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BUTTERFLY (LEPIDOPTERA: INSECTA) DIVERSITY OF TAKHNI REHMAPUR WILDLIFE SANCTUARY, HOSHIARPUR, PUNJAB, INDIA

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INTRODUCTION

The butterfly fauna of India has been well studied in the past, with the works of Marshall & de Niceville (1883), de Niceville (1886, 1890), Moore (1890-1905), Swinhoe (1893, 1896, 1905-1913), Bingham (1905, 1907), Evans (1932), Talbot (1939, 1947), Wynter-Blyth (1957), and Kehimkar (2008) being some of the significant publications. To date, 1641 species of butterflies have been reported from India (Varshney, 2010). Recently, much information on butterflies of different regions, states and protected areas of India has been published (e.g. Arora *et al*. 2009 (Himachal Pradesh); Anonymous (website of Punjab ENVIS Centre, Punjab); Kumar 2008 (Uttarakhand); Mondal *et al*., 1997 (Delhi); Chandra *et al*. 2007 (Madhya Pradesh and Chattishgarh); Haribal 1992, Maulik 2003 (Sikkim); Mondal & Maulik 1998 (Meghalaya); Kunte *et al*., 2012 (Garo Hills, Meghalaya); Mondal & Maulik 2004 (Manipur); Mondal & Maulik 1997 (West Bengal); Mondal & Maulik 1991 (Orissa); Gupta & Shukla 1987 (Madhya Pradesh); Maulik, 2007 (Andhra Pradesh); Kunte 2000 (Peninsular India); Sharma 2012 (Maharashtra); Ambrose & Raj 2005 (Kalakad-Mundanthurai Tiger Reserve, Tamil Nadu); Aneesh *et al*., 2013 (Kerala); Palot *et al*., 2012 (Kerala). However, butterfly diversity at the regional level remains data deficient in most of the regions and states of India.

In particular, the state of Punjab is still unexplored in terms of its butterfly diversity and the available information is mainly restricted to that published by Rose and Sidhu (2001), who provided an inventory of 74 species of butterflies from Punjab; Arora *et al*. (2006), who gave a brief account of 74 species from Punajb Shivaliks; and Sharma and Joshi (2009), who listed 41 species from Dholbaha Dam (Hoshiarpur). However, information on the butterfly diversity of the various protected areas of Punjab is almost totally lacking.

It is precisely with this point in mind that while conducting 'General Faunistic Surveys' of Punjab under the mandates of the Zoological Survey of India, we were fortunate to have the opportunity to study the butterfly faunal diversity of Takhni Rehmapur Wildlife Sanctuary on 12th and 13th November 2011 and 10th and 11th November, 2013. An account of the observations and collections made on the butterfly diversity of this sanctuary has been prepared.

MATERIAL AND METHODS

Study area: Taknni Rehmapur Wildlife Sanctuary is situated at the foot hills of Shiwalik Range of Himalayas and is representative of Foot Hill Ecosystem. The sanctuary is situated in Hoshiarpur district at a distance of 15 Kms. from Hoshiarpur on Hoshiarpur-Mehengrowal road. It is spread over 382.00 hectares of government area i.e., 956 acres, of which 498 acres area belongs to village Takhni and 458 acres area belongs to village Rehmapur. Takhni-Rehmapur was first declared as a wildlife Sanctuary vide

Punjab Government Notification No. 34(32) 92-Ft-IV/2040 dated 16.2.1993 and final notification was issued vide Punjab Government No. 34/10/99-Ft-IV/7182 dt. 8.6.1999.

The sanctuary abodes a variety of wildlife species (Barking Deer, Pangolin, Hog Deer, Hare, Jungle Cat, Jackal, Mongoose, Sambar, Monitor Lizard, Porcupine, Wild Boar, Python, Rat Snake). The vegetation mainly consists of Amb (*Mangifera indica*), Amla (*Emblica officinalis*), Arjun (*Terminalia arjuna*), Bargad (*Ficus bengalensis*), Bamboo (*Dendrocalamous strictus*), Dhak (*Butea monosperma*), Khair (*Acacia catechu*), Kikar (*Acacia nilotica*), Krembal (*Lemna grandis*), Mesquite (*Prosopis juliflora*), Neem (*Azadirachata indica*), Pipal (*Ficus religiosa*), Chilbil Papri (*Holoptelia integrifolia*), Shisham (*Dalbergia sissoo*), Siris (*Albizia lebbeck*) and Subabul (*Leucaena leucocephala*).

Methodology: Collections and observations were made in Takhni Rehmapur Wildlife Sanctuary (N 31° 38.985'; E 075°55.494'; Accuracy 20'; Elevation 1200 feet) on 12th & 13th November 2011 and 10th & 11th November, 2013.

