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Butterfly Richness of Rammohan College, Kolkata, India: An Approach towards Environmental Audit

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Abstract: ***The importance of biological diversity in influencing the sustainability of development efforts as well as local and global environmental changes is now more widely recognized. However, only a small number of West Bengal's major cities have investigated invertebrates in-depth, particularly butterflies. It can be used as a tool for management and conservation choices involving butterflies. As a result, it is imperative to compile a database or checklist of the variety of butterflies found throughout our country, especially in our state of West Bengal. Institutional campuses with undisturbed natural flora and seasonal flowering plantations provide suitable habitat for butterfly populations since they are frequently free of any development operations and pollutants. In Rammohan College campus 21 species of butterflies belonging to four families, 8 subfamilies were found more or less throughout the year.***

Keywords: Butterfly, Rammohan College, Environment Audit, Biodiversity

I. INTRODUCTION

Among the many different insect societies, butterflies are the most alluring. From tiny jewel-like blues to stunning bird-like wings with a wing spread as much as 8 inches, their sizes range. The eyes are drawn to and mesmerized by their radiant colours and subtle flickering movements. Worldwide, there are 17,200 different species of butterflies (Kunte, 2000). India boasts 1501 species of butterflies, including 107 Papilionids (swallowtails), 109 Pierids (whites and yellows), 521 Nymphalids (brush-footed butterflies), 443 Lycaenids (blues), and 321 Hesperids (skippers), making it one of the richest and most diversified butterfly faunas in the world (Gaonkar, 1996; Kunte, 1997). The climate and geography of the area are two elements that affect species diversity (Collins and Morris, 1985; Boggs, 1986; Dennis, 2000).

Because of their pollination efforts, butterflies are a crucial component of the ecology (Daily, 1997; Scoble, 1992). Additionally, due to their sensitivity to climatic and environmental changes, they are regarded as effective ecological indicators (Lawton, 1998; Venkataramana, 2010). The characteristics that make these species so-called "bio-indicators of the area" include their great sensitivity to environmental changes, the relative ease with which they may be seen and knowledge of their natural history.

According to several studies (Blair and Launer, 1997; Stefanscue et al., 2004; Clark et al., 2007; Pocewicz et al., 2009), the richness, diversity, and abundance of butterfly species decline as urban elements such as roads, buildings and lawns increase. Natural biodiversity suffers as a result of the quantity and quality of natural habitat being reduced as a result of urban development (Malagrino et al., 2008). The replacement or reduction of natural and semi-natural habitats by buildings and other concrete constructions is likely to have a negative effect on butterfly populations. Additionally, it is anticipated that different types of pollution will have a negative impact on the quality of residual habitats (Pollard and Yates, 1993). In addition to habitat degradation, extensive insecticide usage has significantly decreased the quantity of butterflies. One can no longer take for granted the butterfly clouds that used to pass by as one wandered through untamed areas.

Presently it is more widely acknowledged that biological diversity is a crucial factor in determining the sustainability of development efforts as well as local and global environmental changes (Samal, 2021). However, few metropolitan areas in West Bengal have undergone a comprehensive study of invertebrates, particularly butterflies. It is useful as a tool for making decisions related to butterfly management and conservation. As a result, it is crucial to create a zone-by-zone database or checklist of the diversity of butterflies in our nation, particularly in our state of West Bengal (Chowdhury and Das, 2007; Chowdhury and Soren, 2011; Dennis and Williams, 1986).

As they are often free of any development operations and pollution, institutional campuses with undisturbed natural vegetation and seasonal flowering plantations offer potential habitat for butterfly populations (Nair et al., 2014; Tiple, 2012). Between 2016 and 2022, a preliminary assessment and recording of Rammohan College's butterfly variety was done.

