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Checklist of butterflies from Ikhara and Kanchan fort peaks of Satmala range, northern Western Ghats, India

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Abstract
The area from Satmala range of Northern Western Ghats including two peaks was surveyed to report presence of butterfly species. Butterflies are the members of insect order Lepidoptera act as bioindicator to predict habitat quality. A total 49 butterfly species belong to 23 genera and 5 families were recorded in present study. The study revealed Nymphalidae as a richest family with 17 species which was followed by Lycaenidae (13 species), Pieridae (12 species) Papilionidae (6 species) and Hesperiidae with a single species. This study appears significant to provide baseline data for an estimation of butterfly diversity of the area along all 14 peaks of Satmala range and consequently Northern Western Ghats.

Keywords: lepidoptera, butterfly, Satmala range, Northern Western Ghats

Introduction
The Western ghats is a 1600 Km long mountain range with a variable breadth of 5 to 25 Km laying parallel to the Western coast of India (Kunte *et al*., 1999) [11]. It can be divided into Southern Wester Ghats, Central Wester Ghats and Northern Western Ghats (NWGs) (Gaonkar, 1996) [3]. The NWGs run north to south along Western Maharashtra from south of Gujarat to Goa. The NWGs includes variety of habitats (Dethe and Medhe, 2020) [2] which supports the insect fauna. Series of estimates are available on the Insect biodiversity components of NWGs. Survey, monitoring and taxonomic studies on various groups of insect including butterflies form Western Ghats have been carried out earlier (Kunte, 1997;Ghate *et al*.,2003;Rane & Ranade,2004; Padhey *et al*.,2013) [10, 4, 16]. Butterflies are flagship species in terms of insect conservation and one of the most popular insects because of their fascinating beauty and attractive colors, good pollinators and very sensitive to environmental factors such as temperature, humidity, rainfall (Ribeiro and Freitas, 2012; Hill *et al*., 2002; Bhowmik and Chowdhury, 2021) [17, 5, 1]. There are some species which are on edge of extinction due to anthropogenic disturbance like habitat destruction, pesticidal use in agriculture (Sharma and Joshi, 2009). Numerous species serve as biological indicators of environmental health and change (Thomas, 2005; Posa & Sodhi 2006; Koh, 2007) [20, 15, 9]. The wester Ghats is explored for butterflies' diversity and its estimation with various aspects. Due to a lack of proper management and study, NWG's biodiversity only remains in the reserved forests and they have received less conservation attention (Watve, 2008) [21]. Surveys in NWG's protected areas are needed to understand the true status and diversity of butterflies. (Padhye *et al*., 2013) [13]. Therefore, studying butterflies is very important for conservation policies and environmental monitoring. (Sidat & Bhatt, 2020) [19]. The Northern section of Western Ghat is comparatively less explored. The area under present study is not explored till the date for systematic and scientific study of insect fauna. Therefore, the survey of butterfly species was undertaken as a part of inventory of insect fauna of this region.

Materials and Methods
Study Area
The Satmala range, of Sahyadri runs in an easterly and south easterly direction right across the Nasik district (Maharashtra state). Sites selected for proposed work are the 'Ikhara Peak' (20º38'46.79"N and 74º05'63.08"E), 'Kanchan Fort peak'(20º37'33.58"N and 74º10'87.62"E) and their nearby area of Satmala range. It is the part of Nashik district of the state Maharashtra. Peaks of Satmala range are of basaltic nature and peculiar for their height, shape and flat submit.The study area harbors various insect habitats (Fig.1) like grassy slopes, sparsely distributed as well as some dense pockets of forest trees, cacti, thorny bushes, shrubs, various soils types, water bodies like dam, rivers, small tributaries and springs. Considering the insect diversity, it was imperative to make their scientific and systematic record. This type of study is essential in estimation of biodiversity as well as helpful in future to assess biodiversity of particular region.
Survey:
The present survey type of work was carried out by scheduled field visits with 8 days of interval for the period of one year. Field data was collected through a random survey when the majority of the butterflies were

active,before 11.00 am in the morning and after 4.00 pm in the evening. Butterfly species were identified in the field using field guides (Kunte, 2000; Kehimkar, 2016). As many as possible the observations were recorded in field in the form of photographs instead of disturbing the environments.

Results

In the present study the butterfly species were found throughout the year with seasonal variation. Total 49 species from the5 families were recorded during the present survey of butterflies. Nymphalidae (17 species, 34.69%) was the richest family among the five families. It is followed by Lycaenidae Family (13 species,26.53 %), Pieridae (12 species,24.48 %), Papilionidae (6 species, 12.24%) and Hesperiidae (1 species, 2.04%). *Junonia* was the most species-rich genus with six species. The checklist of butterfly is given below (Table.1), along with some photographs (Fig.2 and 3).

