



Full length article

## Review of Indian species of *Monoceromyia* Shannon (Diptera: Syrphidae) with description of two new species

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## ABSTRACT

Flower fly species of the genus *Monoceromyia* Shannon (Diptera: Syrphidae) in India are reviewed and two new species, *M. flavoscutata* Sankararaman, Anooj and Mengual, **sp. nov.** and *M. nigra* Sankararaman, Anooj and Mengual, **sp. nov.**, are described from Tamil Nadu and Arunachal Pradesh (India), respectively. A new synonym is proposed: *M. multipunctata* (Hull, 1941) is synonymised under *M. polistoides* (Brunetti, 1923). Moreover, lectotypes are designated for *Ceria patricia* Brunetti, 1923 and *Ceria tredecimpunctata* Brunetti, 1923. An identification key to the Indian *Monoceromyia* species is also provided.

## Introduction

Adult flower flies of the tribe Cerioidini (Diptera: Syrphidae: Eristalinae) are extraordinary high-fidelity mimics of several families of wasps (Thompson, 2015; Van Steenis et al., 2016). Immature stages of this tribe are saprophagous in an array of habitats, such as sap runs, tree rot holes, phytotelmata in agave or bamboo, and in stingless bee colonies (Van Steenis et al., 2016, and references there in). Cerioidines are rare in collections; hence many of the species are known or represented by single individuals. The tribe currently comprises five genera, i.e., *Ceriana* Rafinesque, 1815, *Monoceromyia* Shannon, 1922, *Polybiomyia* Shannon, 1925, *Primocerioides* Shannon, 1927, and *Sphiximorpha* Rondani, 1850, although some authors have proposed to consider them as subgenera of *Ceriana* until genitalia characters and a comprehensive phylogenetic study may resolve their relationships (Riek, 1954; Thompson, 1972; Thompson, 2015; Van Steenis et al., 2016). Out of these five genera, only three have been reported from the Indian subcontinent, i.e., *Ceriana*, *Monoceromyia* and *Sphiximorpha* (Ghorpadé, 2014).

*Monoceromyia* was originally erected as a subgenus under *Cerioides* Rondani, 1850 (junior synonym of *Sphiximorpha*) by Shannon (1922), with *Ceria tricolor* Loew, 1861 from Cuba as type species. This genus can be diagnosed based on an incomplete postmetacoxal bridge (metapleura widely separated behind metacoxae), antennifer (frontal prominence) at least as long as scape, and tergite II longer than wide, strongly

constricted (Thompson, 2015; Van Steenis et al., 2016).

The extensive work on Indian Cerioidini was done by Brunetti (1907, 1908, 1915, 1923) with description of several new species under the genus *Ceria* Fabricius, 1794 (synonym of *Ceriana*, a new name for *Ceria*), although he recognized *Sphiximorpha* as a separate genus based on the absence of antennifer. Later, Shannon (1925) published a revision of this tribe with description of new genera and elevating *Monoceromyia* as a valid genus. Shannon (1927) studied some of the Cerioidini from Asia and provided an identification key to *Monoceromyia* species, but he did not include a few of Brunetti's species that occur in India, although they were mentioned in his checklist. The last described *Monoceromyia* species that occurs in India was published by Hull (1941), as *Cerioides multipunctata* Hull, 1941, based on two males collected from Kullu, Himachal Pradesh. There are currently 28 valid *Monoceromyia* species known from the Oriental Region (Thompson, 2015), but only 12 species occur in India (Ghorpadé, 2014; Mitra et al., 2015). Among these 12 taxa, Ghorpadé (2014) questioned the inclusion of *Monoceromyia flavipennis* (de Meijere, 1908), originally described from Sulawesi (Brunetti, 1915: 250), but listed from India by Knutson et al. (1975: 344) in their catalogue. No published record of *M. flavipennis* is known from India. Ghorpadé (2014) also doubted the presence of *M. trinotata* (de Meijere, 1904) in India. This species was originally described from Dawei (Myanmar) and never recorded from India, but listed from this country by Knutson et al. (1975: 345).

In the present study, the species of *Monoceromyia* from India are

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revised. We describe two new species, eight species are redescribed and one new synonymy is proposed. An identification key to the Indian species of *Monoceromyia* is given and type images of various species are provided.

## Materials and methods

Field sampling in India was carried out by sweep netting across flowers and vegetation from the evergreen forests of Arunachal Pradesh, Kerala and Tamil Nadu. Collected specimens were killed using fumes of ethyl acetate and then pinned for identification. In addition, we studied the *Monoceromyia* specimens deposited in the National Pusa Collection (New Delhi, India). Available specimens were identified to genus using Van Steenis et al. (2016) and to species using Brunetti (1923), Shannon (1927) and Hull (1941).

Morphological terminology follows Thompson (1999) and Thompson et al. (2017). Measurements were made using Leica S8 APO stereozoom trinocular microscope, attached with an ocular lens. For the two new species, images of pinned specimens were captured using DMC2900 camera attached to Leica M205C trinocular stereozoom microscope.

Specimens at National Pusa Collection were captured using Leica DFC 425 digital camera mounted on a Leica M205 FA stereozoom microscope and processed with Automontage software and then processed using Adobe Photoshop version 7.0. Images of species that are known only by holotype were obtained from The Natural History Museum, London. Images of the *M. multipunctata* holotype were obtained from the Museum of Comparative Zoology, Insect Type Database (<https://mczbase.mcz.harvard.edu/guid/MCZ:Ent:22216>). The holotype of *M. flavipennis* and *M. himalayensis* (de Meijere, 1908) at the Hungarian National Museum (Budapest, Hungary) were destroyed in a fire during 1956. Only the holotype was known for these two species and we did not collect individuals of these taxa. Nevertheless, we included them in the identification key using the original descriptions.

For the type material the original label data is given *verbatim*. Double quotation marks (“”) were used to indicate separate labels, and a double slash (//) has been used to indicate separate lines within a label. Italics denote handwriting in the original label. Identification and location labels of other specimens are indicated in standard format. Square brackets are used to indicate information added by the authors. The following acronyms are used for depositories indicated for each studied specimen:

MCZ: Museum of Comparative Zoology, Harvard University, United States.

NBC: Naturalis Biodiversity Center, Leiden, the Netherlands.

NHMD: Natural History Museum of Denmark, Copenhagen, Denmark.

NHMUK: Natural History Museum, London, United Kingdom.

NPC: National Pusa Collection, New Delhi, India.

NZCZSI: National Zoological Collections, Zoological Survey of India, Kolkata, India.

UASB: Department of Entomology, University of Agricultural Sciences, GKVK, Bengaluru, India.

## Results

Newly collected material from Arunachal Pradesh, Kerala and Tamil Nadu and studied specimens deposited at the NPC represented nine *Monoceromyia* species (including two new species) reported from India, i.e., *M. eumenioides* (Saunders, 1841), *M. flavoscutata* sp. nov., *M. fenestrata* (Brunetti, 1923), *M. javana* (Wiedemann, 1824), *M. nigra* sp. nov., *M. obscura* (Brunetti, 1907), *M. polistoides*, *M. tredecimpunctata* (Brunetti, 1923) and *M. trinotata*.

### *Monoceromyia* Shannon, 1922

Type species: *Ceria tricolor* Loew, 1861: 37. Type locality: Cuba [ST

♂♀, MCZ (lost)]

### Diagnosis

The genus is recognized by the frontal prominence (antennifer) as long as or longer than scape; loop in vein R<sub>4+5</sub> with or without appendix; abdomen petiolated, abdominal tergite II longer than wide, constricted; and the postmetacoxal bridge is incomplete (Brunetti, 1923; Shannon, 1922; Van Steenis et al., 2016; Thompson et al., 2017).

### Distribution

Afrotropical, Australasian, Neotropical and Oriental regions (Van Steenis et al., 2016).

### Biology

Studies on the biology of cerioidines by various workers indicated the majority of them utilize tree sap as breeding sites (Rotheray et al., 1998; Rotheray et al., 2006; Ricarte et al., 2007; Reemer et al., 2009) and some breed also in stingless bee colonies (Ricarte et al., 2007; Halcroft et al., 2013). The adults mimic potter wasps (Eumeninae: Vespidae: Hymenoptera) and visit flowers of various plants. In the present study, females of *M. eumenioides* and *M. flavoscutata* sp. nov. were collected while ovipositing in the exuded tree sap of *Albizia Durazz*.

### Remarks

Among the Indian *Monoceromyia* species, only *M. crux* (Brunetti, 1915), *M. fenestrata* and *M. himalayensis* have tergite II shorter than tergite III. Most of the species are black-yellow coloured, except *M. eumenioides* and *M. polistoides* that are brownish-orange and partly orange-brown, respectively. The frontal prominence in most Indian species of *Monoceromyia* is black, except in *M. eumenioides*, *M. fenestrata* and *M. polistoides* that have a brown-orange frontal prominence. The pleuron usually has two or three yellow maculae, but it is entirely black in *M. fenestrata*, *M. nigra* sp. nov. and *M. obscura*.

