

Patterns of butterfly biodiversity in three tropical habitats of the eastern part of Western Ghats

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ABSTRACT:

The Western Ghats is one among the hot spots in **25** biodiversity countries identified in the world. The Coimbatore city is situated at the foot hills of Western Ghats (a part of Nilgiri Biosphere Reserve) are recognized as a paradise of butterflies due to its salubrious climate. Butterflies in the Western Ghats belong to **5** families, **166** genera and **330** species, of which **37** species are endemic and they depend on more than **1000** plant species for feeding and breeding. The present study surveyed **103** individual butterfly species belonging to **5** families namely **Nymphalidae (32)**, **Pieridae (23)**, **Lycaenidae (19)**, **Hesperiidae (15)** and **Papilionidae (14)**, which revealed that Nymphalidae and Pieridae are the rich dominant families, while Hesperiidae and Papilionidae are less dominant. High incidences of butterfly population with wide distribution were observed during the months of March-April and the monsoon seasons (September - November) which diminish during December-January. It was observed that the occurrence and distribution of butterflies are closely associated with the availability of its larval and adult host plants. The butterfly population of a species is gradually decreasing in number due to human interference in the habitat and the destruction of host plants.

Keywords:

Biodiversity, Bioregion, Butterfly population, Host plant, Western Ghats.

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INTRODUCTION

Preserving our planets irreplaceable flora and fauna in the race against extinction has become most significant of all environmental issues. In the recent past, the Western Ghats of India is one of the 34 biodiversity hot spots of the world. A great variety of vegetations are found all along the Western Ghats. Butterflies and Moths (Order: Lepidoptera) offer good opportunities for studies on population and community ecology (Pollard, 1991). Larsen (1987) made a detailed survey of butterflies on Nilgiri Mountains and recorded nearly 330 species including endemics. Previous workers (Ugarte & Rodricks, 1960; Larsen, 1987; Asaithambi, 1994; Kunte, 1997; Arun, 2000; Eswaran & Pramod, 2005) have studied the diversity and seasonal pattern of butterflies in the Western Ghats. Butterflies are an essential part of any natural ecosystem as their adults perform pollination and larvae act as primary herbivores thereby transferring radiant energy trapped by plants to the next tropic level; rendering dual roles as pollinators and energy transferors. Butterflies are being good indicators of climatic conditions as well as seasonal and ecological changes; they can serve in formulating strategies for conservation. It is hence encouraging that butterflies are now being included in biodiversity studies and biodiversity conservation prioritization programme. The present paper deals with the occurrence and diversity of butterflies in the different sites of Western Ghats.

STUDY AERA

The Siruvani hills (10°56' – 10°57' N & 076°43' - 076°44' E); Maruthamalai hills (11°02' – 11°03' N & 076°52' – 076°54' E) and Anaikatti hills (11°06' – 11°08' N & 076°44' – 076° 45' E) of Coimbatore bioregions were selected for the study. The places are well known for its good climate and consist of rich variety of butterfly host plants. The area receives an average rainfall of 668 mm per year recorded over the last 10 years. Maximum temperature varies from 27-35 degrees. Trees such as *Albizia amara*, *Albizia lebbek*, *Acacia leucophloea*, *Acacia polyacantha*, *Ziziphus mauritiana*, *Chloroxylon swietenia*, *Tamarindus indica*, *Tectona grandis* and *Eucalyptus* are the dominant trees in these areas. Dominant shrubs are *Cassia auriculata*, *Cassia fistula*, *Capparis grandis*, *C. roxburghii*, *C. grandiflora*, *C. sepiaria*, *Flacourtia indica*, *Elaeodendron glaucam*, *Clausina heptaphylla*, *Randia dumetorum*, *Premna tomentosa* and *Pavetta indica*. *Lantana camara*,

Chromolaena odorata, and *Parthenium hysterosporus* are the prominent weeds in the open areas of the landscape.

MATERIALS AND METHODS

The butterflies were observed and collected on either side of the transect path in each site. Transects were surveyed twice in a month. According to Wynter – Blyth (1957) the study period was chosen from September 2005 to May 06. The butterflies were initially identified in the field condition and unidentified butterflies were collected by using nylon net and brought to the laboratory for better identification. The collected butterflies were placed in the killing jars (wide mouthed bottle containing a piece of cotton soaked in ethyl acetate) for 1 h. The killed butterflies were preserved in a paper envelope and fixed on the spreading board. The collected butterflies were identified by using the keys of Ackery (1988); Evans (1932) and Gonakar (1996).

