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Pioneer checklist on Butterflies from Maharani's Science College Campus, Mysuru, Karnataka

K S Raghunandan[a*], Prajna Angeline D'Souza[a], Ramya M C[a], K S Prasanna[b]
[a] PG Department of Applied Zoology, Maharani's Science College for Women, Autonomous, Mysuru, Karnataka, India
[b] Principal, Department of Zoology, Government Science College, Autonomous, Hassan, Karnataka, India
***Corresponding Author:** *dorsraghu@gmail.com*

Abstract
The field study was conducted during August, 2023 to July, 2024 by following standard methods to record butterflies at Maharani's Science College campus, Mysuru, Karnataka. A total of 44 species of butterflies belonging to 32 genera and 05 families namely Hesperiidae, Lycaenidae, Nymphalidae, Papilionidae and Pieridae were recorded. Family Nymphalidae (36.4%) was found abundant and family Hesperiidae (7.8%) was found least abundant among all. The Shannon diversity index value (H^1= 2.469) has shown that there exist a moderate diversity of butterfly species distribution at the study area during this period. Interestingly, Karnataka state butterfly, Southern Bird wing (*Triodes minos* Cramer), endemic to peninsular India was encountered representing supportive host and larval plant species for many more such butterfly species at the campus. Thus, this pioneer study may provide a baseline data for the study on butterflies and to analyze biodiversity in future.

Keywords: Butterflies, Nymphalidae, *Triodes minos* Cramer, Shannon diverstiy index, Maharani's Science College, Mysuru

Introduction

Butterflies belonging to order Lepidoptera and Class Insecta have drawn enormous attention throughout the world (Ghazoul, 2002) [7]. Being the tantalizing and beautiful creatures, they are known for its art and beauty of nature (Pandey and Tamboli, 2022) [11]. These are of large economic, aesthetic and biological values (Rajagopal *et al*., 2011) [14] and their presence in the ecosystem influences many other coexisting life forms as they play an important role in an ecological habitat (Santhosh and Basavarajappa, 2015) [17]. Butterflies being the *'flagship species'* (Williams, 1927) [20] serves as the *'keystone pollinators'* and acts as *'bioindicators'* of terrestrial biotopes with specific habitat and distribution seasonally (Kunte, 2000) [10]. They are extremely sensitive to minor environmental changes (Pollard, 1977) [12] and acts as an excellent marker of the health of ecosystem. The conservation of butterfly diversity is achievable by the enhancement of vegetation in habitats specifically preferred by butterflies (Bhatt and Nagar, 2017) [3].

So far, research on butterflies suggests that there are more than 19,238 species of butterflies recorded in the world (*http: www.elibrary. tucl. edu.np*) except in Arctic and Antartic regions. Whereas, India accounts about 1,504 butterfly species and Karnataka state harbors about 318 species of Butterflies (Chethan and Raghunandan, 2021) [4] and 334 species of butterflies from Western Ghats (Gaonkar, 1996 and Kasambe, 2008) [6, 15]. However, many species of butterflies are experiencing constraints due to their habitat loss, including other anthropogenic activities both in rural and urban areas (Bhagya and Basavarajappa, 2024) [2]. Thus, to manage and conserve these butterfly species, it is a high time to have a comprehensive understanding to note on their diversity and distribution. Despite the understanding on butterflies significance at the study area and no scientific reports available regarding their occurrence from Maharani's Science college campus, Mysuru so far, a pioneer study was attempted to document on checklist of butterfly fauna and to note on its diversity.

Materials and Methodology

Fig 1: Map showing aerial view of the study area at Mysuru

The study area, Maharani's Science College for Women (Government Science First Grade College, Autonomous) Mysuru (12^0 18^1 38^{11} N Longitude & 76^0 38^1 32^{11} E Latitude at an elevation of 800.12msl) established by the Queen Regent of Mysore, Kempa Nanjammani Vani Vilasa Sannidhana the mother of Krishna Raja Wadiyar IV during 1917. The field survey was carried out during August, 2023 to July, 2024 on fortnightly basis by following Direct Visual Observation Method (DVOM) and Pollard Walk Method (PWM) (Pollard and Yates, 1977) [16] to record butterflies in the campus. The campus experiencing moderate temperature and rainfall, offering diverse flora supporting for butterfly existence. Identification of recorded butterfly species was through taxonomic field guides (Kehimkar, 2008) [9] & website (*www.ifoundbutterflies.org*) and through captured photographs using *iphone 13.0*. The recorded butterflies were further grouped into 'Common' and 'Rare' categories based on their count from the study area (Shreekrupa and Raghunandan, 2020) [19]. The data was analyzed using MS-EXCEL programme and PAST software (*ver. 6.02*).

