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ORIGINAL ARTICLE

19 Marvels of 2019: A Sneak Peek into the Colorful World of Butterflies from North East India

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ABSTRACT

India is a mega-biodiversity country. It hosts four biodiversity hotspots: the North East Himalayas, the Western Ghats, the Indo-Burma region and the Sundaland (Includes Nicobar group of Islands). These hotspots have numerous endemic species.The north east India occupies about 8% of the geographical area of the country and 4% of total population of the country. Due to its unique geographical distribution, pristine forests, natural water bodies it have its own identity. The biodiversity of the region is unique and endemic. The butterfly diversity of North East India deserves special importance due to its' endemism, wide habitat range, larval host plant diversity and role as environmental indicators. About 962 butterflies are found in NE including the northern part of West Bengal and every year the number is increasing with new discoveries. The current paper deals with 19 species of butterflies from North-East India which is majorly endemic to the region. Such documentation is of extreme importance in order to understand the role of colorful butterflies in maintaining the biodiversity of a specific region.

Key words: *Butterfly, distribution, diversity, habitat*

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INTRODUCTION

Tropical forests are also the most bio-diverse environments on the planet. Recent times have seen mass scale degradation of tropical forests across the world. Deforestation has been extremely rapid in tropical forests across the globe. Tropical deforestation accounts for almost one-fifth of greenhouse gas emissions and threatens the world's most diverse ecosystems. Much of this deforestation is driven by illegal logging (Burgess, *et al*., 2012). The astronomic rate of disappearance of tropical forest areas brings with it a mass extinction of species which deprives future generations of the value associated with this genetic diversity. Anthropogenic disturbance cause a significant impact on regeneration of species, composition, diversity, biomass and carbon storage of the tropics (Jhariya, *et al*., 2014; Pawar, *et al*., 2014a & b). The current global policy agenda is focusing on vanishing of green-belts from the tropics and it's direct impact on climate change patterns across the world (Hansen and DeFries, 2004; Stern, 2006; Nabuurs, *et al*., 2007; IPCC 2007; Kindermann, *et al*., 2008). The biodiversity conservation values of secondary and plantation forests remain poorly understood (Hartley, 2002; Dunn, 2004), especially in relation to butterfly diversity. Along with the availability of larval and adult food plants, habitat quality appeared to be one of the most important parameters that are used to

determine butterfly community structure (Barlow, *et al*., 2007). Several studies (Bowman, *et al*., 1990; Lawton, *et al*., 1998; Ramos, 2000) have discussed the potential of butterfly diversity in secondary forests. Among insects, butterflies are ideal subject for ecological studies of landscapes (Thomas and Malorie, 1985), and their value as indicators of biotope quality is being increasingly recognized because of their sensitivity to minor changes in micro-habitat, in particular, light levels (Kremen, 1992). Butterflies and Moths belong to the order Lepidoptera which is a very large group consisting of a magnificent distributions of the insects across the world. It is estimated that there is about 3600 different types of butterflies and moths alone in North-East India (Radhakrishnan, *et al*., 1989) which is naturally considered as a biodiversity hotspot. Northeast India (NE India) has one of the richest diversity of butterflies in the oriental region. Butterflies, around 18,000 species are estimated to be there in the world and India alone has recorded 1,501 species (Kehimkar, 2008) of which 835 species are present in NE India (Wynter Blyth, 1957) while 962 species of butterflies are recorded by (Evans, 1932). The expected species diversity is more than 1000 species based on recent records. Although Northeast represents only 7.7 % of Indian landmass, it has 66.85% of butterfly diversity of the Indian region (Pers. Comm. Gogol, 2015). Around 66.81% is under forest cover of the total geographic area of Northeast India (https://data.gov.in) with number of important protected areas. Much of these areas still need faunal documentation especially for the lesser known fauna.

The distribution and abundance of insect herbivores is influenced by the abundance of host plants (Knops, *et al*., 1999). Eastern Himalaya and North-Eastern India are part of two global biodiversity hotspots—the Himalaya and Indo-Burma (Myers *et al*. 2000) that are separated by the Brahmaputra River with eastern Himalaya falling north of the river in India. Forests of these regions are rich in endemic, rare and endangered butterfly species (Evans 1932; Winter-Blyth 1957; 2018; Ghana and Roy 2013; Sondheim and Kuntz, 2016).

The biogeography of NE India is comparatively complex due to the unique tectonic and climatic condition, is located in the Indo-Malayan zoographic region, hence species that have affinities with Southeast Asian fauna and Indian fauna like other taxa, is very high. The entire region is termed as Biodiversity Hot Spot for Butterfly fauna (Evans, 1932). Butterflies are sensitive indicators to climate change patterns and they are very sensitive to fluctuations of environmental pollution patterns in their habitat region (Ventra Ramona, 2010). Butterflies have short life cycles and thus react quickly to environmental changes. Their limited dispersal ability, larval food plant specialization and close-reliance on the weather and climate make many butterfly species sensitive to fine-scale changes. Recent research has shown that butterflies have declined more rapidly than birds and plants emphasizing their potential role as indicators as per reports published by United Kingdom Butterfly Monitoring Scheme. Butterflies across the globe are declining in numbers, species richness and diversity due to increased urbanization trends as well as land use land cover changes (Blair and Launder, 1997; Clark *et al*., 2007). Thus, the documentation of butterfly species in biodiversity hotspot deserves special importance. In the current paper, we have documented nineteen butterfly species which majorly inhabit in North East India. Their specific roles as bio-indicators require further attention and detailed research in coming times.

