Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2021; 9(4): 448-452

Received: 28-05-2021
Accepted: 30-06-2021

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Studies on rhopaloceran diversity of high altitude Chandertal Wetland in Lahaul & Spiti district of Himachal Pradesh, India

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DOI: https://doi.org/10.22271/j.ento.2021.v9.i4f.8818

Abstract
Wetlands are among most threatened habitats of world due to many reasons including anthropogenic pressure. Chandertal wetland consists of grassy meadows and a half moon shaped rock basin Chandertal Lake (4270 m above mean sea level). It is designated as inernational Ramsar site and also wildlife sanctuary. Survey on butterflies was carried out there by considering the importance and fragility of this cold desert ecosystem. The research work in Chandertal wetland revealed presence of six rhopaloceran species (Lepidoptera) belonging to Nymphalidae (2 species), Pieridae (2 species), Lycaenidae and Satyridae (1 species each).

Keywords: Chandertal wetland, high altitude, rhopalocera, diversity

Introduction
Like India, the biodiversity in Himachal Pradesh is also very rich and diversified due to its varied climatic conditions ranging from tropical in foothills to arctic environment in trans-Himalayan region. Spiti area of this state constitutes a part of separate and distinct unit, i.e. Trans Himalayas. The Chandertal wetland is an internationally known Ramsar site situated near little below the Kunzam Pass (4520 m amsl) on Manali –Kaza state highway no. 30. It is situated at 32^0 28'30" N latitude and 77^0 37'E longitude, falling in the 1 B Tibetan Plateau Biogeographic zone. This wetland exhibit grassy meadows and a half moon shaped rock basin Chandertal Lake (4270 m above msl) along with few small land locked water bodies (Fig.1). Chandertal area possesses semi developed glacial type of soil. Its floral and faunal species have specialized morphological and physiological features to cope up the extreme environmental conditions. The biodiversity of this ecological zone is unique and reflective of the alpine areas of Western Himalayan ecosystem. With the onset of flowering of floral species, the insect communities after winter diapause become active and start multiplication. In this high altitude wetland the research work on rhopalocera is meagre. To fulfill this taxonomic gap, various survey were conducted to collect and identify the rhopaloceran diversity. In this studied area, six species of rhopalocera belonging to four families *viz*. Nymphalidae, Pieridae, Lycaenidae and Satyridae under order Lepidoptera have been recorded during July to October months of survey years. As altitude further increases from tree line towards alpine area the biodiversity gradually decreases in the terrestrial ecosystems. Lepidopterans are holometabolous, endopterygotes insects with scales on body and appendages. Globally the number of lepidopteran species is about 200,000 (Gillot, 2005) [1]. Lepidopterans specifically rhopalocerans are more coloured with diverse range of habitat and host plants etc. make them more significant to be included in faunistic survey and environment monitoring. In India over 15,000 lepidopteran species belonging to 84 families and 18 super families have been reported. Out of these 84 families, rhopalocerans are mostly represented by major families *viz*. Nymphalidae, Pieridae, Lycaenidae, Papilionidae and Hesperiidae (Mondal, 1998) [2]. Talbot (1939) [3] described many species belonging to families Pieridae and Papilionidae of India. Wynter Blyth (1957) [4] gave overview of the rhopalocerans of India in ten families including Nymphalidae and Pieridae. Later this work was reviewed by Vershney (1993) [5].

