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Research Paper

INSECT DIVERSITY (EXCEPT ODONATA AND LEPIDOPTERA) ASSESSMENT OF ECOPARK, AN URBAN PARK IN KOLKATA, WEST BENGAL, INDIA

Lina Chatterjee, Tarak Samanta, Arjan Basu Roy, Saswati Sinha and Sumana Besra

Nature Mates-Nature Club,
Kolkata, West Bengal,
India.

Abstract

Ecopark is a protected urban park of Kolkata West Bengal, having an area of approximately 480 acres. A total of 55 species of 53 genera under 38 families belonging to 10 orders (Blattodea, Coleoptera, Dermaptera, Diptera, Hemiptera, Hymenoptera, Isoptera, Mantodea, Orthoptera and Zygentoma) are reported in this present Survey. The survey was done at Ecopark, New Town, during a two-year period, from June 2020 to May 2022. Of these, Hymenoptera shares maximum species (14) with species, followed by Hemiptera with 11 species, Coleoptera with 10 species, Diptera with 7 species, Orthoptera with 6 species. Mantodea, Blattodea each with 2 species, and Dermaptera, Isoptera, Zygentoma each with 1 species. This presentation also provides an overview of the insect faunal diversity in West Bengal conservation areas and the guidance of further proposed study. As an outcome, it is always remarkable to study the biodiversity of urban parks in cities where the natural habitat mostly never been removed. This is the first analysis of the variety of insects in Ecopark. The analysis conducted in this study offers fundamental information about the insect diversity in an urban park in a metropolis city. However, there is still a lot of more research that must be done in the long run for the future but the results signified that, besides national park, sanctuary; urban parks in cities also play a crucial role in preserving biodiversity.

Key words: *Urban Parks, Insect diversity, Order, Hymenoptera*.

INTRODUCTION

Bigger vertebrates have received more attention due to climate change and threats to their habitats, while invertebrates are frequently ignored [1]. But Of all the fauna, insects are the most successful and diversified, and they are crucial to the healthiest ecosystems [2]. There are several variables that affect insect diversity and abundance,

including flower abundance, seed variety, plant structure, management, age, and environment [3]. In urban ecosystems, insects are essential for pollination, soil aeration, organic matter decomposition, and nutrient cycling [4].
In general, a decline in species richness is correlated with growing urbanisation [5]. There is evidence that insects are susceptible to change in urban settings like Habitat loss, fragmentation and land use changes [6]. Urban environments are recognized worldwide as hosts for creative strategies to preserve and increase biodiversity. Parks, one particular kind of urban green space, are significant biodiversity hotspots in urbanised habitats [7] [8]. Through citizen science initiatives and scientific education, insects may also be an effective tool for raising public awareness of nature and science [9] [10].

MATERIALS AND METHODS

Study area

The study was done at Ecopark (Figure 1), New Town, during a two-year period, from June 2020 to May 2022 (22.6031335 N 8.4671386 E). The park's 480 acres are made up of with many different microhabitat categories, including grassland, small forest with large trees, fruit trees, flower trees, vegetable plant, bushes, and shrubs. In one edges of the park, there is a small patch of marshland with cattail called as ‘hogla’ by locals. On the other side of the park there is a large freshwater lake with a surface area of around 104 acres. Beside that there are several man-made artificial water bodies at the park. In Kolkata, there are four distinct seasons: summer, monsoon, winter, and autumn. The yearly temperature ranges from 43°C to 9°C. On average, 1400mm of rain falls annually. Here, the soil profile is alluvial.

Identification of the Specimens

The data was taken from various area of the park everyday by observation. Use light trap method twice every three months in the evening for moths or other nocturnal insects. Each species was meticulously captured on camera or a mobile device. There were various methods applied for collecting the specimens such as hands plucking, beating, and sweeping. Capture nets, hand gulfs, small containers, and forceps this type of tools was also used to collect specimens for specimens such as hands plucking,

beating, and sweeping. The collected specimens were identified by the expert, with the help of published journal and books.

