BUTTERFLIES OF RENUKA WILDLIFE SANCTUARY, SIRMAUR DISTRICT, HIMACHAL PRADESH, INDIA

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Introduction

The Renuka Sanctuary (4.03 km^2; 640-950m amsl; 30°35'58" - 30°37'08" N lat. and 77°26'34" - 77°28'21"E long.) lies in the catchment area of the Giri river at Dadahu located near Nahan town in the Sirmaur district of Himachal Pradesh state in the outer ranges of the Western Himalayas. The area forms northern limit of sal (*Shorea robusta*) forests which are replaced by sub-tropical pine (*Pinus roxburghii*) forest in the higher reaches. Besides sal, the vegetation around Renuka lake and in the sanctuary is mainly dry mixed deciduous type (Champion and Seth, 1968) comprising mainly of patches of sal in pure patches and mixed deciduous vegetation.

The major tree species are *Aegle marmelos, Albizia lebbek, Bambusa arundinacea, Bauhinia variegata, Cassia fistula, Dalbergia sissoo, Eugenia jambolana, Ficus religiosa, F. Palmata, Lagerstroemia parviflora, Machilus gamblei, Moringa pterygosperma, Ougeinia dalbergioides, Phoenix humilis, Pistacia integerrima, Pryus pashia, Salix tertrsperma, Salmalia malabarica, Sapium insigne, Terminalia tomentosa,* (Julka and Metha, 2000)*, Acacia catechu, Anogeissus latifolia, Bombax cieba, Cordia myxe. Ehretia* sp. and *Mallotus philippensis.* Important shrubs in the area are *Athatoda vasica, Arisaema wallichianum, Berberis aristata, Cannabis opaca, Girardinia heterophylla, Jasminum, Lantana camara, Rosa sericea, Rhus parviflora, Woodfordia fruticosa,* etc. including a variety of climbers (*Bauhinia vahlii*, *Comberatum decantrum Hedera helix, Porana paniculata,* etc.) in moist depressions and as many as 150 species of herbs, as recorded during the present survey.

The Renuka wetland (Ramsar site no. 1571; 20 ha; 672 m), which lies in the heart of this sanctuary, is also the largest natural fresh water lake in Himachal Pradesh. This wetland is home to at least 443 species of fauna from Protozoa to mammals (ZSI, 2000). Nineteen species of ichthyo-fauna representative of lacustrine ecosystems like *Tor putitora*, *Puntius* sp., *Labeo rohita*, *Rasbora caverii*, *Barilius barila, Channa amphibious*, *Masta-cembelus armatus,* etc. have been recorded over here. The surrounding forest habitat over here is home for 103 species of resident and migratory birds and 24 species of mammals (ZSI, 2000). The entire Renuka Wildlife Sanctuary has been declared as "Abhayaranya" with no rights recognized in this area. In addition, an area of 300 ha which lies outside the sanctuary and is contiguous with its boundary, has been declared as a buffer belt.

However, information about butterfly fauna of Renuka wetland is scanty. Only a small checklist of 39 species of butterflies is known from Renuka Wetland based on observations on 2 species by Kumar and Juneja (1977) and 37 species recorded mostly during September 1992 by Arora (2000). Besides, 70 species are known to occur in the Simbalwara Wildlife Sanctuary (30°24'21" - 30°28'13" N lat. and 77°27'18" - 77°31'26" E long.; 19km^2; 350-700m), located below the Renuka Wildlife Sanctuary on the Shiwaliks, also in Sirmaur District of Himachal Pradesh (Kittur *et al.*, 2006).

Material and Methods

Study Area : Four sites were selected in and around the Renuka Sanctuary for collection of data on butterflies namely :

(i) Forest area on the hill above and trail along the Renuka wetland (East and centre);
(ii) Jogar Ka Khala (North);
(iii) Forest area below Dadahu-Pannar road along the Giri river (West), and
(iv) Kashoga Reserve Forest near Jalal Khud (South) (Fig. 1).

Two sampling surveys were carried out at these sites during November 2007 and June 2008 to collected base line information on the butterflies (fauna).

