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## Diversity of Pachyrynchini (Coleoptera: Curculionidae: Entiminae) in Mt. Kiamo, Malaybalay, Bukidnon, Mindanao, Philippines

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**Abstract**

A field survey of weevils of the tribe Pachyrynchini (Coleoptera: Curculionidae: Entiminae) was conducted in Mt. Kiamo, Malaybalay, Bukidnon last December of 2015 to December, 2016. Field sampling was performed using a combination of belt transect, opportunistic and random sampling techniques. Field investigations were done in two vegetation types with elevation from 750-1,500 meters above sea level (masl), which include the lower montane (750-1,000 masl) and upper montane (1,000-1,500 masl) forests. Baseline data on species richness and local distribution were documented. A total of 239 individuals belonging to 20 species and 3 genera viz., *Pachyrhynchus*, *Homalocyrtus* and *Metapocyrtus* were collected from the two vegetation types. The upper montane forest had higher species richness with 12 species as compared to the lower montane forest with 10 species. Only 2 species were shared between the lower and upper montane. Species composition of Pachyrynchini in Mt. Kiamo is unique from that of Mt. Apo and Mt. Malindang. In addition, recent distribution records of the Pachyrynchini found in Mt. Kiamo identified to the species level were provided. This is the only update on distributional record of these species since Schultze monograph in 1923. The results of the survey show that the richness of Pachyrynchini in Mt. Kiamo is high despite the anthropogenic disturbances it experiences. It is recommended that this mountain ecosystem be declared as protected area in order to conserve the endemic and threatened species and ecosystem as a whole.

**Keywords:** Species richness, new record, endemic, Mindanao, Mt. Kiamo

**1. Introduction**

Pachyrynchini (Coleoptera: Curculionidae: Entiminae) is one of the tribes of weevils with a Philippine centered distribution. It has an estimated of more than 400 species with more than 90% of endemism for species <sup>[1, 2]</sup>. For nearly a century knowledge about this tribe has been unchanged until European, Japanese and Filipino entomologists recently took an interest on this tribe and described new species from unexplored islands and mountain ecosystems like Lubang Island, Zamboanga, Palawan, Mt. Kalatungan, Marilog Davao City and Mt. Apo Natural Park <sup>[1,3-7]</sup>. The tribe's unique distribution and their high level of endemism in every mountain ecosystem also make them a good candidate for biogeographic analysis.

Pachyrynchini's general diagnostic characteristics include mandibles without a scar or lasting appendage on exterior surface evenly arcuate at sides, elytra with humeri rounded, hind coxae broadly contiguous with elytra at sides, and antennae scrobes lateral curving downwards in front of eyes at sides of rostrum <sup>[8]</sup>. Majority of its species have restricted distribution in various mountainous regions with an elevation of 500-2000 meters above sea level and between 16 and 18 north latitude and are endemic to a single mountain region, isolated island or dormant volcano <sup>[9]</sup>. Recent collections which led to the discovery of new species indicate that more species of Pachyrynchini are still unknown to science and their distribution is wider than previously believed. Starr and Wang believed that the number of Pachyrynchini species in the Philippines can reach around 500 as more entomological expeditions are conducted <sup>[10]</sup>.

Mindanao which is the second biggest island in the Philippines is divided into four sub-regions based on its flora and fauna distribution namely Zamboanga, Eastern Mindanao, Bukidnon highlands and Cotabato <sup>[11]</sup>. Mt. Kiamo in Malaybalay, Bukidnon is one of the mountains along Pantaron range belonging to Bukidnon highlands which is believed to be one of the centers of distribution for the tribe Pachyrynchini. This mountain hosts unique flora of which five new species were described recently. Mt. Kiamo has three (3) vegetation types which is

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more or less the same with that of Mt. Kitanglad. It is also one of the mountain ecosystems in Bukidnon which has the presence of forest over ultramafic soil resembling that of Mt. Pantaron. It has the presence of a mossy-pygmy forest similar that of Mt. Hamiguitan. This paper presents the first faunistic data of Pachyrhynchini in Mt. Kiamo, Malaybalay, Bukidnon.

