

BUTTERFLIES OF *QUERCUS LEUCOTRICHOPHORA* - *CEDRUS DEODARA* FOREST

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Introduction

More than 417 species of butterflies are found in the Western Himalaya, extending from Kashmir to Kumaon, out of the 1447 species that occur in the Indian Sub-Continent. These consist of both Palearctic and Oriental forms (Evans, 1932, Wynter-Blyth, 1981 and D'Abrera, 1985).

The present study was carried out to know the butterfly species composition in *Quercus leucotrichophora* (Ban Oak) - *Cedrus deodara* (Deodar) Forests in and around Shimla Hills. This type of forest ecosystem is unique, as it has its own typical floristics and is classed under "Lower Western Himalayan Temperate Forest" between 1200 m - 2400 m (Champion and Seth, 1968; Polunin and Stainton, 1988). Floristics of this region have been extensively studied by Collett (1971) and Polunin and Stainton (1988).

Materials and Methods

Butterflies were caught from the study area with the help of a butterfly net (40 cm diameter and 60-120 cm length), pinned, set, dried, preserved, photographed and identified. Field observations were also carried out to find out the seasonal

occurrence, status and habitats of butterflies. Dominant Flora of the study area was recorded, food plants and nectar feeding plants of butterflies were also identified. Observations were carried out from March 1993 to August 1996.

Study Area

The study area is situated at an altitude of 2100 m - 2200 m above mean sea level lying between 31° 6' N latitude and 77° 10' E longitude. The climate of the region is temperate with temperatures ranging between -3° minimum in January-February and maximum 30° C in May-June. The area experiences maximum rainfall of 1300 mm from June to September months while the total annual rainfall amounts to 1750 mm - 1775 mm. There is snowfall from late December to March months. The relative humidity varies from 67.9% to 99.3%. The study area included Ban Oak - Deodar Forest sites in "Longwood, Keleston estate, Bharari, Tara-Devi, U.S. Club, and Glen" areas of Shimla.

Vegetation

In the study area 13 tree, 29 shrub, 45 herb and 8 grass species were identified as given in Table 1. *Q. leucotrichophora* Ban

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Oak and *C. deodara* (Deodar) dominate the forest canopy.

Results and Discussion

A total of 35 species of butterflies belonging to 7 families were collected from the study area. Table 2 gives the species, status, habitats, nectar plants and larval food plants of all the butterflies collected.

