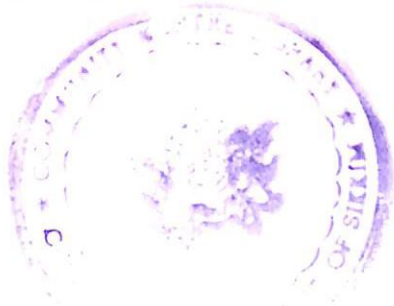


**THE BUTTERFLIES
OF SIKKIM HIMALAYA
AND THEIR NATURAL HISTORY**

**INCLUDES MANY SPECIES
FOUND ALSO IN OTHER PARTS
OF INDIA AND HIMALAYA**

MEENA HARIBAL

S-54167



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WITH 60 COLOUR PLATES AND NINE SKETCHES

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C O N T E N T S

List of Plates and Figures	5
Foreword	7
Preface	8
Introduction	9
Acknowledgements	12
I. Sikkim	13
II. Natural History and Ecology of Butterflies	22
III. Studying Butterflies	41
IV. Conservation, Laws and Farming	49
V. Classification	52
VI. Guide to Identification of Butterflies of Sikkim	59
SWALLOWTAILS OR PAPILIONIDAE	
Parnassiinae	59
Papilioninae	61
WHITES & YELLOWS OR PIERIDAE	
Pierinae	76
Coliadinae	86
BLUES OR LYCAENIDAE	
Poritinae	91
Lyphyrinae	91
Miletinae	92
Curetinae	92
Theclinae	93
Lycaeninae	111
Polyommatainae	113
Riodininae	125
NYMPHALIDS OR NYMPHALIDAE	
Amathusiinae	128
Satyrinae	130
Calinaginae	149
Charaxinae	150
Apaturinae	152
Nymphalinae	158
Heliconiinae	185
Acraeinae	186
Danainae	187
Lybitheinae	193
SKIPPERS OR HESPERIIDAE	
Coeliadinae	194
Pyrginae	196
Hesperiinae	201
References	212
Glossary	216
Index	217

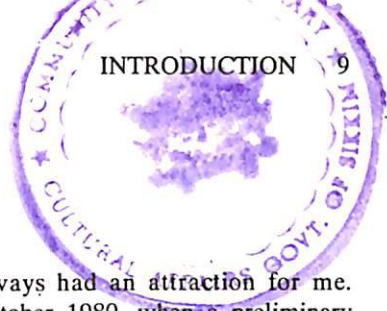
PREFACE

Although only a small Indian state (some 7,300 sq.km), the physical diversity of Sikkim, and its position astride the border between the Palaearctic and Oriental regions, ensures a significantly diversified butterfly fauna. The total number of known species, approaching 700, is comparable with that of neighbouring Nepal, a country some 20 times greater in area. All told, about half the total number of species recorded from the Indian subcontinent occur in Sikkim. Some species, such as *Teinopalpus imperialis* and *Meandrusa gyas*, already enjoy protected status. But protection from collectors will count for nothing if pressure from agriculture and forestry overwhelm natural habitats. As a highly visible invertebrate group, butterflies are ideal for field studies, their various ecological requirements making them excellent indicators of environmental change. But first, it is necessary to have a base line from which to know the local butterfly fauna.

Historically, no country is better served by its Lepidopterological literature than is India. The Colonial Britisher belonged to a curious breed. Wherever he set foot in the world his imagination was captured by the local butterfly fauna, a propensity that was not so evident in any of his German, Dutch, French or Spanish counterparts. And India was no exception, Why then, should a new treatment of the Sikkim butterfly fauna be so opportune and welcome? Of course, earlier works are now outdated as ideas on classification and species concepts have been modified. But more importantly, with Biodiversity and Conservation having moved from the confines of obscure journals and learned societies into the main political sphere, there is an immediate need for a readily available authoritative study.

Meena Haribal has here collated known information on Sikkim's Butterflies, adding to it a wealth of personal observations. We find details of life-histories, larval hosts, adult nectar sources, distribution and habitat, supplemented by more than 50 colour plates illustrating both museum specimens and the butterflies in their natural habitat. Thus it is to be welcomed not only as a work of scholarship but also as a book that takes butterflies out of collection cabinets and places them back in their environment again as living organisms. It is a volume for Academia, Government departments, local libraries and schools, bringing sharply into focus the most important local butterfly fauna on the Indian subcontinent.

P. R. Ackery
(The Natural History Museum, London).



INTRODUCTION

Eastern Himalaya known as paradise of naturalists always had an attraction for me. My first trip to this paradise was through Sikkim in October 1980, when a preliminary survey of flora and fauna of Sikkim was conducted, sponsored by WWF and Fish and Wildlife Dept., Govt. of Sikkim. During this survey we made a small collection of butterflies and also observed a few known species. Our first list of butterflies was about 100 species. This in turn led to a preliminary paper in the *Journal of Bombay Natural History Society* (Haribal *et al.* 1988).

The Sikkim Nature Conservation Foundation trustees were planning to bring out a series of books on the fauna and flora of Sikkim. As per the suggestion of Mrs Usha Ganguli-Lachungpa, I was invited to prepare a book on common butterflies of Sikkim. Once I got set about the task I found that I could make a pictorial guide to the common butterflies of Sikkim, and current book is the outcome of the same. This book includes about 400 species of butterflies with plates containing over 650 illustrations.

On the basis of literature survey and museum studies I have made a checklist of 689 species of butterflies, which also include a few butterflies which have been recorded from the neighbouring areas of Darjeeling and Kalimpong of West Bengal.

Description of the butterflies

Each butterfly is given a continuous serial number through out the book. Description of each butterfly consists of the following;

A serial number followed by the common/trivial name of the butterfly and plate number, if it is depicted. This is followed by the scientific name, sometimes in trinomial, author's name, year of description, distribution and size in millimetres as wing span (WS). Brief identification characters are given, followed by habits and habitats. Wherever life history has been known it is described in brief.

Abbreviations

Throughout the book I have used abbreviations for various very commonly occurring words in the text. They are as follows:

UP- Upperside/dorsal side; UN- Underside/ventral side; HW- Hindwings; FW- Forewings; UPF- Upper forewings; UNF- Under forewings; UPH- Upper hindwings; UNH- Under hindwings; M - Male; F - Female; sp.- one species; spp.- more than one species; ssp.- subspecies; WS- wing span in millimeters, measured from apex to apex of forewings of a properly relaxed specimen; DeN- De Niceville; WB- Wynter-Blyth.

Abbreviations for place names in the Distribution

Two distributions have been given for many of the butterflies. One is the distribution for the species and the other is for the subspecies. The distribution is limited to only neighbouring countries, namely Nepal, Bhutan, Burma (now Myanmar) and Sri Lanka although the butterfly may be found outside this distribution. A negligibly few areas west of India like Afghanistan and Baluchistan also have been included for some.

The abbreviations are as follows;

AF- Afghanistan, AN- Andamans, AS- Assam, AT- Atran, BA- Baluchistan, BE- Bengal, BH- Bhutan, BU- Burma (now Myanmar), CH- Chitral, CN- Central Nepal, CV- Chumbi Valley, DA- Dawans, EG- Eastern Ghat, EH- Eastern Himalaya (including the north-eastern hill states), EI- Eastern India (including Orissa, and Bengal), EN- East Nepal, GH- Gharwal, HI- Himalaya, IN- India, KA- Kashmir, KM- Kumaon, KN- Kangra, KU- Kulu, MA- Manipur, MU- Mussorie, NA- Nagaland, NB- North Burma,

NE- Nepal, NI- Nicobars, NSS- Northern Shan States, NWH- North-west Himalaya, PI- Peninsular India (excluding Himalaya), SB- South Burma, SI- South India (up to Maharashtra and Andhra Pradesh), SL- Sri Lanka, SM- Simla, SSS- Southern Shan States, TA- Tavoy, WG- Western Ghat, WN- West Nepal.

Codes for altitudes of occurrence.

Although butterfly movements are poorly understood, some generalisation as to habitat association which in Sikkim is directly related to altitude, can be made. The altitudes of occurrence given in the text are approximations. It is quite possible that they are found in other habitats also as individual butterflies move between and across habitats.

- 1= 0-900 m
 2= 900-1,800 m
 3= 1,800-2,800 m
 4= 2,800-3,800 m
 5= 3,800-4,500 m
 6= 4,500-5,500 m.

Status

I have followed Evans (1932) in this respect, as current status is not properly known. The codes are as follows:

VC- Very Common, C- Common, NR- Not rare, R- Rare, VR- Very rare, LC- Locally common.

Nomenclature

The scientific names are common throughout the world. But unfortunately not much of the work on taxonomy has been carried out on the Indian Lepidoptera in the past. Owing to this reason different authors refer to various experts on the subject. For classification of the families and subfamilies I have followed Ackery (1989), and for various groups in the families and the genera I have referred to various expert's papers on the genera. I have followed for *Papilionidae*-Collins *et al.* (1985), *Parnassinae*-Ackery (1975); *Piridae*-Talbot (1978); *Lycaenidae* - Eliot (1973) for phylogeny and tentative classification and *Nacaduba* - Tite (1963), *Heliophorus*- Riley (1929); *Satyrinae*- Miller (1968) for Phylogeny and *Ypthimini* - Shirozu *et al.* (1979); *Charaxinae* - Smiles (1982); *Neptini*- Eliot (1969); *Danainae*- Ackery and Vane-Wright (1984); *Hesperiidae*- Evans (1949). Varshney (1977- 1990), Smith (1981) and Smart (1984) and Harish Gaonkar (Pers. comm.) have also been referred to.

Life-Histories

Unfortunately life histories of a very few Sikkim subspecies are known. I have given life history of species which mostly have come from the studies on south Indian butterflies. Mostly I have compiled them from the Journal of Bombay Natural History Society (JBNHS) and the *Lepidoptera Indica*. The major references are Bell (1911-1916), Davidson *et al.* (1890), Mackinon *et al.* (1899) and several other notes from various authors in JBNHS.

The larvae described are the final instar larvae unless specified.

Plates

I was constrained to use only those butterflies which were available in good condition in BNHS collection although in many cases their antennae are missing or the body is broken. I have tried to depict mostly Sikkim subspecies but in some cases when these were not available I have taken recourse to very closely related subspecies. 650 photographs of about 400 species are shown in the plates. Depending on the

identification characters, either upperside or undersides are shown. Where sexes are dimorphic females and also seasonal forms are shown. I have also included about fifty species of butterflies taken in their natural surroundings. A few photographs on habitats, behaviour and ecology are also included.

On each plate the plate number, and the trivial names of the butterflies depicted and a reference scale is also given. The butterflies are numbered in continuation and correspond to the text numbers. I have used a, b, c, d to represent different forms, orientation and sexes of the same butterfly. ♂ denotes M DSF, ♀ M WSF.

References

Most of the references on the butterflies of Sikkim and the references pertaining to the life histories are listed. At the end of each reference in square brackets I have used codes which directly gives the reader information about what that reference contains. The codes used are as follows: RL- Regional list, LH- Life history, TX- Taxonomy, G- General, BI- Biology, CE- Chemical ecology, and their combinations.

Botanical names of larval food plants

I have followed Bennets (1987) for latest scientific names, but whenever not available I have followed Polunin and Stainton (1987) and Cooke (1967).

ACKNOWLEDGMENTS

This project was successful only because of the encouragement and co-operation I received from various friends and authorities. I wish to thank all those who were directly or indirectly involved.

The project was undertaken because of keen interest and initiation by Mrs. Usha Ganguli-Lachungpa of Forest Dept. Sikkim. I also wish to thank authorities of Sikkim Nature Conservation Foundation, particularly the President, Mr. K. C. Pradhan and the Hon. Secretary and Hon. Treasurer, Mr. Tahsi Tobden who welcomed this venture, supported it enthusiastically, took personal interest till completion of the project.

I am grateful to various individuals who helped me during the surveys and collection trips, especially Messrs. Sandip Mehta, Mukund Thakkar and also to Navroze Behramfram and N. D. Mulla who surveyed the Tholung Valley and Rangeet Valley.

I thank the staff of Forest Department of Sikkim, particularly Messrs. Gut Lepcha, M. N. Subba and Sudizom Lucksom, who helped in various ways and also the P. C. C. F., C. C. F. and C. W. L. W., for granting various permits.

I am indebted to the staff and Executive committee of the Bombay Natural History Society for permitting me to use their collection and also the use of the computer which made my work much easier. I also wish to thank the computer staff and researchers Messrs. J. P. K. Menon, Ivan Mendonsa, Ravi Sankaran and Goutam Narayan who helped me while working in the computer room and also Leon Lobo who prepared a few programmes for my various requirements.

I am grateful to the Association of British Council Scholars and the authorities of British Council for granting me a scholarship, which enabled me to visit the British Museum of Natural History for studying museum specimens and use their library for literature. I am indebted to Ms. Doreen D'Sa for suggesting that I should apply for the scholarship of British Council, otherwise I would have really missed a lot of valuable informations.

I wish to thank the authorities of British Museum for permitting me to visit the museum and study their specimens. I particularly wish to thank Mr. Dick Vane-Wright for valuable discussions. I am grateful to Mr. Philip Ackery and Mr. Campbell Smith, who were always readily available to help me in any difficulties while working with collections and also for various helpful discussions.

I am highly indebted to Mr. Arun Prakash and Mr. Shankar for accommodating me in their apartment while I was in London.

I am also thankful to the authorities of Entomology Sections of Forest Research Institute, Dehradun and PUSA Agricultural Institute, Delhi for permitting me to study their specimens. I also wish to thank ZSI authorities in Calcutta, particularly Dr. R. K. Varshney and Mr. D. K. Mandal for helpful discussions.

