

GUIDE TO BUTTERFLIES OF THE
INDIAN SUBCONTINENT
600 COLOURED PHOTOGRAPHS



THE BUTTERFLIES OF SIKKIM HIMALAYA AND THEIR NATURAL HISTORY

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

MEENA HARIBAL

SIKKIM ADMINISTRATIVE



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WITH 60 COLOUR PLATES AND NINE SKETCHES



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Leaving the forest, the path led along the river (Rangeet) bank, and over the great masses of rock which strewn its course. The beautiful India rubber Fig was common, as was *Bassia butyracea* the 'YelPote' of the Lepchas, from the seeds they express a concrete oil, which is received and hardens in bamboo vessels. On the forest skirts, parasitical orchids and ferns abounded, the Chaulmoogra, whose fruit is used to intoxicate fish, was very common; as was an immense mulberry tree, that yields a milky juice and produces a long green sweet fruit. Large fish, chiefly Cyprinoid, were abundant in the beautifully clear water of the river. But by far the most striking feature consisted in the amazing quantity of superb butterflies, large tropical swallowtails black, with scarlet or yellow eyes on their wings. They were seen everywhere, sailing majestically through the still hot air, or fluttering from one scorching rock to another, and especially loving to settle on the damp sand of the river edge; where they sat by thousands, with erect wings, balancing themselves with a rocking motion, as their heavy sails inclined them to one side or other; resembling a crowded fleet of yachts on a calm day. Such an entomological display cannot be surpassed.

Joseph Dalton Hooker May 1848.
Himalayan Journals
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FOREWORD

Butterflies of Sikkim are proverbial all over the world and attracted much attention in the first quarter of the century. At that point of time almost 600 species of butterflies were recorded. Since then no systematic attempt has been made to gauge the current status of this beautiful and fascinating group in the insect world.

Exactly 100 years ago the well known naturalist J. Gamie in his memoirs of Butterflies of Sikkim wrote:

"The Lepcha collectors are most skillful and would compare favourably with those of any in the world: they are the only Hindosthan who have names for different species of butterflies." It would be a great tragedy if this wealth of knowledge were to go into oblivion.

Much water has since flown down the Teesta and Sikkim has caught up with the rest of the world in the path of progress and development though not without often impinging upon its natural environment and rich biological diversity that thrilled the early explorers. There is, therefore, an urgent need to prepare a status paper on all the major flora and fauna with which this region has been richly endowed.

Sikkim Nature Conservation Foundation is primarily constituted by a handful of persons in the region concerned with the preservation of the rich natural heritage. It has embarked upon systematic surveys and publications, with a view to bringing awareness about the wonders of nature in Sikkim. "Butterflies of Sikkim" is one in the series of such publications. It is our hope that this book, apart from inculcating new awareness of this rich natural heritage, it will also help in overall preservation and protection of its habitat.

The foundation is grateful to Dr. Meena Haribal and her colleagues, who traversed the hills and mountains of this region and extensively travelled both within and outside the country to bring out this useful handbook in record time.

We have lost or endangered a great deal of butterfly habitats owing to indiscriminate use of pesticides as also in the continuing degradation of our natural vegetation. It is our hope that a beginning will be made in the restoration of some of these unique ecological habitats.

We have great pleasure in dedicating this book to the large band of Lepcha collectors who fanned out in the State in late nineteenth century in search of plants and insect-life and contributed greatly in placing Sikkim on biological map.

K. C. Pradhan
PRESIDENT

SIKKIM NATURE CONSERVATION FOUNDATION
GANGTOK, JANUARY 1992

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).

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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.

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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.

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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 belerica*, *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 *Sphynx* (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-Philippe (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. Evans 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	"	Pashingdang*	"	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 Palearctic 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 Palearctic 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 the population occurring in Sikkim. Probably due to this 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 barrier for dispersal of the species. Similarly many Palaearctic species like *Lassiommata*, *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, Hesperids 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**.

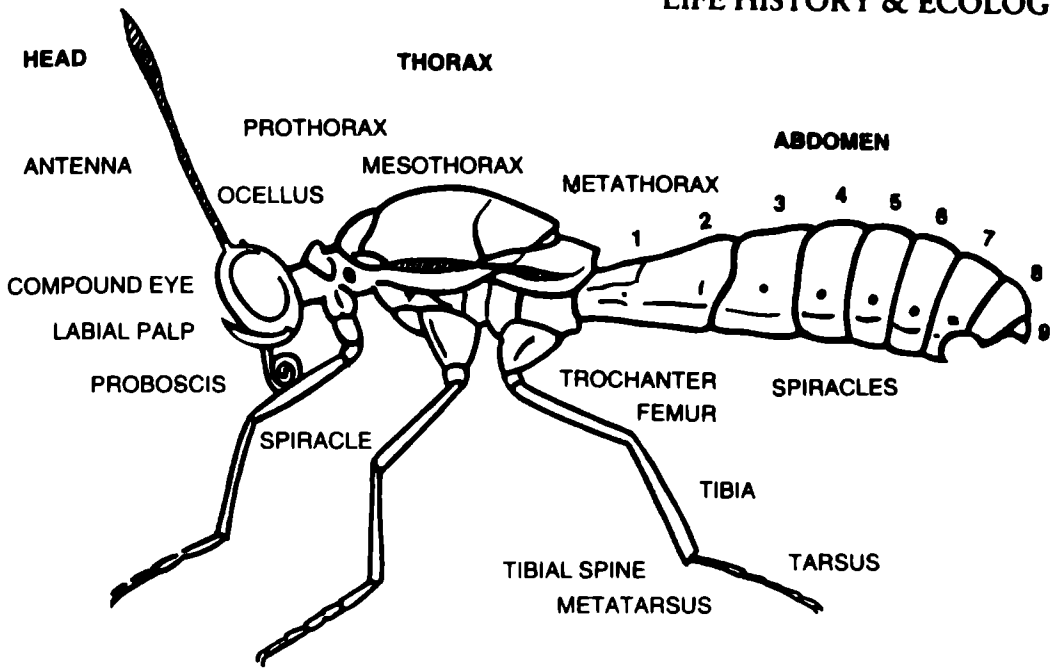
THE EGG

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 *Daniana* subfamily, for instance, scratch the leaf to confirm the identity (Boppre 1983).

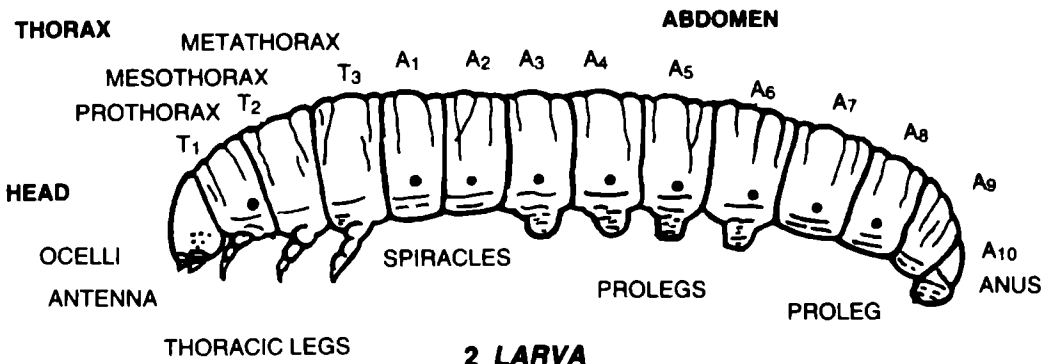
The size of the egg depends on the size and age of the female. The place where the egg is laid is known as the **oviposition site**. The egg shell, known as **chorion**, is either smooth, ribbed or sculptured. It is also often the first meal of the newly-hatched larva. The top end has a small opening, 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)

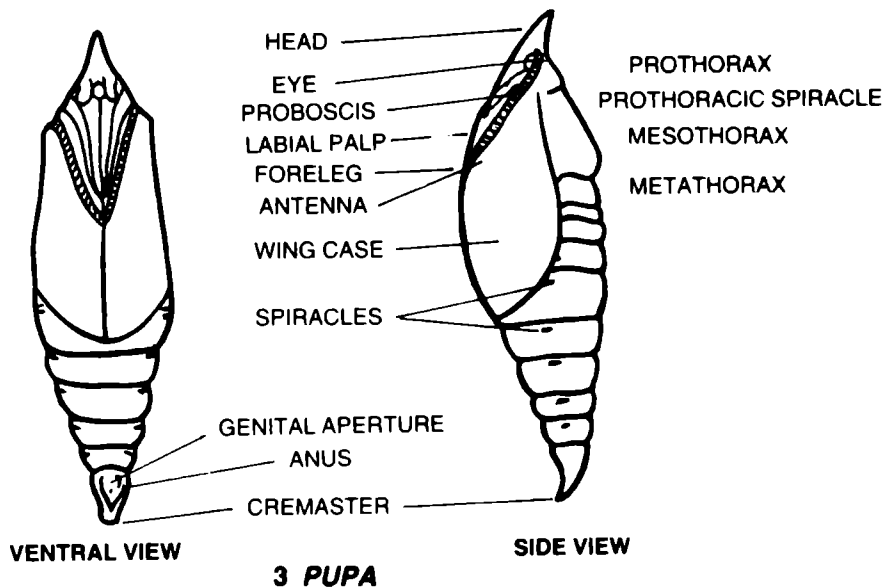
The larva has an elongate body of soft integument, consisting of **13 segments**. The head capsule is sclerotised, encases hard mandibles and bears a group of **simple eyes** known as **ommatida** or **ocelli**. Near the base of the mandibles are very short antennae, which are important to the larva 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**. Each leg is composed of six 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 **sural 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.

segments T₁ and A₁ - A₅ is located a **spiracle**, each having an opening from the respiratory organ.

The function of the larva is to feed and grow. As the larva eats greedily it grows fat, its skin becomes too tight to contain the body; so it stops feeding and attaches itself with the silk to a particular surface or spot. The skin splits down in the middle of the back and the larva crawls out of it. This is known as **moulting**. The stage between each moult is known as **instar**. There are **five instars** for most species, but in some cases, as in Satyrinae, there may be four. The last instar is known as **prepupa**. One can make out this stage, as the faeces changes from the usual dry pellets to a liquidy mass; the colour also fades. The larva stops feeding and starts wandering in search of a place to pupate.

The larva may be smooth or clothed with hair or provided with bristles or setae. They are dull green to yellow, bright red, black and white or brown.

The colouring is usually such that the larva is well camouflaged, and can thus avoid or fool predators. The larva of the Common Baron, for instance is green, with long bristles. It lies on the midrib of the leaf and the bristles remain parallel to the veins, and when lying thus it is very difficult to locate. The larva of the Common Emigrant is dull green and lies on the midrib of the leaf or flatly on the stem. The larva of the Lime butterfly looks like a bird dropping and lies on top of the leaf.

To resist attacks from insects, the plant produces some chemicals known as **antiherbivore** or **alleochemicals**, which deter the insects from feeding on them. But some co-evolved butterflies may have evolved a way of detoxifying these compounds (Ehrlich & Raven 1965). In some cases these compounds are utilised as protecting chemicals, as in Danianae. In many cases butterflies have also evolved a method of avoiding these chemicals by cutting the main vein or petiole and waiting for sometime till the toxic juice oozes out and then feed. The study of plant-insect interactions and the chemical compounds present in plants is known as **Chemical Ecology**, which has become an important discipline.

Generally the larvae feed on plants. The butterflies whose larvae feed on **restricted plant species** are known as **monophagus**. The species which feed on **closely related species** are known as **oligophagus**. The species which feed on various **unrelated plants** are known as **polyphagus**. Some of the **Lycaenid larvae** are **carnivorous** and **do not feed on plants** such larvae are known as **aphytophagus**.

The larvae may feed singly or in groups. Those which feed in groups are warningly coloured (see section Camouflage or Cryptic Colouring) and have typical behaviour. For instance, the gregarious larvae of the Indian Tortoiseshell jerk in a synchronised manner when they sense danger. They are also synchronous in their moulting. This helps in individuals appearing at the same time.

When the larva is ready to pupate, it attaches itself to a spot with **silk pad and cremaster**. After a period of rest, it starts wriggling and makes undulating movements from tail up, until the skin bursts near the head. The skin is then pushed upwards till it gets collected near the tail. The pupa then draws it tail out and by means of some minute hooks in the cremaster, fixes it to a surface again after casting off the old skin. Very often, in many lab reared specimens, the skin remains on the tail end itself.

On the basis of the morphology of larvae it is possible to classify butterflies. They are very useful in taxonomical and phylogenetic studies.

PUPA or CHRYSALIS (Fig. I.3)

This stage is often known as the resting stage, but during this a great many changes are taking place within the shell. All tissues except for a few are broken down completely by means of biochemical reactions and a totally new form is constructed to form an adult butterfly.

The shapes and sizes of pupae vary from family to family. Most of them are cryptic - green, brown or a combination of the two. Initially, just at the stage of formation and for a few hours afterwards, they may be colourless or very pale and smooth. Later they develop colour. For example, the pupa of the Tawny Coaster is pale pink at first; slowly black and orange dots start appearing, and by the end of the day the pupa is light pink with bold black and orange chained vertical rows. Similarly, the pupae of the Common Leopard and the Blue Tiger are pale green in colour, but in a day the colour deepens and golden spots appear.

The pupa is attached by various means. In the Swallowtails and Whites the tail is fixed with head upwards and is supported by a body band. Some are just suspended by the end of the tail. Some pupate in the hollow of a tree or ground, while others roll themselves within a leaf, which is strengthened by connecting or stitching with silken threads.

Generally it takes about 7 to 15 days for the emergence of the butterfly from the pupa, but when the pupa is formed late in autumn may not hatch till the following spring. Emergence generally is early in the mornings or when the weather conditions are suitable.

When the butterfly is ready to emerge, one can see the details of wing markings, head, eyes etc. on the pupa. Just before emergence, the pupal case splits open on the back. The butterfly crawls out of it and finds a suitable perch. Initially, the wings are wrinkled and shrivelled, but slowly blood is pumped into the veins. At this time the butterfly is very vulnerable to attacks from predators. The wings harden on exposure to the sun's rays. The whole process may take about an hour. Then the butterfly is ready to fly in search of a mate and food.

ADULT or IMAGO (Fig. I.1)

The function of an adult butterfly is to mate and reproduce. The body of an adult butterfly is divided into head, thorax and abdomen.

Head. The head consists of a pair of large compound eyes, the colour of which varies from white, yellow to orange and red. They are capable of detecting movements and some colours. They also have the capacity to detect wave lengths in the ultra-violet region.

From between the eyes arises a pair of antennae which are thickened at the end. The shape, size and thickness varies from species to species. In fact the antennae are often a useful clue in identification (Fig. II). The antennae receive or perceive signals, particularly the chemical signals that help locate a mate and food or any other airborne signals, and vibrations and movements. The chemical receptors are located in the pits which are predominantly found at the thickened end or club. The antennae are also used for balancing during flight.

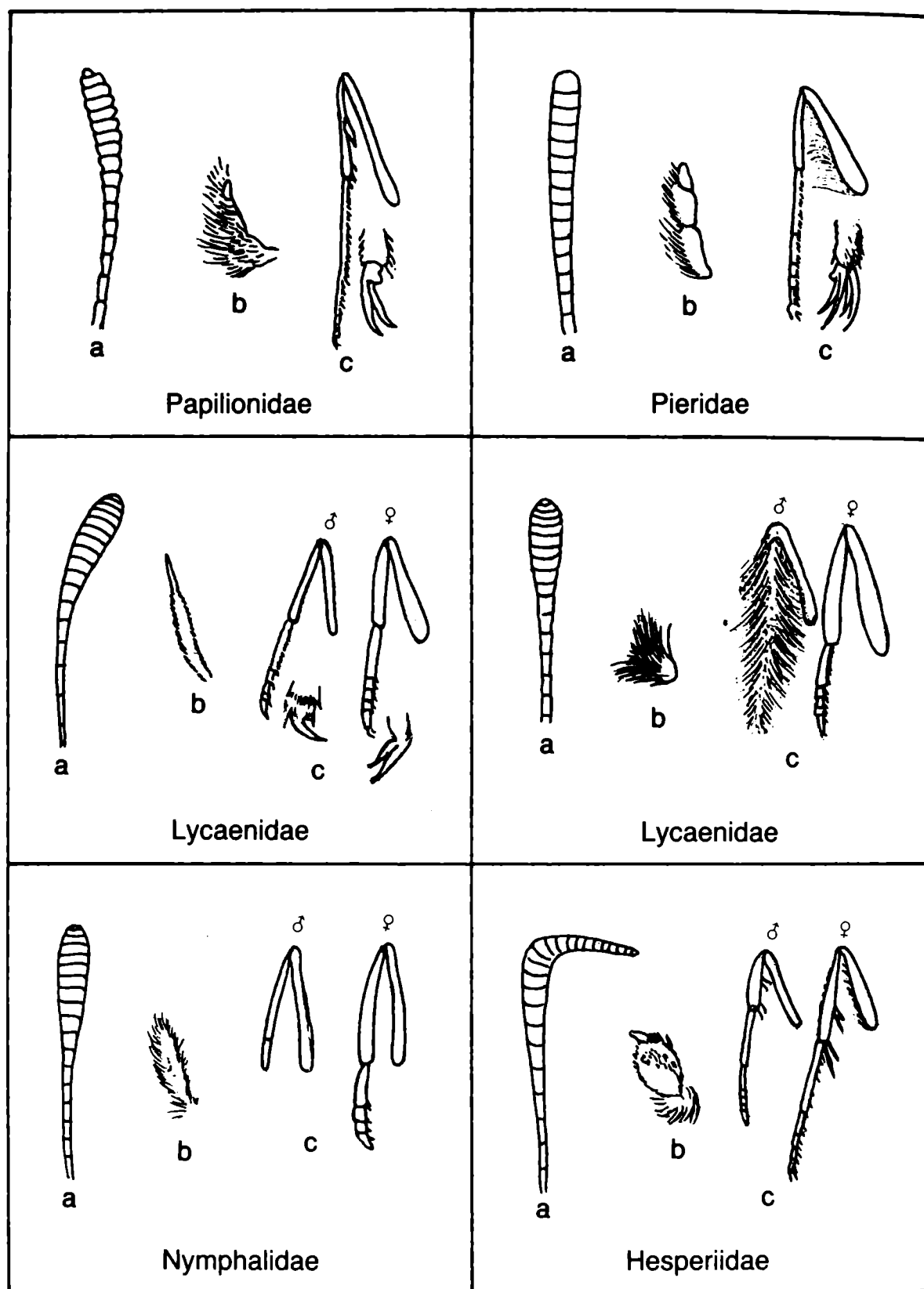
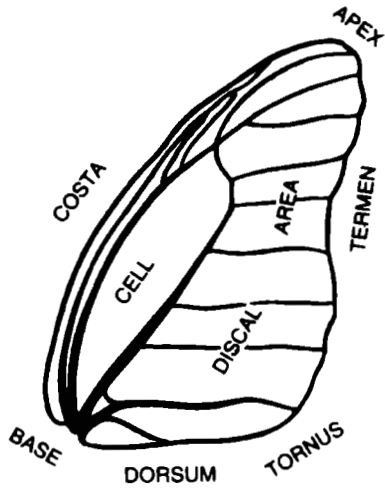
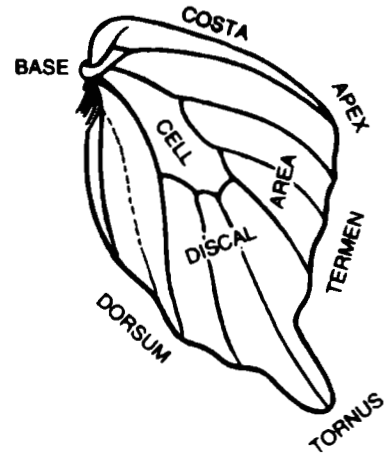


FIG II a) Antennae b) Labial Palpi c) Forlegs of male & female of different families



FOREWING



HINDWING

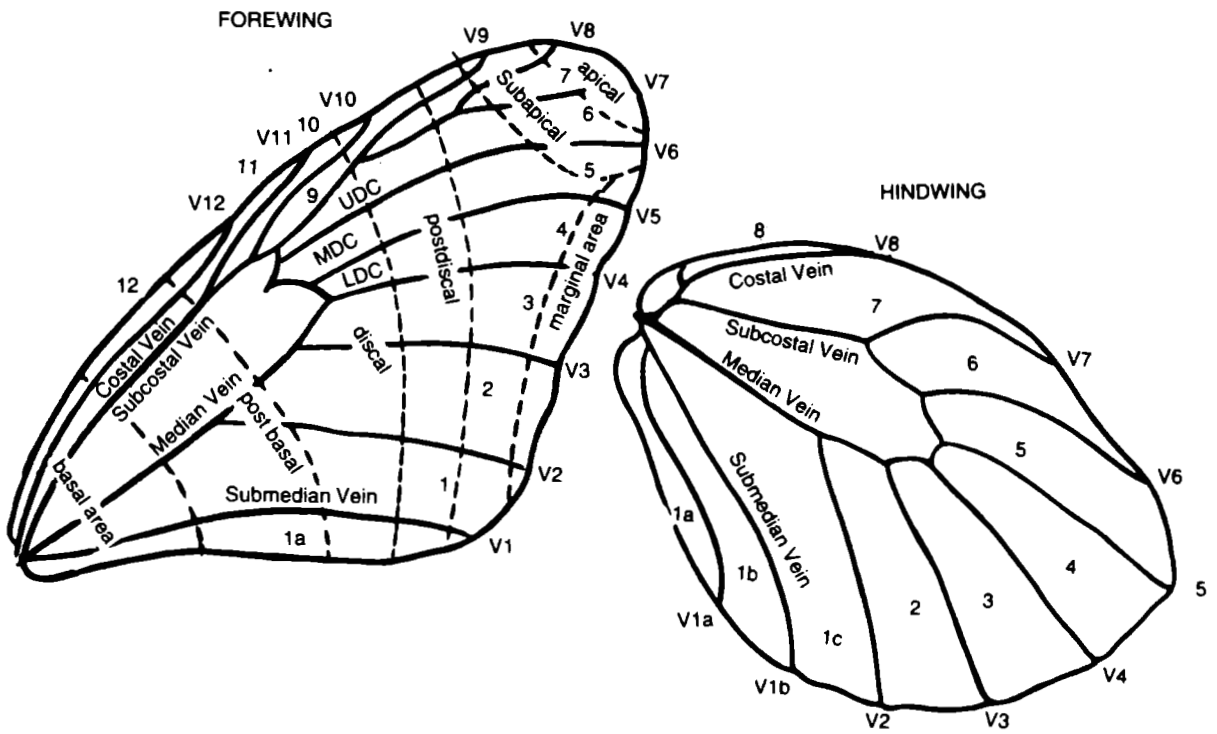


FIG III. VARIOUS PARTS OF BUTTERFLY WINGS AND THEIR VENATION

Below the antennae there is a pair of heavily scaled **palpi**. These show a lot of variation and are also useful in classification. So far, no specific functions have been attributed to them. Philip. J. DeVries feels that their function is to clean or groom the eyes. Particularly in fruit or dung feeding insects, palpi are said to be used like wind shield wipers over the entire surface of the eyes, as there is a great probability of the eyes being soiled or infested by mites (DeVries 1987). My own observation is that palpi are also used to clean the forelegs in *Daniana*.

In between the palpi there is a long, hollow, sucking tube known as **proboscis**, composed of two interlocking halves. It is coiled like a watch spring when at rest or not in use. **Butterflies can feed only on liquid diets.**

Thorax. The first three segments from the head form the **thorax**, which bears **legs and wings**. The leg is divided into 5 segments - coxa, trochanter or hip, femur or thigh, tibia, and tarsus or foot. Coxa is the segment which is attached to the body. Trochanter is very small, between coxa and femur. Femur is the strongest part of the leg and shorter than tibia. Tibia is slender and may be long and freely movable. Sometimes tibia are armed with spurs or spines or with hair. Tarsus consists of five segments of variable length, the fifth ending in a claw, sometimes bifid, maybe blunt or padded (Fig. II).

Wings. The wings bear diverse patterns, and are very useful in the identification of any butterfly. The wing colour patterns serve as a visual aid during courtship display and mating; the brightly coloured patterns of the male serve as long-range communicators.

The patterns of ultraviolet reflection on the wings of many insects are very different from the ordinarily seen visual patterns. These UV patterns are very important to the insects in species recognition for mating because they give insects flashing codes which are invisible to vertebrate predators (Eguchi *et al.* 1983). For example, the American Swallowtail butterfly *Papilio glaucus* has two female forms, of which one is dark and the other is yellow, similar to the male. But when viewed in UV reflectance both types of females look very similar, which helps males recognise females easily (Platt *et al.* 1984).

There are two pairs of wings, called **forewings** and **hindwings**. They are membranous and are supported by veins. The venation is a very important base for classification. The broad area near the base from which the veins arise are known as **cells**. These also give important clues for identification of groups and species. The different parts of the wings are shown in the figure. These are very important, and should be studied carefully before going into the details of identification of the species, as this terminology is often used in the text (Fig. III).

Wings are covered with scales. The scales are arranged like overlapping roof tiles. Each scale is attached by a thin shaft that is inserted into a socket in the wing membrane similar, to feathers in birds. The surface of each scale has five longitudinal ridges criss-crossed with finer ridges, giving the appearance of a honeycomb. There are three types of scales - **pigmentary scales**, **structural scales** and **scent scales**. The pigmentary scales are flat and coloured chiefly by melanins. Melanins are responsible for the colours black and brown, which are synthesized internally by the butterfly. The yellows, oranges and reds are taken from the food plant and are directly incorporated into integuments. Most of the blue, purple, green or metallic hues are caused by the interference of the light. Structural scales are present generally only in males and these

generate the blue-green colours.

Androconial or scent scales are only present in males, and are connected to secretory glands at their bases; they store chemicals known as **pheromones**, which are generally required in courtship displays for attracting a mate.

The average wing beat of a butterfly is **25 beats per minute or less**.

Abdomen The abdomen consists of digestive and reproductive systems. It has 10 segments, of which the last two or three at the tip form the reproductive organs known as **genitalia**. Except for the last three segments, the abdomen is capable of expanding when the gut is full of food. The genitalia provide an important clue to identification of many groups such as Apollos and some of the Lycaenids. In males the last but one segment of the abdomen bears two ventral valves or **claspers**. The claspers open to expose the aedeagus (penis) and other male secondary characters; also, during mating they clasp the end of the female's abdomen. The female genitalia consists of **anus, the egg pore and the copulatory pore**.

SECONDARY SEXUAL CHARACTERISTICS

In most families and groups, the male butterfly can quite often be identified by some extra characteristics known as secondary sexual characters. These are usually specialized androconial scales or scent organs and may be located on wings, the forelegs or in the abdomen. The main types:

Androconial or alar patches. These are generally present on the forewings near the cells or on the the base and above the cells on the HW, where the forewing partly covers it.

Androconial tufts. These are found on the hindwings of Charaxinae, and Satyrinae, and can be erected during courtship.

Androconial folds or dorsal folds. In Papilionidae, the hindwing along the inner margin is folded and holds tufts of hair which are often white and are exposed when the wing is opened.

Hair pencils. These are extrusible abdominal scent organs which are exposed during courtship displays (Plate No.4). They are of different shapes and can serve as an aid to identification (Boppre & Vane-Wright 1989). These produce odorous chemicals which even the human nose can detect. The odours range from a sweet terpenic smell to a very rancid odour. Chemical investigations of these odours have been carried out for many species of danaiids, and various chemicals like linalool, nerol, etc. have been detected. Pyrrolizidine alkaloids like danaiadone, dihydrodanaiadone etc. have also been detected.

AVERAGE LIFE-SPAN

The larger butterflies may have a life-span of 15 to 20 days, and the smaller, less than that. Some of the larger ones may even have a life-span as long as six months. There are records of some that live for over a year.

VARIATIONS

The variations in butterflies may be of two types:

1. Individual variations

2. Seasonal variations

Individual variations are:

Dimorphism and polymorphism. In many species, for example the Great Eggfly, Danaid Eggfly, the female is very different from the male and often mimics poisonous or obnoxious species. Or in some cases females may be less colourful and cryptic, as in Apaturinae. When there is only one such form, it is known as **dimorphism**. But in some cases like in Great Mormon or the Common Rose have more than one female form. This form is known as **polymorphism**.

Gynandromorph. In very few freak cases, particularly in dimorphic forms, one may find a half female and half male form i.e. on one side the wings display female characteristics, and on the other, male. Such a form is known as **gynandromorph**.

Aberrations. In some cases, an excess of black pigment may be present; this is known as **melanism**. In some cases there may be excess of white pigment; this is known as **partial albinism**. When all the pigments are white it is called **albinism**. In some species there may be variations in spottings, etc., which when repeated over several generations, may lead to a new forms and subspecies.

Seasonal variations or polyphenism includes:

Wet Season Forms (WSF), which are generally darker in colour and in many species ocelli are clearly defined.

Dry Season Forms (DSF), which are generally paler and the ocelli are reduced to spots. Sometimes they may also have brown blotches.

PARTHENOGENESIS

Reproduction without fertilization is observed in insect species like weevils, wasps, etc., but has also been observed in Lepidoptera, particularly in moths. The female of the species lays eggs without mating. The individuals that emerge from such unfertilized eggs are generally females.

DIAPAUSE

This is a state in which most of the physiological activities like heart-beat, breathing, etc. are nearly at a halt; this is controlled by hormones. This may happen in any stage of the life-cycle. It depends on the environmental conditions. Many of the species in cold regions undergo this state. In some, pupae it has been experimentally shown that the water content is reduced and **glycerol content is increased**, which helps the insect from freezing, as glycerol acts as an **anti-freezing compound**.

BEHAVIOUR and ECOLOGY

FEEDING

The main function of an adult butterfly is to mate and reproduce, but it also needs energy for survival. In many species, adult butterflies do not feed at all; they utilise the energy stored from feeding during the larval stage. The voracious larva feeds enough to build a sufficient quantity of proteins and a large store of spermatophores or eggs.

The store of protein is a non-renewable resource, and once it is used up, reproduction ceases. Some Neotropical Heliconiines get extra protein from 'kneading' pollen with honey for long hours and then ingesting it (DeVries 1987). But most species which have a longer life-span have to feed on energy and nutrient sources to replenish their strength.

The main source of food is nectar. Although many species of flowers have nectar sources, there is a definite correlation between the different species of butterflies and the flowers they prefer, depending on their ecological niches. Blues and Small Browns feed on low-growing flowers while those which fly high might visit flowering trees and larger shrubs. Some butterflies have specific preferences. For instance, the White Orange Tip feeds on *Sesamum indicum*; it has to go deep into the flowers to get the nectar, its size is such that it can enter into the corolla tube. Larger butterflies like Swallowtails hover over the flowers while feeding on nectar. So they are attracted to those species of flowers which afford them enough space for their large wings to flutter and in which they can directly insert their proboscis into the nectar sources. Some feed with their wings wide open while others might perch on the flowers while feeding. Flowers like *Lantana camara*, *Leea*, *Buddleja* and *Cirsium* are visited by most of the groups. On *Cirsium arvensis*, I have observed 28 species of butterflies and about 8 species of moths feeding within a short span of about an hour in Mussoorie. On the flowers of *Leea* sp. about 40 species have been recorded to feed in one season.

The butterflies also feed on decaying fruits and vegetable matter, sap from trees, mammal and bird droppings, and even dead animals.

One interesting observation I made was of the Purple Red Eye. I was waiting for the bus at Rangpo one evening, and had five minutes to spare. I saw a Purple Red Eye on one of the garden plants. To identify the butterfly I went closer. I saw the butterfly curling its abdomen, so I thought it was laying eggs, but it was feeding on a bird dropping. The dropping was dry. To my surprise it squirted a drop of liquid exactly on the tip of the dropping and then began feeding. After feeding for a few seconds it squirted another drop of water on the dropping and continued feeding. In about 5 minutes it squirted water seven times. Similar behaviour I observed for the Large Yeoman which also squirted water on the dry dropping on the road, but only once.

Newly-hatched adults of both sexes usually have sufficient amounts of sodium in their body. Many males, after copulating, leave behind in the female's body, a substantial quantity of a sperm package which incorporates a high percentage of the male's sodium reserve, which in turn is utilised by the female to balance her sodium

reserve. While the male has to make up his deficiency by absorbing the sodium salts from contaminated ground water and from other sources where easily dissolvable inorganic salts are available. Very often a large congregation of many species of butterflies can be seen on such patches. This behaviour is known as **puddling**. Urine has a fair amount of sodium, and is much sought after. Infact urine mixed with sugar, beer or various aromatic substances is used by both commercial and scientific collectors to secure their specimens. Butterflies also visit damp earth, sweat, etc. in search of sodium. The gathering at such puddles is exclusively male. During the puddling the actual amount of water passing up the slender proboscis, through the insect and out of the anus is a large droplet of water squirted out every few seconds; only the required mineral is absorbed.

FLIGHT

One can identify a group of butterflies just by the way they fly. The nymphalids have a rapid flight. Many species have the habit of sailing; sometimes the FW is pressed down below the horizontal plane, as in the Barons. Great Orange Tips and Swallowtails fly very high above the ground with regular slow wing beats in leisurely flight, and might fly faster when chased. The average speed of butterflies is 10 Kmph. Browns have a very weak flight; they fly very short distances when disturbed and take immediate refuge in the undergrowth. Some butterflies, like Danaids, have a dodging flight, particularly when being pursued.

Insects have a normal 24 hr. cycle called **circadian or dial rhythm**. For example, the danaids are active during the daylight only, and such species are known as **diurnal species**. Most butterflies belong to this group. Some, however particularly some of the Skippers or Hesperiids, and most of the moths, fly only during night; these are known as **nocturnal species**. Yet another group, consisting of the subfamilies like amathusiids, and some of the satyrids like the Jungle Glory and Evening Brown, are active during dusk and dawn. These are known as **crepuscular species**.

BASKING

Flying requires very large amount of energy, and is possible only if the flight muscles have reached a temperature of at least 30⁰C (Feltwell 1986). To achieve this, butterflies bask - they sit with their wings wide open, presenting the maximum surface area to the sun's rays.

Many Lycaenidae bask with their wings closed, leaning at such an angle to the sun that maximum heat is absorbed. It is believed that these butterflies exploit the ability of dark pigments, which are present on the underside, to absorb more radiant heat than the light pigments which are present on the upperside. This makes for more efficient warming up procedures.

Butterflies with white wings are excellent reflectors of heat, and have the advantage of being able to use them as mirrors to reflect the rays of the sun directly on to the vital areas of the thorax where they are most needed. This is accomplished by holding the wings at a 10-60 degree angle in a 'V' shape. The black areas near the wing bases



Egg of the Plain Tiger



Larva hatching out of an egg of the Tawny Coster



Larva of the Indian Tortoiseshell



Egg of the Great Orangetip



Egg of the Common Nawab



Larva of a Limacocidae moth.

