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True flies (Diptera: Insecta) diversity in the recently urbanized area of West Bengal, India

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Abstract

The present study was conducted at Salt Lake and Newtown, recently developed urbanized area adjacent to Kolkata Metropolitan city (North 24 parganas, West Bengal, India) during July, 2016 to June, 2017 once in a week, to document the dipteran diversity, their activities and role in ecosystem. Altogether, 53 insect species under 38 genera belonging to 17 families of the order Diptera were found in these urbanized areas at day time, out of them 10 species are under family Syrphidae, 9 species are under Muscidae and rest from the other families. So, numbers of species of the family Syrphidae were high. Peak activities of the insect were mainly observed from 8 am to 1 pm. Present work reveals the latest data of dipteran diversity at Newtown and Salt Lake City.

Keywords: Diptera, diversity, urban area, new town, salt lake city

1. Introduction

The name Diptera (True flies) originally assigned by Aristotle and was adopted by Linnaeus in 1744. It is one of the largest insect orders in the world next to Hymenoptera and includes many familiar insects such as mosquitoes, sand flies, house flies and blowflies etc. Many species of Diptera are important because they play crucial role in pollination, forensic identification, disease transmission (Mosquitoes and other dipteran vectors). But unfortunately, flies are an important but underappreciated part of our planet's biodiversity. The feeding habits of flies have profound impacts on ecosystems. Immature stages of majority of species are scavengers and contribute to the decomposition of organic material, which in turn, provides nutrients for plants, space for all organisms, and support for healthy ecosystems and clean environments. Some are predators, parasites or parasitoids or plant or fungus feeders. Each plays an important role in maintaining the balance among populations of organisms. Some are also blood sucker and disease vectors. Syrphid and non syrphid both flies play an important role in the pollination activities. They provide an essential ecosystem service, being responsible for 35% of global crop-based food production as pollinators (Klein *et al.*, 2007)^[11]. Nectar is one of the most important foods for majority of dipterans with respect to adult energetic requirements for flight in dispersing, finding mates, mating, and searching sites for oviposition (Larson *et al.*, 2001)^[13].

So far there has been no details record of the dipterans fauna of this study area except a PBR by West Bengal Biodiversity Board (WBBB). The first scientific information on the faunal diversity of the Salt Lake City was done by Seymour-Sewell in 1934^[23]. Some notable works on dipteran insects were done by Brunetti (1920 and 1923)^[2, 3], Ghosh and Dasgupta (1962)^[8], Sen and Dasgupta (1964)^[22], Joseph and Parui (1980)^[9]. Apart from these literatures, Dutta *et al.* (1997)^[5], Joseph & Parui (1997)^[10] etc. also contributed chapters where some insect faunal diversity were recorded from Salt Lake City in the State fauna series of West Bengal published by Zoological Survey of India, Kolkata. In a recent study in Madhya Pradesh, Mishra *et al.* (2004)^[15] reported 30 species of flies of various families from the flowers of *Zizyphus mauritiana*. Some latest notable works on the insect fauna of salt lake were done by Mitra *et al.* (2004 & 2005)^[19-20], Mitra *et al.* (2005)^[18], Mitra and Banerjee (2007)^[17], Ssymank *et al.* (2008)^[24], Mitra (2010)^[16], Ghosh & Chattopadhyay (2013)^[7], Roy *et al.* (2014)^[21], Das *et al.* (2014)^[4], Brintha *et al.* (2015)^[1], Maity *et al.* (2016)^[14], Kushwaha *et al.* (2017)^[12] that enriched the dipteran faunal studies of Kolkata. Now, the present physiography of the Salt Lake is completely changed due to rapid urbanization and different developmental works. Gayen *et al.* (2017)^[6] investigated Dipteran insect from the host plant *Zizyphus mauritiana* in and around New Town except that there is almost no work on dipteran diversity in New Town.

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The present study may provide the baseline data of the diversity of diptera from this area which definitely will help in future to study the impact of rapid urbanization in this developing city by the insect diversity and population. This

study will also reveal the importance of dipterans species in veterinary, forensic, medical and agricultural field.

