



## DIVERSITY OF TRUE FLIES (DIPTERA : INSECTA) IN THE BIBHUTIBHUSAN WILDLIFE SANCTUARY

BULGANIN MITRA AND P. PARUI

Zoological Survey of India, M-Block, New Alipore, Kolkata-700053

### INTRODUCTION

Bibhutibhusan Wildlife Sanctuary is situated in the district of North 24-Parganas (Lat.: 23°11.28'1' Long.: 88°46.10°5') under Bagdah P.S., Bongaon sub-Division. The Sanctuary is bounded on all its three sides by the River Ichamati while the eastern side is bounded by adjoining village areas namely Parmadan and Jhupa.

This sanctuary is the riverine succession forest and the floral diversity encompasses a wide variety of species that include herbs, shrubs, creepers and trees. A total of 205 species were reported that belonged to 60 families. Among them, 94 species were herbaceous, 35 species shrubs, 22 species were found to be creepers/climbers and 60 species were trees. It is found that the herbs are the dominant ones among all the floral species, followed by the trees, the shrubs and the climbers. Among them, trees like *Polyalthia suberosa*, *Terminalia arjuna* and *Cassia seamea* are the dominant plant species. Tropical monsoon climate with four distinct seasons viz summer, monsoon, winter and autumn. Annual temperature ranges from 43°C to 9°C. Average annual rainfall 1400 mm. Area is primarily a river plain with alluvial soil profile. Altitude is average 6 mts. above sea level.

The relatively fast changes of the tropical forest landscapes present a challenge to biodiversity management. Many studies have contributed with important information about habitat requirements for organism groups in tropical forests, such as birds, mammals like higher vertebrates. In conservation research, there is a taxonomic bias against insects, and especially less charismatic insect groups. Insects constitute the great majority

of all species associated with forests. We have very little idea about what factors are most important for species richness, and the relative importance of local and large scaled factors. There are few publications on the dipteran faunal diversity of the protected areas in India (Mitra et al, 2002, 2004, 2006 and Mitra & Parui, 2007 and 2010). But these studies were not analysed how the dipterans relate to habitat qualities of the protected forest like BBWLS. Therefore an attempt has been made to explore the Diptera fauna of BBWLS which may focus on the health of the forest ecosystem at present.

The present communication reports 31 species of 28 genera under 14 families of Diptera for the first time from the Bibhutibhusan Wildlife sanctuary, West Bengal.

### LIST OF SPECIES

#### Family TIPULIDAE

1. *Conosia irrorata* Wiedemann

#### Family STRATIOMYIDAE

2. *Oplodontha minuta* (Fabricius)

#### Family TABANIDAE

3. *Tabanus* sp.

#### Family ASILIDAE

4. *Philodicus femoralis* Ric
5. *Michotamia aurata* (Fabricius)
6. *Astochia longistylus* Wiedemann

#### Family BOMBYLIIDAE

8. *Petrorossia ceylonica* (Brunetti)

## Family DOLICHOPODIDAE

- 9.
- Chrysosoma vittalum vittalum*
- (Wiedemann)

## Family SYRPHIDAE

10. *Asarkina (Asarkina) ericetorum* (Fabricius)  
 11. *Eristalinus (Eristalinus) arvorum* (Fabricius)  
 12. *Eristalinus (Eristalinus) obscuritarsis* (de Meijere)  
 12. *Episyrphus balteatus* (De Geer)  
 13. *Paragus (Paragus) serratus* (Fabricius)  
 14. *Melanostoma orientale* (Wiedemann)  
 15. *Eristalis (Eoseristalis) arbustorum* (Linnaeus)  
 16. *Eristalinus (Eoseristalis) obliquus* (Wiedemann)

## Family PLATYSTOMATIDAE

- 17.
- Plagiostenoptera (Plagiostenoptera) aenea*
- (Wiedemann)

## Family TEPHRITIDAE

18. *Dacus (Bactrocera) dorsalis* Hendel  
 19. *Carpomyia nr. vesuviana* Costa

## Family SCIOMYZIDAE

- 20.
- Sepedon ferruginosa*
- Wiedemann

## Family MICROPEZIDAE

- 21.
- Mimegralla albimana*
- (Doleschall)

