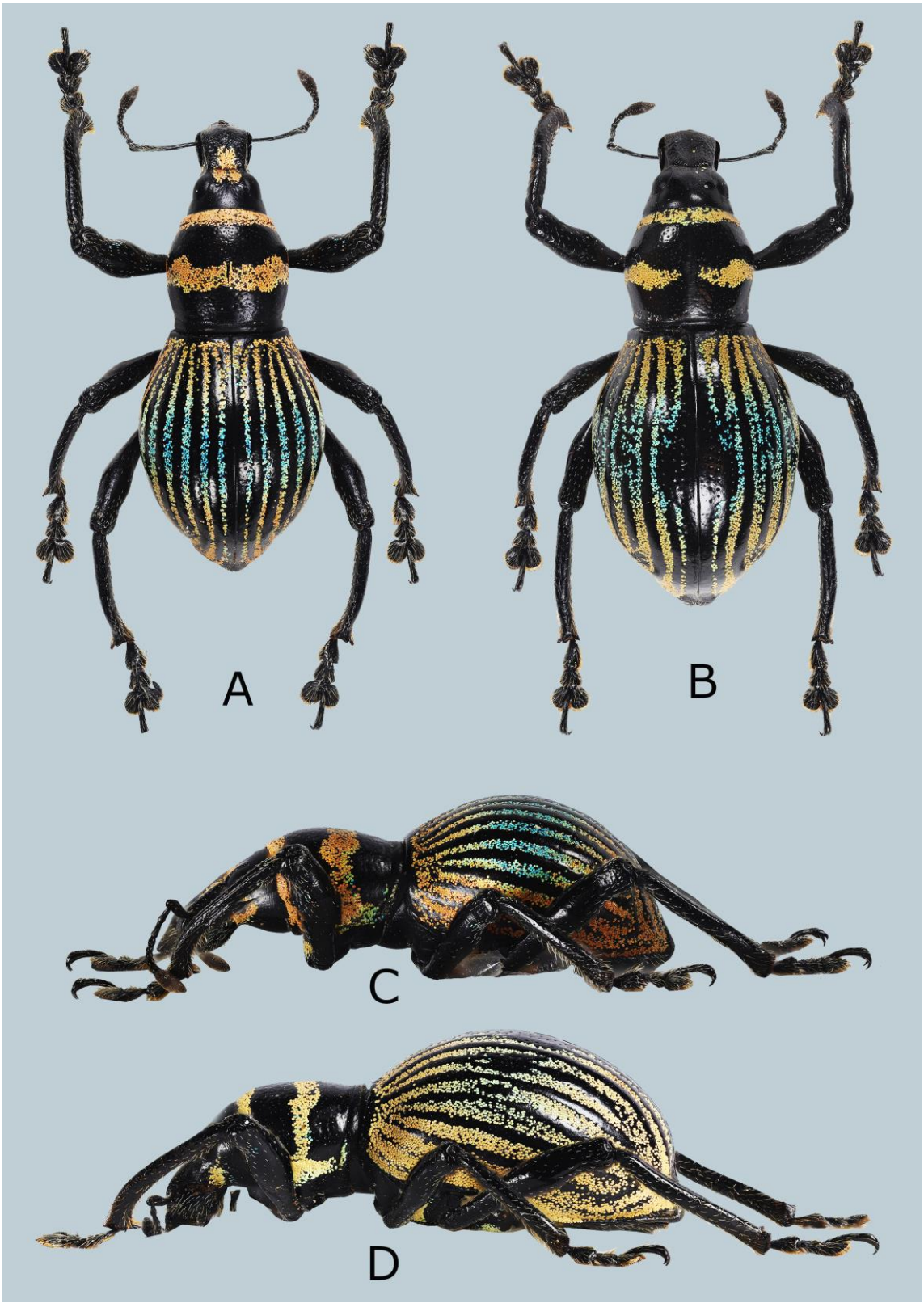


Figure 2. *Metapocyrtus (Orthocyrtus) hirakui* sp.nov. **A** male holotype, dorsal view **B** female, dorsal view **C** ditto, lateral view **D** ditto, lateral view

Female.