Sampling : Sampling of butterflies in the sanctuary was carried by taking species wise counts of butterfly individuals by direct count in fixed transect routes (line transects) following the 'Pollard walk' methodology (Pollard *et al.,* 1975; Pollard and Yates, 1993). Sampling was done visually on these transects by walking and counting the total number of individuals of each butterfly species on a transect of 500m for 1 h in a stretch during sunshine. In all 4 line transects of 500 m each were covered at each site totaling to 4 h of sampling period in a day for a particular site. Each of the four sites was thus sampled twice, November 2006 (post-monsoon/early autumn) and June 2007 (pre-monsoon/early monsoon). Butterflies were sampled using 'stratified random sampling'. All the three strata (canopy, middle story and ground level) were sampled for butterflies with the help of binoculars, butterfly nets, and two helpers. Voucher specimens of only those species were collected for identification that could not be identified in the field as destructive sampling was kept to the minimum.

Relative abundance of each species was estimated by adding up the total counts of each individual species for the entire sampling period (November, 2007 and June, 2008) for all the 4 sites 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.

Similarity index (community coefficient) was calculated for determining the number of butterfly species shared between Renuka Sanctuary and two other sites across the region namely, Simbalbara Wildlife Sanctuary and Dehra Dun valley (New Forest). This was determined as per Jaccard's coefficient (Jaccard, 1912) or index of biotic similarity and has been widely used to estimate the similarity in species composition of butterflies between two different sites as given below in pair-wise comparison where its maximum value is 1.0 (Legendre and Legendre, 1983; Southwood and