## Materials and Methods

### Sampling method

Field sampling was performed using a combination of belt transect, opportunistic and random sampling techniques in Mt. Kiamo, Malaybalay, Bukidnon (Fig.1) last December, 2015 to December, 2016. Samples were mostly obtained from shrubs and collected through handpicking and bush beating and killed in vials with ethyl acetate. Specimens were later air dried and card-mounted for longer storage. Specimens for DNA analysis were soaked in 95% ethanol.

## Description of sampling sites

### A. Vegetation types

a. Lower montane forest- (08°15'27 N, 125°10'08 E) It has an altitude ranging from 750-1,000 masl and dominated by different agricultural crops such as; *Zea mays* L., *Lycopersicon esculentum* Mill., and *Sechium edule* Sw. Some economic fruit trees; *Artocarpus heterophyllus* Lamk., *Psidium guajava* L., and *Lansium domesticum* Corr. Serr. This area is dominated also by different invasive alien species such as, *Lantana camara* L., *Piper arborescens* Roxb. and *Gmelina arborea* Roxb. Grasses- highly dominated followed by the *Pteridium aquilinum*. The agro- ecosystem is located meters away from the Barangay Kibalabag.

b. Upper montane forest- located at 08°15'11 N, 125°09'28 E with altitude ranging from 1,000-1,500 masl. Characterized by taller trees with bigger dbh (diameter at breast height) ranging from 11-47 diameter, with height ranging 16-45 m. Dominated by *Lithocarpus* spp., *Agathis philippinensis* Warb., *Phyllocladus hypophyllus* Hook. f. *Syzygium* spp. and many other trees. Trees were also covered with some mosses.

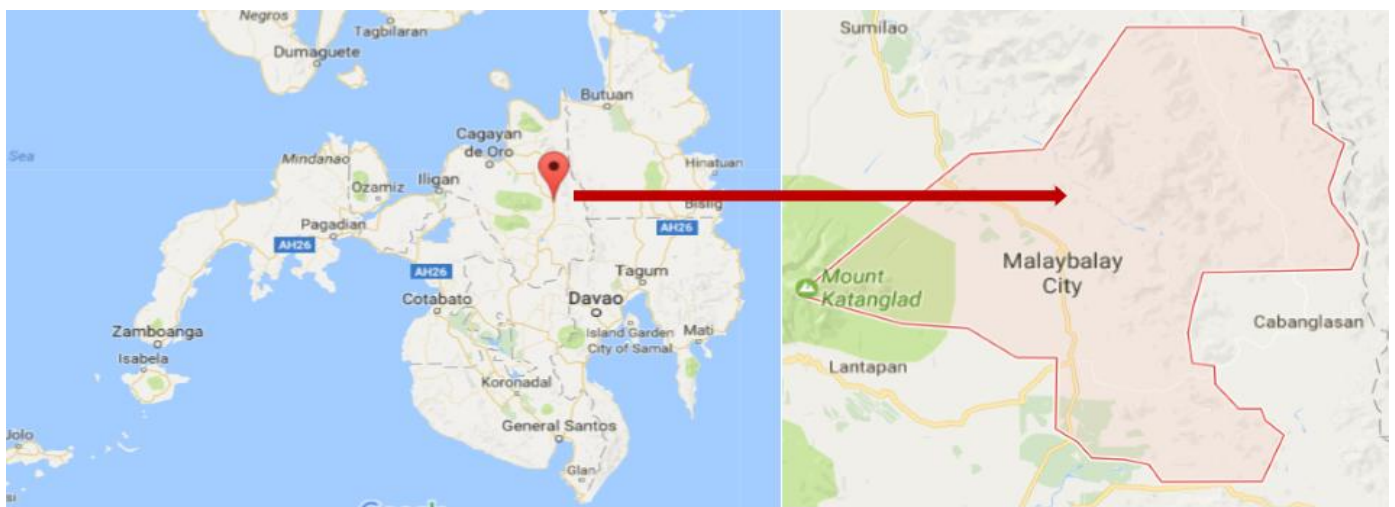


Fig 1. a) Map of Mindanao, b) map of Mt. Kiamo, Malaybalay, Bukidnon

### Identification and Analysis

Identification was done using taxonomic keys and monograph comparison and descriptions provided by Schultz [9], Yoshitake [1] and Rukname & Barsevkis [3]. Confirmation of species was conducted by the third author. Shannon-Weiner diversity index and species distribution were determined using Bio Pro software version 2.0.

