

Two New Flightless Fungus Weevils of the Genus *Disphaerona* JORDAN (Coleoptera, Anthribidae) from Laos

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Abstract *Disphaerona katsurai*, sp. nov. and *D. mihokoae*, sp. nov. are described based on the specimens collected during the surveys of the moss forest in Xiengkhouang, northeastern Laos. These species are similar to *D. chinensis* FRIESER from China and *D. cyrta* JORDAN from India, respectively, but are distinguished from them mainly by the color pattern and tubercle of elytra and the structure of the male genitalia. This is the first representatives of flightless Anthribidae and the genus *Disphaerona* from Laos.

Key words: Curculionoidea, Ecelonerini, Oriental Region, taxonomy, new species

Introduction

Acquirement of the flight ability is one of the most important events in the evolution of insects, while secondary flightlessness is reported in the vast majority of insect orders (WAGNER & LIEBHERR, 1992). The weevil family Anthribidae are no exception, and attracted attentions recently (GREBENNIKOV, 2016; ROZA & MERMUDES, 2019). The flightless Anthribidae are generally collected in the forest leaf litter, e.g., *Phaenotheriolum* GANGLBAUER, 1903 (Piesocorynini), *Phaenotherion* FRIVALDSKY, 1877 (Piesocorynini), and *Disphaerona* JORDAN, 1902 (Ecelonerini) (FRIESER, 1979). Last year, however, some species of the genus *Hylotribus* JEKEL, 1860 (Discotenini), which had been collected by Malaise traps at high altitude in Brazil, were reported as new flightless Anthribidae (ROZA & MERMUDES, 2019).

The genus *Disphaerona* is known from the Oriental Region (24 spp. from southern India and Sri Lanka) and the Palaearctic Region (one sp. from southwestern China) (RHEINHEIMER, 2004; FRIESER, 2008; TRÝZNA & VALENTINE, 2011). There is a considerable gap in the known distribution range of this genus, strongly suggesting its occurrence in the Indochinese Peninsula. In addition, at least one undetermined species was confirmed from Hubei, central China (GREBENNIKOV, 2016). This fact strongly suggests that many undescribed species of this genus are expected in the gap area.

In this paper, we describe two new species of this genus, which were collected during the surveys of the moss forest in Laos. This is the first representatives of flightless Anthribidae and the genus *Disphaerona* from Laos.

This paper is dedicated to the memory of the late Dr. Katsura MORIMOTO who passed away on 3 September 2019. He was not only one of the greatest entomologists in Japan but also one of the greatest weevil taxonomists in the world, and had guided many entomologists in his lifetime.

Material and Methods

In order to compare with known species, we referred to the key by FRIESER (1979, 2008) and

photographs of the holotype of *Disphaerona chinensis* FRIESER, 1995 by GREBENNIKOV (2016). Dissection was made for observation of male genital parts by standard techniques. Terminalia of the holotypes were dissected and mounted with Euparal, following MARUYAMA (2004). The label data of the type specimens are quoted verbatim, following TRÝZNA and BAŇAŘ (2012). The terminology follows HOLLOWAY (1982) and OBERPRIELER *et al.* (2014). The type specimens will be preserved in the Laboratory of Entomology, Tokyo University of Agriculture, Atsugi, Japan (TUA).

Taxonomy

Subfamily **Anthribinae** BILLBERG, 1820

Tribe **Eclonerini** LACORDAIRE, 1865

Disphaerona JORDAN, 1902

Disphaerona JORDAN, 1902: 77 (type species: *Disphaerona punctata* JORDAN, 1902, by original designation and monotypy).

Diagnosis. The genus *Disphaerona* is distinguished from other Oriental anthribid genera by the following combination of character states: pronotal transverse carina curved anteriorly towards side, and fragmented in middle; elytra with round shoulders, nearly straight at base; metaventrite very short (JORDAN, 1902; MORIMOTO, 1972; FRIESER, 2008). *Disphaeronella* FRIESER, 1991 known from Malaysia is similar to this genus, but it can be distinguished from the former by the pronotum without transverse carina (FRIESER, 2008).

Description. Rostrum short, thick, parallel sided. Frons wide, slightly convex. Eyes oval, slightly oblique. Antenna short, scarcely reaching posterior margin of pronotum, antennal segments 1st and 2nd ovate, 3rd to 8th continuously decreasing in length, club dilated apically, 9th triangular, slightly longer than wide, 10th wider than long, 11th slightly round. Pronotum subspherical, transverse carina curved anteriorly towards side, and fragmented in middle, at basal 1/4 (= antebasal). Elytra subspherical like as pronotum, nearly straight at base. Scutellum small. Metaventrite very short. Pygidium convex in lateral view. Tarsi short, 1st twice longer than wide.