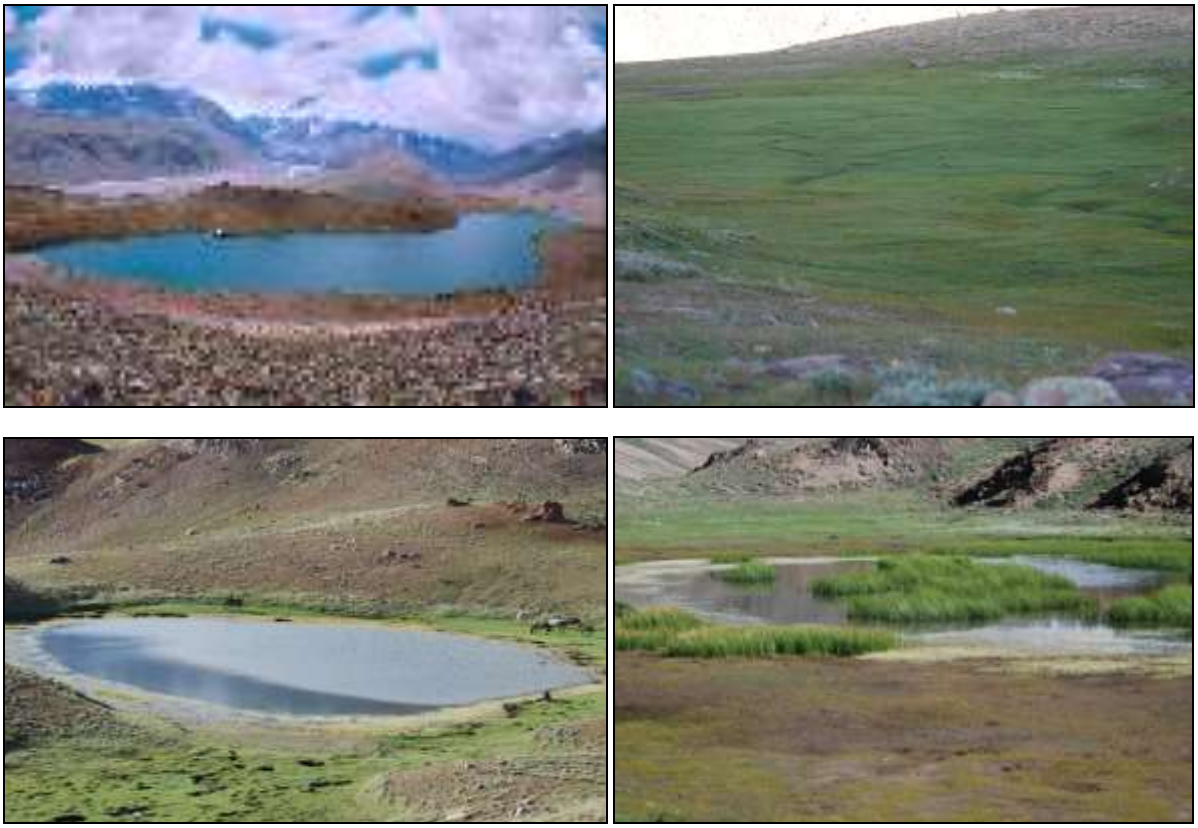

Fig 1: Studied area: Chandertal lake, small land locked water bodies and alpine pastures

Materials and Methods

As suggested by Arora (1990) [6] the butterfly collection was done by aerial netting and sweeping methods. Nylon net bags of 75 cm length and mouth diameter of 38 cm on metal ring were used. Sturdy but light weight handle of varying size was attached to metal ring. Soft-bodied lepidopterans were collected by aerial netting and gently removed from bags. After collecting the butterflies, their killing was necessary to avoid damage to their taxonomic characters during their struggle to fly away and was done by using killing bottles. Glass jars with wide mouth and tight lid supplied with a layer of Na or K cyanide covered with plaster of paris (POP) were used. Other liquid chemicals like chloroform, ethyl acetate and ether were also used. Liquid chemicals poured over cotton, placed in air tight jar and covered by 3-4 layers of filter paper so that insect specimens may remain dry, were used. A killing bottle with a layer of saw dust soaked with few drops of ethyl acetate gave good results and specimens also remains fresh and flexible for stretching as suggested by Ghose (1990), were used. Insect specimens could not be kept in killing bottle for long time as identifying features may be damaged. So after killing, each specimen was transferred to individual butter paper packets (with code) for temporary storage and transported to laboratory. Field note book was used for writing butter paper code and details regarding date, place of collection, habitat, colour of live specimen, host plant and other necessary informations. In the laboratory butterflies were relaxed in relaxing jar for pinning and stretching. Relaxing jar/box made of transparent glass/aluminium containing layer of cellulose wadding at its bottom. The crystals of thymol for protection of specimen from fungal infection in relaxing box. Soft wooden setting board whose groove size may be adjusted between 4 to 15 mm. Grease proof paper strips of variable length and breadth depending upon wingspan etc. were used as setting strips. Relaxed butterflies were properly stretched and pinned by using rust free entomological pins of different size depending upon the size of specimen as suggested by Arora (1990) [6]. Nikon D-80 Camera with zoom tele-lenses, 10 x 50 super Zenith field binocular and 1000 mm tele-lens of Questar make were used for photography. The collected specimen were identified morphologically and later confirmed by scientists of Zoological Survey of India. The collected specimens were deposited in laboratory of department of bio-sciences of Himachal Pradesh University at Shimla.