Photography of the plates was possible only because of Mr. Mihir Devare and Mr. Sudhir Sapre who offered me the use of their various specialized equipment. I also thank Mr. Subodh Manktala for taking special care while developing the slides of the plates and Mr. N. R. Murthy for helping me to photograph difficult subjects like Lycaenidae butterflies.

I am grateful Mr. J. S. Serrao and Ms. Guari Dange who took the job of editors for the manuscript and with their various comments really made the book presentable.

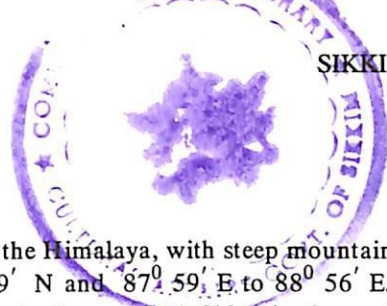
I appreciate the effort put in by Ms. Sunita Kamblı for preparing the life histories and other sketches.

I also wish to thank various individuals particularly Mr. Harish Gaonkar for discussions on various topics on nomenclature and literature and Mr. Naresh Chaturvedi for going through part of the manuscript and giving me helpful comments and hints.

I wish to thank Mr. Ajay Shekdar and Mr. Ajit Chavan for designing the book. I am also grateful to the Messrs. Fotocomp Typesetters, their staff particularly Mr. Sanket, Mr. Venu and Mr. Bhatia who took personal interest in typesetting of the manuscript.

I wish to thank the authorities of Thomson Press especially Mr. Deepak Randive who were responsible for bringing the book to the present form.

Lastly I wish to thank all my family members who encouraged and supported me *throughout this venture.*



SIKKIM

Sikkim is a small, beautiful state of India in the Himalaya, with steep mountains and deep valleys. It lies between $27^{\circ} 5' N$ to $28^{\circ} 9' N$ and $87^{\circ} 59' E$ to $88^{\circ} 56' E$. It is wedged between, Nepal in the west and Bhutan in the east and China in the north and northeast. In the south it is bordered by West Bengal. In the west it is bound by the north-south spur of the Great Himalayan Range which includes the world's third highest peak, **Kanchenjunga** (8,000 m) and down to its south is Singalila ridge. In the north it is bound by Dongkia range and also partly includes the Tibetan Plateau. In the east it is bound by the Chola range. The average steepness is about 45° . Sikkim is the main catchment area for the beautiful river Teesta, which has its main source from Chho Lhamo lake in the north and is further strengthened by many streams and rivers of which Tholung, Lachung, Great Rangeet and Rangpo are important drainers. It also has about 180 perennial lakes, among which Khadchodpalri (Khechiperi), Gurudongmar, Chho Lhamo and Men Moi Tso are some of the most scenic.

The longest north-south distance is about 100 km and about 60-70 km east-west. Its total area is 7,299 sq. km.

Geology of Sikkim

Sikkim encompasses the Lesser Himalaya, Central Himalaya and the Tethys Himalaya (Raina *et al.* 1981).

Major portion of Sikkim is covered by Precambrian rock and is much younger in age, the geological position is known as 'younger units of Paleozoic age'. The southern area has sedimentary and metasedimentary rock.

The physical configuration of Sikkim is partly due to its geographical structure. The north-eastern and western portions of the state are constituted of hard massive gneiss rock capable of resisting denudation. The south and central is chiefly formed of comparatively soft thin slates and half schistern rock which denudes very easily.

The trend of the mountain system as a whole in general is east-west direction. The chief ridges however run in a more or less north-south direction, i.e. Singalila and Chola ridges, and another north-south ridge in the central portion divides the Rangeet Valley from the Teesta Valley of which the two main peaks are Tendong (2,800 m) and Mainam (3,100 m). The Rangeet and Teesta run nearly north-south till they meet. These valleys are open towards the north and usually attain steep gorge-like structures as one approaches the river beds. The glaciers are as low as 4,000 m and those near Kanchenjunga may be about 300 m lower (i.e. at 3,700 m). The perpetual snowline is about 5,000 m.

There are mainly two types of rocks :

- 1) Gneissic group is the oldest and constitutes the main body of the Himalaya in South Sikkim. It is highly micaceous and frequently turns into mica schists. In the north and south the gneiss is not so micaceous.
- 2) Daling is a group of sub-metamorphic rocks and predominantly consists of phyllites.

Climate

Sikkim has been classified as a most humid region in the whole range of the Himalaya, because of its proximity to the Bay of Bengal and direct exposure to the south-west monsoon and its physical features. The rainfall varies from 2,000 mm to 5,000 mm in most of its inner valleys except for its northernmost region which receives scanty rainfall.

Sikkim is divided into four districts; North sikkim, South Sikkim, East Sikkim and West Sikkim, for administrative purposes. Gangtok is the capital, situated at an altitude of 1,690 m. Although North Sikkim is the largest district it is mostly covered by mountains. Its total population according to the recent censuses is 4 lakhs.

Flora and Fauna

The geographic features and the climatic conditions have made Sikkim one of the most highly biologically diversified regions. It has almost all types of habitat from hot tropical forest to cold desert. The southern lower altitudes have deciduous forests and the deep inner valleys have moist montane tropical type of climate which is very similar to that of east Asia. The northern temperate zone has palaeartic species. The northernmost area which borders Tibet has high altitude desert habitat and the flora and fauna is very similar to that of Ladakh in Kashmir.

Types of Vegetation

The flora of Sikkim could be classified into five major types on the basis of altitude and composition.

Vegetation up to 900 m (*Tropical Semi-Deciduous and Tropical wet forests*).

Most of the lower southern valleys fall into this category. This mainly constitutes of deciduous plants like *Sal Shorea robusta*, *Khair Acacia catechu* and many other species like *Lannaea grandis*, *Garuga pinnata*, *Terminalia bellerica*, *Macaranga* sp., etc. Secondary growth consists of various species of *Strobilanthes*, *Barleria*, *Cissampelus*, *Tridax*, *Polygonum*, etc. Also species like Bananas, Pandanus and various species of palms and canes occur in inner valleys.

Vegetation between 900-1,800 m (*Tropical Moist forest or Broad-leaved Forests*).

This region includes mainly various broad-leaved species like *Engelhardia*, *Schima*, *Castanopsis*, *Acer*, *Litsea*, etc. The secondary growth consists of *Girardinia*, *Boehmeria*, *Maesa*, *Ardisia*, *Melastoma*, *Edgeworthia* etc. It also includes various climbers like *Pothos*, *Vitis*, *Rhaphidophora*, *Smilax*, *Dioscorea* etc. Some species of bamboos are also found.

Vegetation between 1,800-2,800 m (*Temperate Broad-leaved Forests*). This region is predominated by *Rhododendron* and *Michelia*. Other species found in this region are *Mahonia*, *Castanopsis*, *Quercus*, *Schima*, *Ilex*, *Acer*, *Magnolia*, *Cinnamomum*, *Betula* etc. The shrubs mainly consists of *Debregeasia*, *Urtica*, *Gynura*, *Hypericum*, *Viburnum*,

Vaccinium, *Piptanthus*, *Mahonia*, *Berberis* etc. These are mostly temperate type of plants.

A maling bamboo is very common in east Sikkim around Gnathang to Zuluk.

Vegetation between 2,800-3,800 m (Temperate Coniferous and Broad-leaved Forests).

Mostly consists of *Rhododendron* and *Tsuga* type of species. In some regions like Tsoka, Bakkim and Lachen area the coniferous species like *Aibes densa*, *Thuja* sp. also occur. Secondary growth mainly consists of *Silene*, *Astragalus*, *Fragaria*, *Impatiens*, *Geranium*, smaller species of *Rhododendrons*, *Gualtheria*, *Cynoglossum*, *Jasmine* etc.

Vegetation between 3,800-4,500 m (Sub-Alpine Vegetation).

Mostly coniferous trees and smaller shrubs occur in the area. The tree line in west Sikkim is up to 4,000 m, while in the east it ceases at a much lower altitude due to steepness of the terrain and deforestation. In north Sikkim in some parts like the Tholung and Zema Valleys it is almost up to 4,500 m. Plants like Junipers, dwarf species of *Rhododendrons*, azaleas and many spring flowers like *Potentilla*, *Anemones*, *Primulas*, *Ligularia*, *Pedicularis*, *Senecio*, *Aster* etc. become very common.

Vegetation between 4,500-5,500 m (High Altitude Desert).

This region has typical high altitude desert plants which come out only in spring. These mainly include various species of *Meconopsis*, *Sedum*, *Waldheimia*, *Lagotis*, *Phlomis*, *Pedicularis*, *Bistorta*, *Potentilla*, *Saxifraga*, *Saussurea* etc. The vegetation becomes sparse as one goes to North Sikkim towards the Tibet border. Most of the plants grow flat across the land because of strong breeze.

The beauty of Sikkim and its lofty mountains and the rich flora and fauna had always attracted the attentions of explorers since the middle of 19th century.

Exploration of land and mountains

Of the great explorers of Sikkim the first name which comes to mind is that of Sir Joseph Hooker. In spite of a lot of initial trouble in getting a permit to enter Sikkim, he explored the northern region in great detail during his various trips between 1849 and 1851. The details of his exploration are recorded in his two volumes entitled *The Himalayan Journals* (Hooker 1855).

In late 19th century the great explorer and mountaineer Douglas Freshfield explored the Zemu Valley and the region around Kanchenjunga and returned via the Tholung Valley. The account of this exploration is contained in his excellent book *Around Kanchenjunga* (Freshfield 1903). Dr. A. M. Kellas, Paul Bauer, Eric Shipton and B. B. Osmaston are some of the prominent explorers. Interested readers can refer to the *Journal of Himalayan and Alpine clubs* and also Mehta and Kapadia (1990).

Natural History

Flora

Sir J. D. Hooker was not only an explorer but also a great botanist, who became later the director of the Kew gardens in England, explored this region in great detail. His botanical investigations are recorded in his volumes mentioned earlier and also in the *Flora of British India*. He was the first explorer to record anything on natural history of Sikkim. The Gamble's book on the *Flora of Sikkim Himalaya*, which was revised by Cowen is the only book available for reference. There is a publication by Bengal Govt. on the *Medicinal Plants of Sikkim and Darjeeling Himalaya* by K. Biswas, (1956). In 1960s Japanese group of Tokyo University botanists lead by Hiroshi Hara have explored in details Western Sikkim and the same has been published in Japanese. In recent years there are a few reports available by the Botanical Survey of India (Rolla Rao 1963). Of late, Sikkim Nature Conservation Foundation is actively engaged in systematic exploration and recording of variation in species of rhododendrons, orchids, primulas and other major groups of flowering plants besides publication of such works.

Fauna

Hardly anything about the current status and ecology of mammals is known. Over 100 species of mammals which include many interesting lesser cats, Serow, Binturong, Red Panda etc., have been recorded by the earlier naturalists.

Birds have been fairly well studied, although a lot more studies on the ecology and natural history needs to be undertaken. About 550 species of birds have been recorded and is available in the form of book by the late Dr. Salim Ali (1989). Our own observations add up about another 20 species to the list.

About 30 species of fishes, 30 species of reptiles and a few species of amphibians have also been recorded (Ganguly 1982).

Study of insects was mainly concentrated on the lepidoptera - butterflies and moths.

History of butterfly study and collection from Sikkim

First ever mention of Sikkim butterflies in the modern literature is in the the Hooker's-*Himalayan Journals* (refer to p. 3).

He also writes about high altitude butterflies as follows: "During my ten days stay at Zemu Samadong (3,000 m), I formed large collection of insects many were new, beautiful and particularly interesting from belonging to types whose geographical distribution is analogous to that of the vegetation. The caterpillars of the swallowtail butterfly (*Papilio machon*) was common, feeding on umbelliferous plants as in England: and a *Sphinx* (like *S. eurphorbiae*) was devouring the euphorbias. The English *Cynthia cardui* (the Painted Lady) was common, as were 'sulphurs', 'marbles' *Pontia* (whites)

'blues' and *Thecla* of British aspect, but foreign species. Among these, tropical forms were rare except one fine black swallowtail." (presumably *P. arcturus*).

First ever serious report on the butterflies of Sikkim was published by H. J. Elwes (1880) in the *Proceedings of the Zoological Society of London*. Later, the same author along with Otto Moller (1888) published additions to the butterflies of Sikkim in the *Transactions of Entomological Society of London*. In the same period L. De Niceville, who was with the natural history section of the Indian Museum in Calcutta also made several trips to Sikkim and its neighbourhood and wrote a series of papers in the *Journal of Royal Asiatic Society of Bengal* (1881, 1882, 1883 and 1885). Almost at the same period the *Gazetteer of Sikkim* (1890) was brought out in which G. A. Gammie and De Niceville have recorded about 631 species of butterflies found in Sikkim, including those which are found in Darjeeling, Buxa and Bhutan as the area was contiguous with Sikkim state and also the vegetation was similar to that of Sikkim. But now many of these butterflies have become synonyms of some of the other butterflies mentioned in the text. A few other authors like G. W. V. DeRhe-Philipe (1911), H. C. Tytler (1915) and F. M. Bailey (1911) have mentioned about few of the butterflies of Sikkim in their papers in the *Journal of Bombay Natural History Society*, while describing for other areas. D. F. Sanders (1947) who did extensive collections in Sikkim around 1940s has also published a paper in *Journal of Bombay Natural History Soc.*, with notes on Sikkim butterflies and their status, but a major list of Sikkim butterflies maintained by him, was available to M. A. Wynter-Blyth and the same has been incorporated in latter's book.