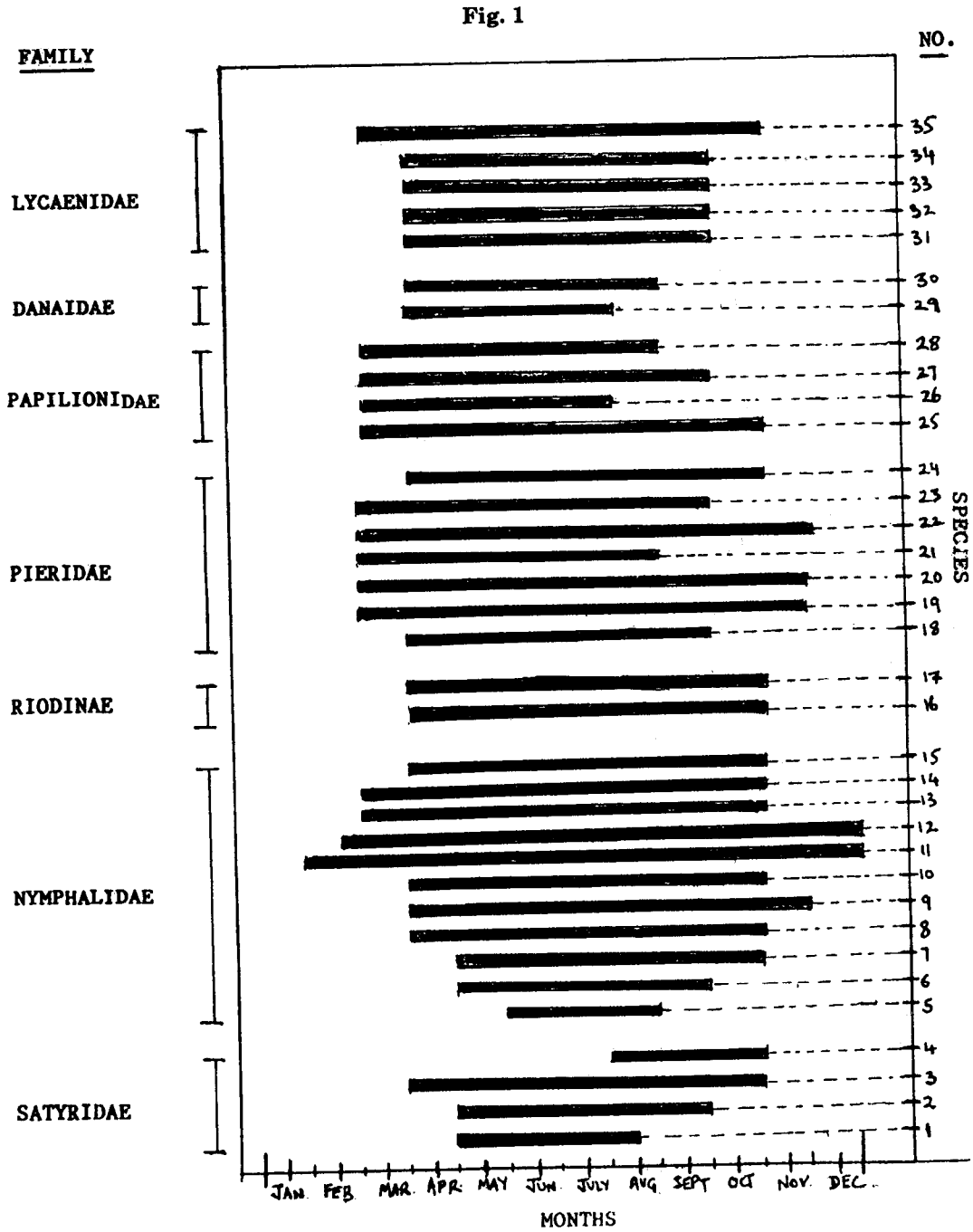
As evident from Table 1 and 2 all the butterfly species found in the area are dependent for food and nectar on specific

plant species that are a component of the *Quercus leucotrichophora* - *Cedrus deodara* forest ecosystem. It can be seen from Fig. 1 that most of the butterflies occur from March to October when the climatic conditions are favourable for these butterflies to feed on nectar from flowers, mate and lay eggs on leaves of food plants that thus complete their life cycle.

Thus in order to conserve these butterflies the *Quercus leucotrichophora* - *Cedrus deodara* forest has to be preserved first.