Comments. The members of this genus have a gourd-shaped body, which is common among flightless beetles in general. This genus is the only fungus weevil performed the phylogeographic analysis (GREBENNIKOV, 2016). A species list is provided at Appendix.

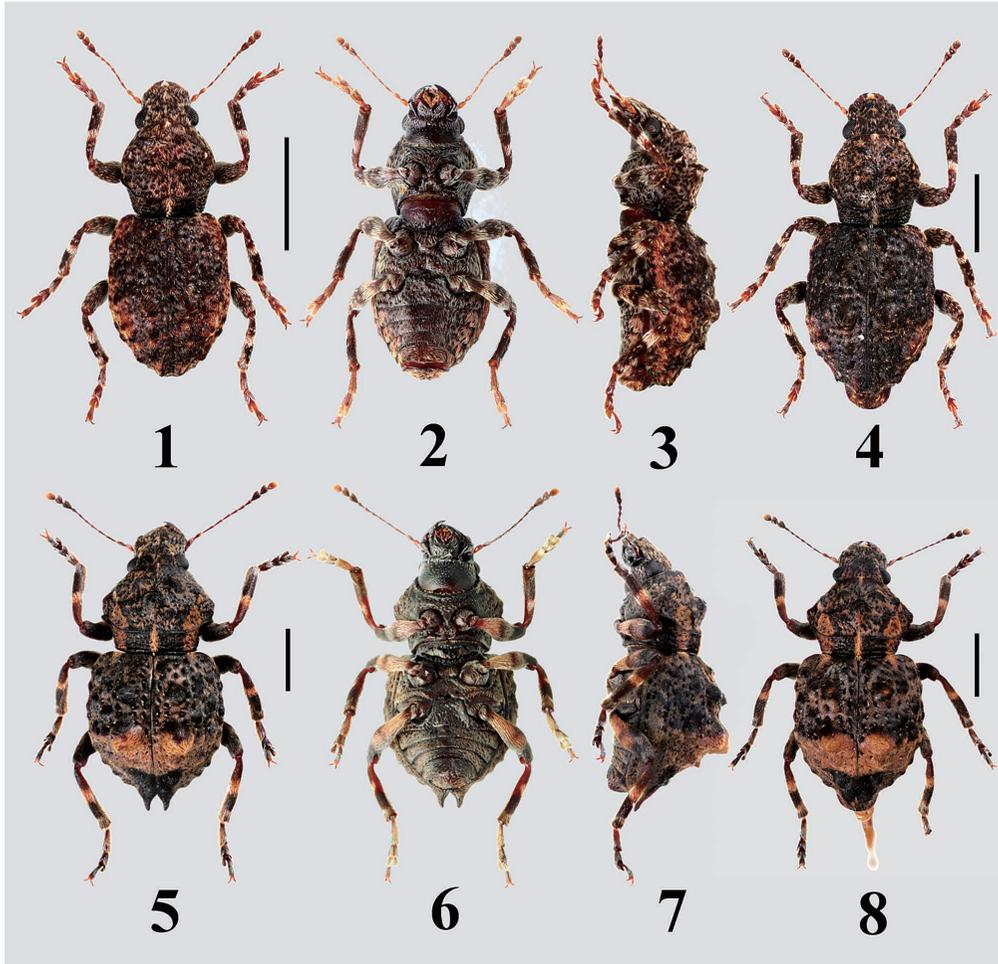
Disphaerona katsurai sp. nov.

(Figs. 1–4 & 9–12)

Diagnosis. This species is similar to *D. chinensis* FRIESER, 1995 from Sichuan, China (Fig. 17) in general appearance, but it can be distinguished from the latter mainly by the following character states: elytral tubercles pointed, disc of elytra without clear leopard-striped pattern on 3rd, 5th and 7th intervals, lateral margin of elytra reddish orange, and tergite VIII without process at sides.

Description. Male. Length: 4.0 mm (excluding head).

