



## A check list of blow fly fauna (Diptera, Calliphoridae) of Kerala including forensically significant species

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**ABSTRACT:** Seventeen species of blow fly belonging to four subfamilies and eight genera were recorded from Kerala based on field studies and literature. Out of the 17 species, seven are forensically significant, six are pollinators and two species each are carrion breeders and termite predators respectively. The distinguishing features and distribution of all the species are discussed.

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**KEYWORDS:** Western Ghats, south India, Bengaliinae, Luciliinae, Chrysomyinae, Rhiniinae

Blow flies belonging to family Calliphoridae is encompassed of a group of flies having veterinary, ecological, medical and forensic significance with worldwide distribution. Currently, 1760 species of blow flies were reported (Bánki *et al.*, 2023) from all over the world. In India, the family is represented by nine subfamilies, 30 genera and 119 species (Nandi, 2004; Bharti, 2011). The subfamilies included are; Melanomyinae, Calliphorinae, Bengaliinae, Luciliinae, Rhiniinae, Helicoboscinae, Chrysomyinae, Ameniinae and Polleniinae.

Extensive work on the taxonomy of blow flies in India was done by Senior-White *et al.* (1940). One of the most significant contributions to the blow fly fauna of India was that of Nandi (2004). An updated checklist of blow flies in India was prepared by Bharti (2011) in which 119 blow fly species belonging to 30 genera were listed. Various aspects of biology (Subramanian and Mohan, 1980), ecology (Radhakrishnan *et al.*, 2012), new reports (Bharti

*et al.*, 2014) and molecular identification (Bharti and Singh, 2017) of blow flies were studied. In Kerala, morphological and molecular identification of blow flies; *Chrysomya chani* (GenBank accession no: MW600494.1), *Chrysomya rufifacies* (GenBank accession No: OM019083.1), *Hemipyrellia ligurriens* (GenBank, accession no: MN831480.1) and *Chrysomya megacephala* (GenBank accession No: MW 522614) were done by Reject Paul and Binoy (2021, 2022).

The checklist was prepared based on field studies and literature survey (Senior-White *et al.*, 1940; Nandi, 2004; Bharti, 2011; Bharti *et al.*, 2014; Bharti and Singh, 2017). A total of seventeen species belonging to four subfamilies and eight genera were recorded from Kerala. The description and distribution of these species with references (Senior-White *et al.*, 1940, Bharti *et al.*, 2014) are discussed.

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**Subfamily: Bengaliinae****Genus: *Bengalia* Robineau-Desvoidy, 1830****1. *Bengalia jejuna* (Fabricius, 1787)**

Diagnosis: Absence of concavity on the posterior margin of eye, upper part of mesopimeron with 9-11 black setulae, broad cercus narrowing down to pointed tip, 3<sup>rd</sup> and 4<sup>th</sup> tergite with marginal bands, bacilliform sclerite with an oblique distal margin, distiphallus with a constriction at the middle of dorsal wall, broad distal lip process with broad wing like membranes.

Distribution: Kochi, Walayar, Thiruvananthapuram (Bharti, 2011)

**2. *Bengalia surcoufi* (Senior-White, 1924)**

Diagnosis: Brownish grey parafrontalia, first and second antennal segments reddish brown in colour, pale palpi with black bristles, all tergites black banded, pale yellowish squamae, tarsi tips are darkened.

Distribution: Kochi (Nandi, 2004)

**Subfamily: Luciliinae****Genus: *Hemipyrellia*, Townsend, 1917****3. *Hemipyrellia ligurriens* (Wiedemann, 1830)**

Diagnosis: Genae and parafrontalia silver white in colour, antennae tawny yellow to brownish in colour, orange palpi, short hairs on the edges of tergites and first visible sternite, bare stem vein, 1<sup>st</sup> longitudinal vein without any setulae, 3<sup>rd</sup> longitudinal vein with short setulae on dorsal and ventral aspects, upper squama with creamish white short cilia and lower squama with light brown cilia. Eyes were holoptic in males and dichoptic in females. The length of the third antennal segment is shorter than the distance between the eyes in males. In males, the parafrontalia was covered with silver white tomentum. In females, the frontal stripe is broader at the middle of frons than in male fly. In males, sparse short hairs are seen on the edges of tergites and first visible sternite.

