



First Record of Genus *Melancistrus* Graham (Hymenoptera: *Pteromalidae*) with Description of a New Species from India

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Authors' contributions

This work was carried out in collaboration among all three authors. All the authors read and approved the final manuscript.

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ABSTRACT

The genus *Melancistrus* Graham (*Pteromalidae*) was first time recorded from India. The specimen was collected from Odisha, India. The collected species is recognized as a new species with the key characteristics of Fore wing with speculum and a broad brownish spot present beneath the marginal vein, starting from the speculum, and described as *Melancistrus macularis* Kumar sp. nov. Also key to species has been updated based on the species recorded so far from the world.

Keywords: *Melancistrus*; new species; *Pteromalidae*; parasitoid; new record.

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1. INTRODUCTION

The *Pteromalidae* family is one among the largest families of Hymenopteran parasites and species are distributed in all zoogeographical regions worldwide [1]. Various insect orders such as Coleoptera, Diptera, Lepidoptera, Hymenoptera, and Hemiptera at their different developmental stages are primary or secondary hosts of pteromalids [2,3]. The *Pteromalidae* is one of the poorly studied families within the Chalcidoidea superfamily despite its economic importance [4]. *Pteromalidae* is represented by 34 subfamilies, about 648 genera, and approximately 4275 species worldwide [5]. The genus *Melancistrus* Graham is represented by only three described species from the World viz. *M. diplosidis* (Eckel, 1903) [6] from Nearctic and USA; *M. mucronatus* (Thomson, 1876) [7] from Czech Republic, Netherlands, Sweden, and UK; and *M. specularis* Graham, 1969 [8] from Sweden and UK. In the present study genus *Melancistrus* Graham has been recorded for the first time from India with the description of a new species.

2. MATERIALS AND METHODS

The specimens were collected by sweeping method during a field survey from Odisha province of India and were preserved in 80% ethyl alcohol. Further study was done at Forest Entomology Discipline, Forest Research Institute, Dehradun. The specimens were dehydrated by exposure with serial dilution of ethyl alcohol from 30 to 100%. The specimens were treated with HMDS for relaxing the specimen and, thereafter, mounted on a triangular card for identification and photography. The different parts of the specimens were photographed under Leica M205C stereo-zoom trinocular microscope and measurements were taken for their further study and identification. Genus level identification was done with the keys as that of Boucek & Rasplus, 1991 [9] and species level identification was done with the literature of Graham, 1969. The morphological terminology used in this paper was that of Boucek, 1988.

Terminology: Ant- Antennae; F1-F7- Funicular segments 1-7; POL- Post ocellar sulcus; OOL- Ocello-ocular sulcus; FW- Forewing; SMV- Sub marginal vein; MV- marginal vein; STV- stigma vein; PMV-Post marginal vein; T1-T8- Tergum 1-8; FRI-Forest Research Institute; NFIC- National Forest Insect Collection.

Key to species of genus *Melancistrus* Graham, 1969:

- 1- Fore wing hyaline.....2
 - Fore wing hyaline and without speculum 4
- 2- PMV distinctly 1.5x shorter than MV and MV 2x as long as STV; antennae 2x as long as head height; metasoma slightly longer than thorax..... *M. diplosidis* Eckel.
 - Wings hyaline; fore wing with speculum.....3
- 3- PMV distinctly shorter than MV; costal cell of hind wing bare *M. specularis* Graham, 1969.
 - Fore wing with broad brownish spot present beneath marginal vein starting from speculum (Fig. 1G); PMV as long as MV; MV 1.75x as long as STV; costal cell hairy; Antennae 1.62 x as long as head height;*M. macularis* Kumar sp. nov.
- 4- Fore wing without speculum; PMV slightly longer than MV; costal cell hairy; costal cell of hindwing with irregular row of hairs extending to its whole length.....*M. mucronatus* (Thomson, 1876).