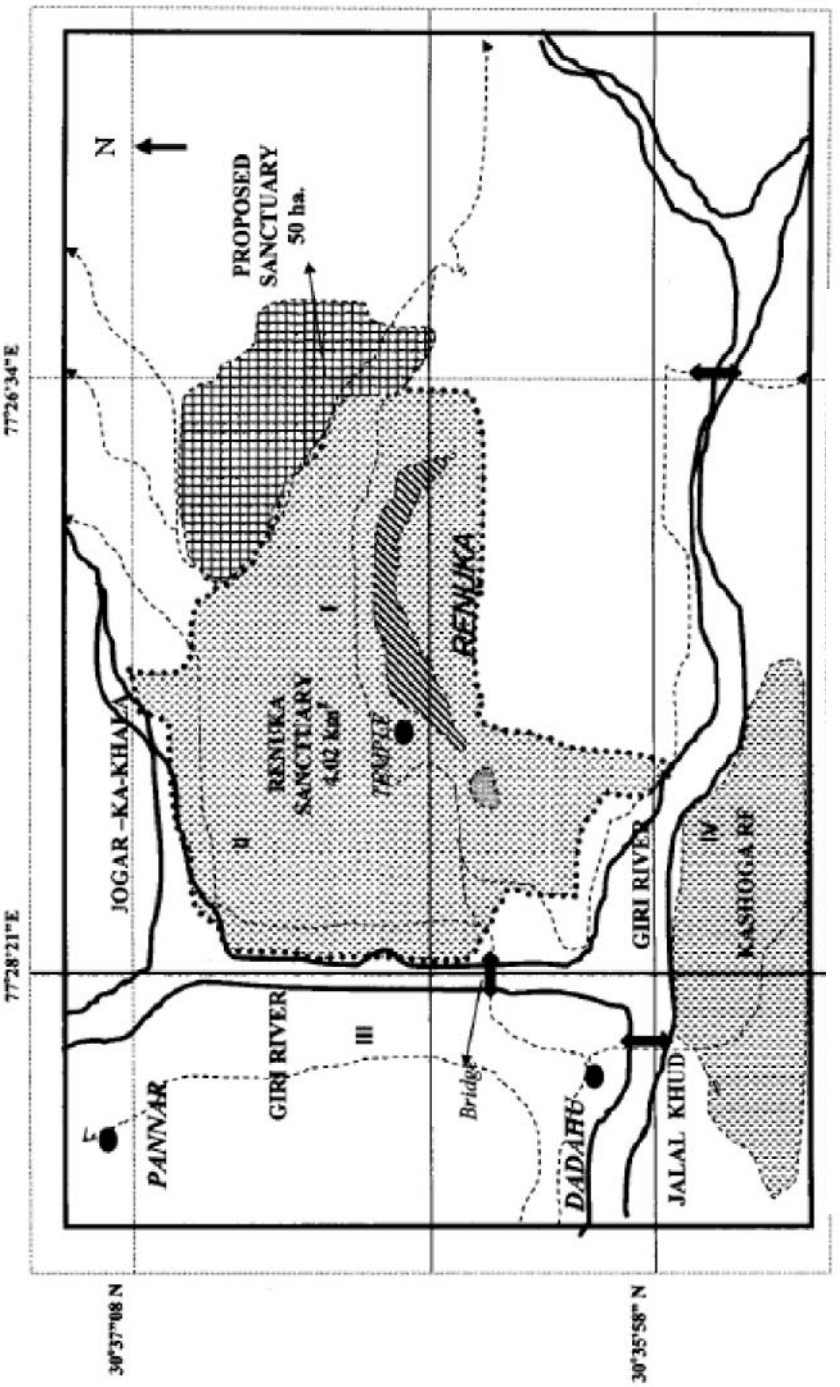

Fig. 1 Renuka Wildlife Sanctuary and the study sites (I - IV)

Henderson, 2000) :

$C_J = J / (a + b - J)$

where :
'J' is the number of common species to both the sites, '
'a' is the number of species in site A and
'b' is the number of species in site B.

Value Cj closer to 1 indicates greater dissimilarity or greater beta diversity and value closer to 0 indicates greater similarity of species and hence low beta diversity between the two sites.

Identification of butterflies was done using the following literature: Evans (1932), Talbot (1939, 1947), Wynter-Blyth (1957), D'Abrera (1982; 1985, 1986), Smith (1989), Haribal (1992) and Kunte (2000).The classification of butterflies followed here is based on Ackery (1984).

Results and Discussion

Relative abundance of species : A total of 1992 individuals of 115 species of butterflies were recorded during two sampling surveys carried out Renuka Wildlife Sanctuary (Appendix I). Butterflies species richness and abundance were both greater during November, 2007 (103 species) than in June, 2008 (33 species). The relative abundance of individual species per transect varied from 1 to 132 individuals in November, 2007 and from 1 to 22 individuals during June, 2008. Low species richness and abundance in June was mainly due to early monsoon rains that year. The most common species during both the samplings was Common Grass Yellow, *Eurema hecabe* followed by Common Sailor, *Neptis hylas*. Based on relative abundance of each species, was categorized into one of the four abundance groups: 'Rare' or Q1 = 1 (relative abundance); 'Uncommon' or Q2 = 2-8; 'Fairly Common' or Q3 = 9-24; 'Very Common' or Q4 = >24-132 respectively (median = 8).

Rare and Protected species : Only one species, the Brown Onyx, *Horaga viola* sampled in the study area is listed as 'rare' throughout its distributional range in India and its food plant is *Coriaria nepalensis* which was also recorded in the study area (Wynter-Blyth, 1957). Besides, seven species, Brown Onyx, *H. viola*; Indigo Flash, *Rapala varuna*; Pea Blue, *Lampides boeticus*; Gaudy Baron, *Euthalia lubentina*; Striped Blue Crow, *Euploea mulciber*; Great Swift, *Peliopidas assamensis*; Large-banded Swift, *P. sinensis*, sampled here, have also been listed in Schedule II and IV of the Indian Wildlife (Protection) Act, 1972 and are thus protected by law. Rest of the other species are of 'common' occurrence common in India. None of the species from Renuka Wildlife Sanctuary has been listed as threatened globally as per the IUCN Red List (IUCN 2007).

Altitudinal winter migrants : A number of species that breed in the adjoining 'moist temperate forest' and 'sub-alpine areas' (above 2,000m amsl) areas were found to come down to Renuka Wildlife Sanctuary during winter (November) to escape the harsh climatic conditions over there. These species were: Tawny Mime, *Chilasa agestor*; Hill Jezebel, *Delias belladonna*; Common Brimstone, *Gonepteryx rhamni*; Dark Clouded Yellow, *Colias erate*; Large Hedge Blue, *Lycaenopsis huegelii*; Common Satyr, *Aulocera swaha*; Tabby, *Psuedergolis wedah*; Large Silverstripe, *Childrena childrena*; Indian Tortoiseshell,

Aglias cashmirensis; Commodore, *Auzakia danava*; Chestnut Tiger, *Prantica sita* and Himalayan Dart, *Potanthus dara*.