RESULTS

Butterfly belongs to the order Lepidoptera, and approximately 15,000 species were so far recorded in the literature (Shieldes, 1989). The Coimbatore bioregion comprises a wide variety of butterflies with abundant distribution in the foot hills of Western Ghats. In present study, there are about 103 species of butterflies belonging to five families were identified and recorded. The family Hesperidae, popularly known as **Skippers** was characterized by short use antennae which bear hooks at the tip. In Hesperidae around 3500 species were recorded in the world of which about 145 species are found in the Indian Sub Continent (Meena Haribal, 1992). In the present survey, 15 individual butterfly species were identified in the family Hesperidae (**Table 1**).

The family Papilionidae includes the **Swallowtails**; they are large in size more attractive and the most endangered groups. In the present study there are about 14 species of butterflies were identified and recorded (**Table 2**). The family Pieridae includes 1000 species in the world. In the present study, there are 23 species of butterflies belonging to the family Pieridae were identified in Coimbatore region (**Table 3**). The butterflies of family Pieridae was identified by using the clues of hind pretarsal claws, using scales containing ptanine type of pigments and imperfect forelegs. The family Nymphalidae is known as the “**Brash foot butterflies**” which is a diverse family, consists of

TABLE : 1 LIST OF HESPERIIDAE SPECIES IN COIMBATORE BIOREGION

Family name	Common name	Species Name	Month of collection	Site of Collection
Hesperiidae	The dart	<i>Potanthus pava pava</i>	March-06	SVH
	Dusky yellow brash flat	<i>Daimio phisara phisara</i>	February-06	MAH
	Chestnut angle	<i>Odontoptilun angulata angulata</i>	February-06	MAH
	Common Red eye	<i>Matapa aria</i>	February-06	MAH
	Giant Red eye	<i>Gangara thyrsis thyrsis</i>	February-06	MAH
	Small grass owlet	<i>Bibasis amara</i>	January -06	SVH
	Chestnut bob	<i>Lambrix salsala salsala</i>	March - 06	SVH
	Brown awl	<i>Badamia exclamationis</i>	January- 06	SVH
	Rice Swift	<i>Borbo cinnara</i>	March -06	SVH
	Common Dart	<i>Potanthus pallida</i>	March- 06	SVH
	Indian Skipper	<i>Spialia galba</i>	November-05	AKH
	Common Spottedflat	<i>Celaenorrhinus leucocera</i>	November-05	AKH
	Spotted Demon	<i>Notocrypta fiesthamelii alysos</i>	November -05	AKH
	Common Awl	<i>Hasora badra badra</i>	October-05	AKH
	Small Common Flat	<i>Sarangesa dasahara dasahara</i>	October-05	AKH

TABLE: 2 THE LIST OF PAPILIONIDAE SPECIES IN COIMBATORE BIOREGION

Family name	Common name	Species Name	Month of collection	Site of Collection
Papilionidae	Blue mormon	<i>Priniceps polymnestor</i>	October-05	SVH
	Common mormon	<i>Priniceps polytes romulus</i>	December-05	MAH
	Common rose	<i>Pachliopta aristoloachiae aristoloachiae</i>	December - 05	MAH
	Common bluebottle	<i>Graphium sarpedon sarpedon</i>	December - 05	MAH
	Crimson rose	<i>Pachliopta hector</i>	December - 05	MAH
	Tailed Jay	<i>Graphium agammemnon agammemnon</i>	January-06	MAH
	Common Jay	<i>Graphium doson axion</i>	December- 05	SVH
	Lime Butterfly	<i>Priniceps demoleus</i>	January- 06	MAH
	Great zebra	<i>Pathysa xenocles phrontis</i>	November- 05	AKH
	Glassy bluebottle	<i>Graphium cloanthus</i>	November- 05	AKH
	Great jay	<i>Graphium eurypylus cheronus</i>	November- 05	AKH
	Common raven	<i>Priniceps castor polas</i>	September-05	AKH
	Common Mime	<i>Chilasa clytia clytia</i>	September-05	AKH
	Veined jay	<i>Graphium bathycles Chiron</i>	November-05	AKH

14 sub families out of which 10 sub families were recorded in Peninsular India. In the present work there are 32 species of Nymphalidae butterflies were identified (Table 4). The family Lycaenidae, otherwise known as “Blues” is the world’s largest family of butterflies, which about 6,000 species. India has approximately 450 species, which is 21% of its total number of butterfly species. The present studies viewed around 19 species of lycaenidae were identified in the foothills of Western Ghats (Table 5).