3. RESULTS

Genus *Melancistrus* Graham 1969

Tridymus mucronatus Thomson, 1876: 194.

Diagnosis: Body black or bluish black. Occiput immargined. Clypeus marked off from the face by a weak groove, its anterior margin strongly curved. Both mandibles with four teeth. Antennae inserted below the middle of the face, 12-segmented (11262 in male, 11253 in female); first funicular segment longer than the pedicellus. Pronotum short, without a collar. Mesoscutum and scutellum having their surface uneven, reticulate and also with numerous small piliferous tubercles, hence appearing almost rugulose. Notauli is complete and deep. The scutello-axillar sutures are straight and converge strongly towards the mesoscutum, so that the base of the scutellum is only about one fifth the breadth of the mesoscutum. The scutellum is hairy, except its sides and the frenum; frenum marked off by a weak grooved line. Axillae are hairy, except

laterally. Propodeum with a median carina which is crossed at about the middle of its length by a transverse crest or ridge which in profile appears like a tooth; plicae and nucha absent; callus hairy all over right to the edge of the metapleuron, the bases of the hairs giving it a roughened appearance, convex, with a raised tubercle in the middle; spiracles small, nearly circular, close to the hind margin of the metanotum. Post-spiracular sclerite broad, sometimes with indications of an oblique carina. The dorsal surface of the hind coxae is roughened, with indications of a longitudinal crest, hairy along its whole length. Hind tibiae each with two spurs, the second weaker and about half the length of the first. Fore wing with no hyaline break between parastigma and marginal vein; marginal vein longer than the curved STV; PMV vein variable, from slightly shorter than to slightly longer than, the marginal. Gaster compressed laterally, strongly so in females and strongly carinate ventrally; hypopygium of females are very long, its tip situated at about three-quarters the length of the gaster, and provided with a membranous process or mucro.

Melancistrus macularis Kumar sp. nov. (Fig. 1A-H)

Description: Female. Body length 2.75 mm.

Color: Body black with metallic bluish shin; thorax and gaster black; eyes cupreous, ocelli translucent white; antenna testaceous; scape yellowish and flagellum brownish; FW hyaline, veins dark brown, a large brown spot present below the veins extending from speculum to tip of PMV; Legs yellow except the tip of tarsal segment brown.

Head: (Fig. 1B-C) Head 1.43x as broad as head height and 1.03x as broad as long; POL 1.13x of OOL; temples round and short, 0.22x as long as eyes; Eyes 2.36x as long as broad; clypeus roundly emarginate; marked off from the face by a weak groove; genal suture complete and prominent; antennal-toruli clypeus 0.32x antennal-toruli vertex; malar space 0.38x eye length.

Antennae: (Fig. 1D) Antenna situated distinctly below center of face, at lower margin ocular line; antennal sensilla is present; antennal formula 11253 with scape not reaching median ocellus, 0.56x as long as eye length; pedicle somewhat globular, 1st aneli very small, 2nd aneli transverse,

F1 cylindrical, distinctly longer than pedicle (1.31x); F2 longer than broad, F3 as long as or slightly longer than broad, F4 and F5 wider than long; clava distinctly longer than preceding two segments combined (1.4x); claval sutures transverse; antennal sensilla distinctly visible on flagellum longitudinally.

Mesosoma: (Fig. 1E-F). Coarsely and irregularly reticulate, mesosoma white hairs, 1.45x as long as wide; pronotum immargined, small 0.11x as long as mesoscutum; mesoscutum 0.33x as wide as long; notauli deep & complete; Scutellum 1.37x as long as broad, frenal groove present, propodeum medially 1.07x as long as scutellum; median area smooth, plicae & median carina present not converging into nucha; plicae extending around spiracles; propodeal apex broad; spiracle normal, oval. **Forewing** (Fig. 1G) 2.04x as long as broad; SMV 0.43x FW length; MV slightly longer than PMV (1.01x); PMV 1.72x as long as STV; marginal fringes present; speculum broad and closed below, basal cell not hairy, costal cell hairy.

