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# Two New species of *Dicopomorpha* Ogloblin (Hymenoptera: Mymaridae) from Himalayan belts of Himachal Pradesh, India with the first record of male of *D. albithorax* Rameshkumar & Manickavasagam

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## ABSTRACT

Two new mymarid species *Dicopomorpha heratyi* Anwar & Zeya, sp. nov. and *Dicopomorpha mirzai* Anwar & Zeya, sp. nov., are described from Himalayan belts of Himachal Pradesh, India and also male of *D. albithorax* Rameshkumar & Manickavasagam is recorded and described for the first time. The type specimens are deposited in the Insect Collections, Department of Zoology, Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

*Keywords:* Chalcidoidea, fairy fly, description, record, new species.

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## INTRODUCTION

Himachal Pradesh a state located in the North of India is covered by Himalayan Mountains.The state is a junction of three biogeographic zones of Indian Himalayan regions i.e. West Himalaya, North-West Himalaya and Trans Himalaya. It is a home to many endemic species. Rajmohana, Saini, Girish Kumar, & Patra (2018) documented nearly 475 species of Chalcidoidea in 17 families from the Indian Himalaya which contains 30 species of Mymaridae in 14 genera. The authors have number of unidentified mymarid specimens from Himalayan regions of India which they plan to identify and publish in due course of time.

This paper treats the genus *Dicopomorpha* Ogloblin (1955) which belongs to *Alaptus*-group of genera (Huber & Lin, 1999). With the addition of these two new species (08 from India), the global number of *Dicopomorpha* accounts for a total of 15 species. The genus though small, but widespread and reported from all the regions of the world. Subba Rao (1989) described *Dicopulus indicus* from India which was later transferred to the genus *Dicopomorpha* by Hayat (1992), and this was the first record of the genus from India. Rameshkumar & Manickavasagam (2016) described four species of the genus from India. Rameshkumar et al, (2017) recorded *D. zebra* Huber (2009) from Andaman and Nicobar Islands, India. Here, we describe two new species of *Dicopomorpha* from Himachal Pradesh and additionally, describe the male of *D. albithorax* Rameshkumar & Manickavasagam for the first time.

## MATERIAL AND METHODS

The materials for this study were collected using various trapping techniques as were summarized by Noyes (1982). The specimens were killed in ethyl acetate fumes and were initially stored in 80% ethanol. The specimens were mounted on cards for description of coloration and taking measurements of body lengths and were subsequently mounted on slides for detailed morphometric and descriptive studies. Slides were prepared following Noyes (1982) with modifications as mentioned in Anwar, Zeya, & Veenakumari (2020). Length of antennal scape excludes the radicle. Nikon eclipse DM 2500 stereo zoom microscope was used to study the specimens as well as photographs and make measurements. The photographs were retouched using Adobe Photoshop®. The types are deposited in the Insect Collections, Department of Zoology, Aligarh Muslim University, Aligarh, Uttar Pradesh, India. A distributional map (Fig. A) is provided for the Indian species of *Dicopomorpha* from the different Indian states/Union Territory.

Terminology used was follow Zeya & Hayat (1995) and Gibson (1997).

The following abbreviations are used:

ANI = Andaman and Nicobar Islands; F = Funicle segment; mps = multiporous plate sensillum or sensilla (= longitudinal sensilla); HP = Himachal Pradesh; MT = Malaise trap; SN = Sweep net; YPT = Yellow pan trap.

Acronyms used for depositories:

EDAU = Department of Entomology, Annamalai University, Chidambaram, Tamil Nadu, India.

ZDAMU = Insect Collections, Department of Zoology, Aligarh Muslim University, Aligarh, Uttar Pradesh, India.

