



## **Studies on the Diversity of Butterfly fauna in and around Kolli Hills, Namakkal district, Tamilnadu**

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### **Abstract**

Lepidoptera are second largest order of arthropods and making them particularly useful for biodiversity surveys. A lush patch of forest and vegetation land is situated in the Eastern Ghats of Kolli Hills Namakkal District. Butterflies were collected for five months survey recorded from December 2016 to April 2017. The specimens collected were analyzed to study the general population trend and the guild structure. The 46 butterflies species in 22 genera belonging to 4 families clearly indicate a high diversity of butterflies distributed in the study field. Of these, Nymphalidae was the dominant family with 17 species. The butterflies collected during the study were classified into different study sites in Kolli hills.

**Keywords:** Butterfly, Kolli Hills, Population, Eastern Ghats, Guild.

### **Introduction**

Biodiversity is the variety of life describing the number and variability in relation to ecosystem in which the occur. The butterflies are the best indicator of these changes and can be used as surrogate to assess the conservation threat to the biodiversity. Insects are excellent organisms for community and ecosystem studies as they act as biological indicators, pollinators, seed dispersers, herbivores, predators and prey. Coleoptera, Diptera and Hymenoptera are the most species insect orders, while the recent estimates suggest that the order Lepidoptera have more number of species (Shobana, 2012). Butterflies belong to the order called Lepidoptera, which means "scaly wings" in Greek. Lepidoptera are beneficial as pollinators, silk producers, indicators of environment. The diversity of insects varies in different ecosystems and they perform their role consequently. Due to their tremendous success and variability, lepidopterans make excellent

model organisms for the study of aposematism, polymorphism, mimicry, speciation, and insect-plant interactions. Butterflies, together with birds and vascular plants, represent the most frequently monitored taxonomic groups (Thomas, 2005), which is mostly due to their extreme popularity among amateur naturalists.

The butterfly fauna of India is rich with over 1500 species which is close to 9% of the total butterfly species of the world. Out of these about 417 species are reported from the western Himalayan region. Contrary to most other groups of insects, butterfly's splendor beauty and diversity have engrossed both Scientist and naturalist's focus. Their bright colors, marvelous shapes and graceful flight give pleasure to everyone (Perveen and Ahmad, 2016).

Butterflies are taxonomically and ecologically well known (Mihoci *et al.*, 2011). They are the important group of insects because they take part in the key stone ecological process of pollination. Butterflies pollinate more than fifty economically important crops (Borges *et al.*, 2003). To a large extent, butterflies (being a pollinating agent) contribute to the growth, maintenance and expansion of flora in the tropical regions where these insects show high abundance and species diversity (Bonebrake *et al.*, 2010). The butterfly's life cycle consists of four stages namely egg, larva, pupa and adult. Most species are diurnal. Butterflies have very specific food and habitat requirements at different stages of their life cycle. The larvae of butterflies are associated with plants but cause only little damage to the hosts. The adults act as incidental, wild pollinators and help in pollination of many native plants. The larvae as well as adults are food for many predators like lizards and birds. Monitoring the change in abundance and assessing the distribution of butterflies' acts as a potential tool for assessing large-scale biodiversity trends. Consequently, in the present-day scenario, many butterfly species are under a real threat due to depletion of the natural cover for various developmental activities.

Butterflies are used in scientific research, this is due to their manageable size, and the fact that most are readily identifiable, even on the wing; they are also relatively easy to rear in captivity. They show symbiotic relationships with the flowering plants, where the plants provide nutritional resources to the animals both in the nectar form for adult butterflies, and plant tissues such as leaves, and soft stems for the caterpillars, the plants also provide shelter from predation a factor which increases butterfly diversity and abundance.

In Tamil Nadu the major forest areas are distributed in to western and Eastern Ghats. When compared Western Ghats, Eastern Ghats experiences heavy pressure from all side from the people for fuel wood, fodder, medicinal plants and illicit felling, thereby losing its forest cover at an unprecedented rate. According to (Champion & Seth , 1968) the vegetation of Eastern Ghats comes under Tropical dry deciduous type. However, evergreen and semi-evergreen forests are also occurring in the high altitude of various hills. Though Forest Survey of India estimates forest cover status of entire India for every two years there are some limitations in their assessment. The scale is on 1:250,000 and the classified map will state only the forest density not the types. With reference to phyto-sociological study eastern Ghats attain very poor

attention from the scientific community. Very few studies reported include (Kadavul & Parthasarathy., 1999). Vegetation mapping using remote sensing data has more advantages over conventional ground survey method and it has been well exploited in many studies (Pant *et al.* 1992; Porwal & Pant 1989; Prowal & Roy 1992; Roy *et al.* 1985; Unni *et al.* 1983). Most of these studies had been carried out only for forest mapping and no phyto-sociological studies were carried out which is an inseparable component of the forest ecosystem.