The Great Orangetip larva in threatening posture



Larva of the Common Tiger



PLATE NO. 2



Larva of the Acacia Blue being attended by the ants



Pupa of Tawny Coster



Larva of the Great Eggfly in pupation process.



Pupa of the Common Leopard

Pupa of the Gull



Ceropegia sp. larval food plant
of Common Tiger.





View of temperate broad-leaved forest from Bakkim



View of land-slides from Pakyong

View of Teesta from Mamring

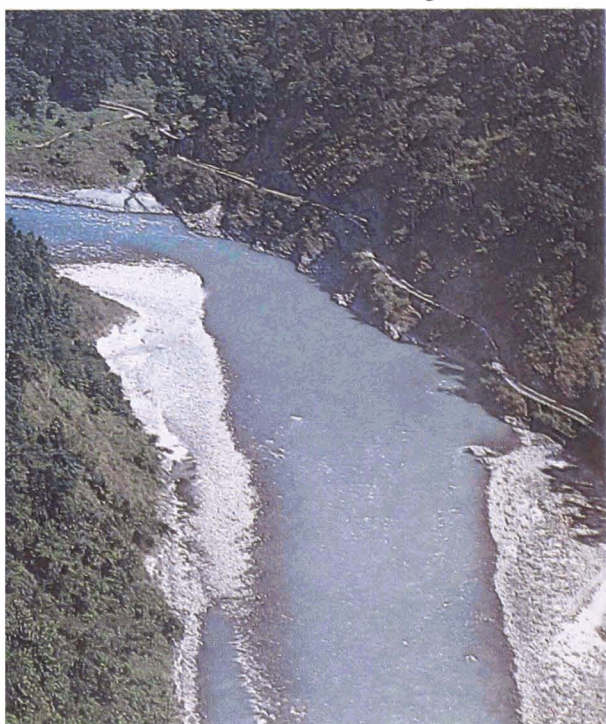


PLATE NO. 3



The newly emerged Common Crow on pupa drying its wings



The Monkey Puzzle

The Elbowed Pierrot



PLATE NO. 4



The Grass Yellow caught in the Spider's web



The Common Jezebel caught by the Crab Spider hidden among the *Lantana* flowers



The Yellow Orange Tip carrying mites on its wing



The abdominal hair pencils of the Common Crow

The Great Orange Tip showing camouflaged markings while drinking at a stream



The female Indian Fritillary laying egg on *Viola* sp.



Scale : 5 cm



PLATE NO. 5



47



46



440



439



518



397



523



526

- 46 Tailed Redbreast
47 Great mormon ♀
397 Courtesan ♀
439 Danaid Egg fly ♀

- 440 Great Egg fly ♀
518 Plain Tiger ♀
523 Magpie Crow ♀
526 Common Crow ♀

PLATE NO. 6



The Fluffy Tit (female)



The Common Silverline



The Longbanded Silverline on *Leea* flowers



The Cornelian feeding on *Leea* flowers

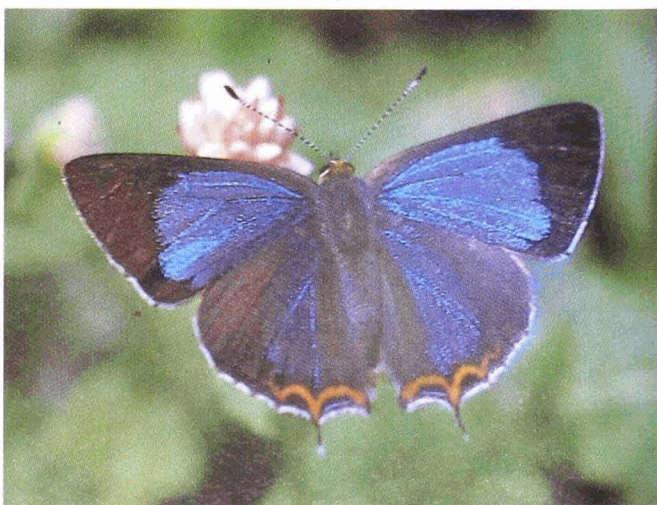


The Hybrid Sapphire

The Purple Sapphire



The Azure Sapphire





The Large Tawny Wall



The Bright-eye Bushbrown

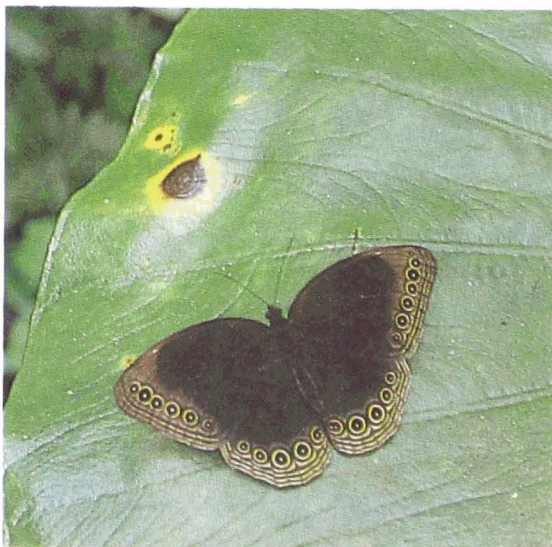


The Himalayan Fivering



The White-line Bushbrown

The Dusky Diadem basking



The Nigger



PLATE NO. 8

Scale : 10 cm



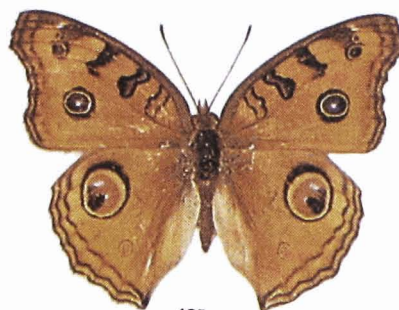
343



33



63



425



234



524

33 Common Rose
63 Indian Cabbage White
234 Common Pierrot

343 Common Bush Brown
425 Peacock Pansy
524 Black Striped Crow

absorb the heat effectively and efficiently, which is then directly transferred to the flight muscles located near by.

PATROLLING AND HILL-TOPPING

Males of some species are seen on certain 'beats', usually areas with assorted food plants. Males fly continuously in search of females. In perching behaviour, the males take up prominent positions, for instance the top of a tree, which gives a good view of the surrounding area. They then dart out to examine any flying object, including other insects, falling leaves and even curious human beings. If it turns out to be an appropriate female, they start courting.

The male often defends its territory from intruders. The males actively patrol a certain area or beat where the female may be feeding or laying eggs from a previous mating. The *Aglaia cashmerensis* or the Indian Tortoiseshell (Haribal, 1989) has been observed displaying such a behaviour. Experiments have proved that once a patrolling male is removed, his place will be promptly taken up by another male. In some cases it has been proved that if the old male is reintroduced it does not necessarily occupy the same area or drive away the new occupant. This establishes that it is not the 'fittest' butterfly which establishes hold on the territory; it is the 'first come first served' principle that is followed.

Males of the species inhabiting mountains or hilly areas often establish themselves on the prominent summit of a hill or ridge, thus giving this behaviour the label 'hill-topping'. In the Himalayas, such behaviour is commonly observed in the Kaiser-I-Hind, Bhutan Glory and many of the Nymphalids.

Many males may display both patrolling and territorial behaviour, although the male of even the most sedentary species will temporarily forsake his watching-brief for feeding purposes.

COURTSHIP

The courtship of butterflies is a complex ritual involving the exchange of visual, chemical and tactile stimuli. It differs from one species to another. Visual stimuli may be in the form of colour, ultra-violet light reflectance, iridescence, size or even any moving object including falling leaves, birds or even a moving butterfly net (Silberglied, 1989).

In case of *Colias* sp., only visual cues are enough to stimulate females. But in some cases, like danaids and *Argynnis*, the male requires olfactory cues before continuing his courtship. The *Euploea core* male, at this stage disseminates his odour, by extruding out hair pencils and releasing scent. The male may dust the chemical cues on the female's antennae when in flight or while resting. If the female has already been mated, she may not respond to it, exhibiting a characteristic rejection posture or may take off on an ascending flight with the male following for some time. If the female accepts the male, he alights next to her and probe laterally and ventrally along her wings to locate her genitalia; finally they mate. They may remain in the clasped position for hours if not disturbed. Once they separate the female will go away in search of food plants to lay her eggs.

EGG-LAYING

Female butterflies are very good botanists. Their identification of plants is based on both visual clues as well as chemical cues. Female butterflies seem to be programmed with a built-in search image of a specific leaf shape and any encounter with a plant that fits this image will promote closer investigation. The interest in the leaf may be heightened if it emits a characteristic odour. Further, she may test the chemical nature of the leaf with the receptors on her feet, antennae or tip of her abdomen. Only if the leaf feels, tastes and smells right she proceeds to lay an egg (Plate No.4).

I have grown plants of Lime and *Bryophyllum* sp., the females of both the Lime butterfly *Papilio demoleus* and the Red Pierrot *Talica nyseus* come to lay eggs on the plant. Both these butterflies are seldom seen in our area. The plants were on the first floor inside the balcony not easily seen from outside. But these butterflies, with a distinct preference for these plants, have been seen to come and lay eggs. Herein, the chemical clues must be first attracting the butterflies to the source.

ENEMIES

The most common enemies of butterflies are lizards, birds, spiders and predatory insects. It is in the earlier stages of its life cycle that the butterfly is most prone to attacks. The adult is very difficult to catch, and the energy that the predator has to spend in catching it is not worth the predator's while.

Birds feed on all stages of butterflies, but mainly take large quantities of larvae. It has been estimated by Dempster, working on Brassicae, that predation by birds accounted for 22.8% of eggs and 21.9% of larvae of the Large Cabbage White butterfly.

I have watched the Paradise Flycatcher take a variety of species of butterflies- the Lime Butterfly, Lemon Pansy, Emigrant, Common Baron, Gaudy Baron, Plum Judy, Pallid Argus, Glassy Blue Tiger; records say they prey on the Common Tiger too. They only feed on the body; the wings are discarded. It is interesting to observe how they separate the wings from the body. Initially they rub the victim against a branch and then give several shakes till the wings fall off. A favourite hunting ground is near streams where butterflies come and bask or feed on the moisture and salts.

Other birds, like the Drongo, Ashy Swallow Shrikes and Wood Swallow Shrikes, have been recorded taking butterflies particularly when the butterflies are migrating.

All animals including mammals, reptiles and amphibians are polyphagous and prey on these insects whenever they become numerous or easily available.

Another most common predator of adult butterflies I have observed is the Robberfly. I have seen and photographed them taking the Common Grass Yellow, Emigrants, Metallic Cerulean, and Common Jezebel.

Preying Mantises and Crab spiders (Plate No. 4) are other major predators. They sit camouflaged on flowering plants and attack when the butterflies come to feed on the flowers. The Common Garden spider and some of the web spinning spiders which spin webs across forest paths also seem to catch quite a few species of butterflies (Plate No. 4). I have seen Common Crow, Dark Blue Tiger, Common Grass Yellow, Common Wandrer and Yellow Orange Tips in spider webs.

PARASITES AND DISEASES

Parasites are those organisms which live on the prey but do not kill the prey because their survival depends on the survival of the host. Butterflies are attacked by a range of parasites like fungi, bacteria, viruses, protozoa and mites (Plate No. 4). Often these are carriers of some major disease. The plant disease known as 'Wilt Disease' is caused by pathogens carried by butterflies.

PARASITOIDS

Parasitoids kill the organism on which they feed. All stages of butterflies except the adult are attacked by parasitoids, mainly by Hymenoptera (Wasps), and Diptera (Flies). The adult parasitoids lay eggs on the larvae, which will continue to develop, while the parasitoids inside the body will also go on growing, feeding on the larva. Sometimes the larva is killed before it pupates, but more often the larva pupates, but at the end of the hatching period, the parasitoids hatch out.

Last but not least, the most dangerous enemy of the butterfly is man. Habitat destruction and spraying of chemicals such as insecticides and pesticides have destroyed the habitat as well as butterflies and other insects vastly. Clearing of secondary growths for commercial plantations and the growing of grasses etc. have also reduced the food plants of the butterflies' which has drastically reduces their numbers.

PROTECTION

CAMOUFLAGE OR CRYPTIC COLOURATION AND INANIMATE MIMICRY

Looking like leaves (Plate No. 4), twigs, or bird droppings is one of the common methods of protection evolved by insects to protect themselves from predators. For instance, the Oakleaf and Oak Blue are brightly coloured on the upperside, but on the underside the butterfly looks very much like a dried leaf with a main mid-rib and veins branching out of it. The camouflage is further enhanced with what looks like leaf spots and fungus markings. This is made even more realistic with appropriate behaviour. The Oakleaf, when disturbed, will fly fast and suddenly sit on a twig aligned in such a way that with its head down it resembles one of the dead leaves. Similarly, the larva of the Lime butterfly looks like a bird dropping and safely sits right on top of a flat leaf. The Browns sport dark patterns in the wet season form and indistinct patterns in the dry season form. Many butterflies have eye-like markings which look like a pair of eyes of vertebrate predators. When disturbed, the butterfly sits in such a manner as to expose these markings, which frighten off potential predators.

The Lycaenids have bright orange markings on the hindwings with thin hair-like tails, which look like antennae, while the real head is inconspicuous. When at rest they keep moving the hindwings up and down and this draws the attention of the predator to the butterfly's rear. So if they are attacked they lose some small portion of the wings and escape. In many New World species, the butterflies frequently bear 'V'-shaped beak marks and torn leaf marks.

Another ruse for self-protection is seen in the Lycaenids. The larvae produce some chemicals (probably sweet chemicals), which lure ants and thus get themselves surrounded by ants. The presence of pugnacious ants ensures that larvae are left unharmed.

PROTECTIVE MIMICRY

Some insects are conspicuously or aposematically coloured, with patterns of bright orange, red, yellow or black or a combination of these. Thus deliberately they draw attention of the predator to themselves. It is believed that the in-built tendency of a vertebrate nervous system is to associate these colours with danger and warning. Hence, very often potential predators associate such butterflies with nonpalatability, as they contain poisonous or toxic substances in their body, which are sequestered from their larval food plants. The butterflies themselves are unharmed by these substances but the predators who feed on them suffer from emesis or toxicity etc., and quickly learn to leave such species alone. Butterflies like the Windmills and Common Rose, which feed on *Aristolochia* plants, sequester aristolochic acid, and have been proved to be highly unacceptable to most birds.

These are the butterflies that are actually harmful to predators. There is yet another set of butterflies which merely 'mimic' them, that is, take on outward characteristics like them, and in this manner keep off predators. This is what one could call a neat trick of nature! For instance, many butterflies that do not actually feed on *Aristolochia*, and are hence **not actually** harmful or unpalatable to the predator, simply mimic the *Aristolochia* - feeding butterflies, and thus 'fool' predators. For instance, the females of the Common Mormon and Great Mormon resemble or mimic the *Aristolochia* -feeding butterflies. This mimicry, which involves a palatable species (mimic) and a non-palatable species (model) is known as **Batesian mimicry**. Such mimicry is advantageous only when the model is abundant and the mimic is rare as predators will learn about non-palatability quickly. The mimic enhances the resemblance by behaving in the manner similar to its model. Examples of this are the Great and Danaid Eggflies, in which males are very different from the females which resemble the Common Crow and the Plain Tiger (Plate No. 5).

Several theories have been put forward on the evolution of Batesian mimicry. Punnett supposed that the mutation was straight to the model, with a very high quality mimicry. Fisher believed that the the mimic evolved gradually by accumulation of many genes with very small effect. The current theory by Sheppard and Ford is that the mimicry evolved in two stages. First the major mutation which produces a poor mimicry, followed by the selection of further genes which refine the resemblance of the mimic to the model. The resemblance is very close to the model in Batesian mimicry. The mutations producing mimics of other models are at an advantage when rare, as the species tends to become polymorphic. An interesting example of a polymorphic mimic is the Great Mormon. It is known to have many female forms, some with tails and others without, of which four forms occur in India. Studies have shown that it contains at least six loci, which affect the colour, morphology of wings and different parts of the body.

A mutual resemblance between two or more closely related species of unpalatable butterflies is known as **Mullerian Mimicry**. In this case both the model and mimic have

equal advantages, although they have a range of palatability. Also models need not be abundant: both models and mimic can be equally rare. The Mullerian mimics show only a general similarity. The Mullerian mimics may have a common ancestor from which they are evolved. Common examples of Indian Mullerian mimics are the Danainae butterflies i.e the Crows and Tigers and Windmills etc. To a certain extent, Sailors and Sergeants are also known to be Mullerian mimics but no detailed studies have been undertaken.

Studies by Brower *et al.* have shown that in a given population, as many as 80 per cent of *D. plexippus* may be non-toxic as some of them feed on non-cardenolide containing plants and are shown to be palatable. Such intraspecific mimicry has been termed as **Automimicry** (Brower 1984). But needs a further investigations.

A possible mimicry of odours in *Atrophena* sp. have been shown by some Japanese workers but which also needs further detailed investigations.

MIGRATION

Every butterfly born has to move from its birth place, may be in search of food, mate, habitat or to escape from the enemies. On a sunny day you will find many butterflies flying around. So you mark one butterfly and observe its movements. It may be flying randomly from one food source to the other or having a small territory and is on look out for a mate to arrive or having a well-defined directional flight, even if it stops to feed on some nectar source, after feeding will resume flight in the original direction. If you are at Amboli (A hill station in Western Ghats in Maharashtra), in October you will find hundreds of the Crow and a few Tiger butterflies steadily go in south-south east direction. The place is hilly and covered with forest. The butterflies fly at height of 1-3 m from the ground, if they find an obstacle, they may take a detour but in the end resume the same original direction. Some scientists have classified these movements into three categories- **local spread or movements** is a movement within ten to hundred metres of the area where the butterfly is born. **Dispersal** is moving from the area where it is born to another area which may be or may not be favourable. **Migration** is a movement from one favourable place to another favourable place, which may be hundreds of kilometres from their place of birth .

The total distance travelled by a butterfly in its life time is known as **life time track**, which may vary from 2 Km to as much as 3000 km.

In many of the species hundreds of insects are produced generation after generation and they die within the range of 10 metres to 100 metres of their place of birth. Such butterflies are generally adapted to relatively permanent habitat and disperse in all directions. The butterflies like Tawny Rajahs and Barons belong to this type butterflies. But the butterflies like *Catopsilia*, *Euploea*, *Danaus*, *Parantica* and *Papilio demoleus* *Cynthia cardui*, *Kallima inachus*, *Lampides boeticus* etc. are known to migrate regularly in various parts of India.

In larger animals, like birds and mammals it is easy to record their migration as they have longer life and often they return back to the same area. In butterflies the life span is very short, the generation which moves from north to south may die after laying eggs in south and it is the next generation which returns to north. Sometimes it may even be the

third or fourth generation which returns back. In some species only one directional migration has been observed and the reverse direction has not been recorded. How far to travel depends on the evolutionary past of regularly travelled distances over hundreds of kilometres by the earlier generations and also depends on the latitudinal and meteorological gradients in habitat suitability and local fluctuations.

The butterfly when flying between two suitable habitats prefers to adopt a particularly preferred compass direction. Most butterflies fly when the sun shines, for the reasons of thermal efficiency. The orientation is relative to the sun's azimuth and persists at least for a period of overnight. As a result of this butterflies travel slightly in different directions at different times of the day. E.g. N.W. in the morning and N.E. in the evening. Some moths are known to migrate on same principle but with respect to moon and stars. On an overcast day moths are shown to be using magnetic compass, which has not yet been proved experimentally for butterflies. Some butterflies might fly non-stop others may stop enroute to feed. Studies of the Monarch butterflies from the Great Lake region in the U.S.A. have been shown to fly at least about the first 2000 Km with-out slowing down.

If the butterflies travel too fast and at great height they might miss the suitable habitat. If they travel too slow they might lose time and will cover less area.

The average speed may be 10-15Kmph. If following the winds, they might fly at higher height from the ground. On the days when the wind is head-on or sideways it may be low over the ground. When the weather is favourable monarchs soar at height of 300 m above the ground, which helps in economising the use of energy.

HOW TO STUDY MIGRATION

The birds are ringed with aluminum rings around the legs which bear the details of the place of ringing and on recovery could be traced to back to the ringer. Animals may be studied by using radio telemetry etc. But to carry out the similar exercise for an insect is difficult for two main reasons: their life time is very short, and the insects are very small. If an aluminum tag is put on to the wing of the butterflies they get easily lost, as the wings being very delicate there is heavy wear and tear while on migration. The pioneering work on butterfly migration was carried out by Urquhart in U.S.A. He tagged thousands of butterflies and recoveries were made enroute by various volunteers and he could study the route and destination of monarch butterflies. This type of study requires a large number of volunteers involvement. When there are large number of insects migrating radar studies could also be carried out. For over short distances the butterflies could be dyed with some fluorescent dyes and volunteers stationed at different places in an anticipated direction could individually follow their passage. The technique of radio telemetry could also be used but the method is still in its infancy.

Very little is known about the migration of butterflies in India. Most of the pioneering work is by Evershed. J. in Palni hills, in the Nilgiris. Also observations by Piele in Mussorie, Hingston in Dharmasala and Evans from other parts of the Himalaya have been recorded. About 60 species have been recorded as migratory in India (Williams 1930).

My own observations are restricted to the observations of *Euploea* and *Danaus* and *Tirumala* in Western Ghats particularly in and around Bombay, both in summer when

the migration is NNW and in autumn it is SSE. I have also observed *P. demoleous* in Rajpipla, Gujarat migrating from east to west during the mid August. Hundreds of dead *B. aurota* on a glacier near a col at about 5500 m. in Jaonli area, in Gharwal. Nitin Jamdar has made some observations in Kashmir for *Pieris brassicae*. Some observations have also been made on *Catopsilia* species in Gujarat and Corbet National Park.

It is very important and would be of great help for all amateurs to collect data on migration and send it to Bombay Natural History Soc. The details of the observations required are as follows:-

1. Name of the species:
2. Single or in Association with other species:
3. Date of observation:
4. Time of observation: ----- hr. to -----hr.
5. Approximate number sp. passing per minute /five minutes at a given point.
6. Weather : Bright clear weather/Cloudy/Rainy/ any other remarks.
7. Wind direction:
8. Height from the ground:----- m to ----- m.
9. Conditions of the butterflies: Tattered/ Fresh/ any others.
10. Any other ecological observations: Feeding on flowers on migration, resting, the species butterflies being attacked by the predators etc.
11. Distance from observer:
12. Name of the observer:
13. Place ----- Alt,-----m. District----- State-----

STUDYING BUTTERFLIES

Amateurs can accomplish astonishingly excellent work on butterflies. In fact, most of the work on Indian butterflies has been carried out by amateurs. Brig. W. H. Evans, Col. C. Swinhoe, and Col. C. T. Bingham were army men who wrote volumes on butterflies, their identification, habits and habitats. The well-known *Butterflies of the Indian Region* was written by M.A. Wynter-Blyth, who was principal of Rajkumar College at Rajkot. T. R. Bell, who was a forest officer, has studied the life cycles of many butterflies; his work has been published in journals of the Bombay Natural History Society. Even the well-known ornithologist Dr. Salim Ali started his study of birds as an amateur, going on to become a professional by his dedication and devotion to the subject.

Although a great deal of work has already been done, a lot remains to be accomplished. The subject is indeed vast. Even with hundreds of scientists working in the field, there will always be plenty of things to be studied and recorded. If the amateur carries out the work methodically with a scientific approach, he or she can make valuable contributions to the subject. For this, the amateur needs guidance.

Basically this involves two major aspects: Identification of the subject and field observation.

IDENTIFICATION

Difference between butterflies and moths

One of the commonest problems for the amateur in identification is differentiating between butterflies and moths. The followings are the important differences:

BUTTERFLIES

Generally fly during day time.

Sit with their wings closed over their back or fully open and generally the forewings do not cover the hindwings

The antennae are clubbed or hooked and never covered with hair.

Butterflies possess a distinct waist

Larvae are smooth, spiny or covered with bristles.

Larvae always have five pairs of prolegs.

Eggs are usually upright, ribbed or dome shaped.

MOTHS

Except for a few most of them are nocturnal.

Sit with their wings spreading horizontally and the forewings partly covering the hindwings.

The antennae are of various shapes and sizes, a few of them are hooked and often tucked under the forewings and are sometimes hairy.

Very few possess a distinct waist.

Larvae have tufts of hair or sometimes completely covered with hair.

Larvae may have five or lesser pairs of prolegs.

Eggs are always smooth, flat or scale like.

Identification is very important as the results depend on the accuracy of your identification

Identification can be carried out with the help of field guides. Out of about 1,400 butterflies found in the Indian subcontinent, this book covers about 400 common species.

First observe the butterfly for its major colours, wing shape, size, patterns etc. Other aspects like flight, feeding methods, way of sitting, etc. should be observed, as these are useful clues to identification. Compare the butterfly with the illustration in one of the plates in this book, which matches closest to the butterfly seen. Then refer to the text corresponding to that number, and read the specific identification marks, which appear in bold letters for many of the species.

In many cases, unless the butterfly is in your hand you cannot identify it. Some you may not be able to identify even if you have them in your hand, either because that particular butterfly is not illustrated in the book or because just looking at it closely is not enough; its genitalia or scales may need to be studied. In such cases you need to collect the butterfly.

To collect butterflies you need the following equipment:

NET.(Fig. IV). A net attached to a ring with a pole of about 0.5 m to 1.00 m length is ideal. Diameter of the ring should be around 0.4 m to 0.5 m. The net should be of soft nylon mesh and should be at least 1.00m deep. Collapsible nets with poles of adjustable lengths are also available.

HOW TO USE THE NET. Butterflies as a rule tend to be -vely geotropic, i.e. they fly away from the ground. Hence the net is brought on the butterfly from the top, with the net elongated on the vertical side, so that the butterfly will fly towards the corner of the net. Immediately turn the net to close the mouth. Then slowly put your hand inside the net whilst keeping the mouth tightly shut around your hand. Allow the butterfly to go to the corner, then hold it at the thorax. Do not hold tightly as the scales may come off on to your hand and you may damage the butterfly.

Butterflies can also be collected by baiting.

TRAPS AND BAITS. Butterflies can be attracted by baiting them to decaying and rotten fruits, honey, salt and moist earth. A rotten banana fermented for 24 hours with rum makes one of the best baits. A trap (Fig. IV) as shown in the figure could be made and hung at most appropriate places in the field, like stream-bed etc. where butterflies are likely to occur. This could attract those butterflies which you would otherwise not see even if you walk several times in that area.

Once the butterfly is in hand you may be able to identify and release it. If you cannot, then it should be killed by gently pinching the thorax. But many larger butterflies do not die in this way, so a killing jar is required.

KILLING JARS. A wide-mouthed bottle containing a wad of cotton soaked in one of the following solvents - ethyl acetate or carbon tetrachloride could be used. Potassium cyanide jars are also used for killing larger butterflies, but one has to be very careful while handling this chemical as it is highly poisonous. The butterfly to be killed is placed inside this for about half an hour to 2 hours depending on its size.

A better method of killing is to place the net with the butterfly entangled in it flat on the ground, to prevent from fluttering and inject into the thorax of the insect a solution

of copper sulphate with a syringe. This puts butterfly to rest without damaging its wing scales.

Once the butterfly is killed it is preserved in a paper envelope.

PAPER ENVELOPES. These are essential on collection trips. After the butterfly is killed, its wings are folded back and it is placed in butter paper envelopes. When these are not available one can make the envelope by folding a lengthwise paper of an appropriate size (Fig. IV).

After the butterfly is placed inside, the envelope should immediately be labeled. The label should have the date and place of collection, name of the collector and any other remarks worth noting.

The following equipment could be useful for further studies.

HAND LENS. This is very useful to study the legs, veins and brand scales.

MICROSCOPE. Microscopes of low magnification up to x10 power are good for studying scales, androconia, genitalia and labial palpi.

FORCEPS: Blunt and bent forceps are useful in the field as well as while studying museum specimens.

RELAXING AND MOUNTING

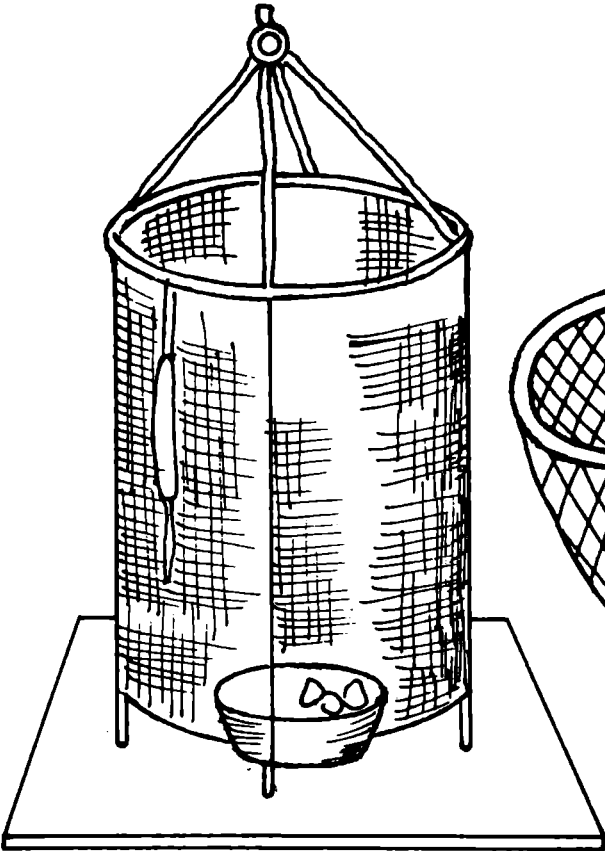
The ideal time to set a butterfly is immediately after it is killed and before the *rigor mortis* of the muscles sets in. But this not always possible in the field. So the specimens are collected in paper envelopes and are relaxed before spreading and mounting.

The relaxing is achieved by placing the butterfly in a jar containing a moist cotton wad covered by a plastic sheet. The butterfly is placed on top of this sheet so that it is not in direct contact with the moisture. The mouth of the jar is closed tightly and left overnight or even for one or two days, depending on the condition and size of the specimen.

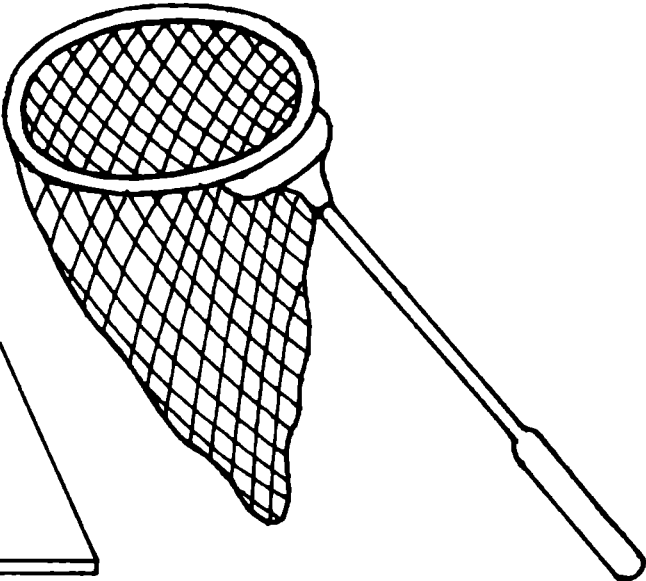
The relaxed butterfly is removed from the jar and a rust proof pin, also called entomological pin, which is easily available at a scientific equipment shop, is passed through the thorax of the insect and fixed on to the spreading board, . The wings are then spread in such a manner that the inner margin of the forewing is perpendicular to the body of the insect and is held in position by strips of paper and pins. Spreading is not an easy job and needs expertise, which comes after long practice. Leave specimens on the relaxing board for about two days. The bigger butterflies may need a week or so before they are properly set. It is advisable to get the specimens set by an expert setter. Once the butterfly is set it is transferred to an insect specimen box. Naphthalene or creosote is used to protect the specimens from ants, mites and other pests.

PHOTOGRAPHY

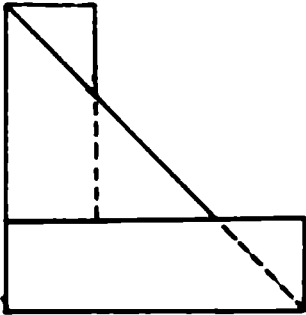
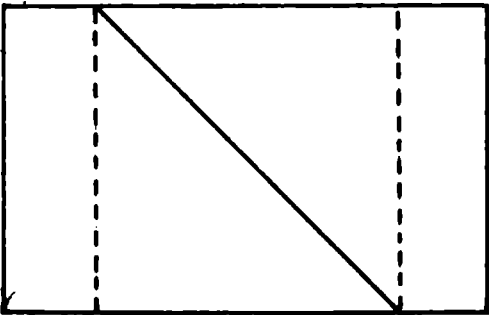
Butterflies are one of the most difficult subjects of nature photography. They are extremely wary of movement; at the slightest movement they are off. To obtain a good photograph one has to approach very close, which requires a lot of patience and a cautious approach. The best time for butterfly photography is early in the morning or after a heavy shower, when they are basking. One can also approach closer while they are feeding on flowers or damp patches.



TRAP



NET



PAPER ENVELOPE

FIG. IV BUTTERFLY COLLECTION EQUIPMENT

Photographing the larva or pupa is much easier, although some larvae might run away as soon as they are exposed to the sunlight. Photographing eggs needs specific equipment.

EQUIPMENT: A 35mm SLR camera of any good make which can be fitted with interchangeable lenses is best suited to the task. The best lenses would be 70-200 macro zoom or any fixed lenses like 50mm, 100mm and 200mm macro lenses, but these are very expensive. Normal 50mm lens or 100mm lens could also be used along with extension rings. These are a set of three rings which are fitted in-between the lens and the body, which helps in focusing at a very close range and gives magnification up to 1:1. Lenses known as close-up lenses, available for various magnifications could be fitted on top of the normal lens, to get desired magnification. But these often do not give very sharp pictures. To photograph eggs, a low magnification microscope fitted with a camera is available. One can also use reversed lenses of 50mm or wide angle lenses like the 28mm with reversal rings, to give magnifications up to 1:1 or 1:2, depending on the focal length of the lens.

It is preferable to have a built in TTL (through the lens) light metering system in the camera, which gives good exposures, although in some cases special techniques are needed.

It is always good to keep photographic records of food and nectar plants. You can make a series of the life history of a butterfly. This would require at least the following photographs: larval food plant, egg, different instars, pupa and adult butterfly. For those interested seriously in photography, the recommended books on photography in the bibliography are a must (Angel 1975, Focal Guide).

FILMS: 100 ASA or 200 ASA professional films are best suited for the purpose, and are readily available. Ektachrome 100 ASA and Fujichrome 100 ASA are good for slide photography. Kodakcolor Gold or Fujicolor and Konica 100 ASA are available for negative films.

FLASHES: Very often the lighting conditions are not very suitable for photography; also, to get a larger image, one has to go quite close to the subject, and close range focusing reduces the depth of field. To get all the parts of the subject in focus may be difficult if slower speed films like 100 ASA are being used. Here a medium sized flash or ring light would be very useful, as it allows you to photograph at lowest aperture. If the light is too strong a diffuser may be used to get a softer effect.

