

## Review on *Doliops* Waterhouse, 1841 (Coleoptera: Cerambycidae) of Mindanao, Philippines with description of a new species

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A new species, *D. coritioi* sp. n. is described and illustrated from Mt. Kiamo, Malaybalay, Bukidnon, Mindanao Island, the Philippines, which is the twelve *Doliops* species described from Bukidnon. New species is distinguished from its allied species by its unique elytral markings. The genus *Doliops* is now represented by 55 described species. The article contains a bibliography and photos of all species of this genus, distributed in Mindanao Island.

Keywords: *Doliops*, checklist, new species, Cerambycidae, endemic, taxonomy

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### INTRODUCTION

The Philippines is one of 17 mega-diverse countries in the world with a level of endemism believed to be ten times of Galapagos Island (Heaney, 1998). Among the taxa in the country with a high level of endemism are insects with 70% endemism and currently has 22,000 described species. Among the most numerous insect group with an estimated 7,000 species in the Philippines are the order coleoptera (Baltazar 2001).

The Philippine coleoptera with a 79% endemism is still poorly known although some taxon are

well studied. Coleoptera are generally polyphagous but most are associated with specific plants and forest habitats thus the accelerated decline of forest habitats in the Philippines is a major threat especially to the coleoptera species with specific host and food plants (Cassola 2000). The genus *Doliops* belonging to the tribe Apomycini is one of the rare beetle species highly associated with forest habitats and with more than 95% of endemism. Currently, it has 55 known species and almost exclusively distributed in Philippines islands (Barševskis 2014). Most species are rare in collections or known only by type specimens (Barševskis & Jaeger, 2014). This genus *Doliops* has been extensively studied with

new species described yearly by Vives and Barševskis (Barševskis 2015).

The distribution of *Doliops* in the Philippines is as follows: Luzon has 26 spp., Mindanao has 18 spp., Samar Island has 3, Mindoro and Negros Island has 2, Babuyan, Calayan, Basilan, Bucas Grande, Masbate, Pollilo, Bohol and Siargao has 1 species (Barševskis 2015). Mindanao Island which is the second biggest island in the Philippines (94,630 km<sup>2</sup>) is a home to 18 species of *Doliops*. During the last Pleistocene epoch it is believed to be connected with land bridges to Samar, Leyte and Bohol thus the term Greater Mindanao. Dickerson (1928) divided Mindanao into 4 faunal and floristic subregion namely Eastern Mindanao-Samar-Leyte, Bukidnon highlands, Cotabato and Zamboanga. The different subregions of Mindanao have different species affinity and have unique flora (Vallejo 2011). The unique flora of each subregion impacts the faunal composition especially the phytophagous species including coleoptera with unique host and food plants. In this paper, a checklist of the *Doliops* from Mindanao together with their distribution and a description of another species from Malaybalay, Bukidnon is presented.

## MATERIAL AND METHODS

The type material of the new species described herein is deposited at Central Mindanao Zoological Museum - CMZM. Morphological features were observed under Luxeo 4D stereoscopic microscope. Photographs of the holotype female was taken with a Nikon D5300 digital camera.

## RESULTS AND DISCUSSION

*Doliops coriticoi* sp.n.  
(Fig.1)

**Type material. Holotype:** Female. Philippines: Mindanao, Mt. Kiamo, Bukidnon, 01.05.2015, local collector leg (CMZM)

**Description.** Body black and shiny without metallic luster. Surface with spots of pale yellow and green scales. Length: 13 mm, Width: 6.4 mm.

Head black, finely punctate shiny; head with longitudinal median band of pale yellow and green scales between eyes and antennal bases. Genae under the eyes with oblique band of pale yellow and green scales. Labrum covered with numerous setae. First antennomere black, shiny and pubescent, without metallic luster. Basal half of the second antennomere brown with white pubescence; apical half of the second antennomere black with black pubescence and scarce setae. Basal half of the 3<sup>rd</sup> antennomere pubescent with white setae, apical half brown to black pubescent with scattered long black setae. Antennomere segments 4-8 brown with white and brown pubescence and few scattered black setae. Antennomere 9-10 black and with pubescence.