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II. MATERIALS AND METHODS

Rammohan College is located in the heart of the city of Kolkata, West Bengal, India. This area is approximately 300 years old and highly urbanized with little or almost no greenery (22.582952ºN & 88.370997ºE). The college has got a small garden, where butterflies frequently visit and sometimes complete their life cycle. The survey has been carried out for a period of six years (10/12/2016 –13/12/2022), in college working days, October to February, the post monsoon season when maximum greenery is available in the campus. The roads inside the college campus were used as fixed transects. Weekly observations were carried out during morning hours (08:00 hrs to 10:00 hrs) and butterflies were recorded based on direct sighting. Some small butterflies were caught using butterfly net and were observed closely after placing them in clear glass container. Then they were released to the same habitat from where they were captured. Photographs of butterfly species in natural habitats were also taken for further references. Later the butterflies were identified from photographs by using standard literatures (Evans, 1932; Wynter-Blyth, 1957; Roy *et al*, 2007, Kehmikar, 2008). Butterflies were broadly categorized into four groups namely – abundant, common, uncommon and rare based on their sighting records and relative abundance (Rajasekhar, 1995).

III. RESULT

Table I: Butterflies found in Rammohan College campus are listed below with their predicted population trend calculated from collected sample of six years.

Species		Common Name	Population Trend
I. Family: Papilionidae			
a. Sub-family: Papilioninae			
1	*Graphium agamemnon (*Linnaeus)	Tailed Jay	Uncommon
2	*Papilio polytes* Linnaeus	Common Mormon	Abundant
3	*Atrophaneura aristolochiae* (Fabricius)	Common Rose	Decreasing
II. Family: Pieridae			
a. Sub-family: Coliadinae			
4	*Eurema hecabe* (Linnaeus)	Common Grass Yellow	Abundant
5	*Catopsilia pyranthe* (Linnaeus)	Mottled Emigrant	Uncommon
b. Sub-family: Pierinae			
6	*Cepora nerissa* (Fabricius)	Common Gull	Common
7	*Appias libythea* (Fabricius)	Striped Albatross	Common
8	*Leptosia nina* (Fabricius)	Psyche	Abundant
III. Family: Nymphalidae			
a. Sub-family: Danainae			
9	*Danaus chrysippus* (Linnaeus)	Plain Tiger	Common
10	*Euploea core* (Cramer)	Common Crow	Decreasing
b. Sub-family: Satyrinae			
11	*Melanitis leda* (Linnaeus)	Common Evening Brown	Decreasing
12	*Mycalesis perseus* (Fabricius)	Common Bushbrown	Uncommon
13	*Ypthima huebneri* Kirby	Common Four-ring	Uncommon
e. Sub-family: Biblidinae			
14	*Ariadne ariadne* (Linnaeus)	Angled Castor	Decreasing
15	*Ariadne merione* (Cramer)	Common Castor	Decreasing
f. Sub-family: Nymphalinae			
16	*Junonia atlites* (Linnaeus)	Grey Pansy	Common
17	*Tarucus nara* Kollar	Rounded Pierrot	Common
18	*Zizeeria karsandra* (Moore)	Dark Grass Blue	Abundant
19	*Euchrysops cnejus* (Fabricius)	Gram Blue	Decreasing
20	*Chilades lajus* (Stoll)	Lime Blue	Uncommon
IV. Family: Hesperiidae			
a. Sub-family: Hesperiinae			
21	*Borbo cinnara* (Wallace)	Rice Swift	Decreasing

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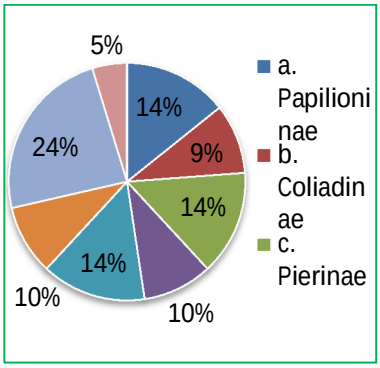
IV. STATISTICAL ANALYSIS

We have taken the data from 10/12/16 to 13/12/22 in the campus of Rammohan College. The species are distributed in 4 families viz. Papilionidae contain 3 species, Pieridae contain 5 species, Nymphalidae contain 12 species, and Hesperiidae contain single species (Pie chart-1). Under these 4 families Papilionidae and Hesperiidae contain single sub-family. The family Pieridae contain 2 sub-family (Pie chart-2) and family Nymphalidae contain 4 sub-families (Pie chart-3). We have also compared the comparative species distribution of different sub-families (Pie chart-4)