Conservation and sustainable utilization of biodiversity are very essential for the survival of mankind in this universe. Biological diversity is increasingly recognized as a vital parameter to assess global and environmental changes. It is essential to document the butterfly fauna of all regions of the country to ensure the survival of these fascinating creatures for future generations. A baseline faunal inventory for Eastern Ghats Kolli Hills to document temporal changes in butterfly fauna over time must be essential. Keeping in mind the importance of biodiversity information this study will be vital to plan proper conservation measures for the survival of butterflies' species. The main objective of the present study is to document the butterfly species diversity, to record the seasonal variations among four different months on the selected butterfly families. The attributes of the present study can be out looked from the dimensions of conservation strategy. This particular study on biodiversity of butterflies in Kolli Hills, agriculture area would encourage the conservation of the pollinator species and an indicator species. This indirectly provides a strong rapport for the maintenance of healthy standards of the campus and also for the sustainable maintenance. Taxonomy is the identification of species based on the morphological characters. Since it requires vast knowledge about the varied organisms and their characters, relatively the taxonomists are very few worldwide. Survival of the species depends on the type of habitat and host it prefers. Diversity of butterflies depends on the presence of its host plant. Relying on the above-mentioned difficulties, the present study aims to resolve the lepidopteron (Butterfly) species and to understand the interaction between the species and using DNA barcoding and Phylogenetic assessment with the following objectives. To study the butterfly diversity in Kolli Hills and access the species diversity, of butterfly species in study area.

## Materials and Methods

### Study area:

The Kolli hills is situated in Eastern Ghats regions and comes under the Nammakkal district, Tamil Nadu state. The Kollihills became taluk and forms a part of Namakkal district. Semmedu is the headquarters of Kolli hills. The mountains are covered with evergreen forests, but increasing areas of forests have been cleared for farming. Important farm products of the mountain ranges include coffee, tea, jackfruit, pineapple, black pepper and other spices. Rice and other minor millets form the staple food of the tribal people who inhabit these mountains. The mountains are covered by lush green vegetation in the spring and monsoon, and are streaked with streams. There are three reserve forests that are controlled by the Government of Tamil Nadu, namely Ariyur Solai, Kundur Nadu, Pulianjolai. The yoke is still alive in these places. Kolli hills are located in central Tamil Nadu, lies between 110 10'54" - 110 30'00" N latitude 78 15'00" - 78 30'00" E longitude. It comprises a compact block of hills with total area of 490 square km and altitude ranging from 1000 to 1300 m above MSL. The slope of this region varies from gentle to very steep. It is an isolated hill range of discontinuous Eastern Ghats, rich in biological diversity of plants predominantly of medicinal and aromatic plants. Kolli hills, is one among eight hills in Southern region. It has a mild climate and the place is known for herbal cultivation. Average rainfall in the Kolli hills is 1340mm<sup>3</sup>. The soil type is loamy and black soil on kolli hills. Kolli hills is mainly occupied by Malayali tribal of 98.8%. These tribal families are depended on forest resources for food, firewood, herbal medicines, timber, fodder, etc. Many of researchers have published medicinal uses of plant like *Acacia leucophloea*, *Chlorixylone swietenia*, *Dichrostachys cinereal*, *Erythroxyllum monogynum*, *Ziziphus guguva*, *Tamaridus indica*, *Memecylon edule*, *Dodonaea viscosa*.

### Sampling method

#### Sampling techniques (Transect line sampling)

Monitoring butterfly populations is an important means of measuring change in the environment as well as the state of habitats for biodiversity. Butterfly monitoring make it possible to assess the trends of butterfly populations. The transects are a way of monitoring the number and variety of butterflies present at a study areas. Butterflies are counted along

fixed routes, known as transects, which are divided into smaller sections, throughout the butterfly season under good weather condition that meet minimum criteria. Counts should ideally be made once every week. Present Diversity survey recorded from December 2016 to April 2017. All species transects are labor intensive and require a commitment to carry out weekly recording, throughout the main period in Kolli hills area.

### Transect walk

Transects methods took about 45-60 minutes to walk and are about 1-2 km in length. A route (transect walk) that provides a fair representation of the habitats and other features present in our study area. Some thoughts have been given to show how the site might change over time, and the route were designed to include areas that are likely to become more suitable for butterflies in future (e.g. through site management). All butterflies seen along the transect line were counted and listed.