Pronotum convex, finely and sparsely punctured especially the lateral side. Black and shiny with the pattern of pale yellow and turquoise elongated diamond shaped scales. One thin band from the base up to three fourths of the pronotum, and short thin band in the lateral side of the basal margin, which towards the apical margin forming a half circle band.

Scutellum rounded and tomentose apically.

Elytra convex, black and shiny, and heavily punctured with four medium sized circular spots located basally on either side of scutellum. Two are located dorsally and another two laterally. Additional two thin transverse bands and tear shaped apical stripe. Second transverse band on apical 1/3 is in zigzag form and confluent at the middle to the first transverse band as well as the tear shaped apical stripe. Bands are thin with diamond shaped pale yellow and green scales with few scattered orange scales. Apical tear shaped stripe confluent to the second transverse band. Elytra finely punctate and tomentose. In basal part with sparse and coarse punctuation and tomentose. Width of elytra at shoulders: 5.0 mm.

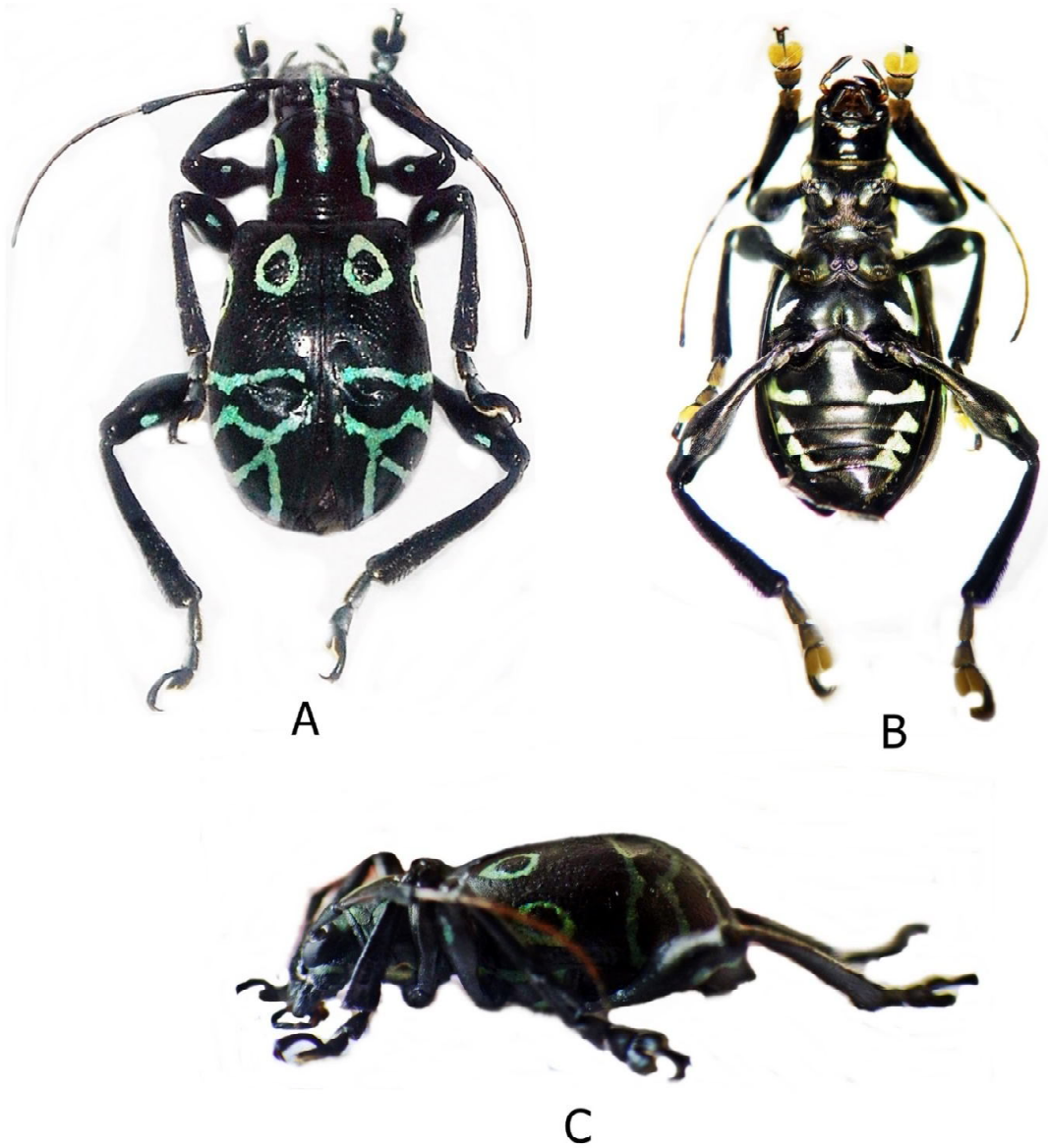


Fig.1. A-C. *Doliops coriticoi* sp.n. (dorsal, ventral and lateral)

Largest width of elytra behind the middle: 6.8 mm.

Femora with light yellow apical spots and more or less tomentose. Surface of tarsomeres covered with white tomentum with sparse black setae. Tibia and tarsi apically covered with numerous setae, tomentose. Underside has the following markings of pale yellow and green scales: large C-shape patch on each side of metasternum; irregular band at each side along apical margin of ventrite I; a small patch on each side of ventrites II–IV, and a tiny spot on ventrite V.

**Distribution:** Mt. Kiamo, Malaybalay, Bukidnon (Fig. 2)

**Differential diagnosis:** New species is similar to *Doliops bukidnoni*, but with different pattern on basal part of elytra, i.e. monochrome black with

two circles of green scales, one laterally, and the other dorsally, while in *D. bukidnoni* basal part of elytra with green bands (Fig. 3).

