New Species of *Aphelinoidea* Girault (Hymenoptera: Chalcidoidea: Trichogrammatidae) along with Key from India

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ABSTRACT

Two new species of *Aphelinoidea* Girault (Hymenoptera: Trichogrammatidae), *A. almoraensis* Ikram & Khan sp. nov and *A. rudrapurensis* Ikram & Khan sp. nov. are being described from India. A key to the Indian species of *Aphelinoidea* Girault and re-description of *Aphelinoidea gwaliorensis* Yousuf & Shafee are also provided. *Aphelinoidea gwaliorensis* Yousuf & Shafee is being revalidated.

Key words: *Aphelinoidea*, Chalcidoidea, new species, India.
INTRODUCTION

Aphelinoidea a cosmopolitan genus of the family Trichogrammatidae. Some members of which are known as egg parasitoids of various leafhoppers (Hemiptera: Cicadellidae) and thus they can be important for biological control (Triapitzin 1995; Walker, Zareh, Bayoun, & Triapitsyn, (1997); Walker, Bayoun, Triapitsyn, & Honda, (2005); Bayoun, Walker, & Triapitsyn, (2008). Walker, Bayoun, Triapitsyn & Honda (2005) reviewed the species of egg parasitoids attacking N. tenellus in California. Triapitsyn (2018) synonymized A. gwaliorensis Yousuf & Shafee under A. (Lathromeroides) neomexicana (Girault), and A. retiruga Lin, was synonymized under A. (Aphelinoidea) longiclavata Yousuf & Shafee. So, presently the genus Aphelinoidea Girault includes 39 described (including three Indian species: A. gwaliorensis Yousuf & Shafee (revalidated), A. yousufi Khan & Anis, A. longiclavata Yousuf, & Shafee) valid species in the world (Noyes, 2019). Here we have described two new species A. almoraensis Ikram, & Yousuf sp. nov and A. rudrapurensis Ikram & Yousuf sp. nov.of the genus Aphelinoidea Girault collected from Uttarakhand region in India. Anupdated key to the Indian species of Aphelinoidea Girault and re-description of Aphelinoidea gwaliorensis Yousuf & Shafee are also provided. Aphelinoidea gwaliorensis Yousuf & Shafee is being revalidated, which was synonymized with Aphelinoidea (Lathromeroides) neomexicana (Girault, 1915) by Triapitsyn (2018).

MATERIAL AND METHODS

All specimens were collected from the forestry and adjoining agro-forestry areas of Haryana, Uttarakhand and Punjab (India) by sweep net. Screened out specimens from insect samples were preserved in 70% alcohol. Later specimens were dissected and kept in a drop of euparol under coverslips. Only body lengths of specimens were measured in millimeters, rest parts of measurements were taken from the divisions of a linear scale micrometer placed in the eye piece of a Nikon Digital Sight attached with Optiphot Microscope, at 10X, 20X and 40X (objective lens) for slide-mounted parts. Scales are placed on photographs of slide mounted parts and measurement was taken with the help of NIS-ELEMENT software in micrometer (µm). Photographs of slide-mounted specimens were taken with digital camera “Nikon Digital Sight attached with Optiphot Microscope (Japan)” fitted over a compound microscope (Leica’s LeitzLabor Lux S). All the specimens including types are deposited at NFIC (National Forest Insect Collection), Forest Protection Division, Forest Research Institute, Dehradun, Uttarakhand (India).

The following abbreviations are used: OOL= Ocello-ocellar length; POL= Post-ocellar; C1 & C2= Club segments 1 & 2; FWW= Fore wing width; STV= Stigmal vein; MV= Marginal vein; PM= Pre marginal vein.
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RESULTS

Taxonomy

Key to Indian species of Aphelinoidea Girault, based on females

1. Fore wings less than 2.5X as long as wide ...........................................................2

   - Fore wings 2.5X as long as wide; marginal fringe about one fifth of wing width; antennae with scape more than 3X as long as wide, pedicel about 2X as long as wide ..........................................................1. A. gwaliorensis Yousuf & Shafee

2. Antennae with club about 4X as long as wide .................................................................3

   - Antennae with club always less than 4X as long as wide ........................................4

3. Fore wings with discal setae restricted to apical half of disc; antennae with scape more than four times as long as .........................................................2. A. yousufi Khan & Anis

   - Fore wings with disc densely setose after venation, covering two third of disc ..........................................................3. A. longiclavata Yousuf & Shafee

4. Antennae with club less than 3X as long as wide, scape more than 3.5 times as long as wide; fore wings with marginal fringe about one-sixth of wing width .................................................................................................4. A. almoraensis sp. n.

   - Antennae with club more than 3X as long as wide; scape less than 3.5X as long as wide; fore wings with marginal fringe about than one-tenth of wing width .................................................................5. A. rudrapurensis sp. n.