## Family MUSCIDAE

22. *Musca (Musca) domestica* Linnaeus  
 23. *Orthellia indica* (Robineau-Desvoidy)  
 24. *Orthellia lauta* (Wiedemann)  
 25. *Stomoxys calcitrans* (Linnaeus)

## Family CALLIPHORIDAE

26. *Calliphora vicina* Robineau-Desvoidy  
 27. *Chrysomya megacephala* (Fabricius)  
 28. *Stomorphina discolor* (Fabricius)  
 29. *Lucilia cuprina* (Wiedemann)

## Family SARCOPHAGIDAE

30. *Bercaea cruentata* Meigen  
 31. *Parasarcophaga (s. str.) albiceps* (Meigen)

## Family TIPULIDAE

This is one of the largest families of Diptera, with approximately 14,000 species described to date, commonly known as crane flies or daddy-long-legs, tipulids are world-wide in distribution, although their greatest diversity is in the humid tropics. Adults tend to be short-lived and are typically found in shaded, humid areas of woodland where they feed on honeydew and nectar. The larvae are much longer-lived, up to a year or more, and are primarily aquatic or semi-aquatic, although some species live in decaying wood, soil and fungi.

In BBWLS, only one species of the family has been collected from the buffer area of the sanctuary. This species is common in West Bengal and distributed throughout the World.

1. *Conosia irrorata* Wiedemann

1828. *Limnobia irrorata* Wiedemann, *Aussereurop. Zweifl. Insekt*, 1 : 574.

*Material examined* : 2 ♀♀, BBWLS, 11.01.2008, coll. B. Mitra

## Family STRATIOMYIDAE

Immature stages of Stratiomyidae are found in a variety of habitats. They are usually associated with decaying plant matter ranging from leaf litter to rotting fruits. Adult soldier flies are often found sitting on leaves in sunny patches in forest habitats and some adults, particularly Stratiomyinae and some Clitellariinae, frequent flowers. They are rarely come to light, indicating that they are primarily diurnal.

Only one species of this family has been collected from the medicinal plant garden near the guest house. This is a common species in West Bengal and distributed only in Sri Lanka of the Oriental Region other than India.

2. *Oplodontha minuta* (Fabricius)

1794. *Stratiomys minuta* Fabricius, *Ent. Syst.*, 4 : 268. Type-locality: Tranquebar, India

*Material examined* : 1 ♂, BBWLS, 11.09.2009, coll. B. Mitra

## Family TABANIDAE

Adult Tabanidae are large flies with broad bodies and bulging eyes. The males are easily differentiated from female flies because eyes are

contiguous in the males and widely separated in the females. The antennae are three segmented. The adults of both sexes feed on nectar and pollen of flowers. Females of most species have piercing mandibles and also take blood meals. They can be serious pests of cattle, horses, and other mammals and may be very annoying to man with their persistent attacks. Adults are only of minor importance as mechanical transmitters of disease within the regions covered here.

Only one species of *Tabanus* has been collected from the grass meadow near the fencing of the sanctuary. The species couldn't be identified due to bad condition of the material.

### 3. *Tabanus* sp.

*Material examined* : 1 ♂, BBWLS, 25.10.2009, coll.B.Mitra

### Family ASILIDAE

Adult stages are medium to large flies often observed on stems of plants, on the ground and grass or flying low. Species vary in appearance and some mimic wasps and bees. Most species are gray to black, hairy-bodied, have a long, narrow, tapering abdomen containing segments that may be banded, patterned or contrasting in color. Adults prey on a variety of arthropods; considered to be beneficial insects, except for those that feed on bees and other beneficial insects. Because of their predatory habit of feeding on other insects and their voracious appetites, they contribute to the maintenance of the natural balance among insect populations.