**Etymology.** This species is named after botanist friend of first author Fulgent Coritico of Central Mindanao University who obtained the specimen for description and in appreciation of his contribution in the advancement of botanical works in different mountains in Mindanao including Mt. Kiamo.

#### List of *Doliops* species and their distribution in Mindanao

##### 1. *Doliops ageometrica* Barševskis, 2014

*Doliops ageometrica*: Barševskis, 2014 - Baltic J. Coleopterol. 14 (2): 11



Fig. 2. Distribution of *Doliops coriticoi* sp.n.

*Doliops ageometrica*: Barševskis, 2015 - Conference "Contemp. Probl. Entomol. East. Eur.": 12

**Distribution:** Mt. Apo, Kidapawan, South Cotabato, Mindanao Isl.

**Endemicity:** Mindanao endemic.

**Holotype deposited:** DUBC

**Photo:** Fig. 4.

## 2. *Doliops bukidnoni* Vives, 2013

*Doliops bukidnoni*: Vives, 2014 - Elytron, 26: 3

*Doliops bukidnoni*: Barševskis, 2014 - Baltic J. Coleopterol. 14 (2): 12

*Doliops bukidnoni*: Barševskis, 2015 - Conference "Contemp. Probl. Entomol. East. Eur.": 12

**Distribution:** Esperanza, Agusan del Sur; Cabanglasan, Bukidnon; San Fernando, Bukidnon, Mindanao Isl.

**Endemicity:** Mindanao endemic.

**Holotype deposited:** EVC

**Photo:** Fig. 3

## 3. *Doliops cuellari* Vives, 2012

*Doliops cuellari*: Vives, 2012 - Les Cahiers Magellanes, ser. n. 7: 75

*Doliops cuellari*: Barševskis, 2013 - Baltic J. Coleopterol. 13 (2): 85

*Doliops cuellari*: Barševskis, 2014 - Baltic J. Coleopterol. 14 (2): 11

*Doliops cuellari*: Vives, 2015 - Bol. S.E.A. 56: 50

*Doliops cuellari*: Barševskis, 2015 - Conference "Contemp. Probl. Entomol. East. Eur.": 12

**Distribution:** Mt. Apo, Davao del Sur; Kapatagan, East Davao; Impasug-ong, Bukidnon; Mt. Kitanglad, Bukidnon, Libertad, Mindanao Isl.