Additional material examined: 5 males; 8 females; Collected and Identified by: Reject Paul M.P.,

Location: Thrissur (Kolangattukara; 10°34'29.4"N; 76°11'01.8"E), Palakkad (Vaniamkulam-II-10°45'32.1"N; 76°20'04.8"E), Ernakulam (Aimuri-10°08'52.8"N; 76°29'18.5"E).

Repository: Dept. of Zoology, St. Thomas' College (Autonomous), Thrissur, Kerala.

Distribution: Foot of Nilgiri hills, Thrissur, Palakkad and Ernakulam, Kerala (Nandi, 2004; Reject Paul and Binoy, 2021).

Remarks: *Hemipyrellia ligurriens* is a forensically significant blow fly and in the current investigation, it was found to get attracted to decomposing pork meat and completing its life cycle.

**Genus: *Lucilia* Robineau-Desvoidy, 1830****4. *Lucilia ampullacea* (Villeneuve, 1922)**

Diagnosis: Third to fifth tergites without marginal band, basicostal scale brownish black, subcostal sclerite with upstanding hairs, and two post sutural acrostichal, alar squama white with tuft of hair on the lower margin, and lower squama infuscated, tibiae black.

Distribution: Malabar Coast, Kerala (Nandi, 2004).

**5. *L. papuensis* (Macquart, 1843)**

Diagnosis: Frons broader than inter post ocelli distance, parafacialia broader than the third antennal segment, occiput with more than two irregular rows of black post ocular setae, posterior surface of post gena with black hairs, anterior pair of post sutural acrostichals present posterior to the second pair of post sutural dorsocentrals, alar and thoracic squama infuscated with a tuft of blackish brown hairs at the lower margin.

Distribution: Malabar Coast, Kerala (Nandi, 2004)

**6. *Lucilia sericata* (Meigen, 1826)**

Diagnosis: Parafrontalia with short decumbent bristles, cerebrale with 8-9 occipital bristles on either side, non arched tergites, tergites metallic golden green with sparse pruniosity, absence of tuft of long hairs on sternites, hypopygium inconspicuous.

Distribution: Calicut, Kerala (Nandi, 2004; Priya and Sebastian, 2015)

**Subfamily: Chrysomyinae**

**Genus: *Chrysomya* Robineau-Desvoidy, 1830**

**7. *Chrysomya megacephala* (Fabricius, 1794)**

Diagnosis: parafrontalia slightly narrower than the breadth of frons, and were covered with golden tomentum. Antennae, arista and palpi were orange, parafacialia and genae were completely orange in colour, anterior spiracles were dark brown in colour, sub costal sclerite covered with brown felted pubescence and also with small erect hairs, a row of setulae were seen on the upper posterior side on the stem vein. Upper calypter was with ventral hairs on the opaque white basal part. Eyes were holoptic in males and dichoptic in females. Facets of upper two-thirds in the male eyes were enlarged and was clearly demarcated from the smaller facets below. In females, the facets were uniformly small. In males, the parafrontalia was covered with golden tomentum. Outer vertical bristles were absent in males. In females, the frontal stripe is broader at the middle of frons than in male fly.

Additional material examined: 6 males; 9 females, Collected and Identified by: Reject Paul, M.P.

Location: Thrissur (Choolissery-10°35'45.0"N; 76°11'18.3"E), Palakkad (Palappuram-10°45'48.3"N; 76°24'54.1"E), Ernakulam (Kanjirakkad-10°07'37.8"N; 76°28'03"E).

Repository: Dept. of Zoology, St. Thomas' College (Autonomous), Thrissur, Kerala.

Distribution: Calicut, Thrissur, Palakkad and Ernakulam in Kerala (Bharti and Singh, 2017; Reject Paul and Binoy, 2022).