Color entirely reddish to blackish brown, except for antennal segments 1st–8th and part of mouthparts, which are yellowish orange, and lateral margin of elytra, which are reddish orange. Pubescence dense, blackish, yellowish and whitish; head, pronotum, elytra, sides of ventrites, and pygidium with yellowish hairs; prosternum, metaventrite, and center of ventrites with whitish hairs; tibiae each with black ring on apical half, with two whitish rings on both sides of black ring; tarsi with whitish hairs.



Figs. 1–8. Habitus of *Disphaerona* spp. — 1–4, *D. katurai*, sp. nov.; 5–8, *D. mihokoae*, sp. nov. — 1–3 & 5–7, Holotype, male; 4 & 8, paratype, female. — 1, 4, 5 & 8, Dorsal habitus; 2 & 6, ventral habitus; 3 & 7, lateral habitus. Scale bars: 2.0 mm.

Head rectangular, about 1.4 times as long as wide; interocular width about 0.8 times as broad as interscrobial width. Postmentum sharp at apex.

Pronotum subspherical, nearly as long as wide, widest at middle; disc uneven; three tubercles in a single row on center small; transverse carina weakly bisinuate, fragmented in middle.

Elytra short, about 1.3 times as long as wide; disc uneven, weakly shining, coarsely punctate; punctures equally small; 3rd elytral intervals with two pairs of large tubercles on basal 1/3 and 2/3; large tubercles rounded in dorsal view, as high as those on pronotum. Pygidium nearly rectangular in posterior view, about 0.7 times as long as wide.

Prosternum, metaventrite and ventrites coarsely and shallowly punctate; ventrite I with anterior margin straight between hind coxal cavities.

Terminalia as illustrated (Figs. 9–12). Aedeagus in lateral view slender, strongly curved, median lobe about 0.5 times as long as total length of aedeagus; pedon bent at apex; tectum sharp apically,

slightly longer than pedon. Tegmen in ventral view long; paramere wide, parallel-sided on basal half, then narrowed anteriorly, with setae along apical margin. Tergite VIII in ventral view nearly trapezoid, nearly as long as wide, bilobed and slightly curved inward at apex, with two tufts at inner and outer sides at apex; lobes of ventrite VIII relatively short.

F e m a l e. Length: 4.5–5.0 mm (excluding head). Color entirely darker than in male. In lateral view, ventrite I–IV conjointly almost horizontal, ventrite V somewhat slanting and longest.

Type specimens. Holotype: ♂, '[LAO PDR] / Phou Samsoum / (alt. 2200~2300m) / Xiengkhouang Prov. / 2.v.2008, H. Kojima' [p]. Paratypes: 2 ♀♀, '[LAO PDR] / Phou Samsoum / (alt. 2300~2400m) / Xiengkhouang Prov. / 3.v.2008, H. KOJIMA' [p].

Distribution. Laos (Fig. 17).

Etymology. The specific name is in honor of the late Dr. Katsura MORIMOTO.

Biology. Unknown. Type specimens were collected by beating of dead twigs lying on the ground.

Disphaerona mihokoae sp. nov.

(Figs. 5–8 & 13–16)

Diagnosis. This species is similar to *D. cyrta* JORDAN, 1928 from Madura, India (Fig. 17) in general appearance, especially due to the elytral disc with a small tubercle on subbasal of the 2nd intervals and two large ones on anterior 1/3 and 2/3 of the 3rd intervals. However, it can be distinguished from the latter mainly by the following character states: color of the posterior half of elytra differs from the basal half of elytra, and developed sharp process at apex of 3rd interval of each elytron.

Description. *M a l e.* Length: 5.6 mm (excluding head).

Color entirely black, except for 1st–10th antennal segments and legs, which are reddish brown, and 11th antennal segment which is yellowish orange. Pubescence dense, blackish, yellowish and whitish; head and pronotum with blackish or yellowish hairs; elytral margins with hairs of blackish/yellowish on anterior 2/3, yellowish between posterior 1/3 and 1/6, and blackish on posterior 1/6; prosternum, metaventrite, ventrites and pygidium with yellowish hairs; apical half of basal two segments of antenna and tarsi with whitish hairs; tibiae each with black ring on apical half, with two whitish rings on both sides of black ring.

Head rectangular, about 1.2 times as long as wide, with longitudinal median carina; interocular width about 0.7 times as broad as interscrobial width. Postmentum slightly rounded at apex.

Pronotum octagon rather than spherical, about 0.8 times as long as wide, widest at middle; disc uneven, with one large median tubercle; transverse carina weakly bisinuate, fragmented in middle.