**Endemicity:** Mindanao endemic.

**Holotype deposited:** EVC

**Photo:** Fig. 5.

## 4. *Doliops confluens* Kriesche, 1928

*Doliops siargaoensis confluens*: Kriesche, 1928 - Deutsche Ent. Z., 48

*Doliops confluens*: Barševskis, 2014 - Baltic J. Coleopterol. 14 (2): 128

*Doliops confluens*: Barševskis, 2015 - Conference "Contemp. Probl. Entomol. East. Eur.": 12

**Distribution:** Mt. Kalatungan, Bukidnon, Mindanao Isl.; Bucas Grande Isl.

**Endemicity:** Mindanao endemic.

**Holotype deposited:** EVC

**Photo:** Fig. 6.

## 5. *Doliops coritioi* Cabras & Barševskis sp. n.

*Doliops coritioi*: Cabras & Barševskis, 2016 sp. n. - Baltic J. Coleopterol. 16 (2) (in press)

**Distribution:** Mt. Kiamo, Bukidnon, Mindanao Isl.

**Endemicity:** Mindanao endemic.

**Holotype deposited:** CMZM

**Photo:** Fig. 1.

## 6. *Doliops costatus* Vives, 2012

*Doliops costatus*: Vives, 2012 - Les Cahiers Magellanes, ser. n. 9: 42

*Doliops costatus*: Barševskis, 2013 - Baltic J. Coleopterol. 13 (2): 86

*Doliops costatus*: Barševskis, 2015 - Conference "Contemp. Probl. Entomol. East. Eur.": 12

**Distribution:** Impasug-ong, Bukidnon, Mindanao Isl.

**Endemicity:** Mindanao endemic.

**Holotype deposited:** EVC

**Photo:** Fig. 7.

## 7. *Doliops curculionoides* Waterhouse, 1841

*Doliops curculionoides*: Waterhouse, 1841 - The Ann. Mag. Nat. Hist. 8 (50): 222

*Doliops curculionoides*: Westwood, 1841 - Arcana Ent. 1 (1): 57

*Doliops curculionoides*: Waterhouse, 1845 - The Trans. Linn. Soc. London 1 (4): 42

*Doliops curculionoides*: Vives, 2005 - Les Cahiers Magellanes 49: 4

*Doliops curculionoides*: Barševskis, 2013 - Baltic J. Coleopterol. 13 (2): 85

*Doliops curculionoides*: Barševskis, 2014 - Baltic J. Coleopterol. 14 (2): 132

*Doliops curculionoides*: Barševskis & Jaeger, 2014 - Baltic J. Coleopterol. 14 (1): 12

*Doliops curculionoides*: Barševskis, 2015 - Conference "Contemp. Probl. Entomol. East. Eur." 12

**Distribution:** Luzon, Eastern Visayas, Masbate, Bucas Grande, Samar, Mindanao Isl.: Surigao del Sur, Bukidnon. Distribution of this species in the Philippines need to clarify.

**Endemicity:** Philippine endemic.

**Holotype deposited:** BMNH

**Photo:** Fig. 8.

#### 8. *Doliops daugavpilsii* Barševskis, 2014

*Doliops daugavpilsii*: Barševskis, 2014 - Baltic J. Coleopterol. 14 (2): 132

*Doliops daugavpilsii*: Barševskis, 2015 - Conference "Contemp. Probl. Entomol. East. Eur." 12

**Distribution:** Mt. Apo, Davao del Sur, Mindanao Isl.

**Endemicity:** Mindanao endemic.

**Holotype deposited:** DUBC

**Photo:** Fig. 9.

#### 9. *Doliops duodecimpunctata* Heller, 1923

*Doliops duodecimpunctata*: Heller, 1923 - Tijdschr. Entomol. 66: 46

*Doliops duodecimpunctata*: Barševskis, 2013 - Baltic J. Coleopterol. 13 (2): 85

*Doliops duodecimpunctata*: Barševskis, 2014 - Baltic J. Coleopterol. 14 (2): 128

*Doliops duodecimpunctata*: Barševskis & Jaeger, 2014 - Baltic J. Coleopterol. 14 (1): 14

*Doliops duodecimpunctata*: Barševskis, 2015 - Conference "Contemp. Probl. Entomol. East. Eur." 12

**Distribution:** Luzon; Mindanao: Surigao Island; Mindoro: Mt. Halcon, Puerto Gallera. Distribution of this species in the Philippines need to clarify.

