



Butterflies of Kedarnath Musk Deer Reserve, Garhwal Himalaya, India

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Abstract: A checklist of 147 species of butterflies recorded from Kedarnath Musk Deer Reserve in Chamoli and Rudraprayag districts of Uttarakhand state in India, studied during May 2006 - September 2008 is given along with their seasonality, altitudinal distribution and relative abundance in the study area.

Keywords: Broad leaved forest, butterflies, moist temperate, seasonality, Western Himalaya

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INTRODUCTION

Kedarnath Musk Deer Reserve (KMDR) was created in 1972 and is situated 300 km north of Delhi, covering an area of 975km². This sanctuary lies in the catchment of Alaknanda river, which is a major tributary of the upper reaches of the Ganga. It is bounded to the north by a range of peaks i.e. Chaukhamba (7,068m) and Kedarnath (above 6,000m) and in the south by Mandal-Okhimath road varying from 1,100-2,870m (Fig. 1). The climate in the Reserve is considerably influenced by south west-monsoon in summer. Of the mean annual precipitation of 2,665mm and 3,093mm at 1,400m and 3,053m, respectively, in the main study area (Fig. 1), 80% falls during June and September and 11% as snow between December and March. Temperatures are highest in May-June before the arrival of monsoon, and are lowest in the first week of January. The highest and lowest temperatures recorded at 3,050m were 25.0°C and -10°C, respectively. The Reserve is snow bound for three months in the year, following heavy snowfall in December (Green 1986; Pande et al. 2001).

A great variety of vegetation types occur in the reserve, reflecting the complex and diverse climate, geology and topography of the region. The forests here stretch over the mountain slopes in large, dense and continuous patches with closed canopy. Besides, high rainfall, lichens on oak trees, dwarf bamboo, numerous fresh water streams and high plant diversity with more than 650 plant species (Semwal & Gaur 1981; Pande et al. 2001; Singh et al. 2009) are the characteristics of the study area. Interestingly, the distribution of at least seven of 252 bird species found in the study area is known only from much further east in central Nepal (Myers & Singh 2006; Singh & Singh 2007). The sub-tropical, moist-temperate, sub-alpine and alpine zones in the reserve are reflected along an altitudinal gradient, while the tropical zone is absent, as per the classification of Champion & Seth (1968). The sub-tropical zone consists of mixed 'broad-leaved' forest with Ban Oak (*Quercus leucotrichophora*) and Moru Oak (*Q. dilatata*) (1,500-2,750m), with *Rhododendron arboreum* often constituting a second under storey. Below these lie impenetrable thickets of Bamboo (*Thamnocalamus* sp.), Elm (*Ulmus wallichiana*), Horse Chestnut (*Aesculus indica*), Bird Cherry (*Prunus padus*), Hazel (*Corylus colurna*), Maple (*Acer* sp.) which are absent from the lower altitudes, are often associated with moru oak. The temperate zone consists of Karsu Oak (*Q. semecarpifolia*) forest (2,500-3,300m) along with Maple (*Acer caecium*), *Meliosma dilleniaeifolia*, Rowan (*Sorbus lanata*), Yew (*Taxus baccata*) along with thickets of a Bamboo (*T. spathiflorus*) and conifer forest with mainly West Himalayan Silver Fir, *Abies pindrow* (2,600-3,400m) and *Rhododendron arboreum*. The Sub-alpine zone consists of Birch (*Betula utilis*), Dwarf *Rhododendron* (*R. campanulatum*), Scrub Forest (3,100-3,350m) intermingled with dense clumps of bamboo (*T. spathiflorus*). The Alpine zone (3,350-3,500m) consists of *R. campanulatum* scrub above which lie the 'pastures' (above 3,500m) that are dominated by the herb community *Danthonia cumminsii*, shrubs like *Rhododendron lepidotum*, *R. barbatum* and forbs *Bistorta* sp. (Green 1986).

Butterflies of KMDR have not been previously documented. Published literature from Garhwal Himalaya pertains mainly to areas lying south of KMDR, Dehradun and Tehri Garhwal districts (Mackinnon & De Nicéville 1899; Ollenbach 1930; Evans 1932; Singh & Bhandari 2003) and from adjoining areas of Kumaon Himalaya, Almora and Nainital districts (Doherty 1886; Hannington 1910). Besides, 35 species have been



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recorded from Nanda Devi National Park (Fig. 1), lying in the Garhwal Himalaya bordering Kumaon (Baindur 1993; Uniyal 2004).

MATERIALS AND METHODS

The study area lies in the south-eastern part of KMDR between 30°27'72"-30°29'29"N & 79°08'82"-79°17'90"E (Fig. 1). Butterflies were sampled from 13 May 2006 to 6 September 2008 using Pollard walk (Pollard et al. 1975; Walpole & Sheldon 1999). Besides photographing butterflies, voucher specimens were also collected of species that could not be identified in the field. Ten transects of 2km each were trekked, for 1.5h each, on forest trails and Mandal - Okhimath road for sampling butterflies, which was done once in two months on the following trails/routes: Mandal (1,528m) - Anusuya Devi Temple (2,100m), Mandal - Kanchula Kharak (2,660m), Kanchula Kharak - Chopta (2,870m), Chopta - Tunganth Temple (3,486m) - Chandrashila Peak (3,621m), Maku bend (2,250m) - Maku Math road (2000m) and Duggal Bitta (2,465m) - Tala Village (1,700m). Relative abundance of each species was estimated by adding up the total counts of each individual species for the entire sampling period for all the 10 transects combined. The species counts were then categorized into four groups: rare, uncommon, fairly common and very common, in increasing order of abundance, based on the quartile divisions, from first quartile (Q1) to fourth Quartile (Q4), respectively.