Table 1
Floristic Composition of the Study Area

Habit	Plant Species
Trees	<i>Aesculus indica</i> , <i>Cedrella serrata</i> , <i>Cedrus deodara</i> , <i>Celtis australis</i> , <i>Elaeagnus parvifolia</i> , <i>Litsea umbrosa</i> , <i>Machilus</i> spp., <i>Pieris ovalifolia</i> , <i>Pinus wallichiana</i> , <i>Pyrus pashia</i> , <i>Quercus leucotrichophora</i> , <i>Rhododendron arboreum</i> , <i>Ulmus wallichiana</i> .
Shrubs	<i>Berberis aristata</i> , <i>B. lycium</i> , <i>Buddleia paniculata</i> , <i>Capparis</i> spp., <i>Debregeasia salicifolia</i> , <i>Desmodium tilioefolium</i> , <i>D. multiflorum</i> , <i>Dioscorea deltoidea</i> , <i>Ficus nemoralis</i> , <i>F. glunerata</i> , <i>Hypericum oblongifolium</i> , <i>Indigofera dosua</i> , <i>I. heterantha</i> , <i>Jasminum humile</i> , <i>Limonia acidissima</i> , <i>Lonicera quinquelocularis</i> , <i>Loranthus vestitus</i> , <i>Marsdenia</i> spp., <i>Prinsepia utilis</i> , <i>Rhamnus virgatus</i> , <i>Rosa moschata</i> , <i>Rubus ellipticus</i> , <i>R. niveus</i> , <i>Smilax parvifolia</i> , <i>Spiraea canescens</i> , <i>Thalictrum foliolosum</i> , <i>Viburnum continifolium</i> , <i>Vitis himalayana</i> , <i>Zanthoxylum alatum</i> .
Herbs	<i>Achyranthes bidentata</i> , <i>Anemone rivularis</i> , <i>Arisaema helleborifolium</i> , <i>A. intermedium</i> , <i>Artemisia parviflora</i> , <i>Bidens pilosa</i> , <i>Bistorta amplexicaulis</i> , <i>Boeninghausenia albiflora</i> , <i>Campanula argyrotricha</i> , <i>C. colorata</i> , <i>Capesella bursapastoris</i> , <i>Ceropegia</i> spp., <i>Commelia obliqua</i> , <i>Crepis japonica</i> , <i>Cynoglossum mieranthum</i> , <i>Delphinium denudatum</i> , <i>Eliptica alba</i> , <i>Erigeron linifolius</i> , <i>Fagopyrum dibotrys</i> , <i>Fragaria indica</i> , <i>Galium asperifolium</i> , <i>G. rotundifolium</i> , <i>Geranium lucidum</i> , <i>G. nepalense</i> , <i>G. wallichiana</i> , <i>Girardinia heterophylla</i> , <i>Habenaria intermedia</i> , <i>Hedera nepalensis</i> , <i>Heracleum canescens</i> , <i>Impatiens thomsoni</i> , <i>Leucas lanata</i> , <i>Oxalis acetosella</i> , <i>O. latifolia</i> , <i>Parochetus communis</i> , <i>Pteracanthus urticifolia</i> , <i>Roscoae alpina</i> , <i>Rumex hastatus</i> , <i>R. nepalensis</i> , <i>Salvia lanata</i> , <i>S. glutinosa</i> , <i>Saxifraga ligulata</i> , <i>Trifolium repens</i> , <i>Urtica dioica</i> , <i>U. parviflora</i> , <i>Viola canescens</i>
Grasses	<i>Andropogon gryllus</i> , <i>Arundinaria falcata</i> , <i>Avena aspera</i> , <i>Cyprus niveus</i> , <i>Eragrostis nigra</i> , <i>Paspalum sanguinale</i> , <i>Pennisetum flaccidum</i> , <i>Tripogon filiformis</i> .



Seasonal occurrence of Butterflies in *Quercus leucotrichophora* - *Cedrus deodara* forest (altitude 2,200 m)

Plate 1

LYCAENIDAE



34. *Heliophorus androcles*



31. *Lycaena phalaes*
Linn.



35. *Lycaenopsis ladonides*

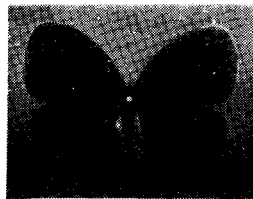


33. *Rapala selira*

SATYRIDAE



3. *Raphicera schakra*, Kollar



1. *Callerbia nirmala*
Moore

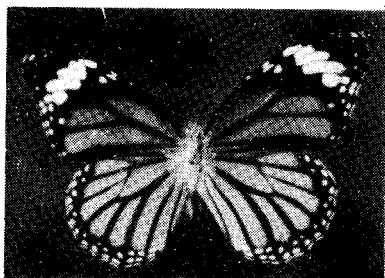


2. *Neope verma*, Kollar

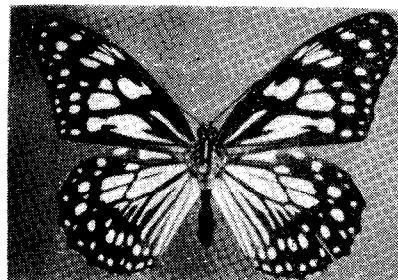


4. *Aulocera swaha*,
Kollar

DANAIDAE



29. *Danais genutia*, Linn.