### *Monoceromyia eumenioides* (Saunders, 1841)

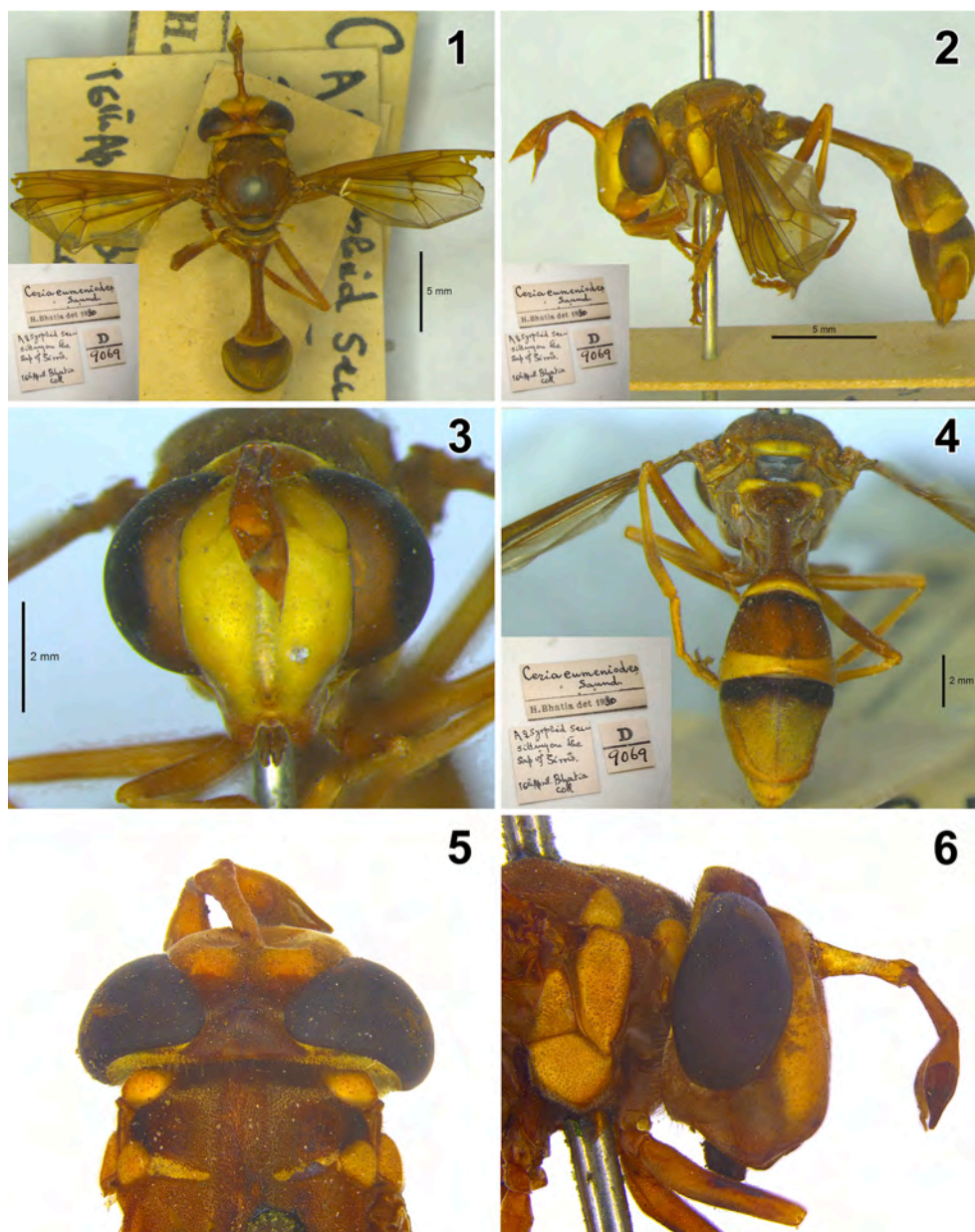
#### Figs. 1–7

*Ceria eumenioides* Saunders, 1841: 60. Type locality: Northern India [HT ♀, NHMUK]

*Ceria apicata* Brunetti, 1908: 95. Type locality: Ganjam, Madras Presidency, India [HT ♂, NZCZSI]

### Redescription

**FEMALE** (Figs. 1–7). Body length: 14–15 mm; wing length: 9–10 mm. **Head.** Face yellow with a pale brown-orange median facial vitta (Fig. 3) or entirely yellow with a translucent median part, slightly concave below frontal prominence (Fig. 6); face slightly protruding antero-ventrally. Head 2.0–2.2 times wider than face just below the antennae. Frons brownish yellow; frontal prominence brown, 4.8–5.0 times longer than wide, slightly longer than scape. Antenna brown, scape and arista paler; gena predominantly brown yellow. Vertical triangle and ocellar triangle brownish-orange; vertex reddish brown slightly raised. Occiput yellow dorsally and covered with yellow white pilosity ventrally along the eye margin. **Thorax** (Figs. 1, 7). Scutum brownish-orange with a yellow macula on postpronotum and on notopleuron; pollinose vitta along transverse suture, extends for short distance. Pleuron brownish-orange with three yellow maculae, one each on posterior anepisternum, dorsal katepisternum and anterior anepimeron. Scutellum yellow with the basal part black. **Legs.** Coxae and trochanters brownish-orange; pro and mesofemur yellow apically; 1/4–1/5 metafemur yellow basally, remainder brownish-orange; tibiae and tarsi reddish-brown, paler. Metafemur elongated. **Wing.** Yellowish, except anterior 1/2, along vein R<sub>4+5</sub>, along spurious vein and crossvein bm-cu brownish; region along stigma, vein R<sub>1</sub>, R<sub>2+3</sub> and along the loop in R<sub>4+5</sub> with dark black suffusion (Fig. 1); loop in R<sub>4+5</sub> with short appendix; crossvein r-m slightly curved. Alula broad, 2.2–2.4 times longer than



**Figs. 1–6.** *Monoceromyia eumenioides* (Saunders, 1841). **Figs. 1–4,** female from Darjeeling. 1. Habitus, dorsal view. 2. Habitus, lateral view. 3. Head, frontal view. 4. Abdomen, posterior view. **Figs 5–6.** Female from Coimbatore. 5. Head and anterior scutum, dorsal view. 6. Head and anterior pleuron, lateral view.

wide. Wing apex with dark suffusion. Halter yellow. **Abdomen** (Figs. 2, 4). Brownish-orange to yellow coloured; tergites III and IV black anteriorly. Length of tergites I: II: III: IV (approx.) 1–1.2: 4.3–4.5: 1.7: 1.5. Tergite II longer than wide, narrow anteriorly. Tergite I with two yellow maculae antero-laterally; tergites II and III each with a yellow fascia on posterior margin, the one on tergite III gets slightly broader laterally (Fig. 2) tergite IV with a yellow fascia posteriorly, extending forward as large macula laterally; tergite V entirely yellow.

**MALE.** Unavailable in the present study.

#### Material examined

1♀, India: Darjeeling, D9069, 16.iv.1930, coll. H. Bhatia (NPC); 2♀, India: Tamil Nadu, Coimbatore, 21.v.2018, sweep net, 10°56'59"N 76°58'59"E, coll. Pavithran (UASB).

#### Distribution

India (Bihar, Maharashtra, Orissa, Tamil Nadu and West Bengal) and

Pakistan (Saunders, 1841; Ghorpadé, 2014; Ghorpadé, 2019; Shehzad et al., 2017).

#### Biology

Two females were collected while sitting on sap run from *Albizia* in the month of May. The female specimen at NPC has a handwritten note saying "A ♀ syrphid seen sitting on the sap of *Sirris*".

#### Remarks

The examined female has the face entirely yellow medially, but freshly collected specimens have a pale brown-orange median facial vitta (H.M. Yeshwanth, pers. comm. on 15.09.2021). This pale median facial vitta is relatively weakly marked in comparison with other *Monoceromyia* species and it may fade in pinned dry specimens.



Fig. 7. *Monoceromyia eumenioides* (Saunders, 1841), female from West Bengal, India. © Somnath Kumbhar.

*Monoceromyia fenestrata* (Brunetti, 1923)

Figs. 8 and 9

*Ceria fenestrata* Brunetti, 1923: 333. Type locality: Runjit valley, Sikkim, India [HT ♀, NHMUK]

Redescription

**FEMALE.** Body length: 10–11 mm; wing length: 8–8.3 mm. **Head.** Face black with a broad black median facial vitta, a pair of yellow maculae on frons adjacent to eyes and two narrow yellow fasciae extending downwards; face slightly protruding antero-ventrally. Head two times wider than face just below the antennae. Width of facial vitta 0.5–0.6 times as wide as width of face. Frons black; frontal prominence brown, 4.8–5.0 times longer than wide. Scape black, much shorter than frontal prominence; arista yellow brown; gena black. Vertical triangle and ocellar triangle black; vertex black. Occiput entirely black and covered with white pilosity ventrally along the eye margin. **Thorax** (Fig. 8). Scutum black with a brownish orange macula only on postpronotum; the remainder of the mesonotum completely black. Pleuron entirely black without any pale marking; anepisternum, katapisternum and anepimeron wholly black. Scutellum entirely black. **Legs.** Coxae black; trochanters black-brown; femora and tibiae black, yellow at the junction; tarsi brownish yellow. Metafemur elongated. **Wing** (Fig. 8). Hyaline, except anterior 1/2, along vein  $R_{4+5}$ , above spurious vein,  $bm$  and  $CuP$ ; a hyaline region above  $dm$ ; loop in  $R_{4+5}$  without appendix; crossvein  $r-m$  curved. Alula broad, 2.7–2.9 times longer than wide. Halter yellow. **Abdomen** (Fig. 8). Black. Length of tergites I: II: III: IV is 1: 1.5–1.6: 4.6–4.8: 3. Tergite II is longer than wide, but shorter than

tergite III. Tergites II and tergite III with a yellow fascia on posterior margin; the remainder of the abdomen black-brown (Fig. 9). Tergites III, IV and V with white pilosity.