Species similarity of Renuka Wildlife Sanctuary with other areas in the region : Only 49 species from Renuka Wildlife Sanctuary were found to be common with 70 species of Simbalbara Sanctuary (Appendix I, marked with asterisk), while 102 species were common with 147 species found in New Forest campus of Dehra Dun valley. The similarity index of Renuka Wildlife Sanctuary with Simbalbara Wildlife Sanctuary was found to be 0.353 as compared to 0.626 with Dehra Dun valley (New Forest Campus) suggesting a greater dissimilarity of butterfly fauna, between Renuka Wildlife Sanctuary (lower Himalayan foothills) and Simbalbara Sanctuary (Shiwaliks) as compared to Renuka and Dehra Dun valley (New Forest). This indicates greater 'beta diversity' between Renuka and Simbalbara, suggesting that these are dissimilar habitats.

Proportion of species in families : The proportions of species in families 'Lycaenidae' in Renuka Wildlife Sanctuary was found to be lower than that of the region (western Himalayas) suggesting that this family is still under sampled and some more species from this family are to be added to this checklist. Comparison of species proportions in families for both Renuka and Simbalbara Wildlife Sanctuaries, respectively, are quite similar for all the families except for the family 'Hesperidae' and 'Lycaenidae' which were under sampled in Simbalbara Wildlife Sanctuary (Table 1). However, the proportions of the family 'Papilionidae' showed less variation (6.8-7.4) is all the

Table 1

Comparison of proportions of species in the families of butterflies recorded from Renuka Wildlife Sanctuary (WLS), with adjoining forest areas in the region (Western Himalayas).

Site	Total species	Percentage of Total				
		Hesperidae	Papilionidae	Pieridae	Lycaenidae	Nymphalidae
Renuka WLS (450-950m; 4.03 km^2)	118	15.3 (18)	06.8 (8)	12.7 (15)	20.3 (24)	44.9 (53)
Simbalbara WLS[1] (350-700m; 19.02 km^2)	70	07.1 (5)	07.1(5)	17.1 (12)	21.4 (15)	47.1 (33)
Dehra Dun Valley (New Forest)[2] (650-670m; 4.45 km^2)	147	14.9 (22)	07.4(11)	12.8 (18)	28.4(42)	36.5 (54)
Western Himalayas[3]	417	15.1	07.4	10.1	30.9	36.5

Sources : 1 - Kittur *et al*. (2006); 2 - Singh (1997); 3 - Singh and Pandey (2004)

sites and were similar to that of the region (Western Himalayas) (Table 1), suggesting that this family, whose species proportion is an indicator of the total species present in an area (Singh and Pandey, 2004), constitutes 7 per cent of the total number of butterfly species richness of the Renuka Wildlife Sanctuary.

Conclusion

The findings of the present study suggest that Reunka Wildlife Sanctuary is home more than one-fourth of the total number of butterfly species found in the Western Himalayas (417 species) (Wynter-Blyth, 1957). The butterfly community of Renuka Wildlife Sanctuary shows more affinity with the butterfly community of the lower west Himalayan foothills than the Shiwaliks, in the region. Besides, the sanctuary also provides refuge to a large number of 'temperate' and 'sub-alpine' butterfly species during winter. The undisturbed 'tropical moist deciduous forest' habitat in the catchment of Giri river along with Renuka wetland supports a rich diversity of plant life which in turn are responsible for high 'point' diversity butterflies in this area. High species richness, presence of some 'rare' and 'protected' species of conservation priority in a small area, along with the wetland with a large number of aquatic and terrestrial fauna, all bestow 'Renuka Wildlife Sanctaury' the unique habitat status in the region that needs to be conserved.

Appendix I

Systematic list of butterflies (Rhopalocera) recorded from, Renuka Wildlife Sanctuary, Sirmaur District, Himachal Pradesh, India.