2. Materials and Methods

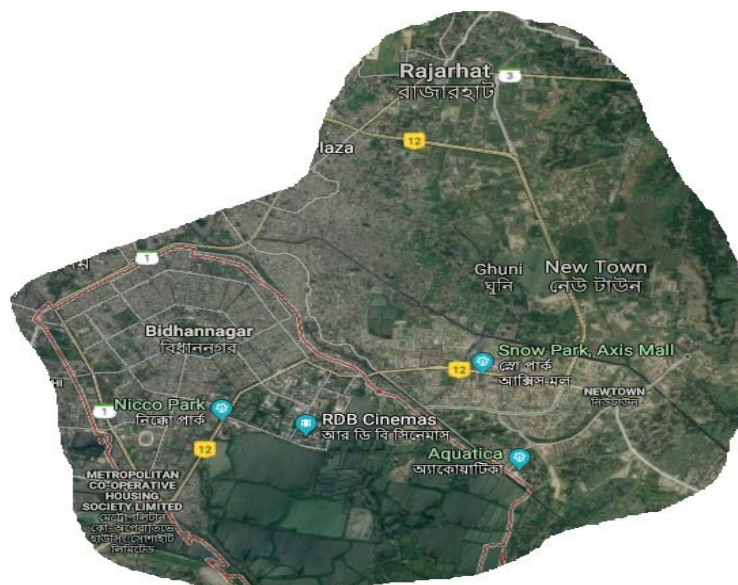


Fig 1: Map showing the study area and collection localities of dipteran insects

2.1 Study Area

Rajarhat consisting of Chinarpark, Kadampukur, Jatragachi, Mahisbathanetc in north 24 parganas is being considered at present as a fast growing planned satellite city in the name of New Town not only in West Bengal but also in India. It is quite close to well-developed Salt Lake City. Salt Lake City or Bidhannagar is a part of East Kolkata Wetland, is an advanced township adjacent to Kolkata. Salt Lake City (22.58° N, 088.42° E) is a well-planned satellite township lying in the eastern part of Kolkata in the district of North 24 parganas in the Indian state of West Bengal. New Town lies between latitude 22.5894°N and 88.4748°E. New Town is a neighbourhood to the north of Kolkata, West Bengal, India. The mean annual total rainfall of this region is 1,582 mm, with maximum and minimum average temperatures being 35.4°C and 13.8°C respectively.

2.2 Collection methodology

This survey was conducted in the Salt Lake City and New town areas including parks, markets, college campuses, wetlands, avenue plantations, bushes and other human inhabiting areas. The insects were collected with the help of insect net throughout the day (from 8am to 4pm) during the period of July, 2016 to June, 2017 once in a week. Methodology was followed after the hand book on collection, preservation and Identification published by Zoological Survey of India, Kolkata (Jonathan & Kulkarni, 1986). Identifications were made by the scientists of Zoological Survey of India, Kolkata.

3. Results

A total of 53 species represented by 38 genera of 17 families belonging to the order Diptera were reported from the study sites. The family Syrphidae was found to be the most dominant and represented by 10 species, followed by Muscidae (9), Sarcophagidae (5), Calliphoridae (4), Culicidae (3), Tabanidae (3), Tephritidae (3), Stratiomyidae (3),

Asilidae (3), Sepsidae (2), Rhiniidae (2), Limoniidae, Chironomidae, Sciaridae, Phoridae, Drosophilidae and Ulidiidae 1 species each.

Family culicidae

1. *Anopheles (Cellia) stephensi* Liston, 1901
Material examined: 3 exs., 18.ix.2016, Newtown.
2. *Anopheles (Cellia) culicifacies* Giles, 1901
Remarks: Reported by Maity *et al.* 2016.
3. *Culex (Culex) quinquefasciatus* Say, 1823
Material examined: 2 exs., 21.xi.2016, Newtown.