Dimensions: LB: 12.0-13.8 mm (â:12.66): LR: mm 2.0- 2.2 (â:2.12): WR: 1.4- 2.0 (â:1.57). LP: 3.2- 3.8 (â:3.56). WP: 3.2- 3.8 (â:3.51). LE: 8.9- 10.0 (â:9.14). WE: 5.5- 6.8 (â:5.86). N=15.

Habitus as shown in Figure 1D-F.

The differences concerning males are: a) head and rostrum mostly glabrous with only few sparse yellow ochre round scales and blue hair like scales on lateral and latero-ventral side, b) pronotum slightly longer than wide in female (LP/WP: 1.0), c) pronotum sub-globular; thin transverse median band interrupted at middle, d) elytra obovate (LE/WE: 1.47-1.62), slightly longer and wider (WE/WP: 1.72-1.79, LE/LP: 2.63-2.78) than male; stria I and II interruption at middle creating a sub-circular broad black glossy spot without scales more prominent; e) ventrite 1 flattened or slightly convex on disc.. Otherwise mentioned, similar to the male.

Etymology

The specific epithet is named after Dr. Hiraku Yoshitake (Tsukuba, Japan) for his great contribution in the advancement of Pachyrhynchini studies in the Philippines.

Distribution

Metapocyrtus (*Orthocyrtus*) *hirakui* sp.nov. is known so far only from the province of Bukidnon.