Identification of butterflies was done using the following literature: Marshall & de Nicéville (1882), Moore (1890-1905), Swinhoe (1905-1913), Evans (1932), Talbot (1939, 1947),

Wynter-Blyth (1957), D' Abrera (1982, 1985 and 1986), Smith (1989), Haribal (1992) Kunte (2000) and Kehimkar (2008) and also by comparison with identified specimens at the 'National Insect Reference Collection', Entomology Division, Forest Research Institute, Dehradun, India. The classification followed here is based on Ackery (1984).

RESULTS AND DISCUSSION

A total of 3617 individuals of 147 species of butterflies were recorded during eleven sampling surveys carried out in KMDR (Table 1). Butterflies were abundant from late April to September. The individual species count for the entire sampling period for all the transects combined, varied from 1 to 522 individuals. The four groups were then differentiated as 'rare' or Q1 = 1; 'uncommon' or Q2 = 2-4; 'fairly common' or Q3 = 5-14; 'very common' or Q4 = 15-522, respectively (median = 3).

Findings included one important range extension into the western Himalayas, the Brown Gorgon, *Meandrusa lachinus* (Fruhstorfer) syn. *M. gyas gyas* (Westwood), from north-east India (Singh 2006). Besides, the Bi-spot Royal *Ancema ctesia ctesia* (Hewitson), and the Powdery Green Sapphire *Heliophorous tamu tamu* (Kollar) were also recorded here west of Kumaon, the previous western limit of the distribution of these species in the Himalaya (Wynter-Blyth 1957; Smith 1989; Varshney 1997). Twelve species (marked with an asterisk in the appendix) are listed in Schedules I, II & IV of the Indian Wild life (Protection) Act (1972) as amended up to 2006 (Anon 2006). Except for the Lofty Bath White *Pontia callidice*, Common Silverstripe *Fabriciana kamala*, Azure Sapphire *Heliophorus androcles moorei* and Golden Sapphire *H. brahma*, the remainder of the 35 species recorded from Nanda Devi National Park (Baindur 1993; Uniyal 2004), were recorded in the present study.

The number of species of swallowtails (Papilionidae) in an area is an indicator of the over-all species richness of butterflies any where in the Indian Sub-continent (Singh & Pandey 2004). By taking the 'Papilionidae' species proportion as 7.4% of the total number of species occurring in an area in the Western Himalayas (Singh & Pandey 2004) the number of species in the study area, where 13 species of 'Papilionidae' were sampled, was estimated to be ca. 176 species as per this methodology. The present figure of 147 species recorded in the study area in KMDR is ca. 83% of the total number of species estimated in the area. Families, especially, 'Lycaenidae' and 'Hesperiidae' were under represented, judging from their species proportions of the five major families in the total number of species found in the Western Himalayas (Singh & Pandey 2004). One reason for recording less number of species than estimated could be that only 10-15 percent of the land area in KMDR was sampled due to inaccessible terrain and low lying areas (below 1,300m) under agriculture and high altitude alpine habitats (above 3,800m) were left out. Although sampling was done during every month from March-mid December, however sampling intensity was low as the total sampling period was only 43 days within the two year study period, which could be another reason for missing a number of species.

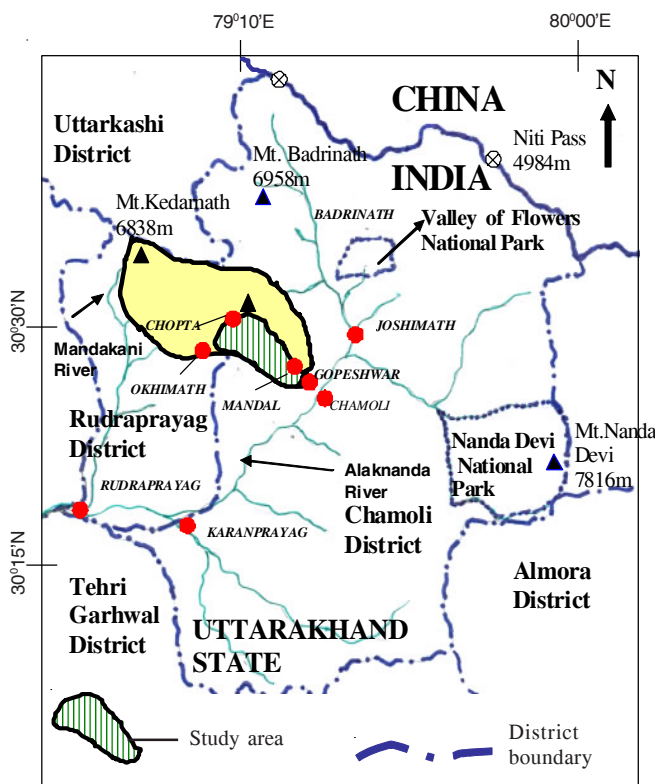


Figure 1. Map of Chamoli and Rudraprayag districts in Garhwal, Uttarakhand state, depicting the location of the study area in Kedarnath Musk Deer Reserve and sites as mentioned in the text.