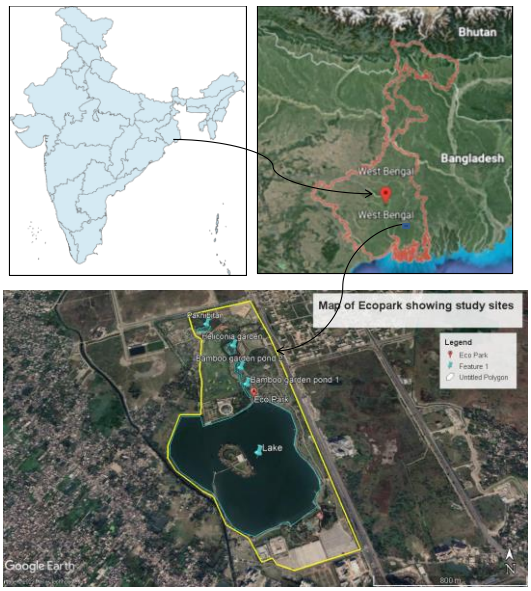

Figure 1: Map of the study area

RESULTS

Altogether, 55 species referring to 53 genuses under 38 families and 10 orders of insects were recorded from Ecopark, kolkata. Among of them, order Hymenoptera represented by 14 species (table:6) followed by Hemiptera with 11 species (table:5), Coleoptera with 10 species (table:2), Diptera with 7 species (table:4), Orthoptera with 6 species (table:9). Mantodea, Blattodea each with 2 species (table:1 and 8), and Dermaptera, Isoptera, Zygentoma each with 1 species (table:3,7 and 10). From the identified species , 38 families of insects reported from this urban park, order Hemiptera (20%) shared maximum families(22%) followed by Hymenoptera, Diptera (16%), Coleoptera (13%), Orthoptera (10%), Mantodea (5%), Isoptera , Zygentoma, Dermaptera, each (3%). (Figure 2) and the lowest number of families represented by order Blattodea (2%), considering the diversity in generic level, Hymenoptera has shared maximum genera (22%), followed by Hemiptera (21%), Coleoptera (19 %), Diptera (13%) and Orthoptera(11%), Mantodea, Blattodea each with 4% and Dermaptera, Isoptera, Zygentoma, Blattodea each with only 2%. (Figure 3) .Like the generic diversity, Hymenoptera is also more diversified in terms of species diversity and shared 25% of total species of this urban park, followed by Hemiptera (20%), Coleoptera (18%), Diptera (13%), Orthoptera (11%), Mantodea (4%), Blattodea (3%)and Dermaptera, Zygentoma, Isoptera each with only (2%) (Figure 4). Considering the number of species (family-wise) reported from this urban park, the maximum number of species is represented Apidae, Formicidae of the order Hymenoptera (4); followed by

Chrysomelidae, Cerambycidae of the order Coleoptera, Vespidae of the order Hymenoptera each 3; Blattidae of the order Blattodea, Coccinellidae of the order Coleoptera, Culicidae of the order Diptera, Acrididae, Gryllidae of the order Orthoptera each 2.Only single species was represented by twenty eight families, namely, Labiduridae of the order Dermaptera, Lampyridae, Meloidae of the order Coleoptera; Stratiomyidae, Calliphoridae, Muscidae ,Asilidae and Syrphidae of the order Diptera; Lygaeidae, Pyrrhocoridae, Aphrophoridae, Cicadellidae, Gerridae, Pseudococcidae, Alydidae, Membracidae, Scutelleridae, Fulgoridae, Coreidae of the order Hemiptera; Crabronidae, Ampulicidae, Sphecidae of the order Hymenoptera; Termitidae of the order Isoptera; Mantidae, Hymenopodidae of the order Mantodea; Pyrgomorphidae, Tettigoniidae of the order Orthoptera and Lepismatidae of the order Zygentoma (Figure 5).