BOOKS ON INDIAN BUTTERFLIES

As only about 400 of the 1,400 butterflies found in India are described in this book, you will need to refer either to other standard reference books or to museum collections for identification of the other butterflies.

The first book on Indian butterflies was published about 140 years ago by Horsfield and Moore in 1857. This was followed by the three-volume *Butterflies of India and Burmah and Ceylon* by De Niceville and Marshall (1882- 1890), based on their own experience in collecting from different parts of the Indian subcontinent including Burma between 1881-1890. It describes most of the species known during that period. This work did not include three major families - Papilionidae, Pieridae and Hesperidae. Both the authors died before the next volume could be worked out.

In 1880, Moore planned a multi-volume publication called *Lepidoptera Indica* (1890- 1913), carrying descriptions and figures on every known butterfly of Indian subcontinent and the neighbouring countries, along with the notes on their distribution. Moore died after the publication of the seventh volume. His work was continued by Col. Swinhoe and completed in 1913. Now these books have become collector's items.

Col. Bingham started writing another set of volumes under the series *The Fauna of British India*; two volumes contained the butterfly families Danaidae, Satyridae, Amathusiidae, Nymphalidae and Riodinidae, and Papilionidae and Pieridae. He died before he could start the next volume.

During this period several papers were published in the journals of the Bombay Natural History Society (BNHS), Asiatic Society, Bengal Natural History Society, Royal Entomological Society, London, and in the Proceedings of the Zoological Society of London.

In 1922-1924, Brig. Evans wrote a series of papers on *Identification of Butterflies* in the journal of the Bombay Natural History Society, using for the first time the common English names. Later the same papers were published by BNHS, in the form of a book, *Identification of Indian Butterflies*, which was revised after a few years. Even now it is one of the standard books used for identification of Indian butterflies. This book has been reprinted by Today and Tomorrow Publishers, however, its price is too exorbitant.

Another book, *Butterflies of India*, which includes a few common species, was written by C. B. Antram (1924). A *Guide to Collection of Butterflies in India*, by H. D. Piele, was published in 1937 and contains about 600 species, particularly of the Western Himalayas, but is now out of print.

Bingham's series was revised by F. Talbot in 1939 and 1942 again under the series *Fauna of British India* (FBI), but after he completed two volumes, India gained Independence, and the author went back to England; he died before he could complete the series. His two volumes include families Papilionidae, Pieridae, Amathusiidae, Danaidae, Satyridae, Libytheidae and Acaeridae. But two major families, Lycaenidae and Hesperidae, remained untouched.

In 1957 another popular book was published by the BNHS, titled *Butterflies of the Indian Region*, authored by M. A. Wynter- Blyth, which soon went out of print. Some copies are still available in some libraries and with private individuals. This has also been reprinted by Today and Tomorrow publishers; but the plates were reproduced very badly.

In recent years, *Butterflies of Himalaya* by M. S. Mani (1986) has been published by Junk publishers, but the treatment of the subject leaves much to be desired. Another book, *Butterflies of Manipur*, by J. R. B. Alfred, is being published by Z.S.I., is meant for beginners and contains pictures of a few species.

REFERENCE COLLECTIONS IN MUSEUMS

Major collections are held by the Zoological Survey of India, which is currently housed in Calcutta, but many of the specimens were damaged during a flood in Allahabad, where the collections were stored earlier. No effort has been made by the

Z.S.I. to renew these specimens, and also, whatever there is is not easily accessible to the general public.

The Forest Research Institute of India in Dehradun has a fairly good representative collection, very well maintained, but all the specimens are old and collected during British times, and no new additions have since been made.

The BNHS has a fairly good representative collection, but with poor weather conditions, the specimens have not remained in good condition. A few recent collections from different parts of India are available here.

The best collection of Indian specimens is in the Natural History Museum, London, where although the specimens are more than a hundred years old, they are in good condition and are accessible to serious students as well as to the amateurs.

Other international museums like the Smithsonian Institute in Washington, American Natural History Museum in New York, Paris Natural History Museum, Hope Museum in Oxford, and Copenhagen Museum in Denmark hold very good collections of Indian butterflies.

FIELD OBSERVATIONS

INTENSIVE STUDIES

Intensive studies can be carried out at a place which is close to your residence and can thus be frequently visited if needed. Observations on all aspects, like flight, food, behaviour need to be recorded. But some of the following need detailed observation:

ADULT BEHAVIOUR. Hardly any behavioural studies are documented, except for a few generalised observations. It is always important to note down specific observations.

FEEDING HABITS: Observe on what the adult butterflies feed, how long they feed and how they feed. For example, the White Orange Tip *Ixias marianne* feeds on the flowers of *Sesame indicum*; because of its small size it can enter the flower and reach the nectar; hardly any other butterfly feeds on these flowers. Similarly, squirting liquid from the abdomen to dissolve the solid droppings may be observed in some species but may not be observed in others.

RANGE AND LONGEVITY: Nothing is known of the dispersal range and longevity of any Indian butterflies. This could be studied by 'mark and release and recapture' (MRR) studies. In one such study, a butterfly was recovered 45 km away from the place of its marking. Another butterfly was caught 48 days after it had been marked and released. Such studies help in finding out more about the range of dispersal and the life-span of butterflies. Also they help to determine the population, abundance, and territories, and gives information on migration.

MATING BEHAVIOUR: One can safely say that nothing is known about the courtship display of Indian butterflies. It would be very interesting to study the functions of chemical and tactile clues involved in mating.

LIFE HISTORY: The life history of 70% of Indian butterflies is still unknown. Even in those that are known, only a few or single food plants have been recorded. Moreover, many of the life history descriptions are based on the rearing of very few specimens, which cannot be called a representative group. The life cycles of the most common

species, like the Himalayan Five Ring *Ypthima sakra sakra*, the Golden Sapphire *Heliophorus brahma* are still unknown. It would be a great contribution to the science if these could be recorded. It is important to know on which leaves the butterflies are laying eggs and the plants the butterflies are associated with. If you do not know the names of these plants, ask locals for the local name and also collect a flowering branch and prepare a herbarium; later this could be identified with the help of a botanist. However, for a detailed life history, it is important to rear the butterflies.

REARING OF BUTTERFLIES: You can collect eggs or larvae from the wild. If the plant is growing in your garden you can sleeve the branch and study the life history in natural conditions. Otherwise you will have to collect and rear in bottles. If eggs are collected till they hatch, see that the moisture content of the leaf and the surroundings remain the same as those in the natural conditions. If the leaf gets desiccated, the larva may not hatch. Once the larva emerges, it has to be fed daily. Some of them are quite voracious feeders. So a stock of fresh leaves is very important, and again the moisture content of the leaf is important. If you have a freezer at home you can collect adequate quantities of the food plant and keep in a dry plastic bag with a tightly closed mouth; the plant remains reasonably fresh for few days.

When the larva is ready to pupate it will stop feeding and start wandering. Pupa of some species freely hang and others may be attached to the leaf or twig by a body band. Adequate facility for pupating has to be given by supplying twigs and leaves. The adult will hatch after 7 to 15 days, depending on the species. If the pupa is formed in winter it may emerge only in the following spring. Keep photographic records of the different larval instars and stages.

Very often photographs may not be enough to recognize the species, and some other morphological studies need to be carried out. Unfortunately none of the Indian museums has a collection of larvae needed for such a study. It would be interesting and fruitful to start a collection of preserved larvae. The method is very simple. A good specimen of a larva is boiled for few minutes in water and then transferred to a vial containing physician's alcohol, available at any chemist. It is also important to note the details of the species, date of collection with any other pertinent details, which should be pasted on the vial or should be written in a register with an appropriate reference number.

REGIONAL AND SPECIES ABUNDANCE LISTS

(Based on Clench 1979).

Study of abundance: In a given region, some of the species may be abundant in some seasons and not so in others. Also, in insects there is a phenomenon known as population outbursts. Whenever weather conditions are suitable there is an increase in the population of some species. This may not be periodical but happen once in a few years or so. These observations are very important to study the biology of any species. The abundance of the given species could be studied at regular intervals. The relative abundance could be recorded in accordance with the following scale:

CODE	NO. OF SPECIMENS SEEN
0	125 -625 specimens in 1 hr.
1	25-125 specimens in 1 hr.
2	5- 25 specimens in 1 hr.
3	1-5 specimens in 1 hr.
4	1 specimen in 1 hr.
5	1 specimen in 1-5 hr.
6	1 specimen in 5- 25 hr.
7	1 specimen in 25 - 125 hr.
8	1 specimen in 125- 625 hr. and so on.

Maintain a file of loose sheets, and keep adding any information available on each species; you can add extra sheets if you observe some hitherto unrecorded species in the area.

In this way you can cover various areas and species. A typical format for recording is given in Table III. You can also maintain a daily log book where you note down details as and when you observe something; this is then transferred to the species sheet or regional lists. It is important to note down the details of weather conditions as they are important for working meaningful conclusions from your observations.

REGIONAL LISTS: You can maintain a state list, district list or list of any particular area such as a national park, garden, etc. Note down all the species observed in that area. A typical format is given in Table IV.

A copy of this information could be sent to the Bombay Natural History Society, Hornbill House, S.B. Singh Road, Bombay 400023, periodically, where we plan to maintain a data bank on Indian butterflies, which would be available to any amateur or research worker for further studies.

Species List – Table III			
Family :		Species :	
Date of Obs.	Place	Code	Remarks

Regional List – Table IV		
Place :		State :
Name of Species	Date of Obs.	Remarks

CONSERVATION

Why Conserve Butterflies?

Insects are of primary importance in recycling of nutrients and play significant role in the maintenance of soil structure and fertility.

Butterflies are one of the important food chain components of the birds, reptiles, spiders and predatory insects.

Butterflies are also good indicators of environmental changes as they are sensitive and are directly affected by changes in the habitats, atmosphere, temperature and the weather conditions.

The life history being very short they are good subjects in the study of genetics. The research in this field has been giving insights to various genetical problems and have applications in a wide range of pure and applied biological sciences. For example 30 years of research on the *Papilio memnon* genetics led to an unexpected result on evolution of mimicry in butterflies. Also research in plant-animal interactions has shown various chemical compounds to possess insect-repellent properties, which could be commercially utilised as the requirement of these chemicals to control population of these insects will be in minute quantities and also as they are naturally occurring compounds and biodegradable, reduce the environmental pollution and resistance of the insect.

Butterflies are most beautiful and colourful creatures on the earth and have a great aesthetic value.

Lastly the butterflies are living creatures of our earth and they also have equal right to live as we humans do.

Threats to Butterflies

Destruction of habitats

The survival of butterflies depends mainly on the availability of the larval food plants which are generally secondary growths consisting of shrubs, creepers, saplings etc.

Agricultural practices have increased as human population has increased and more and more forest and wastelands are being converted to agricultural lands.

Urbanisation is also at a fast rate. Transport network are widening road building and the construction of buildings have increased and most of the wasteland around the fields etc. are being utilised for these purposes.

Grazing is another important factor which destroys saplings and secondary growths.

In Sikkim plantations of cardamom, tea and coffee are becoming fast common, as they are good cash crops. Hence more and more secondary undergrowths are being cleared for the plantation of these crops.

Forestry activities have introduced monoculture and that too of some non-indigenous species which compete with the indigenous plants for nutrients. The same is true for the exotic weeds such as *Eupatorium*, *Lantana* which are spreading all along roads.

Land-slides caused by increased human activities like deforestation, constructions etc. are also causing some amount of concern and threaten the habitat of butterflies.

Luckily air pollution is yet not a major threat to Sikkim except by the by vehicles in Gangtok and other major towns like Singtam and Chungthang.

But the present major threat to Sikkim is construction of two major dams on river Teesta and its tributaries. Unless a proper detailed study is carried out on the effects of these projects on environment and proper measures are accordingly taken these projects may turn out to be a great ecological disaster to Sikkim.

How to conserve

By creating protected areas like national parks and sanctuaries and thus protecting butterfly habitats.

Research and management – For conservation of any species it is necessary to know the life-history and its ecology to plan effective management strategy. Mapping and study of population distribution is also very important.

Nature education and awareness among the public is most important.

When the species have become rare or endangered a captive breeding programme like creating butterfly farms etc. and reintroducing the species in a suitable habitats.

Butterfly farming – The various species of butterflies which are endangered or have become rare due to various factors could be reared in such farms. The basic requirements for this would be a large airy aviary, with various food plants, adult attractants like nectar, salt patches, rotting fruits etc. The males and females are released in such cages and are taken care of at all stages.

Butterfly ranching means collecting the young stages from the wild and rearing them to adult stage in captivity.

Butterfly farms and ranches are useful in various ways. They help in rearing depleting wild stock and the same could be released back into a suitable habitat. The farm is a very good way of educating people about butterfly conservation. Also much research work could be undertaken. It can also be economically exploited. For example very good specimens could be utilised for making fancy articles from them or selling them to the collectors. Slightly damaged specimens could be released back into the wild to restock the genes of the wild population.

It has been implemented in Papua New Guinea and Wicken Fen and many other places have shown a very good result.

By legislation – The International Union for Conservation of Nature (IUCN) and Species Survival Commission the branch of IUCN are two of the most important bodies which help in conservation of individuals as well as in matters of ecology as a whole. The IUCN has brought out several books which are called Red Data books (RDB) for all animals and plants which are endangered or are vulnerable. There is a book on invertebrates which includes butterflies and other insects of the world, brought out in 1983, and later another RDB on the threatened swallowtail butterflies of the world (Collins *et al.* 1988) has been published.

There is also an agreement on International Trade in Endangered Species of Wild Flora and Fauna (CITES), which controls and monitors import and export of the listed

species. 87 countries, including India are members of this convention. General restrictions on trade in Lepidoptera apply in Germany, Kenya, Madagascar, Mexico and Turkey. Specific species are restricted or protected in Austria, Czechoslovakia, Finland, France, Germany, U.K., Greece, Hungary, Luxembourg, Netherlands, Poland, Switzerland, U.S.S.R., Brazil, India, Indonesia, Malaysia, Papua New Guinea and U.S.A.

In India we have The Wild Life Protection Act, 1972 which was later modified in 1989. The animals are classified into five schedules.

Schedule-I animals are fully protected and persons offending these animals are liable to very rigorous punishments. Some of animals included in this are Tiger, Lion, Peafowl and includes butterflies like the Kaiser-I-Hind, Bhutan Glory, some of the Apollos etc.

Schedule-II animals are also protected but when these animals become in excess they could be transferred two next to schedules depending on their ecology.

Schedule-III and **Schedule-IV** animals are generally common animals. **Schedule-V** animals are considered to be pests.

The current act includes about 25 species of Sikkim butterflies in Schedule I and about 300 butterflies in Schedule II. Many of these species are in fact common species but they might have been recorded as rare in some or the other parts of the country. A proper study to assess the current status of butterflies of India is urgently required and after which the schedules could be modified suitably.

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 Peablu 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,

uniformly green or whitish, and slender and pilose; larva forms shelter by folding and joining the leaves of the host plants.

LARVAL FOOD PLANTS: Combretaceae, Fabaceae (Leguminosae), Lauraceae, Malvaceae, Myrtaceae, Rosaceae, Sterculiaceae and Verbanaceae

SUBFAMILY - HESPERIINAE

DIAGNOSTIC CHARACTERS: FW vein V5 arising nearer V4 than V6: male FW upperside with brands or a stigma but never with a costal fold; wings held erect when at rest.

Larvae slender, smooth or finely pubescent, well-defined neck; commonly pale green, yellowish or whitish; they often construct tunnels of grass stems woven together.

LARVAL FOOD PLANTS: Agavaceae, Arecaceae, Combretaceae, Cyperaceae, Liliaceae, Musaceae, Pandanaceae, Poaceae, Rubiaceae, Sapindaceae and Zingiberaceae.

SUBFAMILY - COELIADINAE

DIAGNOSTIC CHARACTERS: Antennae short, less than half the length of FW costa, slender, curved apiculus; HW distinctly lobed, sometimes produced at the tornus, V5 tubular, arising nearer V6.

LARVAL FOOD PLANTS: Araliaceae, Asclepiadaceae, Combretaceae, Fabaceae, Malpighiaceae, Myristaceae and Zingiberaceae.

SUPER FAMILY - PAPILIONOIDEA

Antennae with apical clubs.

FAMILY- PAPILIONIDAE

DIAGNOSTIC CHARACTERS: Larvae with osmetorium; FW vein 3A free to the margin; HW V1A always present. There are about 700 species in the world, of which 55 species are recorded from Sikkim.

SUBFAMILY - PARNASSINAE

DIAGNOSTIC CHARACTERS: HW not tailed; one anal vein; tarsal claws usually asymmetrical in males sometime also in females; FW median spur absent or vestigial.

Larvae cylindrical and black, usually with red tubercles.

LARVAL FOOD PLANTS: Aristolochiaceae, Crassulaceae and Saxifragaceae.

SUBFAMILY - PAPILIONINAE

DIAGNOSTIC CHARACTERS: FW with median spur complete or rarely vestigial. Tarsal claws symmetrical. There are about 650 species found in the world of which 48 species are recorded from Sikkim, further divided into tribes Leptocirini, Papilionini and Troidini in India.

Larvae of Leptocirini variable; adult larvae greenish, smooth or with single pair of conical spines on one or more thoracic segment and on terminal abdominal segment.

Young larvae of Papilionini bear a row of spiny tubercles, typically dark with red or

pale spots and a pale saddle on segments six and seven; older larvae sometimes retain juvenile facies but more often with spines lost except for rudiments on the first and last segments and with the pattern variously modified.

Troidini larvae cylindrical with fleshy, usually red, segmental tubercles and commonly with a white saddle on segments six and seven.

LARVAL FOOD PLANTS: Annonaceae, Aristolochiaceae, Lauraceae, Magnoliaceae, Umbelliferae and Rutaceae.

FAMILY - PIERIDAE

DIAGNOSTIC CHARACTERS: Distinctly bifid pretarsal claws; wing scales containing pterine type of pigments; forelegs imperfect (except in two genera); cells of both FW and HW closed. There are about 1,000 species in the world.

Larvae cylindrical, slightly tapering posteriorly and also laterally in later instars; shortly setose or pubescent but with out any longer process except for an occasional short pair on the 12th segment, usually green or brown with longitudinal stripes.

SUBFAMILY - PIERINAE

DIAGNOSTIC CHARACTERS: Humeral veins usually long; 700 species found in the world.

LARVAL FOOD PLANTS: Brassicaceae, Capparaceae, Loranthaceae and Santalaceae.

SUBFAMILY - COLIADINAE

DIAGNOSTIC CHARACTERS: Humeral veins greatly reduced or absent. Approximately 250 species in the world.

LARVAL FOOD PLANTS: Asteraceae, Fabaceae, Rhamnaceae and Zygophyllaceae.

FAMILY - LYCAENIDAE

Nine subfamilies; antennal bases adjacent to the margin of the eyes, which are often indented; all FW veins from the cell or base; antennae wide apart at the base, often with a hooked club; all legs perfect. About 6,000 species found in the world.

SUBFAMILY - PORITINAE

DIAGNOSTIC CHARACTERS: FW with 10, 11, or 12 veins. Veins 11 anastomosed with 12 and sometimes with 10. HW tailless; very short or indistinct precostal vein; no basal vein along costa. Only one genus found in India.

Larvae long and thin, basally tapered at the end and with a dorsal thick covering of hair, becoming sparser laterally.

LARVAL FOOD PLANTS: Fagaceae.

SUBFAMILY - LYPHYRINAE

DIAGNOSTIC CHARACTERS: FW with 12 veins; veins 12, 11, and 10 are free;

HW tailless; no basal costal vein. Only one species found in India.

Larvae smooth and elliptical with shirt-like carapace, beneath which the head and anal claspers are hidden.

Larval hosts. Aphytophagus -feeds on homopterans, ant regurgitations and probably ant brood, occasionally may be cannibalistic.

SUBFAMILY - CURETINAE

DIAGNOSTIC CHARACTERS: FW with 11 veins; 10 and 11 being free, 7 ends on termen. HW tailless; no basal vein along the coastal margin; males lacking in alar androconia.

Larvae smooth with permanently exerted, cylindrical tubercles on eleventh segment.

LARVAL FOOD PLANTS: Fabaceae, Rubiaceae and Meliaceae.

SUBFAMILY - LYCAENINAE

DIAGNOSTIC CHARACTERS: FW with 11 veins ; veins 7 and 6 usually narrowly separated, but sometimes connate or with a short stalk. HW tailed at V2 or tailless, tornus lobed or rounded; costal margin basally lacking alar androconia.

Larvae onisciform.

LARVAL FOOD PLANTS: Polygonaceae.

SUBFAMILY - POLYOMMATINAE

FW with 11 veins; veins 7 and 6 are separated at their origin although sometimes only narrowly so; HW tailless or with a filamentous tail at vein 2 only; tornus rounded or occasionally with vestigial lobe; no precostal vein. Largest group.

Larvae onisciform.

LARVAL FOOD PLANTS: Very variable. Crassulaceae, Fabaceae, Primulaceae, Rutaceae. Many are aphytophagus and are tended by ants and homopterans. Others may be saprophagus or cannibalistic.

SUBFAMILY - RIODININAE

DIAGNOSTIC CHARACTERS: Male prothoracic legs less than one half the length of pterothoracic legs, with the tarsi unsegmented and rarely and barely clawed. 15 species are met with in Sikkim.

Larvae usually onisciform, broadest in the middle and tapering at both the ends with a clothing of short hair.

LARVAL FOOD PLANTS: Asteraceae, Fabaceae, Myrtaceae.

FAMILY - NYMPHALIDAE

DIAGNOSTIC CHARACTERS: Male fore legs always reduced and clawless; pupa not fastened by a silk girdle, usually suspended from cremaster; most antennal segments with two ventral grooves. Totally 14 subfamilies are known, of which 10 are found in the Indian region. Of the total number of species of butterflies found in the world.

one-third are nymphalids.

SUBFAMILY - AMATHUSIINAE

DIAGNOSTIC CHARACTERS: HW cell open, precostal cell absent; palpi large and broad, rounded in front; FW cell usually open. About 80 species are known from Indo-Australian tropics.

Larvae smooth but distinctly hairy; the tail is bifid and head capsule armed with horns although not in the *Discophora* species.

LARVAL FOOD PLANTS: Arecaceae, Musaceae, Poaceae and Smilacinaceae.

SUBFAMILY - SATYRINAE

DIAGNOSTIC CHARACTERS: FW Usually at least one vein swollen basally; HW always closed by a tubular vein, precostal cell absent (except in *Elymnias*); palpi small, narrow and sharp in front. About 1,500 species found around the world.

Larvae smooth with bifid tail, head capsule occasionally armed with horns.

LARVAL FOOD PLANTS: Arecaceae, Cyperaceae and Poaceae.

SUBFAMILY - CALINAGINAE

DIAGNOSTIC CHARACTERS: Thorax clothed in part with orange or red hairs. Only single genus known, in the Sino- Himalayan region.

Larvae smooth and thinly pilose; head capsule armed with a pair of prominent horns; tail weakly bifid.

LARVAL FOOD PLANTS: Moraceae.

SUBFAMILY - CHARAXINAE

DIAGNOSTIC CHARACTERS: FW veins not swollen basally; HW cell not closed by tubular vein. About 300-400 species occur throughout the tropics.

LARVAL FOOD PLANTS: Leguminosae

SUBFAMILY - APATURINAE

DIAGNOSTIC CHARACTERS: Sexes are dimorphic; generally with bright shiny gloss.

Larvae cylindrical but not regularly spinose; head capsule usually armed with horns and tail bifid.

LARVAL FOOD PLANTS: Urticaceae and *Quercus* (Cupliferaceae).

SUBFAMILY - NYMPHALINAE

DIAGNOSTIC CHARACTERS: Male tarsal claws simple and developed for walking; females lack odoriferous glands between 8th and 9th segments; FW vein 1a usually not free at the base. About 3,000 species are known world-wide.

Larvae generally cylindrical and spinose.

In the tribe Marpesini, only median spines are present.

In Nymphalini, with complete and well-developed row of median dorsal spines together with lateral spines.

In Ergolini, fully developed lateral spines with median dorsal series reduced or absent except towards head and tail.

In Argynnini and Limentini, lateral spines only present and the median and dorsal spines totally absent.

LARVAL FOOD PLANTS: Acanthaceae, Asteraceae, Euphorbiaceae, Flacourtiaceae, Moraceae, Plantaginaceae, Sapindaceae, Scrophulariaceae, Ulmaceae, Urticaceae, Verbanaceae and Violaceae.

SUBFAMILY - HELICONIINAE

DIAGNOSTIC CHARACTERS: Females with odoriferous glands between abdominal 8th and 9th segments; tarsal claws simple and symmetrical; male HW upperside androconia always present along two or more veins. It has been suggested recently that from the Old World, *Cethosia* and *Vindula* be placed in this family as they are Passifloraceae feeders.

Larvae are spinose with six rows of long longitudinal spines, each adorned with stiff bristles; head is similarly armed with a pair of dorsal spines.

LARVAL FOOD PLANTS: Passifloraceae.

SUBFAMILY - ACRAEINAE

DIAGNOSTIC CHARACTERS: Tarsal claws usually toothed or asymmetrical especially, in males; FW vein 3A not fused, especially in males, at the base; HW cell closed by a well-developed tubular vein.

Larvae spinose with six rows of longitudinal bristles; head hairy, lacking spines or horns, and tail simple.

LARVAL FOOD PLANTS: Passifloraceae.

SUBFAMILY - DANAINAE

DIAGNOSTIC CHARACTERS: Males with abdominal hair pencils; female protarsus four-segmented, ankylosed and strongly clubbed; FW vein 3A free at the base; antennae naked. About 150 species in the world, of which 15 species are known from Sikkim. Found mostly in the tropical belt.

Larvae are bare, smooth, and conspicuously patterned, lacking both head ornament and a bifid tail. Dorsally with between one and nine segmental pairs of fleshy tubercles.

LARVAL FOOD PLANTS: Apocyanaceae, Asclepiadiaceae and Moraceae.

SUBFAMILY - LIBYTHEINAE

DIAGNOSTIC CHARACTERS: Characteristic long labial palpi. Ten species found in the world, of which two found in India and Sikkim.

Larvae smooth and do not have bifid tail and capsule ornamentation.

LARVAL FOOD PLANTS: Ulmaceae.

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- Pamassinae 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.

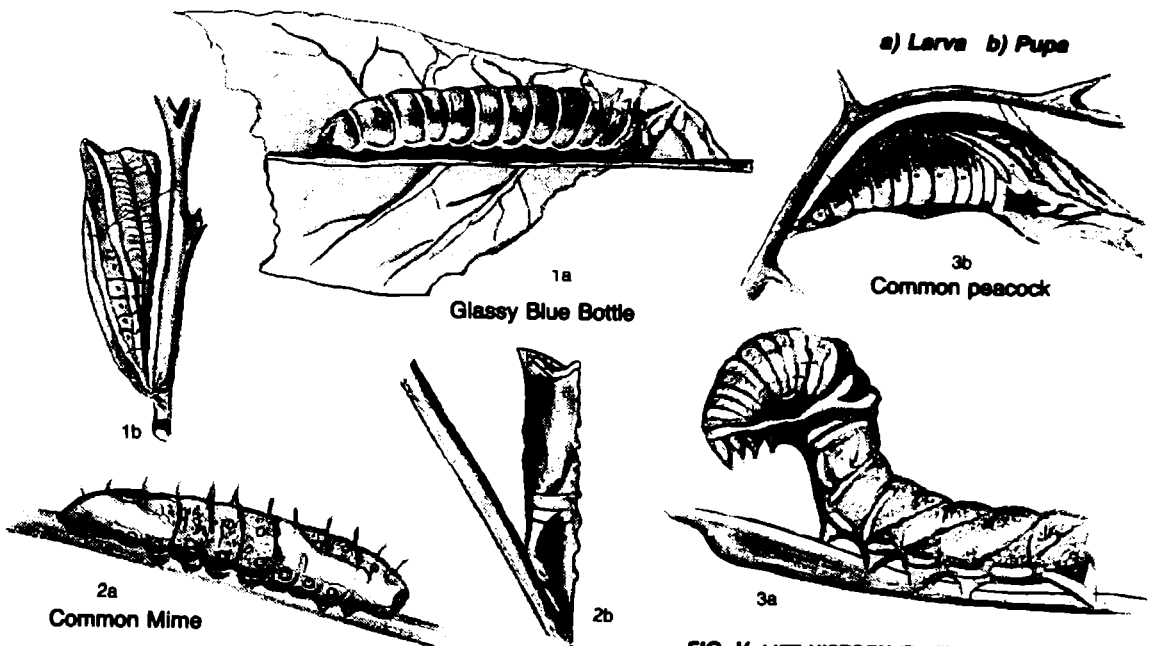


FIG. V LIFE HISTORY (Papilionidae)

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 palaearctic 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 they 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 Grun-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 toral 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 danaids.

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.

Larva after hatching eats up most of the egg-shell, leaving disc on the leaf. Even though the eggs are laid on mature leaves larva feeds on young purple leaves. It keeps to the upperside of the leaf and when not feeding it rests on a silk pad spun on the leaf. It avoids direct sunshine. Duration of larval stage is about 50 days. **Pupa** resembles *Graphium* sp. It has a smooth head and a prominent dorsal horn; the mesothorax is green in colour and has broad yellow dorsal zones on the abdomen (Igarashi. 1987).
LARVAL FOOD PLANTS - *Magnolia campbelli* (Magnoliaceae).

009 BROWN GORGON

Meandrusa gyas gyas (Westwood) 1841

010 YELLOW GORGON

Plate No. 10

Meandrusa payeni evan (Doubleday) 1845

SK-NB SK-AS 2,3

WS- 110-130mm.

M UP ground colour orangish-yellow with darker shade towards the base of the FW. UPF dark brown spotted margin and discal band. UPH is also spotted near tornus with double row of spots. Apex of FW strongly produced; HW tailed. **F** paler and smaller with darker markings.

Occurs at medium elevations in thickly forested areas. Visits damp soil patches and flowers.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - Lauraceae.

SWORDTAILS

As the name suggests, the hind-wing is produced to form a sword-like tail. These are generally black and white butterflies, a few of them with a bluish tinge. They generally have red or yellow spots on the UNH. They keep to the lower hot valleys, though some of them are found up to 2,800 m. These butterflies remain in the open scrub and visit some species of low-growing flowers. They also come to damp patches, where sometimes a large congregation of males are also seen.

The larval food plants belong to the families Annonaceae and Lauraceae.

012 SIXBAR SWORDTAIL

Pazala eurous sikkimica (Heron) 1899

KA-AS WN-AS 1,2

WS- 60-70mm.

Similar to the Spectacle Swordtail (013).

UPF six bars in the cell including the double bar end-cell. Post discal band does not reach the tornus. Outer band lunular, the lunules facing inward. UNH marginal black bands, a complete row of central pale spots, of which tornal ones are yellow.

These are found in open places in forested area between 1,000-2,800 m. Males generally have a territory, and fly high among tree-tops and also rest there; sometimes a large congregation could be seen on tree tops. Females fly close to the ground, particularly around food plants.

LIFE HISTORY - **Egg** not described. **Larva** green, dotted with black, yellow transverse band, and each thoracic segment with a pair of black spines. The anal processes are yellow with black tip. **Pupa** is slender, green with four yellow lines.

LARVAL FOOD PLANTS - *Persea odoratissima*, *Michelia doltoSPA*.

013 SPECTACLE SWORDTAIL

Plate No. 11

Pazala mandarinus paphus (De Niceville) 1886

SK-NB 1,2

WS- 65-75mm.

Similar to the preceding species but UPF margin greyish. Post discal bands consists of narrow outer margin, less crenulated and inner margin split into two near apex. UNH central pale spot in 1,2, end-cell and in 7 not complete. M with no scent wool. **Yellow tornal spot with a black spot surrounded by blue lunule.**

Habits similar to those of the Spot Swordtail. Recorded from Sikkim between 1,000-1800 m. in April and May.

014 CHAIN SWORDTAIL

Plate No. 11

Pathysa aristus anticrates (Doubleday) 1846

SK-BU SK-AS 1,2

WS- 75-90mm.

Very similar to the Spot Swordtail (017).

UPF **the submarginal row is chained line instead of rounded spots**. M with woolly scent fold.

Habits similar to those of the Spot Swordtail.

015 FIVEBAR SWORDTAIL

Plate No. 11

Pathysa antiphates pompilius (Fabricius) 1787

SL,SI,SK-BU,AN EN-BU 1,2

WS- 80-95mm.

UP cream coloured, with **FW five bars in the cell, including the bar end-cell**, of which **fourth from the base is only half across the cell**. The post discal band joins the marginal band at three. UNH a row of yellow discal spots and row of irregular central and marginal and submarginal black spots.

A butterfly of evergreen jungles, it has a quick and graceful flight. It circles rapidly around tree-tops in the sunshine. Fond of visiting damp patches and flowers. Occurs at low elevations. Recorded to be common in Sikkim, by earlier observer. But so far I have not come across any of the swordtails.

LIFE HISTORY - **Egg** is laid singly on the upperside of the fresh leaf or shoot. **Larva** transparent olive-green, speckled thinly with white on dorsum of segments 5 to 14 with dorsal and lateral white and dark lines. Lateral part of segments 3 and 4 reddish black. **Pupa** is bright green, with yellow lines and brown markings.

LARVAL FOOD PLANTS - *Michelia doltoSPA*, *Annona* sp. and *Uvaria* sp.

016 FOURBAR SWORDTAIL

Plate No. 11

Pathysa agetes agetes (Westwood) 1843

SK-BU SK-NB 1,2 NR

WS- 75-90mm.

UP, pale creamish or white, **UPF with four bars in the cell including bar end-cell**. Margin and outer discal black band enclose a pale triangular area. UNH with red tornal spots which continue irregularly from central band. M with cottony scent wool in the dorsal fold.

Butterfly of low elevations in the forested hilly regions. The males visit or congregate on moist sand and damp patches. Found in Sikkim from 900-1,200 m.

017 SPOT SWORDTAIL

Plate No. 11

Pathysa nomius nomius (Esper) 1785-98

SL,SI,EI-SK,AS-BU SI, WN-SK 1,2

WS- 75-90mm.

Similar to the Fivebar Swordtail (015) and Chain Swordtail(014).

UP bluish white with broad black margin on the FW, submarginal rounded bluish spots. **Cell has five broad bars including bar end- cell, of which basal one reaches V1 and 2nd reaches the dorsum.**

HW has submarginal bluish lunules. UNH complete row of red spots.

Locally common, shy and wary. Flies close to the ground, often settles on a dry twig with closed wings. Flight dodging and fast, particularly when disturbed. Visits damp patches and flowers. Found generally in forested areas, among bushes with lesser secondary growth.