Table 1: The checklist of butterfly form Ikhara and Kanchan Fort Peaks of Satmala Range, Northern Western Ghats, India

	Species name	**Common name**
Sr. No	**Family Papilionidae**	
1.	*Pachliopta aristolochiae* (Fabricius, 1775)	Common Rose
2.	*Pachliopta hector* (Linnaeus, 1758)	Crimson Rose
3.	*Graphium agamemnon* (Linnaeus, 1758)	Tailed Jay
4.	*Graphium doson* (C.&R. Felder)	Common Jay
5.	*Papilio demoleus* (Linnaeus, 1758)	Lime Butterfly
6.	*Papilio polytes* (Linnaeus, 1758)	Common Mormon
	Family Pieridae	
7.	*Eurema hecabe* (Linnaeus, 1758)	Common Grass Yellow
8.	*Eurema brigita* (Stoll,1780)	Small Grass Yellow
9.	*Eurema blanda* (Boisduval,1836)	Three Spot Grass Yellow
10.	*Catopsilia Pomona* (Fabricius, 1775)	Common Emigrant
11.	*Catopsilia pyranthe* (Linnaeus, 1758)	Mottled Emigrant
12.	*Delias eucharis* (Drury, 1773)	Common Jezebel
13.	*Cepora nerissa* (Fabricius, 1775)	Common Gull
14.	*Ixias marianne* (Cramer, 1779)	White Orange-tip
15.	*Ixias pyrene* (Linnaeus, 1764)	Yellow Orange Tip
16.	*Anaphaeis aurista* (Fabricius, 1793)	Pioneer
17.	*Calotis aurora* (Cramer,1780)	CrimsonTip
18.	*Pieris canidia* (Linnaeus, 1768)	Indian CabbageWhite
	Family Nymphalidae	
19.	*Melanitis leda (Linnaeus, 1758)*	Common Evening Brown
20.	*Ariadne merione* (Cramer, 1777)	Common Castor
21.	*Phalanta phalantha* (Drury, 1773)	Common Leopard
22.	*Junonia lemonias* (Linnaeus, 1758)	Lemon Pansy
23.	*Junonia atlites* (Linnaeus, 1763)	Grey Pansy
24.	*Junoni ahierta* (Fabricius, 1798)	Yellow Pansy
25.	*Junonia iphita* (Cramer, 1779)	Chocolate Pansy
26.	*Junonia orithya* (Linnaeus, 1758)	Blue Pansy
27.	*Junonia almanac* (Linnaeus, 1758)	Peacock Pansy
28.	*Vanessa cardui*(Linnaeus, 1758)	Painted Lady
29.	*Hypolimnas misippus* (Linnaeus, 1764)	Danaid Egg fly
30.	*Hypolimnas bolina* (Linnaeus, 1758)	Great Egg fly
31.	*Tirumala limniace* (Cramer, 1775)	Blue Tiger
32.	*Danaus chrysippus* (Linnaeus, 1758)	Plain Tiger
33.	*Danaus genutia* (Cramer, 1779)	Striped Tiger
34.	*Euploea core* (Cramer, 1780)	Common Crow
35.	*Euthalia aconthea* (Cramer, 1777)	Common Baron
	Family Lycaenidae	
36.	*Castalius rosimon* (Fabricius, 1775)	Common Pierrot
37.	*Deudorix isocrates* (Fabricius,1793)	Pomegranate Butterfly
38.	*Talicada nyseus* (Guérin-Méneville, 1843)	Red Pierrot
39.	*Jamides celeno* (Cramer, 1775)	Common Cerulean
40.	*Jamides bochus* (Stoll, 1782)	Dark Cerulean
41.	*Zizeeria karsandra* (Moore, 1865)	Dark Grass Blue
42.	*Euchrysops cnejus* (Fabricius, 1798)	Gram Blue
43.	*Spindasi svulcanus* (Fabricius, 1775)	Common Silverline

44.	*Chilades lajus* (Stoll, 1780)	Lime Blue
45.	*Lampides boeticus* (Linnaeus,1767)	Pea Blue
46.	*Freyeria putli* (Kollar, 1844)	Black-spotted Grass Jewel
47.	*Zizula hylax* (Fabricius, 1775)	Tiny Grass Blue
48.	*Zizina otis* (Fabricius, 1787)	Lesser Grass Blue
Family Hesperiidae.		
49.	*Udaspes folus* (Cramer, 1775)	Grass Demon

Discussion

In Maharashtra this type of work has been carried out with considerable scale. Recently, Kharat (2013) [8] There are 91 species of butterflies from North Maharashtra including Nasik, Dhule and Jalgaon district have been reported earlier (Karat,2013; Patil and Dethe,2021) [14] but the area under present study was untouched to conduct this type of work. The existence of the butterfly species reported in the present work is supported by these earlier reports made from the other parts of NSWs and particularly Satmala range. Present results are of greater significance to extend research work on various aspects of biodiversity studies of butterflies from this area.