The authors acknowledge the forest officials of Pakke Tiger Reserve as well as officials from different National Parks and Wildlife Sanctuaries where the current study is carried out. It is important to take into account the support and guidance of natural enthusiasts and friends from North East who helped us in making this survey successful.

MATERIALS AND METHODS

A survey had been carried out in seven sister states of North East India including Northern part of West Bengal. The area is specifically dominated by Eastern Himalayan

mountain range. The study was done following *'Pollard walk"* method,the initial format was outlined by Ernie Pollard in 1977.Butterflies are counted when they are seen within a prescribed distance from the path, often 2.5 meters on either side of the path, and only when the butterflies are seen in front of, or above, the observer (i.e., no backtracking) . The methodology and development of transect monitoring for butterflies have been reviewed in detail elsewhere (Pollard and Yates, 1993). Pollard walk is a fixed-route walk (transect) which is established at a site on which butterflies are recorded along the route on a regular (weekly) basis under reasonable weather conditions for a number of years. Transect routes are chosen to sample evenly the habitat types and management activity on sites. Care is taken in choosing a transect route as it must then remain fixed to enable butterfly sightings to be compared from year to year. Transects are typically about 2-4 kms long, taking between 45 minutes and two hours to walk, and are divided into sections corresponding to different habitat or management units. Butterflies are recorded in a fixed width band (typically 5m wide) along the transect each week. Transect walks are undertaken between 10.45am and 3.45pm and only when weather conditions are suitable for butterfly activity. Weather conditions have a considerable effect on the numbers of butterflies seen. To ensure that the counts are standardised as much as possible:

1. Transects are not walked when the temperature is below 13°C (in northern upland areas this may be reduced to 11°C)
2. Between 13-17°C, a transect may be walked providing there is at least 60% sun
3. Above 17°C, a transect may be walked in any conditions, providing it is not actually raining
4. When wind speeds are above 5 on the Beaufort scale, transects should not be walked

The current survey period was from November, 2018 and is currently on-going. Digital camera with about 300 mm zoom and binocular was used for the current survey work. We have presented a small snapshot of 19 marvellous species as a part of our larger documentation and survey work.

STUDY AREA

The survey was done in different parts of North East including Assam, Arunachal, Sikkim, Meghalaya and northern parts of West Bengal. The diversity of butterflies were studied in different reserved forest, tiger reserve and wildlife sanctuaries.

Table 1: Study Areas of Butterfly Species from N-E India

S.N.	Study Area	Location	Geographic Coordinates
1	Pakke Tiger Reserve	East Kameng district of Arunachal Pradesh	27⁰ 09′N, 92⁰ 81′E
2	Namdapha National Park	Changlang district of Arunachal Pradesh	27⁰ 46'N, 96⁰ 54'E
3	Amchang Wildlife Sanctuary	Guwahati, Assam	26⁰ 18'N, 91⁰ 86′E
4	West Garo Hills	Meghalaya	25⁰ 61′ N, 90⁰ 23′E
5	Cherapunjee	Meghalaya	25⁰ 27'N, 91⁰ 73'E
6	Dzongu Valley	Sikkim	27⁰ 51'N, 88⁰ 44'E
7	Rani-Garbhanga Reserve Forest	Kamrup, Assam	26⁰ 04′ N, 91⁰ 70'E
8	Yazali	Lower Subansiri district of Arunachal Pradesh	27⁰ 53' N, 93⁰ 75'E
9	West Siang	Arunachal Pradesh	28⁰ 15' N, 94⁰ 74'E
10	Lakhimpur	Assam	27⁰ 18' N, 94⁰ 37'E
11	Alipurduar	West Bengal	26⁰ 49' N, 89⁰ 52'E

IDENTIFICATION METHODS

The identification of the different butterfly species is done with the help of identifying keys from the reference book (Butterflies of India by Isaac David Kehimkar, the Butterfly Man of India) and the identification of Indian Butterflies by W.H Evans as well as

comparing the species with its closely related ones. For example *Faunis eumeus* is closely related to *F.canens*, *Lamproptera curius* is closely related to *L. meges.*

Table 2: Distribution of Butterfly species in North East India with special reference to N-E India