Three species under three different genera of the family Asilidae have been reported from this sanctuary. All the specimens were collected from the buffer zone of the sanctuary near to the medicinal plant garden. Among them two species are commonly distributed in India and Oriental in distribution. But the third one, *Astochia longistylus* Wiedemann is the first report from West Bengal other than Great Nicobar in India. This species is also Oriental in distribution

### 4. *Philodicus femoralis* Ricardo

1921. *Philodicus femoralis* Ricardo, *Ann. Mag. Nat. Hist.* (9) 8 : 190. Type-locality: Okkyl, Schwegu, Burma

*Material examined* : 3♂♂, 1♀, BBWLS, 24.10.2009, coll.B.Mitra

### 5. *Michotamia aurata* (Fabricius)

1794. *Asilus aurata* Fabricius, *Ent., Syst*; 4 : 387. Type-locality: East India

*Material examined* : 1♂, 1♀, BBWLS, 24.10.2009, coll. B. Mitra

### 6. *Astochia longistylus* Wiedemann

1828. *Asilus longistylus* Wiedemann, *Aussereurope. Zweifl. Insekt.*, 1 : 433. Type-locality: Java

*Material examined* : 1♂, BBWLS, 24.02.2008, coll.B.Mitra

### Family BOMBYLIIDAE

These are generally rather large gentle looking flies with a long thin proboscis, which can be seen flying low across the ground from flower to flower, or hovering expertly in front of a flower for feeding nectar. Unlike their relatives robber-flies, the Bee-flies larva are the predators. The female Bee-fly drops its eggs near the entrance to the burrow of a solitary bee or wasp. The egg hatches into the first stage larva which is a minute worm-like animal which searches actively for a cell of the bee or wasp's burrow which it enters. It feeds at first on the pollen and nectar supplied by the cells owner until its first moult. The second stage larva is very different, looking far more like a maggot, and it feeds on the larva of the bee or wasp with whose cell it has been sharing peacefully up until this time. After it has finished devouring the helpless bee or wasp larva the Bee-fly larva pupates in the soil from where it emerges, the adults in comparison with their carnivorous larva feed entirely on nectar.

Only one species of bee fly has been encountered from the medicinal plant garden of the sanctuary throughout the survey. This species is common in India including West Bengal also. This species extends its distribution in the country like Malaysia, Pakistan, and Sri Lanka of the Oriental Region.

### 8. *Petrorossia ceylonica* (Brunetti)

1909. *Argyromoeba ceylonica* Brunetti, *Rec. Indian Mus*, 2 : 471. Type locality: Ceylon [Srilanka]

*Material examined* : 1♂, BBWLS, 13.01.2008, coll. B. Mitra

## Family DOLICHOPODIDAE

The dolichopodids or “long-legged flies” comprise one of the most diverse fly families. Most dolichopodids are recognised by their small and slender bristly bodies in metallic blue or green colour, short fleshy proboscis, dorsal or terminal hair-like arista, thorax adorned with strong setae, discal and 2nd basal cells united and shortened. Adults are predators of soft bodied invertebrates, mites, thrips, aphids and are important control agents of several pest species. They are usually found in cool, moist habitats, including sea-shore and salt marshes. Adults of many species are known to feed on nectar. Larvae are maggot like found in soil, moss, decaying vegetation, mud and under bark. Most larvae are sometimes aquatic predators or scavengers while few are phytophagous.

Only one species of Dolichopodidae has been encountered during this survey. All the specimens were collected from the under growth of the sanctuary particularly from the buffer zone area. This species is common to India and restricted to the other countries of the Oriental Region.

9. *Chrysosoma vittatum vittatum* (Wiedemann)

1819. *Dolichopus vittatum vittatum* Wiedemann, *Zool. Mag.* 1 : 3 Type-locality: Java

*Material examined* : 1♀, BBWLS, 13. 01.2008, coll. B. Mitra

## Family SYRPHIDAE

The family Syrphidae under the super family Syrphoidea of the infra order Cyclorrhapha in the section Aschiza is one of the largest and easily recognized groups of Diptera. The members of this family are commonly known as ‘Flower flies’ or ‘Hover flies’. Usually moderate to large sized flies, almost always bristle less, very brightly coloured flies and may be striped, spotted or banded yellow on a blue, black or metallic ground colour. The black and yellow colouration often imparts to them a superficial resemblance wasp; other species are densely hairy and resemble bumblebees. The venaspuria is one of their most characteristic features and is rarely found in other dipterans. It is a vein-like thickening of the wing membrane and may be distinguished from the veins in being fainter and terminating without association with other veins. These flies are pollinators of major

significance. In some agro ecosystems, such as orchards, they outperform native bees in pollinating the fruits.