**Endemicity:** Philippine endemic.

**Holotype deposited:** SNSD

**Photo:** Fig. 10.

#### 10. *Doliops edithae* Vives, 2009

*Doliops edithae*: Vives, 2009 - Les Cahiers Magellanes 88: 17

*Doliops edithae*: Barševskis, 2013 - Baltic J. Coleopterol. 13 (2): 85

*Doliops edithae*: Barševskis, 2014 - Baltic J. Coleopterol. 14 (2): 132

*Doliops edithae*: Barševskis, 2015 - Conference "Contemp. Probl. Entomol. East. Eur." 12

**Distribution:** Bulacao, Bukidnon; Buda, Bukidnon, Mt. Apo, North Cotabato, Mt. Parker, Mindanao Isl.

**Endemicity:** Mindanao endemic.

**Holotype deposited:** EVC

**Photo:** Fig. 11.

#### 11. *Doliops geometrica* Waterhouse, 1842

*Doliops geometrica*: Waterhouse, 1845 - The Trans. Linn. Soc. London 1 (4): 44

*Doliops geometrica*: Westwood, 1848: W.Smith: 60

*Doliops geometrica*: Vuillet, 1911: Insecta 3: 55

*Doliops geometrica conjuncta*: Kriesche, 1928: Deutsche Ent. Z.: 48

*Doliops geometrica*: Vives, 2005 - Les Cahiers Magellanes 49: 4

*Doliops geometrica*: Barševskis, 2013 - Baltic J. Coleopterol. 13 (2): 85

*Doliops geometrica*: Barševskis & Jaeger, 2014 - Baltic J. Coleopterol. 14 (1): 12

*Doliops geometrica*: Barševskis, 2014 - Baltic J. Coleopterol. 14 (2): 132

*Doliops geometrica = conjuncta*: Barševskis, 2014 - Baltic J. Coleopterol. 14 (2): 128

*Doliops geometrica*: Barševskis, 2015 - Conference "Contemp. Probl. Entomol. East. Eur." 12

**Distribution:** San Miguel, Surigao del Sur, Mindanao Isl; Hinabangan, Samar Isl.; Bucas Grande Isl.

**Endemicity:** Greater Mindanao endemic.

**Holotype deposited:** *Doliops geometrica*: BMNH;

*Doliops geometrica conjuncta*: MNHU

**Photo:** Fig. 12.

**12. *Doliops gutowskii* Barševskis, 2013**

*Doliops gutowskii*: Barševskis, 2013 - Baltic J. Coleopterol. 13 (2): 85

*Doliops gutowskii*: Barševskis, 2014 - Baltic J. Coleopterol. 14 (2): 132

*Doliops gutowskii*: Barševskis, 2015 - Conference "Contemp. Probl. Entomol. East. Eur." 12

**Distribution:** Barobo, Surigao del Sur, Mindanao Isl.

**Endemicity:** Mindanao endemic.

**Holotype deposited:** DUBC

**Photo:** Fig. 13.

**13. *Doliops huruki* Barševskis, 2014**

*Doliops huruki*: Barševskis, 2014 - Baltic J. Coleopterol. 14 (2): 120

*Doliops huruki*: Barševskis, 2015 - Conference "Contemp. Probl. Entomol. East. Eur." 13

**Distribution:** Mt. Apo, Davao del Sur, Mindanao Isl.

**Endemicity:** Mindanao endemic.

**Holotype deposited:** DUBC

**Photo:** Fig. 14.

**14. *Doliops kivleniecae* Barševskis, 2014**

*Doliops kivleniecae*: Barševskis, 2014 - Baltic J. Coleopterol. 14 (2): 120

*Doliops kivleniecae*: Barševskis, 2015 - Conference "Contemp. Probl. Entomol. East. Eur." 13

**Distribution:** San Fernando, Bukidnon, Mindanao Isl.

**Endemicity:** Mindanao endemic.

**Holotype deposited:** DUBC

**Photo:** Fig. 15.

**15. *Doliops multifasciata* Schultzze, 1922**

*Doliops multifasciata*: Schultzze, 1922 - The Philipp. J. Sc. 21 (6): 572

*Doliops multifasciata*: Vives, 2005 - Les Cahiers Magellanes 49: 4

*Doliops multifasciata*: Barševskis, 2013 - Baltic J. Coleopterol. 13 (2): 86

*Doliops multifasciata*: Barševskis & Jaeger, 2014 - Baltic J. Coleopterol. 14 (1): 12