DISCUSSION

Climatic changes are thought to alter the distribution and availability of animals and plants through out the world (Warren et al., 2001). Feeding and reproduction of butterflies are closely

related to the available nutritional values of the host plant (Slanksy, 1992; Scribes, 1995 and Thomas, 1995). The growth rate of Lepidopteran depends on the host plants consisting of nutritional composition and plant secondary compositions (Salnsky, 1992). In the Southern Nilgiris and on the lower plateau, March and September - October is the best seasons for butterflies; May is comparatively poor month (Wyhter & Blyth, 1957) for butterflies. The maximum number of species was observed in the Family Nymphalidae through out the entire study area. Many members of this family were polyphagous which would help them to live in all habitats and in different elevation gradients (Sreekumar & Balakrishnan, 2001). They also reported that the May month was comparatively poor month for butterfly population.

TABLE : 3 THE LIST OF PIERIDAE SPECIES IN COIMBATORE BIOREGION

Family name	Common name	Species Name	Month of collection	Site of Collection
Pieridae	Common albatross	<i>Appias albina darada</i>	January-06	MAH
	Three spot grass yellow	<i>Eurema blanda silhetana</i>	December-05	MAH
	Common grass yellow	<i>Eurema hecabe contubernalis</i>	December-05	MAH
	Common Emigrant	<i>Catopsilia Pomona</i>	January-06	MAH
	Common wanderer	<i>Pareronia valeria hippia</i>	March-06	SVH
	Great orange tip	<i>Hebomoia glaucippe glaucippe</i>	March-06	SVH
	Mottled emigrant	<i>Catopsilia pyranthe</i>	January-06	MAH
	Tree yellow	<i>Gandaca harina assamica</i>	December-05	MAH
	White orange tip	<i>Irias Marianne cramer</i>	December-05	SVH
	Pioneer	<i>Anapheis aurota aurota</i>	January-06	MAH
	Common jezebel	<i>Delias eucharis</i>	March- 06	SVH
	Common gull	<i>Cepora nerissa nerissa</i>	December- 05	MAH
	Chocolate albatross	<i>Appias lyncida elenora</i>	March-06	SVH
	Yellow orangetip	<i>Ixias pyrene familiaris</i>	January-06	MAH
	Small orange tip	<i>Coloti etrida</i>	February -06	MAH
	Dark clouded yellow	<i>Colias fieldii</i>	January-06	MAH
	Psyche	<i>Leptosia nina nina</i>	February-06	MAH
	Indian cabbagewhite	<i>Pieris canidia indica</i>	December-05	MAH
	Plain puffin	<i>Appias indra indra</i>	November-05	AKH
	Yellow jezebel	<i>Delias agostina agostina</i>	November-05	AKH
Spot puffin	<i>Appais lalage durvasa</i>	November-05	AKH	
Hill jezebel	<i>Delias belladona ithiela</i>	October -05	AKH	
Small grass yellow	<i>Eurema brigitta rubella</i>	October -05	AKH	

TABLE : 4:1 THE LIST OF NYMPHALIDAE SPECIES IN COIMBATORE BIOREGION

Family name	Common name	Species Name	Month of collection	Site of Collection
Nymphalidae	Common sergeant	<i>Parathyma perius</i>	March- 06	SVH
	Common sailer	<i>Neptis hylas varmona</i>	March-06	SVH
	Lemon pansy	<i>Precis lemonias lemonias</i>	December-05	MAH
	Common fourring	<i>Ypthima hubenri hubenri</i>	February-06	MAH
	Tawny coster	<i>Acraea violae</i>	December-05	MAH
	Common five ring	<i>Ypthima baldus baldus</i>	March - 06	SVH
	Angled caster	<i>Ariadne ariadne pallidior</i>	December -05	MAH
	Danaid eggfly	<i>Hypolimnas misippus</i>	February -06	MAH
	Rustic	<i>Cupha erymanthis lotis</i>	March -06	SVH
	Darkbrand bushbrown	<i>Mycalesis mineus mineus</i>	December-05	MAH
	Great eggfly	<i>Hypolimnas bolina</i>	February -06	BUC
	Peacock pansy	<i>Precis almana almana</i>	December -05	MAH
	Yellow pansy	<i>Precis hierta magna</i>	December-05	MAH
	Dark evening brown	<i>Melanitis phedima bela</i>	December-05	MAH
	Common bushbrown	<i>Mycalesis perseus blasius</i>	December -05	MAH
	Gray pansy	<i>Precis atlites atlites</i>	March - 06	SVH
	Tabby	<i>Psuedergolis wedah</i>	February - 06	MAH
	Baronet	<i>Symphaedra nais</i>	March - 06	SVH
	Common baron	<i>Euthalia aconthea suddhodana</i>	December -05	MAH
	Common tiger	<i>Danus genutia</i>	December -05	MAH
	Blue king crow	<i>Euploea klugii klugii</i>	December -05	MAH
	Common crow	<i>Euploea core core</i>	December -05	MAH
Plain tiger	<i>Danus chrysippus</i>	December -05	MAH	