**MALE.** Unknown.

Material examined

Holotype, female: “Holo- // type” [round, red margin] “Runjit Valley, // Sikkim. // May 1894. // Col. C.T.Bingham. // 96–283” “NHMUK010369977” [QR code] “*Ceria // fenestrata* // Brun. Type ♀ // det. Brun. 19243” (NHMUK) [photograph(s) of primary type studied].

Distribution

India (Sikkim) (Brunetti, 1923; Ghorpadé, 2014).

Biology

Larva unknown; the holotype female has been collected in the month of May.

*Monoceromyia flavoscutata* Sankararaman, Anooj and Mengual, *sp. nov.*

Figs. 10–18

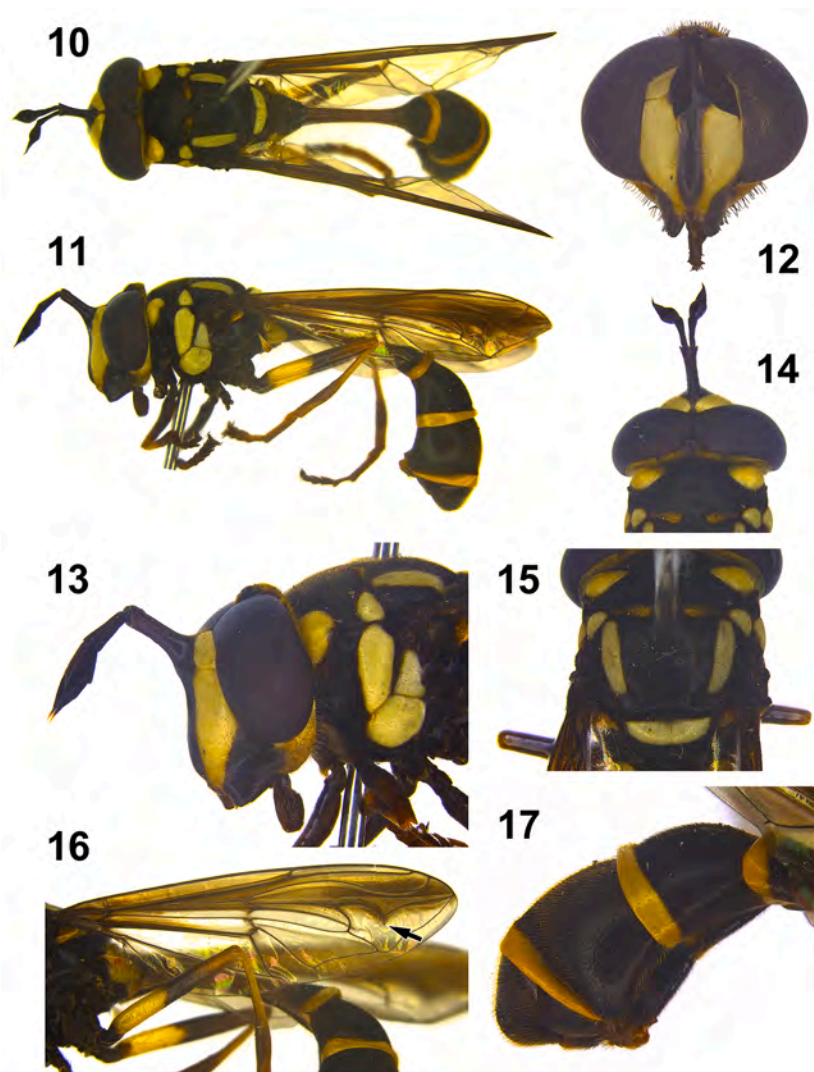
*Monoceromyia javana* (Wiedemann, 1824) of Sankararaman et al. (2020): misidentification.

Differential diagnosis

*M. flavoscutata* *sp. nov.* is somewhat similar to *M. tredecimpunctata* and *M. trinotata* in having a yellow macula on postpronotum and notopleuron, forming a yellow vitta from transverse suture to postalar callus. However, this new species can be differentiated from the latter two by the yellow scutellum with a very narrow black anterior margin (Fig. 15) and the loop in vein  $R_{4+5}$  with a short appendix (Fig. 16, indicated by an arrow). In *M. trinotata* and *M. tredecimpunctata*, the scutellum is black with a yellow fascia on posterior margin, and in both these species the loop in vein  $R_{4+5}$  has no appendix. *Monoceromyia flavoscutata* *sp. nov.* differs from *M. tredecimpunctata* by having a yellow macula on the anterior anepimeron (Fig. 13) (in *M. tredecimpunctata*, anepimeron black, without yellow maculae). It also differs from *M. trinotata* by having the vertex without any macula and median prescutellar yellow macula absent (Figs. 14, 15), while *M. trinotata* has the vertex with two yellow maculae and a median prescutellar yellow macula present (Figs. 55, 58). *Monoceromyia flavoscutata* *sp. nov.* might resemble *M. himalayensis* by having two sublateral vittae posterior to the transverse suture, but they can be distinguished by the longer tergite II (in *M. himalayensis*, tergite II is slightly longer than tergum I), legs colour variable with metafemur yellow on basal 1/3 (in *M. himalayensis*, legs reddish-brown), and the loop in vein  $R_{4+5}$  has no appendix in *M. himalayensis* based on the original description.



Figs. 8–9. *Monoceromyia fenestrata* (Brunetti, 1923), holotype female. 8. Habitus, dorsal view, with labels. 9. Habitus, lateral view.



**Figs. 10–17.** *Monoceromyia flavoscutata* Sankararaman, Anooj and Mengual, *sp. nov.*, holotype male. 10. Habitus, dorsal view. 11. Habitus, lateral view. 12. Head, frontal view. 13. Head and anterior pleuron, lateral view. 14. Head and anterior scutum, dorsal view. 15. Scutum, dorsal view. 16. Wing; detail of vein  $R_{4+5}$  looped with appendix (marked by arrow). 17. Abdomen, lateral view.

#### Description

**MALE.** Body length: 14–15 mm; wing length: 10 mm. **Head** (Figs. 12–14). Face yellow with black median facial vitta from top frons to anterior oral margin, slightly widening at the level of frontal prominence; width of facial vitta 0.27–0.29 times as wide as width of face; face slightly protruding antero-ventrally. Head 1.9–2.1 times wider than face just below the antennae. Frons yellow; frontal prominence black, 4.6–5.0 times longer than wide, slightly longer than scape. Scape black, arista yellow. Gena black. Vertical triangle and ocellar triangle black to brown; vertex black, slightly raised. Occiput yellow dorsally and covered with yellow white pilosity ventrally along the eye margin. **Thorax** (Fig. 15). Scutum black with a yellow macula on postpronotum and notopleuron; a pollinose vitta along transverse suture, extending for short distance on both sides. Two sublateral yellow vittae from transverse suture to postalar callus. Pleuron black with three yellow maculae, one each on posterior anepisternum, dorsal katepisternum and anterior anepimeron. Scutellum yellow with narrow black anterior margin. **Legs.** Coxae and trochanters black-brown; pro- and mesofemur yellow apically; metafemur yellow on basal 1/3, black in middle and yellow-brown apically; tibiae and tarsi yellow-brown. Metafemur elongated. **Wing** (Fig. 16). Hyaline, except anterior 1/2, along vein  $R_{4+5}$ , along spurious vein. Loop in  $R_{4+5}$  with short appendix (indicated by arrow in

Fig. 16); crossvein r-m curved. Alula broad, 2.3–2.5 times longer than wide. Halter yellow. **Abdomen.** Black and yellow coloured (except tergite II, brown black). Length of tergites I: II: III: IV is 1: 4.3: 1.8: 1.7 (approx.). Tergite II four times longer than wide, narrow anteriorly. Tergite I black with two yellow maculae anterolaterally. Tergites II, III and IV black, each with a yellow fascia on posterior margin. Tergites III, IV and V with uniform brownish yellow pilosity (Fig. 17).

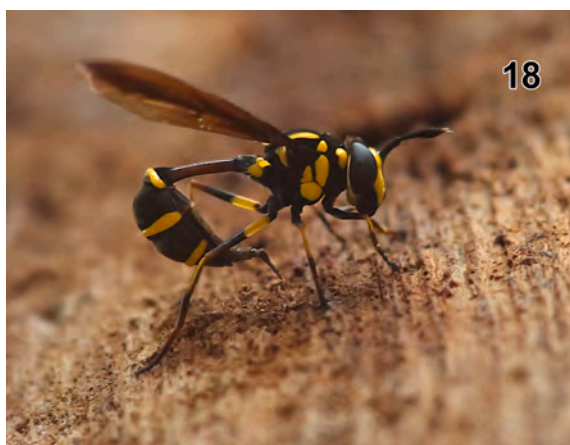
**FEMALE.** Similar to male, except the sexual dimorphic characters and size (body length: 15 mm; wing length: 12 mm).