Other than these publications, the museum collections of butterflies of Sikkim are distributed all over the world, but the major collections are in Natural History Museum (NHM) in London. I had access to the Museums of Bombay Natural History Society (BNHS), Forest Research Institute (FRI), Dehra Dun, ICAR Museum at PUSA New Delhi and Natural History Museum in London and have compiled collection data for over 1500 specimens of about 300 species. The data for those species which are currently common in Sikkim as per our observations have not been compiled. The ZSI Museum at Calcutta was also visited but I did not study them except for a cursory glance.

On the basis of these museum collections it can be concluded that most of the collections were carried out between 1880 to 1920. The major collection from this area was by Otto. Moller who was stationed in Darjeeling and had employed local collectors for collection and used to supply these specimens to various European collectors like Rothschild, Fruhstorfer, Godwin-Salvin etc. His collections are now largely in NHM as most of these above collectors have donated their collections to NHM. G. C. Dudgeon collected extensively from 1889-1900 from Sikkim. Other major collectors are R. P. Bretaudeau and C. Bretaudeau who collected mostly from Lachen-Lachung valleys and their collections are seen in NHM. Various veteran collectors of those days like C. T. Bingham, H. C. Tytler, F. M. Bailey, F. Hannington and W. H. Evans also visited this

area several times. Evars visited Sikkim between 1894-1928 at least five times. Earlier two Everest Expeditions of 1922 and 1924, which entered Tibet via Sikkim, had sent naturalist climbers like Maj. Hingston who with the help of local collectors collected a large number of specimens from Sikkim particularly from the higher altitudes which are now in the custody of NHM and the report about the same was published in technical report of the expeditions by Alpine Club, but the same was not available to me as the library of the Alpine Club was under renovation. B. C. Ollenbach also collected between 1914- 1922 from Sikkim and his collections are seen in FRI museum.

The unfortunate thing about these collections is that most of the collectors mention 'Sikkim' as the place of collection and no exact locations or altitudes are mentioned. One reason for this may be that the state of Sikkim was sparsely populated, not so developed, had very few villages with very small population. Even Gangtok, the capital of Sikkim was not much bigger than a present modern village. The places often mentioned in the collections are valleys of rivers like Rangeet, Teesta, Lachen and Lachung, Also the specific places mentioned are Gangtok, Dikchu, Tendong, Thangu, Senchal, Singhal, Rhenok, Troomling, Kupup, Ari, Gnathong and Karponang. Another interesting observation from these data is that most of the collectors were not residents of Sikkim but the visitors and had gone specifically for natural history collections. So most of the information available is from March-May and from August- November when the weather is good and very little information is available for June-July (months of the heavy rains) and almost no information is available for December-March except for a small collection by Usha and her friends in December in the recent years.

My own observation limits to seven short visits to Sikkim during August, September-November, March, April of various years and amounts to about 250 species of which many are single sightings. I have tried to cover as much area as possible to survey various kinds of habitat found in Sikkim.

The following places were visited and are mentioned often in the text. #

ES = East Sikkim; NS = North Sikkim; WS = West Sikkim; SS = South Sikkim

Gangtok	(ES)	Tumin Khola	(ES)	Zema I & II	(NS)	Yoksum	(WS)
Bushuk*	"	Penlongla	"	Samdong	"	Bakkim	"
Singtam*	"	Phodong	"	Thangu	"	Dzongri	"
Ranipool	"	Mangan*	(NS)	Giagong	"	Pemayangste	"
Pakyong	"	Singhik*	"	Cheora	"	Pelling	"
Saramsa*	"	Sanklang*	"	Zakuchan	"	Rangpo	(SS)
Rongli	"	Ryngyam	"	Pashingdañg*	"	Dickling Chu*	"
Rhenok*	"	Ryngbum	"	Lingja*	"	Reshi	"
Chhangu	"	Naga Bridge*	"	Beh*	"	Mamring	"
Kupup	"	Tung Bridge*	"	Tholung	"	Norak *	"
Men Moi Tso	"	Tsungtsang	"	Naya Bazar*	(WS)	Khanni Khola	"
Gnathang	"	Bichhu	"	Seti Khola	"	Melli Bazar	"
Karponang	"	Lachung	"	Tashiding	"	Majithar	"
Dikchu*	"	Yumthang	"	Legship*	"	Baguwa	"
Rakadong*	"	Munshithang	"	Gyalshing	"	Rabongla	"
Samdong	"	Lachen	"	Gerethang	"	Rangeet Valley*	"

On the basis of these collections and literature I have made a check-list of 689 butterflies and easily ten more could be added,

Biodiversity and Endemism

Although Sikkim is one of the smallest Himalayan states, with an area of 7,299 sq. km. the biodiversity has given Sikkim an unique status. For example, within 30 km of Tholung Valley the altitude rises from 600 m to 5,500 m. Due to this steepness of the mountain and the geographical and climatic conditions, the floral and faunal diversity ranges from tropical species to high altitude cold desert species.

Of total of about 1,400 butterflies recorded from the Indian Sub-continent almost 50% of butterflies are recorded from Sikkim. Of the total area of Sikkim 40% (North Sikkim) is almost inhabitable and is covered with snow for about 4-8 months to perpetual snow and unsuitable for any life. About 30% of the total area of Sikkim which occupies the altitudinal zone from about 200-1,800 m is represented by about more than 75% species butterflies of Sikkim. Remaining species are found in the in-between zone and some of them overlap all the zones.

The subfamily Amathusiinae occurs mainly below 900 m. The region between 600-1,800 m is occupied by the typical hilly region butterflies. The Lycaenidae and Hesperidae are highly diversified. Many of the type specimens of Hesperids have been collected from Sikkim and are in NHM. The nymphalids and danaids are abundant in this region. They include butterflies like the Barons, Pansies, Sailers, Sergeants, Tigers, Crows etc. These butterflies have affinity to Oriental fauna. The Swallowtails also abound this region. Pieridae is represented by Gulls, Puffins, Jezebels and Orangetips.

The zone between 1,800-3,500 m has butterfly fauna typical of temperate zones and have affinity to the Palaearctic fauna. The nymphalids which are found in this region are the Admirals, Tortoiseshells, Silverstripes and Silverspots. Hardly any danaids except for the Chestnut Tiger, occur in this region. Lycaenids mostly consist of the subfamilies Lyaceninae, Theclinae and Polyommatainae- Hairstreaks, Sapphires, Hedge Blues etc. Lybithinae occurs mostly in this zone. Punches and Judies are also seen. But the most diversified is the subfamily Satyrinae, particularly the tribes Lethini and Satyrini. Foresters, Walls, Golden and Silver Forks are numerous. As many as 36 species of tribe Lethini are found in Sikkim. Of the Swallowtails very few larger butterflies occur in this region and include the Krishna and Blue Peacocks. The Yellow Swallowtail in Sikkim has been recorded only from the altitudes above 3,000 m, although it occurs up to 2,000 m in other parts of Himalaya.

The zone beyond 3,000 m is occupied by a very few specialised species which are adapted to harsh climatical conditions and have affinity to the Palaearctic fauna. They include Apollos and Yellow Swallowtail of the Papilionidae. The Clouded Yellows of Pieridae, the Silverstripes and Silverstreaks and the Admirals of Nymphalidae and a very few species of blues like Chumbi Green Underwing, Azure Mountain Blue etc. also occur. Satyrinae is represented by the tribe Satyrini consisting of the Arctic and Mountain Arguses and the Great Satyr.

Table I List comparing butterfly diversity in Sikkim and its neighbouring oriental region

Family	Sikkim	Ind-Sub	Sri Lanka	Burma	Nepal	Malay
Papilionidae	55	94	15	66	43	44
Pieridae	51	99	29	44	49	55
Lycaenidae	162	459	82	338	186	348
Nymphalidae	263	480	68	325	220	253
Hesperiidae	159	307	48	266	125	209
Total	690	1439	242	1039	623	909
Area (x1000 Sq. Km)	7.299	5163.65	65.609	676.577	140.79	329.758

A few butterflies on account of being polyphagous are found from sea level to the high mountains up to about 4,500 m. They are the Indian and the Large Cabbage Whites, Tortoiseshells, Indian Red Admiral, Painted Lady, Dark Clouded Yellow etc.

The Geographic position, i.e. Sikkim is bound by high mountains of more than 4,000 m on three sides, has led to isolation of the population occurring in Sikkim. Probably due to these reasons many of them have become distinct subspecies and forms.

There are many Oriental species which do not occur west of Sikkim. The reason for this may be that the great North-South ridge of the Kanchenjunga spur and Singalila act as a barrier for dispersal of the species. Similarly many Palaearctic species like *Lassiomata*, *Hipparchia* and *Dallacha* have not been recorded east of Nepal.

Many of the subspecies are known only from Bhutan and Sikkim. Infact the following species have been so far recorded only from Sikkim - *Lethe trisigmata*, *Lethe atkinsoni*, and that too from high altitudes of Lachen and Lachung Valleys. But this does not necessarily mean they are endemic to Sikkim only as the surrounding regions like Bhutan, Arunachal Pradesh, South Tibet have similar biodiversity. But hardly these areas have been explored in detail for butterfly fauna also a very few records are available from these regions in last hundred years.

Current status

Compared to earlier records definitely there is a great reduction in numbers as well as species. The main reasons for this is increase in human population and developmental activities and urbanisation.

The lower valleys particularly in those areas which are less disturbed still have a great number of species. The best altitude to observe butterflies is between 900-1,800 m. Most of the swallowtails, nymphalids are abundant here.

The Amatheusiinae needs a special survey to assess the presence of these species in Sikkim as most of the moist bamboo forest habitats are lost.

The best places for looking out for butterflies is the Rangeet Valley and lower altitudes of the Teesta Valley. In the list the places marked with an asterix are very fruitful areas for the butterflies.

The exact current status for most of the species cannot be assessed as the total observation period of my visit was about 1,500 hr. The months of visits were also mostly September-November, except for one visit in August to higher altitudes and one in March-April. Also during my earlier few visits not much of observation on Lycaenids, Hesperiid and Satyrins were carried out as I was not very conversant with these insects. So unless a thorough study in all the seasons is carried out it is not possible to really assess the status, as many butterflies are single brooded or breed only at some particular time of the year. So this treatise is an attempt to help the interested reader to start the observations and send in their observations. May be after a few years of vigorous data collection, particularly by the people stationed in Sikkim itself, we can come to some conclusion and I hope by that time it would not be too late to carry out any protection measures.

The main objective of this book is to give a ready reference book and the book could be utilised as a field guide by amateurs as well as professionals and get the necessary feedback so as to know the correct status of butterflies of Sikkim and the Indian-subcontinent.

Spellings & Pronunciation of names of places vary from source to source hence so far there is no stability in the spellings.

BUTTERFLY NATURAL HISTORY AND ECOLOGY

NATURAL HISTORY

The study of the life cycle and behaviour of the butterfly is its natural history, and the effect of the environmental influences on the life cycle is its ecology.

LIFE CYCLE

The life cycle of the butterfly has four distinct stages - egg, larva, pupa and adult. The transformation that takes place from the first stage to the last is known as complete metamorphosis.

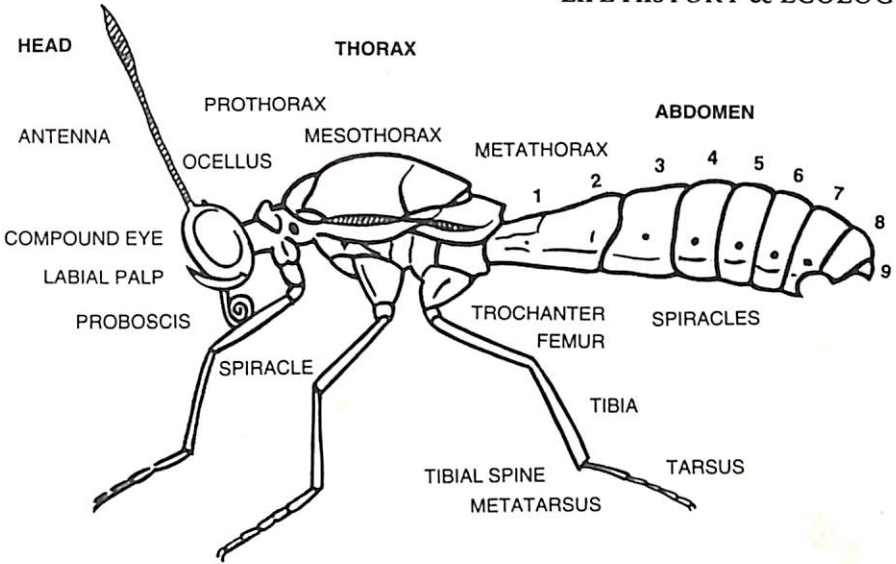
THE EGG

The egg is a fertilized ovum of the female. Depending on the species, eggs are laid singly or in clusters, generally on the upper surface of leaves or on any vegetative parts of plants, or even scattered on the ground near the food plants. The female butterfly recognizes the food plant by means of chemical and visual cues. Females of the Danianae subfamily, for instance, scratch the leaf to confirm the identity (Boppre 1983).

