

## NEW RECORDS OF BEE-FLIES FROM CHHATTISGARH, INDIA (DIPTERA: BOMBYLIIDAE)

**Sumana Halder\*, P. Parui,  
Dhriti Banerjee and Kailash Chandra**

\* Zoological Survey of India, M-Block, New Alipore, Kolkata-700053, INDIA. E-mail: sumanazoology@gmail.com

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**ABSTRACT:** While studying the bee-flies (Diptera: Bombyliidae) diversity of Chhattisgarh, seven species of are added to the fauna of the state. Detailed diagnostic characters along with diagrams, key and distribution are given. The list of species of family Bombyliidae known from Chhattisgarh is also provided.

**KEY WORDS:** Bee-fly, Anthracinae, Bombyliinae, Chhattisgarh, India

The family Bombyliidae includes moderate to large sized, beautiful winged, pollinating insects, commonly known as bee-flies. These flies are abundant in arid and semi-arid regions. This is one of the large and diverse families of brachycerous dipterans (Yeates, 1994). These flies are mostly pollen and nectar feeders, found on flowers hovering in bright sunlight. Brunetti (1909, 1912, 1917, 1920) made useful contribution to the bee-flies fauna of Oriental region including British India. Several studies by Pal (1991), Yeates (1994), Evenhuis & Greathead (1999), Banerjee and Mitra (2004, 2006a,b), Banerjee et al. (2006, 2007), Mitra (2008), Mitra et al. (2011), Mitra & Parui (2014) provided the information on bee flies of different regions of India and globally. Scattered works documented about 4547 species of this family worldwide of which 257 species of this family are reported from Oriental region and 138 species from India (Banerjee & Mitra, 2006b). The family was known by only 5 species belonging to 3 genera recorded from Achanakmar Wildlife Sanctuary and Bilaspur districts of Chhattisgarh (Mitra et al., 2011; Mitra & Parui, 2014). The present study adds 7 species of this family to the existing list of bee-flies dipteran fauna from the state of Chhattisgarh.

### MATERIALS AND METHODS

**Study area:** The study area of Chhattisgarh state extends between 17°46'-24°8' N latitude and 80°15'-84°24' E longitude in the central Indian landscape having a total area of 1, 35,194 sq. km. The maximum area of this covered by dry deciduous forest. The study area comprises four districts viz. Raipur, Surguja, Dhamtari and Koriya (Fig. 1).

**Methodology:** Specimens were collected during faunistic surveys in Chhattisgarh undertaken by the Zoological Survey of India. Usually bee- flies are collected at day time by sweeping net. The flies are generally found near warmth ground in resting state with stretched wings, and also found in flower garden hovering on from flower to flower in bright sunlight due to its nectar feeding abilities. During the survey, GPS coordinates of the collection sites were also recorded with the help of Garmin Oregon 550 device. The collected specimens are kept in an ethyl acetate filled bottle for desensitization and then moved to

desiccator for relaxation before pinning. The pinned specimens were studied under Leica EZ4 HD binocular microscope for identification. Morphological characters like wing, head, eyes, abdomen and thorax were compared for identification confirmation with the description present in the published literature. Photographs of whole specimens and body parts were taken in the Leica Stereo Zoom M205A microscope. After the study, the specimens were deposited in the National Zoological Collection of Zoological Survey of India, Kolkata.

## RESULTS

### Key to the subfamilies:

1. Eyes widely separated in both sexes, antennae widely separated at base, 2<sup>nd</sup> longitudinal vein originates in a knee-shaped form approximately opposition to r-m cross vein, 2<sup>nd</sup> longitudinal vein often form a loop towards tip.....Anthracinae
- Eyes continuous or sub continuous in male, antennae approximated at base, 2<sup>nd</sup> longitudinal vein originates acutely nearer to the origin of praefurca than to r-m cross vein, 2<sup>nd</sup> longitudinal vein (R<sub>2+3</sub>) never with a loop towards apex.....Bombyliinae

### Subfamily: BOMBYLIINAE

#### Tribe: BOMBYLIINI

#### Genus: *Systoechus* Loew, 1855

1855. *Systoechus* Loew, Progr. K. Realsch. Meseritz, 1855: 34. Type-species: *Bombylius sulphurous* Mikan.