S.N.	Common Name	Scientific Name	Habitat	Family	Date of Photo	Location
A	Yellow Jezebel	*Delias agostina Hewitson 1852*	Prefer river stream. often seen nectoring in flower	Pieridae	Sept. 2017	Dzongu, Sikkim
B	Dark clouded yellow	*Colias fieldii* Ménétriés, 1855	Prefer dry vegetation area	Pieridae	Nov. 2018	Cherapunjee, Meghalaya
C	White Dragon Tail	*Lamproptera curius*	Prefer to forest near stream often seen in group in pudling ground	Papilionidae	July 2018	Aalo, West Siang, Arunachal Pradesh
D	Jungle glory	*Thaumantis diores* Doubleday, 1845	Prefer dark area. Seen in the early morning.	Nymphalidae	Nov. 2018	Guwhati , Assam
E	Chocolate Albatross	*Appias lyncida* Cramer, 1777	often found in group near river stream and very commonly found inn flower	Pieridae	Nov. 2017	Alipurduar, W Bengal.
F	Black Prince	*Rohana parisatis* (Westwood [1851])	very first flight, often found in group near river stream	Nymphalidae	Sept. 2018	Yazali, Arunachal Pradesh
G	Red Spot Jezebel	*Delias descombesi* Boisduval, 1836	Slow flight, often seen in Nectaring	Pieridae	June 2018	West Garo Hills, Meghalaya
H	Great Orange Tip	*Hebomoia glaucippe* Linnaeus, 1758	Slow flight, often seen in Nectaring and pudling	Pieridae	Nov. 2018	Alipurduar West Bengal
I	Popinjay	*Stibochiona nicea* Gray, 1846	Very first flight , often seen in resting in leaf	Nymphalidae	Sept. 2017	Dzongu , Sikkim
J	Abscure Banded Swift	*Pelopidas agna agna*	Majorly seen in grasslands, scrub, forest edges	Hesperiidae	Dec. 2018	Amchang wild life sanctuary-Assam
K	Powdered Baron	*Euthalia monima*	Found in forest in low elevation	Nymphalidae	Nov. 2018	Pakke Tiger Reserve, Arunachal Pradesh
L	Courtesan	*Euripus nyctelius*	Found in forest from 400-1000m elevation	Nymphalidae	Nov. 2018	Pakke Tiger Reserve, Arunachal Pradesh
M	Coon	*Pslos fuligo*	Found in forest in elevation	Hesperiidae	Nov. 2018	Lakhimpur, Assam, India
N	Yellow Kaiser	*Penthema lisarda*	Found in forest from 350-1500m elevation,often seen in puddling	Nymphalidae	Feb. 2018	Namdapha Tiger Reserve, Arunachal Pradesh
O	Lesser Mime	*Papilio epycides*	Found in forest from 450-1200m elevation	Papilionidae	Feb. 2018	Namdapha Tiger Reserve,Arunachal Pradesh
P	Yellow Tinsel	*Catapaecilma subochracea*	Found in forest in elevation	Lycaenidae	Feb. 2018	Namdapha Tiger Reserve, Arunachal Pradesh
Q	Large Faun	*Faunis eumeus*	Found in forest from 600-900m elevation	Nymphalidae	Nov. 2018	Cherrapunjee, Meghalaya
R	Glassy Tiger	*Parantica aglea*	Found in forest in elevation uto 2100m elevation	Nymphalidae	Sep. 2018	Namdapha Tiger Reserve, Arunachal Pradesh
S	Dark Blue Tiger	*Tirumala septentrionis*	Found in forest in elevation upto 2000m elevation	Nymphalidae	Aug. 2018	Garbhnaga Reserve Forest, Assam

Fig. 1: Different Butterfly species in North East India

RESULTS AND DISCUSSION

The North East India region comprises states of Assam, Arunachal, Meghalaya, Nagaland, Tripura, Manipur, Mizoram and Sikkim. North East India is the easternmost part of India with a wide range of physiographic and eco-climatic conditions having a lot numbers of endemic floura and fauna. More than 50% of total Indian butterfly species are known to occur here. Many endemic as well as rare butterflies like Gorgons, Dragon tails, Kaiser- E-hind, Bhutan Glory etc are found in North East. Among these 19 butterflies Black Prince, Red Spot Jezebel, Great Orange Tip, Popinjay, Yellow Jezebel, White Dragontail, Jungleglory, Courtesan, Yellow Kaiser, Yellow Tinsel, Lage Faun are endemic to North East. The details of the species are discussed as under. Growing trends of urbanization, deforestation, illegal tree felling is taking its' toll on the pristine biodiversity as well as the health of forests in North East. This rapid degradation in turn is directly affecting the butterfly distribution pattern as they are extremely sensitive to even slightest of environmental changes. Climate Change across the globe is an adage to the problem. Many butterfly species are rapidly getting extinct, endangered and vulnerable. However, the documentation and proper conservation practices of butterfly species is still lacking and requires immediate attention from naturalists, ecologists, evolutionists and environmentalists across the globe.

DECLARATIONS

This research work has no conficts of interest, whatsoever. No animal or plant is being harmed while conducting the study.

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