Remarks: *Chrysomya megacephala* is a forensically significant blow fly and in the current investigation, it was found to get attracted to decomposing pork meat and completing its lifecycle.

**8. *Chrysomya chani* (Kurahashi, 1979)**

Diagnosis: Fuscous to black colour was present on the genae and parafacialia, setulae and hairs on

parafacialia and parafrontalia were blackish in colour, brown to fuscous coloured 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> antennal segments were present, black hairs were seen on the venter of tergite V, small prothoracic spiracle was fuscous black in colour, black coloured epaulet and basicosta were present, dense basal tuft of black hairs were present on the subcostal sclerite, black setae were present on the upper margin of 3<sup>rd</sup> longitudinal vein, base of alar squamae was white in colour and ventrally it was bare except for fringe. Eyes were holoptic in males and dichoptic in females. Facets of upper two-thirds in the male eyes were enlarged and was clearly demarcated from the smaller facets below. In females, the facets were uniformly small. In males, the parafrontalia was covered with fuscous to black tomentum. In females, the frontal stripe is broader at the middle of frons than in male fly.

Additional material examined: 4 males; 7 females. Collected and Identified by Reject Paul, M.P.

Location: Thrissur (Thangaloor; 10°37'35.5"N; 76°11'15.3"E), Palakkad (Varode-10°48'50.0"N; 76°22'47.2"E), Ernakulam (Kuruppampady-10°07'01.8"N; 76°30'12.6"E).

Repository: Dept. of Zoology, St. Thomas' College (Autonomous), Thrissur, Kerala.

Distribution: Western Ghats, Thottilpalam, Calicut, Thrissur, Palakkad and Ernakulam, Kerala (Bharti, 2014; Bharti and Singh, 2017; Reject Paul and Binoy, 2022).

Remarks: *Chrysomya chani* is a forensically significant blow fly and in the current investigation, it was found to get attracted to decomposing pork meat and completing its lifecycle.

**9. *Chrysomya nigripes* (Aubertin, 1932)**

Diagnosis: Parafrontalia and parafacialia with grey tomentum, genae grey, antennae dark brown, anterior spiracle white, only one mesopisternal setae developed, all hairs on the tergite V black, prothoracic stigma white, hind margins of second and third tergites dark banded, basicostal scale dark brown, sub costal sclerite with pale hairs, squama white.

Distribution: Calicut, Kerala (Bharti and Singh, 2017).

#### 10. *Chrysomya rufifacies* (Macquart, 1842)

Diagnosis: Third antennal segment is brownish red in colour on the inner surface. Parafrontalia was narrowed with a black colour in the upper half, lower half was covered with silver tomentum and was covered with upstanding white hairs, parafacialia and genae were light yellowish and covered with white hairs, anterior spiracle white, few white hairs were present on the tergite V, and upper squama was white in colour. The lower squama was slightly fuscous in colour with white hairs. Eyes were holoptic in males and dichoptic in females. In males the parafrontalia was reduced to a fine line covered with silver tomentum. The right and left paprafrontalia slightly narrower than the breadth of the frons. In females, the frontal stripe is broader at the middle of frons than in male fly. Median incision present on the posterior edge of tergite V of females.

Additional material examined: 6 males; 9 females - Collected and Identified by: Reject Paul, M.P.

Location: Thrissur (Thangaloor; 10°37'35.5"N; 76°11'15.3"E), Palakkad (Varode; 10°48'50.0"N; 76°22'47.2"E), Ernakulam (Kuruppampady; 10°07'01.8"N; 76°30'12.6"E),

Repository: Dept. of Zoology, St. Thomas' College (Autonomous), Thrissur, Kerala.

Distribution: Calicut, Thrissur, Palakkad and Ernakulam in Kerala (Nandi, 2004; Bharti and Singh, 2017; Reject Paul and Binoy, 2022)

Remarks: *Chrysomya rufifacies* is a forensically significant blow fly and in the current investigation, it was found to get attracted to decomposing pork meat and completing its lifecycle.