Table1: List of Blattodea reported from Ecopark

SL NO.	Order	Family	Genus	Scientific Name
1	Blattodea	Blattidae	*Periplaneta*	*Periplaneta americana* (Linnaeus, 1758)
2	Blattodea	Blattidae	*Neostylopyga*	*Neostylopyga rhombifolia* (Stoll, 1813)

Table 2: List of Coleoptera reported from Ecopark

SL NO.	Order	Family	Genus	Scientific Name
1	Coleoptera	Lampyridae	*Abscondita*	*Abscondita anceyi* (E.Olivier, 1883)
2	Coleoptera	Coccinellidae	*Cheilomenes*	*Cheilomenes sexmaculata* (Fabricius, 1781)
3	Coleoptera	Coccinellidae	*Henosepilachna*	*Henosepilachna vigintioctopunctata* (Fabricius, 1775)
4	Coleoptera	Chrysomelidae	*Cassida*	*Cassida circumdata* (Herbst, 1799
5	Coleoptera	Chrysomelidae	*Aulacophora*	*Aulacophora indica* (Gmelin, 1790)
6	Coleoptera	Chrysomelidae	*Platycorynus*	*Platycorynus peregrinus* (Herbst, 1783)
7	Coleoptera	Cerambycidae	*Chlorophorus*	*Chlorophorus annularis* (Fabricius, 1787)
8	Coleoptera	Cerambycidae	*Batocera*	*Batocera rufomaculata* (Degeer, 1775)
9	Coleoptera	Cerambycidae	*Stromatium*	*Stromatium barbatum* (Fabricius, 1775)
10	Coleoptera	Meloidae	*Hycleus*	*Hycleus polymorphus* (Pallas, 1771)

Table 3: List of Dermaptera reported from Ecopark

SL.NO.	Order	Family	Genus	Scientific Name
1	Dermaptera	Labiduridae	*Nala*	*Nala lividipes* (Dufour, 1820)

Table 4: List of Diptera reported from Ecopark

SL.NO.	Order	Family	Genus	Scientific Name
1	Diptera	Stratiomyidae	*Hermetia*	*Hermetia illucens* (Linnaeus, 1758)
2	Diptera	Calliphoridae	*Chrysomya*	*Chrysomya megacephala* (Fabricius, 1794)
3	Diptera	Muscidae	*Musca*	*Musca domestica* Linnaeus, 1758
4	Diptera	Asilidae	*Clephydroneura*	*Clephydroneura* sp.
5	Diptera	Syrphidae	*Mesembrius*	*Mesembrius bengalensis* (Wiedemann, 1819)
6	Diptera	Culicidae	Aedes	*Aedes albopictus* (Skuse, 1895)
7	Diptera	Culicidae	Culex	*Culex quinquefasciatus* Say, 1823

Table 5: List of Hemiptera reported from Ecopark

SL.NO.	Order	Family	Genus	Scientific Name
1	Hemiptera	Lygaeidae	*Spilostethus*	*Spilostethus hospes* (Fabricius, 1794)
2	Hemiptera	Pyrrhocoridae	*Dysdercus*	*Dysdercus cingulatus* (Fabricius, 1775)
3	Hemiptera	Aphrophoridae	*Philaenus*	*Philaenus spumarius* (Linnaeus, 1758)
4	Hemiptera	Cicadellidae	*Nephotettix*	*Nephotettix* sp.
5	Hemiptera	Gerridae	*Limnogonus*	*Limnogonus* sp.
6	Hemiptera	Pseudococcidae	*Phenacoccus*	*Phenacoccus* sp.
7	Hemiptera	Alydidae	*Riptortus*	*Riptortus* sp.
8	Hemiptera	Membracidae	*Leptocentrus*	*Leptocentrus* sp.
9	Hemiptera	Scutelleridae	*Chrysocoris*	*Chrysocoris* sp.
10	Hemiptera	Fulgoridae	*Zanna*	*Zanna* sp.
11	Hemiptera	Coreidae	*Homoeocerus*	*Homoeocerus* sp.