Family limoniidae

1. *Conosia irrorata* (Wiedemann, 1828)
Material examined: 2 exs., 11.iv.2017, Newtown.

Family chironomidae

1. *Clinotanytus vomerus* (Chaudhuri & Debnath)
Remarks: Reported by Maity *et al.* 2016.

Family sciaridae

1. *Sciara longipennis* Brunetti
Remarks: Reported by Gayen *et al.* 2017.

Family tabanidae

1. *Chrysops dispar* (Fabricius, 1798)
Remarks: Reported by Maity *et al.* 2016.
2. *Tabanus (Tabanus) striatus* Fabricius, 1787
Remarks: Reported by Maity *et al.* 2016.
3. *Tabanus (Tabanus) rubidus* Wiedemann, 1821
Remarks: Reported by Ghosh & Chattopadhyay, 2013.

Family syrphidae

1. *Sphaerophoria indiana* Bigot, 1884
Remarks: Reported by Maity *et al.* 2016.
2. *Mesembrius bengalensis* (Wiedemann, 1819)
Remarks: Reported by Ghosh & Chattopadhyay, 2013.

3. *Mesembrius quadrivittatus* (Wiedemann, 1819)
Remarks: Reported by Dutta *et al.*, 1997.
4. *Eristalinus (Eristalinus) polychromatus* (Brunetti, 1923)
Remarks: Reported by Maity *et al.* 2016.
5. *Episyrphus balteatus* (De Geer, 1776)
Remarks: Reported by Roy *et al.* 2014a.
6. *Eristalis tenax* (Linnaeus, 1758)
Remarks: Reported by Roy *et al.* 2014a.
7. *Eristalinus (Eristalinus) arvorum* (Fabricius, 1787)
Remarks: Reported by Gayen *et al.* 2017.
8. *Eristalinus (Eristalinus) quinquestriatus* (Fabricius)
Remarks: Reported by Gayen *et al.* 2017.
9. *Syritta indica* (Wiedemann, 1824)
Remarks: Reported by Roy *et al.* 2014a.
10. *Paragus serratus* (Fabricius, 1805)
Material examined: 3 exs., 17.iii.2017, Salt Lake.

Family phoridae

1. *Megaselia (Megaselia) scalaris* (Loew, 1866)
Remarks: Reported by Maity *et al.* 2016.

Family tephritidae

1. *Bactrocera (Bactrocera) dorsalis* (Hendel, 1912)
Remarks: Reported by Maity *et al.* 2016.
2. *Bactrocera (Zeugodacus) cucurbitae* (Coquillett, 1899)
Remarks: Reported by Roy *et al.* 2014a.
3. *Campiglossa cribellata* (Bezzi, 1913)
Remarks: Reported by Roy *et al.* 2014a.

Family sepsidae

1. *Sepsis indica* Wiedemann, 1824
Remarks: Reported by Maity *et al.* 2016.
2. *Australosepsis niveipennis* (Becker)
Remarks: Reported by Gayen *et al.* 2017.

Family drosophilidae

1. *Drosophila melanogaster* (Meigen 1830)
Remarks: Reported by Maity *et al.* 2016.

Family stratiomyidae

1. *Hermetia illucens* (Linnaeus, 1758)
Remarks: Reported by Roy *et al.* 2014a.
2. *Microchrysa flaviventris* (Wiedemann, 1824)
Remarks: Reported by Roy *et al.* 2014a.
3. *Sargas metallinus* (Fabricius)
Material examined: 1ex. 23.xii.2016, Newtown.

Family asilidae

1. *Philodicus femoralis* Ricardo, 1921
Remarks: Reported by Maity *et al.* 2016.
2. *Philodicus ceylanicus* Schiner, 1868
Remarks: Reported by Joseph and Parui, 1997.
3. *Astochia guptai* Joseph & Parui, 1981
Remarks: Reported by Joseph and Parui, 1997.

Family ulididae

1. *Physiphora aenea* (Fabricius)
Remarks: Reported by Gayen *et al.* 2017.