LIFE HISTORY - **Egg** has not been described. **Larva** is usually black with white transverse stripes and underside green; anterior and posterior segments yellowish; a pair of spines on each thoracic and anal segments. **Pupa** earth coloured and not formed on the food plant but under stones, in crevices and under the roots of trees.

LARVAL FOOD PLANTS - *Miliusa tomentosum*, *Polyalthia longifolia* (Annonaceae).

ZEBRAS

These butterflies mimic danaids. They are found from Kumaon to Burma. Three species are known from Sikkim. Generally found at the lower elevations where their models also fly. The males have scent wools in the dorsal folds. So far their larval food plant has not been recorded from India.

018 GREAT ZEBRA

Plate No. 11

Pathysa xenocles phrontis (De Niceville) 1897

SK-BU EN-SK 1,2

WS- 85-120mm.

Mimics danaids, particularly the Glassy Tiger (512).

Also similar to the Circe and the Courtesans.

No tail. UP brownish black with pale stripes and spots. **UPH large tornal yellow spot. UPF basal streak in the cell continuous.**

Found at low elevations. Males congregate at damp patches. Females solitary and visit flowers. Sits with wings closed when at rest. Two specimens were seen in Tholung valley.

019 LESSER ZEBRA

Plate No. 11

Pathysa macareus indicus (Rothschild) 1895

SK-TA EN-SK 1,2

WS- 80-100mm.

Similar to the Great Zebra. **UPH submarginal spots 1 to 4 are lunular or crescent shaped. M UNH submarginal spots in 2 and 3 are lunular, others irregular spots. UPF the basal streak in the cell is broken into three spots.**

Habits similar to those of the genus. A few individuals were seen in Namprikdang and Tholung valley.

020 SPOTTED ZEBRA

Pathysa megarus megarus (Westwood) 1845

BLUEBOTTLES AND JAYS

These are black butterflies with greenish, bluish or yellowish discal bands and spots. Most of them have tails. All of them have red spots on the UNH. Jays are extremely similar looking butterflies and are identified by the extent of red marks on the underside.

Males, except for the Veined Jay, have scent folds on the hind-wings. In the Himalaya found up to 3,000 m. They are fond of damp patches and rotten fruit and vegetable matter, droppings, decaying caracasses etc. Very fast flying butterflies, stopping only briefly at flowers to feed. They generally hover over the flowers while feeding. The larval food plants belong to the families Annonaceae and Lauraceae.



The Red Apollo feeding on the flowers of *Potentilla*



The Glassy Blue Bottle drinking at a stream



The female of the Great Mormon (Form: *alcanor*)



The Redbreast Basking

The Redbreast sucking salts from the soil

The Paris Peacock basking



PLATE NO. 10

Scale : 5 cm



5 a



5 b



6 a



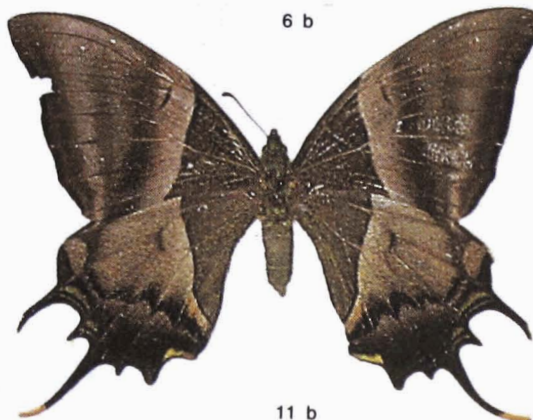
2



6 b



11 a



11 b



8



10

2 Imperial Apollo

5 a Common Blue Apollo UP

5 b Common Blue Apollo UN

6 a Common Red Apollo UP

11 b

6 b Common Red Apollo ♂ UN

8 Bhutan Glory

10 Yellow Gorgon

11 a Kaiser-I-Hind ♂

Kaiser-I-Hind ♀

Scale : 5 cm



PLATE NO. 11



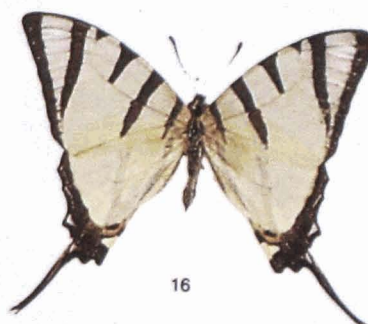
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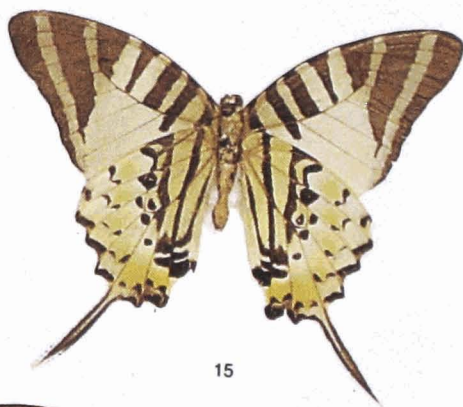
17



14



16



15



23



19



18

- 13 Spectacle Swordtail
14 Chain Swordtail
15 Fivebar Swordtail UN
16 Fourbar Swordtail

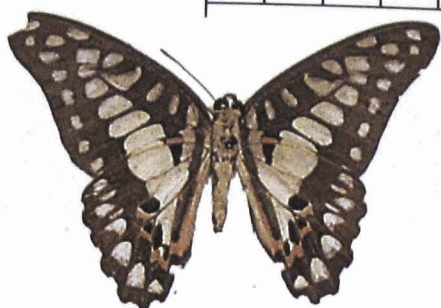
- 17 Spot Swordtail
18 Great Zebra
19 Lesser Zebra
23 Tailed Jay UP

PLATE NO. 12

Scale : 5 cm



26 a



26 b



24 a



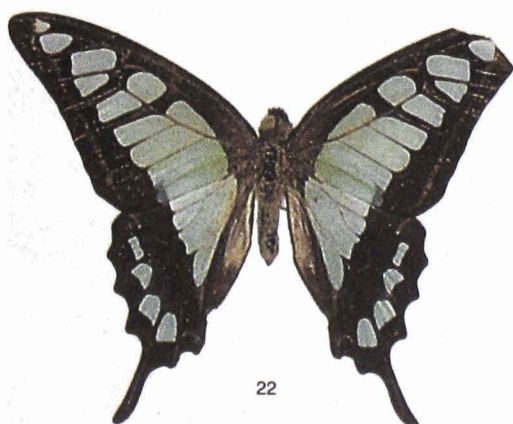
25



24 b



23



22



21

21 Common Bluebottle

22 Glassy Bluebottle

23 Tailed Jay UN

24 a Veined Jay UP

24 b Veined Jay UN

25 Great Jay UN

26 a Common Jay UP

26 b Common Jay UN

Scale : 5 cm



PLATE NO. 13



31



32



28



29



34



36

- 28 Rose Windmill
29 Common Windmill
31 Lesser Batwing ♂

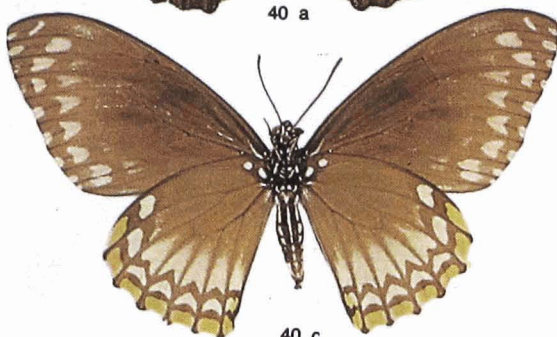
- 32 Common Batwing ♂
34 Crimson Rose
36 Common Birdwing ♂



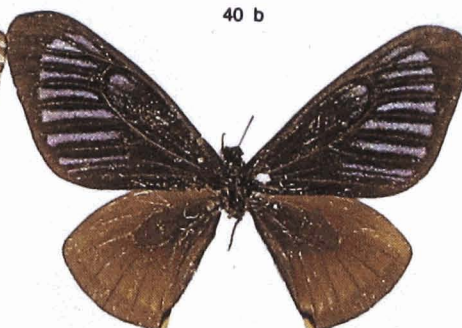
40 a



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



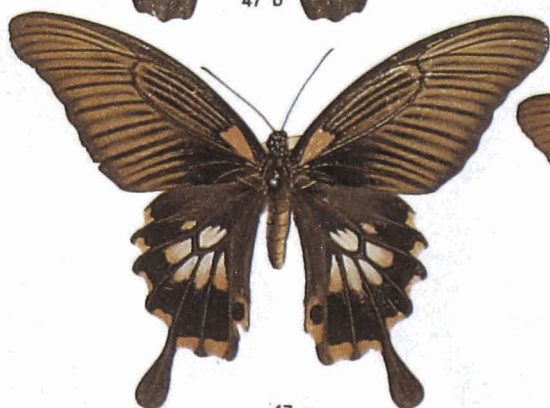
47 a



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

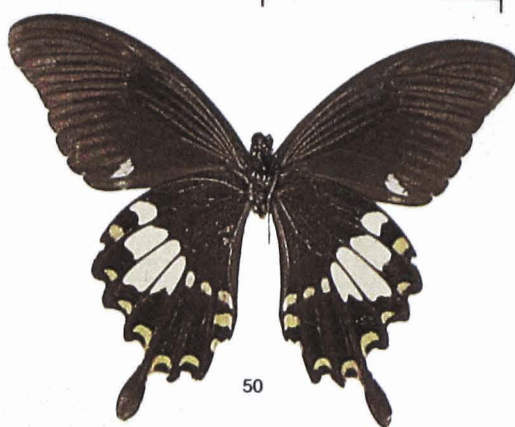
48 a Common Mormon ♂ UP

PLATE NO. 16

Scale : 5 cm



49



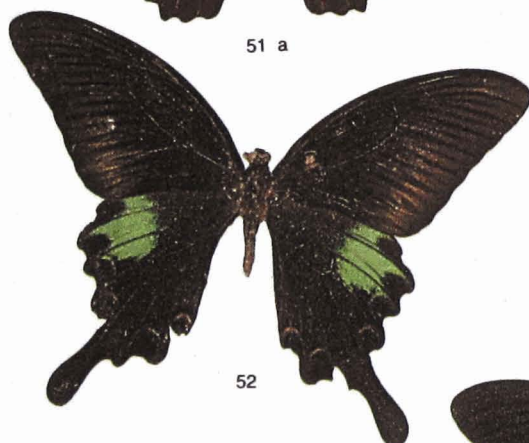
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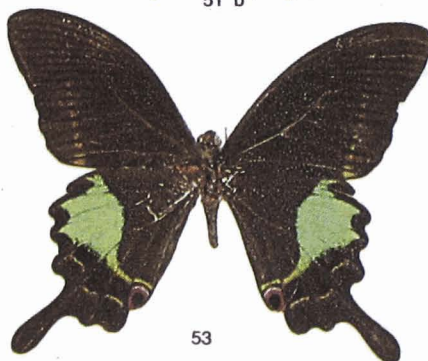
51 a



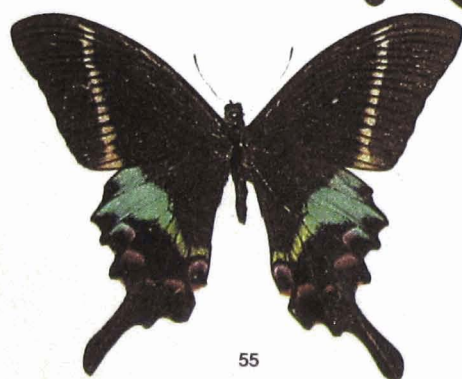
51 b



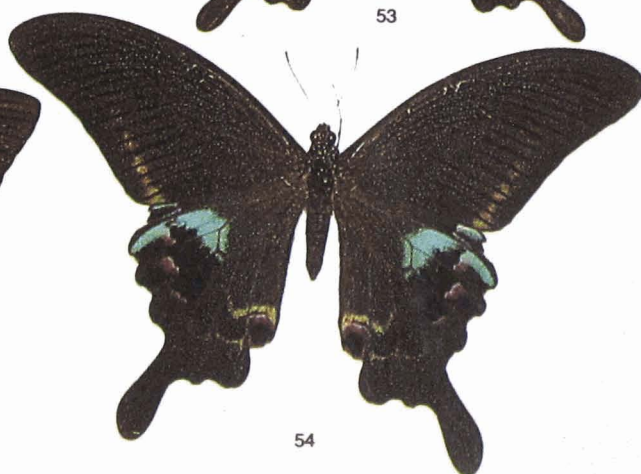
52



53



55



54

- 49 Red Helen
50 Yellow Helen UN
51 a Common Raven ♂
51 b Common Raven ♀

- 52 Common Peacock
53 Paris Peacock
54 Blue Peacock
55 Krishna Peacock

021 COMMON BLUEBOTTLE

Plate No. 12

Graphium sarpedon sarpedon (Linnaeus) 1758

SL,SI,KA-BU KA-BU 1,2

WS- 80-90mm.

UP black, with bluish discal band running across both the wings. **UPF no submarginal spots and no spot in the cell.** UPH submarginal spots are lunular and not complete towards the apex. UNH the lunules are black edged outwardly and red spots are black centred. In the Sikkim subspecies, the median vein on the UPH is mostly white and tail short.

Butterfly of the forested region, found along the forest paths and clearings. Strong flier, flight is typical skipping. Very restless, visits flowers but never sits on them, only hovers over. Visits flowers of *Lantana* and *Buddleia*. Settles on damp patches and animal droppings and carcasses. Territorial insect, beats up and down the path in its territory. Rests with wings closed. Hardly ever seen basking. In Himalaya found up to 2,000 m. In Sikkim I have sightings from Mangan, Sankalang, Legship and Rangpo.

LIFE HISTORY - Egg not described. **Larva** when young is black or dark green, with numerous spines; when full grown, it is green with a pair of short spines on each thoracic segment and anal segment. Also has a transverse yellow bands. Larva lies on the centre of a leaf on the upper surface, is very sluggish and pupates near its feeding spot. **Pupa** green in colour.

LARVAL FOOD PLANTS - *Polyalthia longifolia*, *Miliusa tomentosum*, *Michelia doltoSPA* and other Annonaceae plants.

022 GLASSY BLUEBOTTLE

Plate No. 9 & 12

Graphium cloanthus (Westwood) 1841

KA-BU 1,2

WS- 85-95mm.

Similar to the preceding species but the **band is transparent, broad and enters the cell of UPF**; tail is longer. UNH basal red spots are black centered.

Common at low elevations up to 1,500 m, but also recorded as high as 2,800 m. Visits damp patches, where males can be seen congregating. Flight is rapid; often circles on top of trees and also has the habit of hill topping. I have come across this species in the Teesta and Rangeet valleys; often in the Gharwal Himalaya too.

LIFE HISTORY - (Fig.V.1). **Egg** not described. **Larva** is green, the 13th segment is transparent bluish green. Yellow subdorsal and white subapicular lines. Head is yellow-green with two tubercles, black in front and white posteriorly. **Pupa** bright green with yellow carinae

LARVAL FOOD PLANTS - *Miliusa* sp., *Michelia* sp.

023 TAILED JAY

Plate No. 11 & 12

Graphium agammemnon agammemnon (Linnaeus) 1758

SL,SI,KU-BU KU-BU 1,2

WS- 85-100mm.

UP, **blackish brown with green spots.** UPF double row of spots in the cell. HW prominently tailed but in the Sikkim subspecies the tail is shorter. **UN pale brown with black and red spots on the HW. M** with scent wool in the dorsal fold.

Very common butterfly at low elevations. Very fast flying, visits flowers particularly of *Lantana*, *Poinsettia* etc. But never settles there on but only hovers around. Seldom comes to damp patches. Females fly around the food plants. WB writes the butterfly keeps mainly to the wooded country, where rainfall is heavy, but nowadays it is very common in most urban areas, possibly because its food plant, *Polyalthia longifolia*, has become a very common garden and avenue plant in most cities.

LIFE HISTORY - Egg pale yellow and smooth and generally laid singly on the underside of the leaves. **Larva** when young dark yellowish green with a pale yellow band on the middle of the abdomen. Fully adult larva is fusciform, green in colour with minute black spots and a pair of osmeterium and black spines on each thoracic segments, the third pair being orange-yellow; also anal spines lighter, with

black tips. **Pupa** green or brownish, generally on the underside of the leaves and sometimes on the upperside of the leaves, attached by a body girdle.

I have reared several of these insects, and made one interesting observation. Although it feeds on various food plants of the family Annonaceae, larva collected from one plant refused to feed on the other species, even when they were starved.

LARVAL FOOD PLANTS - *Polyalthia longifolia* (Annonaceae), *Michelia doltoospa*, *Annona squamosa* (Magnoliaceae).

024 VEINED JAY

Plate No. 12

Graphium bathycles chiron (Wallace) 1845

SK-BU SK-BU 1,2

WS- 75-100mm.

UPF with row of submarginal green spots, without tail on the HW. UNH with a dark basal costal bar continued to the origin of V7. **Discal veins black**. UPH cell pale, UNH with a costal bar, the spot internal to it is pale yellow. UNH always a white stripe behind the cell. **UNH discal spots orange** and not red. **M** without scent fold.

Keeps to forested areas. Not very powerful on wing. Seen up to 800 m. In Sikkim it may be found only in lower Rangpo and Rangeet valleys.

025 GREAT JAY

Plate No. 12

Graphium eurypylus cheronus (Fruhstorfer) 1903

SK-BU,AN SK-BU 1,2

WS- 85-90mm.

Similar to the Common and Lesser Jays, but the discal band is broader at the center, always **two spots in 1b of UPF**. UNF the submarginal spots increase towards apex and the inner margin forming straight line. **UNH costal bar joined to the dark basal band. Extreme end-cell spot red.**

Habits are similar to those of others of the group.

LIFE HISTORY - The **Larva** and **Pupa** are very similar to that of *G. doson*.

LARVAL FOOD PLANTS - As for the following species.

026 COMMON JAY

Plate No. 12

Graphium doson axion (Felder, C., and R.) 1864

SL,SI-EI,KU-BU KU-BU 1,2

WS- 70-80mm.

Similar to the preceding two species. The spots are bluish green and transparent discal band is narrower. **UNF the submarginal spots are of irregular shapes and increase in size towards the apex irregularly. UNH the red centred costal bar does not join the dark basal bar.**

Found in the forested areas up to 1,200 m. Visits flowers and damp patches where it may be seen in large congregations, with other butterflies.

LIFE HISTORY - **Egg** not described. **Larva** is black or white with no spine on mesonotum and those of 3 are reduced to tubercles. **Pupa** varies according to the back ground.

LARVAL FOOD PLANTS - *Cinnamomum* sp., *Polyalthia* sp., *Trachelospermum asiaticum*, *Magnolia grandiflora*, *Magnolia pumila*, *Polyalthia longifolia*, *Hunteria zeylanica* etc.

RED BODIED SWALLOWTAILS

Batwings, Windmills, Clubtails and Roses belong to this group of butterflies. Except for Batwings, all are tailed; some like the Clubtails have spatulate tail with red tips. These are generally butterflies of

moderate altitudes and found between 600-2,000 m, in the hot moist broad-leaved forests. They have a red body; wings are black with white patterns and generally have red or white lunules, except in Batwings.

They fly around in forested areas. They visit damp patches and flowers of various species. Most of them have scent folds on the dorsal side of the hindwings. The larvae feed on the plants belonging to the family of Aristolochiaceae and store aristolochic acids which are deterrents to predators. Many other Swallowtails, like the Fs of the Great Mormon, mimic these butterflies

027 PEMBERTON'S WINDMILL

Atrophaneura plutonius pembertoni (Moore) 1902

WN-BU 1,2 R

028 ROSE WINDMILL

Plate No. 13

Atrophaneura latreillei (Donovan) 1805

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

WS- 110-130mm.

Similar to the Common Rose (033) and F the Common Mormon (048).

Large black and white butterfly, tailed prominently. Red body, tail tipped with red. **UPH white discal spots from 2 to 4 in M and F has an additional small spot in 5 and only half way to 6.** HW submarginal red lunules.

Males have been recorded by Sanders to be common between 1,500 m-2,000 m around Chungthang in May and June.

LIFE HISTORY - Egg not described. Larva is pale purple- brown with shining black head. Has pairs of tubercles up to segment 6, and from 7-10 each has 6 tubercles and 11-13 each with four short tubercles. Tubercles are purple black and streaked at the base and red tipped. Segments 7 and 8 are with broad white oblique band. Pupa is reddish-ochreous, broad laterally, attached by a body band. The pupa emits a squeaking noise when touched.

LARVAL FOOD PLANTS - *Nepenthes* sp.

029 COMMON WINDMILL

Plate No. 13

Atrophaneura polyeuctes (Doubleday) 1842

KA-BU SK-BU 2,3 R

WS- 100-120mm.

Red body, tail red tipped. **UPH red submarginal spots irregular.** Large discal spot in 5 and sometimes in 4 also. **UNH three red spots in 1a, 2, 3 and a small white spot in 4** which is seen from above also.

Flies quite high above the trees in leisurely manner in the river valleys. Visits flowers of *Clematis*, *Rhododendron* and *Lantana*. A day flying moth, *Epicopa polydorus*, also flies at the same time and in the same region, manner and habitat as that of the Common Windmill.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Aristolochia griffithi* and *Aristolochia shimadai*.

030 GREAT WINDMILL

Atrophaneura dasarada dasarada (Moore) 1857

KA-BU SK-AS 1,2,3 NR

WS- 100-140mm.

Similar to the preceding species but **UPH submarginal spot in 4 is mostly white, some times spots in 2 and 3 are white edged.** Large spot in 5 and very rarely a spot in 6. Several varieties occur in Sikkim.

Habits similar to those of the Common Windmill. Seen in the Teesta Valley around Chungthang, the Rangpo Valley.

LIFE HISTORY - **Egg** not described. **Larva** is dark grey to creamy white, marbled with oblique blackish lines. Two lateral and two subdorsal rows of fleshy tubercles and an additional pair on segments 3 and 4. Tubercles are all red tipped except for those on 7, 8, and 11 are creamy white. The segments 7 and 8 are almost entirely creamy white. Osmeterium orange. **Pupa** is greenish yellowish, with lilacine stripes, an orange protuberance on the back. Attaches itself vertically with a black silken body and anal pad.

LARVAL FOOD PLANTS - *Aristolochia griffithi*.

031 LESSER BATWING

Plate No. 13

Atrophaneura aidoneus (Doubleday) 1845

GH-SS 1,2 NR

WS- 112-162mm.

Similar to the following species but the **scent fold square and white patch is small**. **F** is shining black, abdomen red striped and head red. Pale area near the tornus of UPF and stripes dusted over and suffused.

Habits similar to those of the following species.

032 COMMON BATWING

Plate No. 13

Atrophaneura varuna astorion (Westwood) 1842

KU-BU KU-TA 1,2 NR

WS- 88-136mm.

M UP bluish black unmarked, **UPH dorsal scent fold is rounded and lower half of the scent area white when the fold is opened**. UPF pale streaks in the cell. **F**, UP brown, **abdomen broad white striped at the sides and head pinkish**.

Butterfly of hot lower forested valley. Flies very leisurely above trees in the river valleys. At least in Rangpo I felt they were territorial. Both sexes are very fond of Lantana flowers.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Aristolochia kaempferi*.

033 COMMON ROSE

Plate No. 5

Pachliopta aristolochiae aristolochiae (Fabricius) 1775

SL,IN,BU,AN,NI IN 1,2 R in S

WS- 80-110mm.

Similar to the female of the Common Mormon and the Rose Windmill.

Red body, tail black. Pale streaks in UPF. **UPH a discal row of white spots from 2 to 5** of which some may be absent and are very **close to cell**. A **submarginal row of red lunules**.

A butterfly of lower elevations and very common in the plains but not very common in Sikkim. It could be observed only in the Lower Rangpo and Rangeet valleys. Also there is a record of it being collected from Senchal.

LIFE HISTORY - **Egg** flat dome shaped orange-red in colour with fine black markings on top, laid singly either on top or on underside of the leaf or on any part of the plant. **Larva** black with rows of red tipped white tubercles. A white band on the middle of the abdomen. **Pupa** brown with various shades of brown and pink markings; attached to the leaf by tail and a body girdle.

LARVAL FOOD PLANTS - *Aristolochia tagala*, *Aristolochia indica* and *Aristolochia griffithi* of which the latter is found up to 1600 m in Sikkim.

034 CRIMSON ROSE

Plate No. 13

Pachliopta hector (Linnaeus) 1758

SL,SI-EI 1,2 S

035 **GOLDEN BIRDWING***Triodes aeacus* (C. & R. Felder) 1860

MU-BU 1,2 NR

WS- 120-190mm.

Very similar to the following species, but yellow is brighter. **UPH with prominent black suffusion internal to the marginal spots in 2 to 4. F base in space 1b of HW black.**

Habits are similar to the following species. It is difficult to distinguish them in flight unless they are at very close range.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Aristolochia griffithi*.

036 **COMMON BIRDWING**

Plate No. 13

Troides helena cereberus (C. & R. Felder) 1865

SL,SI,EG,CN-BU CN-BU 1,2 NR

WS- 140-190mm.

Large black and golden yellow butterfly. **UPH no black suffusion internal to the marginal spots, space in 1b black, mid cell mostly black.**

One of the most beautiful butterflies of India. It is unmistakable even from a long distance. Seen in heavily forested valleys and nullahs. Both sexes visit flowers; particularly fond of *Lantana*. They feed early in the mornings and late in the evenings and during the rest of the day fly lazily above tops of the trees or rest with wings closed.

Because of its beauty it has become a coveted item for collectors. In Papua New Guinea, some of these species are farmed for selling to collectors. In Sikkim seen around Rhenok feeding on *Lantana* flowers, also around Singtam and Middle camp.

LIFE HISTORY - **Egg** is laid singly on the upperside of a leaf or on the stem. The butterfly hovers while ovipositing. **Larva** velvety black, marbled with satiny grey or black. Head black. Body consists of subdorsal and subapical tubercles which are red tipped. On segment 7 and 8 is a diagonal rosy white band. Osmeterium orange. Larva lives on the underside of the leaf or on the stem; hardly on the upperside of the leaf. Larvae are often attacked by Brancoid flies, which lay eggs in the larvae. **Pupa** pink-brown or green with saddle and back of abdomen orange or yellow. The whole surface is reticulated with brown.

LARVAL FOOD PLANTS - *Aristolochia tagala*, *A. griffithi* and *Thottea seliquoia*.

MIMES

Mimes are mimics of danais both in appearance and flight. Due to this they are overlooked and do not get recorded. They are found in lower valleys. Only one species occurs in south India.

037 **BLUE STRIPED MIME**

Plate No. 14

Chilasa slateri slateri (Hewitson) 1859

SK-BU WN-NB 1,2 NR

WS- 100-120mm.

Very similar to the Blue crows and the Palmflies.

UP blackish FW with pale blue stripes and **HW chestnut with a row of submarginal lunular spots, a row of a small post discal spots and a irregular row of narrow streaks.** In the Sikkim subspecies, post discal row of spots incomplete or obsolete.

Seen between 1,000-2,200 m. It has been recorded only in April. Found in the clearings of Oak forests. Flies slowly about 3-5 m high; every now and then settles for short spells on the ground. Displays territorial behaviour; beats up and down the paths of an area for long periods, aggressively attacking any intruders. Does not visit flowers.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Cinnamomum camphora*, *Cinnamomum inaris*, *Litsea* sp.

038 LESSER MIME

Plate No. 14

Chilasa epycides epycides (Hewitson) 1862-66

WN-BU SK-NB 1,2 NR

WS- 70-90mm.

Similar to the Glassy Tiger (512).

UP brownish with pale stripes. UPF apical spots drawn inwardly and are diffused. UPF no black bar across the cell. **UPH a prominent yellow tornal spot.**

A few individuals were seen in Mangan and Tholung Valley feeding on flowers of *Citrus* sp. In Sikkim recorded up to 1200 m, in March and April.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Cinnamomum camphora*, *Persea thunbergii*.

039 TAWNY MIME

Plate No. 14

Chilasa agestor agestor (Gray) 1832

KA-DA SK-DA 2,3 NR

WS- 83-120mm.

Similar to the Chestnut Tiger and the Circe.

UP, FW black and pale bluish stripes very similar to that of the Chestnut Tiger. **HW** also similar but has **submarginal lunules** instead of spots. **UPF a black bar across the cell near the apex.**

Sails atop bushes without flapping the wings and returns again and again to its resting-perch even when disturbed several times from that spot. One individual was seen near Linza in Tholung Valley beating up and down the path, through out the day but not seen in the same area after two days. It was inspecting any flying objects which passed its territory, including us. Found in light woods. Emerges in spring; hibernates in pupal stage.

LIFE HISTORY - **Egg** is laid on the young leaves of *Persea odoratissima*. **Larva** is blackish brown, with two rows of subdorsal and two lateral rows of spines, each with a spot of red at its base, anterior and middle and posterior lateral patches of dull ochreous and the rest of the larva is black with red. The young larva is reddish, soon turning black and white. It lies on the upperside of a leaf and resembles bird's dropping. **Pupa** very similar to that of the Common Mime.

LARVAL FOOD PLANTS - *Persea odoratissima* (Michaliaceae).

040 COMMON MIME

Plate No. 14

Chilasa clytia clytia (Linnaeus) 1758

SL,SI,NW,NE-BU,AN NE-BU 1,2,3 NR

WS- 90-120mm.

Dimorphic forms.

Typical form *clytia*: UP brown with white submarginal and antemarginal spots; **tornal black centred yellow spot**. **UNH a discal series of spots which are diffused inwardly, marginal spots are large and yellow** in the Sikkim subspecies. Resembles the Crows.

Form *dissimilima*: UP on black background pale yellowish blue stripes. **UNH marginal yellow lunular spots, which are outwardly white edged.**

Flight and habits are very similar to those of the Common Crow and the Blue Tiger; also found in same area as their models, but uncommon. Visits flowers, damp patches. When resting sits with wings closed. When disturbed might fly fast and settle among the trees. They sit with their wings wide open while feeding on flowers and they also bask.

LIFE HISTORY - (Fig.V.2). **Egg** is waxy looking, orange- yellow, spherical in shape and often somewhat uneven on the surface. **Larva** is velvety black or dark green, with carmine circular spots. Cream coloured band from 3 to 7 and on segments 11 to 14. Two rows of sharp spines on segments 1 to 4 and a single row on the others. Osmeterium is light watery indigo-blue. The young larvae are often attacked

by spiders. **Pupa** resembles a broken branch and fixes itself exactly in the same manner at the tip of a branch.

LARVAL FOOD PLANT - *Alseodaphne semicarpifolia*, *Cinnamomum zeylanicum*, *Litsea deccanensis*, *Litsea sebifera* (Lauraceae).

041 YELLOW SWALLOWTAIL

Plate No. 14

Papilio machaon sikkimensis (Moore) 1884

BA-BU SK-BH 3,4,5 NR

WS- 75-90mm.

A black and yellow butterfly with tail. UP broad yellow discal band which is away from the cell and UPH large tornal red spot separated from blue lunule by a black line.

A high altitude butterfly, found up to 4,800 m and not recorded below 3,000 m in Sikkim. It haunts alpine meadows, visits low-growing flowers of *Gentian* sp., *Taraxacum* sp., and some other Compositae flowers. Fond of hill-topping and also visits garden flowers. I have not come across this species so far in Sikkim, although there is a series of collections from Thangu and Natula area in museums collected by Everest Expeditions. Sir J.D. Hooker had recorded them as common in the Lohnak and Lachung valleys.

Earlier a large number butterflies of this group of were considered to be subspecies of a single species. However in recent years, (Harish Gaonkar (pers.comm). they are considered to be distinct species.

The plate shows *Papilio machon asiaticus*. Sikkim specimens have shorter tails.

LIFE HISTORY - **Larva** is green with velvety black rings and spotted with fulvous red. The tentacles are red in colour and emit a strongly scented liquid, when alarmed by the predators and parasites like ichenumon flies. **Pupa** is green in colour with dorsal part yellowish-brown and has black tubercles with red tips. The pupa attaches itself to the twig or stem by a body band and anal pad.

LARVAL FOOD PLANTS - *Umbelliferae* : *Dacus carota*, *Heracleum* sp., *Selenium* sp. and *Angelicine* sp.

042 LIME BUTTERFLY

Plate No. 14

Princeps demoleus (Linnaeus) 1758

SL,IN,BU,NE 1,2 NR

WS- 80-100m.

A black and yellow butterfly with a slight tooth on the HW. A broad yellow discal band on both wings. A red spot edged with blue lunule at the tornus. **An ocellus like marking in area 7 of black spot irrorated with blue scales.** UN similar but background is paler.

This butterfly is common throughout India; in the Himalaya found up to 1,200 m. It is a very fast flying butterfly and only hovers briefly to feed on flowers. Visits flowers as well as damp patches. It rests or roosts close to the ground on a stem or a twig. In Sikkim it is fairly common in the lower hot valleys of Rangpo and Teesta.

I have observed its westward migration in Gujarat in Rajpipala forests; several records of it migrating south and east are also available in literature.

It is a minor pest to citrus fruits, particularly attacks young saplings.

LIFE HISTORY - **Egg** spherical and pale yellow in colour. **Larva**, when young is blackish with 'V' spot on the middle of the abdomen. Full-grown larva is yellow-green with a greasy looking white band from segment 5 to the end. Resembles birds dropping in the earlier larval instars. It has flesh coloured osmeterium. Larva lies at the centre of the leaf. **Pupa** is green and brown with shades, if pupated against bark or in the cage. Formed generally on the underside of the leaf or on the twig or branches.

LARVAL FOOD PLANTS - *Citrus* sp

BLACK-BODIED SWALLOWTAILS

This group consists of many beautiful butterflies like Peacocks, Helens and Mormons. Except for some forms of the Great Mormon, Ravens and Red Breasts, all these butterflies are tailed. The forewing is generally black with stripes or irrorations of metallic scales; hindwings have white, yellow or

blue-green discal patches. On the UN of the hindwings there are lunules of red, purple or yellow. Females of this group, except Peacocks, mimic aristolochia feeding butterflies or danais, as do the Ravens. They also may have UNF red spots in basal area or along the inner margin of UNH. They also occupy the same area as red-bodied swallowtails; habits too are similar. The larvae feed on plants of the Rutaceae family.

043 SPANGLE

Plate No. 15

Princeps protenor euprotenor (Fruhstorfer) 1908

KA-NB SK-NB 2,3 NR

WS- 100-140mm.

Tailless black-bodied butterfly. **M UPH white costal streak of specialised scales and tornal black centred red spot**; also has blue scaling. **F** similar but UPH with additional black centred red spot in 2. No white costal stripe. More blue scaling on the disc. **UN the basal red stripe does not reach the base of the HW.**

Primarily a forest butterfly. Flies in a leisurely manner, keeping close to the undergrowth; settles on the leaves every now and then. Fond of damp patches, particularly in the company of its own species. Visits flowers and gardens. This butterfly and the following species and could be easily mistaken for others. In Sikkim I have come across this butterfly in Mangan, Gangtok and Legship.