Results and Discussion

The pioneer checklist on butterfly species recorded at Maharani's Science College campus, Mysuru during 2023 – 24 is represented in Table 1. Total of 44 Butterfly species belonging 32 Genera representing 5 different families namely Nymphalidae (16 species), Pieridae (12 species), Papilionidae (07 species), Lycaenidae (06 species) and Hesperiidae (03 species) were recorded. Schedule butterfly species as per Indian Wildlife Protection Act, 1972 *viz*., *Euploea core* Cramer (Schedule I), *Cepora nerissa* Moore (Schedule II) and *Pachliopta hector* Linnaeus (Schedule IV) was documented during the study. Interestingly, the state butterfly of Karnataka, Southern bird wing - *Triodes minos* Cramer, endemic to peninsular India was encountered at the campus (Table 1). Figure 2 shows the graphical representation of recorded butterflies relative abundance, Genera and species during the study. Accordingly, highest relative abundance was recorded from family Nymphalidae (36.4%), followed by families Pieridae (26.0%), Lycaenidae (15.6%), Papilionidae (14.3%) and least from Hesperiidae (7.8%) family respectievely. However, Genera and Species wise contribution of the observed butterflies it was highest in family Nymphalidae i.e., 36.4% each, followed by 24.2%, 18.2%, 12.1% and 9.1% Genera from families Pieridae, Lycanediae, Papilionidae and Hesperiidae respectievely. Whereas species wise, family Pieridae contributes (27.3%), Papilionidae (15.9%), Lycaenidae (13.6%) and Hesperiidae (6.8%).

Further, based on the butterflies counted during the study these were further grouped into Common (66%) and Rare (34%) categories (Figure 3). The Biodiversity indices were calculated for the recorded butterfly species using PAST software. The Shannon diversity index value of $H^1 = 2.469$ represents the study area is distributed with moderate butterfly species. The values of other indices *viz*., Simpson reciprocal (0.844), Brillouin (2.691), Menhinick (0.873) was depicted in Figure 4.

Thus, the existence of these butterfly species in particular, impact that the campus offers congenial environmental conditions with diverse flora, especially larval and host plant species to many such pollinators in general. Our results are in good agreement with the findings of Chethan and Raghunandan (2021) [4], Bhagya and Basavarajappa (2023) [1], Harisha, (2015) [8], Dayananda (2014) [5], Gowda *et al*., (2011) [13], Sarjan *et al*., (2014) [18], who have studied on various aspects on butterflies from different areas at Mysuru and elsewhere.

Table 1: Checklist of Butterflies recorded at Maharani's Science College Campus, Mysuru (2023 – 24)