#### Material examined

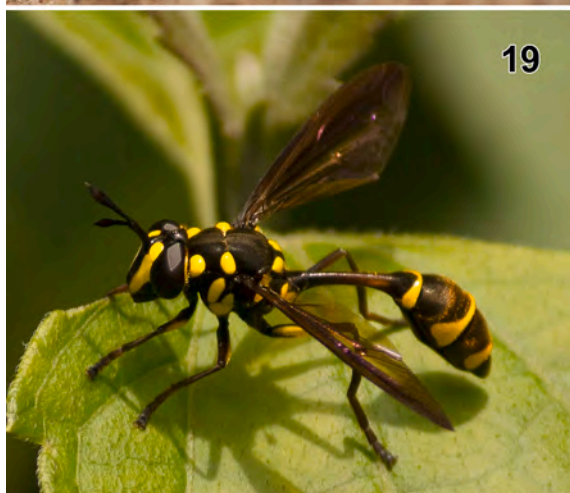
Holotype, male: “India: Tamil Nadu, Thadiyankudisai, // 10°17'11"N 77°42'8"E // 24.vii.2018 // Col. Sankararaman” “*Monoceromyia flavoscutata* ♂ // det. Sankararaman, Anooj & Mengual 2021” [red label] (UASB). Paratype: 1♀, India: Tamil Nadu, Coimbatore, 11°02'4"N 77°12'4"E, 21.vii.2019, sweep net, coll. Sankararaman, H. (UASB).

#### Distribution

India (Tamil Nadu).



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**Figs. 18–19.** 18. *Monoceromyia flavoscutata* Sankararaman, Anooj and Mengual, *sp. nov.*, female ovipositing on sap run from *Albizia Durazz*. © Karthikeyan. 19. *Monoceromyia javana* (Wiedemann, 1824), female from Pathinamthitta, Kerala, India. © Prasob Enose.

#### Etymology

The species epithet *flavoscutata* refers to the yellow scutellum, by which it differs from closely related *M. trinotata* and *M. tredecimpunctata*.

#### Biology

A female was observed ovipositing on a sap run from *Albizia* in the month of April (Fig. 18). The male specimen was collected from coffee plantation with a wide range of tree species. The adults fly from mid-April to late July.

#### *Monoceromyia javana* (Wiedemann, 1824)

##### Figs. 19–22

*Ceria javana* Wiedemann, 1824:32. Type locality: Java [HT ♀, NHMD]

*Ceria vittigera* Bigot, *nomen nudum*: Brunetti, 1908: 96.

#### Redescription

**MALE.** Body length: 16–20 mm; wing length: 13 mm. **Head** (Figs. 21, 22). Face yellow with black median facial vitta from top frons to anterior oral margin; face slightly protruding antero-ventrally. Head two times wider than face just below the antennae. Width of facial vitta 0.40–0.45 times as wide as width of face. Frons yellow; frontal prominence black, 4.8–5.4 times longer than wide, longer than scape; scape black, arista yellow; gena black. Vertical triangle and ocellar triangle black; vertex black; occiput yellow dorsally and covered with yellow white pilosity



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21

**Figs. 20–21.** *Monoceromyia javana* (Wiedemann, 1824), male from Cambodia. 20. Habitus, lateral view. 21. Habitus, dorso-frontal view. © Stephane De Greef.



22

**Figs. 22.** *Monoceromyia javana* (Wiedemann, 1824), male from Cambodia. 22. Habitus, dorsal view. © Stephane De Greef.

ventrally along the eye margin. **Thorax** (Fig. 22). Scutum black with yellow maculae on postpronotum and notopleuron; sometimes with pollinose vitta along transverse suture, extending for short distance on both sides; remaining mesonotum black. Pleuron black with three yellow maculae, one each on posterior anepisternum, dorsal katepisternum

and anterior anepimeron. Scutellum yellow with broad median black macula. **Legs.** Coxae and trochanter black-brown; profemur brown dorsally and yellow ventrally and mesofemur brown black; 1/5 metafemur yellow basally, black in middle and yellow brown apically; 1/3 metatibia yellow brown, tarsus brown. Metafemur elongated. **Wing** (Fig. 22). Hyaline, except anterior 1/2, along vein  $R_{4+5}$ , along spurious vein and crossvein bm-cu brownish; loop in  $R_{4+5}$  without appendix; crossvein r-m curved. Alula broad, 2.3–2.4 times longer than wide. Halter yellow. **Abdomen.** Black and yellow coloured (except tergite II, brown black). Length of tergite I: II: III: IV (approx.), 1: 4.3: 1.8: 1.7. Tergite II 4 times longer than wide, narrow anteriorly. Tergite I with two yellow maculae anteriorly, white pilosity laterally; three yellow fasciae posteriorly, one each on tergite II, III and IV. Yellow fasciae on tergite II slightly concave dorsally, fasciae on tergites III and IV extends forward for short distance laterally. Tergites III, IV and V with brown pilosity (Fig. 22).

**FEMALE.** Similar to male, except the sexual dimorphic characters.

#### Material examined

1♂, India: Karnataka, Sidapur, Coorg, D9070, 29.iv.1917, coll. T.R.N (NPC); 1♀, India: Kerala, Pathanamthitta, 21.vii.2014, sweep net, 9°15'53"N 76°47'13"E, coll. Sankararaman H. (UASB).

#### Distribution

Borneo, Indonesia, India (Arunachal Pradesh, Karnataka, Kerala),

Malaysia, Myanmar, Nepal and Singapore (Wiedemann, 1824; Brunetti, 1923; Shannon, 1927; Knutson et al., 1975; Ghorpadé, 2014; Ghorpadé, 2015; Mitra et al., 2015; Sankararaman et al., 2020).

#### Biology

Larva is unknown. Adults fly from late April to mid-July.

*Monoceromyia nigra* Sankararaman, Anooj and Mengual, *sp. nov.*

Figs. 23–30

#### Differential diagnosis

*Monoceromyia nigra* *sp. nov.* is close to *M. obscura* and the Indomalayan species *M. salvazai* Shannon, 1927 (Figs. 31–32) in having the majority of the mesonotum and pleuron black. This new species differs from *M. obscura* by having the postpronotum black (Figs. 23–25) (postpronotum with a tawny macula in *M. obscura*), the mesonotum longer than broad (in *M. obscura*, mesonotum subquadrate), the scutellum entirely black (Fig. 23) (in *M. obscura*, scutellum black with a narrow yellow fascia on posterior margin), and a reddish brown fascia only on posterior margin of tergite III (Figs. 23–25) (in *M. obscura*, a narrow brownish yellow fascia on posterior margin of tergites II, III, IV). It differs from *M. salvazai* by having the face black with yellow maculae adjacent to eye margin (in *M. salvazai*, the face is yellow with a broad median facial vitta), the wing with veins bm and br suffused, leaving a



Figs. 23–28. *Monoceromyia nigra* Sankararaman, Anooj and Mengual, *sp. nov.*, holotype female. 23. Habitus, dorsal view; 24. Head and anterior scutum, dorsal view. 25. Habitus, lateral view. 26. Head, frontal view. 27. Head and anterior pleuron, lateral view. 28. Wing.



Figs. 29–30. *Monoceromyia nigra* Sankararaman, Anooj and Mengual, *sp. nov.*, holotype female, alive.



Figs. 31–32. *Monoceromyia salvazai* Shannon, 1927, holotype male. 31. Habitus, lateral view, with labels. 32. Habitus, dorsal view.

hyaline region just above dm along spurious vein (in *M. salvazai*, wing with veins bm and br hyaline, only anterior 1/2 along  $R_{4+5}$  and spurious vein infuscated, remainder hyaline), the tergite II at most 1.3–1.5 times longer than wide and shorter than tergites III and IV combined (tergite II at least 2.5 times longer than wide and as long as tergite III and IV combined in *M. salvazai*), and a reddish brown fascia on posterior margin of tergite III (in *M. salvazai*, the abdomen is black brown without any fascia; Figs. 31, 32).

#### Description

**FEMALE.** Body length: 16 mm; wing length: 12 mm. **Head** (Fig. 24). Face black with a broad black median facial vitta (Fig. 26), a pair of yellow maculae on frons adjacent to eyes and two narrow yellow fasciae extending downwards; face with a median raised line extending from frontal prominence to mouth and slightly protruding antero-ventrally.

Width of facial vitta 0.25–0.30 times as wide as width of face. Head 2.0 times wider than face just below the antennae. Frons and frontal prominence black, 4.7–5.0 times longer than wide. Scape black, much shorter than frontal prominence; arista brown. Gena black. Vertical triangle and ocellar triangle black; vertex black. Occiput entirely black and covered with white pilosity ventrally along the eye margin. **Thorax** (Fig. 24). Scutum black; postpronotum and notopleuron black. Pleuron black; anepisternum, katepisternum and anepimeron all black. Scutellum black, with a tiny pollinose spot posteriorly. Mesonotum longer than wide. **Legs.** Coxae black; trochanters black-brown; pro-, meso- and metafemur black, brownish apically; tarsi brownish. Metafemur elongated. **Wing.** Yellowish, except anterior 1/2, along vein  $R_{4+5}$ , above spurious vein, CuP, br, bm, with brownish suffusion leaving hyaline region just above dm, along spurious vein. Loop in  $R_{4+5}$  with a short appendix. Crossvein r-m curved. Alula broad, 2.7–3.0 times longer



than wide. Halter brownish yellow. **Abdomen.** Black (except tergite II black-brown). Length of tergites I: II: III: IV is as 1: 2.8–2.9: 2.2: 2.5. Tergite II shorter than tergite III and IV combined. Tergite II at most 1.4 times longer than wide, anterior part narrow (Fig. 25), with two elongated reddish maculae on lateral margins. Tergite III black with a reddish brown fascia on posterior margin. Tergites IV and V black. Tergite III, IV and V with white pilosity (Fig. 25).