LIFE HISTORY - Egg not described. **Larva** is green with a spectacle-band on the thorax, black edged band on 4th segment; two oblique bands on abdomen and anal segment is brown mixed with white.

Pupa uniformly green or brown, resembles tree bark.

LARVAL FOOD PLANTS - *Zanthoxylum* sp. and *Citrus* sp.

044 TAILED REDBREAST

Plate No. 5

Princeps janaka (Moore) 1857

GH-BU GH-AB 1,2 NR

045 REDBREAST

Plate No. 9 & 15

Princeps alcmenor (C. & R. Felder) 1864

KU-BU 1,2 NR

WS- 110-130mm.

M tailless, black bodied, with blue scales and tornal ocellus white edged. **UN the red basal markings which on HW continued as a band along the dorsum.** **F** with tail, UP black with white discal patch and prominent series of double red marginal lunules.

Fairly common, but could be mistaken for the Great Mormon in flight. Visits various species of flowers and also moist earth and salt patches. Seen in Mangan, Sethi Khola, the Tholung valley and Legship.

046 BLUE MORMON

Princeps polymnestor (Cramer) 1775

047 GREAT MORMON

Plate No. 9 & 15

Princeps memnon agenor (Linnaeus) 1758

CN-BU,AN,NI 1,2,3 C

WS- 120- 150mm.

UP **M** black with blue scaling, with or without red basal streak in the FW cell. UNH usually red lunules at tornus may be extended by grey or may be extended to costa. **UN red basal markings on both the wings.** Four **F** forms are known from Sikkim.

Females:

Form *butlerianus*: Tailless, similar to male of typical form. Both wings dark sepia, FW with white area on inner margin; HW blue scaled.

Form *alcanor*: tailed, UPF greyish brown with dark veins and streaks between them. **Cell at base red.** Velvety black patches at the bases of 1 and 2. UPH black with part of the cell white and broad white streaks around it. **Tornus red with large black spot.** A row of red terminal spots between the veins. Sides of the abdomen yellow. Similar to the Common Rose.

Form *polymnestoroides*: both **M** and **F** have this form, UPF and UPH short blue discal stripes. **F** UPF sepia with pale grey vein streaks. Base of the cell red. UPH velvety brown with blue discal area and black spots. Similar to the Blue Mormon.

A very common butterfly. Found in open forest glades and also around human habitation. Visits flowers of *Poinsettia*, *Jasminum*, *Lantana*, *Salvia* sp., *Canna* etc. A large number of them can be seen around one bush, feeding along with other Peacocks. Visits damp patches also. They fly about 2-4 m. above the ground. Females are very rare, particularly the forms *butlerianus* and *alcanor*.

I have seen this species almost everywhere up to 1,800 m. I found **F** form *alcanor* more common in Rangpo valley.

LIFE HISTORY - **Larva** green with whitish markings. Resembles the Common Mormon. Larvae are heavily parasitised.

LARVAL FOOD PLANTS - *Fortunella*, *Paramignya scandens*, *Citrus* sp.

048 COMMON MORMON

Plate No. 15

Princeps polytes romulus (Cramer) 1775

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

WS- 90-100mm.

M UP dark blackish brown with HW tailed. **HW also has a yellow discal band, which is continued on the FW as marginal yellow spots.** UN similar to above but the HW also a series of submarginal white lunules and marginal white spots. In between the submarginal and discal band there is an area of blue scalings.

Females mimic the Common Rose and the Crimson Rose. **F** has three well defined forms:

Form *cyrus*: resembles the typical male.

Form *romulus*: mimics the Crimson Rose *P. hector*; the bands on the FW are not well formed and the body is black.

Form *stichius*: resembles the Common Rose *P. aristolochie*.

There are a few more forms very similar to the above forms; in all cases the body is black.

Common in the plains; uncommon in the Himalaya, found up to 1,200 m. In Sikkim, seen up to 1,000 m in Rangpo, Rangeet and Teesta valleys. Habits are similar to those of the others of the group. Early mornings, males are seen basking.

LIFE HISTORY - **Egg** spherical and pale orange in colour; opaque, shiny and smudged with pale brown. **Larva** rich glaucous green, slightly yellowish on the sides; head yellow, with crests on segments 4 and 5 yellow. Two tubercles on segments 2 and 13. White markings and bands on segments 7 to 10. It is a pest to *Murraya koenigii*. **Pupa** olive brown, with brown, green and yellow stripes and spots; abdomen milk-white.

LARVAL FOOD PLANTS - *Citrus* sp., *Murraya paniculata* and *M. koenigii*, *Tripahsia* sp. and *Zanthoxylum* sp..

049 RED HELEN

Plate No. 16

Princeps helenus helenus (Linnaeus) 1758

SL,SI,MU-BU MU-BU 1,2 C

WS- 100-120mm. 50-60mm.

Similar to the Yellow Helen (050) and **M** of the Common Raven (051).

A large black **prominently tailed** butterfly with a **large yellowish white discal patch on the HW. UNH a submarginal row of red lunules.**

A very common butterfly up to 2,100 m; generally found in dense jungles; also seen around human habitations as very often its food plant, *Citrus* is grown in the gardens. Visit various species of flowers. Generally the flight is slow but when disturbed might fly away fast. Early mornings or after heavy

showers they sit and bask with wings widely open or FW slightly drooping so as to cover the white patch either fully or partly.

LIFE HISTORY - **Egg** nearly spherical: orange, blotched with red-brown pigments. Surface shiny and finely dented. Eggs are laid one at a time on the mature leaves, in shady places of heavy jungles. **Larva** grass-green in colour, mottled black and white and smoky grey. Osmeterium is deep flesh coloured. The young larva lies on the mid-rib of the leaf, but a full-grown lies in the centre of the upperside of the leaf, stem or twig. **Pupa** is ordinarily green with yellow saddle and if formed, against bark or in the laboratory it may be variegated with brown and pink, black and grey or white and green without yellow saddle.

LARVAL FOOD PLANTS - *Zanthoxylum acanthopodium*, *Toddalia asiatica*, *Phellodendron*, *Evodia* *Citrus* spp.

050 YELLOW HELEN

Plate No. 16

Princeps nephelus chaon (Westwood) 1845

EI-BU NE-NB 1,2 NR

WS- 115-130mm.

Very similar to the Red Helen, but the **UNH yellow lunules instead of red**, hence the name Yellow Helen. **UPH discal patch extends up to area 4**.

Habits similar to those of the preceding species. Not very common in Sikkim or because of its close resemblance to Red Helen it is often mistaken for the Red Helen which is extremely common.

LIFE HISTORY - Similar to that of the Red Helen.

LARVAL FOOD PLANTS - *Toddalia asiatica*, *Zanthoxylum ailanthoides*, *Zanthoxylum ovalifolium*, *Citrus* sp.

051 COMMON RAVEN

Plate No. 16

Princeps castor polas (Jordan) 1909

SK-BU SK 1,2 NR

WS- 100-130mm.

Similar Euploea sp.

Tailless. M UP very very much like the Yellow Helen. Sometimes it also has a row or submarginal spots. **F** brown **UPF** a row a narrow submarginal lunules and a spot end cell. **UPH** the discal area greyish or cream coloured entering apex of the cell and a row of submarginal lunules.

Habits similar to those of the Red Helen. Not very common.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Glycosmis pentaphylla*.

052 COMMON PEACOCK

Plate No. 16

Princeps polyctor ganesa (Doubleday) 1842

CH-BU WN-NB 1,2 NR

WS- 120-150mm.

UP black with golden green scaling. **UPH a prominent greenish blue discal patch whose inner edge is straight but diffused**. **UPF** narrow discal green band may be present. **UNF** pale discal streaks long and enter cell. **UNH** rows of red submarginal lunules.

Very fast flying butterfly of open forested areas and gardens and disturbed human habitation, in hot valleys up to about 2100 m. Visit flowers of *Poinsettia*, *Lantana* and *Jasminum* etc. Also visit damp patches, hardly settles on flowers, generally hovers for a long time at flowers.

LIFE HISTORY - (Fig. V.3). **Egg** not described. **Larva** green in colour, thorax is thickened with oblique yellowish grey stripes on the abdomen. A white longitudinal line above prolegs. **Pupa** bluish green with brown markings.

LARVAL FOOD PLANTS - *Zanthoxylum armatum*, *Zanthoxylum acanthopodium*, and *Clausena* and *Citrus* spp.

053 **PARIS PEACOCK**

Plate No. 9 & 16

Priniceps paris paris (Linnaeus) 1758

SI, EI-BU EI-BU 1,2,3 C

WS- 90-120mm.

Similar to the preceding species but, **the patches on the HW large and inner edge sharply defined and curved**. UPF green discal band short and narrow or sometimes absent.

Habits similar to those of the preceding sp. Males observed displaying hill-topping behaviour. In Sikkim it is found in the same area as the other species and for a beginner it may be difficult to distinguish it in the field. Seen in Rangpo, Rangeet valleys, Malli Bazaar, Gangtok, Mangan, Penlong La, Dikchu etc.

LIFE HISTORY - Eggs green when freshly laid, but soon becomes blotched with brown-red markings. It is spherical, shiny and superficially pitted. Eggs are laid singly either on the upper or under side of the leaf. Larva is grass-green, speckled with yellow and white and a band from 5 and 6 to anal end. Bell writes that he discovered his first larva after searching for 12 years. Pupa, abdomen light yellowish-green, wing cases glaucous green and dorsal area light green. A broad yellow dorsal band from the cremaster to segments 4 and 5. Pupates well hidden among the over hanging leaves.

LARVAL FOOD PLANTS - *Zanthoxylum ovalifolium*, *Zanthoxylum oxyphyllum*, *Toddalia asiatica*, *Evodia* spp. and *Citrus* spp.

054 **BLUE PEACOCK**

Plate No. 16

Priniceps arcturus arcturus (Westwood) 1842

KA-BU NE-BU 1,2,3,4 NR

WS- 110-130mm.

Similar to preceding two species, but **UPH patch is more bluish and extends into the cell and is produced to the margin, just below the apex**. Marginal red lunules more prominent.

Similar to others but found at higher and cooler areas up to 3,000 m; even recorded at 3,200 m. It is fond of hill-topping. In Sikkim it is thought to be five brooded by earlier observers. The WSF are larger and brilliantly coloured. Uncommon in the higher reaches of the Tholung, Teesta Valleys.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Zanthoxylum armatum*, *Zanthoxylum acathipodium* and *Clausena* sp.

055 **KRISHNA PEACOCK**

Plate No. 16

Priniceps krishna (Moore) 1857

CN-BU CN-BU 2,3 NR

WS- 120-130mm.

Similar to other Peacocks. UPF sharply defined yellow discal band, which is more prominent and broader on the UN. UNH with a prominent curved yellow discal band which appears on **upperside as greenish band running from lower edge of the discal blue patch to the dorsum**. UPH complete series of red mauve capped crescents.

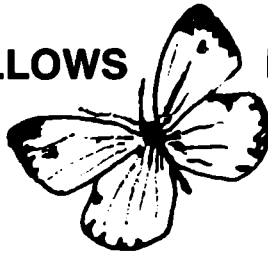
Habits similar to those of the group. Found from 900- 3,000 m. In Sikkim it is not very common. A specimen was collected from Geyzing.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Evodia fraxinifolia*, *Citrus* sp. and *Zanthoxylum* sp.

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 hirsuta*, *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. Hannington.

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.

LIFE HISTORY - Similar to that of the Large Cabbage White (064). Eggs are laid on or near the food plant in groups. But a single egg was laid on a small Cruciferaceae plant with minute white flowers.

LARVAL FOOD PLANTS - Cabbage and cauliflowers. Also Cruciferaceae plants.

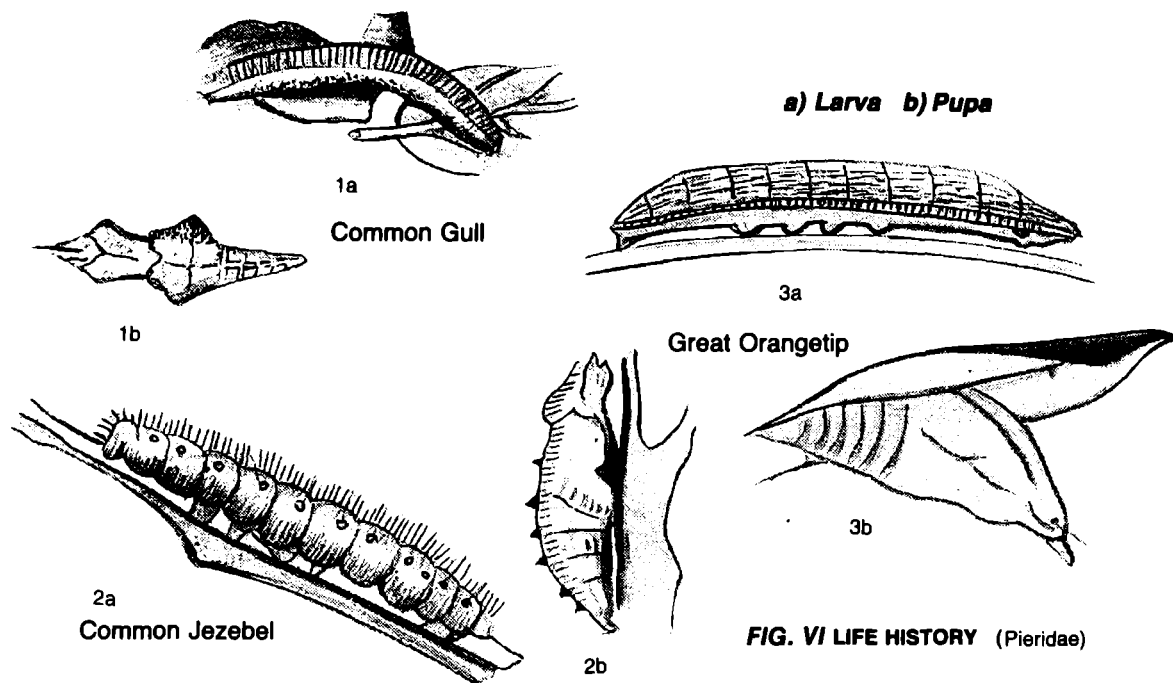


FIG. VI LIFE HISTORY (Pieridae)

064 LARGE CABBAGE WHITE

Plate No. 19

Pieris brassicae nepalensis Gray 1846

BA-HI,TE 1,2,3,4,5

WS- 65-75mm.

Similar to 060.

M, UPF white with black apex and no apical dot on the HW. **F** similar but with two discal spots on FW.

UNH pale yellow.

Habits similar to those of the preceding species.

It is seen from about 1,000 m to 4,000 m. In winter these migrate down to the plains of the adjoining area. Flight of this butterfly is stronger than the others of the genus. I found this butterfly rather uncommon in Sikkim. Mostly seen at higher altitudes.

LIFE HISTORY - **Eggs** are yellow, placed singly or in groups of about 15 to 20. **Larvae** are pale green with slender yellow dorsal line and an interrupted yellow line above each foot. The head, tail and front are entirely green. The body is covered with minute black tubercles arranged in transverse rows. It feeds on the core of cabbages. **Pupa** is greenish-grey yellowish or brownish with often three sulphur lines and some parts of abdomen on the ventral side brownish and wing cases paler.

LARVAL FOOD PLANTS - As for the Indian Cabbage White.

065 SPOTTED SAWTOOTH

Plate No. 19

Prioneris thestylis thestylis (Doubleday) 1842

MU-BU 1,2 NR

WS- 65-80mm.

Mimic of the Hill Jezbel (080).

M UP white with apical black area, which is white streaked or white spotted. **FW** produced and acute angled.

F UP similar to the Hill Jezebel (080) but **with a series of 4 small prominent white spots in oblique line at the end of the cell UPF**. Below HW black with yellow spots as in 080 in WSF but in DSF HW yellow with white vein stripes. Many forms of male and female are known.

Flies in the same areas as its model. Fond of coming to damp patches. Feeds on low-lying flowers. Males show territorial behaviour. If disturbed at one patch will go to next spot and after some time come back again to the earlier spot. Very wary on closer approach. It took me almost half an hour to get one photograph.

LARVAL FOOD PLANTS - *Capparis* sp.

066 REDSPOT SAWTOOTH

Prioneris clemathe clemathe Doubleday 1846

067 PIONEER

Plate No. 19

Anapheis aurota aurota (Fabricius) 1793

SL,IN,NE IN, NE 1,2 NR

WS- 40-55mm.

M white UP; at apex white elongated spots on black background, HW also with white spotted black border. UNF the spots at the apex yellowish and **UNH yellow with black veins**. **F** is similar but veins are darker and thicker. Very characteristic spot is **darkened black discocellular bar which looks like a hockey stick** on the apex of the FW cell. Seasonal forms are known.

A common butterfly. Visits flowers of various species. Probably migrates across the Himalaya as several specimens have been found at various altitudes between 3,000-5,500 m.

LIFE HISTORY - **Egg** white with longitudinal ribs, turns orange just before hatching. **Larva** cylindrical, greenish with broad greenish-brown suprapicula band mottled with white, green, brown and yellow blotches; body covered with short fine hairs. Larvae are gregarious initially, later they separate. Bell writes 'females emerges before the males.' **Pupa** green with all tubercles black or sometimes greyish with yellow tubercles.

LARVAL FOOD PLANTS - *Capparis spinosa*.

ALBATROSSES AND PUFFINS

068 ORANGE ALBATROSS

Plate No. 20

Appias nero galba (Wallace) 1867

SK-BU 1,2 NR

WS- 65-80mm.

M UP, dark orange to crimson, with black veins. UPF apex and outer margin of both wings dusted black.

F similar but dark markings broader and UPF with a short discal band.

Habits similar to those of others of the genus. It is known to be common in Assam and eastern parts of the country.

069 CHOCOLATE ALBATROSS

Plate No. 20

Appias lycinda elenora (Boisduval) 1836

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

WS- 55-70mm.

M UP, white with black costa and margin whose inner margin is toothed. Apex encloses an elongated white spot.

F heavily marked black or dark brown with pale stripes. **M** and **F**, **UNF** has chocolate costa and termen with one pale spot at the apex. **UNH** yellow with chocolate termen.

Common in lower valleys around Rangpo, Rangeet and Teesta up to 1,000 m. Males are common and females are scarcely seen. Males are fond of flowers, they visit flowers of *Eupatorium*, and the other flowers of the Compositae family and other low-growing plants. Flies close to the ground, remains generally in the undergrowth and bushes. Seen basking early in the morning, but very wary. Males also visit damp patches and also seen drinking at streams. They rest with wings closed.

LIFE HISTORY - **Eggs** are laid in batches of 4-12 on young shoots; bottle shaped with 12 longitudinal ridges which are finely transversely striated; light green when laid turning orange before hatching. **Larva** dark yellowish-green with yellow dorsal and subspiracular bands; single row of black shiny tubercles and body covered profusely with minute hairs. Larvae are gregarious. **Pupa** light greenish or brown; snout long and black on the upperside; a lateral row of black dots.

LIFE HISTORY - *Crateva religiosa* and *Capparis cleghornii*.

070 PLAIN PUFFIN

Plate No. 20

Appias indra indra (Moore) 1857

SL,SI,NE-BU NE-BU 1,2 NR

WS- 60-70mm.

M UP, white with black apex, which bear two apical spots. No end-cell black spot and no spot in area 3. **UN** very variable, wavy discal lines and a minute spot end-cell.

F, UPF with large central white discal patch. UPH outer half black and basal area grey or white. **UN** very variable.

Habits similar to those of others of the genus but found in Himalaya up to 2,000m. Males are common females are rare.

071 SPOT PUFFIN

Plate No. 20

Appias lalage durvasa (Moore) 1857

MU-TA 1,2 C

WS- 60-80mm.

M UP, white with broad black apex which bears a white apical spot. A black spot at end-cell and another black spot in the middle of area 3 which is conjoined to the apex and white spot adjacent to it on the outer side.

F UPF black borders broader and enclose a white costal streak and a centre disc. UPH white with dark broad border. **UN** very variable with faint wavy discal lines and minute spot end-cell on HW.

Habits similar to those of the genus, but found up to 2000 m in Himalaya. We have recorded it from the Teesta valley around Mangan, the Tholung valley, West Sikkim and the Rangpo valley.

072 COMMON ALBATROSS

Plate No. 20

Appias albina darada (C. & R. Felder) 1865

SL,PI,EN-BU PI,EN-BU 1,2 R

WS- 60-75mm.

M UP white, **UPF** with narrow apical and terminal markings and white apical spots. **UN** white, **UNF** with a wavy black apical band.

F white UP, with apex costa and termen black with 4 to 5 apical spots and the terminal band deeply indented. No spot in the cell.

Rather uncommon butterfly in northern India, but found up to 2,200 m. Seen only once in Sikkim at Gerathang, basking in the undergrowth on a low bush.

LIFE HISTORY - **Larva** light green with pale yellow spiracular band from 2 to 13; head yellow covered with black tubercles; body rugose with six rows small shining conical tubercles. **Pupa** dirty white with pink shades on segments 4-14.



The Indian Cabbage White feeding on Compositae flower



The Redspot Jezebel

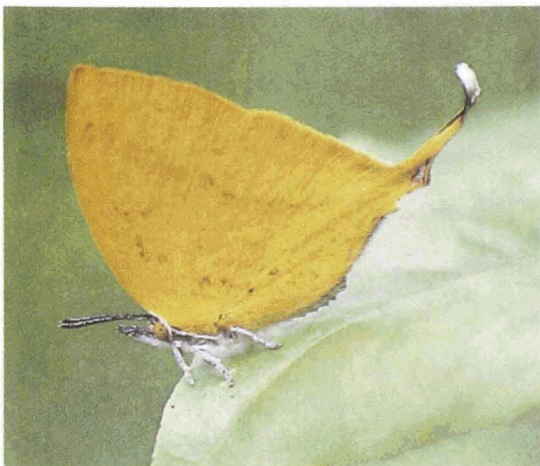


The Common Acacia Blue



The Leaf Blue

The Yamfly



The Plain Sulphur

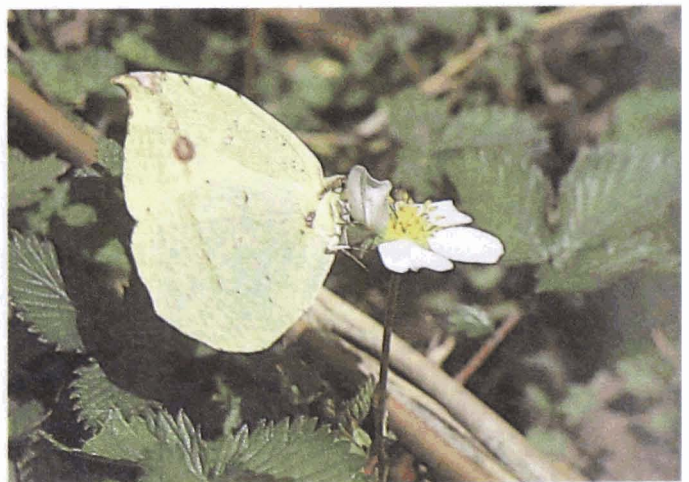
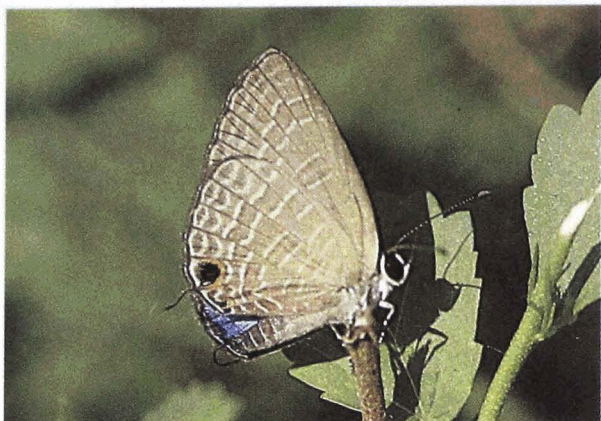
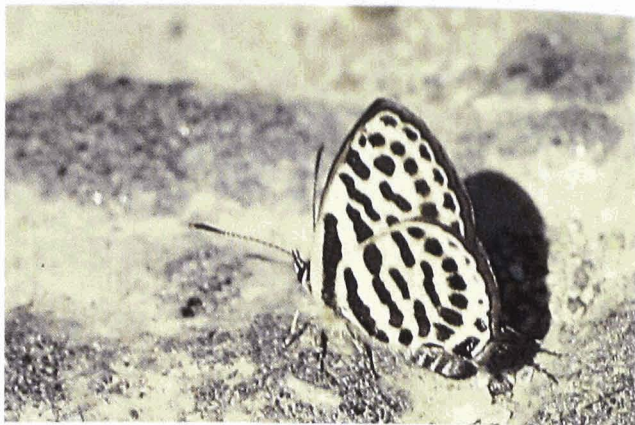


PLATE NO. 18



The Dark Cerulean



The Assam Pierrot



The Hedge Blue basking

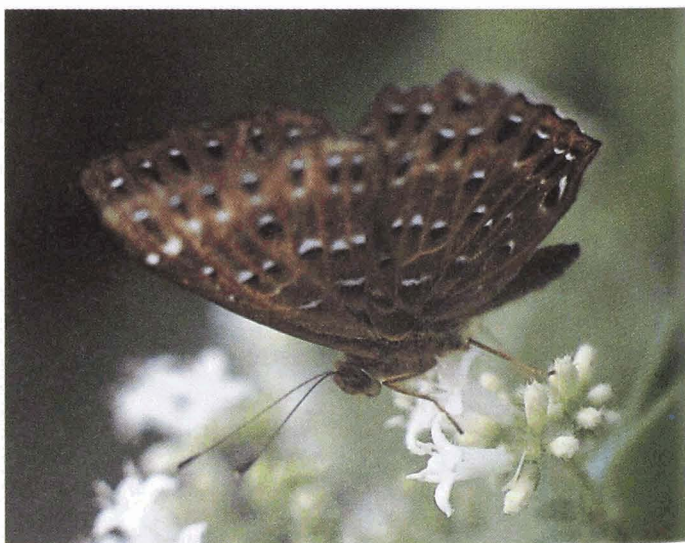


The Striped Punch

The Straight Banded Treebrown



The Punchinello on *Knoxia* flowers



Scale : 5 cm



PLATE NO. 19



56



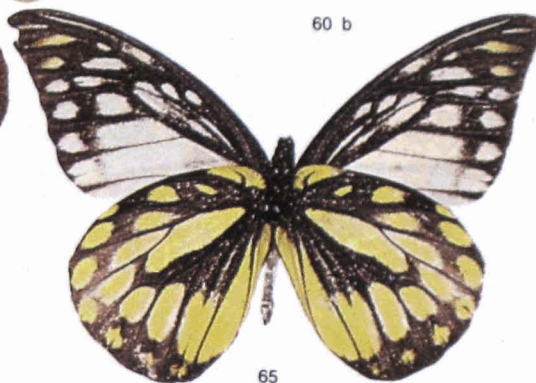
60 a



60 b



59



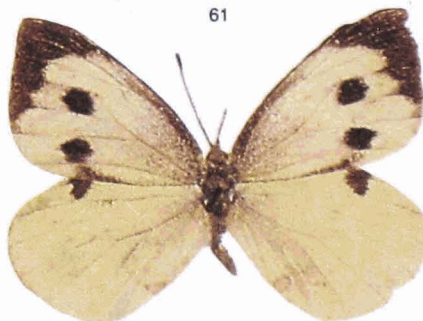
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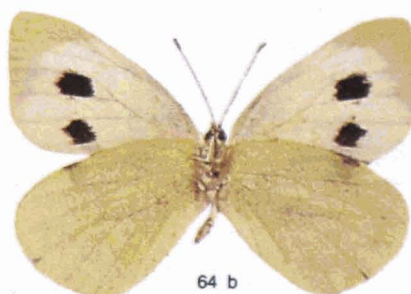
61



63



64 a



64 b



67 a



67 b

56 Psyche

59 Great Blackvein

60 a Chumbi White UP

60 b Chumbi White UN

61 Greenvein White

63 Indian Cabbage White ♂ UP

64 a Large Cabbage White ♂ UP

64 b Large Cabbage White UN

65 Spotted Sawtooth UN

67 a Pioneer ♂ UP

67 b Pioneer ♂ UN

PLATE NO. 20

Scale : 5 cm



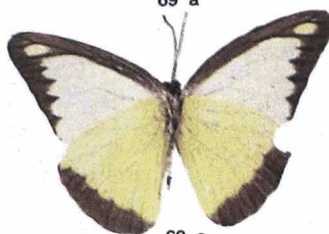
68 a



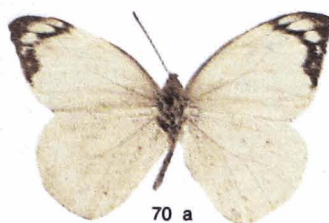
69 a



69 b



69 c



70 a



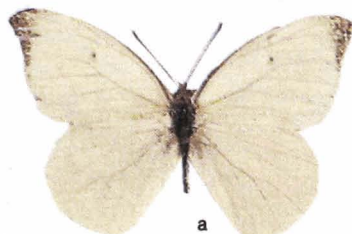
70 b



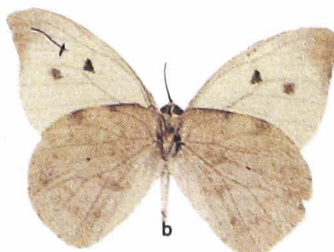
71 a



71 b



a



b



72 a



72 b

- 68 a Orange Albatross ♀
- 69 a Chocolate Albatross ♂ UP
- 69 b Chocolate Albatross ♀ UP
- 69 c Chocolate Albatross ♂ UN
- 70 a Plain Puffin ♂ UP
- 70 b Plain Puffin ♀ UP

- 71 a Spot Puffin ♂ UP
- 71 b Spot Puffin ♀ UP
- a Burmese Puffin ♂ UP
- b Burmese Puffin ♂ UN
- 72 a Common Albatross ♂ UP
- 72 b Common Albatross ♀ UP

Scale : 5 cm

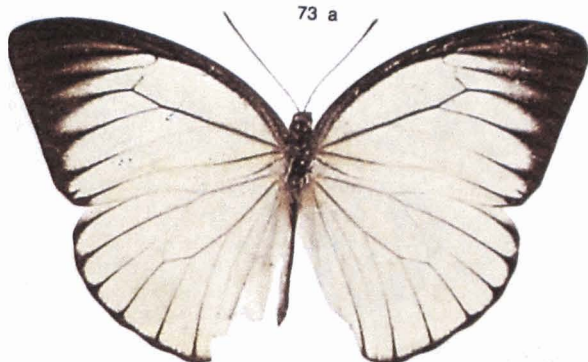
PLATE NO. 21



73 a



73 b



74



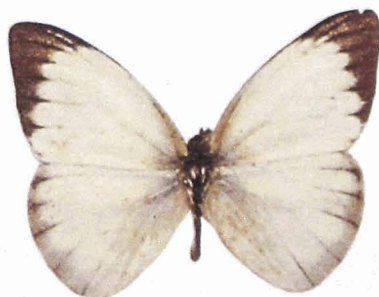
75 a



75 b



75 c



76 a



76 b

73 a Common Wanderer ♂ UP

73 b Common Wanderer ♀ UP

74 Pale Wanderer ♂ UP

75 a Common Gull ♂ UP

75 b Common Gull ♀ UP

75 c Common Gull ♂ UN

76 a Lesser Gull ♂ UP

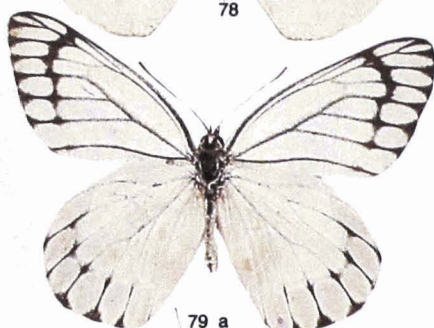
76 b Lesser Gull ♂ UN



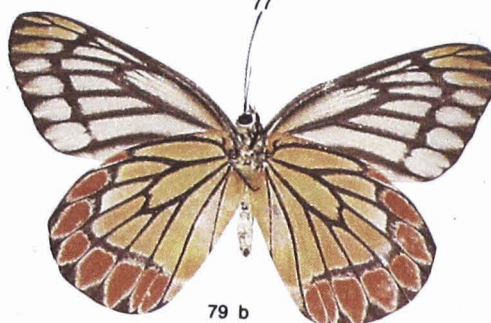
78



77



79 a



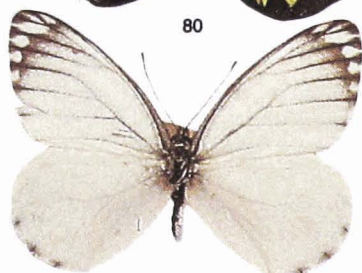
79 b



80



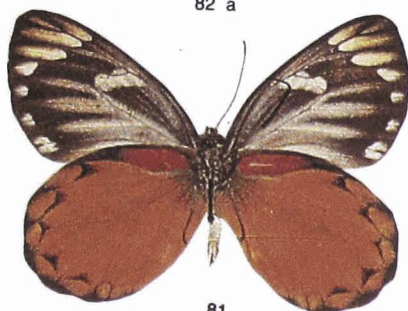
87



82 a



82 b



81



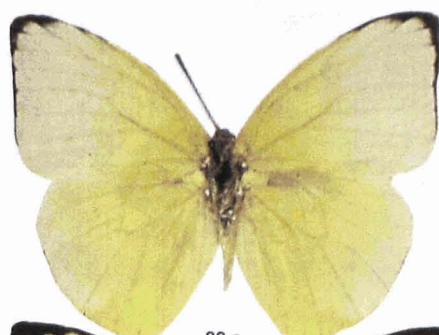
86

- | | | | |
|--------|-----------------------|------|--------------------|
| 77 | Yellow Orangetip ♂ UP | * 81 | Redspot Jezebel UN |
| 78 | Great Orangetip ♂ UP | 82 a | Yellow Jezebel UP |
| 79 a | Common Jezebel ♂ UP | 82 b | Yellow Jezebel UN |
| * 79 b | Common Jezebel ♂ | * 86 | Painted Jezebel UN |
| 80 | Hill Jezebel UN | 87 | Redbase Jezebel UN |

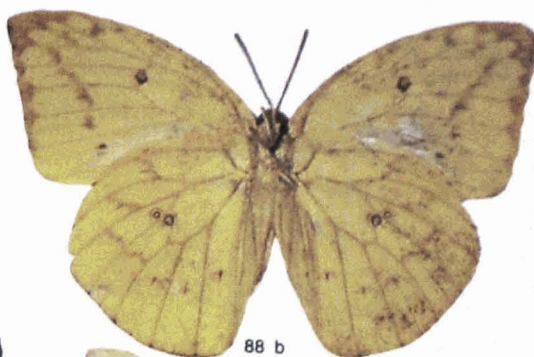
* Rufous colour of the HW is actually yellow (as in 82 b) in fresh specimens.