Aphelinoidea gwaliorensis Yousuf & Shafee (Figs. 1-5)


Female. Length. 0.50 mm. Head with fronto-vertex light yellow; facial area from ventral margin of toruli to mouth margin of the eye gena light brown; eyes and ocelli red; Mandibles golden yellow with tip brown. Antennae with scape and pedicel light brown except club with brownish. Mid-lobe of mesoscutum light golden yellow except light dorsellum and propodeum parts with light yellow. Fore and hind wings hyaline except infuscation beneath marginal vein.

Head: (facial view) (Fig. 1) 1.14X as broad as long (176: 154). Eyes 1.4X as long as malar space; mandibles with tri-denticles. Antennae (Fig. 2) with scape 3.52X as long as broad (67: 19); pedicel 2X as long as broad (44: 22); one anellus present; funicle absent; club three-segmented (C1, C2 and C3), about 2.3X as long as broad (90: 40).

Mesosoma: (Fig. 4) Midlobe of mesoscutum about 1.2X wider than long (92: 78) with 2 pairs of setae present on dorsal surface; midlode of scutellum 1.5X wider than long (92: 61) with 2 pairs of setae, dorsellum 0.61X as long as propodeum (13: 21). Fore wings (Fig. 3), 2.6X as long as broad (501: 194); disc densely setose; STV rudimentary.
Metasoma: (Fig. 5) longer than mesosoma; ovipositor very long, arising from base of 2nd tergite of mesothorax and cover the entire length of gaster slightly exserted, 2.8X as long as hind tibia (230: 82).

Male. Unknown.

Host. Unknown.


Distribution: India: Andhra Pradesh, Arunachal Pradesh, Haryana (New record), Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Odisha, Punjab (New record), Uttar Pradesh, West Bengal.

Discussion: *Aphelinoidea gwaliorensis* was described by Yousuf & Shafee (1985), based on female characters. During present study additional morphometric characters (Midlobe of mesoscutum about 1.2X wider than long (92: 78) with 2 pairs of setae present on dorsal surface; midlobe of scutellum 1.5X wider than long (92: 61) with 2 pairs of setae, dorsellum 0.61X as long as propodeum (13: 21) have been studied.

*Aphelinoidea gwaliorensis* Yousuf & Shafee was synonymized with *Aphelinoidea (Lathromeroides) neomexicana* (Girault, 1915) by Triapitsyn (2018) but several specimens of *A. gwaliorensis* collected during the present study, have been studied in detail and following key characters make it distinct from *A. (Lathromeroides) neomaxicana*. Therefore *A. gwaliorensis* being treated as valid distinct species and hence, it is being revalidated as *Aphelinoidea gwaliorensis* Yousuf & Shafee, 1985.
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Table 1. Comparative characters of A. (Lathromeroides) neomaxicana Girault and A. gwaliorensis Yousuf & Shafee.

<table>
<thead>
<tr>
<th>Key characters</th>
<th>A. (Lathromeroides) neomaxicana (Girault, 1915)</th>
<th>A. gwaliorensis Yousuf &amp; Shafee (1985) (n=5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body size</td>
<td>0.60-1.10 mm</td>
<td>0.50-0.56 mm</td>
</tr>
<tr>
<td>Body colour</td>
<td>Face brown, Mesoscutum mostly orange; gaster generally dark brown or sometimes with several pale or orange transverse strips.</td>
<td>Face dark yellow with pale yellow vertex; gaster dark yellow with brown transverse strips.</td>
</tr>
<tr>
<td>Antennae (Length/ width)</td>
<td>Club: 2.2-3.1×</td>
<td>2.1-2.6×</td>
</tr>
<tr>
<td></td>
<td>Pedicel: 3×</td>
<td>2.0-2.5×</td>
</tr>
<tr>
<td></td>
<td>Scape: About 4×</td>
<td>3.7-4.4×</td>
</tr>
<tr>
<td>Fore wings (Length/ width)</td>
<td>2.3-2.4× as long as wide</td>
<td>2.5-2.7× as long as wide</td>
</tr>
<tr>
<td>Ovipositor: Hind tibia</td>
<td>About 4×</td>
<td>2.5-3.0×</td>
</tr>
<tr>
<td>Ovipositor: Meta tibia</td>
<td>3.0-3.9×</td>
<td>2.8-3.0×</td>
</tr>
<tr>
<td>Genitalia arising from</td>
<td>2nd tergite of mesothorax</td>
<td>3rd tergite of mesothorax</td>
</tr>
</tbody>
</table>

Aphelinoidea almoraensis sp. nov. (Figs. 6-11)

Holotype, 1♀ (on slide), INDIA: Uttarakhand, Almora, 06.02.2018, R. B. Singh, by sweeping.

Paratype: 1♀ (on slide) same data as holotype.