Sl. No.	Butterflies				
	Family	Sl. No.	Common Name	Scientific Name	Occurrence
1.	Nymphalidae (16 Species)	1.	Blue tiger	*Tirumala limniace* Cramer	C
		2.	Chocolate pansy	*Junonia iphita* Cramer	R
		3.	Common bush brown	*Mycalesis perseus* Fabricius	C
		4.	Common castor	*Ariadne merione* Cramer	C
		5.	Common Crow	*Euploea core* Cramer***	C
		6.	Common evening brown	*Melanitis leda* Linnaeus	C
		7.	Common four-ring	*Ypthima huebneri* Kirby	C
		8.	Common leopard	*Phalanta phalanta* Drury	R
		9.	Common sailor	*Neptis hylas* Linnaeus	C
		10.	Danaid Eggfly	*Hypolimnas misippus* Linnaeus	C
		11.	Great Eggfly	*Hypolimnas bolina* Linnaeus	C
		12.	Grey Pansy	*Junonia atlites* Linnaeus	R
		13.	Lemon pansy	*Junonia lemonias* Linnaeus	R
		14.	Plain Tiger	*Danaus chrysippus* Linnaeus	C
		15.	Striped tiger	*Danaus genutia* Cramer	C
		16.	Tawny Coster	*Acraea terpsicore* Linnaeus	R
2.	Pieridae (12 species)	17.	Blue Wanderer	*Tirumala hamata* Macleay	R
		18.	Common albatross	*Appias albina Boiduval*	C
		19.	Common emigrant	*Catopsilia pomona* Fabricius	C
		20.	Common grass yellow	*Eurema hecabe* Linneaus	C
		21.	Common gull	*Cepora nerissa* Moore**	R
		22.	Common Jezebel	*Delias eucharis* Drury	C
		23.	Mottled emigrant	*Catopsilia pyranthe* Linnaeus	C
		24.	Psyche	*Leptosia nina* Fabricius	R
		25.	Small grass yellow	*Eurema brigitta* Stoll	C
		26.	Spotless grass yellow	*Eurema laeta* Boisduval	C
		27.	Three spot grass yellow	*Eurema blanda* Boisduval	C
		28.	Yellow orange tip	*Ixias pyrene* Butler	R
3.	Papilionidae (07 Species)	29.	Blue Mormon	*Papilio polymnester* Cramer	R
		30.	Common Mormon	*Papilio polytes* Evans	C
		31.	Common rose	*Pachliopta aristolochiae* Moore	C
		32.	Crimson rose	*Pachliopta hector* Linnaeus*	C
		33.	Lime butterfly	*Papilio demoleus* Linnaeus	C
		34.	Southern Birdwing	*Triodes minos* Cramer****	R
		35.	Tailed jay	*Graphium agamemnon* Evans	C
4.	Lycaenidae (06 Species)	36.	Common Pierrot	*Castalius rosimon* Fabricius	C
		37.	Common cerulean	*Jamides celeno* Cramer	C
		38.	Lesser grass blue	*Zizina otis* Fabricius	C
		39.	Pale grass blue	*Pseudozizeeria maha* Kollar	C
		40.	Plains cupid	*Luthrodes pandava* Horsfield	C
		41.	Red pier rot	*Talicada nyseus* Khasiana Swinhoe	R
5.	Hesperiidae (03 Species)	42.	Common banded awl	*Hasora chromus* Cramer	R
		43.	Indian Skipper	*Spialia galba* Fabricius	R
		44.	Small branded swift	*Pelopidas mathias* Fabricius	R

Note: * = Schedule I; ** = Schedule II *** = Schedule IV as per Indian Wildlife Protection Act, 1972), **** = Karnataka State Butterfly; C = Common and R = Rare.

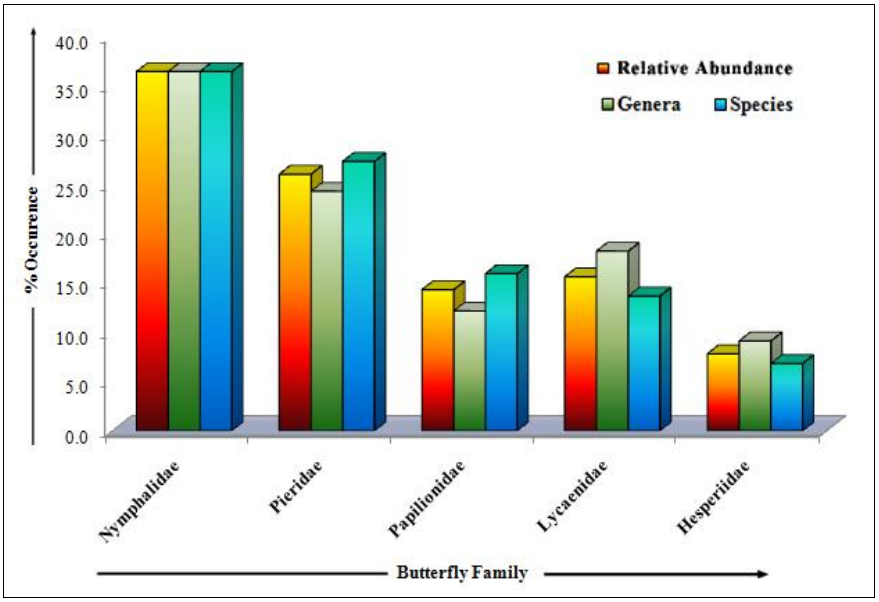


Fig 2: Relative abundance of butterfly family, Genera and Species recorded at Maharani's Science College campus, Mysuru

