

A CHECKLIST OF NEUROPTERA (INSECTA) OF WESTERN HIMALAYA, INDIA

D. K. Bhattacharya & S. R. Dey

Department of Zoology, University of Kalyani, Kalyani - 741235, Nadia, West Bengal, India

Introduction

Neuroptera — a somewhat heterogenous group of predaceous insect, valuable allies of man. They are best represented in the tropical part of the world but neglected by entomologists. They are predaceous on different insect pests and other insects in their larval and adult stages. Beside being predator, a few species of this group are parasitic and parasitize the egg capsules of spiders. As predator, Neuroptera with their high longevity, fecundity and fast developmental rate clearly deserve most attention. Although Neuroptera as predator is somewhat overshadowed by more attention paid to other predator group.

Materials and Methods

Collection of Neuroptera specimens were made at different areas of Western Himalaya. Specimens were collected from herbs, shrubs and trees by sweeping or beating method to dislodge the insect from vegetation. Butterfly nets were used to collect the insect on wings. Collection also made through artificial light trap at night.

After collection materials were brought to the laboratory. Soft bodied specimens were preserved in 70% alcohol. Other adult specimens were preserved in dry condition. For microscopic study of wings, legs and genitalia they were processed through 5% KOH solution to make transparent. Then they were dehydrated through graded alcohols, made clear by clove oil. They were then mounted in canada balsam.

Result and Discussion

Neuroptera as order was created by Linnaeus (1758) and treated it as a heterogenous group formed of Plecoptera, Isoptera, Embioptera, Odonata, Psocoptera, Mallophaga and Trichoptera beside true Neuroptera. Therefore, Neuroptera need to be defined more properly to make it a homogenous group. Imms (1925) considered its order status and subdivided it into two suborders viz. Megaloptera and Planipennia. Brues and Melander (1932) and Essig (1942) raised Megaloptera and Planipennia to the status of order and retained the name Neuroptera for Planipennia. New (1988) treated Planipennia as true Neuroptera. Brooks and Barnard (1990) treated itself as distinct and valid order. As a consequence, the characters by which the Neuroptera presently defined are : Adults with two pairs of membranous wings, may be equal or subequal; complex venation; chewing mouthparts; larvae carnivorous and pupae exarate.

Studies on the Neuroptera of the Indian region virtually initiated by Walker (1853). Subsequent workers who worked on this group are MacLachlan (1868), Vander Weele (1909), Banks (1911), Navas (1913), Sala de Castellarnau (1946) and Ghosh and Sen (1977) are worth mentioning. Studies on this group of insect has given less attention in Western Himalaya. So far, few scattered works have been done in this region. Very small information on the faunal resource of this area can be available from the works of Ghosh (1977), Debnath *et al* (1988), Chakrabarti *et al* (1990) and Dey and Bhattacharya (1997). Hence, this paper deals with a comprehensive account of the Neuroptera fauna of Western Himalaya, India.

Altogether 267 species of Neuroptera are so far recorded from Indian region distributed over 13 families and 104 genera. A classified list of Neuroptera species occurring in Western Himalaya is provided here. This species

catalogue shows that only 66 species distributed over 9 families and 35 genera are known from this study area. When attempt is made to correlate the percentage of distribution of the species under study area with the species of India constitute 24.7% and 1.13% when compared with world Neuroptera fauna.

In respect of their predatory nature, many of them predate on aquatic insects (Megaloptera), some feed on wood boring insects (Raphidoidea) and some feed on aphids and ants while few take spider egg, larvae and other insects.

Classified List of Neuroptera Species Occurring in Western Himalaya

Family	Species
Ascalaphidae	<i>Idricercus decrepitus</i> (Walker)
	<i>I. sogdianus</i> MacLachlan
	<i>Ogeogaster segmentator</i> (Westwood)
	<i>O. tessellata</i> (Westwood)
	<i>Siphlocercus mimius</i> (Walker)
	<i>Glyptobasis dentifera</i> (Westwood)
Chrysopidae	<i>Ankylopteryx octopunctata</i> Fab.
	<i>Chrysopa dasyphlebia</i> (MacLachlan)
	<i>C. himalayana</i> Ghosh
	<i>C. murrensis</i> Tjeder
	<i>C. septempunctata</i> Wesmeal
	<i>Chrysoperla orestes</i> Banks
	<i>C. carnea</i> (Stephens)
	<i>C. gujratensis</i> Ghosh
	<i>Chrysopidae garhwalensis</i> Ghosh
	<i>Cunctochrysa albolineata</i> Killington
	<i>C. jubingensis</i> Holzel
	<i>Mallada alcestes</i> (Banks)
	<i>M. boninensis</i> (Okamoto)
	<i>M. sp.</i>
	<i>M. obvia</i> Holzel
	<i>M. kinnaurensis</i> Ghosh
<i>Italochrysa aequalis</i> (Walker)	
<i>Tumeochrysa indica</i> Needham	
<i>Nothochrysa lefroyi</i> Needham	
<i>N. indigena</i> Needham	
Coniopterygidae	<i>Coniocomposita indica</i> Withycombe
	<i>Coniopteryx ambigua</i> Withycombe
Dilaridae	<i>Dilar indicus</i> Kimmins
	<i>D. hornei</i> MacLachlan
Hemerobiidae	<i>Hemerobius indicus</i> Kimmins
	<i>Micromus calidus</i> Hagen
	<i>M. linearis</i> Hagen

Hemicrobiidae	<i>M. timidus</i> Hagen <i>M. sp. A</i> <i>M. sp. B</i>
Mantispidae	<i>Mantispa indica</i> Westwood <i>M. rugicollis</i> Navas
Myrmeleontidae	<i>Centroclisis eustalacta</i> Gerst <i>Creoleon griseus</i> (Klug) <i>Borbon regius</i> Navas <i>Indoclystus singularis</i> (Westwood) <i>Formicaleon pugnax</i> (Walker) <i>Nuglerus scalaris</i> Navas <i>Formicaleon cubitalis</i> Navas <i>F. truculentus</i> (Walker) <i>F. vasanus</i> (Walker) <i>F. verendus</i> (Walker) <i>Macronemurus nefandus</i> (Walker) <i>Murmecaelurus acerbus</i> (Walker) <i>M. afghanus</i> Kimmins <i>M. imblexus</i> (Walker) <i>Myrmeleon infensus</i> Walker <i>M. morosus</i> Walker <i>M. tunuipennis</i> Rambur <i>M. sagax</i> Walker <i>M. tivalis</i> Gerst <i>Palpares infimus</i> (Walker) <i>P. patiens</i> (Walker) <i>Stnares improbus</i> (Walker) <i>Tomatares astutus</i> (Walker)
Osmylidae	<i>Lahulul babulti</i> Navas <i>Paraosmylus prominens</i> Needham <i>P. balae</i> Ghosh and Sen <i>Thyridosmylus langir</i> (MacLachlan)
Nemopterydae	<i>Halter nutans</i> Navas

In general Neuroptera exhibit a carnivorous habit, offering a better scope to the people to deploying some of them in biological control measures. Some families of Neuroptera are given utmost importance for their efficient role in controlling soft bodied insect pests like aphids, mites etc. So, this group thus appear to have paramount importance in plant protection, specially the families which control the aphids.

The present work thus may provide a comprehensive account of the Neuroptera species of Western Himalaya. This will obviously provide a basic data for the particular group which would help to formulate a biological control programme through the proper identities of these natural enemies in future.

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