Table 6: List of Hymenoptera reported from Ecopark

SL.NO.	Order	Family	Genus	Scientific Name
1	Hymenoptera	Apidae	*Apis*	*Apis dorsata* Fabricius, 1793
2	Hymenoptera	Apidae	*Apis*	*Apis florea* Fabricius, 1787
3	Hymenoptera	Apidae	*Apis*	*Apis cerana* Fabricius, 1793
4	Hymenoptera	Apidae	*Amegilla*	*Amegilla cingulata* (Fabricius, 1775)
5	Hymenoptera	Vespidae	*Vespa*	*Vespa tropica* Linnaeus, 1758
6	Hymenoptera	Vespidae	*Delta*	*Delta pyriforme* (Fabricius, 1775)
7	Hymenoptera	Vespidae	*Polistes*	*Polistes olivaceus* (Deg., 1773)
8	Hymenoptera	Crabronidae	*Liris*	*Liris* sp.
9	Hymenoptera	Ampulicidae	*Ampulex*	*Ampulex compressa* (Fabricius, 1781)
10	Hymenoptera	Sphecidae	*Chalybion*	*Chalybion bengalense* (Dahlbom, 1845)
11	Hymenoptera	Formicidae	*Oecophylla*	*Oecophylla smaragdina* (Fabricius, 1775)
12	Hymenoptera	Formicidae	*Camponotus*	*Camponotus compressus* (Fabricius 1787)
13	Hymenoptera	Formicidae	*Tetraponera*	*Tetraponera rufonigra* (Jerdon 1851)
14	Hymenoptera	Formicidae	*Solenopsis*	*Solenopsis geminata* (Fabricius, 1804)

Table 7: List of Isoptera reported from Ecopark

SL.NO.	Order	Family	Genus	Scientific Name
1	Isoptera	Termitidae	*Coptotermes*	*Odontotermes* sp.

Table 8: List of Mantodea reported from Ecopark

SL.NO.	Order	Family	Genus	Scientific Name
1	Mantodea	Mantidae	*Hierodula*	*Hierodula patellifera* Serville, 1839
2	Mantodea	Hymenopodidae	*Odontomantis*	*Odontomantis planiceps* Haan, 1842

Table 9: List of Orthoptera reported from Ecopark

SL.NO.	Order	Family	Genus	Scientific Name
1	Orthoptera	Acrididae	*Gesonula*	*Gesonula mundata* (Walker, 1870)
2	Orthoptera	Acrididae	*Trilophidia*	*Trilophidia annulata* (Thunberg, 1815)
3	Orthoptera	Gryllidae	*Gryllodes*	*Gryllodes sigillatus* (Walker, 1869)
4	Orthoptera	Gryllidae	*Acheta*	*Acheta domesticus* (Linnaeus, 1758)
5	Orthoptera	Pyrgomorphidae	*Atractomorpha*	*Atractomorpha crenulata* Fabricius, 1793
6	Orthoptera	Tettigoniidae	*Phaneroptera*	*Phaneroptera falcata* Poda, 1761

Table10: List of Zygentoma reported from Ecopark

SL.NO.	Order	Family	Genus	Scientific Name
1	Zygentoma	Lepismatidae	*Lepisma*	*Lepisma saccharinum* Linnaeus, 1758