30. *Trimula limniace*, Cramer

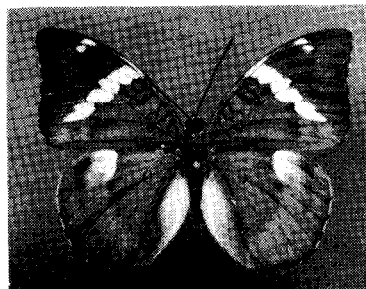
Plate 2

NYMPHALIDAE

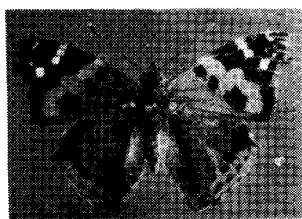


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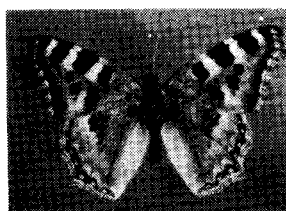
5. *Euthalia patala*, Kollar



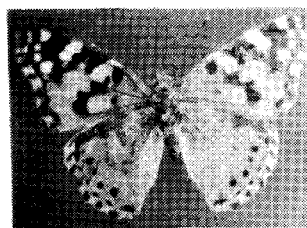
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9. *Vanessa indica*, Herbst



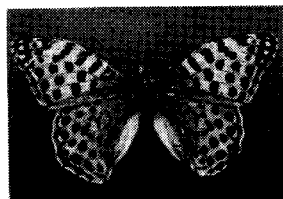
11. *Aglais cashmirensis*, Kollar



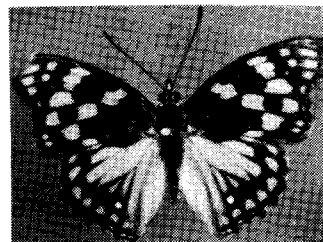
8. *Cylthis caduli*, Linn.



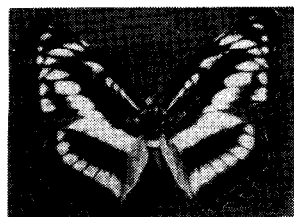
10. *Kaniska canace*,
Johanssen



12. *Argynnis lathonia*, Linn.