In BBWLS, only eight species of Syrphidae have been collected from the different corners of the sanctuary. All of them are common in West Bengal and India and also distributed in different parts of the globe.

10. *Asarkina (Asarkina) ericetorum* (Fabricius)

1781. *Syrphus ericetorum* Fabricius, *Spec. Insect.*, 2 : 425.  
Type - locality: Africa aequinoctial”

*Material examined* : 1 ♂, BBWLS, 24.02.2008, coll. B. Mitra.

11. *Eristalinus (Eristalinus) arvorum* (Fabricius)

1787. *Syrphus arvorum* Fabricius, *Mantissa Insect.*, 2 : 335.  
Type-locality: China

*Material examined* : 4 ♂♂, BBWLS, 25.02.2008, coll. B. Mitra.

12. *Eristalinus (Eristalinus) obscuritarsis* (de Meijere)

1908. *Eristalis obscuritarsis* de Meijere, *Tijdschr. Ent.*, 51 : 250

*Material examined* : 12 ♂♂ 3 ♀♀, BBWLS, 25.02.2008, coll. B. Mitra.

13. *Episyrphus balteatus* (De Geer)

1776. *Musca balteata* De Geer, *Mem. pour Serv. Hist. Ins.*, 6 : 116. 1975. Type-locality: Europe

*Material examined* : 7♂♂ 7♀♀, BBWLS, 23.10.2009, coll. B. Mitra.

14. *Paragus (Paragus) serratus* (Fabricius)

1805. *Mulio serratus* Fabricius, *Syst. Antliat.*, : 186. Type-locality: Tranquebar, India

*Material examined* : 3 ♂♂ 2♀♀, BBWLS, 10.09.2009, coll. B. Mitra.

15. *Melanostoma orientale* (Wiedemann)

1824. *Syrphus orientalis* Wiedemann, *Analecta Ent.*, : 36.  
Type-locality: “Ind. Or.”

*Material examined* : 1 ♂, BBWLS, 23.10.2009, coll. B. Mitra.

16. *Eristalis (Eoseristalis) arbustorum* (Linnaeus)

1758. *Musca arbustorum* Linnaeus, *Syst. Nat. Ed.*, 10 : 591.  
Type-locality: Europe.

*Material examined* : 1♂ 1♀, BBWLS, 24.10.2009, coll. B. Mitra

17. *Eristalis (Eoseristalis) obliquus* (Wiedemann)

*Eristalis obliquus* Wiedemann, *Analecta Ent.*, : 38. Type-locality: Bengal, India

*Material examined* : 1♂ 1♀, BBWLS, 25.10.2009, coll. B. Mitra

Family PLATYSTOMATIDAE

The Platistomatids or Signal flies are very variable in external appearance, ranging from small (2.5 mm), slender species to large (20 mm), robust individuals, often with body colours having a distinctive metallic lustre and with face and wings usually patterned with dark spots or bands. Adults are found on tree trunks and foliage and are attracted to flowers, decaying fruit, excrement, sweat, and decomposing snails. Larvae are found on fresh and in decaying vegetation, carrion, and root nodules. Most larvae are either (eating plant material) or (eating decomposing organic matter).

In BBWLS, only one species of Platystomatidae has been collected from the grass land of the sanctuary. It is also found in other areas of West Bengal and widespread in Oriental and Australian regions other than India.

18. *Plagiostenoptera (Plagiostenoptera) aenea* (Wiedemann)

1819. *Dacus aenea* Wiedemann, *Zool. Mag.*, 3 : 29. Type-locality: Java

*Material examined* : 1♂♂, 3♀♀, BBWLS, 25.10.2009, coll. B. Mitra

Family TEPHRITIDAE

The members of the family Tephritidae are commonly called as "fruit flies" and are easily recognized by their maculated, spotted or ornate colouration of their wings. Subcostal vein of wings bend forward, toward costa almost perpendicularly; inner eye orbits completely sclerotised, nearly always with inwardly directed anterior orbital bristles, post verticles not convergent. Crop (diverticulum) projected into abdomen, used for storage of fluid, abdominal segment 6 well developed. The adult tephritids are serious economic pests.