Recording were taken place once a Week from December 1<sup>st</sup> week to the end of April. Week 1 runs from December 1 —7, week 2 runs from 8-14 December, and so on, regardless of the day Of week and used a separate weekly recording from each of these 26 regarding weeks. Transect counts were ideally made between 10:45 and 15:45 hours. Between 10:00 and 17:00 hours are usually allowable, though butterfly activity may drop off rapidly during the late afternoon so later times were avoided. Transect walks were carried out in warm (13 °C or more) and at least bright weather. The minimum criteria are 13-17°C with at least 60% sunshine, or over 17°C and not raining.

### Photographing specimens

Like any nature photography, chasing butterflies with a camera is an absorbing pursuit. The best part of butterfly photography is that butterflies are most easily approachable unlike birds or other animals. With patients and the art of stalking it is easier to photograph butterflies. The best time for butterfly photographing is soon after sunrise when butterflies come out for basking behavior to regulate or increase their body temperature. Most butterflies spread their wings flat and align themselves for maximum exposure to sunlight. Butterflies are easily approachable at that time. The photographing was done throughout the month on every morning after sunrise. When the temperature is slightly cooler they

are easily approachable Specimens were photographed with Canon:DSLR camera. As the flight period is less during immediate sun rays, photographing butterflies is easier at those times. "As clear the photo so exact the identification".

### Identification

Identification of Photographed specimens was done by comparison with identification books such as "The Book of Indian Butterflies" and "Fauna of British India".

## Results

**Table 1: List of butterflies in Kolli hills.**

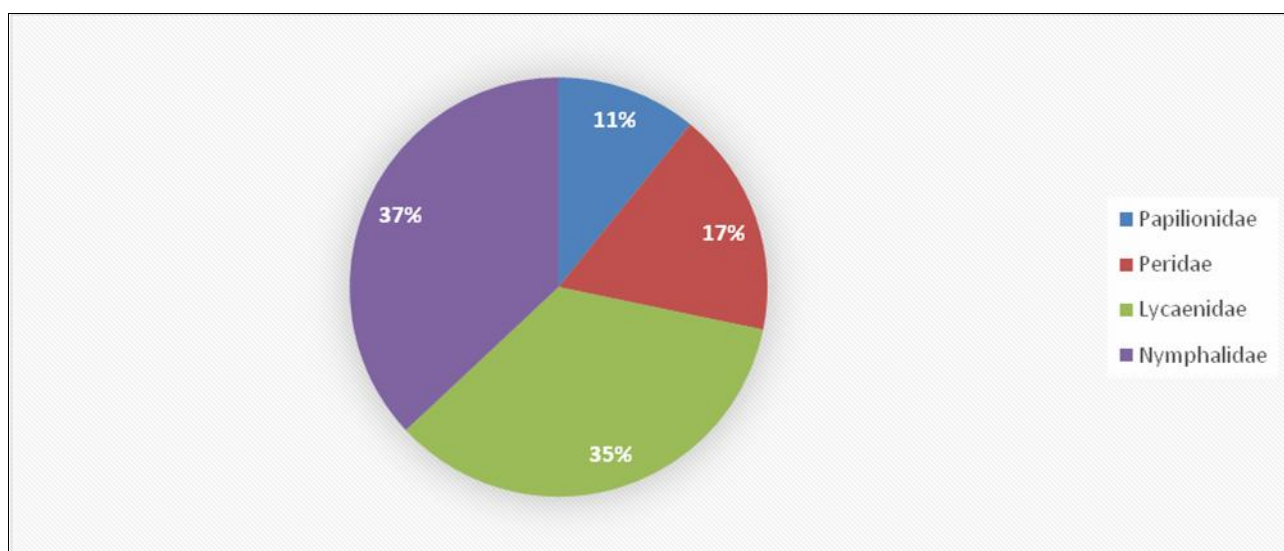
	Family	Common name	Scientific name	No of Individuals
1	Papilionidae	Common rose	<i>Pachliopta aristolochiae</i>	6
		Crimson rose	<i>Pachliopta hector</i>	4
		Common Mormon	<i>Papilo polymnestor cramer</i>	8
		Great Eggfly	<i>Hypolimnas bolina</i>	9
		Common bluebottle	<i>Graphium sarpedon</i>	3
2	Peridae	Common emigrant	<i>catopsilia Pomona</i>	16
		Psyche	<i>Leptosia nina</i>	7
		Mottled emigrant	<i>Catopsilia pyranthe</i>	14
		Common grass yellow	<i>Eurema hecabe</i>	2
		Common Gull	<i>Cepora nerissa</i>	8
		Small Salmon Arab	<i>Colotis amata</i>	9
		Pioneer	<i>Belenois aurota</i>	7
		Small grass yellow	<i>Eurema brigitta</i>	3
3	Lycaenidae	Dark grass blue	<i>Zizeeria karsandra</i>	5
		Tiny grass blue	<i>Zizula hylax</i>	2
		Zebra blue	<i>Leptotus plinius</i>	7
		Forget –me –not	<i>Catochrysops Strabo</i>	6
		Small grass jewel	<i>Chilades putli</i>	6
		Plain hedge blue	<i>Celastrina lavendularis</i>	8
		Tailless line blue	<i>Prosotas dubiosa</i>	2
		Gram blue	<i>Euchrysops cnejus</i>	12
		Pale grass blue	<i>Pseudozizeeria maha</i>	8
		Lime blue	<i>Chilades lajus</i>	4
		Common line blue	<i>Prosotas nora</i>	5
		Plumbeous silverline	<i>Spindasis schistacea</i>	7
		Plains cupid	<i>Chilades pandava</i>	3
		Bright babul blue	<i>Azanus ubaldus</i>	3
		Lesser grass blue	<i>Zizina Otis indica</i>	15
Common pierrot	<i>Castalius rosimon</i>	5		