Figure 3. *Metapocyrtus hirakui* sp.nov. everted endophallus, lateral view

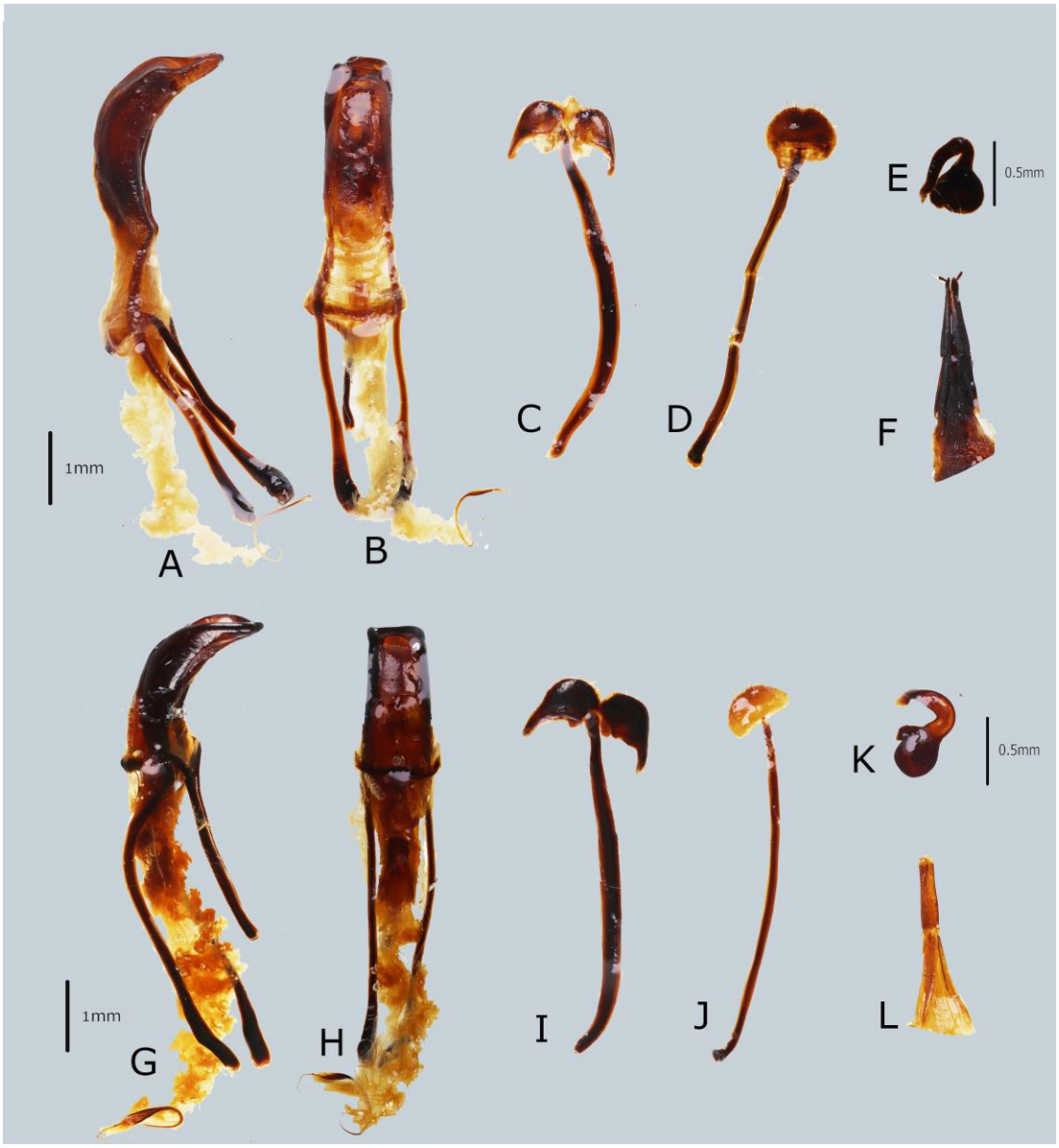


Figure 4. Male genitalia and female terminalia of *Orthocyrtus* spp. **A-F** *Orthocyrtus davaoensis* sp. nov. **A** penis in lateral view **B** idem in dorsal view **C** sternite IX in dorsal view **D** sternite VIII in ventral view **E** spermatheca **F** ovipositor in dorsal view; **G-L** *Orthocyrtus hirakui* sp. nov. **G** penis in lateral view **H** idem in dorsal view **I** sternite IX in dorsal view **J** sternite VIII in ventral view **K** spermatheca **L** ovipositor in dorsal view

Brief Ecological Notes

Specimens of *M.* (*O*). *davaoensis* sp.nov. were collected on leaves of *Swietenia macrophylla* (Meliaceae) at the ridge near Tamugan river in Calinan (Western part of Davao City) with an estimated altitude of 800 m (Fig. 5A). The biotope is a mix of secondary and agroforest. Barangay Calinan is characterized by rugged terrain and adjacent to several mountain ecosystems such as Mt. Carmen and Mt. Tamayong, with considerably higher elevation compared to the downtown area of Davao City. The river near where the new species was

collected is quite pristine as evidenced by the presence of Odonates inhabiting only pristine fluvial systems such as *Eupheae amphicyana* Ris, 1930 and *Neurobasis anumariae* Hämäläinen, 1989. This biotope also has lush vegetation with several plants such as *Medinilla* sp. (Melastomataceae), *Ficus* spp. (Moraceae), *Cyathea* sp. (Cyatheaceae), and *Bambusa* spp. (Poaceae), among others. Despite the conversion of surrounding areas to maize and banana farms, it is still rich with Pachyrynchini weevils particularly members of the genus *Metapocyrtus*. Some of the *Metapocyrtus* species documented within a radius of 500 meters from the banks of the river are *Metapocyrtus (Dolichocephalocyrtus) lineaticollis* Schultze, 1925, *M. (Dolichocephalocyrtus) bituberosus* Heller, 1912, *M. (Trachyrhycyrtus) apoensis* Schultze, 1925 and *M. (Trachyrhycyrtus) adspersus* Waterhouse, 1843. Compared with the aforementioned *Metapocyrtus* species which are abundant in the area, the new species is quite rare with only a few individuals documented. No species of *Pachyrynchus* were observed. Moreover, the discovery of this new species within the remaining green spaces of Davao City reiterates the importance of our urban green spaces as a remaining haven for different species of flora and fauna and calls for immediate conservation measures.

Metapocyrtus (Orthocyrtus) hirakui sp.nov., on the contrary, was abundant in a secondary forest with some old growth trees near Lantapan, with an elevation of approximately 1200 m (Fig 5B) The new species was present all over the area and collected on several plants, namely *Bridelia* sp. (Phyllanthaceae), *Oleandra* sp. (Oleandraceae), *Clerodendrum* sp. (Lamiaceae), *Ageratum conyzoides* (Asteraceae), *Camelia* sp. (Theaceae), *Medinilla* sp. (Melastomastaceae) and *Nepholepis* sp. (Thelypteridaceae) (Fig. 6 A-F). However, they were more abundant along trails and open areas. As documented previously, the majority of the Pachyrhynchini including *Metapocyrtus* are often collected along trails and ridges which are either fully or partially exposed to the sun. The interior of the forest does not usually give an outstanding result in terms of collecting Pachyrhynchini.