Scale : 5 cm

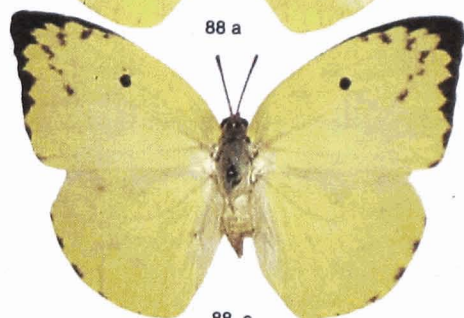
PLATE NO. 23



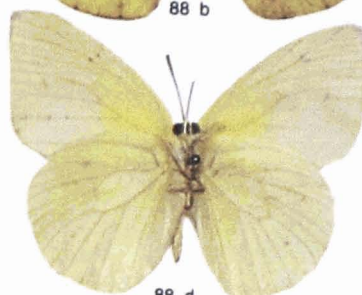
88 a



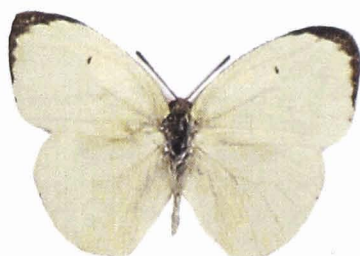
88 b



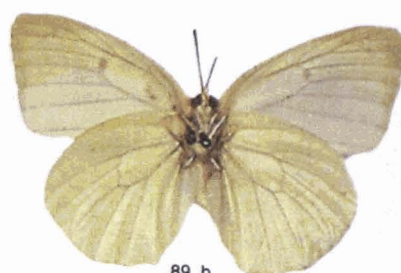
88 c



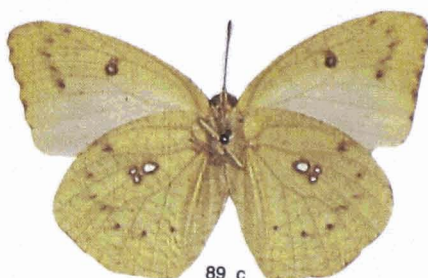
88 d



89 a



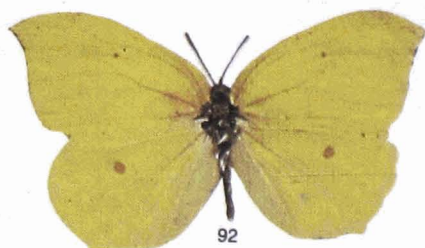
89 b



89 c



90



92



93

88 a Common Emigrant ♂ UP

88 b Common Emigrant UN ♂

88 c Common Emigrant UP ♀

88 d Common Emigrant UN ♂

89 a Mottled Emigrant UP ♂

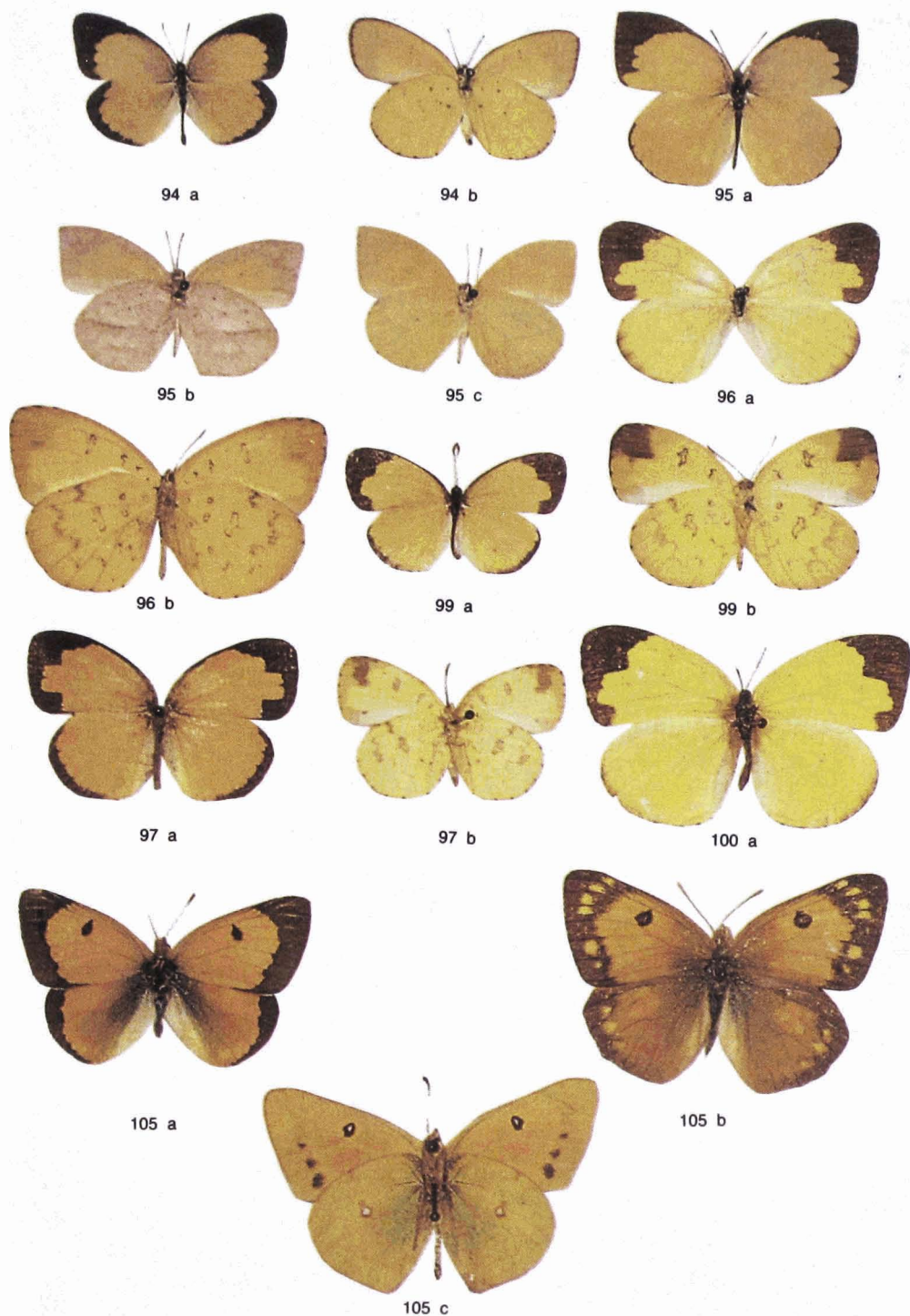
89 b Mottled Emigrant UN ♂

89 c Mottled Emigrant UN ♂

90 Tailed Sulphur

92 Common Brimstone

93 Tree Yellow



94 a Small Grass Yellow UP

94 b Small Grass Yellow UN

95 a Spotless Grass Yellow UP

95 b Spotless Grass Yellow UN ♂

95 c Spotless Grass Yellow UN ♀

96 a Three Spot Grass Yellow UP

96 b Three Spot Grass Yellow UN

97 a Common Grass Yellow UP

97 b Common Grass Yellow UN

99 a One Spot Grass Yellow UP

99 b One Spot Grass Yellow UN

100 Chocolate Grass Yellow UP

105 a Dark Clouded Yellow ♂ UP

105 b Dark Clouded Yellow ♀ UP

105 c Dark Clouded Yellow ♂ UN

LARVAL FOOD PLANTS - *Capparis* sp.

WANDERERS

073 COMMON WANDERER

Plate No. 21

Pareronia valeria hippia (Fabricius) 1787

IN-BU 1,2 R

WS- 65-80mm.

M UP bluish with black veins and narrow black apex which does not reach the upper angle of the cell.

F darker, mimics the danaids, has yellowish or whitish streaks on the dark background. **The submarginal spots of FW are not in line.**

Very common butterfly in the forested areas of the Western Ghats. Seen along the forest paths and open areas. Visits flowers of *Ixora*, *Paveta* and *Impatiens*. It seems it has specialised on feeding on balsams as very few other butterflies like Orange Tips feed on these flowers. Females are generally in the undergrowth and seldom come out. Males often bask early in the mornings. I once observed three females flying around the plant of *Adelocaryum celastenum*, which is suspected to be the source of pyrrolizidine alkaloids, where hundreds of Danaids particularly *Euploea* sp., *Tirumala* and *Parantica* spp. were flying. Females also occasionally bask on a very low growing leaf, just at the edge of a thicket. While resting both sexes sit with their wings closed.

LIFE HISTORY - **Eggs** are oval, with crown of teeth and 17 longitudinal ridges. White, when just laid, but become banded with faded rose at later stage. Eggs are generally laid in groups of six or more. But I have also recorded a group of four eggs and also a single egg laid on the upperside of the leaf. **Larva** is dark green with brown patches and white spots. **Pupa** is green in colour with long head process and sharp at extremity, up-curved and with a very prominent wing bulge. It is marked with some small brown and yellow spots and streaks.

LARVAL FOOD PLANTS - *Capparis hayneana*.

074 PALE WANDERER

Plate No. 21

Pareronia avatar avatar (Moore) 1857

SK-BU SK-NB 1,2 R

WS- 65-80mm.

M UP pale bluish with broad black apex and no dark veins crossing. **The apex almost reaches the upper angle of the cell.** **F**, similar to the female of the Common Wanderer (073) but **the outer edge of the streaks and the submarginal spots of UPF are conjoined and are in line.** Habits similar to those of the Common Wanderer, but found in thicker jungles. So far I have not come across either species in Sikkim.

GULLS

075 COMMON GULL

Plate No. 21

Cepora nerissa nerissa (Fabricius) 1775

SL,PI,SK-BU,AN SK-BU 1,2 NR

WS- 40-65mm.

M UP, white with black border from apex narrowing towards tornus. Two white spots in the apex and a black spot in mid 3, which is bordered by a white spot on the outer side. UPH black border of varying extent. Below, veins dark, UNF costa and apical area yellowish. **UNH** pale yellow to bright yellow with darkened veins.

F UP veins blackened and broader. Below similar to **M**. In DSF the black areas are reduced.

Found commonly in the plains and up to 1,300 m in Himalaya. In South India, found throughout the year and in the hills may be from June to November. Flies close to the ground, flight is strong and fast, more or less straight and when disturbed may be dodging. Often basks on a prominent leaf or exposed bush, about 0.75m to 1.5mm from the ground. Visits flowers, particularly of *Tridax procumbens.*, *Sida rhombifolia*, *Alternanthera* sp. and *Lantana camara*. Females are not observed as often as males.

LIFE HISTORY (Fig. VI. 1). **Egg** white bottle shaped. Laid on the food plant anywhere, but a favourite place is on the top of a thorn. **Larvae** in first and second instars are oily yellowish green with a black head and long tubercles. In third instar green, with seven parallel lines on each segments, with white tubercle in-between the intervals, bearing hairs. Fourth and fifth instars are bluish green, with venter light greenish. Larva lies on top of the leaf when not feeding. **Pupa** is dark bluish or grass-green, wings greenish white, with black lines; narrow, square at the extremities and very slightly bifid; generally found on the upperside of the leaf.

LARVAL FOOD PLANTS - *Capparis aphylla*, *Capparis sepiaria*, *Capparis rheedii*, *Cadaba fruticosa*, *Maeura arenaria* (Capparaceae).

076 LESSER GULL

Plate No. 21

Cepora nadina nadina (Lucas) 1852

SL,SI,SK-BU,AN, SK-BU 1,2 NR

WS- 55-65mm.

Similar on UP to the Albatrosses and Puffins

M UP, white with black apex on **FW** and thin border on **HW**. UNF the costal and apical area greenish yellow and **UNH** greenish yellow except for white patch in the cell and beyond. In south Indian ssp. the **HW** is completely yellowish.

F UP, dark brown with white markings. Below similar to **M**.

Butterfly of hilly regions with heavy rainfall. Not fond of sunshine like 075, generally keeps to the undergrowth. Early in the morning may be seen basking on rock or a leaf. WB records it as local butterfly. Does not usually visit flowers, but visits damp patches and droppings. We have recorded it from West Sikkim and the Tholung valley. In Arunachal Pradesh it was very common.

LIFE HISTORY - **Egg** spindle-shaped, with 12 longitudinal ridges. Teeth forming ring around the top. Surface shiny, light yellow, mottled with rose red. **Larva** yellowish-green with black head and body covered with small white tubercles with hair and longer hairs along subapical and lateral regions. **Pupa** pale green or brownish green, with black and white abdominal teeth.

LARVAL FOOD PLANTS - *Capparis cleghornii*, *Capparis mooni*, *Capparis rheedii* (Capparaceae).

ORANGETIPS

077 YELLOW ORANGETIP

Plate No. 4 & 22

Ixias pyrene familiaris Butler 1898

SL,IN,BA-BU SK-AS 1,2 NR

WS- 60-80mm.

UP **yellow**, **FW** with costal and apical area black and a **large orange band** nearer the cell than the apex. The Sikkim ssp. is larger in size.

F similar but does not have orange band. Below, both sexes, yellow with brown blotches.

A very common butterfly up to 2,000m. Flies in the bushes and scrub at the edge of the forested areas. Flight is fast and straight. It basks with its wings open for quite some time in the mornings. Feeds on

various species of flowers. WB writes that it does not feed on flowers, but I have photographs of it feeding on *Salvadora* sp. and Compositae flowers. Comes to damp patches and also seen near streams and shaded nullahs.

LIFE HISTORY - Egg pearl white, when freshly laid, turning cream coloured later. It has 12 longitudinal ridges and six teeth forming a narrow crown. Egg is laid on leaf or any part of the plant, even withered and dead parts of the plant, in a shaded place. Newly hatched Larva eats the egg-shell. The larva is dark grass-green, covered with small dull red spots, white band, bordered upperside and below by reddish brown line. Pupa is light green, with darker mottlings of round spots and dots.

LARVAL FOOD PLANTS - *Capparis sepiaria* (Capparaceae). Larvae do not take other *Capparis* easily (Talbot 1978).

078 GREAT ORANGETIP

Plate No. 2, 4 & 22

Hebomoia glaucippe glaucippe (Linnaeus) 1758

SL,SI,NE-BU,AN NE-BU 1,2 NR

WS- 80-100mm.

M UP white, with broad orange apical band.

F similar, but with black submarginal spots on the HW. Below, on the white background, brown mottling and a median line resembling the mid rib of a leaf.

A very beautiful butterfly of the forested areas. Seen flying quite high above the tree-line, in a leisurely manner; when chased will fly quite rapidly. Females generally do not fly low but males can be seen flying close to the ground sometimes. I have watched females being chased by several males for quite some distances. Fond of visiting flowers of *Impatiens sahyadriensis*, *Ixora*, *Paveta* etc.; comes to damp patches too. While feeding generally keeps wings folded or three fourths open. In Sikkim I have seen this species up to 2,000 m, in Singtam, Rhenok, Middle camp, Gangtok, Mangan and Legship.

LIFE HISTORY - (Fig.VI. 3) Egg is bottle-shaped and white in colour, turning yellow later. Generally laid on the upperside of the leaf close to the ground. I have observed it laying at a height of about 1.2 m from the ground in October. Larva is green, white beaded subapical band whose lower half is orange except on segment three where it is blue. When larva is threatened or in danger lifts its head in such a manner that it very much resembles the hood of a cobra and it also behaves in similar fashion (see plate). Pupa similar to that of Emigrants. Yellowish green, dorsum and lateral part of the head purple and large spots on segments 4,5 and 9. Pupa is formed on the underside of the leaf close to the ground.

LARVAL FOOD PLANTS - *Crateva religiosa*, *Capparis mooni*, *Capparis spinosa*.

JEZEBELS

079 COMMON JEZEBEL

Plate No. 4 & 22

Delias eucharis (Drury) 1773

SL,SI,KU-BU 1,2 R

WS- 66-83mm.

UP white with darkened veins, UPF with a outer discal black curved line. UPH, the colours from below are seen through above. Below, UNF apical area may be yellowish, UNH yellow with a row of red marginal spots which are edged white, and black border on both side.

In females veins are much broadened.

A very beautiful butterfly, seen commonly around gardens and forest edges. Very fond of visiting flowers of *Lantana camara*, *Anacardium occidentale*, *Tridax procumbens*, Singapore cherry, mango inflorescence, and many other garden as well as wild flowers. Generally fly about 1.5-2.0 m from the ground. Females are known to fly higher than the males in search of food plants, which grow higher on the trees. In some years, a burst of population of these insects is observed. In 1990 there was one such burst, and they were found through out Bombay in large numbers between August and September. At

this time many individuals were also seen going steadily to the north. Some notes on migration of this species are available in literature.

LIFE HISTORY - (Fig.VI.2). Egg yellow flask-shaped: with longitudinal ridges. Eggs are laid in batches of 10 to 20 on the underside of a leaf; a batch of sixty nine has been observed on a single leaf. **Larva** is greenish yellow-brown with white hairs. Newly hatched larva first feeds on the egg shell, then goes off to the margin of the leaf and starts feeding on it voraciously. They feed from side to side. When disturbed they drop by the silken thread.

Pupation does not occur at the same time, some individuals pupate earlier than the others. The pupa is not necessarily formed on the food plant; the larva wanders off and pupates at any suitable place. I had seen one pupa formed on a young date palm plant which was quite far away from the food plant. I have also observed the prepupal stage larvae often hanging down from the silk, probably they fall down to ground in search of suitable sites for pupation. But Issac Kehimkar has contradictory observations. He reared 9 larvae, all of which pupated on the food plant itself and 8 out of 9 hatched on the same day at the same time. So probably it depends on the environmental conditions.

Pupa is green in colour with black spines and also some black blotches on abdomen and wing cases. Pupa is firmly attached with tail-pad and body band either horizontally or perpendicularly; hatching may not be synchronised.

LARVAL FOOD PLANTS - *Loranthus longiflora*, *Loranthus elasticus*, *Viscum* sp., and *Scurrula* sp. (Loranthace).

080 HILL JEZEBEL

Plate No. 22

Delias belladonna ithiela (Butler) 1869

KU-BU CN-SK 1,2,3 NR

WS- 76-90mm.

Mimiced by the Spotted Sawtooth (065).

UNH without red markings. UP dark with pale grey or white spots and streaks. **UPH a bright yellow patch in area 7** where the FW partly covers the HW. UNF with apical yellow spots otherwise similar as UP. **UNH is black with bright yellow spots.**

Very common from June to November in the lower valleys. But also another very closely related ssp. is observed up to 3000 m. Found in open areas around fields and forest edges and disturbed human habitations. They are fond of visiting flowers of *Buddleia* and *Lantana*. In Western Himalaya they visit Horse Chestnut, *Aesculus indicus*. Males fly close to the ground. Flight fast, but could be dodging if chased. It has been recorded by us from Naya Bazaar, Legship, Tashiding, Rangpo, Dickling chu khola, Gangtok, etc.

081 REDSPOT JEZEBEL

Plate No. 17 & 22

Delias descombesi descombesi (Boisduval) 1836

SK-BU 2,3 NR

WS- M- 65-88mm and F 80-90mm.

UP, FW black with white stripes, HW white with black border. **UNH is yellow with a row of yellow marginal spots black border and a red basal-costal stripe in area 7.**

Uncommon. But seen on flowers of Himalayan cherry and other blossoms. Habits similar to those of the genus. Seen in Gangtok, Saramsa, Mangan and Rangpo and Legship.

082 YELLOW JEZEBEL

Plate No. 22

Delias agostina agostina (Hewitson) 1852

CN-BU 1,2,3 NR

WS- 64-70mm.

UP mainly white with black apical veins. **UNH yellow with white spotted black border.** UNF black veins and curved post discal black line. **No red spots.**

Habits as those of the genus. But not common in Sikkim. We have recorded it from Legship, Singtam and the Tholung valley.

083 PALE JEZEBEL

Delias sanaca oreas Talbot 1928

084 DARK JEZEBEL

Delias berinda boyleae Butler 1885

085 REDBREAST JEZEBEL

Delias thysbe pyramus (Wallace) 1867

WS- 80-98mm.

Similar to the Redbase Jezebel (087).

UPH a red basal area in 7 extending to the cell. Underside similar to 084.

Habits as for the group.

Only one specimen has been recorded by us feeding on Himalayan cherry flowers.

086 PAINTED JEZEBEL

Plate No. 22

Delias hyparete indica Wallace 1867

SI,EI,KU-BU KU-BU 1,2 NR

WS- 70-88mm.

Similar to the Common Jezebel (079) and Painted Sawtooth (066).

UNH the yellow does not reach the red marginal spots and the spots are not bordered by black line inwardly and not enclosed by white edges.

Habits as for the group. Rather uncommon; only one specimen was seen in Narak near Loranthus plant.

LIFE HISTORY - Not been described properly. **Larva** is yellow and hairy.

Pupa is with shiny spots.

LARVAL FOOD PLANTS - *Loranthus* sp.

087 REDBASE JEZEBEL

Plate No. 22

Delias aglaia (Linnaeus) 1758

NE-BU 1,2,3 NR

WS- 70-80mm.

Similar to the Redbreast Jezebel (085).

But does not have any red stripes on the UPH. UNH a patch of red basal marking from 8 to the inner margin.

Fairly common butterfly, seen up to 2,000 m. Habits as those of the group. In Sikkim I have come across it in Rangpo, Rangeet and Teesta valleys. Also seen in other inner valleys.

LIFE HISTORY - **Egg** spindle-shaped and bright yellow. Laid in batches of 20 to 30 or more on the upperside of the leaf. **Larva** red, each segment with long black and yellow hairs. The young larvae are yellow and sparsely hairy and head black.

LARVAL FOOD PLANTS - *Loranthus* sp.

COLIADINAE**YELLOWS**

They are also known as the Yellows as this is the predominant colour observed for this group of

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

SL,IN,BU 1,2 NR

WS- 30-40mm.

FW is more elongate and narrowed towards the apex than any other species of the genus. **The black outer border is well marked and excavated. The inner edge is more or less regularly incurved from costa to inner margin. Slightly toothed at veins 1a, 2 and 3.** WSF has broader black area. UNF no spots in the cell except for discocellular spot.

A butterfly very common in hot weather. It flies close to the ground, around bushes; flight is weak. Congregation can be observed in the undergrowth. Visits low growing flowers. In the Himalaya it has been seen and recorded up to about 3200 m.

LIFE HISTORY - **Egg** not described. The eggs are laid singly on the upperside of the leaves, often on the young folded leaf-buds. **Larva** is grass-green, with a dark green dorsal line and yellow tinged white subapical band, **Pupa** green, with subapical white band and brownish spots on each segments. Snout is pink and wrinkled.

LARVAL FOOD PLANTS - *Cassia kleinii* (Leguminosae).

095 SPOTLESS GRASS YELLOW

Plate No. 24

Eurema laeta sikkima (Moore) 1906

SL,IN,BU SK-BU 1,2 NR

WS- 30-45mm

Well marked seasonal forms are known. Apex of the FW is more produced particularly, in DSF. WSF with well-developed black borders not much indented. In DSF the border does not reach the tornus.

UNH In both forms with more or less distinct oblique post discal diffused band, In DSF more distinct and reddish. No spots in the cell of UNF.

Butterfly of drier regions. Flies close to the ground, very short distance, before it settles. I have never seen it basking with its wings wide open. Visits various flowers like *Smithia sensitiva*, *Tridax*, *Alternanthera*, *Vernonia*, *Sida* sp. and many more low-growing flowers. Flies throughout the year in peninsular India. So far I have not seen it in Sikkim, although it has been recorded by earlier collectors.

LARVAL FOOD PLANTS - Not recorded; possible the same as for other species.

096 THREE SPOT GRASS YELLOW

Plate No. 24

Eurema blanda silhetana (Wallace) 1867

SL,IN,BU,AN 1,2 C

WS- 40-50mm.

UP similar to 094. **UNF there are always three spots in the cell and a discocellular end-cell spot.** All other markings are very variable. **M** has a sex brand which is narrower and less prominent than of 094.

A very common butterfly of the plains and low altitudes upto 1,500 m. Seen on moist patches in large congregations. They also visit low-growing flowers. Since the food plants are trees or high growing creepers the females are seen flying high above the tree levels. Other habits similar to 094.

LIFE HISTORY - Eggs are white, when freshly laid. Usually laid in clusters of 20 to 30 on the upperside of the leaf. **Larva** very similar to that of *E. hecabe*. Body dark bluish green, with pale yellowish green spiracular line. Larvae are gregarious and are often attacked by hymenopterous parasites (wasp). **Pupa** resembles that of 094. Dark yellowish green, with top of snout yellow. Pupae are almost found invariably strung together, to the rib of a leaf.

LARVAL FOOD PLANTS - *Caesalpinia spicata*, *Cassia*, *Delonix regia* (Leguminosae).

097 COMMON GRASS YELLOW

Plate No. 24

Eurema hecabe contubernalis (Moore) 1886

SL,IN,AN,NI EI-BU,AN 1,2 C

WS- 40-50mm.

UP dark yellow with FW having dark apex and broadly black termen which is usually excavated at 2 and 4. UPH a uniform black border. UNF the apical area not entirely brown. UNF with two spots in the cell, some times one or both may be absent. UNH with various brown markings and without a transverse streak in area 7 on UNH. M has prominent broad sex brand which reaches to the origin of vein 3. Markings are highly variable. Several subspecies are known from the Indian region.

One of the commonest butterflies found throughout India. Flies close to the ground. It is strong flier than any others of the group. Keeps on wing for quite some time and seen often ascending high in the air. Visits flowers of various low-growing plants. The males are also fond of damp patches. Found both in shady places as well as open areas. In the Himalaya seen up to 2,800m.

In Northwest Himalaya it is known to appear only from August to October. But from Sikkim we have specimens even in December, from lower altitudes.

LIFE HISTORY - Egg spindle shaped, bluntly pointed top with longitudinal ridges. White when freshly laid, turns yellow later. Eggs are laid singly, generally on the upperside of the leaves. Larva is dark green, glaucous on the sides, with a spiracular narrow white band; the larvae are gregarious and defoliate the whole leaf. The larvae make their cocoons on the naked mid-rib of the leaf they have defoliated. The cocoons are arranged serially and hung by their stalks on the mid-ribs in such a way that they look like leaves of the host plant. The size and shape of the cocoons are nearly the same as the host leaf. More than hundreds of cocoons hang from a small infested branch (Tikader 1966). These were observed on *Acacia mollissima* and *Albizzia* sp. Pupa usually green, with dark violet dorsal line and dorsal margin of the wing also violet-grey. Wings near the abdominal end dark.

LARVAL FOOD PLANTS - *Cassia obtusifolia*, *Cassia* sp., *Caesalpinia spicata*, *Sesbania*, *Caesalpinia*, *Acacia* sp. and *Albizzia* sp., etc. all belonging to Leguminosae.

098 SCARCE GRASS YELLOW

Eurema jordani Corbet and Pendlebury 1932

SK-SB

099 ONE SPOT GRASS YELLOW

Plate No. 24

Eurema andersoni andersoni (Moore) 1886

SL,SI,SK-BU,AN SK-BU 1,2 NR

WS- 38-45mm.

Similar to 094 on the UP. UNF with two dark transverse subapical streaks. A single spot in the cell and traces of a dark streak in area 1b. UNH in area 7 a long streak, directed towards and almost contiguous with the discocellular spot of UNH.

Habits similar to 094.

100 CHOCOLATE GRASS YELLOW

Plate No. 24

Eurema sari sodalis (Moore) 1886

SK,AS-BU 2 R

WS- 40-45mm.

UP similar to 094.

The inner edge of the excavated area, between 2 and 4, is directed towards the distal margin at a point just above the tornus, this is a character not found in any other Indian *Eurema*. UNF with apical area entirely and broadly dark chocolate.

Habits not much known.

CLOUDED YELLOWS

101 **ORANGE CLOUDED YELLOW**

Plate No. 24

Colias stoliczakana miranda Fruh 1903

102 **EVEREST CLOUDED YELLOW**

Colias berylla Fawcett 1904

103 **FAWCETT'S CLOUDED YELLOW**

Colias nina nina Fawcett 1904

104 **DWARF CLOUDED YELLOW**

Colias dubia Elwes 1906

SK-CH

105 **DARK CLOUDED YELLOW**

Plate No. 24

Colias fieldii Menetries 1855

BA-BU SK-NB 1,2,3,4,5

WS- 54-65mm.

UP orange or orange-red with a black broad border; the apex of the F is spotted with the ground colour; M not spotted. Underside yellowish with silvery spots on the UNH. UPH is heavily dusted with black. In M, UPH with a yellow sex brand at the base of area 7.

A very common butterfly throughout the Himalaya, particularly in alpine meadows, from about 2,500-3,300 m. But during colder months found as low as 200 m. Found in forest clearings or in the open meadows. Visits various species of low growing flowers such as *Taraxacum officinale*, *Gentiana carinata*, *Gentiana* spp., *Primula* sp., *Caltha palustris*, etc.

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.

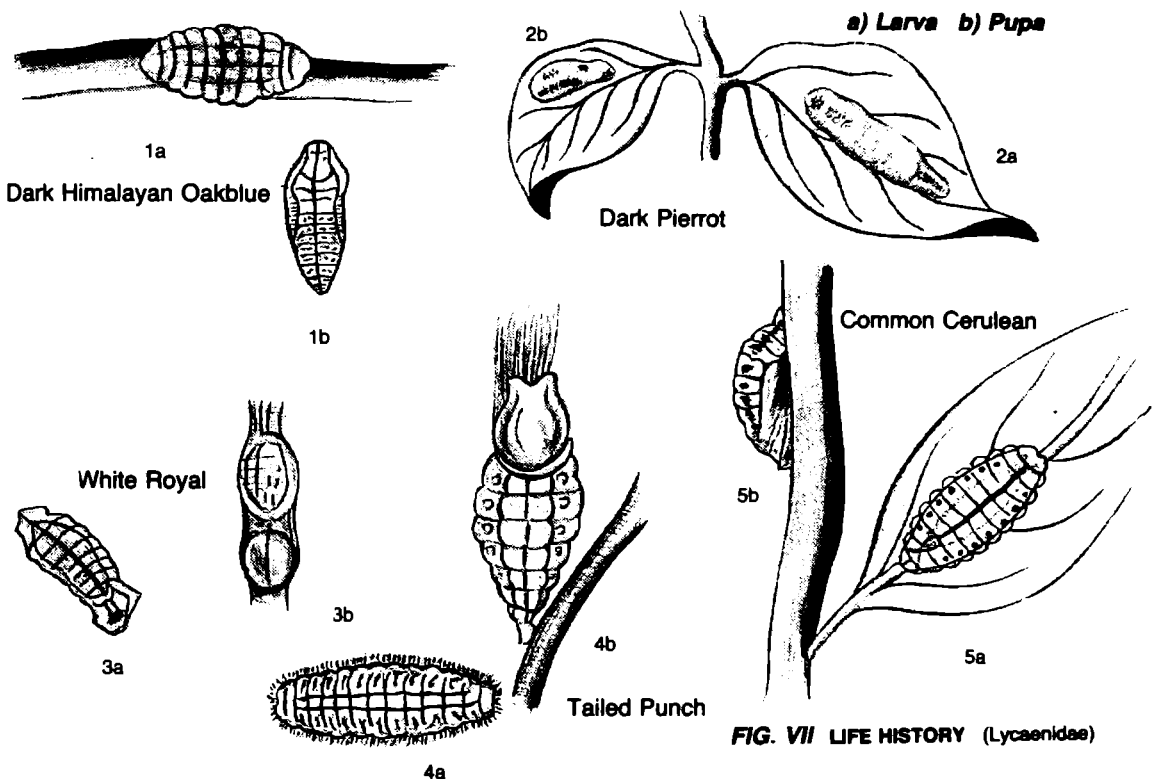


FIG. VII LIFE HISTORY (Lycaenidae)

PORITINAE

106 COMMON GEM

Plate No. 25

Poritia hewitsoni hewitsoni Moore 1865

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

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 oojeinense*.

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

basal streak above the cell, leaving only a basal red discal patch. Fs have a much larger white area than the earlier species.

Habits similar to those of the preceding species.

THECLINAE

115 METALLIC GREEN HAIRSTREAK

Plate No. 25

Chrysozephyrus duma duma (Hewitson) 1869

SK-MA 2 NR

WS- 42-48mm.

Ms UP metallic green, black border 1 to 2 mm and sharply defined. Fs UP dark brown with discal orange spots larger and conjoined. M UN grey-brown with silvery gloss. F UN brown with no silvery gloss. UN markings are very distinct in both sexes.

Shade-loving insect of the forests and thick undergrowth. During the dry season they keep to nullahs and shaded streams where there is water. They frequent hilltops where they fly fast around trees and bushes, sitting with their wings closed. They have never been recorded at flowers. Found between 1,400-1,500 m. Recorded to be fairly common in July in Sikkim.

116 METALLIC GREEN HAIRSTREAK

Chrysozephyrus sikkimensis

117 POWDERED GREEN HAIRSTREAK

Plate No. 25

Chrysozephyrus zoa (De Niceville) 1889

SK-MA 1,2 R

WS- 42-46mm.

M UP black, powdery dark green scales, black border (4 mm) meeting apex from V4 to V6. F as in *T. duma*.

M and F UN uniform, very dark brown, silvery discal line prominent, remaining markings obscure.

Habits similar to those of the group.

LARVAL FOOD PLANTS - Possibly *Rhododendron* sp.

118 SILVER HAIRSTREAK

Plate No. 25

Chrysozephyrus syla assamica Tytler

SK-MA SK-MA 3,4 NR

WS- 36-38mm.

M similar to the Metallic Green Hairstreak (115).

UP shining metallic green, narrow black borders (1 mm to 1.5 mm). **F UP** pale blue, **FW** with black border and apex and two white discal spots. **M and F UN silvery with distinct discal band.**

Flies from May-October from 1,800 m to 3,200 m. Recorded to be common in west Himalaya and rare in the east.

119 KIRBARI HAIRSTREAK

Chrysozephyrus kirbarensis Tytler

OAKBLUES

These are large-sized Blues of a brilliant metallic blue or purple colour and a dark border. Fs have broader dark borders.

Only the *A. eumolphus* is a green coloured butterfly with metallic scales. UN they are brown or grey-brown, with numerous darker and paler spots and markings.

They are generally butterflies of forested regions, found along the forest paths or edges. They come to damp patches and sap; they hardly visit flowers. Particularly Ms early in the morning, are seen basking. In Sikkim the group is highly diversified and the largest number of species are found in Sikkim and NE India. Nothing much about their habits and ecology is known; they are not often seen because many of them fly above the canopy of trees and go unnoticed.

120 LILAC OAKBLUE

Narathura camadeo camadeo (Moore) 1857

SK-AT SK-AS 1,2 R

121 DOHERTY'S DULL OAKBLUE

Narathura khamti Doherty 1891

122 INDIAN OAKBLUE

Narathura alemon De Niceville 1891

123 POWDERED OAKBLUE

Plate No. 26

Narathura bazalus (Hewitson) 1862

SK-KR 2 NR

WS- 44-48mm.

M UP very dark purple, almost black. F pale purple.