*Doliops multifasciata*: Barševskis, 2014 - Baltic J. Coleopterol. 14 (2): 120

*Doliops multifasciata*: Barševskis, 2015 - Conference "Contemp. Probl. Entomol. East. Eur." 13

**Distribution:** Cabanglasan, Bukidnon; Intavar, Bukidnon, San Fernando, Bukidnon, Lindaban, Bukidnon, Mindanao Isl.

**Endemicity:** Mindanao endemic.

**Holotype deposited:** SNSD

**Photo:** Fig. 16.

**16. *Doliops serapavginae* Barševskis, 2014**

*Doliops serapavginae*: Barševskis, 2014 - Baltic J. Coleopterol. 14 (2): 120

*Doliops serapavginae*: Barševskis, 2015 - Conference "Contemp. Probl. Entomol. East. Eur." 13

**Distribution:** Mt. Parker, T'boli, South Cotabato; Mt. Apo, Kidapawan, South Cotabato; Kiamba, Sarangani, Mindanao Isl.

**Endemicity:** Mindanao endemic.

**Holotype deposited:** DUBC

**Photo:** Fig. 17.

**17. *Doliops tamutisi* Barševskis, 2014**

*Doliops tamutisi*: Barševskis, 2014 - Baltic J. Coleopterol. 14 (2): 120

*Doliops tamutisi*: Barševskis, 2015 - Conference "Contemp. Probl. Entomol. East. Eur." 13

**Distribution:** Intavas, Bukidnon; Cabanglasan, Bukidnon, Mindanao Isl.

**Endemicity:** Mindanao endemic.

**Holotype deposited:** DUBC

**Photo:** Fig. 18

**18. *Doliops valainisi* Barševskis, 2013**

*Doliops valainisi*: Barševskis, 2013 - Baltic J. Coleopterol. 13 (2): 86

*Doliops valainisi*: Barševskis, 2014 - Baltic J. Coleopterol. 14 (2): 134

*Doliops valainisi*: Barševskis, 2015 - Conference "Contemp. Probl. Entomol. East. Eur." 13

**Distribution:** Bukidnon, Mindanao Isl.

**Endemicity:** Mindanao endemic.

**Holotype deposited:** DUBC

**Photo:** Fig. 19

### 19. *Doliops villalobosi* Heller, 1926

*Doliops villalobosi*: Heller, 1926 – Tijdschr. Ent. 69: 43

*Doliops villalobosi*: Barševskis, 2013 - Baltic J. Coleopterol. 13 (2): 87

*Doliops villalobosi*: Barševskis & Jaeger, 2014 - Baltic J. Coleopterol. 14 (1): 14

*Doliops villalobosi*: Barševskis, 2014 - Baltic J. Coleopterol. 14 (2): 130

*Doliops villalobosi*: Barševskis, 2015 - Conference "Contemp. Probl. Entomol. East. Eur." 13

**Distribution:** Mindanao Isl.: Cabanglasan, Bukidnon; San Fernando, Bukidnon; Samar Island. Distribution of this species in the Philippines need to clarify.

**Endemicity:** Greater Mindanao endemic.

**Holotype deposited:** SNSD

**Photo:** Fig. 20

The first species of *Doliops* described from Mindanao was *D. curculionoides* Waterhouse, 1841 followed by *D. geometrica* Waterhouse, 1842 which was described a year later. Four species of *Doliops* were described in the 20<sup>th</sup> century by known coleopterists such as Waterhouse, Heller, Schultze and Kriesche (Barševskis 2015). For nearly a century *Doliops* study in Mindanao has been dormant until Vives (2009) described *D. edithae* from the materials submitted by Mr. Estan Cabigas. Since then, 12 species of total *Doliops* diversity in Mindanao have been described almost yearly (Vives 2012a, 2012b, 2013a, 2013b, Barševskis 2013, 2014, Barševskis & Jaeger 2014).