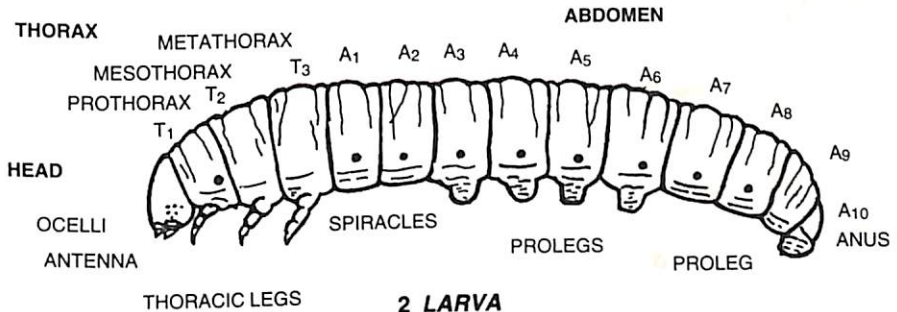
The size of the egg depends on the size and age of the female. The place where the egg is laid is known as the oviposition site. The egg shell, known as chorion, is either smooth, ribbed or sculptured. It is also often the first meal of the newly-hatched larva. The top end has a small opening, known as micropyle, through which the sperm enters the egg and also helps the developing embryo in respiration. The egg may be spherical, cylindrical or domed. In the genus *Cyrestis*, the egg has a lid, which is pushed open by the larva when it emerges. The eggs of some Lycaenids have most beautiful sculpturing when seen under a microscope. They have varied colours like green, yellow, white, orange or red. One can even see the larva developing inside the egg. Generally larva hatch after about 3 or 4 days, depending on the surrounding temperature. Eggs laid at the end of autumn may hibernate in winter and hatch when weather conditions become suitable in the following spring.

THE LARVA or CATERPILLAR (Fig. I.2)

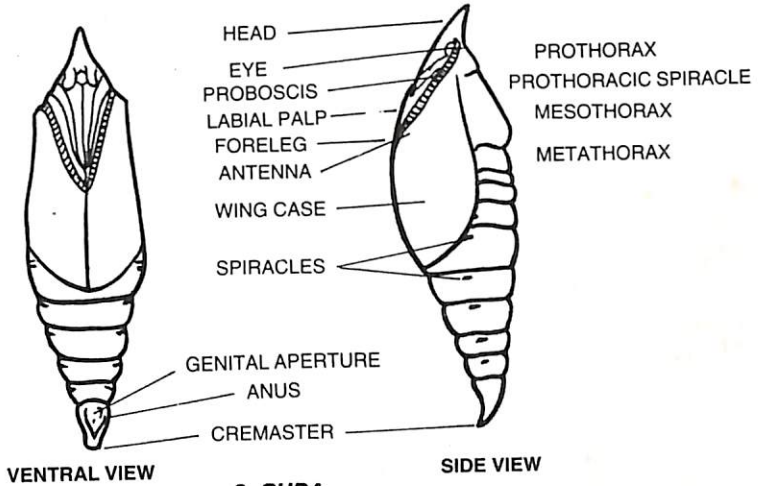
The larva has an elongate body of soft integument, consisting of 13 segments. The head capsule is sclerotised, encases hard mandibles and bears a group of simple eyes known as ommatida or ocelli. Near the base of the mandibles are very short antennae, which are important to the larva for distinguishing food. Behind and to the sides of the mandibles are the silk spinning glands known as spinnerets. The body is divided into thoracic segments T₁-T₃, each bearing three pairs of legs. The body is divided into segments. The abdominal segments A₃-A₆ and A₁₀ bear a pair of prolegs or sucker feet each, which help in walking. These are furnished with minute hooks on soles. The last segments are known as claspers. The last segment also carries a sclerotised plate called surnal plate or button of silk, to which the pupa will be attached. On either side of



1 ADULT



2 LARVA



3 PUPA

FIG 1 EXTERNAL STRUCTURES OF ADULT, LARVA AND PUPA.

CLASSIFICATION

Insects are some of the most interesting and highly diversified creatures of the world. They are found everywhere on land and in fresh water. They constitute one of the most important links in the food chain or the web of life. They link plants and other predatory insects, birds and fish, transforming and transmitting chemical energy from green plants to the animals. They are essential pollinators of flowers and scavengers of decomposing organic matter.

Insects have been in existence on the earth since 300 million years, and man has found them useful in many ways. For American Indians they were a staple diet. The Mayas of Central America used them as weapons - they used to hurl occupied wasp's nests at their enemies. Honey has been part of medicine and diet from times immemorial. Collection of honey was an important occupation. The Chinese learnt the art of silk culture from insects.

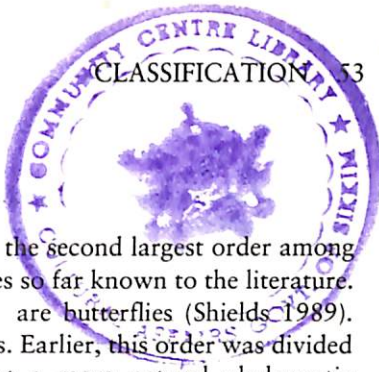
The earliest known fossil records of insects are about 310 million years old, in the upper carboniferous periods when cockroaches, bristletails and mayflies evolved with the advent of flowering plants. Butterflies and moths evolved somewhere in the Cretaceous period, about 135 million years ago (Horn 1978).

Insects belong to the phylum Arthropoda, class Insecta, of the animal kingdom. Arthropoda are the group of animals having jointed legs. The unique features of insects are that they have six legs, and their body is divided into three parts: head, thorax and abdomen. Most of these possess two pairs of wings. The other classes of arthropoda are Crustacea-lobsters, crabs, shrimps etc.; Arachnida-spiders, mites, scorpions etc.; and Myriopoda-millipedes and centipedes.

Insects are further divided into an order, suborder, superfamily, family, subfamily, genus, subgenus, species, subspecies and forms.

The focal point of classification is the species. Species is a population of organisms with very similar characters that interbreeds but are reproductively isolated from all other populations. Scientifically, a species name consists of two Latin or latinised names - generic name and specific name. This is used throughout the world in scientific literature. Often there is a third name, which denotes geographical variations. This may be followed by the name of the author/s who first described it and the year of description. Whenever the author's name is in parentheses, it means that originally this species was described under a different generic name.

There are common or trivial names for the insects too, but they vary from place to place. For example, *Lampides boeticus* is known as the Peablue in India while in Europe it is known as the Long Tailed Blue. Sometimes two or more species have the same common name. The Orangetip in India is *Ixias marianne*, while in England it is *Anthocharis cardamine*. To avoid confusion, throughout the world, scientific names are used in scientific literature. If the common name is used, it is followed by the scientific name, which generally appears in italics.



CLASSIFICATION OF BUTTERFLIES

Butterflies belong to the order Lepidoptera, which is the second largest order among insects, and is made up of approximately 150,000 species so far known to the literature. These include moths and butterflies, of which 17,820 are butterflies (Shields 1989). Some of its members are most showy and familiar insects. Earlier, this order was divided into two suborders, Heterocera and Rhopalacera. But a more natural phylogentic grouping has been made in recent classification, so we have suborders Tugatae (Micropterygidae - primitive moths) and Frenatae (Microlepidoptera) and macrolepidoptera. Butterflies belong to the two superfamilies of macrolepidoptera i.e. Hesperioidea (Skippers or Hesperiiids) and Papilionoidea (butterflies) and along with 11 superfamilies of moths (Horn 1978).

Table II Notations used for venation of butterflies

NN		CN		NN		CN		Veins
FW	HW	FW	HW	FW	HW	FW	HW	
12	8	SC	SC + R ₁	6	6	M ₁	M ₁	SC-Subcostal
11	8	R	SC + R ₂	5	5	M ₂	M ₂	R-Radial
—	7	6	R ₃	4	4	M ₃	M ₃	M-Median
10	—	R ₂	—	3	3	CU _{1a}	CU _{1a}	CU-Cubital
9	—	R ₃	—	2	2	CU _{1b}	CU _{1b}	A-Anal
8	—	R ₄	—	1b	1b	1A	1A	
7	—	R ₅	—	1a	1a	2A	2A	

NN - Numerical notations, CN - Comstock-Needham notations

SYSTEMATICS OF INDIAN BUTTERFLIES AND IDENTIFICATION OF SUBFAMILIES (based on Ackery 1989).

SUPERFAMILY - HESPERIOIDEA

This superfamily consists of only one family- Hesperiiidae.

FAMILY - HESPERIIDAE

DIAGNOSTIC CHARACTERS: FW with no stalked peripheral veins, antennae with sub-apical thickening. Around 3,500 species are known in the world of which about 300 species are found in the Indian subcontinent; about 145 of these are met with in Sikkim.

SUBFAMILY - PYRGINAE

DIAGNOSTIC CHARACTERS: FW V5 not curved at the base and usually about intermediate between V6 and V4 or near V6 at its origin; cell either long or approximately two-thirds the length of costa or shorter. Larvae brightly coloured,

PAPILIONIDAE



SWALLOWTAILS

The family Papilionidae consists of generally large butterflies, many of them have long tails, which resemble roughly those of the Swallows, hence the name **swallowtails**, including the world's largest of the butterflies, the **Queen Alexandra's Birdwing**, *Ornithoptera alexandrae*, and has a wing-span of over 250mm.

The greatest diversity in this family is found in the Indo-Australian regions, particularly in the tropical belt. In India, the family comprises of two subfamilies- Parnassinae and Papilioninae and include many beautiful butterflies like the Kaiser-I-Hind, Gorgons, Bhutan Glory, Peacocks, Birdwings, Swordtails, Jays and Dragontails. High altitude butterflies, the Apollos of the mountainous region also belong to this family. They are richly coloured, with diverse patterns and shapes.

The average life-span of an adult swallowtail butterflies may be as long as 4 months, but generally up to 20-30 days. The eggs are spherical and smooth. The larvae have fleshy spines or tubercles, but are never hairy. They have a pair of structures called osmeterium, which is the forked scent gland. The gland produces powerful smelling chemicals, mainly containing isobutyric and isomethyl butyric acids, along with aristolochic acids in some Aristolochie feeding butterflies, which help in repelling predators.

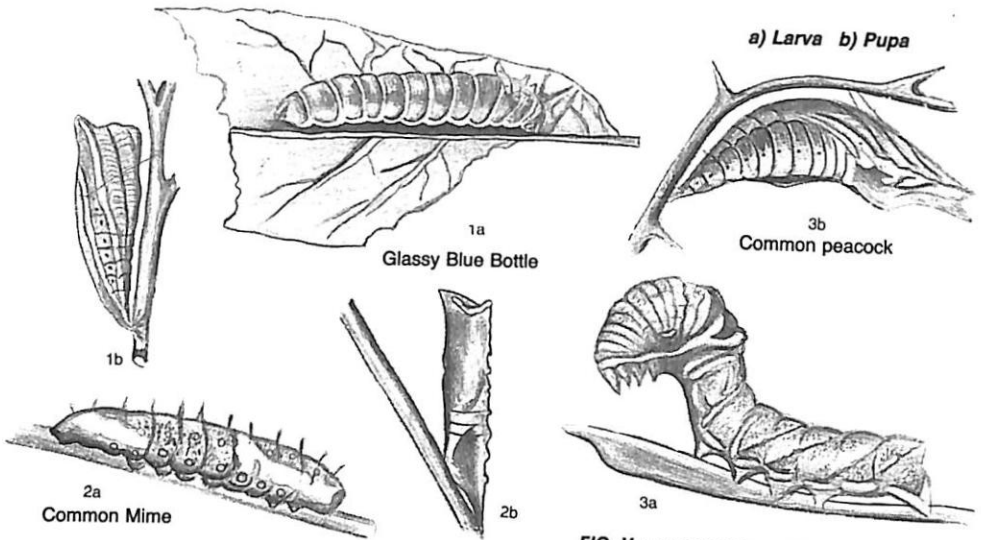


FIG. V LIFE HISTORY (Papilionidae)

PARNASSINAE

APOLLOS

Apollos are white butterflies with black, red and blue spots. Their hind-wings are almost egg-shaped and are without tails. The female has a horny pouch at the end of the abdomen, which is formed from a quickly drying substance discharged by the male during fertilisation. These are butterflies of high altitudes and are rarely found below 3,000 m except for the Blue Apollo *Parnassius hardwickii*, which is found as low as 2,000 m. The genus is generally distributed throughout the mountainous and northern palaeartic and western nearctic regions.

The wing pattern is generally used in differentiating the species. But variations in the wing pattern in most of the species makes identification difficult. Hardly any studies on these butterflies have been carried out in India because of the terrain in which are found is difficult to approach. As they are found in very inaccessible areas, which are bound by high valleys and interbreeding between the two near population is reduced, this has led to formation of many subspecies. For example, there are as many as 9 subspecies of *P. acdestis* from Chitral to Sikkim alone. There may be even more subspecies in remote and inaccessible valleys. Many of these species are considered rare, but they may not actually be so rare. It is just that sightings are rare.

The study of these creatures is an interesting subject as their life is limited to a short summer, as most of their habitat is under snow for more than 8 months in a year. These are hardy and tough insects. They are very strong fliers, flying generally in the direction of the wind or sideways. They visit flowers of *Taraxacum*, *Aster* spp. and flowers of the Boraginaceae family.

Their larval food plants belong to the Saxifragaceae and Sedum family. They scatter eggs on the ground around the food plants. They also pupate in holes and cracks in the ground or rocks. They probably hibernate. Nothing much is known about the life history of the Indian *Parnassius*, and neither have their food plants been recorded.

001

PARNASSIUS ACDESTIS Grum-Grsh 1891002 **IMPERIAL APOLLO**

Plate No. 10

Parnassius imperator agustus Fabricius 1903

SK 4

WS- 80-90mm.

One of the largest Apollos found in Sikkim. UNH basal red spots prominent. UPH a red spot in area 7. UP pale yellowish. UPF black bands complete with considerable scaling. **UPH with red discal spot in 5 and 7, large and white centred.**

Nothing much about its habits and habitat is known except that it has been collected from the Chumbi area and N. Sikkim.