#### *Systoechus eupogonatus* Bigot, 1992 (Fig. 2)

1992. *Systoechus eupogonatus* Bigot, Anns. Soc. ent. Fr., 7: 365.

**Material examined:** Surguja (South), Mendra, 19.xi.2011, (1 female); Balrampur (23°36.98'N & 83°36.514'E), 14.xi.2011 (1 male), coll. A. Raha.

**Diagnostic characters:** Face dull yellow with grey hairs, frons black with concolourous hairs, In females, frons grey with grey pubescence, proboscis a little longer than head and thorax together, antennae black, scape covered with long blackish hairs above; thorax covered with thick, pale yellow pubescence, scutellum black with reddish apex; legs reddish with femora brownish; wings nearly clear; abdomen concolorous with thorax.

**Distribution:** Chhattisgarh: Surguja (Earlier recorded from India).

**Elsewhere:** Sri Lanka.

### Subfamily: ANTHRACINAE

#### Key to the tribe:

1. Apex of antennal flagellum without hairs, basicosta spine like.....2
- Apex of antennal flagellum with a circle of hairs, basicosta produced but not spine like, pulvilli not reduced, metaplares bare, squama with a hairy fringe.....Anthracini
2. Apex of antennal flagellum devoid of hairs, basicosta spine like, pulvilli reduced, conical in shape, squama with a scaly fringe.....Exoprosopini
- One antennal flagellomere with an apical style, pulvilli rounded.....Villini

#### Tribe: ANTHRACINI

#### Key to the genera:

1. Third antennal joint onion shaped with styliform prolongation bearing a distinct pencil of hairs at tip, submarginal cells 3.....*Spogostylum* Macquart, 1840
- Third antennal joints cone-shaped with microscopic apical bristle, submarginal cells 2.....*Anthrax* Scopoli, 1763

**Genus: *Spogostylum* Macquart, 1840**

1840. *Spogostylum* Macquart, Dipt. Exotic. Nov. ou peu connus., 1: 53. Type-species: *Spogostylum mystaceum* Macquart.

***Spogostylum duvaucelii* (Macquart, 1840)**

1840. *Anthrax duvaucelii* Macquart, Dipt. Exot. ii, 1, pp. 63.

2006. *Spogostylum duvaucelii* (Macquart): Banerjee et al., Bionotes, 8 (2): 44.

**Material examined:** Raipur dist., Barnawapara WLS Lalbandha Nala (21°23'6.66"N & 82°24'34.86"E), 4.viii.2011, (1 male), coll. Sunil Gupta.

**Diagnostic characters:** Frons at antennal level one-third of head width, gradually narrowed towards vertex which bears short, soft hairs, vertex with distinct indentation, antennae black with greyish-white shimmer, scape and pedicel with bristles black; scutellum blackish with long, soft black hairs mixed with short yellow hairs; legs black, coxae bears long silky white hairs, femora and tibiae with small white scales; wings nearly clear, costal cell and extreme base yellowish, 1<sup>st</sup> posterior cell widely and 5<sup>th</sup> posterior cell narrowly open; abdomen blackish grey, entire dorsum covered with whitish scales.

**Distribution: India:** Andhra Pradesh Chhattisgarh (Raipur), Gujarat, Himachal Pradesh, Thar Desert, Uttar Pradesh, West Bengal. **Elsewhere:** Pakistan, Sri Lanka.

**Genus: *Anthrax* Scopoli, 1763**

1763. *Anthrax* Scopoli, Ent. Carniolica: 358. Type-species: *Musca morio* Linnaeus.

**Key to the species:**

1. Wings with roundish isolated spots over the fork of 3<sup>rd</sup> longitudinal vein (R<sub>4+5</sub>), apex of discal cell (1m<sub>2</sub>) and at base of the 3<sup>rd</sup> posterior cell (2m<sub>3</sub>) outside the brown band, 3<sup>rd</sup> antennal joint onion-shaped, the outline of the brown band straight.....*distigma* (Wiedemann, 1828)
- Wings without such isolated spots outside the brown band, the outline of the brown band forms an irregular diagonal line with a clear spot behind base of 2<sup>nd</sup> longitudinal cell, one at fifth and second basal cell, all inside the band, third antennal joint conical in shape.....*gestroi* (Brunetti, 1912)

***Anthrax distigma* Wiedemann, 1828**

1828. *Anthrax distigma* Wiedemann, Auss. Zweifl. i. pp. 309.