Of the 19 *Doliops* species found in Mindanao, 15 are endemic to Mindanao, 2 are Greater Mindanao endemic and another 2 species are Philippine endemic. Due to limited field collections, actual distribution and endemism of the *Doliops* species is not conclusive. However, pre-

vious collections would tell that they have a restricted distribution often confined to one mountain or locality. Of the 19 species, 12 are recorded from the highlands of Bukidnon while 6 are recorded from Mt. Apo Natural Park. Other localities with records of *Doliops* are South Cotabato, Sarangani, Surigao del Sur, and Agusan del Sur. Furthermore, 10 species of *Doliops* were found in only one locality either in Bukidnon or Mt. Apo. Future field expeditions would confirm if these species are site endemic to the province where they were collected.

Based on the biogeographic subregions of Mindanao as proposed by Dickerson (1928), Bukidnon highlands have the highest species richness, followed by Mt. Apo which borders Eastern Mindanao and Cotabato. The distribution pattern of *Doliops* is very similar with the distribution pattern to the genera *Pachyrynchus* and *Metapocyrtus* (Curculionidae: Entiminae: Pachyrynchini) which is believed to whom this group is mimicking. In his article "Monograph of Pachyrynchini...", Schultze (1923) mentioned that the center of distribution of Pachyrynchini in Mindanao are Bukidnon and Mt. Apo. A similar pattern was observed with *Doliops* where half of the described species are from the Bukidnon highlands and Mt. Apo while a few are from South Cotabato, Surigao and Agusan (Vives 2005, Barševskis 2014, 2015).

The high association of *Doliops* with *Pachyrynchus* which are generally forest dweller (Cabras et al. 2016, Linsley 1959, Schultze 1923) indicate that these species are associated with forest habitats and are among the most at risk of habitat degradation due to deforestation. Their rarity and sporadic distribution plus habitat degradation and the rampant illegal poaching of these species as evident in different online stores selling specimens require immediate attention. Since most species were only described from one or few collected specimens, no ecologic data or abundance data is available for these species. Conservation efforts should be immediately conducted especially to the rare and site endemic species before extinction catches up.





Fig. 3. *Doliops bukidnoni* Vives, 2013

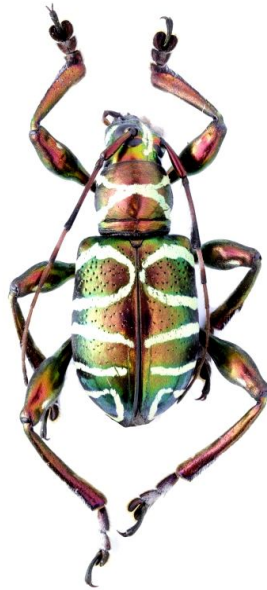


Fig. 4. *Doliops ageometrica* Barševskis, 2014

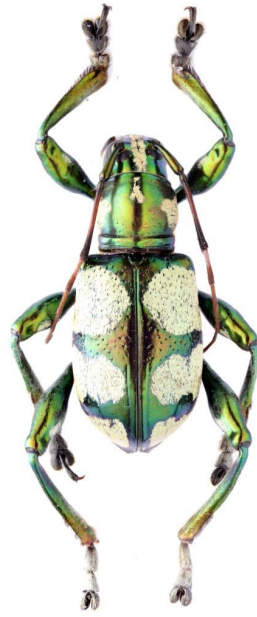


Fig. 5. *Doliops cuellari* Vives, 2012

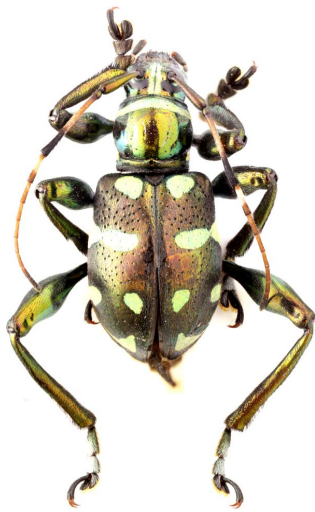


Fig. 6. *Doliops confluens* Kriesche, 1928



Fig. 7. *Doliops costatus* Vives, 2012 (Vives, 2012)