003 **VARNISHED APOLLO***Parnassius acco* Gray 1853004 **HANNYNGTON'S APOLLO***Parnassius acco hunningtoni* Avinoff 1916005 **COMMON BLUE APOLLO**

Plate No. 10

Parnassius hardwickii viridicans Fabricius 1908

CH -SK SK 3,4,

WS- 50-60mm.

A very variable species. UP creamy white, base dusted with black scales. UPF two red spots beyond the cell. **UPH a row of bluish white centered submarginal spots and three large discal red spots.** Markings very variable; sometimes specimens are white with most of the spots reduced.

Found between 2,800-4,200 m, usually in open alpine country or among low growing shrubs and junipers. Fast flying, flies close to the ground. Visits flowers of *Aster*, *Senecio*. *Taraxacum* spp. Sightings have been recorded from March to October. There is even a record in February with heavy snow in the area.

006 **COMMON RED APOLLO**

Plate No. 9 & 10

Parnassius epaphus sikkimensis Elwes 1882

CH-SK SK 5

WS- 50-60mm.

UP white with black and red spots. **Margin prominently chequered. HW base heavily black.** The wings are transparent. UPF and UPH have prominent red spots.

Found even higher than the preceding species, between 4,200-5,000 m. During the short sunlight hours they are seen flying, but owing to heavy breeze flight is often side ways in the direction of wind. Flies close to the ground up to about 1.0 m. Settles often on flowers or on stones. Basks with wings wide open or FW partly covering HW.

007 **BLACKEDGED APOLLO***Parnassius simo* Gray 1853**PAPILIONINAE**008 **BHUTAN GLORY**

Plate No. 10

Bhutanitis lidderdalii lidderdalii Atkinson 1873

BH- NA 3

WS- 90-110mm.

UP dull black with yellowish white narrow vertical lines. UPH has large tornal orange-red patch with blue grey spots, which are inwardly tipped white. Wings long, HW many tailed, the one at V2 being the longest.

Its occurrence in Sikkim is based on a record made recently by an observer. However it is worth keeping look out for this beautiful species. The habitat is similar to that of the following species. Occurs between 2000-3000 m. It has hill- topping habit, flying generally high above the trees and visiting flowers of diverse species. Flight weak and resembles that of the danaiids.

LIFE HISTORY - Recorded in literature.**LARVAL FOOD PLANTS** -*Aristolochia griffithii*.011 **KAISER-I-HIND**

Plate No. 10

Teinopalpus imperialis imperialis Hope 1843

SK-AT CN-AS 3

WS- 90-120mm.

UP, scaled with beautiful rich green, black discal lines on both the wings. **M** UPH prominent yellow discal area from 4 to 8 and in female this area is greyish but has yellow patch from base to 2 and is also larger. **M** has a single prominent tail and other vein ends are toothed while **F** has three prominent tails at 2 and 4 and shorter at 3, and others are toothed.

Males are generally found on top of summit or ridges establishing territories, which they guard fiercely; any intruder is chased away. They are active from 7.30am to noon. After this they are at rest; they sit with their wings wide open or half-open often motionless: not even respond to human touch. Males visit damp patches and also suck moisture from leaves. As soon as it becomes cloudy they stop all activity.

Females are also seen flying to the summits and these are mostly virgins in search of males. Their activity starts around 8.30am and lasts up to just after noon. Females fly on cloudy days as well as during showers, but they also like sunny spells. Flight is very fast and flitting; and females are less powerful than males. They rarely visit flowers or damp patches, Most probably they are double-brooded.

LIFE HISTORY - **Eggs** are laid on the upperside of the leaf. Egg is spherical, smooth, pale purplish red and does not change its colour till the 12th day when black larval head appears; hatches after about 15 days. **Larva** green in colour, head covered with minute spines, segments also have hair-like long spines and resembles the Lime Butterfly larva, spindle shaped, broad near the head and tapering towards tail.

PLATE NO. 14

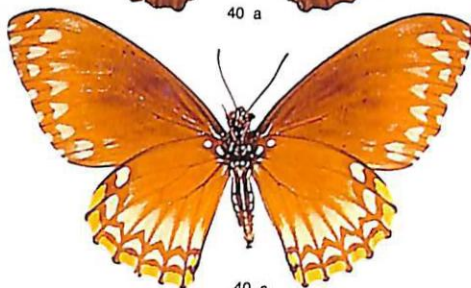
Scale : 5 cm



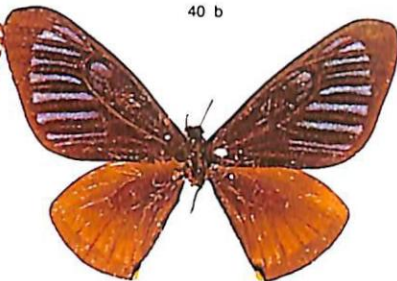
40 a



40 b



40 c



37



39



38



41



42

37 Blue Striped Mime

38 Lesser Mime

39 Tawny Mime

40 a Common Mime (*f. clytia*) UP

40 b Common Mime (*f. dissimilis*)

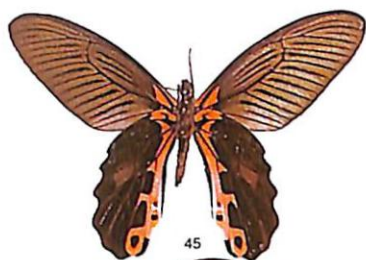
40 c Common Mime (*f. clytia*) UN

41 Yellow Swallowtail

42 Lime Butterfly

Scale : 5 cm

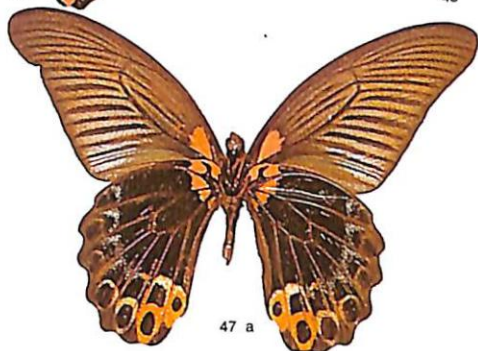
PLATE NO. 15



45



43



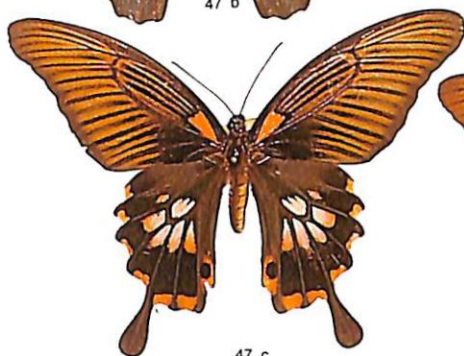
47 a



47 b



48 a



47 c



48 b

43 Spangle UN

45 Redbreast UN

47 a Great Mormon UN

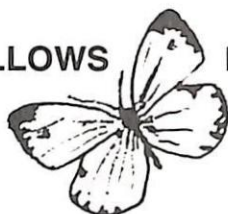
48 b Common Mormon (*f. stychius*) ♀ UP

47 b Great Mormon (*f. typical*) UP

47 c Great Mormon (*f. alcanor*) ♀ UP

48 a Common Mormon ♂ UP

WHITES AND YELLOWS PIERIDAE

PIERINAE
WHITES

These are commonly known as Whites because their predominant colour is generally white, with black, yellow, orange, red bands, streaks or spots. On the UN many of them are cryptically coloured. They are sun loving insects especially males and sometimes found in large congregations on river or stream bed where they are seen sucking moisture and salts. They visit various species of flowers. Some of the species bask with their wings fully open, others partly open. It includes butterflies like the Puffins, Albatrosses, Gulls, Wanderers, Cabbage Whites and Jezebels.

Many of the males have secondary characters. Jezebels and Cabbage Whites have specialised scales on the FW. They are also known to store unpleasant substances and are aposematically coloured. Hence Jezebel and Cabbage Whites are mimicked by Sawtooths and others of the group.

056 PSYCHE

Plate No. 19

Leptosia nina nina (Fabricius) 1793

SL,PI,MU-BU, 1,2 NR

AN, NI

WS- 20-35mm.

UP white with a black apex and a discal spot on the FW.

A common butterfly, particularly in the plains and at lower altitudes. Flies close to the ground in undergrowths and bushes, with a slow closing and opening of wings, a hypnotising kind of rhythm; possibly this is why it has got the name Psyche. It can be easily identified from any distance because of its typical flight.

When rests, it folds its HW over FW in such a manner, that it conceals the large discal spot, only leaving behind the visible protectively marked HW, which has fine brown strigae and the tips of the FW. Often settles on the ground. Seen flying throughout the day. When disturbed it does not fly very far. So far I have never seen it bask.

Visits flowers of various low-growing plants like *Hibiscus hirusta*, *Sida rhombifolia*, *Sida acuminata*, *Lapidagathis*, *Alternanthera* etc., In Sikkim it is very common in the Rangpo valley and beyond that to the north it becomes uncommon.

LIFE HISTORY - Egg typical pierid shaped long and notched on the top. White, but when viewed with up turned binoculars, ridges and dents could be observed and dents are darker. Larva grey-green with dark dorsal line, with short erect black bristles interspersed with white tubercles and white long hair generally carrying at its tip a drop of amber coloured liquid. Pupa slight and delicate looking, very transparent green with pink suffusion and pink-brown spots; lateral row of black spots and a median ring of seven black spots.

LARVAL FOOD PLANTS - *Capparis spinosa*, *Capparis rheedii*, *Crateva religiosa* (Capparaceae).

057 BUTLER'S DWARF

Baltia butleri sikkima Fruhstorfer 1903

LA-KU, CN-SK CN-SK 4 R

058 THIBET BLACKVEIN

Aporia peloria (Hewitson) 1852

059 GREAT BLACKVEIN

Plate No. 19

Aporia agathon agathon (Gray) 1831

KA-BU NE-BU 2 NR

WS- 40-70mm.

The Sikkim subspecies is very dark. Very closely resembles the Hill Jezebel on the UP. FW discal area is white on a dark greyish or black background. HW cell stripe is very broad and post discal spots are longish - their length is twice their breadth. HW is also dusted with black.

I have come across the Western ssp. in Western Himalaya often, but not in Sikkim. They are fond of flowers and visit flowers of *Cirsium falconeri*, *Albizia* sp. and many others. They come to damp patches, sometimes a very large congregation of these can be seen at such places. I once saw hundreds of butterflies at the village waste water stream in Agoda, in Gharwal.

LIFE HISTORY - Life history of eastern subspecies is not recorded. For western ssp *cuphusa*- **Larva** dirty brown, black head and dorsal dark longitudinal stripe; body covered with weak white hairs. **Pupa** greenish-yellow with black markings.

LARVAL FOOD PLANTS - *Berberis nepalensis*, *Berberis chitria* and other species *Berberis*.

CABBAGE WHITES

060 **CHUMBI WHITE**

Plate No. 19

Pieris dubernardi chumbiensis (De Niceville) 1897

CV,SK 4,5 R

WS- 45-60mm.

UP white with black stripes; UPF prominent black spot mid 3 in male. UNH pale yellow, a post discal or submarginal series of spots. Antennal club is large and spatulate.

Few specimens have been obtained from the Tibet border by a native collector employed by Capt. Hannynghton.

The description of **F** available is based on a single female taken from the Chumbi valley. This butterfly I have included in this book to elicit further information on the high altitude butterflies from the area.

061 **GREENVEIN WHITE**

Plate No. 19

Pieris montana Verity 1908

MR-SK SK-SS 4,5

062 **CHUMBI GREENVEIN WHITE***Pieris melaina* Rober 1907063 **INDIAN CABBAGE WHITE**

Plate No. 17 & 19

Pieris canidia indica Evans 1926

SI,CH-DA CH-DA 1,2,3,4,5

WS- 45-60mm.

M UP white with black apex and an apical spot on the FW; HW with a spot on costa and a small black spot in-between the veins. **UNH base of the costa is yellow.**

F similar but the spots are more well developed. UPF also has a spot on the inner margin below the apical dot.

A very common butterfly from about 200-3,500 m. Visits flowers of various species. Flies close to the ground and rests with wings closed. Flies throughout the year. Common in more open areas, particularly around human habitations and cultivated fields. It is found throughout the Himalaya and also represented in South India.

butterflies. Many of them have seasonal forms. They are butterflies of undergrowths although a few of them are found in the higher canopy. Essentially they are found in open grassy patches and less forested habitats. The males have specialised scent scales or sex brands. Their habits and life history is similar to that of Pierinae, but they are essentially feeders of Leguminosae plants.

EMIGRANTS

088 COMMON EMIGRANT

Plate No. 23

Catopsilia pomona (Fabricius) 1775

SL,IN,BU 1,2,3 C

WS- 55-80.

Seasonal forms occur. Initially they were treated as two different species.

A very variable species. **M** pale yellow or greenish yellow. In **M** apex is black, narrow and in **F** it is broad and also costa is dark which may be usually joined to spot end-cell. Underside unmarked. In DSF underside both wings have silvery red-ringed spot at end-cell. **No reddish brown strigae in any forms.** A very common butterfly throughout the country, including drier parts. Sometimes swarming of this butterfly can be seen just after the monsoon. They are also known to migrate in both seasons. They are fond of visiting various species of flowers. They fly about 1 m to 4 m from the ground. Often a **F** is seen being chased by many males. They also visit damp patches, where sometimes a large congregation of these butterflies can be seen. In Sikkim they are found up to 2,000m and at times higher, up to 2,800 m. They are widely distributed insects found in Indo-Australian and African regions.