Elytra short, nearly as long as wide; disc uneven, weakly shining, coarsely punctate; punctures larger on basal 2/3 than those on apical 1/3; 2nd intervals each with a small tubercle just behind base; 3rd intervals each with two large tubercles on anterior 1/3 and 2/3, which are rounded in dorsal view, roundly convex in lateral view; 3rd interval with subconical pointed process at apex. Pygidium nearly rectangular, about 0.6 times as long as wide.

Prosternum, metaventrite and ventrites coarsely and shallowly punctate; ventrite I straight between hind coxal cavities.

Terminalia as illustrated (Figs. 13–16); Aedeagus in lateral view slender, weakly curved, median lobe about 0.6 times as long as total length of aedeagus; pedon bent at apex; tectum sharp apically, slightly longer than pedon. Tegmen in ventral view long, paramere wide, parallel-sided on basal 4/5, then weakly narrowed anteriorly, with setae along apical margin. Tergite VIII in ventral view nearly rectangular, nearly as long as wide, bilobed and slightly curved inward at apex, with two tufts at inner and outer sides at apex; lobes of ventrite VIII relatively long.



Figs. 9–16. Terminalia of *Disphaerona* spp. — 9–12, *D. katurai*, sp. nov.; 13–16, *D. mihokoae*, sp. nov. — 9 & 13, Aedeagus, ventral view; 10 & 14, ditto, lateral view; 11 & 15, tegmen, ventral view; 12 & 16, segment 8, ventral view. Scale bars: 1.0 mm.

F e m a l e. Length: 5.0–5.6 mm (excluding head). The processes on 3rd elytral intervals shorter than those in male. In lateral view, ventrite I–IV conjointly almost horizontal, ventrite V somewhat slanting and longest.

Type specimens. Holotype: ♂, ‘Phou SamSoun / alt.2100m LAOS / Xiang Khoang Pr. / May 16, 2008 / J. Yamasako leg.’ [p]. Paratypes: 2 ♀♀, ‘[LAO PDR] / Phou Samsoun / (alt. 2200~2300m) /

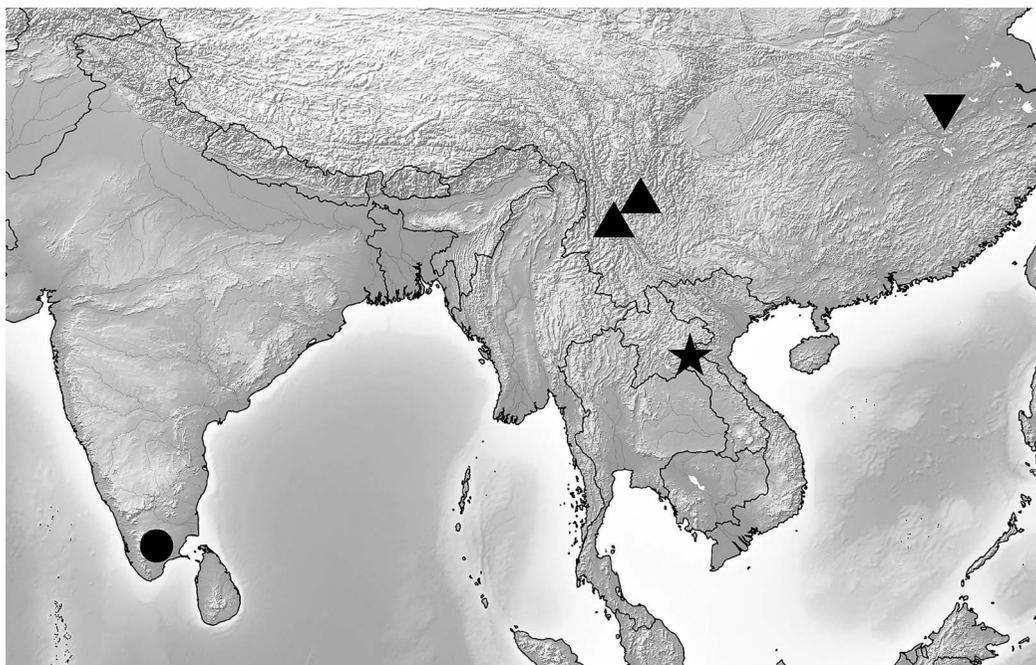


Fig. 17. Distribution of *Disphaerona* spp. — Black star, *D. katsurai* sp. nov. and *D. mihokoae* sp. nov.; black circle, *D. cyrta* JORDAN; black triangle, *D. chinensis* FRIESER; black inverse triangle, *Disphaerona* sp. in GREBENNIKOV (2016). The underlying map was generated using the online SimpleMappr tool (SHORTHOUSE, 2010).