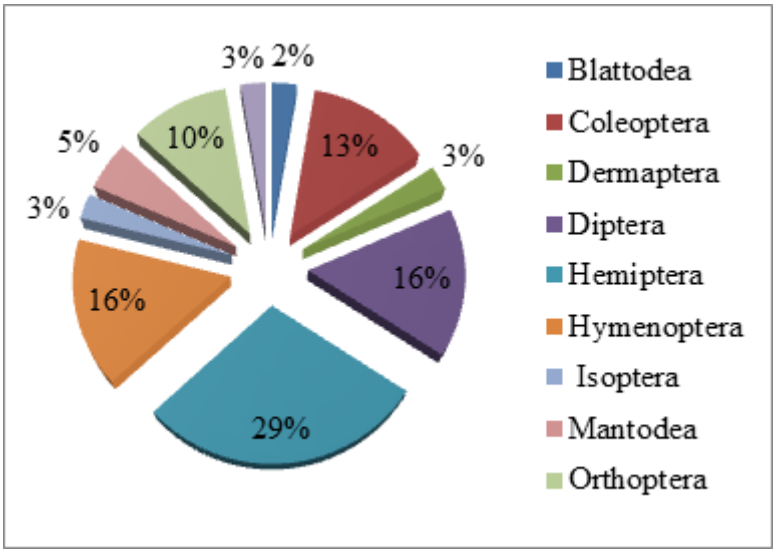

Fig 2: Percentage of family diversity in each order

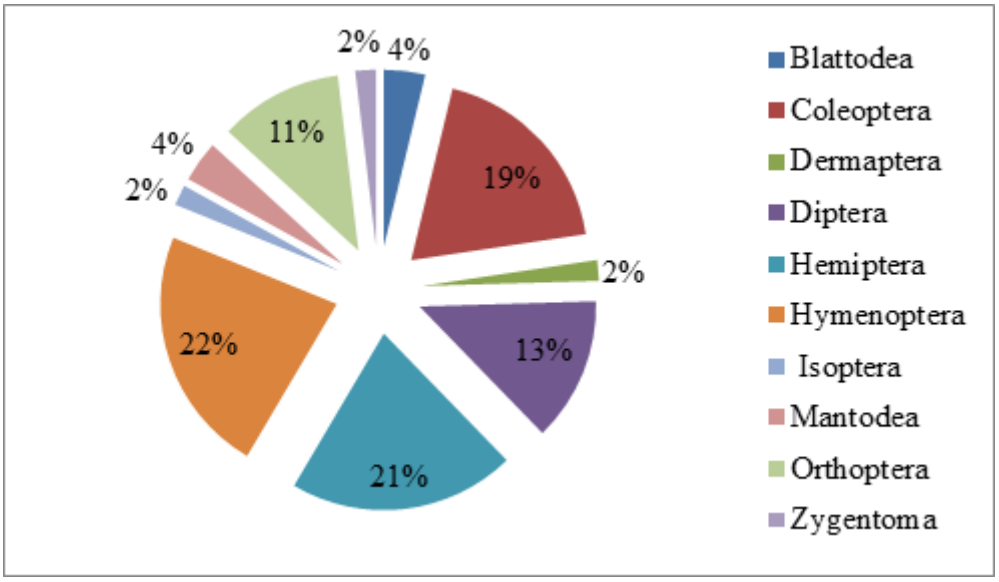

Figure 3: Percentage of generic diversity in each order

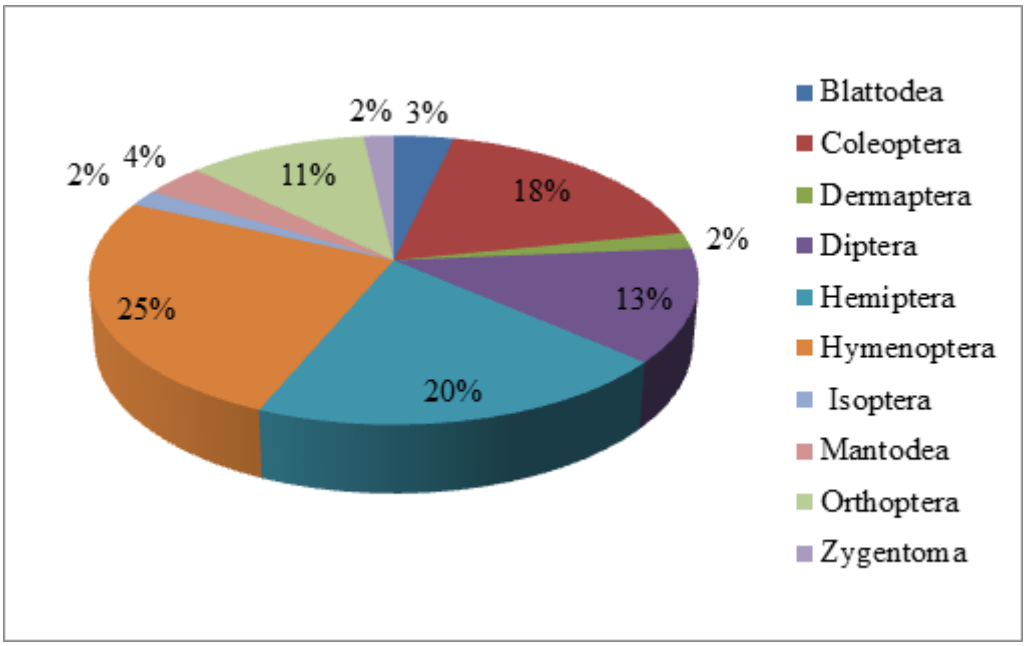

Figure 4: Percentage of species diversity in each order

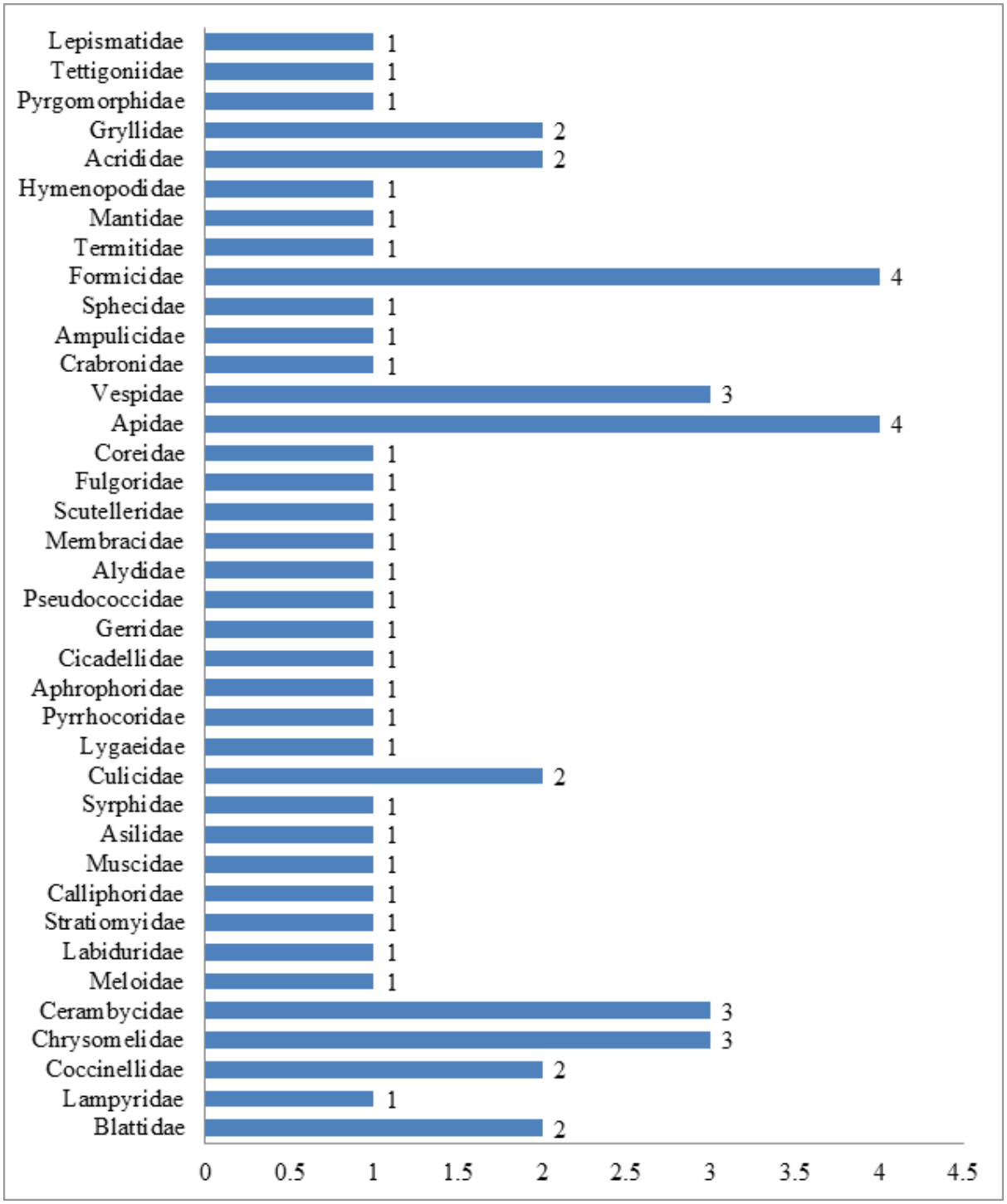

Figure 5: Number of species (Family-wise) in Ecopark

DISCUSSION

According to a baseline study, more than 300 floral species are present in this urban park's natural environment. The presence of over 300 floral species in this 480 acres protected areas with 104 acres water body indicated a potentially diverse insect population. A total of 55 species of insects belonging to 53 genera, 38 families, and 10 orders support the aforementioned perspective. In this study, the order Hymenoptera is discovered to be the most dominant group of insects in terms of generic and species diversity order with highest number

of families. Hymenoptera are commonly used as ecological biomarkers of ecosystem health. Hymenoptera are mostly pollinators and phytophagous creatures. There is a butterfly garden created in this urban park, which provide the existence of ideal habitats for Lepidoptera, on