OBSERVATIONS ON THE STATUS AND DIVERSITY OF BUTTERFLIES IN THE FRAGILE ECOSYSTEM OF LADAKH (J & K)

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INTRODUCTION

As one of the more inaccessible parts of the Himalayan Ranges, the cold deserts of India are resource poor regions. These could be considered as an important study area because of their extremely fragile ecosystem. The regions on the north flank of the Himalayas experience heavy snowfall and these remains virtually cut off from the rest of the country for several months in the year. Summers are short. The proportion of oxygen is less than in many other places at a comparable altitude because of lack of vegetation. There is little moisture to temper the effects of rarefied air. The people of these areas depend predominantly on agriculture and animal husbandry.

Ladakh is the highest altitude plateau region in India, situated in the state Jammu and Kashmir between Karakoram mountain range in the north and the main Great Himalayas in the south. It has an area of 45,110 km. Ladakh borders Tibet to the east, the Lahaul and Spiti to the south, the Valley of Kashmir, Jammu and Pakistan to the west and Afghanistan and China in the north.

Bounded by two of the world’s mightiest mountain ranges, the Karakoram in the north and the Great Himalaya in the south, Ladakh is traversed by two other parallel chains, the Ladakh Range and the Zanskar Range. Ladakh range and Zansker range running in the east and west side respectively through Ladakh, divides it into three main valleys i.e., Zansker valley, Indus valley and Nubra valley. The Zansker valley lies west to Zansker range, the Indus valley sandwiched between Zansker and Ladakh ranges and Nubra valley on the east side of Ladakh range crossing the Khardungla pass. The river Indus is the backbone of Ladakh.

As a distinct biome, this cold desert need specially focused research and a concerted effort in terms of natural resource management, especially in the light of their vulnerable ecosystems and highly deficient natural resource status. Ecology and biodiversity of the Ladakh is under severe stress due to severe pressures. Ladakh and Kargil districts have been greatly disturbed since 1962 because of extensive military activities. Since 1992, tourists and others have been allowed to visit some pristine areas. There has been tremendous increases in human and livestock populations. Increased agricultural and developmental activities have further contributed to the loss of wildlife in the area. The situation is critical, as almost all the large mammals in this zone are on the endangered list.

The floral and faunal elements of this area are unique and have high level of endemism which need to be protected. They have direct bearing on sustaining the ecosystem as well as the life of people. Insects form a predominant group and have a vital role in the equilibrium of the cold desert. But as compared to other vertebrate groups, this group has received little attention from researchers.

Butterflies are the most important component of our biodiversity. Apart from being aesthetically attractive, they act as indicators to depict the health
of a habitat. The larvae of butterflies are associated with plants but cause only little damage to the hosts. The adults act as incidental, wild pollinators and help in pollination of many native plants. The larvae as well as adults are food for many predators like lizards and birds. The butterfly diversity in an ecosystem tells how much healthy it is, as butterflies are very sensitive to any change in the environment. But in the present day scenario, many butterfly species are under a real threat due to depletion of the natural cover for various developmental activities. This is truer in case of high altitude areas. In Ladakh, some species of Apollo butterflies are of great interest because of their high money value in insect trade. During the survey by Zoological Survey of India in Ladakh in July 2009 to September, 2009, about 20 species of butterflies have been identified from Ladakh. Some of them are also available in lower altitudinal ranges of Himalayas but certain species such as The Mountain Blue, the Small Jewel White, The Lofty Bath White, The Lesser Bath White, The Common Red Apollo, The Mountain Satyr and The high Brown Silverspot are confined to high altitude only. Of these, two species i.e. The Common Red Apollo and The high Brown Silverspot are also included in Indian Wildlife (Protection) Act. The area from south Pullu to Khardungla is quite rich in common red Apollo, but due to traffic and tourism this habitat of Apollo butterflies is being destroyed and need to be conserved.

OBSERVATIONS

The species collected from Ladakh have been identified consulting the works of Evans (1932), Wynter-Blyth (1957), Cantlie (1963) and Mani (1986). The following species of butterflies are being reported from Ladakh.