Additional distributional records were provided by the 1<sup>st</sup> and 3<sup>rd</sup> authors' collection. Previous records were provided by extensive literature review.

### Results and Discussion

A total of 239 individuals belonging to 20 species and three genera were recorded from the lower montane and upper montane forest of Mt. Kiamo. Seven (7) species belong to the genus *Pachyrhynchus*, twelve (12) species belong to *Metapocyrtus* and one (1) species belongs to the genus *Homalocyrtus*. *Pachyrhynchus* species include *P. cabrasae* which is a new record in the Pantaron range, *P. cumingi*, *P. anitchshenkoi*, *P. postpubescens*, *P. regius*, *P. sulphureomaculatus* and *P. erichsoni*. Some *Metapocyrtus* species include *Metapocyrtus (Metapocyrtus) adaptatus* Schultz 1925, *M. (Trachycyrtus) cf. adspersus* (Waterhouse) 1843, *M. (Sclerocyrtus) chamissoi* Schultz 1925, *M. (Trachycyrtus) cf. crassipinosus*, *M. (Orthocyrtus) lanusinus* Schultz 1922 and *M. (Sphenomorphaidea) transversarius*

Schultze 1925 among others.

High species richness and abundance of members of the genus *Metapocyrtus* was observed which is consistent in most mountains explored. Members of the genus *Metapocyrtus* is already reported as a pest to some crops and ornamental plant especially in lowland ecosystems [12]. Some reports show that there are *Pachyrhynchus* species observed to be serious pest to some fruit trees such as cacao (*Theobroma cacao*) and mango (*Mangifera indica*) [13]. However, in Mindanao they are observed to be rarer and more specific compared to *Metapocyrtus* on their elevation and food preference since member of this genus have only been reported in forested ecosystems or forest ridges. Currently, we have more than a hundred described species of *Pachyrhynchus*, more than 200 described species of *Metapocyrtus* and 6 species record for *Homalocyrtus* [2, 3, 4, 5, 6, 7]. The higher species richness and abundance of *Metapocyrtus* can be attributed to its high adaptability to environmental changes and lower preference for specific food plants. *Metapocyrtus* are abundant especially in the lower elevation with encroaching agricultural and invasive alien species such as *Lantana camara* L., *Piper arborescens* Roxb. and *Impatiens balsamina* Elm. Many of the members of the genus *Metapocyrtus* are found feeding on these plants.

**Table 1:** Species richness and distribution of Pachyrynchini in Mt. Kiamo

No.	Species	Lower Montane forest	Upper Montane forest
1	<i>P. anichtchenkoi</i> Rukname & Barsevskis, 2016		1
2	<i>P. cabrasae</i> Rukname & Barsevskis, 2016		2
3	<i>P. cumingi</i> Waterhouse, 1841		3
4	<i>P. postpubescens</i> Schultze, 1922		2
5	<i>P. regius</i> Schultze, 1922		1
6	<i>P. erichsoni</i> Waterhouse, 1841		3
7	<i>P. sulphureomaculatus</i> Schultze, 1922		10
8	<i>M. (Metapocyrtus) adaptatus</i> Schultze, 1925	90	
9	<i>M. (Trachycyrtus) cf. adpersus</i> Waterhouse, 1843	7	
10	<i>M. (Sclerocyrtus) chamissoi</i> Schultze, 1925	7	
11	<i>M. (Trachycyrtus) cf. crassipinosus</i>	9	
12	<i>M. (Orthocyrtus) lanusinus</i> Schultze, 1922	13	20
13	<i>M. (Sphenomorphaidea) metallicus</i> Heller, 1912		3
14	<i>M. (Dolichocephalocyrtus) bituberosus</i> Heller, 1912	2	
15	<i>M. (Sphenomorphaidea) Transversarius</i> Schultze, 1925		2
16	<i>M. (Dolichocephalocyrtus) ruficollis</i> Waterhouse, 1842	5	
17	<i>Metapocyrtus</i> sp.1	25	20
18	<i>Metapocyrtus</i> sp.2	8	
19	<i>Metapocyrtus</i> sp.3	5	
20	<i>Homalocyrtus</i> sp.		1
	Total	171	68