LIFE HISTORY - Egg spindle-shaped, white and laid singly on the upperside of the leaf or on any part on the young shoot. **Larva** green; with dark green head and longitudinal darker stripes. It generally lives on the top of the leaf when young they lie along the mid-rib of the leaves. The older ones may lie on the stem or on the underside of the leaf. WB writes: 'the larvae seem to be less attacked by parasites than those of other pierids in India, probably because of the means of protection they have developed - the larva can jump up to 8 inches and can exude a greenish evil-smelling liquid from the mouth. But although I have reared several larvae, I have not observed this behaviour under laboratory conditions. **Pupa** green in colour and attached by tail and body band. The pupa also has a defence mechanism and can produce a dull knocking sound by moving its abdominal segments from side to side. **LARVAL FOOD PLANTS** - Various species of *Cassia*, *Butea monosperma*, *Bauhania racemosa* (Leguminosae).

089 MOTTLED EMIGRANT

Plate No. 23

Catopsilia pyranthe (Linnaeus) 1758

SL,IN,BU 1,2,3 NR

WS- 50-70mm.

UP chalky white or greenish. Very similar to 085, but **has fine reddish brown strigae in both the forms.**

Habits similar to those of the preceding species.

LIFE HISTORY - Very similar to that of the Common Emigrant.

LARVAL FOOD PLANTS - Same as those of the Common Emigrant.

SULPHURS

090 TAILED SULPHUR

Plate No. 23

Dercas verhuelli doubledayi Moore 1905

SK-BU SK-NB 1,2,3 NR

WS- 60-70mm.

Sulphur yellow UP with irregularly shaped apical patch. FW apex black and produced and HW toothed at 4.

Found in Himalaya up to 1,250 m. In Sikkim they are recorded in May and June. The males visit flowers and damp patches. One specimen from south Sikkim is in a recent ZSI collection. Visits flowers of low growing-plants. Comes out late in the afternoon. When disturbed takes shelter on the UN of the leaves. I saw one specimen in Arunachal Pradesh.

091 PLAIN SULPHUR

Plate No. 17

Dercas lycoris lycoris (Doubleday) 1842

SK-AS 1,2 NR

WS- 50-60mm.

Similar to the Tailed Sulphur (087)

HW is rounded;

Rarer than the preceding species. A single specimen was observed in the Tholung valley feeding on the flowers of *Fragaria* sp.

092 COMMON BRIMSTONE

Plate No. 23

Gonepteryx rhamni nepalensis (Doubleday) 1847

BA-BU CH-BU 3,4,5 NR

WS- 60-70mm.

UP sulphur coloured or greenish yellow. FW apex sharply produced and falcate. **HW toothed at 3. A dark orange spot at the end of cell, on each wing.**

Found between 1,500m to 3,500m in Himalaya. Fond of visiting flowers of Marsh marigold, *Caltha palustris*, *Cnicus arvensis*, *Gentian* sp., etc. Flies in open meadows and forest edges. It is a common butterfly throughout Europe and temperate regions of Asia. The word **Butterfly** is derived from the butter- yellow colour of this insect. Several specimens were observed in the Tholung valley feeding on low growing flowers.

LIFE HISTORY - Larva green with black scales like plates on the back with whitish or pale green line on each side, the upper edge of which is shaded off into the general colour. Resembles that of the Great Orangetip. **Pupa** is green, with several reddish dots, it is very broad in the middle and attenuated like the end of a boat.

LARVAL FOOD PLANTS - *Rhamnus dahuricus*, *Vaccinium* sp.

093 TREE YELLOW

Plate No. 23

Gandaca harina assamica Moore 1906

SK-BU,AN,NI SK-AS 1,2 NR

WS- 35-45mm.

M UP yellow and F white and unmarked except for the black apex and termen of the FW.

It is found in the forested areas of low elevations. Flies in shaded patches and is closely related to the next few species.

GRASS YELLOWS

094 THE SMALL GRASS YELLOW

Plate No. 24

Eurema brigitta rubella (Wallace) 1867

LYCAENIDAE



BLUES

Blues are small to medium-sized butterflies, major colour of many of them being violet to various shades of blues, although all other major coloured butterflies are also included in this group. They are divided into 9 subfamilies of which 8 are found in India. This is one of the largest families and about 150 species occur in Sikkim. Many of these butterflies are difficult to identify and need further detailed study of genitalia and scales etc. Evans has prepared a key to visual identification and one should follow this. In the present book about 80 species have been described and also illustrated.

Some of them are sun-loving insects others shun sun, while some are butterflies of undergrowth, others keep to high canopy. Generally on the UN they are cryptically coloured with various bands, spots and streaks. Many of them in the larval and pupal stage are attended to by ants. They secrete sweet-scented liquid which attracts ants. Some of the species are carnivorous in nature. In many groups sexes are dimorphic and Fs are generally duller than the Ms. In some groups Ms have specialised scent scales. Very little is known about their life-history and ecology because of their obscure habits. Also because they are small and a difficult group of insects to identify, they are neglected. I have made an attempt to include many species from this group in the hope that readers will take interest and learn more about them. Although they are small surely they have a very interesting ecology. We may come across many interesting observations in the course of their studies.

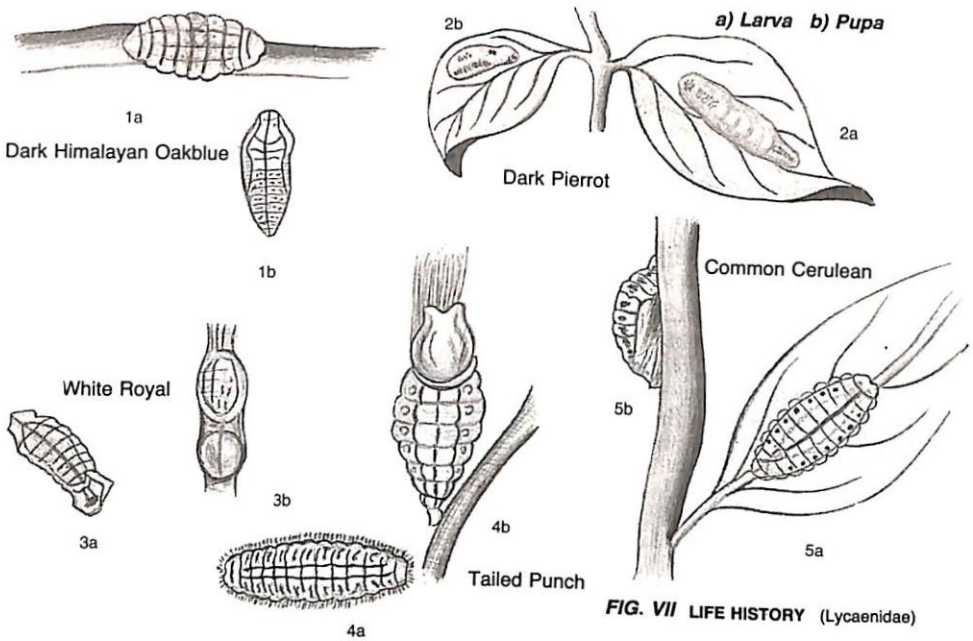


FIG. VII LIFE HISTORY (Lycaenidae)

PORITINAE

106 COMMON GEM

Poritia hewitsoni hewitsoni Moore 1865

KU-BU KU-AS 1,2 NR
WS- 31-38mm.

Plate No. 25

UP dark blue. Submarginal and apical spots usually present in M. UPH cell entirely without blue or a minute spot in some specimens. Ms also have a brand on UPH above V7 which is covered by a tuft. UN, brown with pale lines very variable. Fs, brown above with blue spots.

Found in jungle country at lower elevations. HW tuft produces a pleasant perceptible odour. The Ms fly rapidly around and settle on leaves. I have come across this species only as dead specimens, from Mangan and Rangpo areas. They are not seen easily, presumably they fly high among the trees and go unnoticed.

LIFE HISTORY - Egg truncate, half again as long as wide with two vertical and sloping and two horizontal faces.

LARVAL FOOD PLANTS - Not recorded.

LIPHYRINAE

107 MOTH BUTTERFLY

Liphyra brassolis Westwood 1888

1,2 VR

MILETINAE

108 COMMON BROWNIE

Plate No. 25

Miletus boisduvali assamensis (Doherty) 1891

SK-BU 1,2 NR

WS- 15-25 mm.

UP, brown with obscure white narrow curved discal band on UPF. The lower spots are well detached.

Body in M very long and projecting beyond the wings. UN white with thin brown lines.

Flies in forested areas of low elevations. Recorded to be rare in Sikkim and Darjeeling areas.

LIFE HISTORY - Not known but members of this genus are known to be carnivorous and recorded to be feeding on greenflies elsewhere in the world.

109 CRENULATE DARKIE

Allotinus drumila (Moore) 1865

110 GREAT DARKIE

Allotinus multistrigatus multistrigatus De Niceville 1886

111 FOREST PIERROT

Plate No. 25

Taraka hamada mendesia Fruhstorfer

SK-BU 1,2 NR

WS- 20-30mm.

UP M brown with a small white discal patch on FW. F UPF white with broad dark costa and termen. M and F UN white with numerous large black spots.

It has been recorded as common at lower elevations in Sikkim. Shows extreme variations in forms, one extreme being entirely black, while the other has the costa and the outer margin black. The black spots from the UN are seen through on the UP of both wings.

112 APEFLY

Plate No. 25

Spalgis epius epius (Westwood) 1852

PI, SL, KU-BU 1,2 LC/NR

WS- 20-30mm.

UP brown, with diffused or well-defined white patch on UPF. **UN covered with numerous fine wavy lines.**

Fairly fast and erratic flight, keeps low down among the bushes, particularly among its food stuffs. Settles with wings closed. Found in thick forested areas below 1,200 m. Widely distributed but not common.

LIFE HISTORY - Life-history is very interesting. It is a carnivorous insect. Lays **Eggs** among insects, particularly mealy bugs and scale insects (Coccidae). The little **Larva** which hatches out burrows into one end of an insect and devours all of it except the outer skin. Then it proceeds to the next and as it grows becomes completely covered with the outer skin of the host. The covering is left behind when it pupates. **Pupa** resembles a monkey's head, hence the common name Apefly. Moore has observed it on *Dactylopius andonium* and Euphorbiaceae plants.

CURETINAE

113 BRIGHT SUNBEAM

Plate No. 25

Curetis bulis Westwood 1882

MU-SB 1,2 NR

WS- 35-45mm.

UP, **M** bright orange with black apex and termen. UN silvery white. **UNF discal band not bordered by well-formed lunules and is straight. The band coalesces with post discal band at V6. The spot in 6 is shifted well beyond the spot in 7. UNH the discal band in 6 and 7 not in line with the bar end-cell.**

F has white discal area on both the wings and no orange colour. UNF band pointing to apex. Powerful flier. Territorial, pursues any intruding butterfly. Takes quick sharp flights to and fro. **M** bask in the sun high on top of a tree or a rock, while **Fs** bask low near the ground. When pursued, flies very fast and settles on a twig, showing its white silvery underparts, which confuses the pursuer, and the insect gets protection. **Ms** visit damp and moist patches. Seen up to 2,100 m in Sikkim. Commonest of the two Sunbeams found. I have recorded this species only from Rangpo Valley and Narak, where it was photographed while feeding on damp patches. In Arunachal Pradesh it was quite common.

LIFE HISTORY - **Eggs** are hemispherical. The egg of *C. thetis* is decorated with spines and is pale bluish in colour. **Larva** has protective pillons on segment 12. **Pupa** is hemispherical.

LARVAL FOOD PLANTS - For *C. thetis* are *Derris indica*, *Derris scandens*, *Abrus precatorius*, *Xylia xylocarpa* (Leguminosae) and *Trichilia connaroides* (Meliaceae) and for *C. siva*, *Desmodium oojinense*.

114 ANGLED SUNBEAM

Plate No. 25

Curetis dentata Moore 1882

SI, MU-DA 1,2 NR

WS- 35-45mm.

Similar to the preceding species but **UPH discal band in 6,7 is in line with bar end-cell.** Very variable. **M** UP broad border, widens rapidly to broad dark dorsal area, and there is more or less a prominent

198 **SLATE FLASH**

Plate No. 30

Rapala manae schistacea (Moore) 1879

SL,IN,BU,AN 1,2,3 NR

WS- 30-33mm.

UP similar to the Indigo and Refulgent Flashes (196 and 197).

UN ground colour pale brown to slaty brown (F sometimes yellowish brown). **FW band narrow and only white edged outwardly** otherwise markings as in 197.

Habits similar to those of the group.

LIFE HISTORY - **Larva** ground colour purple-brown, with dark brown head and narrow white band across the face immediately over the mouth. On each side of this band is a small white spot. Subdorsal and spiracular humps are dull crimson and bordered with white. Larva feeds on just opening leaves, buds and flowers of various species and closely resembles the background; is difficult to locate. Larvae could be obtained by beating the plants. Attended to by *Formica nigra*, *Crematogaster* sp. ants.**Pupa** pink in colour with black blotches.**LARVAL FOOD PLANTS** - Flowers of *Spiraea sorbifolia* (Rosaceae), *Antidesma acidum* (Euphorbiaceae), *Zizyphus* sp., (Rhamnaceae) *Acacia megadalena*, *A. caesia* (Leguminaceae). *Quisqualis indica* (Comp.) and also on tea blossoms *Thea chinensis*. *Gardenia axillaris* in Hongkong.199 **SCARCE SLATE FLASH**

Plate No. 30

Rapala scintilla De Niceville 1890200 **SHOT FLASH***Rapala buxaria* De Niceville201 **COMMON RED FLASH**

Plate No. 30

Rapala jarbas (= *iarbas*) (Fabricius) 1787

SK-BU

WS- 35-41mm.