1898. *Spogostylum distigma*: Coquillett, Proc. U.S. Nat. Mus., 21: 318

1999. *Anthrax distigma* : Evenhuis & Greathead, D.J. World Catalog of Bee-flies, 299

2006. *Anthrax distigma* (Wiedemann): Banerjee et al., Bionotes, 8 (2): 44.

**Material examined:** Raipur dist., Badgoar Forest (21°18.240'N & 82°26.760'E), 11.xi.2011, (1 male), coll. Sunil Gupta.

**Diagnostic characters:** The width of frons is more than 1/3<sup>rd</sup> of the head above antennae, face dark grey with blackish pubescence, dark brown proboscis; antennae black having black bristles; black thorax, dorsum with hairy scales, scutellum black with hairy bristles; clear wings with dark baso-costal band, spots on the fork of 2<sup>nd</sup> vein and also at the base of the 3<sup>rd</sup> posterior cell, halteres are dark brown in colour; blackish legs, femora with whitish scales; blackish abdomen, 1<sup>st</sup> abdominal segment bluish grey with fine black pubescence.

**Distribution: India:** Andaman and Nicobar Islands, Arunachal Pradesh, Bihar, Chandigarh, Chhattisgarh (Raipur), Karnataka, Kerala, Meghalaya, Sikkim, Tamil Nadu, Uttarakhand and West Bengal. **Elsewhere:** Bangladesh, Java, Myanmar, Phillipines, Sri Lanka, Sulawesi.

***Anthrax gestroi* (Brunneti, 1912)** (Fig. 2)

1912. *Argyromoeba gestroi* Brunneti, Rec. Ind. Mus., 7: pp. 470.

2006. *Anthrax gestroi*: Banerjee et al., Bionotes, 8 (2): 44.

**Material examined:** Raipur dist., Nawa Para Forest (21°23.769'N & 82°24.712'E), 9.xi.2011, (1 male), coll. Anil & Angshuman. Dhamtari, Sankra Rest House (20°17.270'N & 81°59.747'E), 19.x.2011, (1 male), coll. Sunil Gupta.

**Diagnostic characters:** Width of frons one-third of head, antennae grayish black with 3<sup>rd</sup> joint conical; thorax black with yellowish or whitish scaly hairs, dorsum with yellow hairs, scutellum with yellow and black pubescence; wings hyaline with basal half blackish, outer margin of wing band oblique, anal and axillary cells with clear tip; fore coxae with yellow hairs and black bristles; abdomen black with yellow bristly hairs, last 3<sup>rd</sup> to 4<sup>th</sup> abdominal segments bear milky white scales.

**Distribution: India:** Andaman and Nicobar Islands, Bihar, Chhattisgarh (Dhamtari, Raipur), Maharashtra and Tamil Nadu.

**Tribe: EXOPROSOPINI****Genus: *Exoprosopa* Macquart, 1840**

1840. *Exoprosopa* Macquart, Dipt. Exot., 2 (1): 35. Type-species: *Anthrax Pandora* Fabricius.

***Exoprosopa flammea* Brunetti, 1909** (Fig. 2)

1909. *Exoprosopa flammea* Brunetti, Rec. Indian. Mus., 2: 466.

**Material examined:** Koriya dist., GGNP, Jalpani Forest (23°45'49.6"N & 82°09'13.4"E), 12.v.2013, (1 male), coll. A. Raha.

**Diagnostic character:** Head along with frons and face orange-yellow covered with short, golden yellow hairs, mouth lemon yellow covered with short bright yellow hairs, ocelli small, close together; scutellum reddish-brown, posterior margin with a row of concolorous strong bristles directed backwards; wings with two broad, dark brown bands, the 1<sup>st</sup> one covers the two basal cells, basal fourth of discal cell, then narrows to hind border of wing and encloses the basal third of anal and auxiliary cells, the 2<sup>nd</sup> one starting from costa; coxae, femora and most of the tibiae reddish-orange, all tarsi black; whole abdomen covered with short, bright-orange hairs.

**Distribution: India:** Andhra Pradesh, Bihar, Chhattisgarh (Koriya), Gujarat, Kerala, Uttar Pradesh. **Elsewhere:** Sri Lanka.