A low abundance of *Pachyrhynchus* species and high abundance of *Metapocyrtus* was observed in Mt. Kiamo. Only several individuals of *Pachyrhynchus* species were found with no more than 5 individuals except for *P. sulphureomaculatus* with 10 individuals recorded. The rarity of some *Pachyrhynchus* species was also noted by Yoshitake<sup>[1]</sup>. On the other hand, a high abundance of *M. lanusinus*, *M. adaptatus* and *M. sp. 1* was observed with 33, 90 and 45 individuals recorded. They specially dominate the lower montane forest. The most abundant species of *Metapocyrtus* in Mt. Kiamo thriving in the lower montane is *M. adaptatus* which was previously recorded in Surigao while *M. lanusinus* is the most dominant *Metapocyrtus* found in the upper montane often found in shrubs and trees<sup>[2, 9]</sup>. *M. lanusinus* was collected in Mt. Malindang as well as along the secondary forests in Marilog District, Davao City. Marilog District is the junction between Bukidnon and Davao City which indicates this species has a wider distribution. Previous records of *M. lanusinus* were only in Lindabon and Impalutao, Bukidnon. The other two most abundant *Metapocyrtus* species were not observed from other mountain ecosystems including Mt. Apo Natural Park and Mt. Candalaga, Compostela Valley although more field surveys will confirm the species' actual geographic distribution in Mindanao.

High species richness was observed in the upper montane forest with 12 recorded species while less species richness was observed in the lower montane with 10 species record. All *Pachyrhynchus* species were collected in the upper montane forest while species from the genus *Metapocyrtus* were observed from the lower montane to upper montane forest. The elevational distribution of Pachyrynchini in Mt. Kiamo is similar to the records in Mt. Apo Natural Park where *Pachyrhynchus* species were restricted to higher elevation while *Metapocyrtus* were found in all elevation gradients<sup>[14]</sup>. *Pachyrhynchus* seem to be more restricted to higher elevation as observed in Mt. Kiamo, Mt. Malindang, Mt. Apo and Mt. Candalaga. However, in museum collection, records show that *Pachyrhynchus* are also found in much lower elevation as low as 300 masl. *Metapocyrtus* on the other hand have no preference on elevation or food plants. Studying the habitat requirement, actual distribution of each species, life history and food plants of *Pachyrhynchus* would

be very valuable in conserving these species which are mostly threatened by habitat degradation and deforestation. Schultze<sup>[9]</sup> mentioned that most species from this genus feed on Philippine native species and the loss of their food and host plants which remains unknown is a big threat to them. Their ability to withstand environmental changes should also be studied.

**Table 2:** Biodiversity Indices of the lower montane and upper montane forest of Mt. Kiamo, Malaybalay, Bukidnon

Indices	Lower montane	Montane
Species abundance	171	68
Species richness	10	12
No. of endemic species	10	12
Shannon diversity index	0.709	0.83
Shannon Hmax Log Base 10 (Richness)	1	1.079
Shannon J' (Evenness)	0.709	0.769

All Pachyrynchini recorded in Mt. Kiamo are endemic. *Metapocyrtus* is believed to be endemic to the Philippines although a new species was recently described in Japan but is believed to have migrated to Japan through the English ivy plant<sup>[15]</sup>. The high level of endemism of Pachyrynchini is not astonishing since they are flightless beetles and the unique geologic history of the country and the island and mountain isolations made these species to speciate over time. Further field works would confirm the actual distribution of every Pachyrynchini species. The Pachyrynchini species recorded in Mt. Kiamo differs in composition compared to the Pachyrynchini of Mt. Apo Natural Park as well as Pachyrynchini of Mt. Malindang<sup>[13, 16]</sup>. This indicates the restricted distribution of the Pachyrynchini species with several species being highly restricted in distribution especially members of the genus *Pachyrhynchus*. Future biogeographic analysis would also tell if these species follow a certain biogeographic affinities in Mindanao as proposed by Dickerson<sup>[11]</sup>.