**MALE.** Unknown.

#### Material examined

Holotype, female: “India: Arunachal Pradesh, Basar, West Siang, // 27°58'59"N 94°39'59"E // 05.ix.2019 // Col. Sankararaman” “*Monoceromyia nigra* ♀// det. Sankararaman, Anooj & Mengual 2021” [red label] (UASB).

#### Distribution

India (Arunachal Pradesh).

#### Etymology

The species epithet ‘*nigra*’ means black in Latin, referring to the black mesonotum, pleuron and scutellum.

#### Biology

The holotype female was collected from the river bank along a forest stream in the month of September (Figs. 29, 30). Larva unknown.

#### *Monoceromyia obscura* (Brunetti, 1907)

#### Figs. 33–36

*Ceria obscura* Brunetti, 1907: pl. XIII, Fig. 12; 1908: 94. Type locality: Sikkim, India [HT ♀, NZCZSI]

#### Redescription

**FEMALE.** Body length: 12–13 mm; wing length: 8–8.3 mm. **Head.** Face black with a narrow V-shaped yellow fascia below frontal

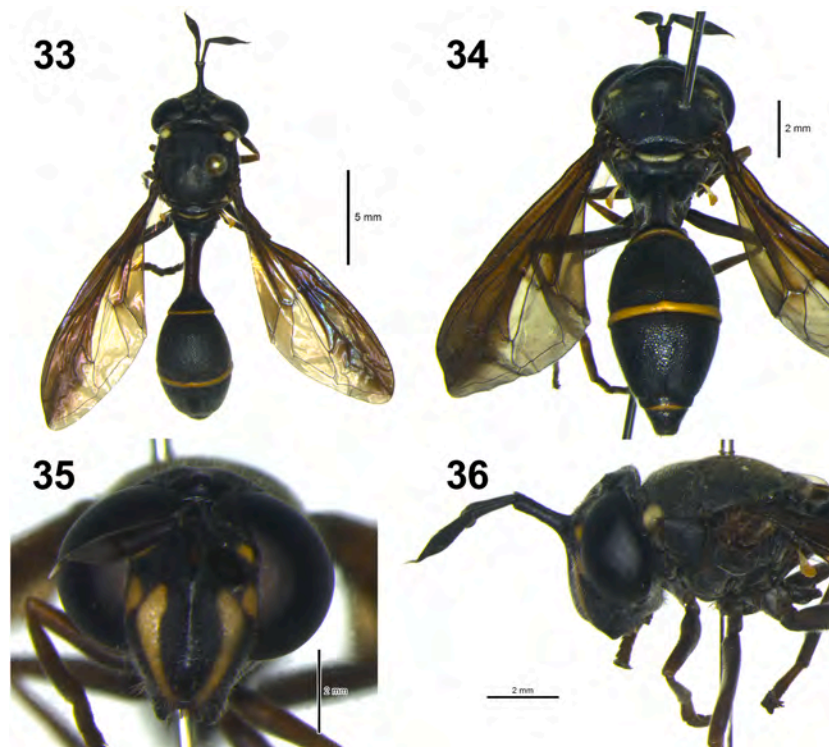
prominence forming two yellow vittae submedially, which leaves a broad median facial vitta from top of frons to anterior oral margin, with a pair of yellow maculae on frons adjacent to eye margin (Fig. 35); face slightly protruding antero-ventrally. Width of facial vitta 0.5 times as wide as width of face. Head 2.0–2.2 times wider than face just below the antennae. Frons black; frontal prominence black, 4.9–5.0 times longer than wide. Scape black, slightly shorter than frontal prominence; arista yellow. Gena black. Vertical triangle and ocellar triangle black; vertex black, slightly raised. Occiput entirely black and covered with white pilosity ventrally along the eye margin. **Thorax** (Fig. 33). Scutum black, with a tawny macula only on the postpronotum; notopleuron black. Pleuron black; anepisternum, katepisternum, anepimeron all black. Scutellum black with a narrow yellow fascia on posterior margin. Mesonotum subquadrate. **Legs.** Coxae black; trochanters black-brown; pro-, meso- and metafemur black, brownish apically; tarsi brownish. Metafemur elongated. **Wing.** Hyaline, except anterior 1/2, along vein  $R_{4+5}$ , above spurious vein, veins bm and br suffused, leaving a hyaline region just above dm along spurious vein. Loop in  $R_{4+5}$  with a short appendix. Crossvein r-m curved. Alula broad, 2.8–2.9 times longer than wide. Halter yellow. **Abdomen.** Black and yellow coloured, except tergite II black-brown. Length of tergites I: II: III: IV is as 1: 3.9–4.0: 2.3: 2.5. Tergite II is longer than wide, narrow in anterior part. Tergites II, III, IV with a narrow brownish yellow fascia on posterior margin (Fig. 34). Remainder of abdomen black-brown. Tergites III, IV and V with white pilosity.

#### Material examined

1♀, India: Himachal Pradesh, 21.vii.2014, sweep net, coll. S.S. Anooj (NPC).

#### Distribution

India (Himachal Pradesh and Sikkim) and Nepal (Brunetti, 1923; Shannon, 1927; Knutson et al., 1975; Ghorpadé, 2014; Ghorpadé, 2015; Mitra et al., 2015).



Figs. 33–36. *Monoceromyia obscura* (Brunetti, 1907), female from Himachal Pradesh India. 33. Habitus, dorsal view. 34. Abdomen, posterior view. 35. Head, frontal view. 36. Head and anterior pleuron, lateral view.

### Biology

Larva is unknown. The specimen collection data suggest adults fly from late May to mid-November.

### *Monoceromyia patricia* (Brunetti, 1923)

#### Figs. 37–38

*Ceria patricia* Brunetti, 1923: 335 and 336. Type locality: Tavoy, Tenasserim, Lower Burma [LT ♂, NHMUK]

### Redescription

**MALE.** Body length: 20 mm; wing length: 12.0 mm. **Head.** Face yellow with black median facial vitta; width of facial vitta 0.5 times as wide as width of the face. Head two times wider than face. Frons yellow, frontal prominence black, vertex yellow except ocellar triangle black. Frontal prominence about 4.5 times longer than wide; scape brown, shorter than frontal prominence, arista paler. Gena yellow with a wide brown vitta extending to eye margin. Vertex strongly raised; yellow white pilosity ventrally along the eye margin. **Thorax.** (Figs. 37–38) Scutum black, postpronotum and notopleuron with a yellow macula. A pair of sublateral yellow vittae from transverse suture to posterior margin of mesonotum, and a pair of pruinose maculae dorso-medially at the inner end of the transversal suture. Pleuron black, anterior anepisternum black; the posterior anepisternum, dorsal katepisternum and anterior anepimeron each with a yellow macula; posterior anepimeron black; anatergum with a yellow macula. Scutellum black, with a broad yellow posterior margin. **Legs.** All legs brown to pale brown, except metafemur yellow basally. **Wing.** Hyaline, except for anterior 1/2, along vein  $R_{4+5}$  and along spurious vein. Loop of vein  $R_{4+5}$  with a short appendix. Crossvein r-m slightly curved. Alula 2.9 times longer than wide. **Abdomen.** Black, except tergite II brown. Tergite I with a yellow macula laterally (Fig. 38). Tergite II longer than wide, narrow anteriorly.



Figs. 37–38. *Monoceromyia patricia* (Brunetti, 1923), lectotype male. 37. Habitus, dorsal view. 38. Habitus, lateral view, with labels.

Tergites II, III and IV each with a yellow fascia on posterior margin; the yellow fascia on tergite II simple, those on tergites III and IV extend forward a shorter distance antero-laterally but not joining anteriorly (Fig. 37); tergite IV with two submedial yellow maculae broadening posteriorly not connected to the yellow fascia on posterior margin; tergite V yellow. Length of tergites I: II: III: IV is as 1: 3.0: 1.5: 1.5.

**FEMALE.** Similar to male except for normal sexual dimorphism and as follows: antennifer and antennae paler, brownish; frons yellow, with a medial black fascia from eye to eye connected posteriorly to the black area of the ocellar triangle; tergum V black with a medial yellow macula.

### Material examined

Lectotype (here designated), male: “LOWER // TENASSERIM. // Tavoy 10.93. // C. T. Bingham. // 96.281” “Tavoy, // Lower Tenasserim, // Lower Burma. // Oct., 1893. // Lt.-Col. C. T. Bingham // 96.281.” “*Ceria // patricia // Brun. Type ♂ // det. Brun. 19243*” “SYN- // TYPE” [round, blue margin] “NHMUK013933164” [QR code] (NHMUK) [photograph(s) of primary type studied]. This specimen is here designated as lectotype to fix and ensure the universal and consistent interpretation of the name. Paralectotype, female: “LOWER // TENASSERIM. // Tavoy 10.93. // C. T. Bingham. // 96.281” “Tavoy, // Lower Tenasserim, // Lower Burma. // Oct., 1893. // Lt.-Col. C. T. Bingham // 96.281.” “*Ceria // patricia // Brun. Type ♀ // det. Brun. 19243*” “SYN- // TYPE” [round, blue margin] “NHMUK013933165” [QR code] (NHMUK) [photograph(s) of primary type studied]. This specimen is here designated as paralectotype.