Table 1. Systematic list of butterflies (Rhopalocera) recorded from Kedarnath Musk Deer Reserve, Chamoli and Rudraprayag districts, Uttarakhand, India (May 2006 - September 2008)

Species	Common Name	Month	Altitudinal range	Relative abundance	
A. Super family: Papilionoidea					
I Family: Papilionidae (Swallowtails)					
a. Sub-family: Parnassiinae					
1	<i>Parnassius hardwickei</i> Gray	Common Blue Apollo	June	3,600m	Rare
b. Sub-family: Papilioninae					
2	<i>Troides aeacus aeacus</i> Felder & Felder	Golden Birdwing	April-July	1500-2000m	Fairly common
3	<i>Atrophaneura polyeuctes letincius</i> Fruhstorfer	Common Windmill	April-May;Sept	1500m-1800m	Uncommon
4	<i>Atrophaneura dasarada ravana</i> Moore	Great Windmill	April-May	1500m	Uncommon
5	<i>Atrophaneura latreillei latreillei</i> Donovan	Rose Windmill	June-July	1500-2000m	Very common
6	<i>Atrophaneura aidoneus</i> Doubleday	Lesser Batwing	April-May; Sept.	1500-2200m	Uncommon
7	<i>Papilio protenor protenor</i> Cramer	Spangle	April-May;Sept.	1500-1800m	Uncommon
8	<i>Papilio bianor polyctor</i> Boisduval	Common Peacock	April-Sept.	1500m	Fairly common
9	<i>Papilio polytes romulus</i> Cramer	Common Mormon	Sept.-Oct.	1500m	Uncommon
10	<i>Papilio machaon</i> Linnaeus	Common Yellow Swallowtail	Sept.-Oct.	1500m	Uncommon
11	<i>Pazala eurous cashmirensis</i> Rothschild	Sixbar Swordtail	April-May	2000-2300m	Fairly common
12	<i>Graphium cloanthus cloanthus</i> Westwood	Glassy Blue Bottle	April-May; Sept-Oct.	1500m	Fairly common
13	<i>Meandrusa lachinus</i> Fruhstorfer*	Brown Gorgon	April-Oct.	1600-2300m	Fairly common
II Family: Pieridae (White and Yellows)					
a. Sub-family: Pierinae					
14	<i>Pieris daplidice moorei</i> Röber	Bath White	April-Sept.	1500-1800m	Uncommon
15	<i>Pieris montana ajaka</i> Moore	Mountain Green-veined White	June-July	1500-2000m	Very common
16	<i>Pieris canidia indica</i> Evans	Indian Cabbage White	June-Oct.	1500-2000m	Very common
17	<i>Pieris brassicae</i> Linnaeus	Large Cabbage White	April, Oct.	1500-1700m	Very common
18	<i>Aporia leucodice soracta</i> Moore	Himalayan Black Vein	June-July	1500-1800m	Fairly common
19	<i>Aporia agathon caphusa</i> Moore	Great Black Vein	May-July	1500m	Very common
20	<i>Delias belladonna horsfieldii</i> Gray	Hill Jezebel	April-Oct.	1500-1700m	Fairly common
b. Sub-family: Coliadinae					
21	<i>Catopsilia pomona</i> Fabricius	Common Emigrant	April; Sept.-Oct.	1500m	Uncommon
22	<i>Catopsilia pyranthe</i> Linnaeus	Mottled Emigrant	Nov.	1500m	Uncommon
23	<i>Gonepteryx rhamni nepalensis</i> Doubleday	Common Brimstone	April-Nov.	1500-2000m	Very common
24	<i>Eurema blanda silhetana</i> Wallace	Three Spot Grass Yellow	July, Sept.-Oct.	1500-1800m	Very common
25	<i>Eurema brigitta rubella</i> Wallace	Small Grass Yellow	Sept.-Oct.	1500m	Fairly common
26	<i>Colias fieldii</i> Menétris	Dark Clouded Yellow	April-Nov.	1500-3400m	Very common
27	<i>Colias erate</i> Esper	Pale Clouded Yellow	March	1800-2200m	Uncommon
III Family: Lycaenidae					
a. Sub-family: Curetinae					
28	<i>Curetis bulis</i> Westwood	Bright Sunbeam	June-July;Sept	1700m	Uncommon
b. Sub-family: Theclinae					
29	<i>Chrysozephyrus syla</i> Kollar	Silver Hairstreak	Sept.	2500m	Rare
30	<i>Chrysozephyrus birupa</i> Moore	Fawn Hairstreak	June-July;Sept.	2000m	Uncommon
31	<i>Euaspa ziha</i> Hewitson	White Spotted Hairstreak	May	2100m	Rare
32	<i>Chaetoprocta odata</i> Hewitson	Walnut Blue	May	1500m	Uncommon
33	<i>Arhopala rama rama</i> Kollar	Dark Himalayan Oakblue	June, Nov.	1500-2000m	Uncommon
34	<i>Panchala paraganesa paraganesa</i> de Nicéville	Dusky Bushblue	June-July	2000m	Uncommon
35	<i>Spindasis nipalicus nipalicus</i> Moore	Silver-grey Silverline	May	1500m	Uncommon
36	<i>Tajuria diaeus</i> Hewitson*	Straightline Royal	Nov.	1500-2000m	Uncommon
37	<i>Ancema ctesia ctesia</i> Hewitson	Bi-spot Royal	July-Oct.	1500-1600m	Uncommon
38	<i>Pratapa iceta icetas</i> Hewitson*	Dark Blue Royal	May	1800m	Rare
39	<i>Chliaria kina kina</i> Hewitson*	Blue Tit	Oct.	1650m	Rare
40	<i>Deudorix epijarbas ancus</i> Fruhstorfer	Cornelian	Nov.	1700m	Rare
41	<i>Rapala selira</i> Moore	Himalayan Red Flash	April-May	1800m	Very common
c. Sub-family: Lycaeninae					
42	<i>Lycaena pavana</i> Kollar	White-bordered Copper	April-July; Nov.	1500-2800m	Fairly common
43	<i>Lycaena phlaeas indicus</i> Evans	Common Copper	May-June	3000m	Fairly common
44	<i>Heliophorus tamu tamu</i> Kollar	Powdery Green Sapphire	April-Oct.	1500-2700m	Very common
45	<i>Heliophorus sena</i> Kollar	Sorrel Sapphire	Sept.- Nov.	1500-1700m	Very common
d. Sub-family: Polyommatainae					
46	<i>Everes diporides</i> Chapman*	Chapman's Cupid	April;Sept.	1500-2000m	Uncommon
47	<i>Acytrolepis puspa gisca</i> Fruhstorfer	Common Hedge Blue	June-July; Oct.-Nov.	1500-2400m	Very common
48	<i>Celatoxia marginata</i> de Nicéville	Margined Hedge Blue	June	2000m	Fairly common
49	<i>Udara dilecta</i> Moore	Pale Hedge Blue	July	1800-2400m	Very common
50	<i>Udara albocaerulea</i> Moore	Albocerulean	May	1600m	Rare
51	<i>Celastrina gigas</i> Hemming	Silvery Hedge Blue	April-June; Sept-Oct.	1500-2400m	Very common
52	<i>Celastrina huegeli</i> Moore	Large Hedge Blue	Apr.-Oct.	1500-2200m	Very common
53	<i>Celastrina argiolus</i> Linnaeus	Hill Hedge Blue	May	1600m	Fairly common
54	<i>Zizeeria karsandra</i> Moore	Dark Grass Blue	June-July; Sept.-Oct.	1500-1700m	Very common
55	<i>Pseudozizeeria maha maha</i> Kollar	Pale Grass Blue	Sept-Nov	1500-2000m	Very common
56	<i>Lampides boeticus</i> Linnaeus*	Pea Blue	April, July, Nov.	1500-2000m	Fairly common
57	<i>Aricia agestis</i> Denis & Schiffermueller	Orange-bordered Argus	Nov.	2350m	Rare