Sl. No.	Species	Common name name	Relative abundance	Month
1	2	3	4	5
A. Super family: Papilionoidea				
I Family: Papilionidae (Swallowtails)				
(a) Sub-family: Papilioninae				
1	*Graphium sarpedon sarpedon* Linnaeus	Common Blue Bottle[2]	Rare	June
2	*Chilasa agestor govindra* Moore	Tawny Mime	Rare	Nov.
3	*Chilasa clytia clytia* Linnaeus	Common Mime[4]	Uncommon	June
4	*Papilio demolius demolius* Linnaeus	Lime Butterfly[2,4]	Very Common	June; Nov.
5	*Papilio protenor protenor* Cramer	Spangle[2]	Uncommon	Nov.
6	*Papilio polytes romulus* Cramer	Common Mormon[2,4]	Very Common	June; Nov.
7	*Papilio paris paris* Linnaeus	Paris Peacock	Common	June; Nov

Contd...

1	2	3	4	5
8	*Papilio polyctor polyctor* Boisdual	Common Peacock[3]	-	-
II Family: Pieridae (White and Yellows)				
(a) Sub-family: Pierinae				
9	*Pieris canidia indica* Evans White[2,4]	Indian Cabbage	Very Common	Nov.
10	*Pieris brassicae* Linnaeus	Large Cabbage White[1]	Fairly Common	Nov.
11	*Pieris daplidice moorei* Röber	Bath White[1]	Rare	Nov.
12	*Cepora nerissa phryne* Fabricius	Common Gull[4]	Uncommon	Nov.
13	*Delias eucharis* Drury	Common Jezebel[2,4]	Fairly Common	Nov.
14	*Delias belladonna horsfieldii* Gray	Hill Jezebel	Uncommon	Nov.
15	*Leptosia nina nina* Fabricius	Psyche[4]	Fairly Common	Nov.
16	*Pareronia valeria* Cramer	Common Wanderer	Fairly Common	Nov.
(b) Sub-family: Coliadinae				
17	*Catopsilia pomona* Fabricius	Common Emigrant [2,4]	Very Common	June; Nov.
18	*Catopsilia pyranthe* Latreille	Mottled Emigrant[2,4]	Very Common	Nov.
19	*Gonepteryx rhamni nepalensis* Doubleday	Common Brimstone	Fairly Common	Nov.
20	*Eurema andersonii* Moore	One Spot Grass Yellow	Very Common	Nov.
21	*Eurema hecabe fimbriata* Wall	Common Grass Yellow[2,4]	Very Common	June; Nov.
22	*Eurema laeta* Boisduval	Spotless Grass Yellow[2,4]	Fairly Common	Nov.
23	*Colias erate* Esper	Dark Clouded Yellow	Uncommon	Nov.
III Family: Lycaenidae				
(a) Sub-family: Curetinae				
24	*Curetis dentata* Moore	Angled Sunbeam[4]	Rare	Nov.
(b) Sub-family: Theclinae				
25	*Iraota timoleon* Stoll	Silver Streak Blue	Rare	Nov.
26	*Arhopala amantes* Hewitson	Indian Oak Blue	Uncommon	June
27	*Arhopala alemon* De Niceville	Large Oak Blue[4,5]	Uncommon	June

Contd...