the other hands it also provides the food for Hymenoptera such as wild flower plant for nectar. Majority of Hymenoptera species depend on their wild flower plants. That's why the number of Hymenoptera diversity is increase the in this urban park. Hemiptera are well recognized for being plant-dwelling insects and they can be found in all vegetation strata. The presence of diverse plant species frequently influences the assemblages of herbivorous hemipterans. After the order Hymenoptera, they are the second most prominent group in this urban park. This indicates that there are sustenance plants and a diverse collection of floral diversity is present this area. The reported species of the Order Coleoptera are mostly phytophagous, Plant-dwellers which is followed by Hemiptera. Here, the variety of Diptera is also reported. Some dipterans are visitors or pollinators of plants; some significant species are act like predators or pests. Several families of this order, such the Muscidae, Calliphoridae and Sarcophagidae, have nurtured attachment with human habitations and people. Therefore, their availability indicates the human interference in this urban park. The reported Orthoptera are mostly Grassland preferable insect. Some of them are crop- plant eater. Some of them are ground dweller. The remaining orders of the reported species namely Blattodea, Dermaptera, Isoptera, Mantodea, Zygentoma also indicate the rich ground biodiversity, plant diversity, human interaction in this urban park.

CONCLUSION

Ecopark is one of the protected urban parks in Kolkata, West Bengal. Urban parks, specifically natural evergreen wilderness, are the main repository for biodiversity in a city because they usually provide several floral species of various ages, classes, canopies, undergrowth and overgrowth vegetation. As an outcome, it is always remarkable to study the biodiversity of urban parks in cities where the natural habitat mostly never been removed. This is the first analysis of the variety of insects in Ecopark. The analysis conducted in this study offers fundamental information about the insect diversity in an urban park in a metropolis city. However, there is still a lot of more research that must be done in the long run for the future but the results signified that, besides national park, sanctuary; urban parks in cities also play a crucial role in preserving biodiversity.

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