**Genus: *Litorhina* Bowden, 1975**

1975. *Litorhina* Bowden, J. Entomol. Soc. South. Afr., 38: 314. Type species: *Litorhynchus corticeus* Bezzi, 1924.

***Litorhina lar* (Fabricius, 1781)** (Fig. 2)

1781. *Bibio lar* Fabricius, Spec. Insect. Exhib. eor. duff specific.: 414.

1999. *Litorhina lar* Evenhuis & Greathead, D. J. World Catalog of Bee-flies: 414.

2007. *Litorhina lar*: Banerjee et al., J. Exp. Zool. India 10 (2): 333-336.

**Material examined:** Raipur dist., Nawa Para Forest (2123.769N & 8224.712E), 9.xi.2011, (1 ♂), coll. Anil & Angshuman. Gariyaband, Kodhomali Forest (2011.537N & 8214.858E), 18.x.2011, (1 male), coll. Sunil Gupta.

**Diagnostic character:** Head dark nut-brown covered with short, black pubescence, face similar in colour to head, 1<sup>st</sup>, 2<sup>nd</sup> antennal segments are ferruginous while 3<sup>rd</sup> one black; thorax black covered with sparse black pubescence mixed with depressed yellowish brown scale like hairs; thorax dull

orange brown with scutellum dark reddish brown; legs reddish brown, tarsi black except basitarsi lighter, fore tibiae with rows of short bristles, mid femora with two strong bristles on inner side towards tip.

**Distribution:** **India:** Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chandigarh, Chhattisgarh (Gariabandh, Raipur), Gujarat, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal. **Elsewhere:** Sri Lanka, Australia.

**Tribe: VILLINI**

**Genus: *Exhyalanthrax* Becker, 1916**

1916. *Exhyalanthrax* Becker, Ann. Hist. Nat. Natl. Hung., 14: 44. Type-species: *Anthrax vegans* Loew.

***Exhyalanthrax afer* (Fabricius, 1794)**

1794. *Anthrax afra* Fabricius, Ent. Syst., 4: 258.

1804. *Anthrax fimbriatus* Meigen, Syst. Besch., 2: pp. 154

2003. *Exhyalanthrax afer*: Lutovinovas et al., Acta Zoologica Lituonica, 13: 403.

**Material examined:** Surguja dist., Buthuri Beat (23°34.66'N & 83°32.257'E), 14.xi.2011, (1 male), coll. A. Raha.

**Diagnostic character:** Ocelli pale; antennae black; thorax brownish to blackish with few yellow scales on its upper surface; on the sides of thorax covered with black hairs and base of the wings covered with yellowish hairs; clear wings with dark brownish band extending to the apex of the costal cell; legs brown with hairy femora, anterior tibiae with short pubescence and hind tibiae with brownish scales; the band of wings fills 1/3<sup>rd</sup> of the total wing.

**Distribution:** Throughout India: Andaman, Bihar, Chhattisgarh (Surguja), Maharashtra, Odisha, Tamil Nadu, Uttarakhand and West Bengal. **Elsewhere:** Myanmar, Sri Lanka.

**List of Bombyliidae from Chhattisgarh**

Superfamily: ASILOIDEA

Family: BOMBYLIIDAE

Subfamily: BOMBYLIINAE

Tribe: BOMBYLIINI

Genus: *Systoechus* Loew, 1855

*Systoechus eupogonatus* Bigot, 1992\*

Genus: *Bombomyia* Greathead, 1995.

*Bombomyia maculata* Fabricius, 1775

Subfamily: ANTHRACINAE

Tribe: ANTHRACINI

Genus: *Anthrax* Scopoli, 1763

*Anthrax distigma* Wiedemann, 1828\*

*Anthrax gestroi* (Brunetti, 1912)\*

Genus: *Spogostylum* Macquart, 1840

*Spogostylum duvaucelii* (Macquart, 1840)\*

Tribe: EXOPROSOPINI

Genus: *Heteralonia* Rondani, 1863

*Heteralonia (Homolonia) lateralis* (Brunetti, 1909)

*Heteralonia (Isotamia) insulata* (Walker, 1852)

Genus: *Ligyra* Newman, 1841.