Metasoma: (Fig. 1H). Gaster sub-sessile, petiole transverse. Gaster 1.71x as long as broad; T1 longer covering about 2/3rd of gaster; hypopygium reaching more than half of gaster.

Material examined: 1♀ India, Odisha: Kianalikul: Jajpur, 20°51'06.2"N 86°19'25.5"E; Rice & paddy field, 21. ii.2022, Coll. Aishwarya Ray. Accession number: FRI/NFIC/23558.

Melancistrus macularis Kumar sp. nov. (Male)

Description: (Fig. 2A-H)

Body length 2.45 mm shorter than female. Body color same as in female; antenna light brown than female; Legs yellowish brown & tip of tarsal segment brown. Temples round and larger in male, 0.4x as long as eyes; malar space 0.52x eye length. Occiput is more prominent in male than female; eye length and breadth is small compared to female. Inter toruli and ocular toruli distance broader in male. Antenna of male is larger in size, antennal sensilla is absent, antennal formula 11263 pedicle globular, clava less broad than the preceding two segments; setae dense and larger in size. FW shorter than female wing, veins dark brownish, basal cell hairy; costal cell less hairy; PMV and MV slightly shorter than female; speculum absent. Gaster

sub-sessile, petiole transverse, T2 is large in male.

Material examined: 2♂; India, Odisha: Banapur, Jajpur, 20.832033N 86.308638E; (Rice & paddy

field, 17.x.2022, Coll. Aishwarya Ray. Accession number: FRI/NFIC/23558.

Etymology: The name of the species has been derived from the brown spot or macula present on FW.