1	2	3	4	5
28	*Surendra quercetorum* Moore	Common Acacia Blue	Fairly Common	Nov.
29	*Loxura atymnus* Cramer	Yamfly	Rare	June
30	*Rapala varuna* Hewitson[IWPA-II]	Indigo Flash	Uncommon	Nov.
31	*Virachola perse* Hewitson	Large Guava Blue	Rare	Nov.
32	*Horaga onyx* Moore	Common Onyx	Rare	Nov.
33	*Horaga viola* Moore[IWPA-II]	Brown Onyx	Rare	Nov.
(c) Sub-family: Lycaeninae				
34	*Heliophorus sena* Kollar	Sorrel Sapphire	Very Common	June; Nov.
(d) Sub-family: Polyommatinae				
35	*Chilades laius* Cramer	Lime Blue	Fairly Common	Nov.
36	*Acytolepis puspa gisca* Fruhstorfer	Common Hedge Blue[4]	Very Common	Nov.
37	*Lycaenopsis huegelii huegelii* Moore	Large Hedge Blue [5]	Very Common	Nov.
38	*Zizeeria karsandra* Moore	Dark Grass Blue [4]	Uncommon	Nov.
39	*Pseudozizeeria maha maha* Kollar	Pale Grass Blue [4]	Very Common	June; Nov.
40	*Lampides boeticus* Linnaeus[IWPA-II]	Pea Blue[4]	Fairly Common	Nov.
41	*Syntarucus plinius* Fruhstorfer	Zebra Blue	Very Common	Nov.
42	*Prosotas nora* Felder	Common Line Blue	Very Common	June; Nov.
43	*Castalius rosimon* Fabricius	Common Pierrot[4]	Fairly Common	Nov.
44	*Talicada nyseus* Guerin	Red Pierrot	Fairly Common	Nov.
45	*Freyeria trochilus putli* Kollar	Least Grass Jewel[4]	Very Common	Nov.
46	*Neopithecops zalmore* Butler	Common Quaker	Rare	June
(d) Sub-family : Riodininae				
47	*Abisara echerius* Moore	Plum Judy [4]	Uncommon	Nov.
IV Family: Nymphalidae				
(a) Sub family: Satyrinae				
48	*Elymnias hypermnestra* Linnaeus	Common Palmfly[4]	Fairly Common	June; Nov.
49	*Melanitis leda* Linnaeus	Common Evening Brown [4]	Uncommon	Nov.
50	*Lethe europa* Fabricius	Bamboo Treebrown	Rare	Nov.
51	*Lethe rohira* Fabricius	Common Treebrown[2]	Fairly Common	Nov.

Contd...

1	2	3	4	5
52	*Mycalesis mineus mineus* Linneaus	Dark Brand Bushbrown[2,4]	Fairly Common	June; Nov.
53	*Callerebia annanda* Moore	Ringed Argus [5]	Fairly Common	June; Nov.
54	*Callerebia nirmala nirmala* Moore	Common Argus [5]	Very Common	Nov.
55	*Ypthima nareda nareda* Kollar	Large Three Ring[3]		
56	*Ypthima inica* Hewitson	Lesser Three Ring	Very Common	June; Nov.
57	*Ypthima baldus* Fabricius	Common Five Ring[4]	Very Common	June; Nov.
58	*Aulocera swaha swaha* Kollar	Common Satyr	Uncommon	Nov.
(c) Sub-family: Charaxinae				
59	*Charaxes solon* Fabricius	Black Rajah	Rare	June
60	*Polyura athmas athamas* Drury	Common Nawab[2,4]	Rare	Nov.
(d) Sub-family: Nymphalinae				
61	*Psuedergolis wedah* Kollar	Tabby [5]	Rare	Nov.
62	*Ariadne merione* Cramer	Common Castor[2]	Uncommon	Nov.
63	*Cupha erymanthis* Drury	Rustic[4]	Very Common	June; Nov.
64	*Phalantha phalantha* Drury	Common Leopard[2,4]	Very Common	Nov.
65	*Vagrans egista* Cramer	Vagrant	Fairly Common	Nov.
66	*Argyreus hyperbius hyperbius* Linnaeus	Indian Fritillary	Uncommon	Nov.
67	*Childrena childreni* Gray	Large Silverstripe [5]	Rare	Nov.
68	*Precis iphita iphita* Cramer	Chocolate Soldier [2,4]	Very Common	June; Nov.
69	*Junonia orithya* Linnaeus	Blue Pansy[4]	Fairly Common	Nov.
70	*Junonia hierta* Fabricius	Yellow Pansy [2,4]	Fairly Common	June; Nov.
71	*Junonia lemonias* Linnaeus	Lemon Pansy[2,4]	Very Common	Nov.
72	*Junonia atlites* Linnaeus	Grey Pansy	Uncommon	Nov.
73	*Junonia almana* Linnaeus	Peacock Pansy[4]	Uncommon	Nov.
74	*Kaniska canace himalaya* Evans	Blue Admiral[4]	Uncommon	Nov.
75	*Vanessa indica indica* Herbst	Indian Red Admiral	Fairly Common	Nov.
76	*Aglais cashmirensis aesis* Fruhstorfer	Indian Tortoiseshell	Uncommon	Nov.
77	*Cynthia cardui* Linnaeus	Painted Lady[4]	Very Common	Nov.