Species	Common Name	Month	Altitudinal range	Relative abundance	
e. Sub-family: Riodininae					
58	<i>Dodona eugenes eugenes</i> Bates	Tailed Punch	April-May; Oct.	1800-2000m	Uncommon
59	<i>Dodona dipoea nostia</i> Fruhstorfer*	Lesser Punch	May-June;Sept	1400-2,000m	Fairly common
60	<i>Dodona durga</i> Kollar	Common Punch	May-June; Sept.-Oct.	1500-1800m	Fairly common
61	<i>Zemerus flegyas indicus</i> Fruhstorfer	Punchinello	April	1600-1800m	Rare
62	<i>Abisara fylla</i> Doubleday	Dark Judy	May; Sept.-Oct.	1500-1800m	Fairly common
IV Family: Nymphalidae					
a. Sub family: Satyrinae					
63	<i>Mycalesis nicotia</i> Westwood	Bright-eye Bushbrown	June-July	1750m	Rare
64	<i>Mycalesis perseus blasius</i> Fabricius	Common Bushbrown	Sept.	1400-1700m	Fairly common
65	<i>Mycalesis francisca sanatana</i> Moore	Liaccine Bushbrown	April-May	2000-2200m	Uncommon
66	<i>Lethe sidonis vaivarta</i> Doherty	Common Woodbrown	July, Sept.	1500-1700m	Very common
67	<i>Lethe maitrya</i> de Nicéville	Barred Woodbrown	June-July	2000-2500m	Fairly common
68	<i>Lethe siderea</i> Marshall	Scarce Woodbrown	June-July	1700-2400m	Uncommon
69	<i>Lethe insana insana</i> Kollar	Common Forester	May;Sept	2000-2200mm	Uncommon
70	<i>Lethe verma verma</i> Kollar	Straight-banded Treebrown	June-Sept.	1500-1800m	Very common
71	<i>Lethe baladeva aisa</i> Fruhstorfer	Treble Silverstripe	June	2000m	Rare
72	<i>Zophoessa goalpara narkanda</i> Fruhstorfer	Large Goldenfork	Sept.	2200m	Rare
73	<i>Neope yama yama</i> Moore	Dusky Labyrinth	Sept.	2000m	Rare
74	<i>Neope pulaha pulaha</i> Moore	Veined Labyrinth	April -July	1500-1800m	Uncommon
75	<i>Melanitis phedima galkissa</i> Fruhstorfer	Dark Evening Brown	Oct.	1600m	Rare
76	<i>Dallacha hyagriva hyagriva</i> Moore	Brown Argus	Sept.	1700m	Rare
77	<i>Callerebia annada caeca</i> Watkins	Ringed Argus	May-July;Sept	1600-2500m	Very common
78	<i>Callerebia hybrida</i> Butler ?	Hybrid Argus	June-July	1500-2300m	Very common
79	<i>Callerebia scanda scanda</i> Kollar	Pallid Argus	Sept.-Oct.	1800-2000m	Uncommon
80	<i>Callerebia nirmala nirmala</i> Moore	Common Argus	July	1500m	Very common
81	<i>Ypthima nareda nareda</i> Kollar	Large Three Ring	May;Sept	1700-2000m	Uncommon
82	<i>Ypthima sakra nikaea</i> Moore	Himalayan Five Ring	April-Oct.	1500-2300m	Very common
83	<i>Ypthima baldus baldus</i> Fabricius	Common Five Ring	June	1500-1700m	Uncommon
84	<i>Ypthima indecora</i> Moore	Western Five Ring	March-May;Sept	1500-2200m	Fairly common
85	<i>Orinoma damaris</i> Gray	Tiger Brown	July-Nov.	1600-2000m	Fairly common
86	<i>Raphicera moorei</i> Butler	Small Tawny Wall	July	2300m	Uncommon
87	<i>Pararge schakra</i> Kollar	Common Wall	June-Oct.	1700-2500m	Fairly common
88	<i>Aulocera swaha swaha</i> Kollar	Common Satyr	April-Oct.	1800-2000m	Very common
89	<i>Aulocera loha</i> Doherty	Great Satyr	July-Sept.	2000m	Fairly common
90	<i>Aulocera brahminus dokwana</i> Evans	Narrow Banded Satyr	July- Sept.	3,500m	Rare
b. Sub-family: Charaxinae					
91	<i>Polyura dolon dolon</i> Westwood	Stately Nawab	May	2700m	Rare
c. Sub-family: Apaturinae					
92	<i>Dilipa morgiana</i> Westwood *	Golden Emperor	March	1600m	Rare
93	<i>Sephisia dichroa</i> Kollar	Western Courtier	May-Oct.	1500-2000m	Fairly common
94	<i>Apatura ambica ambica</i> Kollar	Indian Purple Emperor	Sept.	1700m	Rare
95	<i>Dichorragia nesimachus</i> Boisduval	Constable	May	1500-2400m	Rare
96	<i>Stibochiona nicea nicea</i> Gray	Popinjay	April-May; Sept.-Oct.	1600-1700m	Uncommon
d. Sub-family: Nymphalinae					
97	<i>Auzakia danava</i> Moore	Commodore	April-May	1600-2000m	Uncommon
98	<i>Athyma asura asura</i> Moore	Studded Sergeant	Sept.-Oct.	2000m	Rare
99	<i>Athyma selenophora</i> Moore	Staff Sergeant	Nov.	1500m	Rare
100	<i>Athyma opalina opalina</i> Kollar	Himalayan Sergeant	April-Nov.	1500-2400m	Very common
101	<i>Neptis ananta ananta</i> Moore	Yellow Sailer	April-July	1500-1800m	Fairly common
102	<i>Neptis soma butleri</i> Eliot		April-May; Sept.-Oct.	1500-2000m	Very common
103	<i>Neptis mahendra</i> Moore	Himalayan Sailer	April-Oct.	1500-2000m	Very common
104	<i>Neptis sappho astola</i> Moore	Pallas' Sailer	April	1500-2000m	Common
105	<i>Neptis sankara sankara</i> Kollar	Broad-banded Sailer	May;Sept	1400-1800mm	Uncommon
106	<i>Cyrestis thyodamas ganescha</i> Kollar	Common Map	May-Oct.	1500-1700m	Fairly common
107	<i>Hypolimnas misippus</i> Linnaeus	Danaid Eggfly	Sept.	1700m	Uncommon
108	<i>Kallima inachus huegeli</i> Kollar	Orange Oakleaf	April-Sept.	1500-1700m	Uncommon
109	<i>Pseudergolis wedah</i> Kollar	Tabby	May-June; Sept.-Oct.	1500-2000m	Fairly common
110	<i>Phalantha phalantha</i> Drury	Common Leopard	September	1700m	Rare
111	<i>Precis iphita iphita</i> Cramer	Chocolate Soldier	April-Oct.	1500-2000m	Very common
112	<i>Cynthia cardui</i> Linnaeus	Painted Lady	April-June; Nov.	1500-3700m	Very common
113	<i>Kaniska canace himalaya</i> Evans	Blue Admiral	June-Oct.	1500-3000m	Uncommon
114	<i>Vanessa indica indica</i> Herbst	Indian Red Admiral	April-June; Sept.-Nov.	1500-1800m	Very common
115	<i>Aglais cashmirensis aesis</i> Fruhstorfer	Indian Tortoiseshell	April-May; Sept.-Oct.	1500-3700m	Very common
116	<i>Nymphalis xanthomelas fervescens</i> Stichel	Large Tortoiseshell	April-May	3600m	Uncommon
117	<i>Polygonia egea agnicula</i> Moore	Eastern Comma	August-Oct.	2700-3500m	Uncommon
118	<i>Symbrenthia lilaea khasiana</i> Moore	Common Jester	May; Sept.-Nov.	1500-1800m	Fairly common
119	<i>Symbrenthia hypselis cotanda</i> Moore	Spotted Jester	April-Oct.	1500-2000m	Fairly common
120	<i>Symbrenthia brabira</i> Moore	Himalayan Jester	April-Oct.	1500-1800m	Uncommon
121	<i>Argyreus hyperbius hyperbius</i> Linnaeus	Indian Fritillary	April	1700m	Fairly common
122	<i>Childrena childreni</i> Gray	Large Silverstripe	Sept.-Oct.	1500-1800m	Rare
123	<i>Issoria issaea</i> Moore	Queen of Spain Fritillary	April-July	1700-3500m	Fairly common
124	<i>Euthalia patala patala</i> Kollar	Grand Duchess	June-July	1600-2000m	Fairly common