TABLE : 4:2 THE LIST OF NYMPHALIDAE SPECIES IN COIMBATORE BIOREGION

Family name	Common name	Species Name	Month of collection	Site of Collection
Nymphalidae	Blue tiger	<i>Tirumala limniace leopardus</i>	March- 06	SVH
	Dark blue tiger	<i>Tirumala septentrionis</i>	March-06	SVH
	Glassy tiger	<i>Parantica aglea melanoides</i>	March- 06	SVH
	Common evening brown	<i>Melanitis leda ismene</i>	November-05	AKH
	Common duffer	<i>Discophora sondiaca zal</i>	November-05	AKH
	Bright eye bush brown	<i>Mycalasis nicotia</i>	November- 06	AKH
	Common brown	<i>Euthalia aconthea suddhodana</i>	November- 06	AKH
	Leopard lacewing	<i>Cethosia cyane</i>	September -05	AKH
	Indian Fritillary	<i>Argyreus hyperbius hyperbius</i>	October -05	AKH

TABLE : 5 THE LIST OF LYCAENIDAE SPECIES IN COIMBATORE BIOREGION

Family name	Common name	Species Name	Month of collection	Site of Collection
Lycaenidae	Indian red flash	<i>Rapala manea</i>	March- 06	SVH
	Common pierrot	<i>Castalius rosimon rosimon</i>	March- 06	SVH
	Zebra blue	<i>Syntarucus plinius</i>	March- 06	SVH
	Common tip	<i>Hypolycaena erylus himavantus</i>	February-06	MAH
	Hybrid sapphire	<i>Heliophorus hybrida</i>	February -06	MAH
	Common cerulean	<i>Jemides celeno celeno</i>	February-06	MAH
	Pale grass blue	<i>Pseudozizeeria maha</i>	March-06	SVH
	Metallic cerulean	<i>Jemides alecto euryaces</i>	March-06	SVH
	Red Pierrot	<i>Talicauda nyseus guerini ménéville</i>	March -06	SVH
	Grass jewel	<i>Zizeeria trochilus trochilus</i>	February-06	MAH
	Striped pierrot	<i>Tarucus nara</i>	March -06	SVH
	Tiny grass blue	<i>Zizula hylax</i>	February -06	MAH
	Lime blue	<i>Chilades laius</i>	March -06	SVH
	Margined hedge blue	<i>Lycaenopsis marginata</i>	November-05	AKH
	Silver royal	<i>Ancema blanka argentea</i>	November -05	AKH
	Common acacia blue	<i>Surendra quercetorum quercetorum</i>	September-05	AKH
	Common leaf blue	<i>Amblypodia anita anita</i>	September- 05	SVH
	Common Cerulean	<i>Jamides celeno celeno</i>	November- 05	AKH
	Dark grass blue	<i>Zizeeria knysna</i>	November -05	AKH

SVH : Siruvani Hills

MAH : Maruthamalai Hills

AKH : Anaikatti Hills

The *Princeps demolens*, *Papilionidae* *hector*, *P. aristolochiae* are more in number during the months of October and December. The present investigation showed that the butterfly population is greatly increased during the period of October – November due to the availability of more larval host plants and high flower density. Therefore, this period might be the best season for butterflies of these areas. Though the Danaid butterflies are found throughout the year, they found abundantly during the months of October - December and also it was found more during March and April. The cool climate, increased moisture content, emergence of fresh larval host plants and flowering of adult host

plants may be the factors for the emergence of butterflies during the same seasons. The butterfly community did not show much variation between the sampling locations of the study areas, hence the whole area can be considered as one unit while planning conservation measures.

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