Butterflies were collected with a butterfly net and voucher specimens (non-schedule species of Wildlife (Protection) Act 1972) preserved for identification. These have been deposited in the National Zoological Collection (NZC) at the Northern Regional Centre, Dehradun. The works of Evans (1932), Talbot (1939, 1947), Wynter-Blyth (1957), Haribal (1998) and Kehimkar (2008) were used to identify specimens to species and subspecies levels. Identification was also done from the digital photographs taken in the field of as many species as possible with aid of Digital Camera (DX-80 model of Nikon make). Latitude, Longitude and Altitude were recorded with the aid of GPS of Garmin make (model OREGON® 550).

The abundance status provided here is based on an arbitrary frequency scale formulated from the present observations based on the numbers obtained and was quantified as follows: Common (encountered 6-10 times), Less Common (3-5 times), and Uncommon (only once or twice).

RESULTS

A total of 52 species belonging to 41 genera and five families were collected and identified including *Libythea myrrha sanguinalis* Fruhstorfer and *Euploea mulciber mulciber* Cramer, which are new to the butterfly fauna of Punjab. So far, the former species was known from Kulu in Himachal Pradesh, India to Burma (Myanmar) and the latter species was known from Shimla, India to Burma (Myanmar) (Evans, 1932). Family-level analysis of the number of species revealed that the family Nymphalidae were the most species rich with 26 species, followed by Lycaenidae 12 species, Pieridae 10 species, Papilionidae and Hesperiidae with 2 species each (Table 1 and Fig. 1).

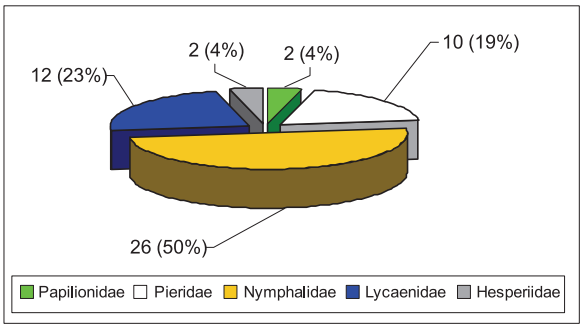

Fig. 1. Family-level classification of butterfly species in Takhni Rehmapur WLS, Punjab (n = 52 spp.)

Observations on the relative abundances of the 52 species observed revealed that 16 species were classed as common, 18 as less common and the remaining 18 species as uncommon (Table 1 and Fig. 2).

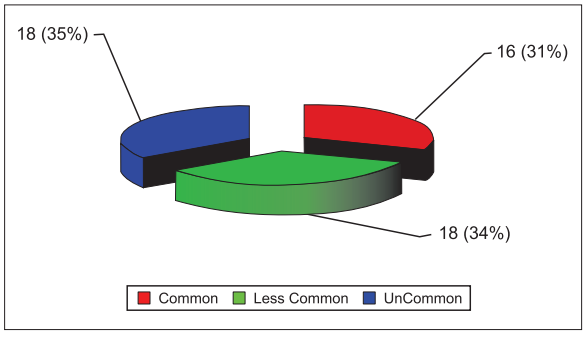

Fig. 2. Relative abundance of butterflies at Takhni Rehmapur WLS (n = 52 spp.)

These preliminary observations on butterfly diversity of Takhni Rehmapur WLS will definitely form the basis for future studies such as: ecology,

Table 1. A systematic list of butterfly species recorded from Takhni-Rehmapur Wildlife Sanctuary district Hoshiarpur, Punjab), India.

Sl. No.	Species	Common Name	Relative abundance
	Family : Papilionidae		
	Subfamily : Papilioninae		
1	*Papilio polytes romulus* Cramer	Common Mormon	Less Common
2	*Papilio demoleus demoleus* Linnaeus	Lime Butterfly	Less Common
	Family : Pieridae		
	Subfamily : Pierinae		
3	*Cepora nerissa phryne* (Fabricius)	Common Gull	Common
4	*Pieris brassicae nepalensis* Linnaeus	Large Cabbage White	Less Common
5	*Pieris canidia indica* Evans	Indian Cabbage White	Common
6	*Anapheis aurota aurota* (Fabricius)	Pioneer	Common
7	*Ixias pyrene kausala* Moore	Yellow Orange Tip	Common
8	*Leptosia nina nina* (Fabricius)	Psyche	Less Common
	Subfamily : Coliadinae		
9	*Colias fieldi edusina* Butler	Dark Clouded Yellow	Less Common
10	*Eurema hecabe fimbriata* (Wallace)	Common Grass Yellow	Common
11	*Catopsilia crocale crocale* (Cramer)	Common Emigrant	Common
12	*Catopsilia pyranthe minna* (Herbst)	Mottled Emigrant	Common
	Family : Nymphalidae		
	Subfamily : Danainae		
13	*Danaus chrysippus chrysippus* (Linnaeus)	Plain Tiger	Common
14	*Danaus genutia genutia* (Cramer)	Common Tiger	Less Common
15	*Euploea core core* (Cramer)	Common Indian Crow	Common
16	*Euploea mulciber mulciber* (Cramer)	Blue-Spotted Crow	Uncommon
17	*Parantica aglea melanoides* Moore	Glassy Tiger	Uncommon
	Subfamily : Satyrinae		
18	*Mycalesis mineus mineus* Linnaeus	Dark-brand Bushbrown	Common
19	*Ypthima hübneri* Kirby	Common Four-Ring	Uncommon
20	*Melanitis leda ismene* (Cramer)	Common Evening Brown	Less Common
21	*Lethe rohria rohria* (Fabricius)	Common Treebrown	Uncommon
	Subfamily : Nymphalinae		
22	*Vanessa indica indica* (Herbst)	Indian Red Admiral	Uncommon
23	*Phalanta phalantha phalantha* (Drury)	Common Leopard	Common
24	*Hypolimnas bolina* (Linnaeus)	Great Eggfly	Uncommon