SYSTEMATIC ACCOUNT

Order LEPIDOPTERA
Sub Division RHOPALOCERA
Super Family PAPILIONOIDEA
Family PAPILIONIDAE
Genus Parnassius Latreille, 1804


Type-species: Papilio apollo Linnaeus

1. Parnassius epaphus Oberthür, 1879

1879 Parnassius epaphus Oberthür, Etudes d'Ent. 4: 23

Common Name: Common Red Apollo

Diagnostic features: Male: Upperside of fore wing with crimson black-encircled spots reduced to a minute subcostal dot in the black mark beyond the cell; the subhyaline terminal margin much narrower, with dentate white spots in the interspaces along the actual margin; cilia white, markedly alternated with black at the apices of the veins. Hind wing: the dusky black along the dorsal margin comparatively much broader, its inner border more irregular, deeply bi-emarginated, the crimson centre to the black mark above the tornal angle entirely absent. In no specimens that I have seen are the crimson spots centered with white.

Underside: on the fore wing the white dentate spots in the terminal row are larger, which give to the wing the appearance of having a subterminal as well as a post-discal transverse series of dusky-black lunules. On the hind wing the row of basal and the obliquely-placed pre-tornal spots are of a duller shade, while as in that form all the crimson spots are broadly centered with white. Female differs from the male in the dusky black markings on the upperside that are broader, especially the postdiscal series on the fore wing: this generally forms a diffuse band and so often restricts the lunules of the white ground-colour beyond it, blending as it does diffusely with the subhyaline terminal margin. Anal pouch of fertilized of the posterior high keel or carina absent.


Distribution: Afghanistan, Pakistan, Tadzikistan, Northern India (Jammu & Kashmir and Sikkim), Nepal, Bhutan and China.

Remarks: All the species of genus Parnassius Latreille are Palaearctic, present above the tree line in isolated pockets. The species Parnassius epaphus, though has wide distribution but the subspecies Parnassius epaphus hillensis Bang-Haas is confined to Ladakh and Spiti areas of cold desert is included in Wildlife (Protection) Act of India (Schedule II, Part II). As per present survey this subspecies is commonly available in a small stretch of seven kilometers from South Pullu to Khardungla. But
due to rapidly expanding tourism this subspecies in Ladakh is under a real threat and this area is immediately needed to be conserved.

Genus *Papilio* Linnaeus, 1758


Type- species: *Papilio machaon* Linnaeus

2. *Papilio machaon* Linnaeus, 1758


Common name: Common Yellow Swallowtail

Diagnostic features: Sexes similar; wings dorsally yellow with black markings, veins black; upperside of forewing with basal area black dusted with yellow scales; rest of the cell yellow with a black bar in cell and a black bar at end cell; marginal area black with a complete series of regular small yellow spots near termen. The hind wings have a pair of protruding tails, below each tail is a red eye spot.


Distribution: Throughout the Palearctic region in Europe and Asia; across North America.

Remarks: This species though widely distributed and moderately available in hilly areas of north-west India but in Ladakh as per present surveys, it is quite rare and mainly present near brackish water lakes. In Ladakh the tail of this species is shorter as compared to the other specimens available in Himachal Pradesh.

Family PIERIDAE

Genus *Pontia* Fabricius, 1807


Type- species: *Papilio daplidice* Linnaeus

3. *Pontia callidice* (Hubner, 1799)


Common name: Lofty Bath White

Diagnostic characters: Male: Upperside ground colour white, forewing with discocellulars edged broadly with black on each side; a short broad transverse pre apical black bar present and another similar short bar further outwards; hindwing uniform, unmarked. Underside: white; fore wing markings as on the upperside, but those at apex green and with a few scattered superposed black scales on the upper preapical bar; hind wing with basal area green, an oval white spot in middle of cell. Female Upperside on fore wing the black edging to the discocellulars broader; a curved, postdiscal, irregular, macular, black band, the upper three and lowest spot that compose it large; hind wing with an anterior, postdiscal, short, curved, macular, black band, followed by a more or less complete terminal series of spots at the apices of the veins.


Distribution: North-west Himalayas above 12,000 feet from Chitral to Mussoorie. Occurs in the higher mountains of Europe; in Asia from the Altai to the Himalayas.

Remarks: This species is typically Palaearctic present above tree line. As per present surveys, it shares common habitat with *Parnassius epaphus* and is available in a small stretch of seven kilometers from South Pulla to Khardungla and need to be conserved.

4. *Pontia chloridice* (Hubner, 1808-1813)


Common name: Lesser Bath White.