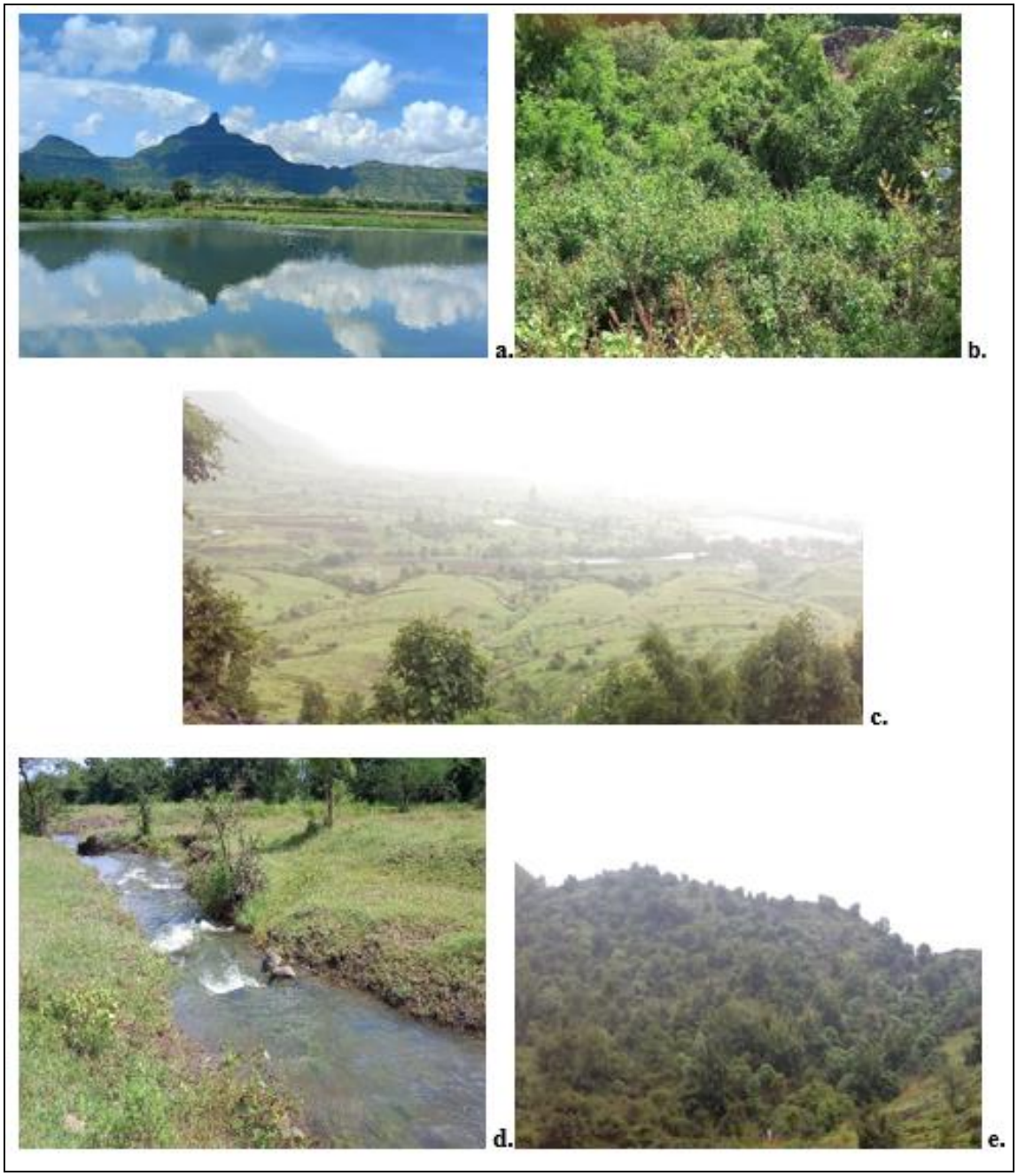

Fig 1: Showing different habitats within study area: a. large water dam and agricultural fields b. Dense vegetation of shrubs and trees c. Grassy slopes and small dams d. Riverine habitat e. Slopes covered with trees and shrubs

Fig 2: Butterfly species from study area

Fig 3: Butterfly species from study area

Conclusion

The present study emphasizes need of more research work to explore this area for various biodiversity aspects of lepidopteran group.

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