Table 1 Contd.

Sl. No.	Species	Common Name	Relative abundance
25	*Hypolimnas misippus* (Linnaeus)	Danaid eggfly	Uncommon
26	*Junonia lemonias persicaria* Fruhstorfer	Lemon Pansy	Less Common
27	*Junonia hierta hierta* (Fabricius)	Yellow Pansy	Less Common
28	*Junonia almana almana* (Linnaeus)	Peacock Pansy	Less Common
29	*Junonia atlites* (Linnaeus)	Grey Pansy	Uncommon
30	*Junonia iphita siccata* (Stichel)	Chocolate Pansy	Less Common
31	*Junonia orithya swinhoei* Butler	Blue Pansy	Less Common
32	*Cynthia cardui* (Linnaeus)	Painted Lady	Uncommon
33	*Ariadne merione tapestrina* (Moore)	Common Castor	Common
34	*Neptis hylas astola* Moore	Common Sailer	Common
35	*Athyma perius* (Linnaeus)	Common Sergeant	Less Common
36	*Kallima inachus hugeli* (Kollar)	Orange Oakleaf	Uncommon
37	*Symbrenthia hippoclus khasiana* Moore	Khasi Common Jester	Uncommon
	Subfamily : Libytheinae		
38	*Libythea myrrha sanguinalis* Fruhstorfer	Club Beak	Uncommon
	Family : Lycaenidae		
	Subfamily : Polyommatinae		
39	*Lampides boeticus* (Linnaeus)	Pea Blue	Less Common
40	*Castalius rosimon rosimon* (Fabricius)	Common Pierrot	Common
41	*Zizeeria karsandra* (Moore)	Drak grass blue	Uncommon
42	*Pseudozizeeria maha maha* (Kollar)	Pale Grass Blue	Common
43	*Freyeria putli* (Kollar)	Grass Jewel	Less Common
44	*Catochrysops strabo* (Fabricius)	Forget-me-not	Less Common
45	*Euchrysops cnejus cnejus* (Fabricius)	Gram Blue	Less Common
46	*Zizina otis* (Fabricius)	Lesser Grass Blue	Uncommon
47	*Tarucus alteratus* Moore	The Striped Pierrot	Uncommon
48	*Prosotas nora ardates* (Moore)	Common Line Blue	Uncommon
49	*Azanus ubaldus* (Cramer)	Bright Babul Blue	Uncommon
	Subfamily : Theclinae		
50	*Rapala iarbus sorya* (Kollar)	Common Red flash	Uncommon
	Family : Hesperiidae		
	Subfamily : Hesperiinae		
51	*Pelopidas mathias mathias* (Fabricius)	Small Branded Swift	Common
52	*Potanthus pallida* (Evans)	The Common Dart	Less Common

biology and conservation of butterflies in Punjab in general and at Takhni Rehmapur WLS in particular.

SUMMARY

A preliminary study on the butterfly diversity of Takhni Rehmapur Wildlife Sanctuary (Hoshiarpur, Punjab) India was conducted on 12-13 November 2011 and 10-11 November 2013. A total of 52 species belonging to 41 genera of five families were recorded including *Libythea myrrha sanguinalis* Fruhstorfer and *Euploea mulciber mulciber* Cramer, which are new to the butterfly fauna of Punjab. Species richness was greatest for the family Nymphalidae with 26 species, followed by Lycaenidae 12 species, Pieridae 10 species, and Papilionidae and Hesperiidae with 2 each. An analysis of relative abundances revealed that of the 52 species reported, 16 were classed as common, 18 as less common and the remaining 18 species as uncommon.

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