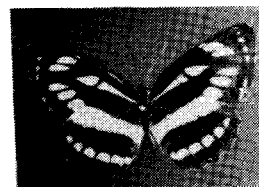
6. *Sepsis dichroa*, Kollar



14. *Pantoporia opalina*, Kollar



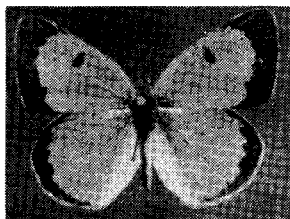
7. *Cyrestis thyodamas*,
Boisduval



15. *Neptis mahendra*

Plate 3

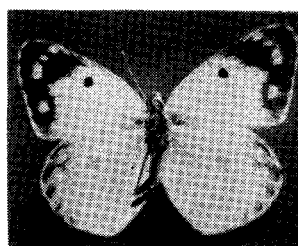
PIERIDAE



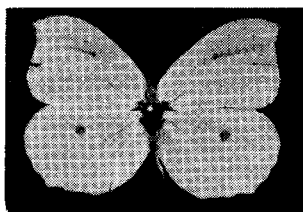
19. *Colias fieldi*, Menetries



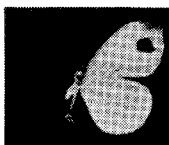
20. *Colias erata*, Linnaeus



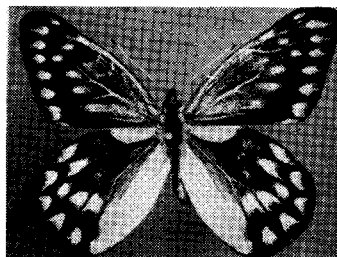
23. *Pieris brassicae*, Linnaeus



24. *Genopteryx nhami*, Gistel



21. *Leptosia nina*, Fabriculus



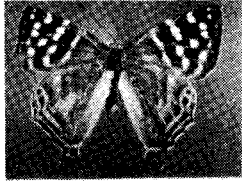
18. *Delias belladona*, Moore



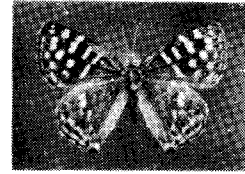
22. *Pieris canidia*, Linnaeus



Plate 4
RIODINAE

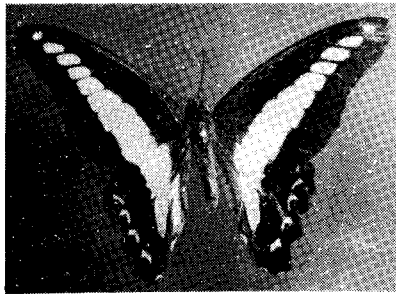


16. *Dodona eugenus*, Bates

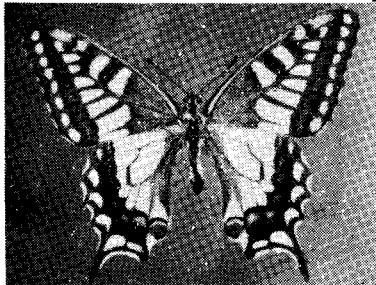


17. *Dodona durga*, Kollar

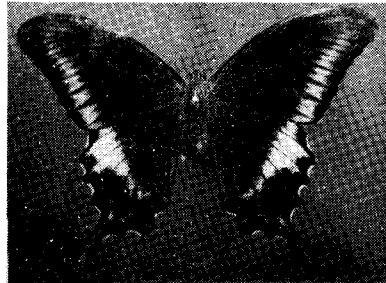
PAPILIONIDAE



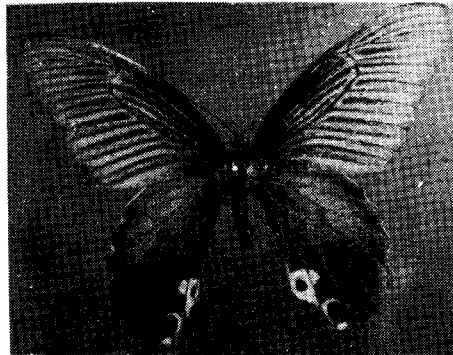
28. *Graphium sarpedon*, Linnaeus



27. *Papilio machaon*, Linnaeus



25. *Princeps polyctor*, Boisduval



26. *Princeps protenor*, Cramer

Table 2

Butterflies in Q. leucotrichophora - C. deodara Forest Eco-system

Name	Status	Habitats	Nectar plants (Flowers)	Food Plants (Leaves)
1	2	3	4	5

Satyridae :

1. <i>Callierbia nirmala</i> , Moore	Very Common	Undergrowth, Ground, Refuse	<i>Oxalis latifolia</i> , <i>Impatiens thomsoni</i>	Grasses
2. <i>Neope verma</i> , Kollar	Common	Undergrowth, Leaves, Bark, Tree Trunk	-	Grasses
3. <i>Raphicera schakra</i> Kollar	Common	Grass, Rocks, Flowers, Sunny-places	<i>Bidens pilosa</i> , <i>Debregeasia hypoleuca</i>	Grasses
4. <i>Aulocera swaha</i> , Kollar	Common	Sunny places, rocks	-	Grasses

Nymphalidae :