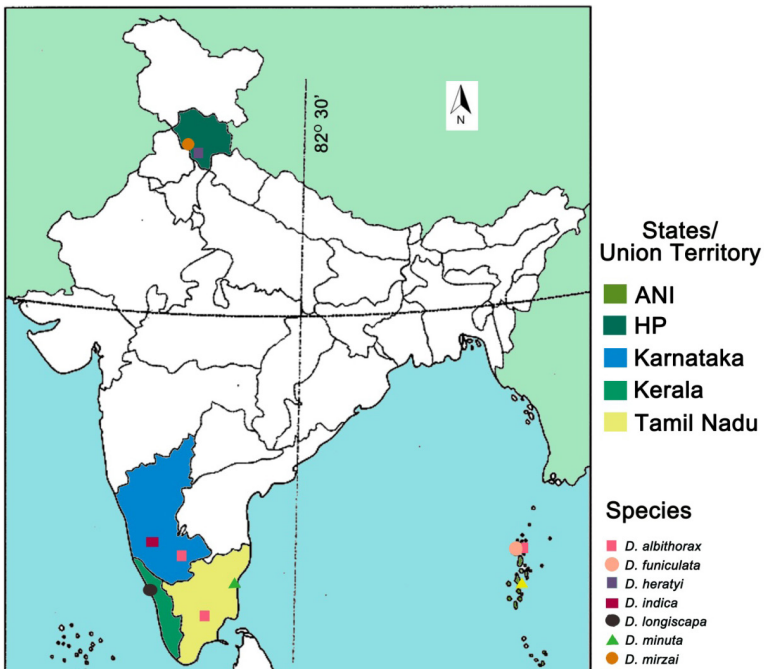


Figure A. Distributional map of *Dicopomorpha* species in India.

## RESULTS

### Taxonomy

### Key to Indian species of *Dicopomorpha* Ogloblin, females

1. Antenna with funicle 6-segmented (Fig. 1c) ..... 2

- Antenna with funicle 7-segmented (Fig. 3b) ..... 3

2. Mesosoma pale yellow; mesoscutum with rugose sculpture ..... *D. albithorax*

- Mesosoma yellow medially, sides dark brown; mesoscutum with reticulate sculpture (Fig. 2b) ..... .....*D. heratyi* sp. nov.

3. F2 normal, as long as other funicular segments .....*D. funiculata*

- F2 reduced, subquadrate (Fig. 3b) ..... 4

4. Mesosoma pale yellow with rugose sulptures ..... *D. indica*

- Body dark brown; mesosoma with reticulate sculptures ..... 5

5. Mesosoma strongly reticulate (Fig. 3d); ovipositor as long as gaster (Fig. 3e) .....*D. mirzai* sp. nov.

- Mesosoma faintly reticulate; ovipositor at most two-third length of gaster ..... 6

6. Scape with two distinct, transverse, white bands, pedicel white ..... *D. zebra*

- Scape and pedicel brown …….…. 7

7. Scape at most 8× as long as broad; ovipositor longer than mesotibia ..*D. minuta*

- Scape at least 8.5× as long as broad; ovipositor shorter than the length of mesotibia .....*D. longiscapa*

### *Dicopomorpha heratyi* Anwar & Zeya sp. nov.

**Material examined:** Holotype: ♀ (on slide under 4 coverslips, slide No. MYM.220), INDIA: HIMACHAL PRADESH, Shimla, 2.08.2014 (YPT), Coll. K. Veenakumari. (ZDAMU).

#### Diagnosis

This is the largest *Dicopomorpha* species recorded so far from India with body length 420 µm. Body colour dark brown except mesoscutum and scutellum yellowish brown medially. Antenna with funicle 6-segmented; funicular segments increase in length distally; clava longer than F4-F6 combined. Head with vertex, mesoscutum and scutellum with polygonal reticulation. *Dicopomorpha heratyi* sp. nov. is similar to *D. albithorax* Rameshkumar & Manickavasagam, the only other Indian species with 6-segmented funicle, but otherwise differs in the following characters: mesosoma brown except mesoscutum and scutellum yellowish brown medially (*D. albithorax:* mesosoma largely pale yellow); head triangular; vertex relatively broad with polygonal reticulation (*D. albithorax:* head rounded; vertex relatively narrow with rugose sculpture); fore wing with distinctly curved apex (*D. albithorax:* fore wing with apex relatively less curved).