	Species	Common Name	Month	Altitudinal range	Relative abundance
e. Sub-family: Acraeinae					
125	<i>Pareba vesta</i> Fabricius	Yellow Coster	Aug.-Sept.	1400-1500m	Uncommon
f. Sub-family: Danainae					
126	<i>Parantica sita</i> Kollar	Chestnut Tiger	April-Oct.	1500-2200m	Very common
127	<i>Danaus genutia</i> Cramer	Common Tiger	May	1500m	Rare
128	<i>Euploea mulciber mulciber</i> Cramer*	Striped Blue Crow	April-July	1500m	Uncommon
129	<i>Euploea core core</i> Cramer	Common Indian Crow	Sept.-Oct.	1500m	Rare
g. Sub-family: Libytheinae					
130	<i>Libythea lepita lepita</i> Moore*	Common Beak	April-May	1500-1800m	Uncommon
B. Super Family: Hesperioidea					
I Family: Hesperidae					
a. Sub-family: Coeliadinae					
131	<i>Bibasis jaina jaina</i> Moore	Orange Awlet	Nov.	1700 m	Rare
132	<i>Choaspes benjaminii xanthropogon</i> Kollar	Indian Awlking	Sept.	1800-2100m	Uncommon
b. Sub-family: Pyrginae					
133	<i>Celaenorrhinus leucocera leucocera</i> Kollar	Common Spotted Flat	June-July	2000-2500m	Uncommon
134	<i>Celaenorrhinus dhanada</i> Moore	Himalayan Yellow Flat	Sept.	2000m	Rare
135	<i>Celaenorrhinus pero pero</i> de Nicéville	Mussoorie Spotted Flat	June-July	1500-2500m	Very common
136	<i>Tagiades menaka</i> Moore	Spotted Snow Flat	May-July	1500-2000m	Uncommon
137	<i>Pseudocoladenia dan fatih</i> Kollar	Fulvous Pied Flat	June; Sept.-Oct.	1500-2000m	Fairly common
c. Sub-family: Hesperinae					
138	<i>Aeromachus dubius dubius</i> Elwes & Edwards	Dingy Scrub Hopper	Sept.	1700-800 m	Uncommon
139	<i>Sovia grahami</i> Evans	Graham's Ace	May	1700m	Rare
140	<i>Pedesta masuriensis masuriensis</i> Moore	Mussoorie Bush Bob	May	1800m	Rare
141	<i>Notocrypta feisthamelii alysos</i> Moore	Spotted Demon	April-July;Sept	1500-2500m	Fairly common
142	<i>Potanthus dara</i> Kollar	Himalayan Grass Dart	May	1700m	Rare
143	<i>Potanthus pseudomaesa clio</i> Evans	Indian Dart	Sept	1500-1800m	Common
144	<i>Parnara guttatus guttatus</i> Brem.	Straight Swift	Sept.	1500m	Rare
145	<i>Polytremis discreta discreta</i> Elwes & Edwards*	Himalayan Swift	July	1500-1800m	Rare
146	<i>Polytremis eltola</i> Hewitson	Yellow Spot Swift	April-May; Sept.-Oct.	1500-1700m	Common
147	<i>Pelopias mathias mathias</i> Fabricius	Small-branded Swift	July	1700m	Uncommon