There are two species of Tephritidae collected from the vegetation of the sanctuary. Of them *Dacus (Bactrocera) dorsalis* Hendel is distributed all over the countries in the globe.

19. *Dacus (Bactrocera) dorsalis* Hendel

1912. *Dacus dorsalis* Hendel, *Supplta ent.*, 1 : 18. Type-locality : Koshun, Formosa

*Material examined* : 7♂♂, 1♀, BBWLS, 25.10.2009, coll. B. Mitra

20. *Carpomyia nr. vesuviana* Costa

*Material examined* : 1♀, BBWLS, 25.10.2009, coll. B. Mitra

Family SCIOMYZIDAE

The Sciomyzidae belongs to the typical flies of the . They are commonly called marsh flies, and in some cases snail-killing flies due to the food of their.

Marsh flies are generally slender, yellowish or brownish, about 0.5-1 cm long. They have fairly prominent eyes, prominent forward-pointing antennae, and bristles on the hind (upper hind leg). The wings are often mottled with various light brown markings according to species. Marsh flies are common along the edges of ponds and rivers, and in marshy areas. The adults drink dew and . The prey on or become of (slugs and snails). Very little is known about the complete of these flies.

In BBWLS, only one species of Sciomyzidae has been collected from the grass meadow of the sanctuary. This species is common in India but restricted its distribution in the Oriental Region.

21. *Sepedon ferruginosa* Wiedemann

1824. *Sepedon ferruginosa* Wiedemann, *Analecta. Ent.*; 56. Type-locality: East Indies

*Material examined* : 6♀♀, 7♂♂, BBWLS, 25.10.2009, coll. B. Mitra

Family MICROPEZIDAE

The Insects of the family Micropezidae are commonly called stilt-legged flies, after their characteristically long legs. The fore legs are markedly smaller than the other pairs. Mostly they are long-bodied, often black flies, usually with infuscated (darkened) wings. Little is known of the larval habits, but they are probably phytophagous or saprophagous. Adults are either predaceous on

small insects or are attracted to excrement or decaying fruit.

In BBWLS, only one species of Micropezidae has been collected from the under growth of the sanctuary. This is the common species of the family Micropezidae found in India, throughout the Oriental region, Japan, New Guinea, Oceania

#### 22. *Mimegralla albimana* (Doleschall)

1856. *Taenioptera albimana* Doleschall, *Natuurk. Tijdschr. Ned-Indie* 10 (n. Ser. 7) : 413, Type-locality: Djokjakarta, Java

Material examined : 2♂♂, 1♀, BBWLS, 9.02.2010, coll. B. Mitra

#### Family MUSCIDAE

Muscidae is a family of found in the superfamily. The apical segment of the of Muscidae are plumose, and the basal portion is smooth. Muscidae, some of which are commonly known as or due to their , are worldwide in distribution and contain almost 4,000 described species in over 100 genera.

Most species are not synanthropic. Adults can be predatory, or feed on a number of types of plant and animal exudates. They can be attracted to various substances including sugar, sweat, tears and blood. Larvae occur in various habitats including decaying vegetation, dry and wet soil, nests of insects and birds, fresh water, and carrion.

In BBWLS, only four species of Muscidae have been collected from the different parts of the sanctuary. All the species reported here are very common throughout the globe.

#### 23. *Musca (Musca) domestica* Linnaeus

1758. *Musca domestica* Linnaeus, *Syst. Nat. Ed. 10, 1* : 596. Type-locality: Europe

Material examined : 15 ♀♀, 10 ♂♂, BBWLS, 22.07.2008, coll. B. Mitra, 6 ♀♀, 18 ♂♂, BBWLS, 9.02.2010, coll. B. Mitra

#### 24. *Orthellia indica* (Robineau-Desvoidy)

1830. *Lucilia indica* Robineau-Desvoidy, *Mem. Pres. div. Sav. Acad. Sci. Inst. Fr.*, 2: 453. Type-locality: Bengal