#### 11. *Chrysomya albiceps* (Wiedemann, 1819)

Diagnosis: Third antennal segment blackish brown, prostigmal bristles absent, two mesoepisternal setae, dorsal part of thorax shine with a little dusting, anterior spiracle white, few white hairs on the

posterior edge of tergite V with incision, black transverse narrow marginal bands on the 3<sup>rd</sup> and 4<sup>th</sup> tergites.

Distribution: Periyar Lake and Tiger Reserve, Thekkady, Kerala (Radhakrishnan *et al.*, 2012)

#### Subfamily: Rhiniinae

Genus: *Idiella* Braeuer and Berensteamn, 1889

#### 12. *Idiella euidielloides* (Senior-White, 1922)

Diagnosis: Basicosta black, sternopleuron and mesopleuron with distinct piliferous spots, first and second tergite with few black lateral bristles, posteroventral surface of hind tibia with longer hairs, tibial hairs not exceeding the width of tibia.

Distribution: Cardamom Estate, Kerala (Arce *et al.*, 2020)

#### 13. *Idiella mandarina* (Wiedemann, 1830)

Diagnosis: Frontal stripe brownish black, white parafrontalia with black spots, genae shining black, antennae brown, black palpi, lower half of the occiput with dense hairs, pleurae with dense golden hairs, tibiae and first tarsal joint brown and rest of tarsi black.

Distribution: Thiruvananthapuram, Kerala (Nandi, 2004).

Genus: *Stomorhina* Rondani, 1861

#### 14. *Stomorhina discolor* (Fabricius, 1794)

Diagnosis: Frontal stripe dark brown, parafacialia and parafrontalia white with shining black spots, epistome and genae shining black, antennae and palpi brown, green thorax densely grey dusted with small black spots, anterior lower mesopleuron and anterior sternopleuron glossy black, abdominal segments with black hind margins with a black median stripe, hind femur yellowish at base, tibiae and tarsi brownish yellow.

Distribution: Cardamom Estate, Kerala (Nandi, 2004).

**Genus: *Cosmina* Robineau-Desvoidy, 1830****15. *Cosmina bicolor* (Walker, 1856)**

Diagnosis: Parafrontalia greyish with black spots, parafacialia silvery white, antennae yellowish brown, palpi black, propleuron hairy, mesopleuron metallic green, sub median mesonotal stripes broad, abdominal segments with a median stripe, strong bristles close to the apex of fifth sternite, hypopygium without strong spines, epaulet reddish brown.

Distribution: Nilgiris, Kerala (Nandi, 2004).

**16. *Cosmina simplex* (Walker, 1858)**

Diagnosis: Parafacialia silvery white with black spots, parafrontalia greyish with shining black spots, genae shining black, antennae yellowish brown, thorax copper green with black spots, long bristles on the entire surface of fifth visible sternite, hypopygium with curved laterally directed spines.

Distribution: Kochi, Kerala (Nandi, 2004).

**Genus: *Strongyloneura* Bigot, 1886****17. *Strongyloneura prolata* (Walker, 1860)**

Diagnosis: Mesopleuron without bristle on its upper part, third sternite without tuft of hair, fourth sternite with tuft of hair, fifth sternite and hypopygium are well developed, last sternite projected posteriorly and widely uncovered by corresponding tergites, bend of vein  $M_{1+2}$  gently curved.

Distribution: Chalakudy, Kerala (Nandi, 2004).

Among the 17 species recorded, six species were pollinators (*Idiella euidielloides*, *I. mandarina*, *Stomorphina discolor*, *Cosmina bicolor*, *C. simplex* and *Strongyloneura prolata*), seven species forensically significant flies (*Chrysomya megacephala*, *C. chani*, *C. nigripes*, *C. rufifacies*, *C. albiceps*, *Hemipyrellia ligurriens* and *Lucilia sericata*), two species carrion breeders (*Lucilia ampullacea*, *L. papuensis*) and two species were termite predators (*Bengalia jejuna* and *B. surcoufi*) (Nandi, 2002).

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