*Listed in the Indian Wildlife (Protection) Act 1972.

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Image 1. Moist temperate forest



Image 2. Sub-alpine zone with *Rhododendron campanulatum* shrubberies



Image 3. Orange Awlet, *Bibasis jaina* (upper)

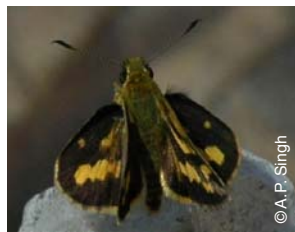


Image 4. Himalayan Dart, *Potanthus dara* (upper)



Image 5. Mussoorie Bush Bob, *Pedesta masuriensis* (under)



Image 6. Straight Swift, *Parnara guttatus* (upper)



Image 7. Yellow-spot Swift, *Polytremis eltola* (under)



Image 8. Common Spotted Flat, *Celaenorrhinus leucocera* (upper)



Image 9. Fulvous-pied Flat, *Pseudocoladenia dan fatih* (upper)



Image 10. Mussoorie Spotted Flat, *Celaenorrhinus pero* (upper)



Image 11. White Spotted Hairstreak, *Euspa ziha* (under)

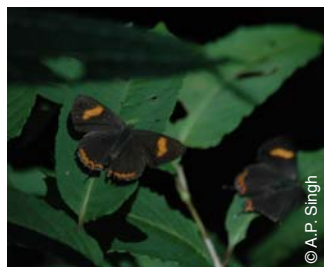


Image 12. Powdery Green Sapphire, *Heliophorus tamu* - females



Image 13. Powdery Green Sapphire, *Heliophorus tamu* - male



Image 14. Sorrel Sapphire, *Heliophorus sena* (under)

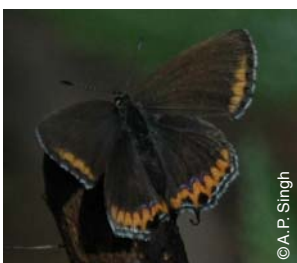


Image 15. Sorrel Sapphire, *Heliophorus sena* (upper)



Image 16. White-bordered Copper, *Lycaena pavana*



Image 17. White-bordered Copper, *Lycaena pavana 2*



Image 18. Alboerulean, *Udara alboerulea* (under)



Image 19. Chapman's Cupid, *Everes diporides*



Image 20. Common Hedge Blue, *Acytolepis puspa* -female (upper)