Diagnostic characters: Male: Upperside ground colour white, forewing with discocellulars edged broadly with black on each side; a short broad transverse pre apical black bar present and another similar short bar further outwards; hindwing uniform, unmarked. Underside: white; fore wing markings as on the upperside, but those at apex green and with a few scattered superposed black scales on the upper preapical bar; hind wing with basal area green, an oval white spot in middle of cell. Female Upperside on fore wing the black edging to the discocellulars broader; a curved, postdiscal, irregular, macular, black band, the upper three and lowest spot that compose it large; hind wing with an anterior, postdiscal, short, curved, macular, black band, followed by a more or less complete terminal series of spots at the apices of the veins.
Material examined: Nubra Valley, Panamic, 1ex, 08.VII.2008, coll. H. S. Mehta and party.

Distribution: Chitral and Ladakh in India and Pakistan.

Remarks: Papilio chloridice a typically Palaearctic species, has very restricted distribution. During present surveys it has been found to confine to Nubra valley and is quite rare in this area.

5. Pontia daplidice (Linnaeus, 1758)

Common name: Bath White

Diagnostic characters: Male with wings white; upperside of forewing with apex black studded with white spots and lines, end cell with black spot; underside of hindwing blotched with green colour. Female similar to male except upperside of forewing with a discal spot and upperside of hindwing with an obscure row of terminal and marginal spots.


Distribution: Central and Southern Europe, Baluchistan, Peshawar, Chitral, Kashmir and along the Himalayas right across the Central Himalayas up to Darjeeling.

Remarks: This species is widely distributed from plains of India to cold desert of Ladakh. As per present surveys, it is commonly available in Agricultural fields of Ladakh adjoining Leh.

Genus Colias Fabricius, 1807

Type-species: Papilio lyale Linnaeus

6. Colias erate (Esper, 1805)

Common name: Pale Clouded yellow

Diagnostic features: Male with wings dorsally lemon yellow with broad unspotted black outer border, a prominent black spot present in cell of forewing. Female as in male but borders spotted with ground colour; upperside of hindwing heavily dusted with black scales.


Distribution: Himalayas from Chital to Kumaon; hills of south India.

Remarks: As per present surveys, Colias erate is commonly available in agriculture fields of Ladakh adjoining Leh. Otherwise this species in moderately available in Northwest India from plains to high altitude areas.

Genus Pieris Schrank, 1801

Type-species: Papilio brassicace Linnaeus

7. Pieris brassicace (Linnaeus, 1758)

Common name: Large cabbage White

Diagnostic features: Male with wings dorsally white with black apex of forewing and apical spot on hindwing; no discal spot present in forewing; underside if hindwing pale yellow. Female similar with two additional discal spots on upperside of forewing.


Distribution: Throughout Europe, North Africa and Asia to the Himalayas.

Remarks: This species is very common in agricultural fields of Ladakh and is widely distributed. In India it is available from plains to high altitude areas.

8. Pieris canidia (Linnaeus, 1768)

Common name: Indian Cabbage White.
Diagnostic characters: Male upperside of wings white; upperside of forewing with apex black, inwardly dentate black outer margin and with a black discal spot; upperside of hindwing with apical spot and terminal spots. Female similar to male with an additional discal spot on upperside of hindwing.


Distribution: North-west India, Himalayas, Assam, Burma, Nilgiris, Palnis, Travancore, Cochin, Tibet, West China.

Remarks: As per present surveys, this species is moderately available in agricultural fields of Leh and surrounding areas.

9. Pieris rapae (Linnaeus, 1758)


Common name: Small Cabbage White.

Diagnostic features: Male wings dorsally white, very small apical black area on forewing, one discal spot on forewing and apical spot on hindwing. Female similar to male but with additional discal spot on upperside of forewing.

Material examined: Diskit, 1ex, 07.VII.2008, coll. H. S. Mehta and party.

Distribution: Australia, New Zealand, Palaearctic area, in India Ladakh, Kashmir, North-West India.

Remarks: The species Pieris rapae is distributed only in high altitude areas of India and in present surveys it has been found to be rare.

Family LYCAENIDAE

Genus Celastrina Tutt, 1906


Type-species: Papilio argiolus Linnaeus

10. Celastrina argiolus (Linnaeus, 1758)


Common name: Hill Hedge Blue.

Diagnostic features: Male with wings dorsally blue with broad dark border on forewing, increasing to apex, female with very broad dark borders and discal area pale blue. Wing below grey coloured in both sexes.
Material examined: Nubra Valley, Khardung, 1ex, 09.VII.2008, coll. H. S. Mehta and party.