Contd...

1	2	3	4	5
78	*Symbrenthia lilaea khasiana* Moore	Common Jester	Very Common	Nov.
79	*Hypolimnas bolina* Linnaeus	Great Eggfly [2,4]	Uncommon	Nov.
80	*Kallima inachus huegeli* Kollar	Orange Oakleaf [2,4]	Uncommon	June; Nov.
81	*Cyrestis thyodamas ganescha* Kollar	Common Map[2,4]	Uncommon	Nov.
82	*Athyma perius* Linnaeus	Common Sergeant	Fairly Common	Nov.
83	*Neptis hylas astola* Moore	Common Sailer[2,4]	Very Common	June; Nov.
84	*Neptis yerburi yerburi* Butler	Yerbury's Sailer[2]	Uncommon	Nov.
85	*Athyma cama* Moore	Orange Staff Sergeant [5]	Rare	Nov.
86	*Moduza procris* Cramer	Commander[4]	Uncommon	Nov.
87	*Auzakia danava* Moore	Commodore	Rare	Nov.
88	*Euthalia lubentina* Cramer[IWPA-IV]	Gaudy Baron[4]	Rare	June/ Nov.
89	*Tanaecia lepidae* Butler	Grey Count[4]	Rare	Nov.
(e) Sub-family: Acraeinae				
90	*Pareba vesta* Fabricius	Yellow Coster	Uncommon	June
91	*Pareba violae* Horsfield	Tawny Coster	Fairly Common	Nov.
(f) Sub-family: Libytheinae				
92	*Libythea myrrha sanguinalis* Godart	Club Beak[2]	Very Common	Nov.
(g) Sub-family: Danainae				
93	*Danaus chrysippus* Linnaeus	Plain Tiger[2,4]	Fairly Common	June; Nov.
94	*Danaus genutia* Cramer	Common Tiger[4]	Fairly Common	June; Nov.
95	*Tirumala septentrionis* Butler	Dark Blue Tiger[2]	Rare	Nov.
96	*Tirumala limniace* Cramer	Blue Glassy Tiger[2,4]	Uncommon	Nov.
97	*Parantica aglea* Stoll	Glassy Tiger[2,4]	Fairly Common	Nov.
98	*Parantica sita* Kollar	Chestnut Tiger	Rare	Nov.
99	*Euploea mulciber mulciber* Cramer[IWPA-IV]	Striped Blue Crow[4]	Uncommon	Nov.
100	*Euploea core core* Cramer	Common Indian Crow[2,4]	Very Common	June; Nov.

Contd...

1	2	3	4	5
B. Super Family: Hesperioidea				
I Family: Hesperiidae				
(a) Sub-family: Coeliadinae				
101	*Badamia exclamationis* Fabricius	Brown Awl [5]	Uncommon	Nov.
(b) Sub-family: Pyrginae				
102	*Celaenorrhinus leucocera leucocera* Kollar	Common Spotted Flat	Uncommon	Nov.
103	*Pseudocoladenia dan* Fabricius	Fulvous Pied Flat	Rare	June; Nov.
104	*Sarangesa dasahara* Moore	Common Small Flat [4]	Uncommon	Nov.
105	*Tagiades litigiosa* Moschler	Water Snow Flat	Rare	June
106	*Caprona agama* Moore	Spotted Angle [5]	Rare	June
107	*Spialia galba* Fabricius	Indian Skipper [5]	Uncommon	Nov.
(c) Sub-family: Hesperiinae				
108	*Notocrypta curvifascia* Felder	Restricted Demon[2]	Fairly Common	Nov.
109	*Udaspes folus* Cramer	Grass Demon	Fairly Common	June
110	*Suastus gremius* Fabricius	Indian Palm Bob[2]	Rare	Nov.
111	*Matapa aria* Moore	Common Red Eye [4]	Rare	Nov.
112	*Potanthus dara* Kollar	Himalayan Dart [5]	Uncommon	Nov.
113	*Potanthus pallida* Evans	Pale Dart [3,5]	-	-
114	*Parnara guttatus* Bremer & Grey	The Straight Swift[2]	Rare	Nov.
115	*Peliopidas sinensis* Mabille[IWPA-IV]	Large Branded Swift	Uncommon	Nov.
116	*Peliopidas thrax* Hubner	Small Branded Swift[2]	Very Common	Nov.
117	*Peliopidas assamensis* deNiceville[IWPA-IV]	Great Swift	Rare	Nov.
118	*Polytremis eltola* Hewitson	Yellow Spot Swift[2]	Fairly Common	Nov.