M and F UN, FW broadly rounded and the apex is irrorated with grey and glossed with purple. **All the markings are very large and surrounded narrowly with white scales.** A spot at the base of the cell, large in the middle and very large at end-cell. **A very broad discal band, consisting of four spots, placed obliquely outwards, two spots shifted inwardly and breaking the line.** UNH heavily irrorated with white, the spots are numerous and prominent.

Habits as described for the group.

LIFE HISTORY - Larva very transparent greenish yellow, with a darker green dorsal band. Pupa is typical *Arhopala* shaped and is unmarked. The abdominal portion is whitish and the thorax greenish.

LARVAL FOOD PLANTS - *Hopea* sp. and 'Kindal', *Terminalia paniculata*.

124 LARGE OAKBLUE

Plate No. 26

Arhopala amantes amantes (Hewitson) 1862

SI,DU-DA DU-SK 1.2 NR

WS- 45-47mm.

M UP dark shining blue, F paler. M and F UNF **3 spots in the cell of which the spot at the base is the smallest.** A discal band of conjoined spots of which the middle one is out of line. UNH has basal and sub-basal spots and irregular bands.

Habits as those of the group.

LIFE HISTORY - Larva is green with two sub-dorsal reddish lines, a red patch on the second and last segments, the interdorsal space filled with blackish spots and lines; a lateral row of spots. Pupa green with reddish abdomen.

LARVAL FOOD PLANTS - *Hopea*, *Terminalia paniculata*, *Xylia xylocarpa*, *Lagerstroemia microcarpa*.

125 **GREEN OAKBLUE**

Plate No. 26

Arhopala eumolphus eumolphus (Cramer) 1780

NE-BU NE-AS 1,2 NR

WS- 44-50mm.

M UP, green with rich golden scales. F blue with dark narrow borders. **UN brownish or greyish.** UNF with a series of brown spots of increasing size and surrounded with pearly white shining rings. UNH with six or seven oval, irregularly round dark brown spots, narrowly edged with grey. Anal region with three deep black spots (of which the inner one is largest) which are bordered on the inner edge with a emerald-green band covered with a golden lusture.

Habits as those of the group. Recorded to be fairly common at lower altitudes in October and November in Sikkim.

126 **DARK HIMALAYAN OAKBLUE**

Arhopala paramuta De Niceville

127 **ABERRANT BUSHBLUE**

Plate No. 26

Arhopala abseus indicus Riley

SL,SI,SK-BU SK-TA 1,2 NR

WS- 32-35mm.

M UP dull purple-blue with broad border. **F** paler and border broader and also with a spot end-cell. **UNF** ground colour shining pink-grey. **Markings darker brown, edged with white. Two round spots of equal size inside the cell, pale ones below them, a band of conjoined square spots from costa.** A terminal blackish line, a subterminal series of conjoined lunular marks. **UNH** entirely suffused with dark pinkish-brown and **a white spot on midcosta.** Shape of HW is unusual.

Habits similar to those of others. Has been recorded as common in Sikkim from June to December.

128 **BIFID PLUSHBLUE**

Flos diardi (Hewitson) 1862

129 **SHINING PLUSHBLUE**

Flos fulgida (Hewitson) 1863

130 **SPANGLED PLUSHBLUE**

Plate No. 26

Flos asoka (De Niceville) 1883

SK-SS 1,2 NR

WS- 40-44mm.

UNF marginal space below V5 is nearly white. Costal space from the base to the discal band, broadly paler than the bands, with a somewhat reddish tint. On UNF the cell has a curved pale streak and bar end-cell. On UNH four sub-basal black spots from inner margin up to cell. **HW tailed.** Very similar to *A. areste*.

Habits as those for the group.

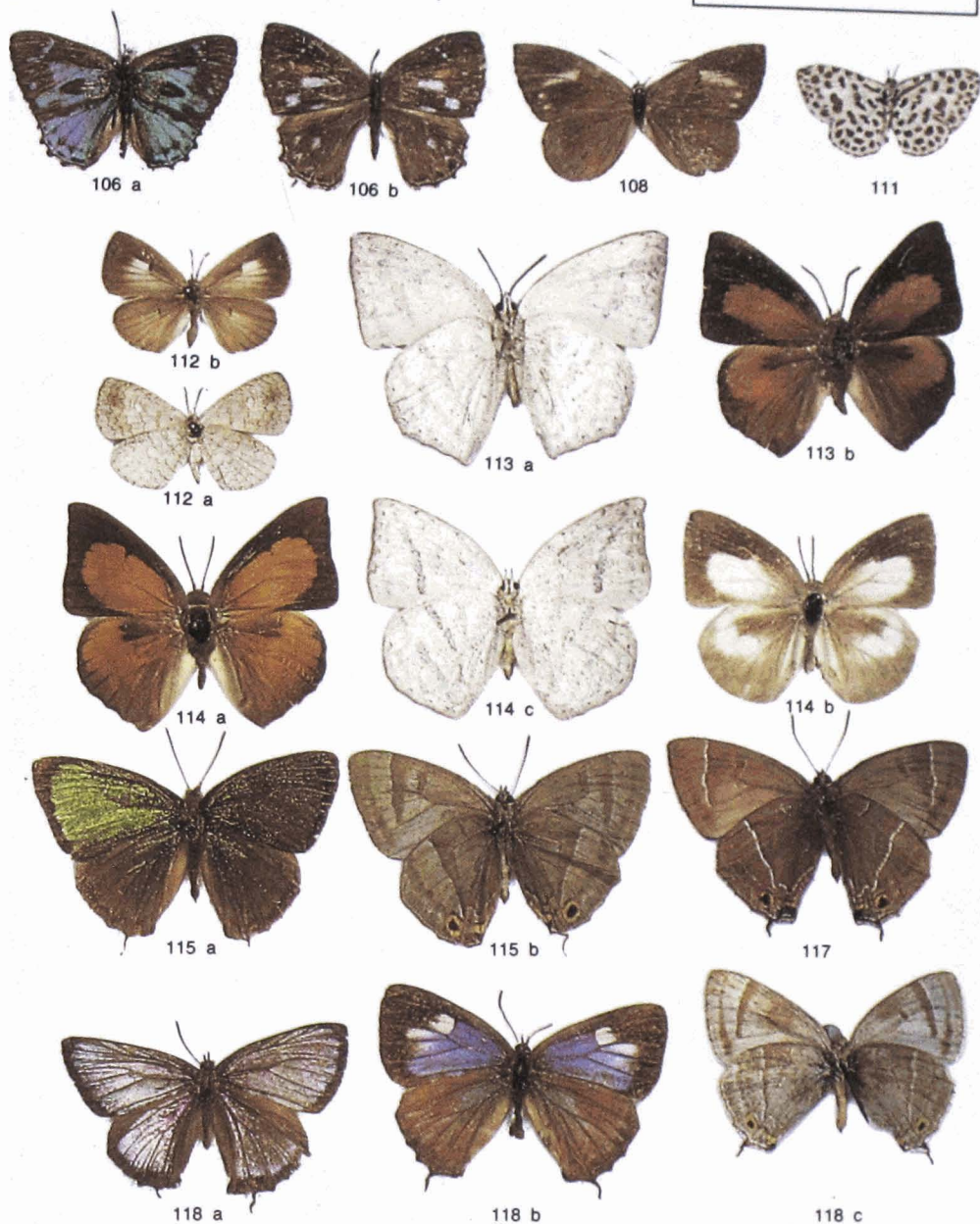
131 **CHINESE PLUSHBLUE**

Flos chinensis Felder 1865

SK-AS NR

Scale : 5 cm

PLATE NO. 25



- 106 a Common Gem ♂
 106 b Common Gem ♀
 108 Common Brownie UP
 111 Forest Pierrot UN
 112 a Apefly UP
 112 b Apefly UN
 113 a Bright Sunbeam UN
 113 b Bright Sunbeam ♂ UP
 118 c Silver Hairstreak UN

- 114 a Angled Sunbeam ♂ UP
 114 b Angled Sunbeam ♀ UP
 114 c Angled Sunbeam ♂ UN
 115 a Metallic Green Hairstreak ♂ UP
 115 b Metallic Green Hairstreak ♂ UN
 117 Powdered Green Hairstreak UN
 118 a Silver Hairstreak ♂ UP
 118 b Silver Hairstreak ♀ UP

PLATE NO. 26

Scale : 5 cm



123



124 a



124 b



125 a



125 b



127



130 a



130 b



133



134 a



134 b



135



138



139 a



139 c



139 b



140 a



140 b

- | | | | | | | | | |
|-------|-------------------|----|-------|-----------------------|----|-------|------------------------------|----|
| 123 | Powdered Oakblue | UN | 130 a | Spangled Plushblue ♂ | UP | 138 | Dusky Bushblue | UN |
| 124 a | Large Oakblue ♂ | UP | 130 b | Spangled Plushblue | UN | 139 a | Common Acacia Blue ♂ | UP |
| 124 b | Large Oakblue ♀ | UN | 133 | Spotless Oak Blue | UP | 139 b | Common Acacia Blue ♀ | UP |
| 125 a | Green Oakblue ♂ | UP | 134 a | Centaur Oakblue ♂ | UP | 139 c | Common Acacia Blue ♂ | UN |
| 125 b | Green Oakblue ♀ | UP | 134 b | Centaur Oakblue ♂ | UN | 140 a | Silverstreaked Acacia Blue ♂ | UP |
| 127 | Aberrant Bushblue | UN | 135 | Variegated Plush Blue | UN | 140 b | Silverstreaked Acacia Blue ♂ | UN |

Scale : 5 cm

PLATE NO. 27



144 a



144 b



145 a



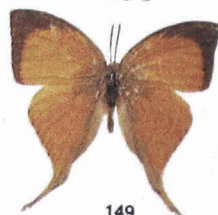
145 b



146 a



146 b



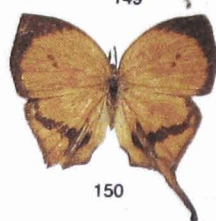
149



147 a



147 b



150



151 a



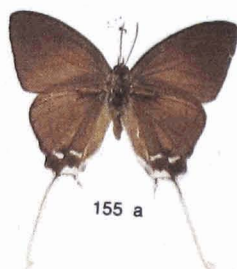
151 b



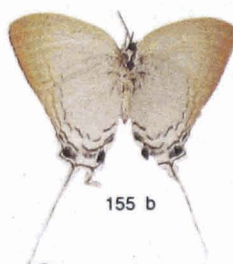
154 a



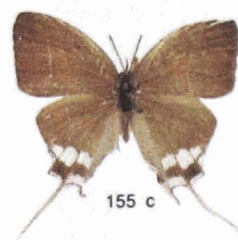
154 b



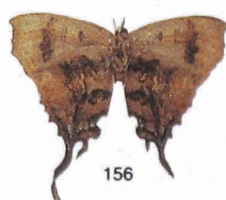
155 a



155 b



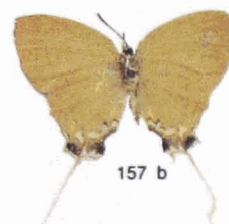
155 c



156



157 a



157 b

144 a Hewitson's Dull Oakblue ♂ UP

144 b Hewitson's Dull Oakblue UN

145 a Dark Himalayan Oakblue ♀ UP

145 b Dark Himalayan Oakblue UN

146 a Silverstreak ♂ UP

146 b Silverstreak ♂ UN

147 a Common Tinsel UP

147 b Common Tinsel UN

149 Yamfly ♂ UP

150 Branded Yamfly ♂ UP

151 a Common Onyx UP

151 b Common Onyx UN

154 a Monkey Puzzle UP

154 b Monkey Puzzle UN

155 a Common Imperial ♂ UP

155 b Common Imperial ♂ UN

155 c Common Imperial ♀ UP

156 Truncate Imperial UN

157 a Blue Imperial ♂ UP

157 b Blue Imperial ♂ UN



160 a



160 b



165



163



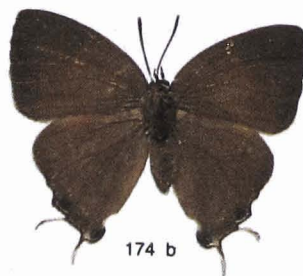
171 a



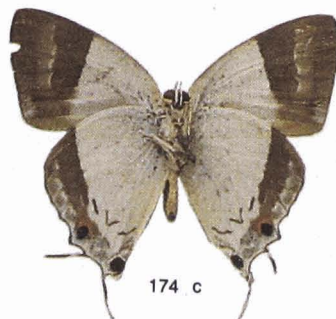
171 b



174 a



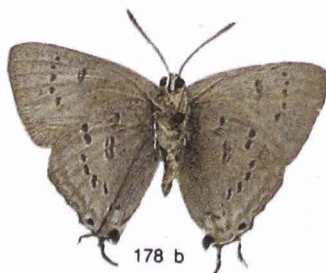
174 b



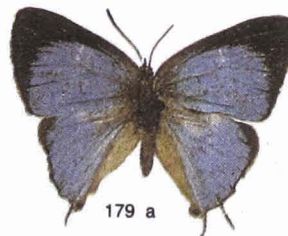
174 c



178 a



178 b



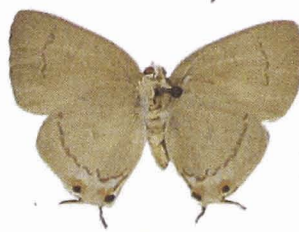
179 a



179 b



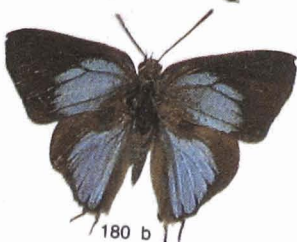
176 a



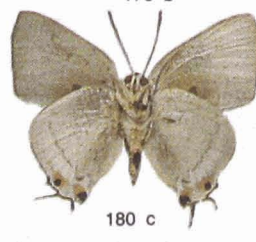
176 b



180 a



180 b



180 c

160 a Common Silverline ♂ UP

160 b Common Silverline UN

163 Club Silverline UN

165 Longbanded Silverline UN

171 a Spotted Royal ♂ UP

171 b Spotted Royal UN

174 a Banded Royal ♂ UP

174 b Banded Royal ♀ UP

174 c Banded Royal ♂ UN

176 a White Royal ♂ UP

176 b White Royal ♂ UN

178 a Bi-spot Royal ♂ UP

178 b Bi-spot Royal ♂ UN

179 a Whitebanded Royal ♂ UP

179 b Whitebanded Royal ♂ UN

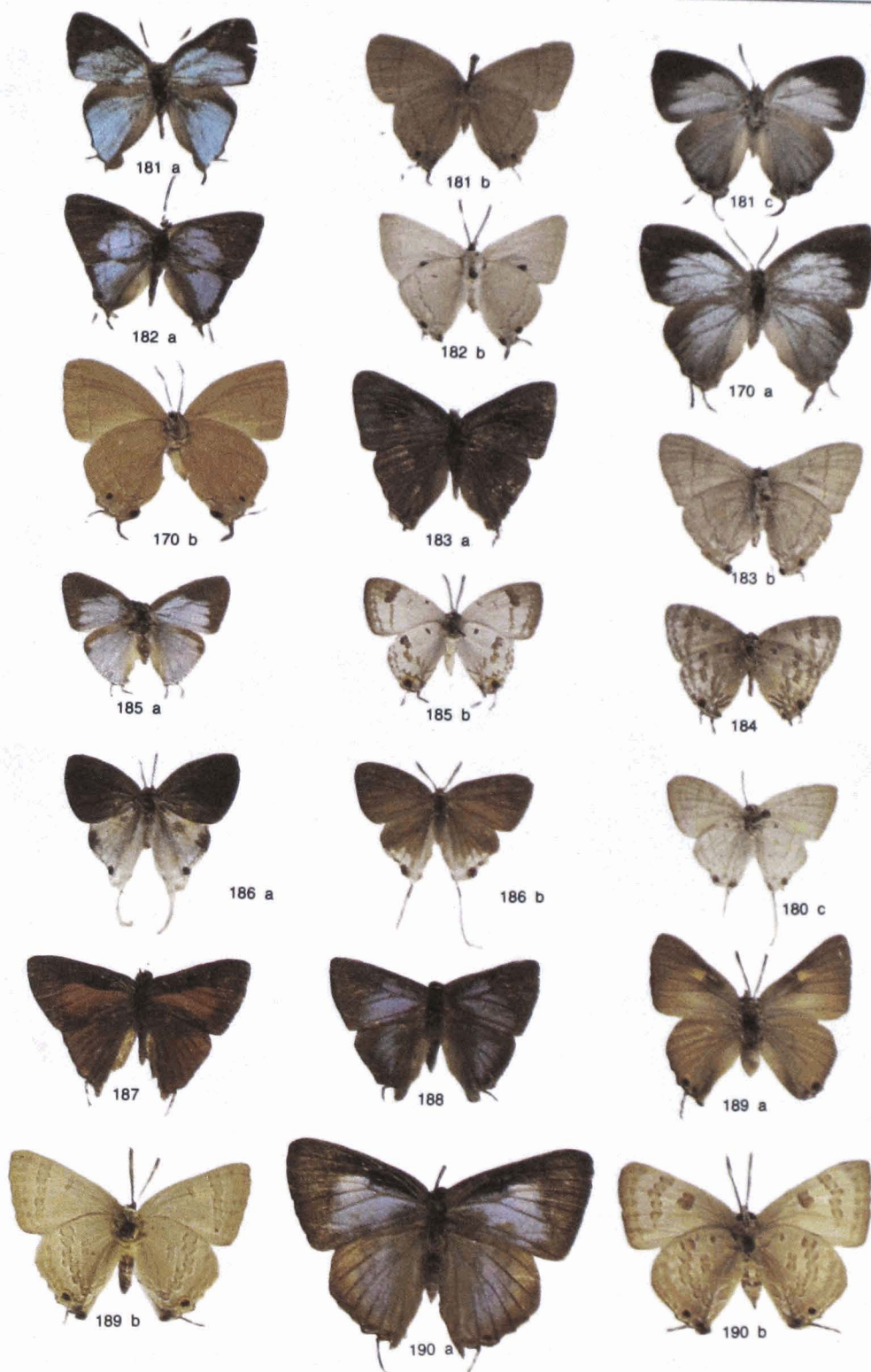
180 a Silver Royal ♂ UP

180 b Silver Royal ♀ UP

180 c Silver Royal ♂ UN

Scale : 5 cm

PLATE NO. 29



170 a Branded Royal UP

170 b Branded Royal UN

181 a Broad Tail Royal ♂ UP

181 b Broad Tail Royal ♂ UN

181 c Broad Tail Royal ♀ UP

182 a White Royal ♂ UP

182 b White Royal ♂ UN

183 a Common Tit UP

183 b Common Tit UN

184 Blue Tit UN

185 a Orchid Tit UP

185 b Orchid Tit UN

186 a Fluffy Tit ♂ UP

186 b Fluffy Tit ♀ UP

186 c Fluffy Tit ♂ UN

187 Cornelian ♂ UP

188 Green Flash ♂ UP

189 a Common Guava Blue UP

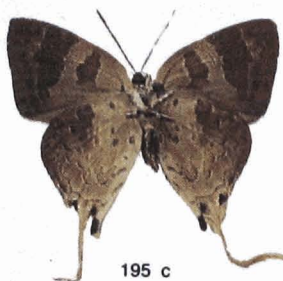
189 b Common Guava Blue UN

190 a Large Guava Blue UP

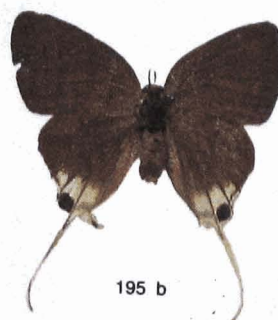
190 b Large Guava Blue UN



195 a



195 c



195 b



193



196 a



196 b



198



201 b



199



201 a



207



208 a



208 b



210 a



210 b

193 Narrow Spark

195 a Plane ♂ UP

195 b Plane ♀ UP

195 c Plane ♂ UN

196 a Indigo Flash UP

196 b Indigo Flash UN

198 Slate Flash UN

199 Scarce Slate Flash UN

201 a Common Red Flash ♂ UP

201 b Common Red Flash UN

207 Purple Sapphire UN

208 a Golden Sapphire ♀ UP

208 b Golden Sapphire ♂ UP

210 a Azure Sapphire ♂ UP

210 b Azure Sapphire ♂ UN

Scale : 5 cm



PLATE NO. 31



216, a



216 b



219 a



219 b



220



221 a



221 b



222



224



230



227 a



227 c



227 b



229 a



229 b



228 b



228 a



231 a



231 c



231 b



232 a



232 b

216 a Large 4-Line Blue ♀ UP

216 b Large 4-Line Blue ♂ UN

219 a Pale 4-line Blue ♂ UP

219 b Pale 4-line Blue ♂ UN

220 Transparent 6-Line Blue UN

221 a Opaque 6-Line Blue ♂ UP

221 b Opaque 6-Line Blue ♂ UN

222 Banded Line Blue UN

224 Tailless Lineblue UN

227 a Common Cerulean ♂ UP

227 b Common Cerulean ♂ UN

227 c Common Cerulean ♀ UP

228 a Metallic Cerulean ♂ UP

228 b Metallic Cerulean ♂ UN

232 b Glistening Cerulean ♂ UN

229 a Forget-Me-Not UP

229 b Forget-Me-Not UN

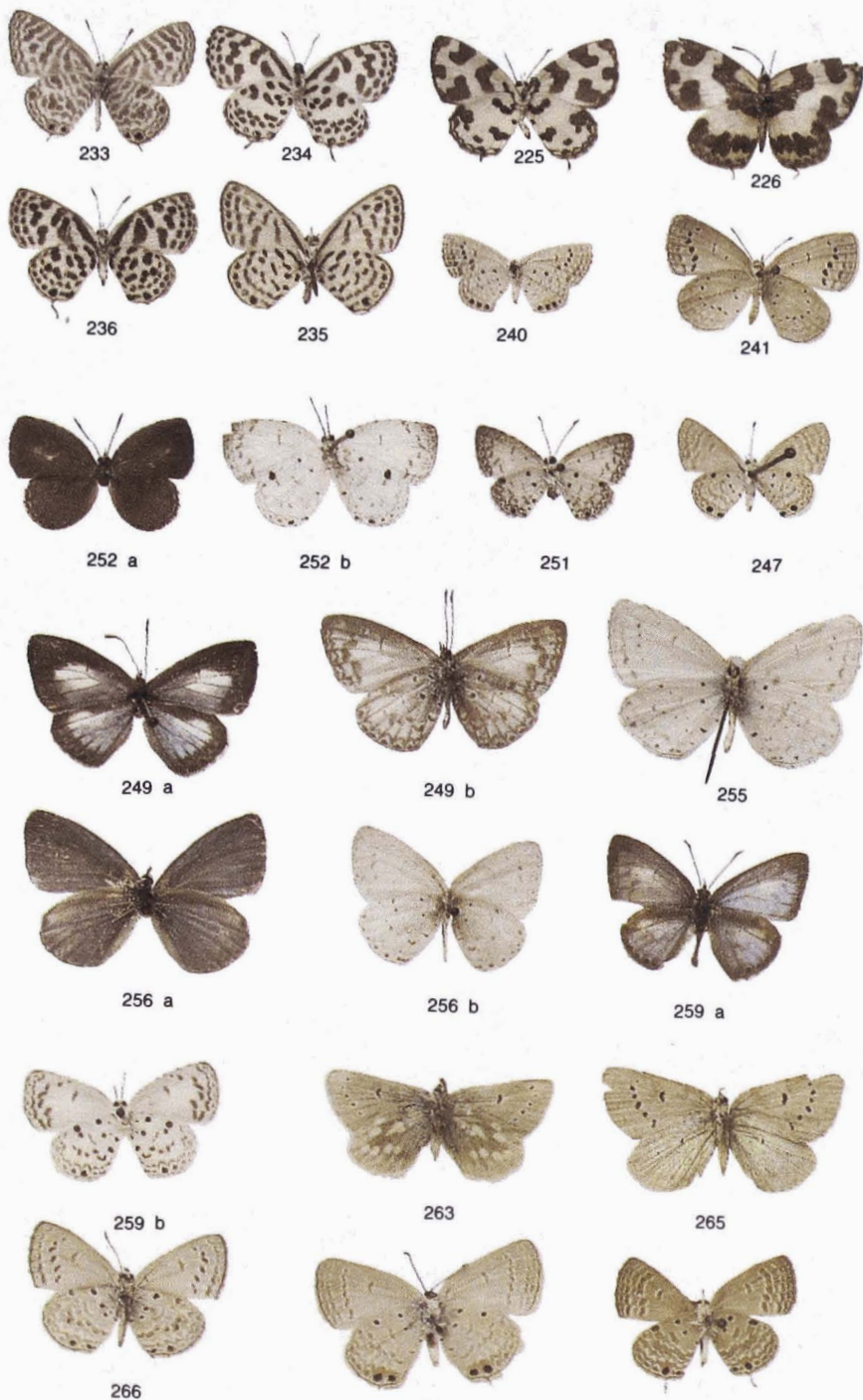
230 Peablu UN

231 a Dark Cerulean ♂ UP

231 b Dark Cerulean ♂ UP

231 c Dark Cerulean ♀ UN

232 a Glistening Cerulean ♂ UP



225	Angled Pierrot UN	247	Bright Babul Blue UN	256 b	Large Hedge Blue UN
226	Elbowed Pierrot UN	249 a	Margined Hedge Blue UP	259 a	Common Hedge Blue UP
233	Zebra Blue UN	249 b	Margined Hedge Blue UN	259 b	Common Hedge Blue UN
234	Common Pierrot UN	251	Quaker UN	260	Gram Blue UN
235	Striped Pierrot UN	252 a	Malayan UP	263	Mountain Blue UN
236	Dark Pierrot UN	252 b	Malayan UN	265	Chumbi Green Underwing UN
240	Grass Jewel UN	255	Pale Hedge Blue UN	266	Lime Blue UN
241	Pale Grass Blue UN	256 a	Large Hedge Blue UP	267	Plains Cupid UN

132 TAILLESS PLUSHBLUE*Flos areste* (Hewitson) 1862

SK-SS SK-AS R

WS- 40-44mm.

UN very similar to *A. asoka* but HW not tailed.UNF markings as in *A. asoka* but slightly broader.

Habits as those for the group.

133 SPOTLESS OAKBLUE

Plate No. 26

Narathura fulla ignara Riley**134 CENTAUR OAKBLUE**

Plate No. 26

Nilasera centaurus pirithous (Moore) 1883

SL,SI,KU-BU,AN KU-AS 1,2 NR

WS- 53-62mm.

Similar to the Large Oakblue (124).

UNF middle spot in the cell is completely surrounded by paler ring. **The discal band is continuous and curved towards the base.** UNH markings are blurred and indistinct. (130A widely distributed butterfly).

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Schliechera oleosa*.**135 VARIEGATED PLUSHBLUE**

Plate No. 26

Nilasera adriana De Niceville 1883

SK-SS 1,2 NR

WS- 38-44mm.

Similar to *A. asoka*. (130).

UNH **no metallic tornal green scales**. UNH basal area variegated, discal markings shining purple brown on a dark area.

According to DeN this is one of the commonest butterflies in Sikkim.

136 YELLOW DISC OAKBLUE*Panchala singla* (De Niceville) 1885

SK-KR 1,2 NR

WS- 44-48mm.

UP similar to others of the group.

UNF has a small round spot at the base, a large oval spot in the middle and a quadrate spot at the end-cell, above which there is a dark spot at the costa. **UNH has violet-whitish powdery indistinct markings.**

Habits as those of the group.

137 YELLOWDISC TAILLESS OAKBLUE*Arhopala perimuta perimuta* (Moore) 1857**138 DUSKY BUSHBLUE**

Plate No. 26

Acesina paraganesa paraganesa (De Niceville) 1882

KU-BH 1,2 NR

WS- 30-34mm.

UP dull violet-blue with 3-5mm border. Prominent spot end-cell and a whitish patch beyond. **UN white with chocolate-brown white edged markings.**

Very easy to distinguish from other butterflies but similar to *A. ganesa*. A recent record is from Nepal.

139 COMMON ACACIA BLUE

Plate No. 26

Surendra quercetorum quercetorum (Moore) 1857

SL,SI,DU-BU,AN DU-BU 1,2 NR

WS- 30-40mm.

M UP very dark brown blue with the middle of the disc of FW dark purple. **F brown, paler on disc of FW. M has only one tail at V2 and F tailed at V2 and V3. M and F UN dark brown with fine black markings; some of them are silver edged outwardly.** UNF has spot mid and end-cell and two costal spots.

Found in forested hilly regions at low elevations up to 1,200 m. The species flies strongly but never far. Hardly visits flowers or moist patches. Usually seen sitting on a branch or bark of a tree not much higher than the ground level. **M** are found almost throughout the year. **Fs** are commoner than **Ms**. We have recorded this species from west and east Sikkim and also from the Rangpo Valley.

LIFE HISTORY - **Larva** onisciform, light green in colour with a pink lateral band above the legs on each side. The sides banded obliquely with alternate light and dark green bands. Feeds on young shoots of the food plant. The larva is attended to by the ants. I have recorded at least two species of ants. Interesting observation is that the *Acacia* plants have a sweet gland on each leaf just near the axis which produce some ant attractants. The larva lies on such glands so when the ants come for these glands they attend the the larva also. Another interesting observation was the adults also sit on these glands and ants move around them. I saw two females and one male on one of the *Acacia* plants and were there at least for five hours on the same plant. In the afternoon when we returned to the same spot a pair was seen mating on the plant above the gland. **Pupa** is short and stout: brown in colour and is fastened by the tail.

LARVAL FOOD PLANTS - *Acacia megadal ena* and *Acacia suma*.

140 SILVERSTREAKED ACACIA BLUE

Plate No. 26

Surendra todara distorta De Niceville

SI,SK-DA SK-SS 1,2 NR

WS- 34-38mm.

M UP deep shining purple broad border of 2 mm to 5 mm at apex. UP **F** pale purple-blue. **M and F UN pale brown with vinous gloss, no cell spot or spot end-cell. UN waved with narrow silvery discal line.** One tail at V2.

Habits similar to those of the preceding species, but much less common.

LIFE HISTORY - **Larva** is very similar to that of the Common Acacia Blue but the third segment overhangs the second. **Pupa** is indistinguishable from that of the Common Acacia Blue.

LARVAL FOOD PLANTS - As for the preceding species.

141 SYLHET OAKBLUE*Amblypodia silhetensis silhetensis* Hewitson**142 SINGAPORE OAKBLUE***Amblypodia yendava* Smith**143 COMMON LEAF BLUE** Plate No.*Amblypodia anita anita* Hewitson 1869

SI,HI,BU 1,2 NR

WS- 50-55mm.

UP dark violet, UN leaf like markings.

A butterfly of forested region, in south India found during monsoons. Rapid flight for a short distance ; visits flowers of various plants like *Acacia*, *Leea* etc.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANT - Recorded in literature.

144 HEWITSON'S DULL OAKBLUE

Plate No. 27

Narathura aenea Hewitson 1869

SK-AS 1,2 R

WS- 46mm.

M UP bright violet-blue with 1.5 mm border. **F** purple with broad border. **UNH discal spot in 6 is much nearer to spot in 5. Spots in 5, 6 and 7 are in line. UNH has no tornal green scales.**

Recorded to be rare in Sikkim. Specimens have been collected by Moller in October and November.

145 DARK HIMALAYAN OAKBLUE

Plate No. 27

Narathura rama rama Kollar 1848

KA-DA KA-SK 1,2 C

WS- 38-40mm.

M UP dark violet-blue, almost black. **F**, purple with broad borders. **UNF** three indistinct spots in the cell and are not edged with pale border. **UNH** markings are very indistinct .

Habits similar to those of the others of the genus.

LIFE HISTORY - . Shown in the life sketches (Fig. VII. 1)

LARVAL FOOD PLANTS - *Quercus incana*.

146 SILVERSTREAK

Plate No. 27

Iraota timoleon (Stoll.) 1790

SI,GH-BU 1,2 NR

WS- 40-48mm.

M UP bright shining blue with broad dark border. **F** UP dark brown with shining purple lower discal patch on FW. **M** tailed at V1 and **F** tailed at V1 and V2. **M** and **F** **UN dark ochreous or reddish brown background.** **UNF** has a silver streak and discal spots. **UNH** usually has a broad irregular basal silver streak, obscure zig- zag discal markings. **UNH** markings, if present, are clear.

It may be more common than recorded, as it flies among foliage of trees, especially of Banyan and other *Ficus* species, which is its larval food plant. Very fast on the wing but seldom flies far. Found at low elevations in wet hilly regions, may be sparingly found up to 2,100 m. It has been earlier collected from Daling in May.

LIFE HISTORY - Larva feeds on young shoots of various fig plants.

LARVAL FOOD PLANTS - Skin of capsules (fruits) of *F. glomerata*, *Ficus benghalensis*, *F. religiosa* and fruits of pomegranate .

147 COMMON TINSEL

Plate No. 27

Catapaecilma elegans major Fruhstorfer

SI,OR, MU-BU MU-BU 1,2 NR

WS- 28-32mm.

M UP dark violet-blue, narrow dark border. **F** UP paler broad dark border. **Termin** scalloped and cilia prominently chequered. **Tails** at V1: 1 mm, V2: 4.5 mm. **M** and **F** **UN** grey brown with irregular black and silvery greenish metallic edged ochreous bands and spots.

Found in both thick jungles and in open forest patches in the hilly regions up to 1,800 m. Strong on the wing and is fond of settling on bare branches and twigs. Never visits flowers; visits damp patches. Recorded as common in Sikkim. **M** are seen more often than **F**s. One specimen was photographed by NDM at Legship

LIFE HISTORY - Life history of only south Indian subspecies is known. **Egg** not described. **Larva** feeds on 'Kindal'. Flattened head and tail segments look very similar to the plant, colour is dirty green with a patch of dark green in the centre of the back. It is also mottled a good deal all over. **Pupa** is fastened by the tail along a leaf, narrow, without any projections of any kind. It is greenish brown in colour and dotted minutely with darker brown.

LARVAL FOOD PLANTS - *Terminalia paniculata* in south India.

148 DARK TINSEL

Catapaecilma delicatum De Niceville 1887

SK-AS 1,2 R

WS- 28-32mm.

M UP smoky purple with obscurely violet shot. **F** as in the preceding species. UN chrome yellow, no bands or spots, densely streaked with black, bearing greenish silvery metallic scales.

Habits similar to those of the preceding species. Strictly confined to Sikkim. Very rare; collected in April and May.

149 YAMFLY

Plate No. 27

Loxura atymnus continentalis Fruhstorfer

SL,SI,CI,MU-BU CI,MU-BU 1,2 NR

WS- 36-42mm.

UP, orange with a broad black apex and border on FW. Border narrow or absent on HW. **HW long tailed**. UN ochreous.