Since this is the first faunistic paper done on Mt. Kiamo, all are new records. However, there are some noteworthy records such as *P. regius* which was previously recorded only in Leyte but was recently found in Mt. Kiamo and other

localities in Mindanao such as Agusan del Norte and localities in Bukidnon. Additional materials were also collected in Samar which indicates that this species has a Greater Mindanao distribution. *M. (Sclerocyrtus) chamissoi* and *M. (Trachycyrtus) cf. adpersus* were previously recorded only in Bohol, Samar and Leyte but were recently found in Mt. Kiamo which also signifies how the last Pleistocene epoch provided interconnectivity through land bridges for these

species to reach further dispersal<sup>[17, 18]</sup>. The other species found in Mt. Kiamo are also found in nearby localities such as Agusan and Surigao. As for *P. sulphureomaculatus*, this is the first record for Pantaron Range however this species has been recorded in neighboring localities in Bukidnon and also in Samar and Leyte indicating that this species has a Greater Mindanao distribution. The species *P. erichsoni* have the widest range of distribution from Luzon to Mindanao.

**Table 3:** Pachyrynychini of Mt. Kiamo's previous and current records

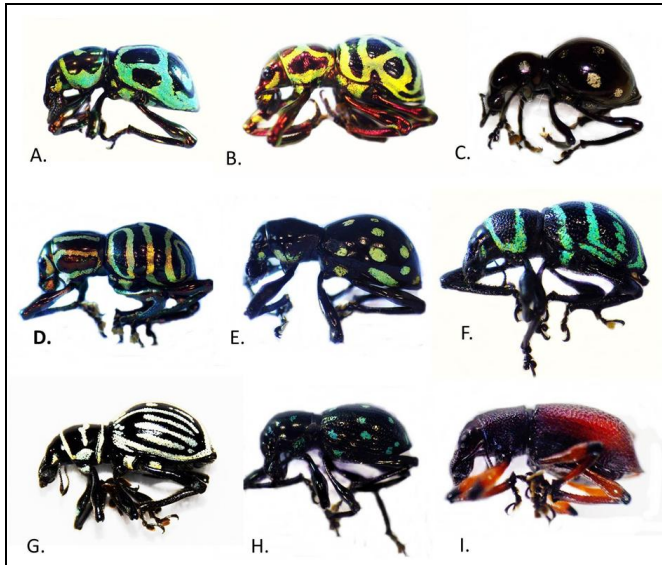
No.	Species name	Previous record	Updated Record
1	<i>P. anichtchenkoi</i> Rukname & Barsevskis, 2016	Bukidnon (Mt. Kalatungan, Intavas, Cabanglasan)	Bukidnon (Mt. Kiamo)
2	<i>P. cabrasae</i> Rukname & Barsevskis, 2016	Bukidnon (Mt. Kalatungan, Cabanglasan)	Bukidnon (Mt. Kiamo,)
3	<i>P. cumingi</i> Waterhouse, 1841		Bukidnon (Mt. Kiamo, Cabanglasan, Intavas, Mt. Kalatungan) Panamokan, Bohol, Samar (Hinabangan, Marabut), Sarangani (Kiamba)
4	<i>P. postpubescens</i> Schultze, 1922	Bukidnon (Lindabon)	Bukidnon (Mt. Kiamo Cabanglasan, Intavas, Kalatungan, Panamokan, San Fernando)
5	<i>P. regius</i> Schultze, 1922	Leyte (Cabalian)	Agusan del Norte, (Sibagat); Bukidnon (Mt. Kiamo, Cabanglasan, San Fernando); Leyte, Sogod; Samar, Marabut,
6	<i>P. erichsoni</i> Waterhouse, 1841	Leyte, Surigao, Dinagat Island	Luzon: Cagayan; Ifugao, (Banaue); Nueva Vizcaya (Belanse); Marinduque (Boac, Buenavista; Mindoro, (Baco); Sierra Madre, (Aurora, Dingalan, Labulo); Quirino, (Disimungal, Madela; Mindanao: Bukidnon (Mt. Kiamo, Cabanglasan, Intavas, Panamokan); Cotabato (Kidapawan, Mt. Apo); Surigao del Sur (Esperanza); Visayas: Leyte (Sogod); Samar, Hinabangan)
7	<i>P. sulphureomaculatus</i> Schultze, 1922		Bukidnon (Mt. Kiamo); Agusan del Sur.; Cotabato, Kidapawan, Mt. Apo, Mt. Parker; Sarrangani, Kiamba, ; Surigao del Sur, Esperanza, San Miguel, Tandag; Leyte; Samar, Hinabangan, Sogod
8	<i>M. (Metapocyrtus) adaptatus</i> Schultze 1925	Mindanao (Surigao)	Bukidnon (Mt. Kiamo)
9	<i>M. (Trachycyrtus) cf. adpersus</i> Waterhouse, 1843	Bohol (Bilar), Biliran, Samar, Leyte (Palompon)	Bukidnon (Mt. Kiamo)
10	<i>M. (Sclerocyrtus) chamissoi</i> Schultze 1925	Samar (Loquilocon, Wright)	Bukidnon (Mt. Kiamo)
11	<i>M. (Trachycyrtus) cf. crassipinosus</i>	Surigao	Bukidnon (Mt. Kiamo)
12	<i>M. (Orthocyrtus) lanusinus</i> Schultze 1922	Bukidnon (Lindabon)	Bukidnon (Mt. Kiamo, Impasug-ong) Davao City (Marilog)
13	<i>M. (Sphenomorphaidea) metallicus var. sphenomorphoides</i> Heller, 1912	Bukidnon (Tangcolan)	Bukidnon (Mt. Kiamo)
14	<i>M. (Dolichocephalocyrtus) bituberosus</i> Heller, 1912	Mindanao (Davao, Dolicaon)	Bukidnon (Mt. Kiamo,)
15	<i>M. (Sphenomorphaidea) Transversarius</i> Schultze, 1925	Bucas Grande, Siargao	Bukidnon (Mt. Kiamo,)
16	<i>M. (Dolichocephalocyrtus) ruficollis</i> Waterhouse, 1842	Cagayan, Bukidnon (Tangkulan, Lindaban)	Bukidnon (Mt. Kiamo, Mt. Musuan)