#### Description

*Female* (holotype): Body length, 420 µm. Body brown to dark brown, except mesoscutum and scutellum yellowish brown medially. Antenna brown. Wings subhyaline with brownish tinge. Legs, including coxae, brown.

Head (Fig. 1b). Head, in frontal view, triangular, 1.2× as broad as high; vertex, with polygonal reticulation. Antenna (Fig. 1c) with scape, 5.7× as long as broad; pedicel 2× as long as broad, longer than all funicular segments individually; funicle 6-segmented, all segment longer than broad; F1 smallest and F6 the longest; clava 2.7× as long as broad, longer than F4-F6 combined, with 3 mps.

Mesosoma (Fig. 2b). Mesosoma as long as metasoma; mesoscutum and scutellum with polygonal reticulation; anterior scutellum shorter than frenum; propodeum smooth, subequal to anterior scutellum. Fore wing (Fig. 2a) 9× as long as broad, distinctly curved at apex; disc with a few setae in a single row medially; longest marginal seta 3× as long as maximum wing width. Hind wing (Fig. 2a) 22×as long as broad; longest marginal seta 7× as long as maximum wing width.

Metasoma (Fig. 2c). Ovipositor slightly exserted beyond apex of gaster, 0.7× mesotibia.

*Measurements* (holotype slide, µm): head width: height, 160: 135; antennal segments length: width — radicle, 15: 13; scape, 100: 18; pedicel, 45:23; F1, 23: 10; F2, 24: 10; F3, 28: 13; F4, 30: 14; F5, 33: 18; F6, 35: 20; clava, 115:43; mesosoma length, 170; mesoscutum, 48; anterior scutellum, 25; frenum, 50; metanotum, 13; propodeum, 28; fore wing length: width, 525:60; longest marginal seta, 188; hind wing length: width, 500: 23; longest marginal seta, 150; protibia, 95; mesotibia, 155; meso basitarsus, 30; metatibia, 153; metasoma, 205; ovipositor, 105.

Male: Unknown.

Hosts: Unknown.

Distribution: India: Himachal Pradesh.

Etymology: The species is named after Dr. John Heraty, Professor in Entomology, University of California, Riverside, California, USA.

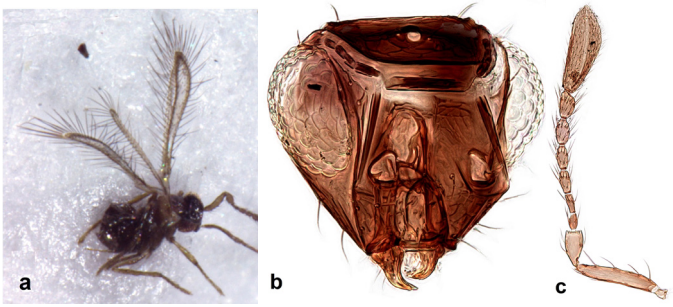


Figure 1. *Dicopomorpha heratyi* sp. nov. (female, holotype). a) habitus, b) head, frontal, c) antenna.

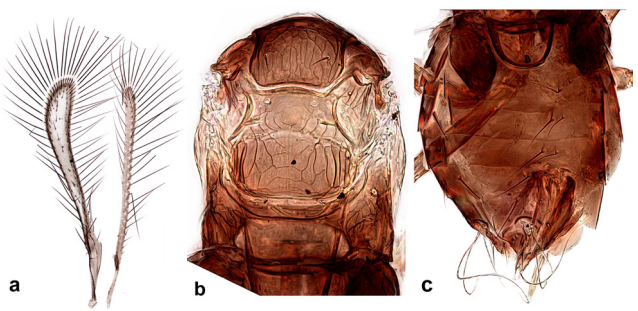


Figure 2. *Dicopomorpha heratyi* sp. nov. (female, holotype). a) wings, b) mesosoma, c) metasoma.