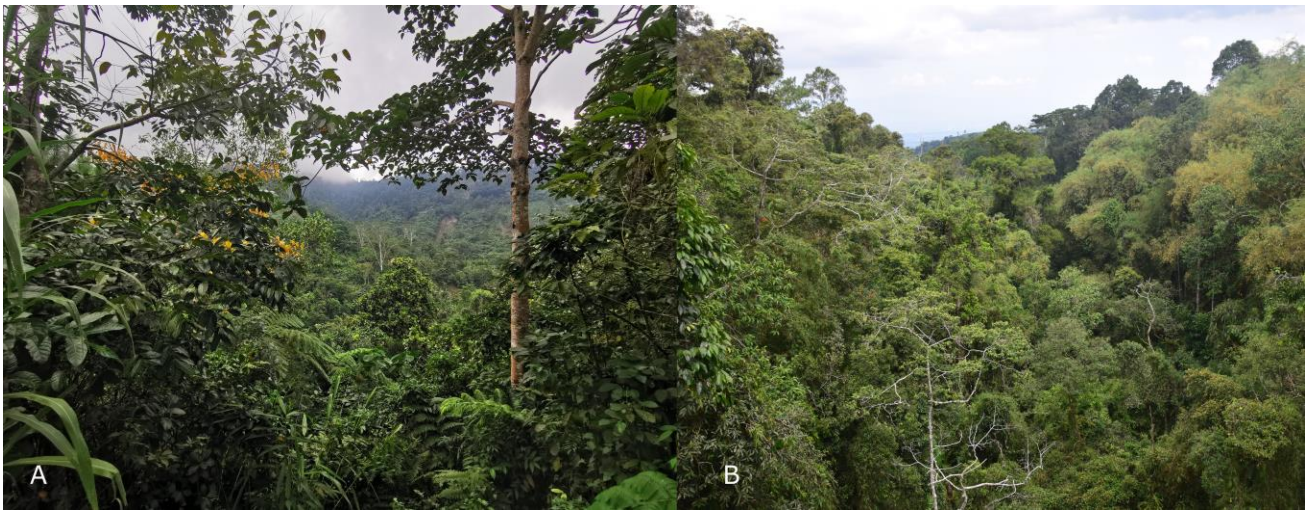


Figure 5. Habitat of *Orthocyrtus* spp. **A** *O. davaoensis* sp.nov in Davao City **B** *O. hirakui* sp.nov. in Lantapan, Bukidnon

Figure 6. A *Swietenia* macrophylla (Meliaceae) **B** *Ageratum conyzoides*(Asteraceae) **C** *Medinilla* sp. (Melastomastaceae) **D** *Bridelia*sp (Phyllanthaceae) **E** *Camelia* sp. (Theaceae) **F** *Clerodendrum* (Lamiaceae)