Material examined : 5 ♀♀, 11 ♂♂, BBWLS, 9.12.2008, coll. B. Mitra, 1 ♀♀, 7 ♂♂, BBWLS, 9.02.2010, coll. B. Mitra

#### 25. *Orthellia lauta* (Wiedemann)

1830. *Musca lauta* Wiedemann, *Aussereurop. Zweifl. Insekt.*, 2 : 410. Type-locality: Java

Material examined: 6♀♀, 2♂♂, BBWLS, 12.02.2010, coll. B. Mitra

#### 26. *Stomoxys calcitrans* (Linnaeus)

1758. *Conopscalcitrans* Linnaeus, *Syst. Nat., Ed., 10, 1* : 604 Type-locality : Sweden

Material examined: 8♀♀, 12 ♂♂, BBWLS, 10.02.2010, coll. B. Mitra

#### Family CALLIPHORIDAE

The family Calliphoridae is a cosmopolitan group and predominantly tropical in distribution closely related to Muscidae, Tachinidae and Sarcophagidae. The calliphorids are generally ubiquitous. They fly mainly by day, though a number of specimens also were attracted by light. Adults are often attracted to sweet liquids, and can be collected at flowers, where they feed on nectar. They also feed on the liquid products of organic decomposition, which provide the proteins essential to the female for egg maturation. Some of the species are of significant veterinary importance, causing the cutaneous myiasis of livestock known as 'fly strike'. Larvae are scavengers or parasitic on insects, earthworms, snails, and other animals.

In BBWLS, only four species of Calliphoridae have been collected from the different parts of the sanctuary. The calliphorids of this sanctuary are very common in West Bengal, India and other parts of the globe.

#### 27. *Calliphora vicina* Robineau-Desvoidy

1826. *Calliphora erythrocephala* (Meigen): Senior-White, Aubertin & Smart, *Fauna Brit. India, Dipt.*, 6 : 33. Type-locality: Philadelphia

Material examined: 4♀♀, 8 ♂♂, BBWLS, 11.01.2008, coll. B. Mitra

#### 28. *Chrysomya megacephala* (Fabricius)

1794. *Musca megacephala* Fabricius, *Syst. Ent.* 4 : 317. Type-locality: Guinea

Material Examined: 12 ♂♂ 7 ♀♀, BBWLS, 11.01.2008, coll. B. Mitra

**29. *Stomorphina discolor* (Fabricius)**

1794. *Musca discolor* Fabricius, *Ent. Syst.*, 4 : 320. Type-locality: Ind. Or.

*Material examined* : 3 ♂♂, 3 ♀♀ BBWLS, 13.01.2008, coll. B. Mitra

**30. *Lucilia cuprina* (Wiedemann)**

1830. *Musca cuprina* Wiedemann, *Aussereurop. zweiffl. Insekt.*, 2 : 654. Type-locality: China

*Material examined* : 1 ♂, 2 ♀♀, BBWLS, 14.01.2008, coll. B. Mitra, 12 ♂♂ 7 ♀♀, BBWLS, 25.02.2008, coll. B. Mitra

**Family SARCOPHAGIDAE**

Flies of the family Sarcophagidae are commonly known as flesh flies. Most flesh flies breed in , dung, or decaying material, but a few species lay their eggs in the open wounds of mammals; hence their common name. Some flesh fly larvae (maggot) are internal of other insects. 3-segmented, with an; vein Rs 2-branched, present, well developed. Medium-sized flies with black and gray longitudinal stripes on the and checkering on the . Arista commonly plumose on basal half; bare in a few species. Four bristles (short, long, short, long, from front to rear). Hindmost bristle located even with or toward midline from bristle.

In BBWLS, only two species of Sarcophagidae have been collected from the different parts of the sanctuary. These two species are common throughout the world.

**31. *Bercaea cruentata* (Meigen)**

1826. *Sarcophaga cruentata* Meigen, *Syst. Besch. europ. zweifl. Insekt.*, 5 : 28; Kano and Shinonaga, 1994, *Jap. J. sanit. Zool.*, 45 : 270. Type-locality: Europe

1986. *Bercaea cruentata* : Verves, *Cat. Palae. Dipt.*, 12: 159; Pape, 1991, *Jap. J. Ent.*, 59(1): 213; Nandi, 1992. *J. Beng. Nat. Hist. Soc.*, 11(2) : 35.