### Distribution

Myanmar (Brunetti, 1923; Shannon, 1927; Knutson et al., 1975; Ghorpadé, 2014; Mitra et al., 2015). Occurrence of this taxon in India is doubtful and the inclusion of this species in this review is due to the citation by Knutson et al. (1975).

### Biology

Larva unknown. Label data suggesting the adult flies in the month of October.

### *Monoceromyia polistoides* (Brunetti, 1923)

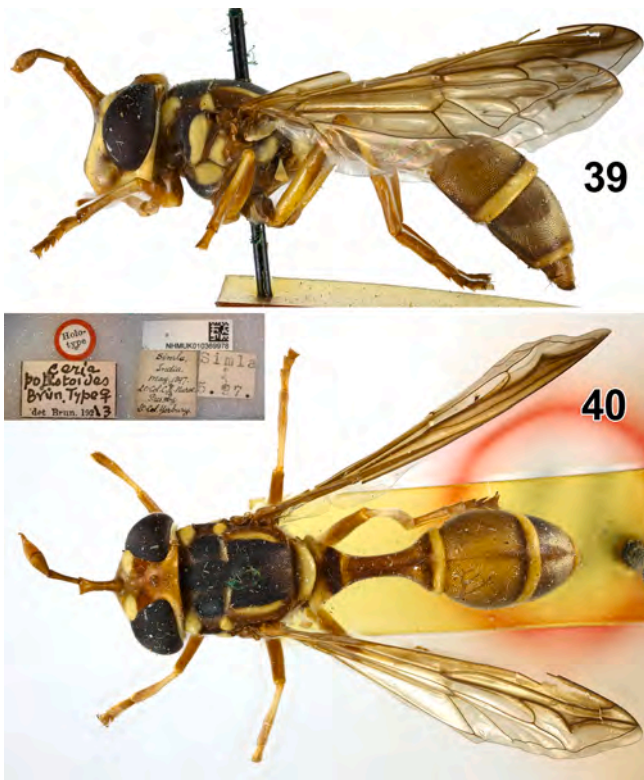
#### Figs. 39–49

*Ceria polistoides* Brunetti, 1923: 335. Type locality: Simla, India [HT ♀, NHMUK]

*Cerioides multipunctata* Hull, 1941: 163. Type locality: Koolos, India [HT ♂, MCZ] **Syn. nov.**

### Redescription

**MALE.** Body length: 12–13 mm; wing length: 8.0–8.2 mm. **Head.** Face pale yellow with a black median facial vitta (reddish brown at base), inverted V-shaped black macula at the level of frontal prominence, apically; face slightly protruding antero-ventrally. Width of facial vitta 0.4–0.5 times as wide as width of face. Head 2.0–2.2 times wider than face just below the antennae. Frons pale yellow, frontal prominence brown, ocellar triangle brown, vertical triangle orange yellow. Frontal prominence 4.9–5.0 times longer than wide; scape brown, shorter than frontal prominence; apical segment and arista paler. Gena yellow with a median vitta extending downwards from eye margin. Vertex brown, slightly raised. Occiput orange yellow dorsally and pale yellow, covered with yellow white pilosity ventrally along the eye margin. **Thorax** (Figs. 40, 41, 46). Scutum mostly black, pale orange-brown laterally that becomes with a reddish brown on postalar callus; yellow macula on postpronotum and notopleuron; with two sublateral yellow vittae posterior to transverse suture. Pollinose vittae along transverse suture, extending for short distance. Pleuron black to reddish brown, anterior anepisternum black; the posterior anepisternum, dorsal katepisternum and anterior anepimeron with a yellow macula; posterior anepimeron brown-orange; anatergum with yellow macula. Scutellum yellow, with a narrow brown fascia on anterior margin. **Legs.** All legs brown-orange,



Figs. 39–40. *Monoceromyia polistoides* (Brunetti, 1923), holotype female. 39. Habitus, lateral view. 40. Habitus, dorsal view, with labels.

except femora and tibiae yellow basally. Metafemur elongated. **Wing.** Hyaline, except for anterior 1/2, along vein  $R_{4+5}$  and along spurious vein. Loop of vein  $R_{4+5}$  with a short appendix. Crossvein r-m slightly curved. Alula 2.5–2.7 times longer than wide. **Abdomen.** Brown-orange coloured, except tergite I black, with two yellow maculae laterally (Figs. 40, 41, 46). Length of tergites I: II: III: IV is as 1: 2.8–3.0: 2.3: 2.2. Tergite II longer than wide, narrow anteriorly. Tergites II, III and IV with a yellow fascia on posterior margin. Tergite II with a basal yellow fascia and slightly darker apically, before the posterior yellow fascia.

**FEMALE.** Body length: 13 mm; wing length: 9–9.2 mm. Similar to male, except for sexually dimorphic characters and the colour of abdomen, somewhat paler.

**Material examined**

Holotype of *M. polistoides*, female: “Simla, // India. // May 1897. // Lt.-Col. C.G. Nurse. // Pres. by // Lt.-Col. Yerbury.” “Simla // 5.97” “Holo- // type” [round, red margin] “*Ceria // polistoides // Brun. Type ♀ // det. Brun. 1924*” “NHMUK010369978” [QR code] (NHMUK) [photograph(s) of primary type studied].

Holotype of *M. multipunctata*, male: “Koolloo. // Carleton.” “M.C.Z. Type 22216” [red label] “*Cerioides // multipunctata // Hull // FMH.*” [red margin] “MCZ-ENT 00022216” [QR code] (MCZ) [photograph(s) of primary type studied].

Additional material: 2♀, India: Kumaon, Bhim Tal, 4500 ft., D9174, 23–24.iv.1923, coll. Fletcher (NPC).

**Distribution**

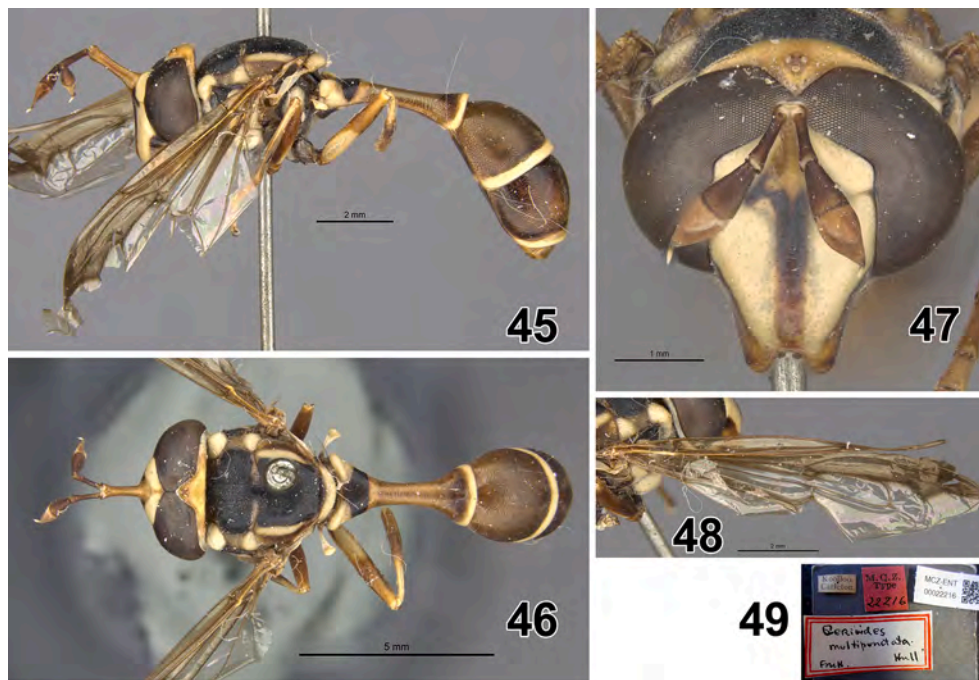
India (Himachal Pradesh and Uttarakhand), Pakistan, and Nepal (Brunetti, 1923; Shannon, 1927; Knutson et al., 1975; Ghorpadé, 2014; Ghorpadé, 2015; Mitra et al., 2015; Shehzad et al., 2017).

**Biology**

Larva is unknown. The adults fly in the months of April and May.



Figs. 41–44. *Monoceromyia polistoides* (Brunetti, 1923), female from Bhim Tal. 41. Habitus, dorsal view, with labels. 42. Habitus, lateral view. 43. Head, frontal view. 44. Abdomen, posterior view.



**Figs. 45–49.** *Monoceromyia multipunctata* (Hull, 1941), holotype male. 45. Habitus, lateral view. 46. Habitus, dorsal view. 47. Head, frontal view. 48. Wing. 49. Labels. Credit: Museum of Comparative Zoology, Harvard University.

#### Remarks

*Monoceromyia polistoides* was described by Brunetti (1923) from a single female collected from Simla (Shimla now) in Himachal Pradesh. Until now, this species was known only from the holotype, deposited at NHMUK. But there were also two female specimens of this species available at NPC, misidentified as *M. eumenioides*. The specimens at NPC match the original description by Brunetti (1923). *Monoceromyia multipunctata* was described by Hull (1941) based on two males collected from the Koolloo (Kullu now), also in Himachal Pradesh. He described this species based on its closer resemblance to *M. tredecimpunctata*, but he did not compare it with *M. polistoides*. The holotype of *M. polistoides* fits well with the original description of *M. polistoides* except the antennal colour and slightly darker abdomen. In the holotype of *M. polistoides*, all antennal segments are orange-brown, while in *M. multipunctata* the scape and pedicel are brown and the baso-flagellomere is slightly paler. Based on the morphological similarities, we consider *M. multipunctata* as a junior synonym of *M. polistoides*.