M UP **bright red with veins 3 and 4 and prominently black, and lobe red** while in *R. melampus*
-4W all red. **UNH spot in 2 prominently orange crowned** and in *R. melampus*

LYCAENINAE

204 CHUMBI GREEN UNDERWING

Lycaena younghusbandi Elwes

SK, CU 4, 5 NR

WS- 24-38mm.

Similar to the Azure Mountain Blue (265).

M and F UP, dark brown, UNH ground colour mostly green with small almost rounded spots, and with prominent tornal metallic spots.There is another species *Albulina asiatica*, similar to 264 and 265, but M UP, shining sky blue and cilia rarely chequered. It has been collected by earlier collectors from the high altitudes of Sikkim and Chumbi Valley.

205 LISTER'S HAIRSTREAK

Pamela dudgeoni (De Niceville) 1894

206 COMMON COPPER

Lycaena phalaeas flavens Ford

SAPPHIRES

These are one of the most beautiful of Indian butterflies. Ms are metallic blue, purple, azure, gold or coppery gold, with black borders. Fs are brown, with orange discal patch on the UPF, and UPH has an orange tornal border. Both sexes are yellow on the underside, with an orange border on the UNH.

They are sun-loving butterflies, found along forested paths, open fields and wastelands and also around human habitations. Fast-flying butterflies, fly close to the ground for short distances. Early in the morning, both Ms and Fs are seen basking with their wings fully open or FW partly covering the HW. They rest in the thickets and bushes with wings closed. They visit flowers, damp patches and also droppings. The life-history of most of these butterflies is unknown, except for that of *Heliophorus sena*, which is found in the Western Himalaya

207 PURPLE SAPPHIRE

Plate No. 30

Heliophorus epicles indicus Fruhstorfer

KU-DA, AN 2, 3, 4 NR

WS- 28-34mm.

M UP dark shining purple with broad black border. F UP dark brown with broad orange discal patch on both FW and HW. Both sexes below bright yellow. No discal markings except sometimes a few dots between base and red marginal area. Red marginal area very dark and broad and is continued to apex of FW.

Commonest and most widely distributed species in the Himalaya from spring to autumn. Habits as those of the group.

LIFE HISTORY - Hongkong ssp. has been described.

LARVAL FOOD PLANTS - *Polygonum chinense* for Hongkong ssp.

208 GOLDEN SAPPHIRE

Plate No. 30

Heliophorus brahma Moore

KU-BU KU-SK 2, 3, C

WS- 28-34mm,

M UP, **golden coppery with black borders**. F similar to that of the preceding species. UN bright yellow with dark discal lines and end-cells usually obsolete on UNH. Red margin not continued to UNF and **tornal spot on UNF prominent**.

Habits as those of the genus.

LIFE HISTORY - Recorded for the Hongkong ssp.

LARVAL FOOD PLANTS - *Rumex* sp.

209 **HYBRID SAPPHIRE**

Plate No. 30

Heliophorus hybrida Tytler

SK,NA

210 **AZURE SAPPHIRE**

Plate No. 30

Heliophorus androcles moorei (Hewitson) 1865

KA-BU SK,CH,BH 2,3 NR

WS- 30-35mm.

M, UP **azure blue**. F similar to that of the preceding species. **UPH marginal band ends at V6 and not wider there**. UNH, in DSF the red band is irrorated with white scales and in WSF scaling is confined to edges only.

211 **POWDERY GREEN SAPPHIRE**

Heliophorus tamu (Kollar) 1844

KU-NB KU-SK 2,3 R

WS- 34-40mm

Similar to the Azure Sapphire (210).

Green colouring on UPF of M is **more extensive**.

POLYOMMATINAE

LINE BLUES

Very confusing group of butterflies, as they are very similar looking to each other. They are a good challenge for amateurs for identification. Often the study of genitalia may be necessary to confirm the identification. On the upperside, the Ms are dark blue, violet or leaden purple with dark borders. On the underside they are pale to dark brown with numerous discal and post-discal lines. In some species the discal lines on the UN are seen through on the UP. Fs are brownish above with dark border. Below similar to Ms. Some of them are tailed and others tailless. They also have prominent tornal spots, sometimes with metallic scales.

212 **CILIATE BLUE**

Anthene emolus (Godart) 1823

213 **STRAIGHTWING BLUE**

Orthomiella pontis pontis (Elwes) 1887

214 **POINTED PIERROT**

Niphanda cymbia De Niceville 1883

215 **DINGY LINE BLUE**

Petrelaea dana (De Niceville) 1883

NYMPHALIDAE

AMATHUSIINAE



These are generally brown insects, but some with brilliant colours. On the underside they bear large eyes or are strikingly marked. Nothing much about the life history and ecology of these beautiful butterflies is known because of their crepuscular activity and also because they are found in deep forests and shun sunlight. The males are very powerful and are active at dusk and dawn. The flight is similar to that of satyrins or Browns. Fs are less active and fly slowly. Ms are attracted to rotten fruits, toddy, sugar sap, cattle and animal dropping.

Larval food plants are palms and bamboos.

278 COMMON FAUN

Plate No. 34

Faunis canens arcesilaus Stichel 1831

SK-BU 1,2

WS- 65-75mm.

UP plain brown and unmarked. M a brand and tuft at the base of UPH. UN brown with a series of small yellow discal dots or spots. Also has basal, discal and marginal lines.

Habits as those of the group.

LIFE HISTORY -Recorded in literature.

LARVAL FOOD PLANTS - *Musa* sp.

279 YELLOW DRYAD

Aemona amathusia amathusia (Hewitson) 1867

280 CHOCOLATE JUNGLE QUEEN

Plate No. 34

Sticopthalma nourmahal nourmahal (Westwood) 1851

SK-NA SK-BU 1,2 R

WS- 95-105mm.

UP dark brown with **outer marginal border ochreous**. Broad ochreous apical band. HW rounded. **UN brown with eye-like markings**.

It is recorded by DeN as a very rare species in Sikkim. It has been collected by native collectors and by O. Moller from hot lower valleys. Found up to 1,100 m. Habits as described for the group.

281 NORTHERN JUNGLE QUEEN

Plate No. 34

Sticopthalma camadeva camadeva (Westwood) 1848

SK-NB SK 1,2 R

WS- 125- 150mm.

A large beautiful butterfly. **UP** dark brown with **UPF a large discal metallic blue band**. UPH brown with a marginal and submarginal purplish pale blue band, between which is a wavy brown band. M with hair pencils at the base of the area 7, where the FW partly overlaps the HW. No brand.

UN dark brown, conspicuously marked with bands and lines. Also very prominent eye-like markings on both wings.

A species of heavy forests. It has been recorded as rare in Sikkim, found up to 800 m. It has seasonal forms, DSF being paler. Further east it is quite common. It is a collector's item, and also many articles displaying this butterfly are sold in the market.

LIFE HISTORY -Recorded in literature.

LARVAL FOOD PLANTS - Bamboos.

282 JUNGLE GLORY

Plate No. 34

Thaumantis diores diores (Doubleday) 1845

SK-BU 1 R

WS- 95-115mm.

A large dark brown butterfly with **broad iridescent blue discal patch on the FW and HW with a large circular patch of the same blue**. On M UN there is a polished band at 1a and 1b of the FW and on UPH a tuft near the bases of the cell which is covered by the FW.

A species of thick forests of low elevations, it is seen up to 800 m. Visits damp patches and generally seen out after dusk. Habits similar to those of the others of the group. It is rare in Sikkim. Has been collected from Rangeet Valley. Saw a few specimens in Arunachal Pradesh.

LARVAL FOOD PLANTS - Bamboos.

283 **KOHINOOR**

Amathuxidia amythaon (Doubleday) 1847

SK-BU 1 R

WS- 110-130mm.

Very beautiful butterfly. M UP brown with broad dark blue discal band. F **similar but with yellow discal band. HW lobed. M also has a dark rounded brand at the base of the HW** and tuft below 1b base and is hairy.

Habits as those of the group.



Plate No. 34

284 **COMMON DUFFER**

Discophora sondiaca zal Westwood 1851

SI,SK-BU SK-BU 1 R

WS- 80-90mm.

UP brown, UPF with rows of small spot, F has bluish apical band. M has a large central dark brand on the HW.

They were once recorded as common in Sikkim. But recently there have been no records, possibly because no one has looked for them. They fly during dawn and dusk and may fly at night. Keep to their own particular areas. Found at the edge or in clearings in the bamboo jungles. WB writes that it could be flushed out by beating the thickets. It emits an unpleasant smell when caught.

LIFE HISTORY - (Fig. VIII. 1). **Larva** black mottled with grey, broad yellowish dorsal line, the junction of the segments with yellow red spots. Body is covered with white hairs, head black and has perpendicular yellow lines. feeds on bamboos.

LARVAL FOOD PLANTS - Bamboos.

Plate No. 34

285 **GREAT DUFFER**

Discophora timora timora (Westwood)

BE,SK-BU,AN BE-SK-BU 1 NR

WS- 85-100mm.

M similar to the preceding species, but UP **darker with purplish gloss and FW with apical spots;**

HW unspotted. F has rows of yellow spots on FW and HW; the spots on FW are more developed.

Habits similar to others of the group. It is rarer than the Common Duffer.

Plate No. 34

286 **RED CALIPH**

Enispe euthymius euthymius (Doubleday) 1845

SK-BU 1 R

WS- 90-100mm.

Similar to some of the Nymphalids like the Silverstripes, Leopard and Yeomans.

UP tawny or brick red with zig-zag band, spots and discal line. M UPH hairy.

Uncommon at low elevations from April to October. But WB quotes that it is common at low elevations in Sikkim from September to March.

Plate No. 34

287 **BLUE CALIPH**

Enispe cyncus Westwood

SK-BH 1 R

WS- 90-100mm.

This species is recorded by DeN as very rare in Sikkim.

SATYRINAE

Satyrids are generally brown coloured and inconspicuous butterflies of medium size. They have marked seasonal forms. In WSF they have mostly eye-like markings and darker in colour. DSF are generally drab and paler and the eye-like markings are either replaced by spots or striations. Most of them are weak fliers and fly very close to the ground. Some of them shun sunlight while others bask in bright sunlight. They are found from sea-level to about 4,000 m. Many of them occur in the temperate zone.

They generally fly in the secondary undergrowths and a few of them visit flowers. Most of them come to rotten fruit, sap, salts, etc. In many groups males have secondary sexual characters like hair tufts, sex brands, etc.

Their food plants are mainly grasses and bamboos.

a) Larva b) Pupa

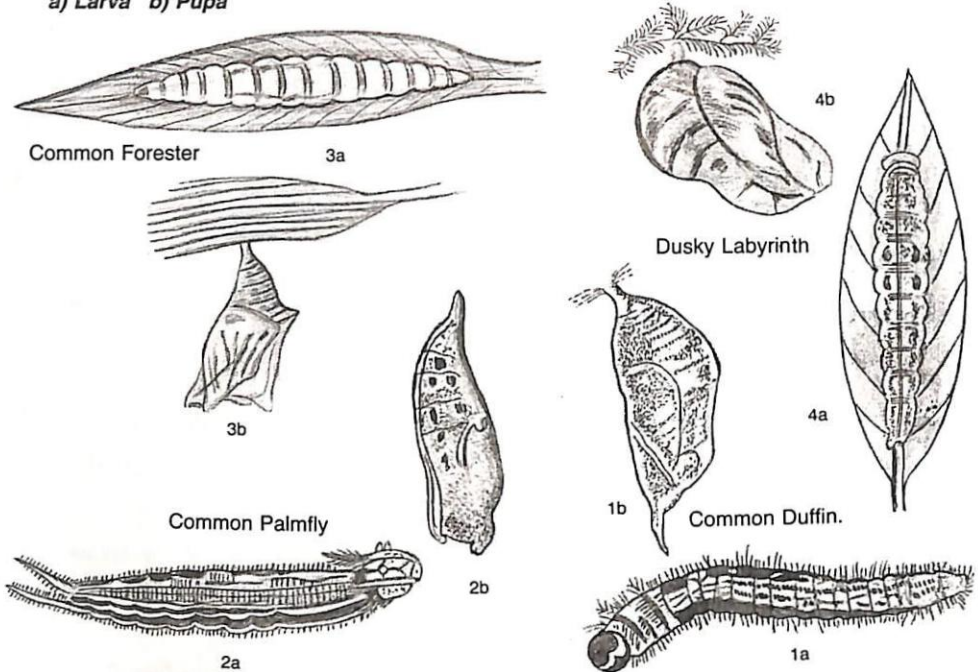


FIG III LIFE HISTORY (Nymphalidae)

EVENING BROWNS

As the name suggests these butterflies are crepuscular insects, and fly during dawn and dusk. They are larger butterflies of the group. During daytime they rest in the undergrowths or grassy patches. They do not visit flowers but visit rotten fruits and sap. I have never seen them sit or bask with their wings open.

288 COMMON EVENING BROWN

Plate No. 35

Melanitis leda ismene (Cramer) 1775

SL,IN,BU,AN 1 R

WS- 60-80mm.

Distinct seasonal forms are known.

WSF: UP brownish, FW with prominent white pupilled black spots in 3 and 4, the white spot in 4 is against its upper edge of the black spot. **UN, prominently striated with brown strigae and with prominent large ocelli**. FW produced and angled below 5. Tails at V1 and V3 are equal.

DSF: **UP the apical markings include a short dark ochreous bar and the spots are also inwardly edged with same colour** which hardly extends beyond 5. UN brown with streaks and blotches and patches of varying shades. Ocelli reduced to spots. FW produced and angled at 5 and falcate in F.