Description

Female. Length 0.85 mm. Head with vertex pale yellow; gena brownish; eyes and ocelli red. Mandibles dark brown. Antennae with scape, pedicel and club light brown. Mesosoma with pronotum, mesoscutum and scutellum brown; metanotum and propodeum pale brown. Gaster uniformly dark brown with several pale transverse stripes.

Head: (facial view) (Fig.6) 1.14X as broad as high (153: 134); front-vertex with prominent setae; vertex with rugose sculpture. Eyes reddish , about 1.55X as long as malar space (70: 45); mandible with three denticles (Fig. 10). Antennae (Fig. 7) with scape broad at the base, 3.8X as long as broad (65: 17); pedicel 2X as long as broad (44: 22); one anellus present; club three-segmented (C1, C2 and C3), 2.7X as long as broad (92: 34), C3 longest, more than 2X longer than pedicel.

Mesosoma: Fore wings (Fig. 11), hyaline except infuscation beneath venation, 2.4X as long as broad (484: 201), fore wings disc with dens setose not arranged in rows, STV rudimentary and marginal fringe short. Hind wings about 11X as long as wide (396: 37) with 3 rows of discal setae, marginal fringe long, about 1/5th of wing width.

Metasoma: Gaster longer than mesosoma; ovipositor 1.3X as long as hind tibia (175: 131) (Figs. 8, 9).

Host: Unknown
Distribution: INDIA: Uttarakhand.
Etymology: The name of the species is derived from collection site ‘Almora’ district in Uttarakhand.

Remarks: *Aphelinoidea almoraensis* sp. nov. is very close to *Aphelinoidea longiclavata* Yousuf & Shafee (1988a) but can be separated by having antennae with scape 3.8X as long as broad; pedicel 2X as long as broad; club 2.7X as long as broad. Fore wings, 2.4X as long as broad.

In *Aphelinoidea longiclavata*, antennae with scape 4X as long as broad; pedicel 2.5X as long as broad; club long, about 4X as long as broad. Fore wings, slightly more than 2X as long as broad.

*Aphelinoidea rudrapurensis* sp. nov. (Figs. 12-19)


**Description**

Female. Length 0.79 mm. Head with fronto-vertex bright yellow; facial area from ventral margin of toruli upto mouth margin of the eye gena light brown; eyes and ocelli red; Mandibles golden yellow with tip brown. Antennae with scape, pedicel and club brown. Midlobe of mesoscutum light golden yellow, except dorsellum and propodeum parts with light yellow. Fore and hind wings hyaline except light infuscation beneath venation.

Head: (facial view) (Fig. 12) 1.2X as broad as high (191: 162). Eyes 2.3X as long as malar space; mandibles with tri-denticles (Fig. 14). Antennae (Fig. 13) with scape broad at the base, 3.25X as long as broad (78: 24); pedicel 2.4X as long as broad (53: 22); one anellus present; funicle absent, club three-segmented (C1, C2 and C3), 3.3X as long as broad (119: 36), C3 longest.
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Mesosoma: (Fig. 15) Midlobe of mesoscutum 1.14X wider than long (124: 108) with 2 pairs of setae present on dorsal surface; midlobe of scutellum 1.52X wider than long (116: 76), having 2 pairs of setae, dosrsellum as long as propodeum. Fore wings (Fig. 16), 2.30X as long as broad (578: 251); disc densely setose, STV rudimentary; marginal fringe about 1/10th of FWW. Hind wings (Fig. 17) 11X as long as wide (452: 41), 2 rows of setae present. Metasoma: Gaster longer than mesosoma; ovipositor very long, arising from base of and cover the entire length of gaster and slightly exserted, 2.3X as long as hind tibia (421: 181) (Figs. 18-19).

Host: Unknown

Distribution: Uttarakhand.

Etymology: The name of the species is derived from collection site ‘Rudrapur’ district in Uttarakhand.

Remarks: Aphelinoidea rudrapurensis sp. nov. is very similar to Aphelinoidea yousufi Khan & Anis (2016) but can be separated by having antennae with scape 3.25X as long as broad; club 3.3X as long as broad. Midlobe of mesoscutum 1.14X wider than long; midlobe of scutellum 1.5X wider than long. Fore wings, 2.30X as long as broad; disc densely setose upto the margin of stigmal vein. Ovipositor very long, arising from base, and cover the entire length of gaster and slightly exserted, 2.3X as long as hind tibia.

In Aphelinoidea yousufi antennae with scape broad at the base, 4.44X as long as broad, club about 4X as long as broad. Midlobe of mesoscutum 1.23X wider than long; midlobe of scutellum 2.25X wider than long. Fore wings, 2.2X as long as broad; discal setae restricted to apical half. Ovipositor short, arising from IIIrd of the gaster, about 1.47X as long as hind tibia.

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REFERENCES


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