*Ligyra aurantiaca* Guerin – Meneville, 1835

*Ligyra semifuscata* (Brunetti, 1912)

Genus: *Exoprosopa* Macquart, 1840  
*Exoprosopa flamma* Brunetti, 1909\*  
 Genus: *Litorhina* Bowden, 1975  
*Litorhina lar* (Fabricius, 1781)\*  
 Tribe: VILLINI Hull  
*Exhyalanthrax afer* (Fabricius, 1794)\*

## DISCUSSIONS

Present paper reports twelve species of bee flies belonging to 2 subfamilies and 9 genera from the Chhattisgarh state, among them seven species are reported from the State for the first time. All seven species, newly reported from the State Chhattisgarh are exclusively Oriental in distribution. Among them *Litorhina lar* (Fabricius, 1781) and *Spogostylum duvaucelii* (Macquart, 1840) are also extended their distribution to Australian region and Palaearctic region respectively. High species diversity (12 species belonging to 9 genera) indicates very good potentiality of these flies in this state. There is further scope of discovery of many more bee-flies from the state, if more extensive and intensive surveys of the unexplored areas are undertaken.

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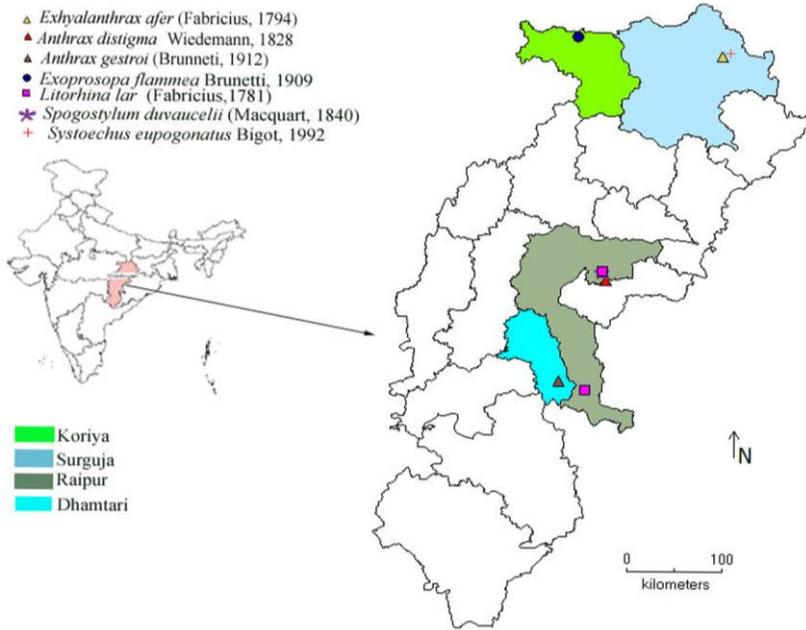


Figure 1. The study area.

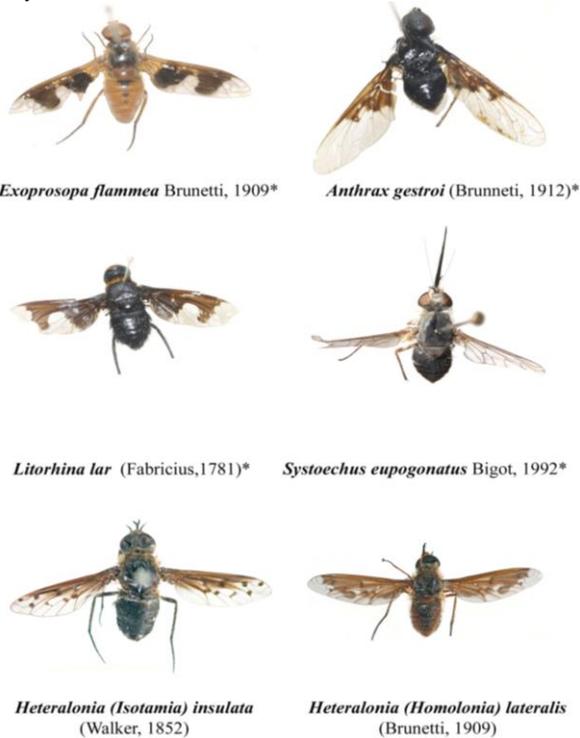


Figure 2. The species.