Fig. 8. *Doliops curculionoides* Waterhouse, 1841



Fig. 9. *Doliops daugavpilsii* Barševskis, 2014



Fig. 10. *Doliops decimpunctata* Heller, 1923

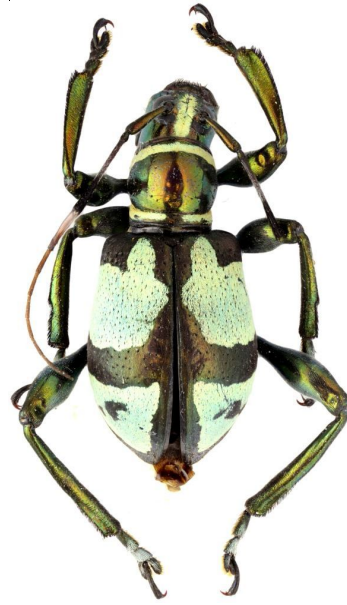


Fig. 9. *Doliops edithae* Vives, 2009



Fig. 10. *Doliops geometrica* Waterhouse, 1842



Fig. 11. *Doliops gutowskii* Barševskis, 2013



Fig. 12. *Doliops huruki* Barševskis, 2014



Fig. 13. *Doliops kivleniecae* Barševskis, 2014

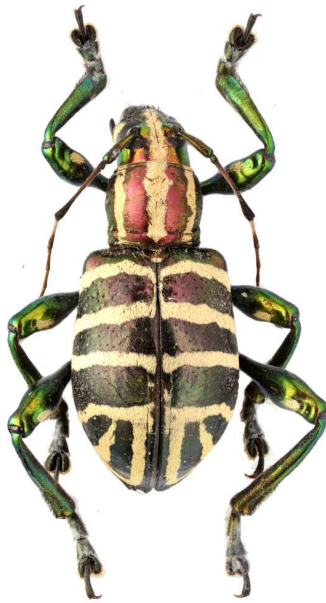


Fig. 14. *Doliops multifasciata* Schultze, 1922

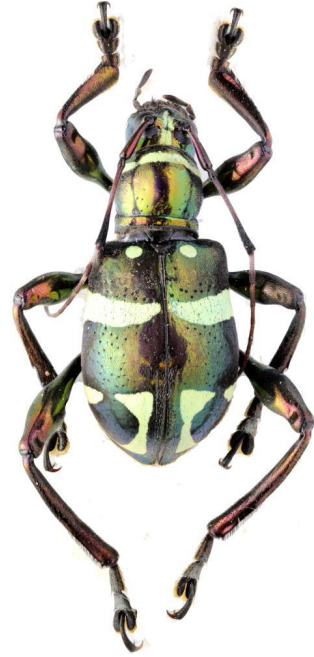


Fig. 15. *Doliops serapavginae* Barševskis, 2014



Fig. 16. *Doliops tamutisi* Barševskis, 2014



Fig. 17. *Doliops valainisi* Barševskis, 2013

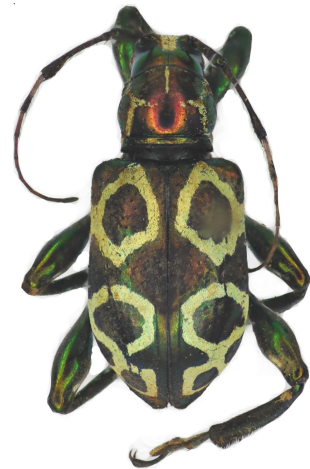


Fig. 18. *Doliops villalobosi* Heller, 1926

## CONCLUSION AND RECOMMENDATION

*Doliops coriticoi* sp. n. is the twelve *Doliops* species discovered from the highlands of Bukidnon and the sixth species new to science from Mt. Kiamo, Malaybalay, Bukidnon. *Doliops* of Mindanao comprises 33.96% of the species found in the Philippines. The highlands of Bukidnon and Mt. Apo Natural Park are the center of distribution of *Doliops* in Mindanao. These are also the same centre of distribution of the Pachyrhynchini which is believed to whom this group is mimicking. These two areas alone have 17 out of the 18 *Doliops* species in Mindanao. More ecologic and faunistic work should be done on the genus *Doliops* especially in unexplored mountains which may hoard new species or new records. Conservation efforts should be conducted especially to the noted site endemic species. Mt. Kiamo should also be listed as a protected area in order to conserve the endemic and threatened species found in this mountain ecosystem.

## ACKNOWLEDGEMENT

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