Results and Discussions

The biodiversity of Chandertal wetland ecological zone is unique and reflective of the alpine areas of Western Himalayan ecosystem. About 35% area of wetland is covered by alpine herbs and grasses (*Poa, Anaphalis, Gentiana, Pedicularis, Potentilla, Polygonum, Ranunculus, Thymus* etc.). At such high altitude wetland, six species of rhopalocera (Lepidoptera) belonging to four families *viz*. Nymphalidae representing *Cynthia cardui* and *Aglais cashmirensis,* Pieridae representing *Pieris brassicae nepalensis* and *Colias fieldii,* Lycaenidae representing *Polymmatus eros* and Satyridae representing *Paralasa shallada.* The relative abundance of these species were also low due to high altitude and harsh environmental conditions along with anthropogenic pressure. As altitude further increases the biodiversity gradually decreases in the terrestrial ecosystems (Kikkawa and Williams, 1971) [7]. In India, rhopalocerans are mostly represented by major families *viz*. Nymphalidae, Pieridae, Lycaenidae, Papilionidae and Hesperiidae (Mondal, 1998) [2]. Talbot (1939) [3] described many species belonging to families Pieridae and Papilionidae of India. Thakur *et al.* (2006) [8] gave distributional record of 14 rhopalocerans belonging to Nymphalidae, Pieridae, Lycaenidae and Papilionidae from Pin Valley National Park located at Lahaul and Spiti district of

Himachal Pradesh. Arora *et al.* (1995) [9] reported 223 species of rhopalocera including *Cynthia cardui*, *Pieris brassicae nepalensis* and *Polymmatus eros* from Western Himalayas. Mehta *et al*. (2002) [10] reported 50 rhopaloceran species including *Cynthia cardui* and *Pieris brassicae nepalensis* from Pong Dam Wetland at Himachal Pradesh. Uniyal (2004) [11] reported 35 species belonging to families Nymphalidae, Pieridae, Lycaenidae and Papilionidae etc. from Nanda Devi Naional Park located at altitude up to 7818 m above mean sea level.

Phylum : Arthropoda
Class : Insecta
Order : Lepidoptera
Family : Nymphalidae
Genus : *Cynthia*
Species : cardui (Linnaeus)

1758. *Papilio cardui* Linnaeus, Syst. Nat., ed. x: 475.
1932. *Vanessa cardui* Evans, Identification of Indian Butterflies, p. 177.
1957. *Vanessa cardui* Wynter-Blyth, Bombay Nat. Hist. Soc., p. 210.
1937. *Cynthia cardui* Field, Smithson. Contrib. zool., 84: 37.
1994. *ccardui* Varshney, Oriental Insects, 28: 175.

Locality: Chandertal and Batal.
Material examined: Himachal Pradesh: Lahaul & Spiti district: grassy meadows of sanctuary, 1 ♀, 7.vi.2006. Banyal, Thakur and Ranjit; 2 ♀, 15.vii.2007, 1 ♀, 2 ♂,31.vii.2008, 3 ♀,10.viii.2009, Ranjit.

Description: Fore wing dark brown with pale ochreous spots at subbasal area; an irregular band from mid of cell to tornal angle; from coastal edge to area five there is post discocellular series of three spots; margin darkbrown. Hind wings darkbrown, area beyond disc to outer margin ochreous brown; a row of larger five darkish brown spots present with slight paler centre, a row of lunular spots is submarginal and a row of larger spots present marginally. Simillar markings on underside alongwith few additional spots on fore wing only.

Distribution: Throughout India due to migratory habit Himalaya; Himachal Pradesh, Lahaul & Spiti.

Phylum : Arthropoda
Class : Insecta
Order : Lepidoptera
Family : Nymphalidae
Genus : *Aglais*
Species : *cachmirensis* (Kollar)

1844. *Vanessa cashmirensis* Kollar, Hugel's Kaschmir, iv: 442, pl.11, figs.3, 4.
1957. *Vanessa cashmirensis* Wynter-Blyth, Bombay Nat. Hist. Soc., p. 214.
1994. *Aglais cashmirensis* Varshney, Oriental Insects, 28: 174.