## *Dicopomorpha mirzai* Anwar & Zeya sp. nov.

**Material examined:** Holotype: ♀ (on slide under 4 coverslips, slide No. MYM.101), INDIA: HIMACHAL PRADESH: Hamirpur, Barsar, 1.x.2013 (SN), Coll. P.T. Anwar & F.S.K. Amer. (ZDAMU).

**Diagnosis**

*Dicopomorpha mirzai* Anwar & Zeya, sp. nov. is a distinctive species with funicle 7-segmented, and appears close to *D. indica* (Subba Rao, 1989) in having similar antennal configuration and shape of the fore wing. However, both differ from each other by the colour of the body and sculpture on mesosoma. In *D. mirzai* body is dark brown; mesoscutum and scutellum with reticulate sculpture (in *D. indica* mesosoma is largely pale yellow and the mesoscutum and scutellum with rugose sculpture).

**Description**

*Female* (holotype): Body length, 260µm. Body dark brown. Antenna with scape, pedicel and funicle yellowish brown, clava dark brown. Legs, including coxae, pale brown. Wings subhyaline with brown suffusion.

Head (Fig. 3a). Head, in frontal view, 1.4× as broad as high; vertex with polygonal reticulations, area below transverse trabecula and facial region with faint reticulations. Antenna (Fig. 3b) with scape 4.4× as long as broad; pedicel 1.7× as long as broad, longer than all funicular segments individually; funicle 7-segmented, all longer than broad except F2, ring-like; F7 longest; clava 3× as long as broad, longer than F5-F7 combined, with 3mps.

Mesosoma (Fig. 3d). Mesosoma subequal to metasoma length; mesoscutum with longitudinal polygonal sculpture; scutellum with polygonal reticulation; anterior scutellum subequal to frenum length; propodeum less than 0.5× length of scutellum. Fore wing (Fig. 3c) more or less straight, slightly curved towards apex, posterior margin wavy; 12× as long as broad, with a few setae scattered irregularly behind venation and on wing disc; longest marginal seta 5× as long as maximum wing width. Hind wing (Fig. 3c) 21×as long as broad; longest marginal seta 6× as long as maximum wing width.

Metasoma (Fig. 3e). Ovipositor, 1.2× as long as mesotibia.

*Measurements* (holotype slide, µm): head width: height, 170: 120; antennal segments length: width - radicle, 15: 8; scape, 88: 20; pedicel, 38: 23; F1, 15: 10; F2, 8: 8; F3, 23: 9; F4, 28: 13; F5, 30: 10; F6, 28: 13; F7, 35: 18; clava, 103: 33; mesosoma length, 158; mesoscutum, 53; anterior scutellum, 25; frenum, 33; metanotum, 8; propodeum, 28; fore wing length: width, 455: 45; longest marginal seta, 175; hind wing length: width, 425: 20; longest marginal seta, 125; protibia, 88; mesotibia, 123; mesobasitarsus, 30; metatibia, 120; metasoma, 138; ovipositor, 145.

Male: Unknown.

Hosts: Unknown.

Distribution: India: Himachal Pradesh.

Etymology: The species is named in honour of Professor (Late) Babar Mirza, founder of the Department of Zoology, Aligarh Muslim University, Aligarh.

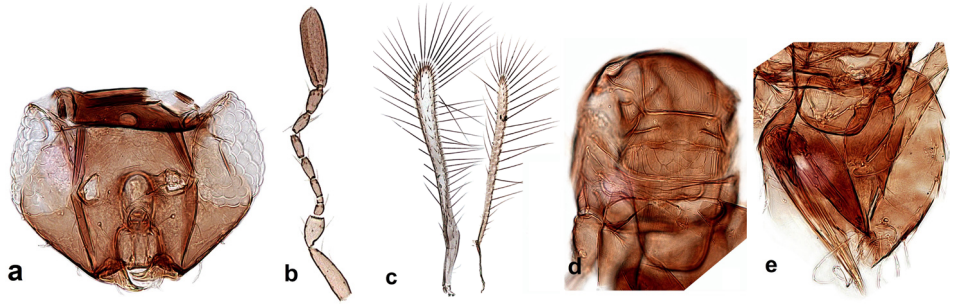


Figure 3. *Dicopomorpha mirzai* sp. nov. (female, holotype). a) head, frontal, b) Antenna, c) wings, d) mesosoma, e) metasoma.