5. <i>Euthalia patala</i> , Kollar	Not too Common	Oak leaves, Ground, Canopy, Refuse	-	<i>Quercus leucotricho- phora</i>
6. <i>Sephisia dichroa</i> , Kollar	Not too Common	Oak-leaves, Streams, Rotting refuse	-	<i>Quercus leucotri- chophora</i>
7. <i>Cyrestis thyodamas</i> , Boisduval	Not too Common	Leaves, Ground, Wet Sand, Flowers	<i>Aesculus indica</i> , <i>Buddleia paniculata</i>	<i>Ficus nemoralis</i> <i>F. glomerata</i>
8. <i>Cynthia caduii</i> , Linnaeus	Common	Flowers, Ground, Sunny-Places	<i>Debregeasia hypoleuca</i> <i>Buddleia paniculata</i> , <i>Salvia lanata</i>	<i>Debregeasia hypoleuca</i> , <i>Artemesia parviflora</i>
9. <i>Vanessa indica</i> , Herbst	Common	Flowers, Ground, Undergrowth	<i>Bidens pilosa</i> , <i>Oxalis latifolia</i> , <i>Rumex hastatus</i> , <i>Oxalis acetosella</i>	<i>Urtica dioica</i> , <i>U. parviflora</i>

(Contd...)

1	2	3	4	5
10. <i>Kaniska canace</i> , Johanssen	Rare	Bark, Ground, Tree-Trunk	-do-	<i>Urtica</i> <i>dioica</i> , <i>Girardiana</i> <i>heterophylla</i> , <i>Smilax</i> <i>parvifolia</i>
11. <i>Aglais</i> <i>cashmirensis</i> , Kollar	Very Common	Flowers, Ground, Sunny-Places	-do-	<i>Urtica</i> <i>dioica</i>
12. <i>Argynnis lathonia</i> , Linnaeus	Not too Common	Undergrowth Grass, Sunny-Places	-do-	<i>Viola</i> spp.
13. <i>Apatura ambica</i> Kollar	Rare	Under-Canopy Ground Leaves		<i>Ulmus</i> <i>wallichiana</i>
14. <i>Pantoporia</i> <i>opalina</i> , Kollar	Common	Leaves, Canopy, Stones, Flowers	<i>Debregeasia</i> <i>hypoleuca</i>	<i>Berberis</i> <i>aristata</i> , <i>B.lycium</i>
15. <i>Neptis mahendra</i>	Common	Flowers Open-Sunny- Places	<i>Debregeasia</i> <i>hypoleuca</i>	
Riodinae :				
16. <i>Dodona eugenus</i> , Bates	Common	Leaves, Open Sunny- places	<i>Prinsepia utilis</i> , <i>Berberis aristata</i> , <i>Vitis himalayana</i>	<i>Arundinaria</i> <i>falcata</i> , Grasses.
17. <i>Dodona durga</i> , Kollar	Not too Common	Ground, Rocks, Streams	<i>Trifolium</i> sp.	Grasses
Pieridae :				
18. <i>Delias belladona</i> , Moore	Common	Flowers, Trees	<i>Debregeasia</i> <i>hypoleuca</i> , <i>Buddleia</i> <i>paniculata</i> , <i>Aesculus indica</i>	<i>Loranthus</i> <i>vestitus</i>

(Contd...)

1	2	3	4	5
19. <i>Colias fieldi</i> , Menetries	Common	Flowers, Grass, Sunny- places	<i>Debregeasia</i> <i>hypoleuca</i>	<i>Indigofera</i> <i>dousa</i> , <i>I. heterantha</i>
20. <i>Colias erate</i> , Linnaeus	Not too Common	Flowers, Grass, Sunny- places	<i>Bidens pilosa</i>	<i>Parochetus</i> <i>communis</i>
21. <i>Leptosia nina</i> , Fabricius	Common	Flowers, Undergrowth Bushes, Sunny- places	<i>Impatiens thomsoni</i>	<i>Capparis</i> spp.
22. <i>Pieris canidia</i> Linnaeus	Very Common	Flowers, Sunny-places	<i>Impatiens thomsoni</i> <i>Buddleia paniculata</i> <i>Debregeasia</i> <i>hypoleuca</i>	Cruciferae
23. <i>Pieris brassicae</i> , Linnaeus	Common	Flowers, Sunny-places	-	Cruciferae
24. <i>Genopteryx</i> <i>nhami</i> , Gistel	Common	Flowers, Undergrowth leaves	-	<i>Rhamnus</i> <i>variegatus</i>
Papilionidae :				
25. <i>Princeps polycctor</i> , Boisduval	Not too Common	Forests, Undergrowth Flowers	<i>Buddleia</i> <i>paniculata</i>	<i>Zanthoxylon</i> <i>alatum</i>
26. <i>Princeps protenor</i> , Cramer	Common	Flowers, Undergrowth Forests	<i>Oxalis latifolia</i>	<i>Zanthoxylon</i> <i>alatum</i> , <i>Limonia</i> <i>acidissima</i>
27. <i>Princeps machaon</i> , Linnaeus	Not too Common	Flowers, Leaves, Sunny-places	<i>Debregeasia</i> <i>hypoleuca</i>	<i>Heracleum</i> <i>canescens</i>
28. <i>Graphium</i> <i>sarpedon</i> , Linnaeus	Common	Flowers, Trees, Leaves Sunny places	<i>Buddleia</i> <i>paniculata</i> , <i>Aesculus indica</i>	<i>Litsea</i> spp. <i>Machilus</i> spp.