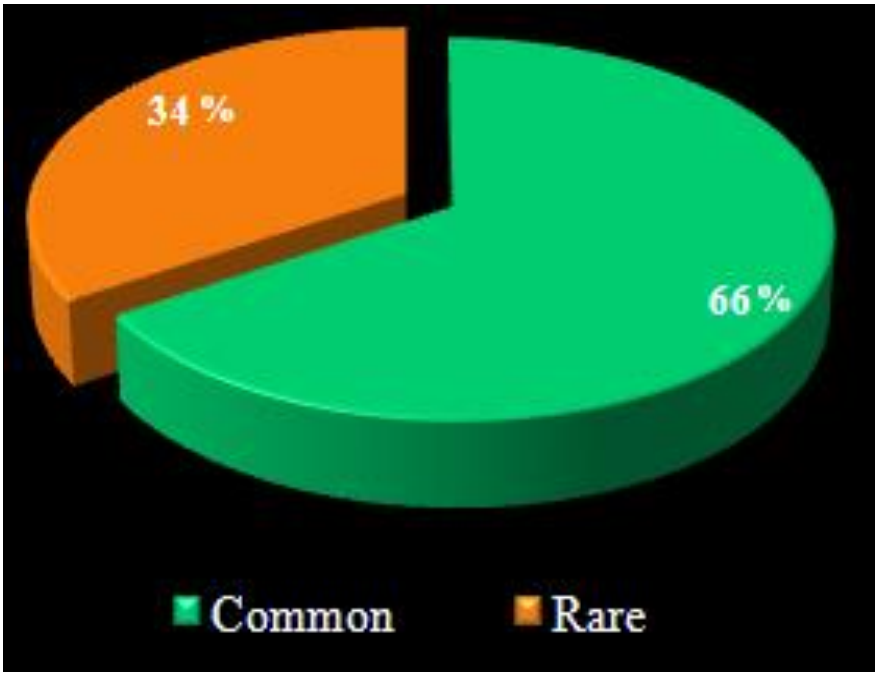
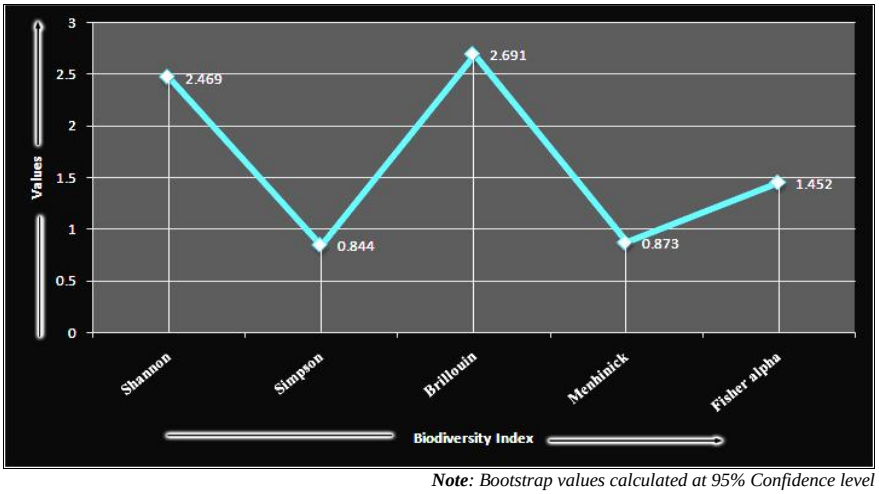


Fig 3: Percent occurrence of status of butterflies recorded at Maharani's Science College campus, Mysuru



***Note**: Bootstrap values calculated at 95% Confidence level*

Fig 4: Biodiversity indices for butterfly species recorded at Maharani's Science College Campus, Mysuru

Plate 1. Photographs of few butterfly species documented at Maharani's Science College Campus, Mysore

1. *Euploea core* Cramer; 2. *Phalanta phalanta* Drury; 3. *Hypolimnas bolina* Linnaeus; 4. *Junonia lemonias* Linnaeus; 5. *Catopsilia pomona* Fabricius 6. *Papilio polymnester* Cramer; 7. *Papilio polytes* Evans; 8. *Jamides celeno Cramer*; 9. *Luthrodes pandava* Horsfield & 10. *Pelopidas mathias* Fabricius

Conclusion

Total of 44 species of butterflies belonging to 5 families were recorded at Maharani's Science College campus, Mysuru. The butterfly species *viz.*, *Euploea core* Cramer (Schedule I), *Cepora nerissa* Moore (Schedule II) and *Pachliopta hector* Linnaeus (Schedule IV) was documented during the study which were Scheduled species as per Indian Wildlife Protection Act, 1972 and the state butterfly of Karnataka, (Southern bird wing) *Triodes minos* Cramer, endemic to peninsular India was reported first time from the campus. Thus, the present scientific study instigates further indepth research on various aspects of butterflies and may be helpful to assess biodiversity at the campus in future.

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