Image 21. Common Hedge Blue, *Acytolepis puspa* (under)



Image 22. Common Hedgeblue, *Acytolepis puspa* - female (under)



Image 23. Margined Hedge Blue, *Celatoxia marginata* -male (under)



Image 24. Margined Hedge Blue, *Celatoxia marginata* (upper)



Image 25. Pea Blue, *Lampides boeticus* (upper)



Image 26. Silvery Hedge Blue, *Celastrina gigas* (under)



Image 27. Common Punch, *Dodona durga*



Image 28. Dark Judy, *Abisara fylla*



Image 29. Punchinello, *Zemeros flegyas* (upper)



Image 30. Tailed Punch, *Dodona eugenes*



Image 31. Bi-Spot Royal, *Ancema ctesia* (under)



Image 32. Bi-spot Royal, *Ancema ctesia* (upper)



Image 33. Blue Tit, *Chilaria kina*



Image 34. Cornelian, *Deudorix epijarbas* (upper)



Image 35. Cornelian, *Deudorix epijarbas* (under)



Image 36. Dark Himalayan Oakblue, *Arhopala rama*



Image 37. Dark Himalayan Oakblue, *Arhopala rama* (upper)



Image 38. Dusky Bush Blue, *Panchala paraganesa* (under)



Image 39. Himalayan Red Flash, *Rapala selira* (under)



Image 40. Himalayan Red Flash, *Rapala selira* (upper)



Image 41. Silver Hairstreak, *Chrysozephyrus syla* male



Image 42. Silver Hairstreak, *Chrysozephyrus syla* M & F



Image 43. Silver Hairstreak, *Chrysozephyrus syla* male - 3



Image 44. Straightline Royal, *Tajuria diaeus* Female (upper)



Image 45. Straightline Royal, *Tajuria diaeus* Male (under)



Image 46. Straightline Royal, *Tajuria diaeus* Male (upper)



Image 47. Yellow Coster, *Pareba vesta* (upper)



Image 48. Golden Emperor, *Dilipa morgiana* (upper)



Image 49. Popinjay, *Stibochiona nicea* (under)



Image 50. Western Courtier, *Sephisa dichroa*



Image 51. Chestnut Tiger, *Parantica sita*



Image 52. Common Indian Crow, *Euploea core*



Image 53. Common Beak, *Libythea lepita* (upper)



Image 54. Blue Admiral, *Kaniska canace* (upper)



Image 55. Chocolate Soldier, *Precis iphita* (upper)



Image 56. Common Jester, *Symbrenthia lilaea* (under)



Image 57. Common Map, *Cyrestis thyodamas* (upper)



Image 58. Pallas' Sailor, *Neptis sappho astola* (upper)

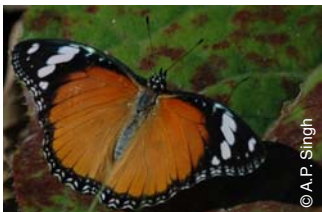


Image 59. Danaid Eggfly, *Hypolimnna misippus* (form *inaria*) (upper)



Image 60. Eastern Comma, *Polygonia egea agnicula* (upper)



Image 61. Grand Duchess, *Euthalia patala* (upper)



Image 62. Himalayan Jester, *Symbrenthia brabira* (upper)



Image 63. Himalayan Jester, *Symbrenthia brabira*



Image 64. Himalayan Sailer, *Neptis mahendra* (under)



Image 65. Himalayan Sailer, *Neptis mahendra* (upper)

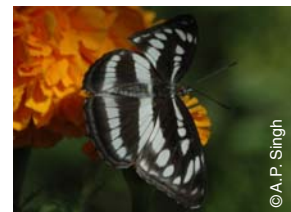


Image 66. Himalayan Sergeant, *Athyma opalina* (upper)



Image 67. Indian Fritillary, *Argyreus hyperbius* female (upper)



Image 68. Indian Red Admiral, *Vanessa indica* (upper)



Image 69. Indian Tortoiseshell, *Aglais cashmirensis* (upper)



Image 70. Large Silverstripe, *Childrena childreni* (upper)



Image 71. Large Silverstripe, *Childrena childreni*



Image 72. Large Tortoiseshell, *Nymphalis xanthomelas* (upper)



Image 73. Orange Oak Leaf, *Kallima inachus* (under)



Image 74. Staff Sergeant, *Athyma cama* (upper)



Image 75. Painted Lady, *Cynthia cardui* (upper)



Image 76. Queen of Spain Fritillary, *Issoria lathonia* (upper)



Image 77. Studded Sergeant, *Athyma asura* (under)



Image 78. Tabby, *Psuedergolis wedah* (upper)

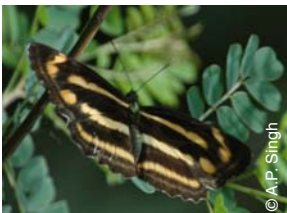


Image 79. Yellow Sailer, *Neptis ananta* (upper)



Image 80. Bright-eye Bushbrown, *Mycalesis nicotia* (under)



Image 81. Bright-eye Bushbrown, *Mycalesis nicotia* (upper)



Image 82. Common Argus, *Callerebia nirmala* (under)

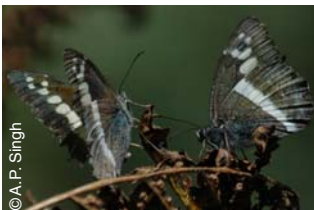


Image 83. Common Satyr, *Aulocera swaha*



Image 84. Common Satyr, *Aulocera swaha* (under)