(Contd...)

1	2	3	4	5
Danaiidae :				
29. <i>Danais genupia</i> , Linnaeus	Not too Common	Flowers, Forests	-	<i>Cynanchum</i> spp. <i>Ceropegia</i> spp.
30. <i>Danais limniace</i> , Cramer	Not too Common	Flowers, Forest- Openings	<i>Buddleia</i> <i>paniculata</i>	<i>Calotropis</i> spp. <i>Marsdenia</i> spp.
Lycaenidae :				
31. <i>Lycaena phlaeas</i> , Linnaeus	Common	Flowers, Grasses, Leaves, Sunny places	<i>Debregeasia</i> <i>hypoleuca</i> , <i>Erigeron</i> <i>linifolius</i>	<i>Rumex nepalensis</i>
32. <i>Lycaena pavana</i>	Common	Flowers, Leaves Sunny places	<i>Rumex hastatus</i>	<i>Rumex hastatus</i> , <i>R. nepalensis</i>
33. <i>Rapala selira</i>	Not too Common	Flowers, Leaves, Sunny-places	-	<i>Indigofera</i> <i>purpurea</i>
34. <i>Heliophorus</i> <i>androcles</i>	Not too Common	Leaves, Undergrowth, Sunny-places	-	<i>Rumex</i> spp.
35. <i>Lycaenopsis</i> <i>ladonides</i>	Common	All places	<i>Impatiens thomsoni</i> , <i>Buddleia paniculata</i> <i>Debregeasia hypoleuca</i> , <i>Fagopyrum dibotrys</i> , <i>Achyranthus bidentata</i>	<i>Preensepia</i> <i>utilis</i>

SUMMARY

A study was carried out in a *Quercus leucotrichophora* - *Cedrus deodara* forest to find out its butterfly species composition, their status, habits, nectar plants, larval food plants and seasonal occurrence. The dominant flora of the study area was also recorded. A total 35 butterfly species were recorded. Field observation showed that all the species of butterflies are dependent for food and nectar on plants that are typical of *Quercus leucotrichophora* - *Cedrus deodara* forest ecosystem.

क्वेरकस ल्यूकोट्रिकोफोरा - सीड्रस देवदारा वनों की तितलियाँ

अरुण पी० सिंह व राका सिंह

सारांश

क्वेरकस ल्यूकोट्रिकोफोरा - सीड्रस देवदारा वनों का एक अध्ययन वहाँ की तितलियों की जाति रचना, उनकी स्थिति, आदतें, मकरन्द पादप, जातकों के भोज्य पादप और मोसमी उपलभ्यता ज्ञात करने के लिए किया गया। अधीत क्षेत्र के अधिरोही पेड़-पौधें अभिलिखित किए गए। कुल मिलाकर ३५ तितली जातियाँ अभिलिखित हुईं। क्षेत्र प्रेक्षणों ने दिखाया कि तितलियों की ये सभी जातियाँ भोजन और मकरन्द के लिए उन पादपों पर निर्भर हैं जो क्वेरकस ल्यूकोट्रिकोफोरा - सीड्रस देवदारा पारिस्थिकी प्रणाली के प्रारूपिक होते हैं।

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