*Material examined* : 2 ♂♂ 7 ♀♀, BBWLS, 11.01.2008, coll. B. Mitra

**32. *Parasarcophaga* (s. str.) *albiceps* (Meigen)**

1826. *Sarcophaga albiceps* Meigen, *Syst. Besch. zweifl. Insekt.*, 5 : 22, Kano and Shinonaga, 1994, *Jap. J. sanit. Zool.* 45 : 256. Type-locality: Europe

*Material examined* : 3 ♂♂ 4 ♀♀, BBWLS, 22.10.2008, coll. B. Mitra

**DISCUSSION**

Of the 14 families recorded in this study, the family Syrphidae having the highest number of species (8) followed by Muscidae (4), Calliphoridae (4), Asilidae (3), Tephritidae (2) and Sarcophagidae (2). Rest of the families like Tipulidae, Tabanidae, Bombyliidae, Dolichopodidae, Platystomatidae, Sciomyzidae, Micropezidae and Stariomyidae each having single species.

Among the 14 families of Diptera , the syrphids are mostly saproxylic (which are wholly/ partially dependant on dead or decaying wood of managed or unmanaged ecosystems) in nature ( Mitra & Mehta, 2010). The muscids, calliphorids and sarcophgids are predominantly human associated group of insects. Therefore it can be said that the forest is good for saproxylic group of insects like syrphids and asilids but in the same time the presence of closely associated groups like muscids, calliphorids and sarcophgids indicate the sanctuary is under threat of human pressure.

**ACKNOWLEDGEMENTS**

We wish to express our thanks to Dr. K. Venkataraman, Director, Zoological Survey of India, for the necessary facilities and encouragement. We are very much obliged to Dr. T.K. Pal, Scientist-'F', and Incharge of Entomology A division, Z.S.I. Kolkata for giving us opportunity to study the materials.

**REFERENCES**

- Delfinado, M.D. and Hardy, D.E. 1973. (eds.). *A Catalog of Diptera of the Oriental Region*, 1 : 1- Univ. of Hawaii Press, Honolulu.
- Delfinado, M.D. and Hardy, D.E (1975). (eds.). *A Catalog of Diptera of the Oriental Region*. 2 : 1- Univ. of Hawaii Press, Honolulu.
- Delfinado, M.D. and Hardy, D.E. 1977. (eds.). *A Catalog of Diptera of the Oriental Region*. 3 : 1- Univ. of Hawaii Press, Honolulu.

- Mitra, B, Parui, P and Banerjee, D.2002 Diptera fauna of Balaram-Ambaji Wildlife and Jessore Sloth Bear sanctuaries, North Gujarat, India. *J. Interacademia*, **6** (4) : 498-511.
- Mitra, B, Parui, P, Banerjee, D and Sharma, R, M.2004. On a collection of Diptera from Kalatop- Khajjiar Wild life sanctuary, Himachal Pradesh. *Himalyan Chemical and Pharmaceutical Bulletin HCPB*. (20- 21) : 31-35
- Mitra, B., Parui, P., Ahmed, S., Mukherjee, S.P., Sur, S., and Sinha, P. 2006. A preliminary study on the dipteran pollinators of Jessore Sloth Bear and Balaram- Ambaji wildlife sanctuaries, North Gujarat. *Pb. Univ. Res. J (Sci)*, **56**: 145-148.
- Mitra, B., Parui, P. 2007. Insecta: Diptera , *In :Fauna of Bannerghata National Park, Conservation Area series*, **33**: 67-75. *Zool. Surv. India*.
- Mitra, B, and Parui, P. 2010. Dipteran insects from the Great Nicobar Biosphere Reserve. *BIONOTES*, **12**(2): 54-55
- Mitra, Bulganin and Mehta, H.S. 2010. A preliminary note on the conservation of Saproxyllic flies (Insecta: Diptera) in Himachal Pradesh. *Rec. zool. Surv. India*, **110** (3): 1-5