Image 85. Common Wall, *Pararge schakra* (upper)



Image 86. Common Wood Brown, *Lethe sidonis* (under)



Image 87. Dark Evening Brown, *Melanitis phedima* (upper)



Image 88. Dark Evening Brown, *Melanitis phedima* (under)



Image 89. Dusky Labyrinth, *Neope yama* (upper)



Image 90. Great Satyr, *Aulocera padma* (under)



Image 91. Himalayan Five Ring, *Ypthima sakra*



Image 92. Hybrid Argus, *Callerebia hybrida* (under)



Image 93. Large Goldenfork, *Zophoessa goalpara* (under)



Image 94. Large Goldenfork, *Zophoessa goalpara* (upper)



Image 95. Large Three Ring, *Ypthima nareda* (under)



Image 96. Large Three Ring, *Ypthima nareda* (upper)



Image 97. Narrow-banded Satyr, *Aulocera brahminus* (under)



Image 98. Pallied Argus, *Callerebia scanda* (under)



Image 99. Pallied Argus, *Callerebia scanda* (under)



Image 100. Ringed Argus, *Callerebia annada* (under)



Image 101. Small Tawny Wall, *Raphicera moorei* (upper)



Image 102. Straight-banded Tree Brown, *Lethe verma* (under)

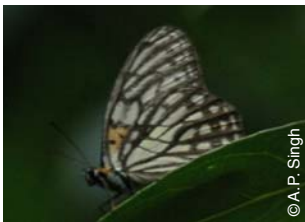


Image 103. TigerBrown, *Orinoma damaris* (upper)



Image 104. Vined Labyrinth, *Neope pulaha* (under)



Image 105. Vined Labyrinth, *Neope pulaha* (upper)



Image 106. Western Five Ring, *Ypthima indecorum* (upper)



Image 107. Brown Gorgon, *Meandrusa lachinus* female



Image 108. Great Windmill, *Atrophaneura dasarada*



Image 109. Common Yellow Swallowtail, *Papilio machaon*



Image 110. Glassy Blue Bottle, *Graphium cloanthus*



Image 111. Golden Birdwing, *Troides aeacus*

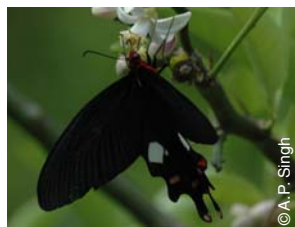


Image 112. Common Windmill, *Atrophaneura polyeuctes*



Image 113. Common Peacock, *Papilio bianor polyctor*

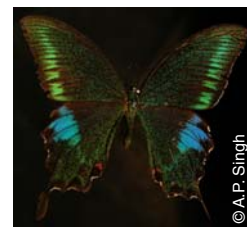


Image 114. Common Peacock, *Papilio bianor polyctor*



Image 115. Rose Windmill, *Atrophaneura latreillei*



Image 116. Spangle, *Papilio protenor*



117. Common Brimstone, *Gonepteryx rhamni*



118. Dark Clouded Yellow, *Colias fieldi*



Image 119. Small Grass Yellow, *Eurema brigitta* (upper)



Image 120. Small Grass Yellow, *Eurema brigitta* (under)



Image 121. Bath White, *Pieris daplidice*



Image 122. Great Black Vein, *Aporia agathon*



Image 123. Hill Jezebell, *Delias belladonna* (upper)



Image 124. Hill Jezebell, *Delias belladonna*



Image 125. Himalayan Black Vein, *Aporia leucodice*



Image 126. Large Cabbage White, *Pieris brassicae*



Image 127. Mountain Green-veined White, *Pieris montana* (under)



Image 128. Mountain Green-veined White, *Pieris montana* (upper)



Image 129. Sixbar Swordtail, *Pazala eurous* (upper)



Image 130. Large Tortoiseshell, *Nymphalis xanthomelas* (upper)



Image 131. Brown Argus, *Dallacha hyagriva* (under)

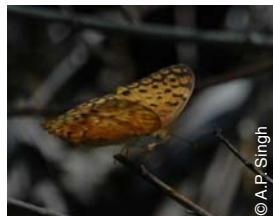


Image 132. Common Leopard, *Phalantha phalantha*



Image 133. Dingy Scrub Hopper, *Aeromachus dubius* (upper)



Image 134. Himalayan Yellow Flat, *Celaenorrhinus dhanada* (upper)



Image 135. Indian Dart, *Potanthus pseudomaesa clio* (upper)

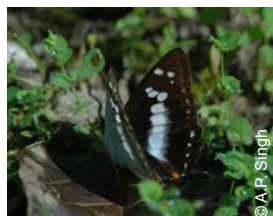


Image 136. Purple Emperor, *Apatura ambica* - female (upper)



Image 137. Red Himalayan Flash, *Rapala selira* (under)

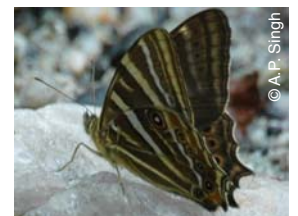


Image 138. Treble Silverstripe, *Lethe baldeva aisa* (under)



Image 139. Common Five Ring, *Ypthima baldus* (under)



Image 140. Golden Birdwing, *Troides aeacus* female (under)



Image 141. Himalayan Five Ring, *Ypthima nikaia* (under)



Image 142. Large Hedge Blue, *Celasrina huegelii* (under)

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