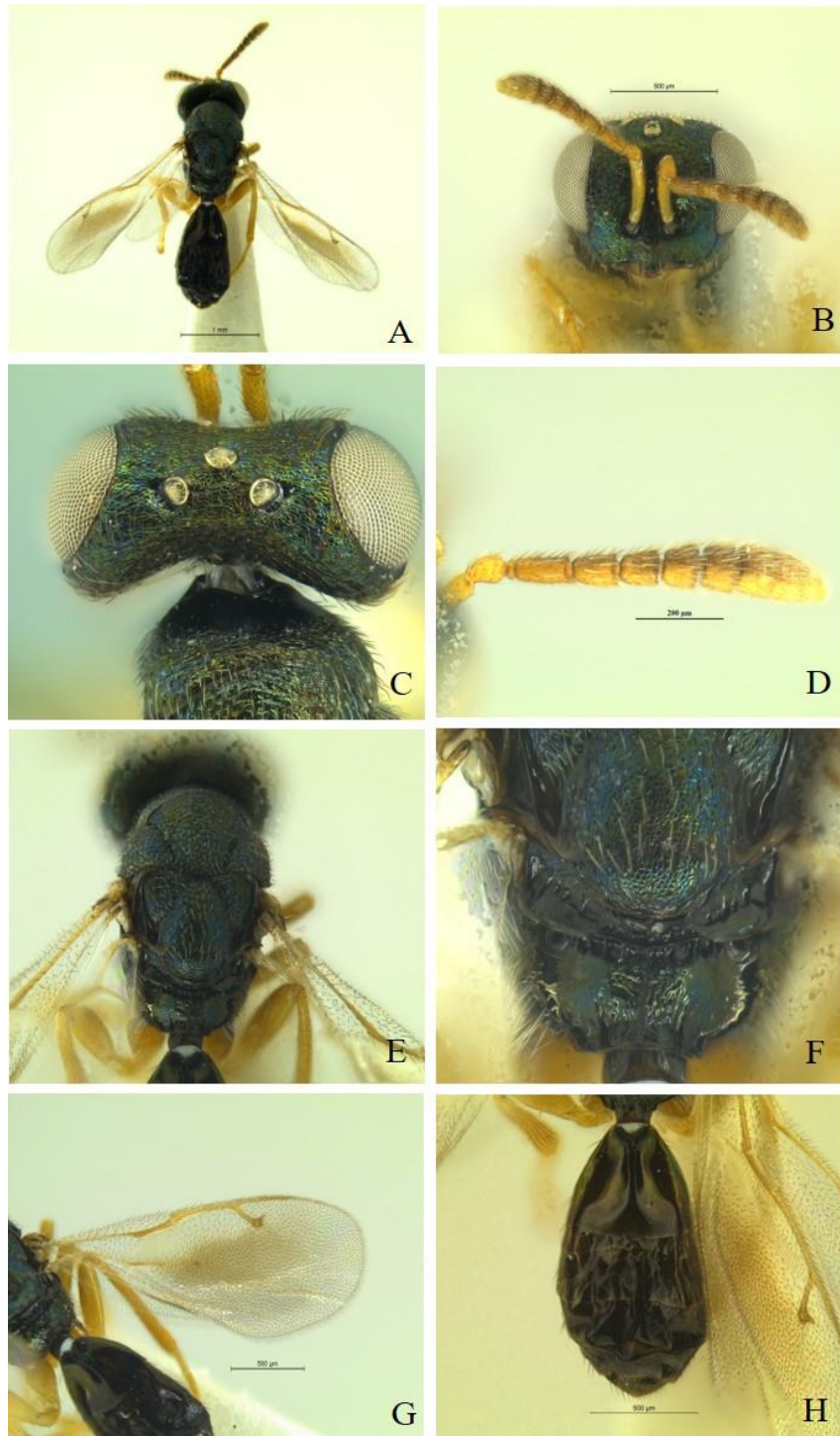


Fig. 1. Female. A- Female habitus dorsal view, B- Head frontal view, C- Head dorsal view, D- Antenna, E- Thorax dorsal view, F- Propodeum, G- Forewing, H- Metasoma dorsal view