Xiengkhouang Prov. / 2.v.2008, H. Kojima' [p].

Distribution. Laos (Fig. 17).

Etymology. The specific name is in honor of Mrs. Mihoko MORIMOTO, who is the wife and a great supporter of Dr. Katsura MORIMOTO.

Biology. Unknown. Type specimens were collected by beating of dead twigs lying on the ground.

Discussion

Secondary flightlessness in insects is likely to be evolved in the circumstances such as in stable habitats, isolated habitats, or habitats, where energetic cost of flight is high (e.g., in habitats with cold temperatures and/or high winds), and is also occurred in parasites and commensals (WAGNER & LIEBHERR, 1992). This phenomenon is also known to promote speciation (IKEDA *et al.*, 2012). For the present new species, the isolation hypothesis will be acceptable, as their type locality, Phou Samsoum, northeastern Laos, is the mountainous area (2,100–2,400 m). Consequently, it is likely that new species of *Disphaerona* will be discovered from other places of Laos, and also from the mountainous areas of the other Indochinese region, such as Thailand and Myanmar.

Acknowledgments

The first author thanks Dr. Munetoshi MARUYAMA (the Kyushu University Museum, Fukuoka) for his kind guidance and constant encouragement. We thank Dr. Hiraku YOSHITAKE (Kyushu Okinawa Agricultural Research Center (Itoman residence), NARO, Itoman) and two anonymous reviewers

for reading the manuscript. We also thank Dr. Takeshi YÔRO (Kamakura) and Dr. Junsuke YAMASAKO (Institute for Agro-Environmental Sciences, NARO, Tsukuba) for providing the material, and Dr. Toshio SENOH (Chiang Mai University, Chiang Mai) and Dr. Shûhei YAMAMOTO (Field Museum of Natural History, Chicago) for the literatures. This study was partly supported by a grant from JSPS KAKENHI (24405028 to HK). This is a contribution from the Entomological Laboratory, Kyushu University, Fukuoka (Ser. 7, No. 68).

要 約

今田舜介・小島弘昭：ラオス産の非飛翔性ヒゲナガゾウムシ *Disphaerona* 属 (鞘翅目ヒゲナガゾウムシ科) の2新種。—— ラオス北東部シェンクワン県雲霧林の調査により得られた標本に基づいて *Disphaerona* 属の2新種 *D. katsurai* sp. nov. および *D. mihokoae* sp. nov. を記載した。両新種は中国の *D. chinensis* FRIESER およびインドの *D. cyrta* JORDAN に似るが、主に上翅の斑紋や突起、雄交尾器の違いによりそれぞれ区別される。ラオスからの非飛翔性ヒゲナガゾウムシ科甲虫および *Disphaerona* 属の発見は今回が初めてとなる。

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Appendix. Species list of the genus *Disphaerona*

- D. adversa* FRIESER, 1979. India
D. aequalicollis FRIESER, 1979. Sri Lanka
D. andrewesi JORDAN, 1909. India
D. besucheti FRIESER, 1979. India
D. chinensis FRIESER, 1995. China
D. conicollis FRIESER, 1979. India
D. consimilis FRIESER, 1979. India
D. cyrta JORDAN, 1928. India
D. digitalis FRIESER, 1979. India
D. distincta FRIESER, 1996. India
D. enodis FRIESER, 1979. India
D. externa FRIESER, 1997. Sri Lanka
D. hirsuta FRIESER, 1996. Sri Lanka
D. katurai, hoc opus. Laos
D. laevicollis FRIESER, 1979. India
D. loebli FRIESER, 1979. India
D. mihokoae, hoc opus. Laos
D. mussardi FRIESER, 1979. Sri Lanka
D. picta JORDAN, 1928. Sri Lanka
D. pilosula FRIESER, 1979. Sri Lanka
D. porcata FRIESER, 1979. Sri Lanka
D. punctata JORDAN, 1902. Sri Lanka
D. rugosostriata FRIESER, 1979. India
D. subdentata FRIESER, 1979. India
D. thompsoni FRIESER, 1979. India
D. verrucella JORDAN, 1912. India
D. verrucosa (KARSCH, 1882). Sri Lanka