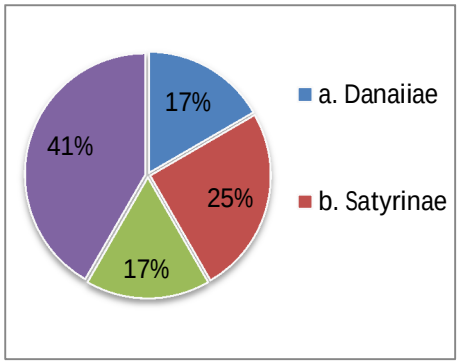
Sub-families	No. of species
Papilioninae	3
Coliadinae	2
Pierinae	3
Danainae	2
Satyrinae	3
Biblidinae	2
Nymphalinae	5
Hesperiinae	1

Species distribution under different families. Species distribution under family: Pieridae

(Pie chart – 1)

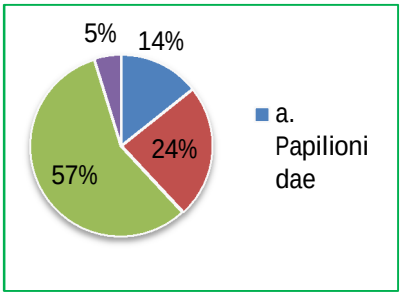


(Pie chart – 2)

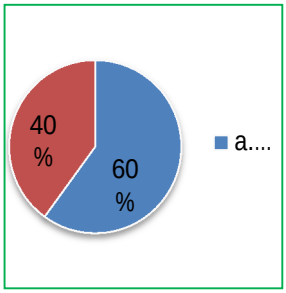


Species distribution under family:Nymphalidae. Species distribution under different sub families

(Pie chart – 3)



(Pie chart – 4)



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V. DISCUSSION

Recent studies have highlighted the importance of institutional campuses as a preferred habitat for butterflies (Kurve and Pejavar, 2004). Among the insects, butterflies occupy a vital position in the ecosystem and their occurrence and diversity are considered as good indicators of the health of any given terrestrial biotope (Aluri and Rao, 2002; Thomas, 2005). In Rammohan College campus 21 species of butterflies belonging to four families, 8 subfamilies were found more or less throughout the year. Maximum number (17species) were observed in the month of December, 2021. Least number of (4 species) were found in the month of February (2022). Highest number of species (04) were observed under sub-family Nymphalinae of Family Nymphalidae. Longest duration of butterfly was observed in case of *Zizeeria karsandra* (November to February). Least frequent butterfly is *Mycalesis perseus* (December only). They reflect a healthy ecosystem patch in the heart of the city. If the landscaping and maintenance of any college campus gardens are carefully planned, the diversity of butterflies may increase in the college campus providing a rich ground for butterfly conservation as well as for research (Dasgupta, 2014). Creating habitats for butterflies would help in conserving not only butterflies but also other insects, birds and small mammals. From the conservation point of view, some butterflies play a very important role as an ecological indicator and vital role of plant propagation as vectors of cross-pollination. Therefore, further research on the biodiversity of butterflies with special reference to their host plants and other factor(s) that contribute to their distribution, diversity and abundance may be investigated in future.

VI. ACKNOWLEDGMENT

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*Graphium agamemnon (*Linnaeus)



Papilio polytes Linnaeus



Atrophaneura aristolochiae (Fabricius)



Eurema hecabe (Linnaeus)



Catopsilia pyranthe (Linnaeus)



Cepora nerissa (Fabricius)



Appias libythea (Fabricius)

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Leptosia nina (Fabricius)



Danaus chrysippus (Linnaeus)



Euploea core (Cramer)



Melanitis leda (Linnaeus)



Mycalesis perseus (Fabricius)



Ypthima huebneri Kirby



Ariadne ariadne (Linnaeus)



Ariadne merione (Cramer)



Junonia atlites (Linnaeus)