### Conclusion and Recommendation

High species richness and abundance of Pachyrynychini was observed in the lower and upper montane forests of Mt. Kiamo, Malaybalay, Bukidnon with a record of 239 individuals belonging to 20 species and 3 genera. New records were also established for the Pachyrynychini fauna of Bukidnon and Mindanao. The species composition of Pachyrynychini differs greatly from Mt. Apo Natural Park and

Mt. Malindang which indicates the uniqueness of this mountain ecosystem and the restricted distribution of the Pachyrynychini species. Several species are shared with neighboring localities such as Surigao and Agusan while some species seems to be confined only to different localities in Bukidnon. The high endemicy and unique Pachyrynychini fauna of this mountain ecosystem requires immediate attention especially that several anthropogenic disturbances

are encroaching in this mountain. It is recommended that this mountain be declared as protected area in order to conserve the endemic and threatened species and ecosystem as a whole.



**Fig 2:** A. *P. anichtchenkoi* Rukname & Barsevskis, 2016; B. *P. cabrasae* Rukname & Barsevskis, 2016; C. *P. erichsoni* Waterhouse 1841; D. *P. postpubescens* Schultzze 1922; E. *P. sulphureomaculatus* Schultzze, 1922 ; F. *M. (Sclerocyrtus) chamissoi* Schultzze 1925; G. *M. (Orthocyrtus) lanusinus* Schultzze 1922; H. *M. (Sphenomorphoidea) metallicus* Heller 1912; I. *Homalocyrtus* sp.