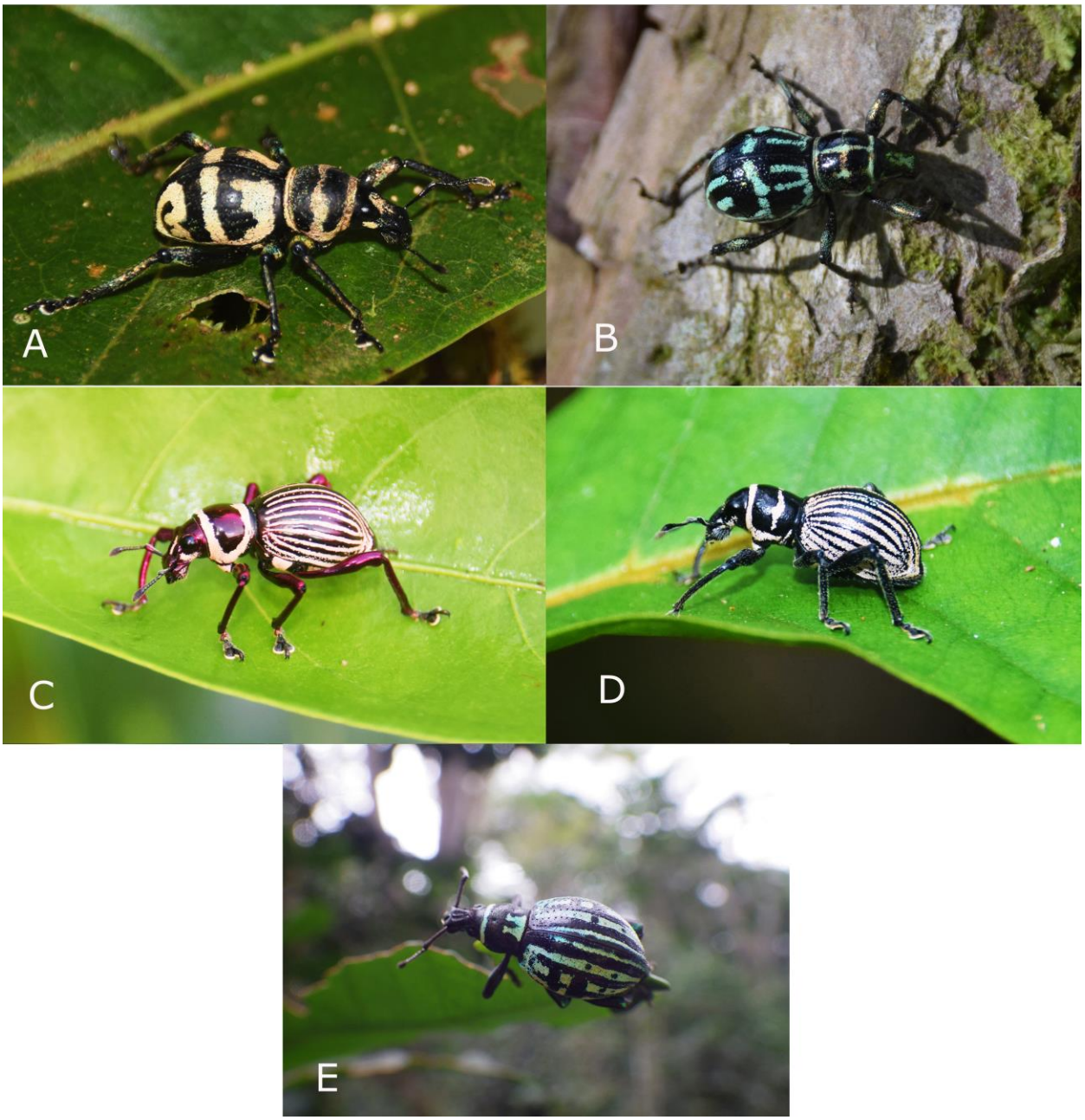
Notes on mimicry

Mimicry is well investigated in butterflies but far less understood in beetles which possess equally interesting mimetic patterns (Meyer, 2006). The first record of mimicry among Pachyrhyncini was noted by Wallace (1889) when he noticed sympatric species sharing the same colors of integuments and elytral patterns. It was also noted by Schultze where he provided a list of 19 sympatric species of *Pachyrhynchus*, *Metapocyrtus*, and *Doliops* sharing the same coloration and patterns (Schultze, 1923 and 1925). He further reported 14 sympatric species of *Metapocyrtus* exhibiting very similar elytral patterns, being separable only after a closer inspection of diagnostic characters such as the rostrum (Schultze, 1925). Further study by Tseng

et al. (2014) indicated that Pachyrhychini weevils are taking advantage of their coloration as aposematic signals in deterring predators, explaining how the diverse mimicry among the tribe exploits the predator's visual system. Pachyrhynchini does not possess toxins like in the case of butterflies but has a very hard elytra which deter predators and acts as a secondary defense of an aposematic insect (Schultze, 1923; Wang et al., 2018). As mentioned by de Jager and Anderson (2019), mimicry can be confirmed using 3 conditions namely "(1) characterizing a model, (2) identifying a receiver with a percept of said model, and (3) demonstrating that the receiver exerts selection on the mimic". This sympatric and allopatric convergence of colors and patterns have been greatly observed among Pachyrhynchini and other Entiminae weevil groups such as *Alcidodes*, *Polycatus*, *Eupyrgops*, *Neopyrgops*, *Coptorhynchus*, and the long-horned beetle *Doliops* which can be an outstanding example of the mimetic complex. This occurrence has also been observed among spiders, and other insects belonging to the orders Heteroptera and Orthoptera which show superficial resemblance and body coloration and pattern (Wallace, 1889; Cabras et al., unpublished).