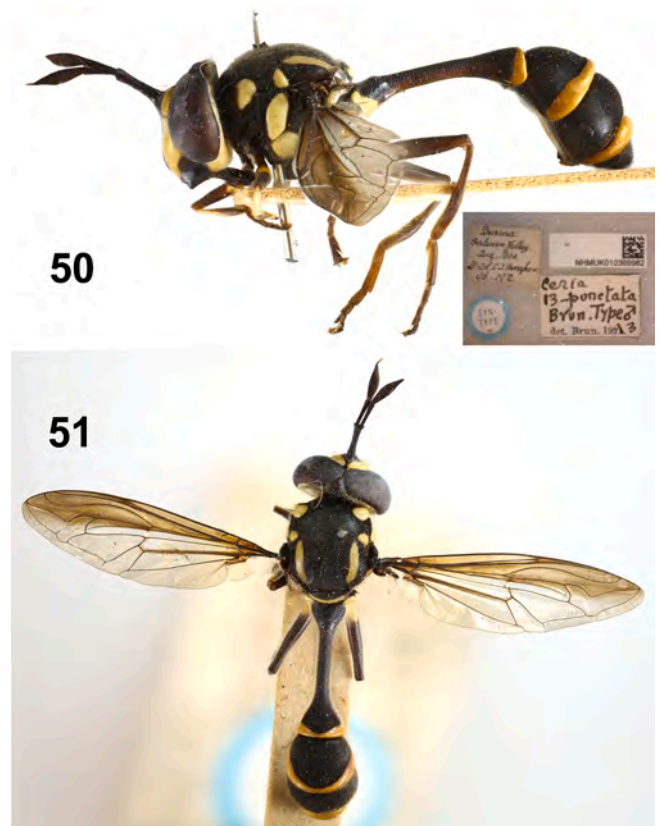
#### *Monoceromyia tredecimpunctata* Brunetti, 1923

##### Figs. 50–54

*Ceria tredecimpunctata* Brunetti, 1923: 336. Type locality: Salween valley, Burma [LT ♂, NHMUK]

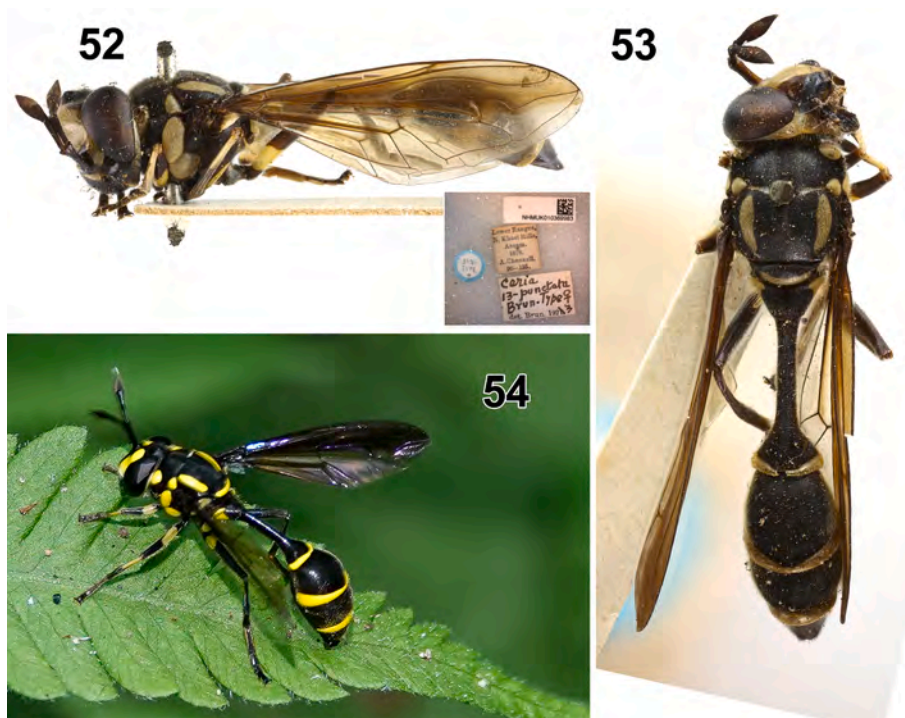
#### Redescription

**MALE.** Body length: 15–16 mm; wing length: 10–10.2 mm. **Head.** Face yellow with a black median facial vitta from top frons to anterior oral margin, slightly widening at the level of frontal prominence; face slightly protruding antero-ventrally. Width of facial vitta 0.24–0.26 times as wide as width of face. Head two times wider than face just below the antennae. Frons yellow; frontal prominence black, 4.8–5.0 times longer than wide, longer than scape; scape black, arista yellow white. Gena black. Vertical triangle and ocellar triangle black to brown; vertex black, slightly raised. Occiput yellow black dorsally and pale yellow ventrally along the eye margin. Yellow white pilosity on vertex, frons, face and on occiput ventrally along eye margin. **Thorax** (Figs. 51, 53). Scutum black, with two sublateral yellow vittae posterior to



**Figs. 50–51.** *Monoceromyia tredecimpunctata* (Brunetti, 1923), lectotype male. 50. Habitus, lateral view, with labels. 51. Habitus, dorsal view.

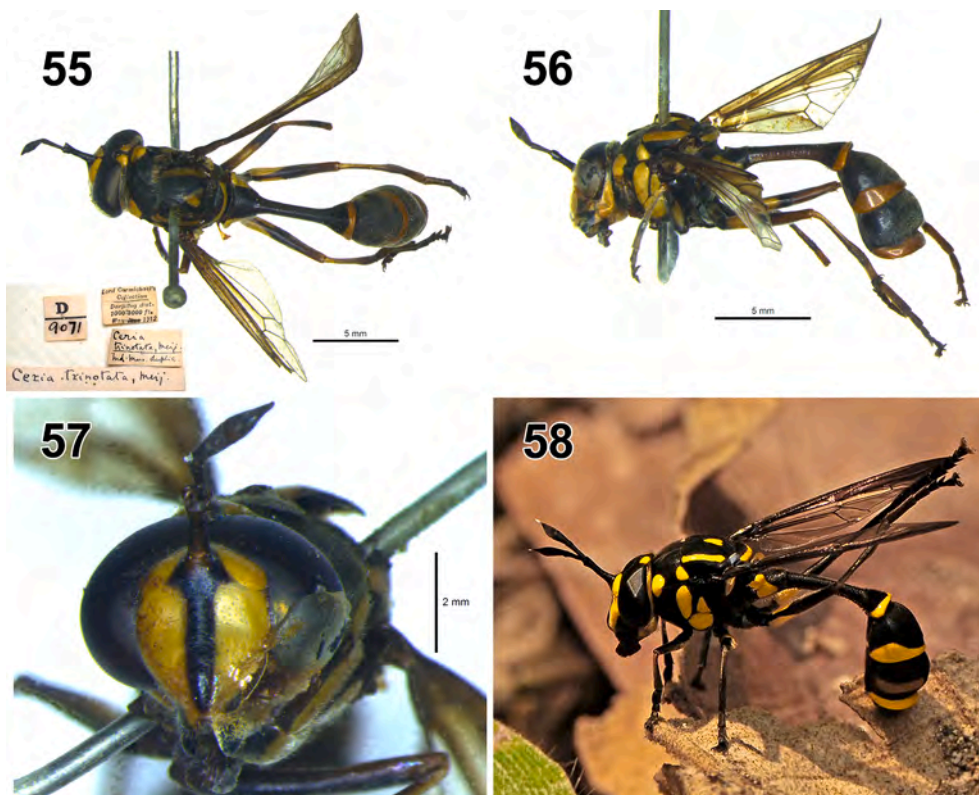
transverse suture; postpronotum and notopleuron with a yellow macula. Yellow-white pilosity on scutum. Pleuron black; the posterior anepisternum and dorsal katapisternum with a yellow macula; anterior



Figs. 52–54. *Monoceromyia tredecimpunctata* (Brunetti, 1923). Figs. 52–53, paralectotype female. 52. Habitus, lateral view, with labels. 53. Habitus, dorsal view. 54. Female from Dosedewa Forest trail, Assam, India. © Rejoice Gassah (CC BY 4.0; <https://creativecommons.org/licenses/by/4.0/>).

anepimeron black. Scutellum black with a narrow yellow fascia on posterior margin. **Legs**. Legs black-brown, except pro- and mesofemur yellow basally; metafemur yellow on basal 1/3; tibiae and tarsi brown. **Wing** (Fig. 51) Hyaline, except anterior 1/2, along vein  $R_{4+5}$  and along

spurious vein. Loop in  $R_{4+5}$  without short appendix; Crossvein r-m curved. Alula broad, 2.5 times longer than wide. Halter yellow. **Abdomen** (Fig. 50). Black and yellow coloured (except tergite II, brown black). Length of tergites I: II: III: IV (approx.), 1: 4: 1.8: 1.6. Tergite II is



Figs. 55–58. *Monoceromyia trinotata* (de Meijere, 1904). Figs. 55–57, male from Darjeeling. 55. Habitus, dorsal view, with labels. 56. Habitus, lateral view. 57. Head, frontal view. 58. Male from Lamnamkok NP, Thailand. © Tim Stratford, bugs-alive.blogspot.com.

four times longer than wide, narrow anteriorly. Tergite I with two yellow maculae laterally, white yellow pilose laterally. Tergites II, III and IV with a yellow fascia on posterior margin, with white yellow pilosity.