A very common butterfly throughout the country. Found up to 2,000 m in the Himalaya. These are crepuscular insects and found flying at dusk and dawn. They are attracted to light like moths. During day-time they rest in the thick undergrowths. They are also common in cities; probably they also migrate as they are found in large numbers just at the beginning of October in cities like Bombay. They are attracted to rotten fruit, toddy and damp patches. When disturbed they fly very short distances and get lost in undergrowth. In Sikkim it is found in the Rangeet Valley, Legship, Tashiding. Singtam, Middle camp, Gangtok, Mangan, Rangpo etc.

LIFE HISTORY - Eggs are laid on the underside of the grass blades or rice either singly or in rows of two to seven. Larva is bright yellowish grass-green and spindle shaped, with black and yellow stripes. Head is dark green with white hairs and two short spiny horns of dark vinous-red colour. Two anal processes as long as horns. Body is hairy. Larva is very sensitive, as soon as it is touched it curls and falls down to the ground. Pupa is transparent green, wings veined darker and body surface smooth and shiny. The cremaster is blue. Pupa is suspended by the tail on the underside of twig or leaf, freely hanging but firm. The shape is somewhat similar to that of danaiids.

LARVAL FOOD PLANTS - *Oryza sativa* and various grasses like *Eleusine*, *Panicum*, *Apluda*, *Sorghum*, *Zea* spp.

289 DARK EVENING BROWN

Plate No. 35

Melanitis phedima bela Moore 1875

SL,IN,BU SK-NB 1,2,3 C

WS- 65-80mm.

Seasonal forms.

WSF: **M UP, unmarked or rarely with obscure black and white spots. F UPF black spots prominent** but white spots may be present and pale area above to costa. **UN, dark brown finely striated with pale purplish line**. Ocelli are very small but well defined. FW strongly falcate and termen straight, tail at V3.

DSF: **Termen ashy**, markings as in 288 but more, obscure and ill defined. UN darker brown with blotches and ocelli reduced to pale spots. **HW tooth at 1b much shorter than that of V3**. The subapical reddish brown patch is squarish.

Habits as for the genus. But affects evergreen forests and flight is weaker than that of the Common Evening Brown. In Sikkim I have recorded it from Rangpo and Gangtok.

LIFE HISTORY - Eggs are always laid in batches of 2 to 4, on the underside of the leaf. Life history is similar to that of the Common Evening Brown.

LARVAL FOOD PLANTS - Same as that of the preceding species.

290 GREAT EVENING BROWN

Melanitis zitenius zitenius (Herbst) 1796

SI,KU-BU,AN KU-KR 1,2 C

WS- 80-95mm.

Seasonal forms are present.

HELICONIINAE

These butterflies were classified as belonging to the subfamily nymphalinae but, now considered as a separate subfamily. Except for the two genera all others are found in Neotropical region where they are highly diversified. This diversification in fact had led Bates to propose the theory of Batesian mimicry.

The two genera in India are *Vindula* and *Cethosia*. They are orange, tawny to moss green butterflies. Sexes are dimorphic, females tend to be drab.

These are sun-loving butterflies, often seen basking. The *Cethosia* spp. are found to bask close to ground while the *Vindula* are known to bask on tree-tops and high growing creepers. They also visit moist patches, droppings and rotting fruits and flowers.

Their larval food plants belong to Passifloraceae. The larvae are spiny and some of their Neotropical relatives are known to produce rashes when touched.

507 CRUISER

Plate No. 44

Vindula erota erota (Fabricius) 1793

SL, SI, SK-BU SK-BU 1,2 R

WS- 72-110mm.

Similar to the Large and Common Yeomans (410 and 411) and the female of the Clipper (485).

M UP tawny-orange with the broad discal band of the same colour. UPH with two ocelli and the HW is tailed. **F** similar markings but the tawny orange colour is replaced by greenish white. **Ms** are fairly common. **Fs** are rather rarer and remain in the thickets or on tree-tops. The habits are as described for the subfamily. In Sikkim I have seen this species in the Tumin khola and the Rangpo valley. In south India I found females commoner than males. They visit flowers of *Lantana* and 'Chandrika'.

LIFE HISTORY - **Larva** pale olive-green with six short yellow based spines on each segments, the two upper ones are much longer. Spiracles black, with whitish on either side. Head dark brown with two long spines. **Pupa** brownish, from the front it resembles leaf insect or a dried leaf and freely suspended.

LARVAL FOOD PLANTS - Passifloraceae.

508 RED LACEWING

Plate No. 44

Cethosia biblis tisamena Fabricius 1770

NE-BU 1,2 NR

WS- 65-90mm.

Similar to the Plain Tiger (518) and female of the Danaid Eggfly (439).

M UP orange to tawny-red with black wavy border. **F** markings similar but the ground colour varies from tawny-red to moss-green.

Habits as those of the subfamily. In Sikkim **Ms** are commoner and occur up to about 2,000 m. Common at lower altitudes up to 1400 m around Legship, Rangpo, Mangan, Singhik and Naya bazar.

509 LEOPARD LACEWING

Plate No. 44

Cethosia cyane Drury 1770

OR, MU-BU 1,2 NR

WS- 85-95mm.

Male similar to the female of the Indian Fritillary (413).

M UP orange with wavy black border and **UPF** has a **white sub-apical band**. Mimics the Plain Tiger. **F** similar but the orange colour is replaced by moss-green.

Habits are as described for the subfamily. It is rather rare in Sikkim. Occurs almost in similar habitat as that of the preceding species.

LIFE HISTORY - **Larva** cylindrical, purplish-black, segments with alternate yellow and crimson bands; rows of dorsal and lateral spines. Head with two long spines.

LARVAL FOOD PLANTS - *Passiflora* sp.



HESPERIIDAE

The Hesperids, also commonly called Skippers, are very drab looking butterflies with thick body resembling the moths. They are generally brown in colour with various spots and streaks some of which may be transparent. Very few are brightly coloured. Some of them are crepuscular but most of them are diurnal in habits. Some species visit flowers while others do not. Some of them are fond of sunshine while others generally remain on the underside of the leaves. Some species like flitters etc. bask in the sun. Generally their flight is very swift and it is often difficult to relocate the insect once it is disturbed from a resting place.

The family is divided into seven subfamilies of which the Indian species are divided into three subfamilies. These are one of the most difficult group of lepidoptera. There are more than 300 species found in India of which about 161 are found in Sikkim. Many of them could be identified only on the basis of genitalia studies. Many of the nomino typical specimens have come from Sikkim area.

Their larval food plants belong to mainly grasses, palms, and bamboos. But some of them also feed on dicotyledon species. Eggs are smooth or some times ridged, white or red coloured. Laid generally on the UN of the leaf. Larvae are cylindrical with large head. Usually green some times transparent green or some of them are conspicuously marked. Larvae generally live in the cell made out of rolled leaves. Pupae are also formed inside the cell some times covered with white powder.

COELIADINAE

529 BRANDED ORANGE AWLET

Bibasis oedipodea athena (Frushtorfer) 1911

530 ORANGE AWLET

Plate No. 58

Bibasis jaina jaina Moore 1865

SI, DU-BU, AN 1, 2 NR

WS- 60-70mm.

UP, chocolate brown, with orange streaks, HW fringed with orange. UN, pale brown, HW with orange stripes along the veins. Ms have obscure central dark brand.

Found only in heavily forested regions of lower elevations. Generally rests in the shaded regions, on the underside of a leaf, with wings wide open like a moth, and could be mistaken for one. It has crepuscular habits, active only during early mornings and late evenings. It has a straight, fast flight. Seen along nullahs and forest paths. It is known to be attracted to the flowers of *Lantana*. In Himalaya it is found up to 1,200 m. I found it locally common in Rangpo and Khanni khola.

531 PLAIN ORANGE AWLET

Bibasis anadi De Niceville 1883

532

Bibasis harisa harisa (Moore) 1865

533 GREEN AWLET

Bibasis vasutana Moore 1865

534 SMALL GREEN AWLET

Bibasis amara (Moore) 1865

Plate No. 58

535 PALE GREEN AWLET

Plate No. 58

Bibasis gomata gomata (Moore) 1865

SI, SK-AS

WS- 50-60mm.

M UP brown with pale yellowish streaks between the veins. F very dark purple-brown, with bases green.

UNH black with, veins pale and narrow, pale green or pale yellow streaks between them.

This is a rare butterfly, also has nocturnal habits as those of the Orange Awlet.

LIFE HISTORY - Shown in Fig. IX.7.

LARVAL FOOD PLANTS - *Heptapluron venulosum*.

536 PALE GREEN AWLET

Plate No. 58

Bibasis sena sena (Moore) 1865

SL, SI, SM-BU

WS- 45-50mm.

537

Hasora anura anura De Niceville 1889

538 WHITE BANDED AWL

Hasora taminatus bhavara Fruhstorfer 1911

539 COMMON AWL

Plate No. 50

Hasora badra badra Fruhstorfer 1911

SL, WG, SK-BU WG, SK-BU

WS- 50-55mm.

M UP brown with apical spots on the UPF. F with large yellow spots in cell, 2 and 3, and apical spots on UPF. UN no white band, apex of FW and the disc of HW is purple-washed.

They are powerful insects of thick jungles; flight extremely rapid and of bounding type. They visit various species of flowers like *Leea*, *Lantana* etc. They also visit dropping etc. They fly generally during early mornings and evenings. They rest under the leaves.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Derris* sp.

540 PLAIN BANDED AWL

Hasora vitta indica Evans 1932

541 BROWN AWL

Plate No. 58

Badamia exclamtionis (Fabricius) 1775

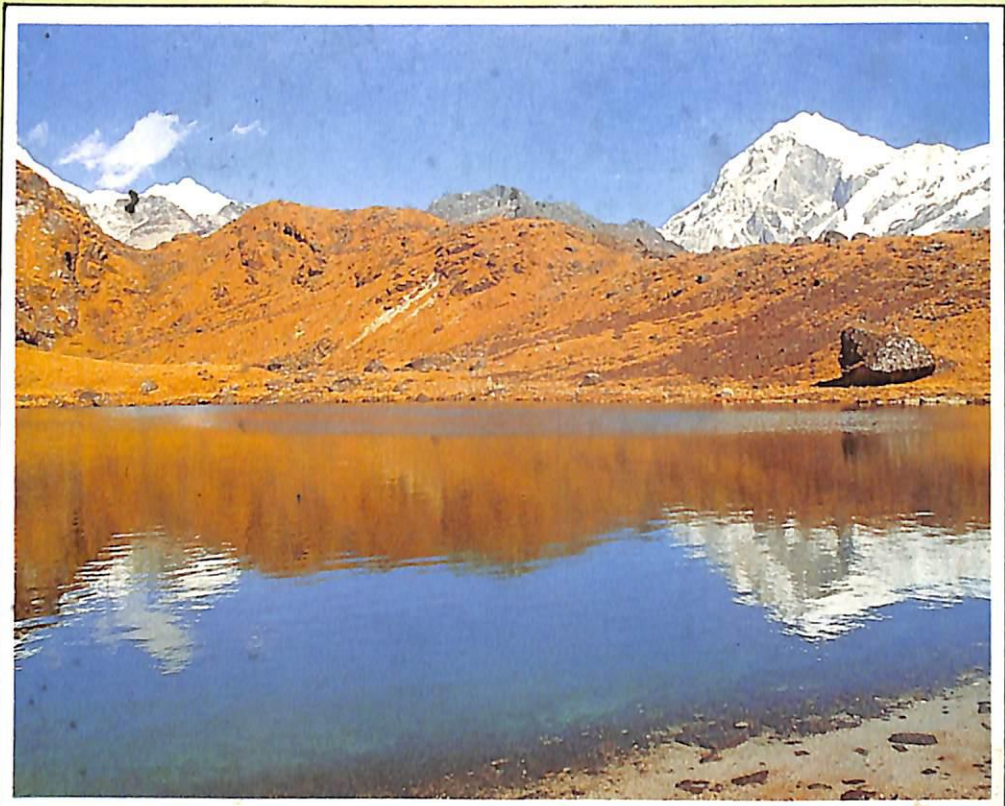
SL, SI, NI-BU

WS- 50-55mm

UP dark brown. FW long and narrow, with slender whitish elongated semi-transparent spots in the cell and in area 2 and 3. HW unmarked, falcated.

A very common insect, found up to 2,000 m in Himalaya. The flight is very fast and bounding. Visits flowers, particularly of *Buddleja* sp. Ms are occasionally known to bask and also visit bird droppings. I have also observed them on *Lantana* and *Leea* flowers.

LIFE HISTORY - Eggs are laid on young shoots. Larva is bright yellow in colour with velvety black patches. Head yellowish with two rows of rectangular spots of five spots in each row. Larva shelters



Sikkim is one of the smallest states of India, with an area of 7299 sq. km., flanked between the two Himalayan kingdoms – Bhutan and Nepal. Due to the steepness and the geographical position almost all types of terrains from hot tropical forests to cold desert conditions are met within two hundred kilometres of its length. The bio-diversity is amazing. Of the 1400 species of butterflies found in the Indian sub-continent about 700 species have been recorded from Sikkim.

This book is a first ever easy-to-know pictorial guide for identification of butterflies of the Indian subcontinent, showing more than 600 coloured photographs of about 400 species of butterflies. The text includes diagnostic characters and little known ecology from literature, including author's personal observations. An attempt is also made to compile the life histories of the butterflies described in the book, which are scattered in various journals and other scientific publications and are not easily retrievable. A chapter on how to study butterflies, meant particularly for beginners and amateurs is also included.

The format of this book was planned essentially for an amateur, keeping in mind whatever difficulties the author encountered in the field with other field guides.