Metapocyrtus (Orthocyrtus) davaoensis,sp.n. was collected nearly in the same locality as *M. kitangladensis*. This suggests a possible mimicry between the two species for they have similar elytral markings. Additional photographic documentation also suggests the presence of *M.O. davaoensis* sp.nov.in Marilog District, Davao City where *M. kitangladensis* was also documented. The importance of the geographic distribution of the model as the limiting factor for the effectiveness of the mimicry complex has already been established. As Ries and Mullen (2008) mentioned "the advantage of mimicry does not extend beyond the range of the model", although allopatric convergence of colors has also been documented.

Metapocyrtus (Orthocyrtus) hirakui sp.nov. belong to a mimetic complex involving *Pachyrhynchus tikoi* Rukmane, 2016, *Doliops valainisi* Barsevskis, 2013, and *Polycatus mimicus* Bramante & Bramante, 2020, all sharing a superficial resemblance. All species were collected in less than 500m diameter and at times from the same plant. *M. O. hirakui* and *P. tikoi* were very abundant in the secondary forest of Lantapan, Bukidnon, and could be easily interchanged due to their uncanny resemblance. Some members of the genus *Polycatus* have been previously recorded to be involved in the possible Pachyrhynchini mimicry complex. Sometimes they exhibit a perfect mimicry, looking exactly like some Pachyrhynchini models, while other times they exhibit imperfect mimicry wherein they don't exactly have the same pattern. According to Forsman & Appelqvist (1998) imperfect mimicry, even if the superficial resemblance and coloration of the elytra, is enough to fool visual predators which mostly rely on patterns and coloration in their choice of prey. *Polycatus* can be easily distinguished from Pachyrhynchini for the rostrum that is entirely continuous with the head, the metepisternal suture is complete, a distinct squamose scutellum, a definite epistome on the rostrum, and the antenna club that has the first joint much longer than the rest together with its basal half narrowed into a conspicuous peduncle. As expected in this case of Batesian mimicry, mimics (*Polycatus mimicus* and *Doliops valainisi*) were much less numerous in the field than models (*Metapocyrtus (Orthocyrtus) hirakui* and *Pachyrhynchus tikoi*.



Figures 7. Mimicry of *O. davaoensis* sp.nov. and *O. hirakui* sp.nov. **A** *Metapocyrtus* (*Orthocyrtus*) *davaoensis* sp. nov. **B** *Metapocyrtus kitangladensis* sp. nov. **C** *Pachyrhynchus tikoi* **D** *Metapocyrtus* (*Orthocyrtus*) *hirakui* **E** *Polycatus mimicus*

Acknowledgments

We wish to express our gratitude to National Geographic Society (GR-000000031) for the funding in the Jewel Weevil Mimicry Complex in Mindanao Island project, and CHED DARETO for funding the coleoptera expeditions of AC and MNM to Davao City and other neighboring places through the Urban Biodiversity Research and Conservation project; to Dr. Guillermo P. Torres for the continuous support to our coleopterological researches; to Chrestine

Torrejos and Mark John Pepito, members of the research team of the Coleoptera Research Center; to Efrain Loidge Pajota for helping in the images; to Dr. Arvids Barševskis for the continuous support, especially during our visit to Ilgas; to Dr. Hiraku Yoshitake during the first author's visit to Institute for Agro-Environmental Sciences, NARO, Tsukuba, Japan (NIAES); Dr. Klaus-Dieter Klass and Olaf Jäger for their help during our visits to Senckenberg Natural History Collections, Dresden, Germany (SMTD). A special thanks also to Jordan Lim for the English review.

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