### *Dicopomorpha albithorax* Rameshkumar & Manickavasagam, 2016

*Dicopomorpha albithorax* Rameshkumar & Manickavasagam, 2016: 8384, female. Holotype, female, India, Andaman & Nicobar Islands, Diglipur, Ramnagar, (EDAU), examined.

**Material examined:** ♂ (on slide under 4 coverslips, slide No. MYM.107) INDIA: KARNATAKA, Bengaluru, Jarakabande Kaval, 14.xi.2013 (MT), Coll. K. Veenakumari. (ZDAMU).

### Diagnosis

Male: Body length 270*µ*m. Body mostly dark brown except mesosoma pale yellow. Antenna and legs pale yellow. Head, with rugose sculpture. Antennal with flagellum 9-segmented, longitudinal sensilla on all flagellar segments (Fig. 4a). Mesosoma (Fig. 4c) as long as metasoma; setation and sculpture similar to females. Fore wing (Fig. 4b) 8× as long as broad, disc bare except a few setae in the middle; longest marginal seta 3× as long as maximum wing width. Hind wing (Fig. 4b) 22× as long as broad; longest marginal seta 6× as long as maximum wing width. Genitalia (Fig. 4d) 0.6× mesotibia.

Hosts: Unknown.

Distribution: India: Andaman & Nicobar Islands, Karnataka, Tamil Nadu.

Comments: *Dicopomorpha albithorax* Rameshkumar & Manickavasagam is similar to *D. indica* (Subba Rao, 1989), as both share same body coloration but the later has one extra funicle segment. It may fall under a potential synonymy of *D. koreana* Triapitsyn & Berezovskiy (2003) from South Korea which has similar body colouration and 6-segmented funicle. Both the species hardly differs from each other except for the presence a few setae on the fore wing.

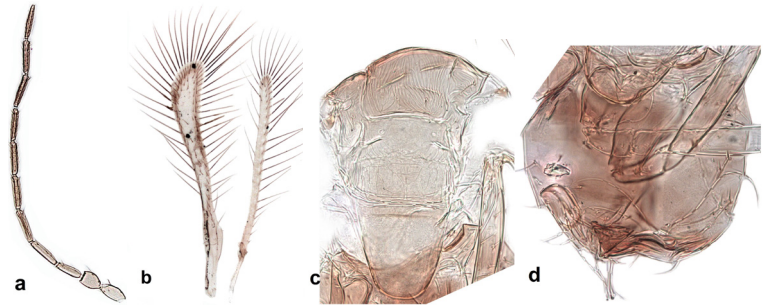


Figure 4. *Dicopomorpha albithorax* Rameshkumar & Manickavasagam (male). a) antenna, b) wings, c) mesosoma, d) metasoma.

## DISCUSSION

*Dicopomorpha* Ogloblin constitutes the smallest known insects of the world (male of *D. echmepterygis* Mockford measuring 139 µm in length). All the recorded and described species of the genus from India measure less than 500 µm which makes it one of the most challenging groups in terms of collection and description. Also, the genus shows variation in characters which makes it even more demanding to study the genus collectively from the world. Here, we have described two new species and reported the male of a known species for the first time. The descriptions although based on single specimens but, remarkably show characters that separates them with the already existing species. The photographs are clear enough to record and identify these species when collected again in future.

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### Disclosure statement

No potential conflict of interest was reported by the authors.

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