4	Nymphalidae	Plain tiger	<i>Danus chrysippus</i>	8
		Blue tiger	<i>Tirumala limniace</i>	9
		Dark blue tiger	<i>Tirumala septentrionis</i>	6
		Striped tiger	<i>Danus genutia</i>	3
		Blue admiral	<i>kaniska canace</i>	4
		Common Indian crow	<i>Euploea core</i>	12
		Common crow	<i>Euploea core</i>	8
		White fourring	<i>Ypthima ceylonica</i>	6
		Common fourring	<i>Ypthima huebneri</i>	7
		Tawny coster	<i>Acraea violae</i>	15
		Common fivering	<i>Ypthimia</i>	6
		Chocolate pansy	<i>Junonia iphita</i>	3
		Lemon pansy	<i>Junonia lemonias</i>	8
		Danaid eggfly	<i>Hypolimnas misippus</i>	9
		Angled castor	<i>Ariadne ariadne</i>	6
		Hermit	<i>Chazara briseis</i>	5
Nigger	<i>Orsotrioena medus</i>	8		
		Total number of individuals species		314

Butterflies are usually indicates a healthier ecosystems. Butterflies also serve as major pollinators of both wild and cultivated plants. With the pressing needs of the growing human population in India, natural greeneries are being clear-felled giving way to urbanization, pollution and overgrazing. Loss of prime habitat is the major threat to all wildlife including butterflies. In addition to these, a variety of threats from human

recreational activities, trampling, run-off from roads, litter deposition and weeds are common factors which affect butterfly populations. Although we cannot nullify the ill effects of urbanization and development, we can at least try to reduce them by planting endemic trees and plants supporting the local wildlife. This will make sure that at least the common species will not go on to the verge of extinction.

Fig 1: Butterfly diversity in Kolli Hills.





A total of 314 butterflies were identified under four families in Kollihills, Family Nymphalidaehave 123 number of butterflies were identified. Respectively Lycaenidae 95, Peridae 66, Very less number of butterflies were identified in family Papilionidae 30 (Table 1). Individuals species 17 and 16 were presence in families Nymphalidae and Lycaenidae. Papilionidae and Peridae as follows 5 and 8 species only in total number of individuals (Fig 1).

The rich diversity of butterflies, especially the Nymphalids and Lycaenids in indicates a varied assemblage of floral species. The flora in Kollihills is a mixed type with herbs and shrubs dominating the vegetation in the varies climate conditions. Trees are comparatively higher in number in Kollihills. Butterfly diversity varies with season. They are abundant for only a few months and rare of absent during other months of the year. During the present study, the numbers of the butterflies were peaked during post-monsoon season (late August to October) which was similar to the findings of (Tiple et al, 2007, Tiple, 2012, Tiple & Khurad, 2009). The species abundance was less during monsoon.

## Discussion

The study revealed that Kollihills is qualitatively rich in butterflies with 46 species of butterflies belonging to 22 genera coming under 4 families. Out of these, individuals of the family Nymphalidae were found to be dominant. It indicates that 4 families identified so far from Kollihills, nearly 10 % of families only were recognized from study fields. Diversity generally increases when a greater variety of habitat types were present. The study area is endowed with different types of habitats such as forest and grass lands, pepper plantations, and shrubs. This may be the reason for the species richness.

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