Locality: Chandertal and Batal.
Material examined: Himachal Pradesh: Lahaul & Spiti district: 2 ♀, 15.vii.2007, 1 ♀, 2 ♂, 31.vii.2008, 3 ♀, 10.viii.2009, Ranjit.

Description: Wing span upto 58 mm. Upper surface of wings more brownish than lower and possess dark and a few white spots. Upper surface of forewings with broad inner fuscous border. Yellowish area prominent in both fore and hind wings. Discal spots in cells 2 and 3.

Distribution: Common in Himalaya. Ranges 900-4800 m.

Phylum : Arthropoda
Class : Insecta
Order : Lepidoptera
Family : Pieridae
Genus : *Pieris*
Species : *brassicae*
Sub species : *nepalensis* Doubleday

1846. *Pieris brassicae nepalensis* Doubleday, p.9, pl.vi, figs.1-3.

Locality: Chandertal lake, Batal.
Material examined: Himachal Pradesh: Lahaul & Spiti district: grassy meadows of sanctuary, 2 ♂, 4.vi.2006,1 ♀, 7.vi.2006. Banyal,Thakur and Ranjit; 2 ♀, 15.vii.2007,1 ♀, 2 ♂, 31.vii.2008, 3 ♀,10.viii.2009,Ranjit.

Description: Antennae black, tip clubed and white in colour. Head, thorax and abdomen posses white hair. Forewings with an additional black spot on its outer half. Hind wings with larger coastal spot. Underside apical and marginal boarder ochreous-yellow.

Distribution: Ranges from Baluchistan and Chitral to Assam; Himalaya to adjoining plains; Himachal Pradesh, Lahul & Spiti.

Phylum	:	Arthropoda
Class	:	Insecta
Order	:	Lepidoptera
Family	:	Pieridae
Genus	:	*Colias*
Species	:	*fieldi* Menetries

1855. *Colias fieldii* Menetries, Enum. Corp. Anim. Mus. Petr., 1: 79, pl.1, fig. 5.
1939. *Colias electo fieldi* Talbot, Fauno of British India including Ceylon & Burma, 1: 562.
1957. *Colias electo* Wynter-Blyth, Bombay Nat. Hist. Soc., p. 455.
1992. *Colias fieldi* Haribal, Butterflies of Sikkim Himalaya, p. 90.
1993. *Colias fieldi* Varshney, Oriental Insects, 27: 364.

Locality: Chandertal and Batal.
Material examined: Himachal Pradesh: Lahaul & Spiti district: grassy meadows of sanctuary, 2 ♂, 4.vi.2006, Banyal, Thakur and Ranjit; 2 ♀, 10.vii.2007, 1 ♀, 2 ♂, 27.vii.2008, 3 ♀, 10.viii.2009, Ranjit.

Description: Wing span: Male upto 55mm, female upto 57mm. Upper surface is orange red with a black broad border. A prominent black spot at the mid of fore wing present between radius and media vein. Female wing margins were black but spotted with orange colour in between. These spots were absent in male wings. In male upper surface of hind wings was heavily dusted with black spots near basal area. These dark clouded yellow were feeding on flowers of *Taraxacum officinale* in the studied area.

Distribution: Common throughout the Himalaya.

Phylum	:	Arthropoda
Class	:	Insecta
Order	:	Lepidoptera
Family	:	Lycaenidae
Genus	:	*Polymmatus*
Species	:	*eros*

1808. *Lycaena eros* Ochsenheimer, Schmett. Eur., 1 : 42.

Locality: Banks of Chandertal lake.
Material examined: Himachal Pradesh: Lahaul & Spiti district: grassy meadows of sanctuary, 2 ♀, 5.vi.2006. Banyal, Thakur and Ranjit; 2 ♀, 15.vii.2007, 2 ♂, 31.vii.2008, 2 ♀, 10.viii.2009, Ranjit.

Description: Wings: span upto 29 mm, dorsally silvery shining blue, variable dark boarders and diffused. Hind wings ventrally pale brown and forewing posses black spots almost in straight line, ventrally.

Distribution: Baluchistan, common in Northern and North Western Himalayan ranges.