**References**

1. Ballentes M, Mohagan A, Gapud V, Espallardo MC, Zarcilla M. Arthropod Faunal Diversity and Relevant Interrelationships of Critical Resources in Mt. Malindang, Misamis Occidental. Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) 2006, 1-166. ISBN971-560-125-1.
2. Barsevskis A. New Species of *Pachyrhynchus* Germar, 1824 And *Macrocyrtus* Heller, 1912 (Coleoptera: Curculionidae) From The Marinduque Island (Philippines) As A New Example Of Mimetic Species Pair. Acta Biol. Univ. Daugavp. 2016; 16(1):1-6
3. Bollino M, Sandel F. Three New Species of the Genus *Pachyrhynchus* Germar, 1842 from Lubang Island (Philippines) (Coleoptera: Curculionidae: Pachyrhynchini). Mun. Ent. Zool. 2015; 10(2):392-401
4. Cabras A, Nique G, Mohagan A. Diversity and Distribution of Pachyrhynchini (Coleoptera: Curculionidae: Entiminae) in Mt. Apo, Natural Park, Philippines. Journal of Biodiversity and Environmental Science. 2016; 8(2):312-319.
5. Cabras A, Rukname A. A New Species of *Pachyrhynchus* Germar, 1824 (Coleoptera: Curculionidae: Entiminae) from Marilog, Davao City, Mindanao, Philippines with Notes on its Ecology. Acta Biologica Univ. Daugavp. 2016; 16(1):123-127.
6. Catibog-Sinha C, Heaney LR. Philippine Biodiversity: Principles and Practice. Quezon City, Haribon Foundation for the Conservation of Nature 2006, 495.
7. Dickerson R, Merrill ED, McGregor RC, Schultzze W, Taylor EH, Herre AW. Distribution of Life in the Philippines. Manila, Bureau of Science, 1928, 322.
8. Heaney LR, Regalado JC. Vanishing Treasures of the Philippine Rainforest. Chicago, The Field Museum of Natural History 1998, 88.
9. Hsu CF, Tseng HY, Hsiao Y, Ko CC. First record of the

- host plant and larvae of *Pachyrhynchus sonani* (Coleoptera: Curculionidae) on Lanyu Island, Taiwan. Entomological Science 2017; 20:288-291.
10. Morimoto K, Kojima H, Miyakawa S. Curculionoidea: General Introduction and Curculionidae (Part 1). Phyllobiini, Polydrusini and Cyphicerini (Coleoptera). Entomological Society of Japan (ed.), The Insect of Japan, 3.iv + 406 pp. ToukaShobo, Fukuoka, 2006.
11. Rukname A, Barsevskis A. Nine new species of the genus *Pachyrhynchus* Germar, 1824 (Coleoptera: Curculionidae) from the Philippines. Baltic J Coleopterol. 2016; 16(1):77-96.
12. Rukname A. Six New Species of The Genus *Pachyrhynchus* Germar, 1824 (Coleoptera: Curculionidae) From The Philippines. Acta Biol. Univ. Daugavp. 2016; 16(1):81-92.
13. Schultzze W. A monograph of the Pachyrhynchid group of the Brachyderinae, Curculionidae: Part I. Philipp. J. Sci., 1923; 23:609-673 + 6 pls.
14. Starr C, Wang H. Pachyrhynchine Weevils (Coleoptera: Curculionidae) of the Islands Fringing Taiwan. J. Taiwan Mus. 1992; 45(2):5-14
15. Yap SA, Gapud VP. Taxonomic review of the genus *Metapocyrtus* Heller (Coleoptera: Curculionidae: Entiminae: Pachyrhynchini). Philip. Entomol. 2007; 21:115-135.
16. Yap SA. Checklist of the *Metapocyrtus* complex (Curculionidae: Entiminae: Pachyrhynchini) of the Philippines. Asia Life Sci., 2008; 17:249-260.
17. Yoshitake H. *Metapocyrtus (Trachycyrtus) hederaphilus* sp. nov. (Coleoptera: Curculionidae: Entiminae), a pest of the English ivy cultivated in Mie Prefecture Honshu Japan. Japanese journal of Systematic Entomology. 2012a; 18(2):261-267.
18. Yoshitake H. Nine New Species of the Genus *Pachyrhynchus* Germar (Coleoptera: Curculionidae) from the Philippines. Esakia, 2012; (52):17-34.