Distribution: Chitral to Kumaon; Sikkim.

Remarks: The species Albulina pheretes is a high altitude and Palearctic species. As per present surveys it is quite rare and confined to Nubra Valley.

Genus Plebejus Kluk, 1780
1780. Plebejus Kluk, Hist. nat. pocz. gospod. 4: 89.
Type-species: Papilio argus Linnaeus
13. Plebejus christophi (Staudinger, 1874)
Common name: Small Jewel Blue.

Diagnostic features: Male: Wings dorsally dull violet blue; forewing with narrow dark border; ventrally wings without prominent red marginal spots, hindwing with small metallic spots along entire margin; marginal spots of both wings faintly orange crowned.

Female: wings dorsally brown, bases blue scaled; otherwise similar to male.


Distribution: North Iran, Caucasus, Kurdistan, Turkestan, Chitral, North Afghanistan, Ladakh, Kashmir.

Remarks: It is a high altitude species commonly available in Ladakh.

Genus Pseudophilotes Beuret, 1958
Type-species: Papilio baton Bergrasser
14. Pseudophilotes vicrama (Moore, 1865)
Common name: Chequered Blue.

Diagnostic features: Male with wings dorsally dusky blue; female dark brown; wings with fringe prominently chequered; ventrally wing creamish in colour with black spots, marginal spots orange crowned.


Distribution: Chitral to Kumaon; Ladakh.

Remarks: This species though commonly available in hilly areas of north-west India but in Ladakh as per surveys conducted presently, it is quite rare. In Ladakh it is distributed near the brackish water lakes.

Genus Vanessa Fabricius, 1807
Type-species: Papilio atalanta Linnaeus
16. Vanessa cardui (Linnaeus, 1758)
Common name: Painted Lady.

Diagnostic features: Sexes similar; wings dorsally pinkish red with black markings; forewing slightly concave below apex; hindwing slightly wavy but otherwise evenly rounded; upperside of forewing with apex black bearing inner three conjoined and four separate marginal white spots.
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17. Vanessa cashmiriensis Kollar, 1844


Common name: Indian Tortoise Shell.

Diagnostic features: Sexes similar; forewing narrower, more produced and cut off at apex; termen slightly concave; hindwing toothed at vein 4; wings dorsally tawny; forewing with one black patch in cell, one at end cell and one beyond the cell; underside of hindwing blue submarginal spots inwardly bordered brownish.


Distribution: Himalayas.

Remarks: This species is quite common in hilly areas of North-west India including cold desert areas of Ladakh.

Genus Hyponephele Muschamp, 1915


Type-species: Papilio lycaon Rottemburg

19. Hyponephele davendra (Moore, 1865)


Common name: White ringed meadow brown.

Diagnostic features: Sexes similar; upperside of forewing tawny with a prominent black ocellus towards apex; underside of hindwing with ocelli; discal line dark, outwardly white margined.


Distribution: Iran - Afghanistan, Himalayas, Tibet, Middle Asia, Baluchistan - Kumaon, North West India

Remarks: This species is also a high altitude butterfly. As per recent surveys, it is less available in Ladakh.

Genus Paroeneis Moore, 1893

1893. Paroeneis Moore, Lepidoptera Indica 2: 36.

Type-species: Chionobas pumilus C. & R. Felder

20. Paroeneis pumilus (c. & R. Felder, 1867)


Common name: Mountain Satyr

Diagnostic features: Sexes similar; wings dorsally mostly tawny except for dark border; with a tawny discal band, the latter ill defined, diffused inwards;


Distribution: Himalayas, Kashmir, Tibet.

Remarks: It is typically a high altitude species. According to the present surveys, it is less available in Ladakh.
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REFERENCES


PLATE-I

*Parnassius epaphus*

*Papilio machaon*

*Pontia callidice*

*Pontia chloridice*

*Colias erate*

*Pieris brassicae*
PLATE-II

Pieris canidia

celastrina argiolus

Hyponephele davendra

Argynnis adippe pallida

Vanessa cardui

Plebejus christophi
PLATE-III

Albulina omphisa

Aulocera swaha

Vanessa cashmiriensis

Pseudophilotes vicrama

Albulina pheretes

Paroecis pumilus
PLATE-IV

Ladakh - A fragile ecosystem

A habitat of Apollos near Khardungla