Phylum	:	Arthropoda
Class	:	Insecta
Order	:	Lepidoptera
Family	:	Satyridae
Genus	:	*Paralasa*
Species	:	*shallada*

1880. *Erebia shallada* Marshall and de Niceville (Lang in M S.), p. 247.
1893. *Paralasa shallada* Moore, p.105, pls. cxviii, figs.1a, 1b.
1932a.*Erebia shallada shallada* Evans,p.118;1940 Wynter-Blyth, p. 725.

Locality: Banks of Chandertal lake.

Material examined: Himachal Pradesh: Lahaul & Spiti district: grassy meadows of sanctuary, 3 ♂, 8.vi.2006, Banyal, Thakur and Ranjit; 2 ♀, 11.vii.2007, 2 ♂, 29.vii.2008, 2 ♀, 10.viii.2009, Ranjit.

Description: Wing span 45-55 mm. Fore wing: ocellus much larger with only a very obscure reddish yellow ring. Ochraceous-red patch darker and much smaller if ring absent. In hind wing the ground colour is much paler and dusted with white.

Distribution: North West Himalaya: Kashmir to Kumaon.

Conclusion

This research work revealed the presence of six species of rhopalocera (Insecta: Lepidoptera) belonging to four families *viz*. Nymphalidae: *Cynthia cardui* and *Aglais cashmirensis*, Pieridae: *Pieris brassicae nepalensis* and *Colias fieldii*, Lycaenidae: *Polymmatus eros* and Satyridae: *Paralasa shallada*. The species diversity and their relative abundance found less which may be due to high altitude area above tree line, harsh environment and anthropogenic pressure. Chandertal Lake is a holy place for nearby people and also a tourist place for others. This increases the human and vehicular interferences. Keeping in view the biodiversity and ecological significance, His Excellence the Governor, Himachal Pradesh under section 18(1) of the Wildlife (Protection) Act, 1972 has notified Chandertal wetland as "Chandertal Wildlife Sanctuary" in Lahaul & Spiti district of Himachal Pradesh. For protecting habitat of faunal species (some endangered species) and their propagation, the area allocated to this sanctuary is 38.56 sq. km. in survey of India, survey sheet no. 52 H/10 and 52 H/11 to the scale 1:50,000 (Notification, H.P.Govt.). Protected areas help in biodiversity conservation.

Acknowledgement

The cooperation of Bio-sciences department of H.P. University, Shimla, M.L.S.M. College Sunder Nagar and scientists of Zoological Survey of India is thankfully acknowledged.

References

1. Gillot Cedric. Entomology. Third Edition, Springer Publication, The Netherlands 2005, 243-331.
2. Mondal DK. Faunal Diversity in India: Lepidoptera. ZSI Publication 1998, 312-318.
3. Talbot G. The fauna of British Indian including Ceylon and Burma (Butterflies) I. Taylor and Francis, London 1939, 506.
4. Wynter Blyth MA. Butterflies of Indian region. The Bombay Natural History Society, Mumbai. 1957, 523.
5. Varshney RK. Index Rhopalocera Indica. Part-III, Genera of butterflies from India and neighboring countries (Lepidoptera: (A) Papilionidae, Pieridae and Danidae). Oriental Insects 1993;27:343-372.
6. Arora GS. Collection and Preservation of Animals: Lepidoptera ZSI Publication, Kolkata 1990, 131-138.
7. Kikkawa J, Williams EE. Altitudinal distribution of land birds in New Guinea. Search 1971;2:64-69.
8. Thakur MS, Mehta HS, Mattu VK. Distributional Records of Butterflies (Lepidoptera: Rhopalocera) from Pin Valley National Park, Himachal Pradesh India, Annals of Forestry 2006;14(1):83-85.
9. Arora GS, Ghosh SK, Chowdhari MS. Insecta Lepidoptera. Fauna of Western Himaalaya, Part-I, Himalayan Ecosystem Series. ZSI Publication, Kolkata 1995, 61-73.
10. Mehta HS, Julka JM. Mountains: Northwest Himalaya. In: Ecosystems of India (Eds. Alfred, J.R.B.; Das, A.K. and Sanyal, A.K.). ENVIS Centre, Zool. Surv. India, Kolkata 2002, 410.
11. Uniyal VP. Butterflies of Nanda Devi National Park a World Heritage Site. Indian Forester 2004;130(7):800-803.