Family muscidae

1. *Atherigona (Atherigona) simplex* (Thomson, 1869)
Remarks: Reported by Maity *et al.* 2016.
2. *Musca domestica* Linnaeus, 1758
Remarks: Reported by Roy *et al.* 2014a.

3. *Musca ventrosa* Wiedemann, 1830
Remarks: Reported by Roy *et al.* 2014a.
4. *Musca (Byomya) sorbens* (Wiedemann)
Remarks: Reported by Gayen *et al.* 2017.
5. *Musca (Byomya) pattoni* (Austen)
Remarks: Reported by Gayen *et al.* 2017.
6. *Morellia hortensia* (Wiedemann)
Remarks: Reported by Gayen *et al.* 2017.
7. *Orthelia timorensis* (Robineau-Desvoidy)
Remarks: Reported by Ghosh & Chattopadhyay, 2013.
8. *Orthelia indica* (Robineau-Desvoidy)
Remarks: Reported by Roy *et al.* 2014a.
9. *Orthelia lauta* (Wiedemann)
Remarks: Reported by Roy *et al.* 2014a.

Family calliphoridae

1. *Chrysomya megacephala* (Fabricius, 1794)
Remarks: Reported by Roy *et al.* 2014a.
2. *Hemipyrellia ligurriens* (Wiedemann, 1830)
Remarks: Reported by Roy *et al.* 2014a.
3. *Lucilia porphyrina* (Walker, 1856)
Remarks: Reported by Roy *et al.* 2014a.
4. *Bengalia torosa* (Wiedemann, 1819)
Remarks: Reported by Maity *et al.* 2016.

Family rhiniidae

1. *Stomorhina discolor* (Fabricius, 1794)
Remarks: Reported by Roy *et al.* 2014a.
2. *Isomyia viridaurea* (Wiedemann, 1819)
Remarks: Reported by Roy *et al.* 2014a.

Family sarcophagidae

1. *Parasarcophaga albiceps* (Meigen)
Remarks: Reported by Roy *et al.* 2014a.
2. *Parasarcophaga (Liosarcophaga) dux* (Thomson)
Remarks: Reported by Roy *et al.* 2014a.
3. *Parasarcophaga (Pandelleisca) bainbriggei* (Senior White)
Remarks: Reported by Gayen *et al.* 2017.
4. *Iranihindia futilis* (Senior-White, 1924)
Remarks: Reported by Roy *et al.* 2014a.
5. *Parasarcophaga ruficornis* (Fabricius)
Material examined: 2 exs., 08.i.2017, Salt Lake.

4. Discussion

The present Study revealed total 53 dipteran species under 38 genera and 17 family. From the study area most abundance of dipteran family is Syrphidae (7 genera and 10 species) which is in agreement of previous works (Roy *et al.*, 2014, Maity *et al.*, 2017). Followed by, family Muscidae (4 genera 9 species), Sarcophagidae (2 genera 5 species), Calliphoridae (4 genera 4 species), Culicidae (2 genera 3 species), Tabanidae (2 genera 3 species), Tephritidae (2 genera 3 species), Stratiomyidae (3 genera 3 species), Asilidae (2 genera 3 species), Sepsidae (2 genera 2 species), Rhiniidae (2 genera 2 species), While the least abundant family were Limoniidae, Chironomidae, Sciaridae, Phoridae, Drosophilidae and Ulididae (1 genus and 1 species each). The abundance of Syrphidae shows that the study area possesses great abundance of pollinators. While Muscidae and sarcophagidae family shows that the area having a favourable habitat for scavengers because of lacks of processing of wasted materials created by the rapid urbanized locality. Dipterans from order Sarcophagidae, Phoridae, Ulididae, Muscidae etc. have

significant forensic importance. This work has to be continued for further investigation as many more species can be recorded from the study to know the importance and role of dipterans as pollinator and scavenger in the study area. It can be concluded with this comment that, the true flies of these areas are more diversified and this communication will be served as baseline data for future works on dipteran diversity and their ecosystem services.

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