**FEMALE.** Similar to male, except the sexual dimorphic characters and size (body length: 18 mm; wing length: 13 mm).

#### Material examined

Lectotype (here designated), male: "Burma: // Salween Valley. // Aug., 1894. // Lt.-Col. C. T. Bingham // 96.192." "Salween Valley // Burma // Col. C. T. Bingham 8-94 // 96.192" "Ceria // 13-punctata // Brun. Type ♂ // det. Brun. 19243" "SYN- // TYPE" [round, blue margin] "NHMUK010369982" [QR code] (NHMUK) [photograph(s) of primary type studied]. This specimen is here designated as lectotype to fix and ensure the universal and consistent interpretation of the name. Paralectotype, female: "Lower Ranges, // N. Khasi Hills, // Assam. // 1878. // A. Chennell. // 96-135." "Ceria // 13-punctata // Brun. Type ♀ // det. Brun. 19243" "SYN- // TYPE" [round, blue margin] "NHMUK010369983" [QR code] (NHMUK) [photograph(s) of primary type studied]. This specimen is here designated as paralectotype.

#### Distribution

India (Meghalaya) and Myanmar (Brunetti, 1923; Shannon, 1927; Knutson et al., 1975; Ghorpadé, 2014; Mitra et al., 2015).

#### Biology

Larva is unknown. The adults fly in the month of August.

#### *Monoceromyia trinotata* (de Meijere, 1904)

##### Figs. 55–58

*Ceria trinotata* de Meijere, 1904: 97. Type locality: Darjeeling, India [HT ♂, NBC]

#### Redescription

**MALE.** Body length: 19–21 mm; wing length: 19 mm. **Head.** Face yellow with a black median facial vitta from top frons to anterior oral margin, slightly widening at the level of frontal prominence; face slightly protruding antero-ventrally. Width of facial vitta 0.25–0.26 times as wide as width of face. Head 2.0–2.2 times wider than face just below the antennae. Frons yellow black; frontal prominence black, 4.8–5.0 times longer than wide, longer than scape; scape black, arista yellow white. Gena black. Vertex raised, with two large yellow maculae laterally and a narrow black vitta medially (Fig. 57); ocellar triangle black. Occiput black dorsally and pale yellow ventrally along the eye margin. Yellow white pilosity on vertex, frons, face and on occiput ventrally along eye margin. **Thorax** (Fig. 55). Scutum black with two sublateral yellow vittae posterior to the transverse suture and a yellow prescutellar macula medially; postpronotum and notopleuron with a yellow macula; a yellow vitta from transverse suture to postalar callus on both sides (Fig. 58). Pleuron black; the posterior anepisternum, dorsal katepisternum and anterior anepimeron with a yellow macula each. Scutellum black with a narrow yellow fascia on posterior margin. **Legs.** Coxae and trochanters black-brown; femora brown with a darker ring medially and yellow base: basal 1/2 of pro- and mesofemur, and basal 1/4 metafemur yellow, and metafemur with a dorsal black line joining the medial black ring with the trochanter; pro-, meso- and metatibiae yellow on basal 1/3, the remainder brown; tarsi brown. **Wing.** Hyaline, except anterior 1/2, along vein R<sub>4+5</sub> and along spurious vein. Loop in R<sub>4+5</sub> without short appendix; crossvein r-m curved. Alula broad, 2.5 times longer than wide. Halter yellow. **Abdomen.** Black and yellow coloured. Length of tergites I: II: III: IV is as 1: 3.8–4.0: 1.6: 1.3 (approx.). Tergite II is four times longer than wide, broadening posteriorly. Tergite I with two yellow maculae antero-laterally, white yellow pilose laterally. Tergites II, III and IV with a yellow fascia on posterior margin; yellow fascia on tergite III slightly extending forward for short distance laterally; tergite IV with an additional pale pollinose fascia just

above the yellow fascia on posterior margin. Tergites III, IV, V with white-yellow pilosity.

**FEMALE.** Unavailable in the present study.

#### Material examined

1♂, India: Darjiling, v.1912, coll. Lord Carmichael (NPC).

#### Distribution

India (West Bengal) and Myanmar (Brunetti, 1923; Shannon, 1927; Knutson et al., 1975; Ghorpadé, 2014; Mitra et al., 2015).

#### Biology

Larva is unknown. The adults fly in the months of April-May.

#### Key to the Indian species of *Monoceromyia*

1. Wing yellowish, without uniformly infuscated area...***Monoceromyia flavipennis* (de Meijere)**
  - Wing hyaline to yellowish-brown with uniformly infuscated at least on anterior margin, usually infuscated on anterior 1/2 or more...2
2. (1). Tergite II slender and much longer than tergite III (Figs. 7, 10, 22, 23, 32, 33, 46, 51, 50, 55)...5
  - Tergite II shorter than tergite III (Figs. 8, 9)...3
3. (2). Scutum with sublateral yellow vittae from transverse suture to posterior margin...***M. himalayensis* (de Meijere)**
  - Scutum without sublateral yellow vittae posterior to transverse suture...4
4. (3). Pleuron and mesonotum black, with yellow (pale) maculae on postpronotum only. Scutellum black. Wing with a hyaline section just above cell dm (Fig. 8) posterior to the spurious vein...***M. fenestrata* (Brunetti)**
  - Postpronotum and notopleuron with a yellow macula each. Pleuron black with a yellow macula on posterior anepisternum and dorsal katepisternum. Scutellum yellow, black at base. Wing without such hyaline area...***M. crux* (Brunetti)**
5. (2). Scutum without sublateral yellow vittae from transverse suture to posterior margin (Figs. 7, 22, 23, 32, 33)...10
  - Scutum with sublateral yellow vittae from transverse suture to posterior margin (Figs. 15, 38, 40, 46, 51, 53, 55, 58)...6
6. (5). Frontal prominence orange-brown. Mesonotum black medially, orange-brown laterally, with yellow maculae on postpronotum and notopleuron, with sublateral yellow vittae posterior to transverse (Figs. 40, 41). Tergites II–V orange-brown; tergites II–IV with a yellow fascia on posterior margin (Figs. 39, 42). Legs paler, orange and yellow...***M. polistoides* (Brunetti)**
  - Frontal prominence black. Mesonotum black, also black laterally, with yellow maculae on postpronotum and notopleuron, with sublateral yellow vittae posterior to transverse (Figs. 10–15). Tergites II–V black with or without yellow fascia. Legs darker, mostly black to brown with or without yellow markings...7
7. (6). Scutum with a median prescutellar yellow macula between the sublateral yellow vittae (Figs. 55–58)...***M. trinotata* (de Meijere)**
  - Scutum without median prescutellar macula (Fig. 38)...8
8. (7). Tergites III and IV with a yellow fascia on posterior margin extending forward for a short distance antero-laterally, curving inwards (Figs. 37, 38)...***M. patricia* (Brunetti)**
  - Tergites III and IV with a straight yellow fascia on posterior margin (Fig. 17)...9
9. (8). Anterior anepimeron with a yellow macula (Fig. 13). Scutellum yellow with narrow black anterior margin (Fig. 15). Wing: loop in R<sub>4+5</sub> with short appendix (Fig. 16)...***M. flavoscutata* Sankararaman, Anooj and Mengual sp. nov.**

- Anterior anepimeron black (Figs. 52, 54). Scutellum black with a narrow yellow fascia on posterior margin. Wing: loop in  $R_{4+5}$  without appendix (Fig. 50)...*M. tredecimpunctata* (Brunetti)
- 10. (5). Brownish-orange species (Figs. 1–4). Frontal prominence orange-brown. Face without dark markings medially, sometimes with a pale brown-orange median vitta...*M. eumenioides* (Saunders)
  - Darker species species, usually black with yellow markings (Figs. 20, 23, 33, 34). Frontal prominence black. Face always with a black median vitta (Figs. 20, 26, 27, 35, 36)...11
- 11. (10). Postpronotum black (Fig. 24). Tergite III with a yellow fascia on posterior margin (Fig. 25)...*M. nigra* Sankararaman, Anooj and Mengual, sp. nov.
  - Postpronotum with a tawny or yellow macula (Figs. 33–36). Tergites II, III and IV with a yellow fascia on posterior margin...12
- 12. (11). Notopleuron black (Fig. 33). Pleuron entirely black (Fig. 36). Scutellum black with a narrow yellow fascia on posterior margin. on posterior margins of tergites III and IV with a straight yellow fascia (Figs. 33, 34). Metafemur entirely brown to black...*M. obscura* (Brunetti)
  - Notopleuron yellow (Fig. 22). Pleuron with yellow maculae on posterior anepisternum, dorsal katepisternum and anterior anepimeron (Fig. 20). Scutellum yellow with a broad median black macula (Fig. 22). Posterior yellow fascia on tergites III and IV extends laterally forward for a short distance (Fig. 20). Metafemur with a yellow macula baso-ventrally...*M. javana* (Wiedemann)

#### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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