Tarucus nara Kollar



Zizeeria karsandra (Moore)



Euchrysops cnejus (Fabricius)

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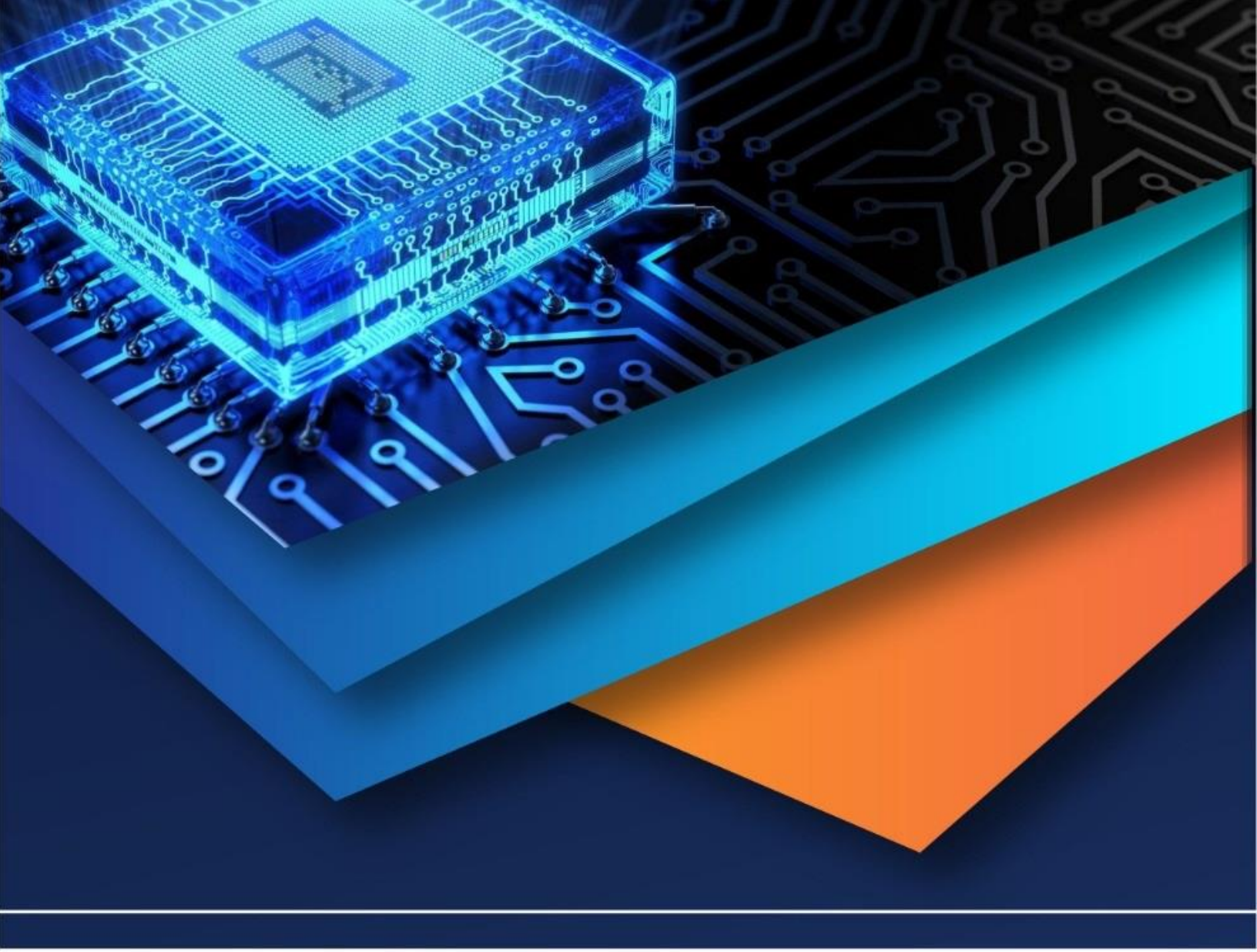
Chilades lajus (Stoll)



Borbo cinnara (Wallace)

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