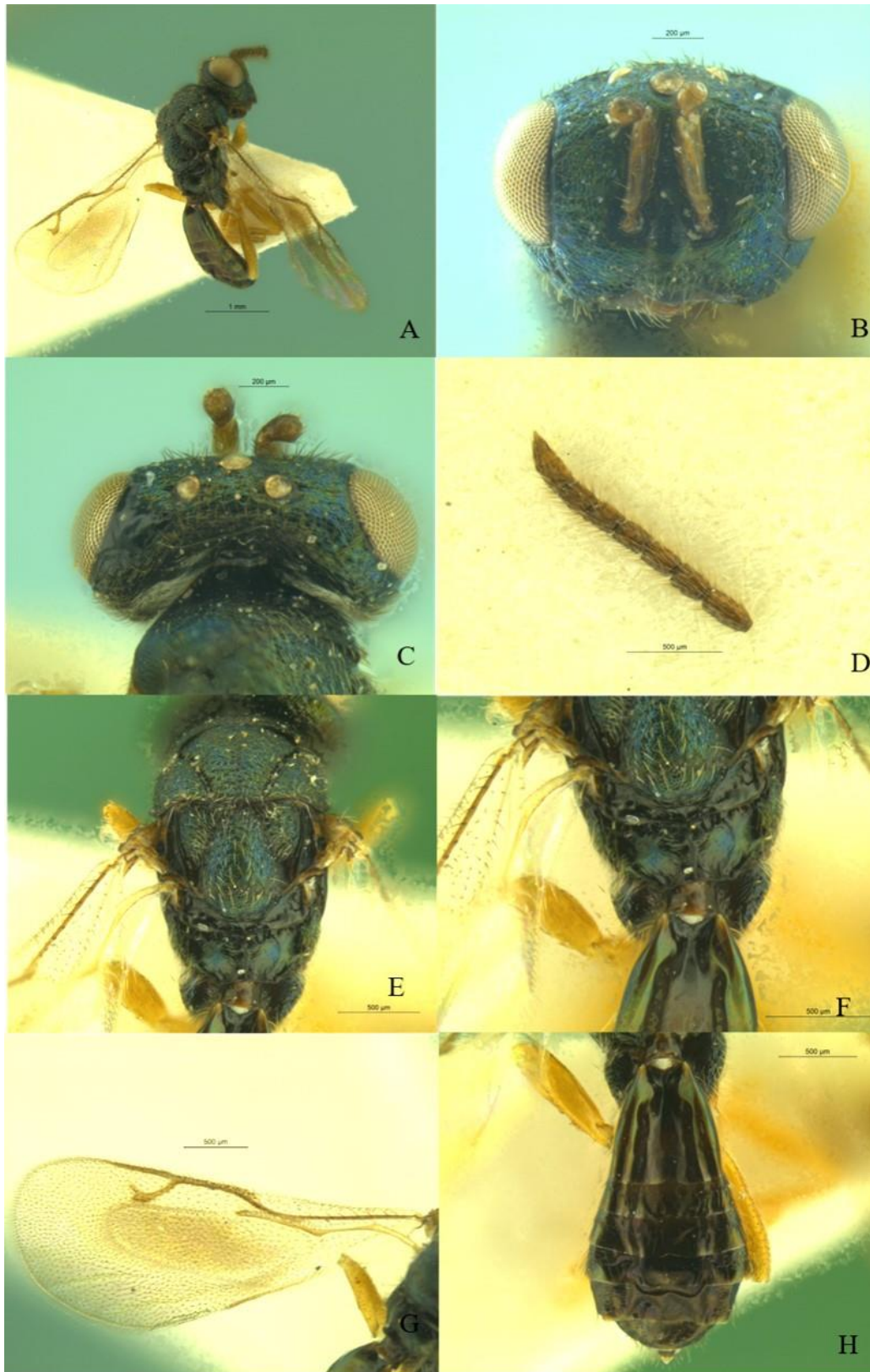


Fig. 2. Male. A- Male habitus lateral view, B- Head frontal view, C- Head dorsal view, D- Antenna, E- Thorax, F- Propodeum, G- Forewing, H- Metasoma

4. DISCUSSION

The Genus *Melancistrus* was erected by Graham in the year 1969 and belongs to the subfamily Ormocerinae based on the holotype species *Melancistrus specularis* Graham 1969. Additionally, another species was added in the genus with new combination from *Tridymus mucronatus* Thomson to *M. mucronatus* (Thomson, 1876) [7], and [10] have combined the species *Syntasis diplosidis* Eckel 1903 to *M. diplosidis* (Eckel, 1903) [6] base on their most suitable characters. The present species *M. macularis* Kumar sp. nov. is close to *M. specularis* Graham, 1969, but the presence of broad brownish spot beneath marginal vein of fore wing, PMV as long as MV and STV; costal cell hairy and antennae 1.62 x as long as head height make distinct and unique [11]. This character of broad brownish spot beneath marginal vein of fore wing was not recorded in any of the previously described species of the genus *Melancistrus* Graham. *Melancistrus diplosidis* [6] was recorded to be associated with primary host belonging to order Diptera, family Cecidomyiidae (*Cecidomyia resinicola* and *Cecidomyia resinicoloides*) and *Melancistrus specularis* Graham was found to be associated with family plant *Betula* sp. (Betulaceae). The described species in the present study were collected by sweep net from a paddy field and may be associated with member Diptera order, as the species of this genus remain associated with Dipteran fly.

5. CONCLUSION

The genus *Melancistrus* Graham is one of the less studied genus in which only three species were described worldwide. This is the first record of this genus from India and the discovery of new species viz. *M. macularis* Kumar sp. nov. the number of species increased to four with *M. diplosidis* (Eckel, 1903) [6], *M. specularis* Graham [8] and *M. mucronatus* (Thomson, 1876) [7].

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Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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