IWPA -Listed in Schedule II & IV of the Indian Wildlife (Protection) Act, 1972.
[1] species (2) also recorded by Kumar and Juneja (1977) in Renuka Wetland.
[2] species (34) also recorded by Arora (2000) in Renuka Wetland.
[3] species (3) only recorded by Arora (2000) in Renuka Wetland.
[4] species common with Simbalbara Wildlife Sanctuary, Himachal Pradesh (Kittur *et al.*, 2006)
[5] species not common with New Forest, Dehra Dun, Uttarakhand (Singh, 1997)

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SUMMARY

Two sampling surveys during November 2007 and June 2008 in Renuka Wildlife Sanctuary and adjacent areas, located in the West Himalayan foothills, revealed the occurrence of 118 species of butterflies. Amongst these were seven protected species under the Indian Wildlife (Protection) Act, 1972 including some rarities like the Brown Onyx, *H. viola*, Gaudy Baron, *Euthalia lubentina*; Great Swift, *Peliopidas assamensis* and Large-banded Swift, *P. sinensis*. Besides, 12 species from adjoining 'temperate' forests migrated down during winter to this 'deciduous' habitat. Species similarity of Renuka Wildlife Sanctuary was determined to be more similar to New Forest, Dehra Dun located at the base of the Himalayan foothills than Simbalbara Wildlife Sanctuary located nearby on the Shiwalik ranges. High point diversity and presence of rare species of conservation priority all make this Sanctuary a unique habitat in the region.

Key words **: Butterflies, Renuka Wildlife Sanctuary, Himachal Pradesh.**

सिरमौर जिले, हिमाचल प्रदेश, भारत के रेणुका वन्यप्राणि अभयारण्य की तितलियां

अरुण पी० सिंह

सारांश

पश्चिमी हिमालयी पादपहाड़ियों में अवस्थित रेणुका वन्यप्राणि अभयारण्य और उसके साथ लगते क्षेत्रों में नवम्बर 2007 और जून 2008 में किए गए दो न्यादर्शन सर्वेक्षणों से वहां तितलियों की 118 जातियां होने का पता लगा। इनमें से सात जातियां ऐसी हैं जिनहें भारतीय वन्यप्राणि (संरक्षण) अधिनियम 1972 के अधीन रक्षित किया हुआ है और उनमें कुछ दुर्लभ जातियां भी हैं जैसे ब्राउन ओनिक्स, *एच० वायला,* गॉडी बैरन, *युथेलिया ल्यूबेनटिना,* ग्रेट स्विट, *पेलियोपिडास असमेंसिस* और लार्ज बैण्डेड स्विट, *पी० साइनेसिंस*। इनके अलावा, आसपास के समशीतोष्ण वनों से सर्दियों में पव्रजन करके बारह तितली जातियां भी इस पर्णपाती प्राकृतावास में चली आती हैं। रेणुका वन्यप्राणि अभयारण्य की जातिगत विविधता सुनिश्चित करने पर वह न्यूफोरेस्ट, देहरादून की जातिगत विभिन्नता जैसी बनी जो हिमालयी पादपहाडियों की तलहटी में स्थित है। बनिस्वत सिम्बलबाड़ा वन्यप्राणि अभयारण्य की जातिगत विविधता के जो शिवालिक पर्वत श्रेणियों के निकट अवस्थित हैं। अत्यधिक उच्चस्तर की विविधता और संरक्षण प्राथमिकता वाली दुर्लभ तितली जातियों का मिलना इस अभयारण्य को इस क्षेत्र का विलक्षण प्राकृतावास बना देते हैं।

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