Generally common in the wet season. It flies weakly, for short distances, alighting immediately on a nearby low bush. Sometimes basks early in the morning or after rains. Seen along the forest paths and in clearings. In the Himalaya, particularly in Sikkim, it has been recorded as common throughout the year at lower altitudes, although I have not come across this species so far.

LIFE HISTORY - **Larva** is wood louse-shaped and dull green in colour, suffused with pink and resembles the young leaves of its food plants. Larva attended to by red ants. **Pupa** is pale green in colour and the edges of wing cases are marked with pinkish purple. It is fastened by the tail and a band, is blunt and longish.

LARVAL FOOD PLANTS - *Dioscorea pentaphylla*.

150 BRANDED YAMFLY

Plate No. 27

Yasoda tripunctuata (Hewitson) 1863

SK-BU 1,2 NR

WS- 32-40mm.

Similar to the Yamfly (149).

UPF with black bar end-cell and three discal spots. UPH black bar end-cell and oblique discal band. **M** can be distinguished by the HW being longitudinally folded in the neighbourhood of the "sexual mark" in 1b, which is marked inwardly by the conspicuous narrow orange line.

Habits similar to those of the group. Rare in Sikkim.

151 COMMON ONYX

Plate No. 27

Horaga onyx onyx (Moore) 1857

SL,SI,KN-SB,AN KN-SB 1,2 NR

WS- 30-33mm.

UP blue with white discal patch. UN dark yellowish or greenish; **prominent white band across both the wings. Tails at V1: 2mm, at V2: 4mm and V3 short, 1 mm. M UNF with a band along the basal half of the V1.**

Found in thick hilly country. Flight weak and for short distance. Does not come out into open much nor settles on flowers or damp patches. Rests and basks on leaves close to the ground. In the Himalaya it is rare. Flies before and after rains in the foothills and up to 2,000 m.

LIFE HISTORY - Larva curious looking creature, about 2 cm long; reddish brown with some green and brown markings, like most Lycaenids, but furnished with eleven tentacular processes. **Pupa** short and thick, anteriorly green and wing cases dark brown. The abdominal segments also brown. The sides of the back and body green.

LARVAL FOOD PLANTS - *Coriaria nepalensis*.

152 YELLOW ONYX

Horaga moulmeina (Moore) 1883

153 BROWN ONYX

Horaga viola Moore 1882

154 MONKEY PUZZLE

Plate No. 4 & 27

Rathinda amor (Fabricius) 1775

SI-AS 1,2 NR

WS- 26-28mm.

UP, dark brown with white spot end-cell and usually narrow white spots in 2 and 3 forming a short band on FW. On UPH two black tornal spots and narrow dark reddish spots above them. UNF white to dark yellowish brown, some irregular dark basal markings, a curved white discal band beyond which the apex is ochreous-brown. **UNH covered with numerous irregular markings. HW tailed at V1: 2 mm, V2: 6 mm and V3: 2,5 mm.**

Insect of thick jungles, very common up to 900 m particularly where the food plants are found. The flight is weak and short. Always flies low down. Keeps to undergrowth. Could be seen along the forest paths and clearings. I have come across this species in other parts of the country, particularly in the Western Ghats. DeN has never come across this specimen in Sikkim.

LIFE HISTORY - Larva pale green in colour with a line of long pink protuberances along the back, the last curved outwards and upwards, two protuberances curved outwards on the side of last segments, and one on the fourth segment a straight, sharp pointed. The line of dorsal protuberances branches near the head into two. Feeds on Euphorbiaceae. *Hopea* and 'Pitkuli' *Ixora* flowers and young shoots of *Eugenia zeylanica*, Garden croton, etc. **Pupa** green, becoming brown as it nears emergence. Back of abdomen pink and larva perfectly smooth and fastened by a long stalk by tail. It resembles a monkey's head, hence the name Monkey Puzzle.

LARVAL FOOD PLANTS - *Ixora* sp., plants of Rubiaceae, Dipterocarpaceae, Euphorbiaceae, Loranaceae, Sapindaceae and Myrtaceae.

155 COMMON IMPERIAL

Plate No. 27

Cheritra freja freja (Fabricius) 1793

SI,SL,KU-TA KU-TA 1,2 NR

WS- 38-42mm.

UP dark brown. **M** with purple tinge, HW tornal area with black spots and metallic scales. **Tail at V1 is 5mm and at V2 is 22mm. M** UN ochreous, darkening at the apex, and termen of FW and HW. **F** UN white, outwardly ochreous. UNF discal line ochreous.

A hill insect. Flutters weakly at the edge of the jungles and in forest clearings. Flies off fast when disturbed and settles on top of a tree well out of reach. Basks on top of a tree with wings wide open. I have come across this species in the Teesta Valley at Mangan and Tumlin.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Xylia xylocarpa*, *Saraca asoca* and *Cinnamomum* and *Ixora* spp.

156 TRUNCATE IMPERIAL

Plate No. 27

Cheritrella truncipennis De Niceville 1887

SK-KR 1,2 R

WS- 32-36mm.

M UP dark purple with black apex and termen. **F** paler blue. Two discal spots on UPF. **M and F UN** pale brown with irregular dark markings. Two tails **V1: 4 mm and V2: 13 mm**. The FW termen truncate just above the middle to apex.

Habits similar to those of the preceding species.

157 BLUE IMPERIAL

Plate No. 27

Ticherra acte (Moore) 1857

KU-BU 1,2 R

WS- 34-38mm.

M UP dark purple-blue with 1 mm border. Black tornal spots on the UPH coalesced and crowned by two white spots. **F** dark brown, UN similar to that of the Common Imperial. WSF bright orange marked faintly. DSF brown with more prominent markings and some obscure central markings. **Tails at V1b: 5 mm and V2: 18 mm**.

Common in Sikkim during rainy season. Only one specimen was encountered by me at Tumin.

158 BLUE POSY

Biduanda melisa cyara (Hewitson) 1878

SK-BU SK-NB 1,2 R

SILVERLINES

These are very pretty insects. The **Ms** are generally bluish or brown on the UP. On the UN both the sexes have, either on white or a pale background, dark bands which are encrusted with thin silvery lines. The WSF are darker while the DSF are paler. HW bears two tails.

These are low-flying butterflies; visit various species of low-growing flowers. In south India they are particularly fond of *Leea* and *Alternanthera* spp. The flight is quick, often one cannot relocate the butterfly after it is disturbed.

They are very abundant in the wet season; visit damp patches. There are about 12 species in India of which 6 occur in Sikkim. The life-history of most of these butterflies is yet to be studied.

159 KHAKI SHOT SILVERLINE

Spindasis ictis (Hewitson) 1865

SL,IN 1,2 NR

160 COMMON SILVERLINE

Plate No. 28

Spindasis vulcans fusca Moore 1881

SL,IN,BU 1,2 NR

WS- 26-34mm.

Similar to the preceding species.

UN without brick red bands. Seasonal forms known, WSF pale yellow with black edged dark yellow bands. Autumn form: UN khaki with black edged bands of similar colour. Spring form UN khaki, bands indicated by only silverlines. UNH outer basal band broken into three spots. Habits as those of the group. Rare in Sikkim.

161 SILVERGREY SILVERLINE

Spindasis sani De Niceville 1888

WS- 36-42mm. 1,2 NR

M and F UPF with black spotted orange areas, M shot with blue. UN pale yellow with conspicuous black-edged red bands, with silver laden. UNH the outer basal band continues.

Habits as those of the group. Recorded as common at lower altitude in Sikkim. In south India very common during monsoons.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Plectronia parviflora*, *Zizyphus rugosa*, *Z. jujuba*, *Allophylus cobbe*, *Clerodendrum indicum*.

162 KHAKI SILVERLINE

Spindasis rukmini De Niceville 1888

SK-AS 1,2 NR

WS- 33-38mm.

UN khaki with narrow dark bands. UP brown, with FW blue shot and without orange spot.

Habits as those of the group

163 CLUB SILVERLINE

Plate No. 28

Spindasis syama peguanus Moore 1884

OR, WG, SK-BU

WS- 26-40mm.

UNF base of the cell with a continuous club shaped streak.

Habits as those of the group.

164 ELWES'S SILVERLINE

Spindasis elwesi Riley

KM-AS 1,2 R

WS- 26-42mm.

UN yellow with broader black bands. M UPF blue shot with orange spot and F brown with orange spot UPF.

Habits as those of the group.

165 LONGBANDED SILVERLINE

Plate No. 28

Spindasis lohita himalayanus Moore

SI,SI-BU,AN SI-NB 1,2,3 NR

WS- 30-42mm.

UN creamy yellow to cinnamon-red with black to red bands. UNH outer basal band joins or almost joins lower end of the central band. UNF fourth and fifth bands from the base are joined to form a V-shaped marking.

Habits similar to those of the group. Recorded to be common in Sikkim. A few specimens were seen in the Rangpo Valley.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Terminalia paniculata*, *Dioscorea pentaphylla*, *Xylia* sp.

ROYALS

Beautiful medium-sized butterflies. On the upperside they have metallic blue to azure blue colour, with a varying black border. On the underside they are either pale brown, silvery or some shade of grey or brown and marked with darker discal lines and spots. HW is tailed and lobed. On the underside they resemble the Flashes.

They are very shy forest butterflies, generally do not come down to the ground but remain in the upper foliage of trees. Hence it is difficult to see them and may seem to be very rare butterflies. They are found near the food plant, *Dendrophthoe* and *Viscum*, which are epiphytes. They do not visit flowers, but come down to damp patches and water to drink, when they can be easily caught. Again in Sikkim these are highly diversified insects and as many as 17 species are known from Sikkim.

166 STRAIGHTLINE ROYAL

Iolaus diaeus Hewitson 1865

167 DARK BLUE ROYAL

Pratapa icetas extensa Evans

KN-BU SK-DA 1,2 NR

168 PALLID ROYAL

Tajuria albiplaga De Niceville 1887

169 CHESTNUT AND BLACK ROYAL

Tajuria yajna isotroidea De Niceville 1887

170 BRANDED ROYAL

Plate No. 29

Tajuria melastigma De Niceville 1887

171 SPOTTED ROYAL

Plate No. 28

Tajuria maculata (Hewitson) 1865

SK-BU 1,2 R

WS- 36-44mm.

M:UP pale blue turning whitish on disc on FW and beyond cell on HW. F white with border as in M. UN has several large irregularly placed black spots.

In Sikkim it has been recorded between 1,000-1,200 m. Rare

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Viscum* or *Dendrophthoe* sp. May be attended by ants.

172 SLATE ROYAL

Maneca bhotea (Moore) 1884

SK-AS 1,2,3 NR

173 PALE GRAND IMPERIAL

Jacoona fabronia (Hewitson) 1878

174 BANDED ROYAL

Plate No. 28

Charana (=Rachana) jalindra indra (Moore) 1883

SI,SK-DA 1,2 NR

WS- 36-44mm.

M UP shining violet-blue, with border 1-3 mm at apex. **F** dark brown but in subspecies *indra* UPH has white subterminal line in 1c to 2. UN **white with broad chocolate discal band**, HW **tornal scales more prominent**. White diffused area beyond discal band is more extensive.

Habits as those for the group.

Somewhat rare in Sikkim.

LIFE HISTORY - **Larva** uniform dark brown, suffused with grey; 3 and 4 segments are sometimes light brown. **Pupa** fastened along a leaf. Four abdominal ridges, head chiefly brown; wing covers are greenish. Abdomen ground colour greenish marked with pinkish brown, while the thorax has some white markings. When looked at from above, has the appearance of human head.

LARVAL FOOD PLANTS - *Dendrophthoe elastica*.

175 MANDARINUS BLUE*Charana mandarinus* (Hewitson) 1869

SK-BU 1,2 NR

176 WHITE ROYAL

Plate No. 28

Tajuria illurgis (Hewitson) 1869

MU-BU 1,2 R

177 CHOCOLATE ROYAL*Ramelana jangala ravata* (Moore) 1869

SK-BU 1,2 NR

WS- 32-42mm.

M UP brown with UPF blue in lower half of the cell to basal half of 1a and 1b. **M** UPH chocolate and **F** yellow to pale ferruginous. UNH tornal spots crowned with metallic green line.

Ms are fond of settling on damp patches during hot dry summer months, often seen in large numbers at such places. Common up to 1,000 m from May to November. In Sikkim species there is considerable variation seen on the UN.

178 BI-SPOT ROYAL

Plate No. 28

Ancema ctesia (Hewitson) 1865

KU-DA 1,2,3 NR

WS- 38-40mm.

M UP bright shining blue. UPF a large black spot below the end of the cell in area 2 and 3 and another mid 1b. **F** purple blue turning white towards the apex. **M** and **F** UN polished silvery grey, with a discal series of separate black spots, broad bar end-cell and prominent spot mid 7 on UNH.

The **Ms** are fond of visiting damp patches, and are recorded to be common from June to October in Sikkim.

179 WHITEBANDED ROYAL

Plate No. 28

Ancema(=Pratapa) cotys (Hewitson) 1865

SK-BU 2,3 NR

WS- 33-37mm.

Ms UP pale shining azure blue with border 0.5-5 mm at apex. **UPH** with white patch mid costa. **F** UP paler with prominent white patch end-cell on FW. **M** and **F** UN pale brown with white band broadening towards dorsum and costa. Lot of seasonal variation in band width.

Habits similar to others of the genus. A rarer species in Sikkim.

180 SILVER ROYAL

Plate No. 28

Ancema blanka argentea (Aurivillius) 1897

SI,SK-DA SK-DA 1,2,3 NR

WS- 30-40mm.

M UP shining blue, brand on HW large and dark. **UPF** has blue streaks on the black apex. **UN** highly polished silver. **UNF** outer discal line faint and continuous, **UNH** with top bar of outer discal line shifted in. **F** UP pale blue. **UN** white with ochreous tinge.

Habits similar to those of others of the genus.

181 BROAD TAIL ROYAL

Plate No. 29

Camena cleobis (Godart) 1823

SI,DU-DA 1,2 NR

WS- 27-38mm.

M UP pale shining sky blue, apex very broadly black and border thread-like at tornus. **F** pale blue and **UPF** with less extensive black at the apex. **M** and **F** UN pale brown. **UNF** discal line straight at costa, lower part curved nearer end-cell than termen. **HW** inner tail broad.

Habits similar to those of the others. Visits flowers of *Poinsettia*. Occurs below 1,200 m.

LIFE HISTORY - **Eggs** are either laid on the stems or on the **UN** of the leaves. Spherical in shape with honeycomb-like indentations. Full grown **Larva**, if seen from the front or the side, its hump or hood forms a perfect fish head with mouth open and two small black dots like eyes. Laterally a black band has the appearance of a bow, extending from about the first segment, arching upwards just posterior to subdorsal dots. **Larva** just before pupating has the appearance of shrivelled leaf and lies at the end of the petiole with head downwards. **Pupa** is dark brown, resembles a brown dead twig.

LARVAL FOOD PLANTS - *Dendrophthoe elastica*, *Viscum capitellatum*.

182 WHITE ROYAL

Plate No. 29

Camena deva lila (Moore) 1883

SL,SI,MU-DA,AN MU-DA, AN 1,2 NR

WS- 32-40mm.

M UP shining blue but paler in WSF. **UPF** border prominently angled mid 1b and continued along dorsum. **HW** brand large and very conspicuous on a dark area. **F** UP greyish blue with veins of **HW** prominently dusky blue. **M** and **F** UN cream coloured. **Outer discal line disconnected, top bar of the line on HW shifted out.**

Found in woody and hilly regions up to 2,000 m in the Himalaya. Prefers to keep to the upper foliage and hence not easy to locate. In Sikkim it has been recorded to be rare.

LIFE HISTORY (Fig. VII. 3) **Larva** dull greenish with a pink tinge on the sides and black ridges, resembles in an extraordinary way the leaf of food plant *Dendrophthoe*, so much so that one has to examine the plant again and again before it can be located; wood louse shaped, but with a distinct sharp ridge on the back making the cross section almost triangular. **Pupa** attached by tail end, white coloured with a broad lateral abdominal band meeting across segment 5 dorsally. Head blunt, wings white, with green-brown longitudinal streak. Belly white, the whole surface of pupa is oily-looking.

LARVAL FOOD PLANTS - *Scurrula parasitis*, *Dendrophthoe tomentosa*, *Dendrophthoe longiflorus* (Loranthaceae).

183 COMMON TIT

Plate No. 29

Hypolycaena erylus himavantus FruhstorferSK-BU,AN SK-BU 1 NR
WS- 32-36mm.

M UP, pale blue to dark brown, dark shining purple depending on the light. Black border, UPF has a large black discal area of modified scales. **F** dark brown, HW has white disconnected discal band above tornus. Tonal black spot in 2 is white-edged. Both sexes **UN pale greyish brown. Double bar end-cell, discal line regular on FW and broken and less regular on HW. On UNH no spot in the basal area of 7. Tails at V1: 6 mm and at V2: 5 mm.**

Abundant at low elevations. The **Ms** settle in large numbers on damp patches. **Fs** not often seen.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Meyna pubescens*.

184 BLUE TIT

Plate No. 29

Chliaria kina cachara (Moore) 1883DU-BU SK-DA 1,2 NR
WS- 26-29mm.

M pale blue UP with broadly dark bordered. Inner portion of the black border shot iridescent purple blue. **F** UP dark brown, discs whitish. **M** and **F** **UN grey background, markings of same colour but with black edges.** On UNF no black spot on costa above mid- cell. On UNF discal band broken at 4. On UNH the upper spot of discal band not black as in ssp *C. kina. kina* as shown in the plate, but rest of the marking are the same.

Blue Tits are known to associate with *L. puspa gisca*, which they resemble, and may be mimics also. Doherty writes he could not distinguish them till he had them in hand. But I do not feel there is so much of a resemblance. We have a specimen collected from West Sikkim.

LIFE HISTORY - **Larva** pale bright green, head yellowish brown covered with scattered pin hair. A dorsal reddish pink stripe, wider at both ends, two stripes of the same colour on either side between dorsal and abdominal stripes. Larva feeds on the flowers of Fox-tail orchid. **Pupa** is green in colour.

LARVAL FOOD PLANTS - *Rhynchostylis retusa* (Orchidaceae).

185 ORCHID TIT

Plate No. 29

Chliaria othona (Hewitson) 1865SI,DU-BU 1,2 NR
WS- 24-27mm.

M UP pale blue with apical broad black boarder. **F** UP dark brown, lower part of the disc on FW may be whitish. HW tonal area broadly bluish white crossed by dark veins. **Ms** and **Fs** **UN white, with markings brown and black edged. Prominent black spot above mid-cell on UNF. Prominent spots at the base of 7 on UNH. Tails at V1: 4 mm, V2: 2 mm, thin.**

Found in thick forests, particularly around their food plants. Flight weak; do not fly far when disturbed. They generally sit with wings closed and parallel to the sun's rays to absorb maximum radiation. Nowadays it is also found in gardens where orchids are grown. Occasionally visits flowers and damp patches. Found up to 1,800 m. **Fs** are rare, possibly because they remain near the tree-tops where food plants are found, and escape notice.

LIFE HISTORY - **Larva** onisciform, green with rosy red dorsal band and three wavy lines of the same colour on each side. Head is concealed. Whole surface clothed with minute bristles and anal segment extended into distinct short protuberances. Feeds on flowers. **Pupa** fastened along the stem of the orchid. It is smooth and greenish grey, as that of common Lycaenid type. Slightly marked with white and with generally a distinct wavy mark on the wing covers.

LARVAL FOOD PLANTS - *Cottonia peduncularis*, *A. crispum*, *Rhynchostylis retusa* (Orchidaceae).

186 FLUFFY TIT

Plate No. 29

Zeltus amasa (Fabricius)

SK-BU 1,2 NR

WS- 28-32mm.

M UP pale blue powdery on FW base, with broad black apex and border. HW shot deep purple. **F** dark brown, UPH obscure white disconnected discal line. Long fluffy tail, at V1: 13 mm, V2: 7 mm. **M** and **F** UN bluish white, apices broadly pale ochreous-brown, markings darker, double lines end-cell, a narrow discal line continuous on FW and broken at 3, 4, and 6 on HW. UNH prominent spot in base of 7, ternal spots not crowned with orange.

Confined to hot wet forests of low elevations. In flight it reminds one of the male Paradise Flycatcher flying through the thickets in the forest. Flies gracefully in sunny patches quite close to the ground. Flight is weak, flies for a short distance and settles down again. **Ms** have not been recorded at flowers. But they come to damp patches or on leaves about 2 m from the ground, from which they take short flights. DeN writes: 'It flies rapidly and reminds me of a blue bodied dragonfly. It is possible that this butterfly has mimicked *Libellula* sp'. I found one **F** on a damp patch feeding on moist ground. It was sitting with its body parallel to the sun's rays. On approaching closer it flew a few metres away and settled again. When it was disturbed there it came back near the old place but kept moving within a short distance from the stream.

LIFE HISTORY - Larva green, hairy, depressed. Head black and marked with short red and black lines. Three anal segments are flattened dorsally and marked crimson above. Pupa is yellowish green with head and thorax emerald green.

LARVAL FOOD PLANTS - Orchidaceae?

187 CORNELIAN

Plate No. 29

Deudorix epijarbus amatius Fruhstorfer

SL,SI,CH-BU,AN,NI SK-BU, AN,NI 1,2,3 NR

WS- 34-38mm.

Similar to the Red Flashes (201 and 202).

M UP red with broad brown costa and tornus of FW and cell black. HW basal costal area dark, veins black on the disc. **F** UP, brown, FW disc paler. **M** and **F** UN usually dark brown with white edged cell bars and broad white edged discal band of the ground colour or slightly darker. HW lobe black. **Black ternal spot with yellow ring.** Tail at V2 thin.

Flies extremely fast; visits flowers, damp patches; settles on low bushes. The **M** basks with wings partly open, on top of the trees. Found up to 2,500 m in both jungle and open country.

Sometimes it is a pest on pomegranate and other fruits. In the Western Himalaya feeds on Horse Chestnut.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - Fruits of pomegranate, *Sapindus emarginatus*, *Aesculus indicus*, *Connarus wightii*, etc.

188 GREEN FLASH

Plate No. 29

Artipe eryx (Linnaeus) 1771

SK-BU,AN 2,3 R

WS- 35-45mm male and 45-60mm F.

M UP shining blue with dark border; lobe is green tipped. **F** dark brown with green lobe. **M** and **F** UN emerald-green with a narrow white discal line and end-cell bars. In **F** ternal area of HW is broadly white.

Very easily recognisable by its green UN,

DeN writes: "It provides very good camouflage for **M**, but one wonders why **F** has a white patch on the HW". It would be interesting to study its ecology.

LIFE HISTORY - It is similar to that of the Common Guava Blue.

LARVAL FOOD PLANTS - *Gardenia anusta* in Hongkong.

189 COMMON GUAVA BLUE

Plate No. 29

Virachola isocrates (Fabricius) 1793

SL,IN,BU 1,2,3 NR

WS- 40-44mm.

M UP dark fuscous, sometimes paler on the disc, shot brilliant violet-blue on lower parts of the discs of FW and most of HW. Tonal spot usually present. **F** paler and darker towards the end-cell of FW, beyond which there is an ochreous patch and sometimes a similar tonal patch. **UN** both sexes are pale brown, **markings slightly darker than the ground colour, and white edged discal band and tonal bands.** **UNF** discal band continuous, **UNH** no spot at base 7. **UNF** no spot in cell or at base 7. **M** with brand on UPH at 6.

Found at lower altitudes, with low rainfall. Flight is very rapid and powerful. Visits flowers readily. **Ms** bask on high trees on top of hills.

LIFE HISTORY - Larva blackish with large brown head. Feeds on fruits of *Catunaregam* and guava. Larvae are attended by ants *Formica nigra*, which clear away droppings and act as sweepers. They also act as guards to the pupae. About the larva Aitken writes, "I have taken a pomegranate infested with larvae (several in one fruit) and made it stand in an egg cup. In the morning the fruit was so securely fastened that on picking the fruit the cup was lifted along with it".

LARVAL FOOD PLANTS - *Punica granatum*, *Psidium guajava*, *Eriobotrya japonica*, *Catunaregam nutans*, *Catunaregam uliginos*

190 LARGE GUAVA BLUE

Plate No. 29

Virachola perse perse (Hewitson) 1863

SL,SI,KN-BU,OR KN-BU 1,2,3 NR

WS- 48-52mm.

M UP shining blue with broad dark brown border, **cell of FW black beyond which often there is a orange patch.** **F** blue more extensive and paler, whitish or yellow patch beyond cell of FW. **M** and **F UN** pale brown often purple washed, **markings darker and outwardly black and white edged.** **Discal band consists of linked spots and bent on FW above the middle.**

Habits as those of the preceding species, but more of a forested species and nearly always found in forested regions.

LIFE HISTORY - Similar to that of the preceding species.

LARVAL FOOD PLANTS - *Catunaregam nutans*

191 PALE SPARK*Sinthusia virgo* (Elwes) 1887**192 BROAD SPARK***Sinthusia chandrana grotei* Moore**193 NARROW SPARK**

Plate No. 30

Sinthusia nasaka amba (Kirby) 1878

KN-BU SK-BU 1,2 R

WS- 28-32mm.

M, **UP** very deep blue with black border. The blue on FW restricted to base only. **F** dark brown **UP.** **M** and **F UN** pale grey with bars end-cell and narrower than in *S. chandrana* and more regular and white-edged outwardly, while in *chandrana* white-edged on both sides.

A forest insect, flight rapid. Frequents shrubs and bushes in the hills up to 2,000 m.

194 **WITCH**

Araotes lapithis (Moore) 1857

1,2 NR

195 **PLANE**

Plate No. 30

Bindahara phocides phocides (Fabricius) 1793

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

WS- 36-40mm.

Similar to the Imperials (155-157).

M UP dark brown, **HW** with long yellowish brown tail; **tornal area with blue margin on HW**. **F** dark brown tornal area, lobe and tail white. Prominent marginal spot in 2 of **HW**, **M UN** yellowish brown and **F** white. Both with **very broad discal band and band through the cell, which is usually dark brown, and irregular discal band on HW**.

One of the most beautiful species of *Lycaenidae*. Found in evergreen regions of heavy rainfall, seldom emerges from thick forests. **Ms** are fond of flowers.

LIFE HISTORY - **Larva** resembles that of *V. isocrates* but with a dorsal and lateral dark purplish brown patch on segments 7 and 8. **Pupa** is indistinguishable from that of *V. isocrates*. It is brown with dorsal and lateral black lines, surface rough, covered with pits and furnished with a few bristles.

LARVAL FOOD PLANTS - Fruits of *Salacia*, a creeper belonging to the family *Celastraceae*.

196 **INDIGO FLASH**

Plate No. 30

Rapala varuna oresis Moore

SL,SI,KN-BU,AN,NI SK-BU,AN 1,2 NR

WS- 28-32mm.

M UP dull shining blue shading to dark border on **FW**. **F** UP pale shining steel blue, darker border. Both sexes **UN** ground colour slaty blue, often with purple or greenish gloss, almost white in **DSF**. **FW** discal band white-edged on both sides markings usually broad. **HW** discal band generally curved and parallel to termen. **Bar end-cell usually close to or touching discal band**. Width of markings variable.

M with pale circular brown brand. Tuft black or brown, **UPF** bases of veins 2,3, and 4 denuded scales and usually darkened.

Found both in the hilly regions as well as in the plains. Locally common. Fond of visiting flowers.

LIFE HISTORY - **Larva** similar to that of the Slate Flash (198); green, diagonal line pure white. Fifth segment very dark green, in some cases almost black, forming band. Feeds on flowers and sometimes seen attended to by ants. **Pupa** also is similar to that of the Slate Flash.

LARVAL FOOD PLANTS - Flowers of *Zizyphus xylophora*, *Zizyphus rugosa* (*Rhamnaceae*), *Quisqualis indica* (*Com.*), *Sapindus laurifolius* (*Sapindaceae*).

197 **REFULGENT FLASH**

Rapala refulgens De Niceville 1891

NE-BU 1,2,3 NR

WS- 31-33mm.

Similar to the Indigo Flash (196).

M UP shining purple. Broad black border and apex on **FW**. **F** UP paler and black border narrower. **M** and **F UN** pale brown, markings obscure and white edged on both the sides. **FW** apex and **HW** tornus more produced than in the others of the genus.

Habits similar to those of the genus.

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 megadalaena*, *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 1890**200 SHOT FLASH***Rapala buxaria* De Niceville**201 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* HW all red. **UNH spot in 2 prominently orange crowned** and in *R. melampus* not prominently orange crowned. **F** UP coppery brown with black border, in *R. melampus* paler red.

Habits as those of the genus.

LIFE HISTORY - Larva ochreous, considerably marked with black, ornamented with sub-dorsal and a lateral series of tubercles bearing thick brushes of short black bristly hair. All the segments of nearly equal width. Larva is flattened, the constrictions between the segments not very prominent. **Pupa** brownish yellow sprinkled with black dots, smooth and of the usual Lycaenid type.

LARVAL FOOD PLANTS - *Rubus* sp.**202 COMMON FLASH**

Plate No.

Bidaspa nissa nissa (Kollar) 1848

KA-BU KA-SK

203 COPPER FLASH*Vadebra petosivis* Hewitson

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 phalaeeas 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

216 **LARGE 4-LINE BLUE**

Plate No. 31

Nacaduba pactolus continentalis Fruhstorfer

SL,SI,SK,BU,AN,NI SI,SK-BU 1,2 NR

WS- 34-38mm.

M UP dark purple-brown, border narrow. **F** UP purple-blue variable, paling outwardly. **M** and **F** UN no prominent black apical spot. All markings are equally prominent. UNF inner submarginal line broad, diffused, complete and yellowish. UNH submarginal spots consist of strigae.

Found up to 2,800 m. Insect of thick, moist forest and heavy jungle. Flies rapidly and strongly and settles often on the bushes. **Ms** occasionally visit flowers. and moist patches, where a congregation can be seen. They also feed on droppings. **Fs** fly high around the food plants, which are creepers of the higher canopy.

LIFE HISTORY - **Egg** is very flat when viewed laterally, laid in the forest canopy where young leaves are found or on seedlings. **Larva** is a honey yellow creature, feeds on very young leaves. Ants have been recorded attending the larvae, but very rarely. The larvae are covered with dorsal hair which are paired.

LARVAL FOOD PLANTS - *Entada pursaetha* (Leguminosae).

217 **VIOLET 4-LINE BLUE**

Nacaduba pavana vajuva Fruhstorfer

218 **POINTED LINE BLUE**

Nacaduba helicoïn meriguiana Moore

219 **PALE 4-LINE BLUE**

Plate No. 31

Nacaduba hermus nabo Fruhstorfer

SL,SI,SK-BU 1,2 NR

WS- 30-35mm.

M UP plumbeous blue more or less violet in a side light. **F** similar to that of the Large 4-Line Blue. UN inner submarginal line consists of separate lunules, all markings narrow and discontinuous and white. UNF upper edges of inner submarginal and outer discal line are close together. Smaller than *pactolus*. Habits similar to those of the group.

220 **TRANSPARENT 6-LINE BLUE**

Plate No. 31

Nacaduba kurava euplea Moore

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

WS 30-34mm.

Tailed. **M** UP shining violet-blue, markings from UN clearly showing above. **F** UP bases normally shining pale blue with discs white. Both sexes UN markings narrow, regular and prominent. UNF with an additional pair of lines in cell near base. UNH black spot in 2 is conspicuously larger than tornal spot.

Habits as those of the group.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Embelia tsjeriam-cottam* and *Ardisia humilis* (Myrsinaceae), *Waltheria indica* (Sterculiaceae).

221 **OPAQUE 6-LINE BLUE**

Plate No. 31

Nacaduba beroe gythion Fruhstorfer

SI,SK-BU 1,2 NR

WS- 28-34mm.

Similar to the Transparent 6-Line Blue (220).

UN markings duller and not showing through above. M UP darker violet discs covered with hair-like scales which can be seen through a hand lens.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - Recorded in literature.

222 BANDED LINE BLUE

Plate No. 31

Prosotas aluta coelestis De Niceville

KU-BU,AN 1,2 NR

WS- 23- 25mm.

Tailed. M UP pale shining blue-violet with broad dark borders. F UPF lower discal area and base UPH pale metallic blue. UN both sexes dark brown, UNH bands black at the base. Discal band and band end-cell coalesced to form large black discal area.

Habits as those of the group.

223 BHUTYA LINE BLUE

Prosotas bhutea (De Niceville) 1883

SK-KR 1,2 NR

224 TAILLESS LINEBLUE

Plate No. 31

Prosotas dubiosa sivoka Evans

SL,IN,BU SK-BU 1,2 NR

WS- 22-26mm.

M UP dark purple blue or brown with very narrow border. F UP plain brown, sometimes with bluish patch on lower discal area of FW. UN bands narrow and slightly darker than the ground colour, very irregular on FW. UNF basal band to V1. In ssp. *sivoka* DSF F ochreous blue, UN with dark bands and on UNH marginal spots increasing in size to costa, spot at the apex being as large as the tornal spot. UNF the basal band not to V1.

Habits are similar to those of others of the group. Both sexes come to flowers of *Ageratum*, *Verbana* and *Celosia*. Attracted to mud, damp patches and cattle droppings.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Acacia* sp., *Mimosa pudica*, *Mimosa* sp., and *Leucana* sp.

225 ANGLED PIERROT

Plate No. 32

Caleta caleta decidia (Hewitson) 1876

SL,SI,IN-BU SI, IN,BU 1,2 NR

WS- 27-40mm.

Black and white butterfly. UP on white background black markings. UN, broad black markings. UNH markings are conjoined.

Common up to about 300 m, but in the south it has been recorded up to 2,800 m. particularly abundant in monsoon. DSF is smaller and markings are also narrower. Flight is rapid; flies close to the ground and visits low-flowering bushes and plants like *Leea*, *Blapharis*, *Alternanthera* spp., etc. Found along shady paths and nullahs. Visits damp patches also.

LIFE HISTORY - Larva is similar to that of *ethion*, but has two green bands on the back; woodlouse shaped, greenish white in colour covered with minute hair. Pupa is short and stout, green in colour clothed with hair, ochreous mottled with brown. The pupa is attached by tail and band to any convenient surface.

LARVAL FOOD PLANTS - *Zizyphus rugosa* (Rhamnaceae).

226 ELBOWED PIERROT

Plate Nos. 4 & 30

Caleta elna noliteia Fruhstorfer

OR,SK-AS 1,2 NR

WS- 30-34mm.

Similar to the Angled Pierrot (225).

UP dark blackish. **UNF basal markings consist of a single band from costa to dorsum**, meeting a black area of the base of HW. **UNH the submarginal spots are smaller and well separated.**

WB writes: "In Sikkim one author considers it very common on damp patches, while the others considered it very rare". So WB considers it to be probably a local species.

The species is very variable in markings. Some of the WSF specimens of Sikkim have cinnamon ground colour and markings are cinnamon brown. It was very common in Arunachal Pradesh in May. Visits flowers of Compositae and also droppings and moist earth.

CERULEANS

Ms are shiny light blue to azure with narrow black border. **Fs** paler and border is broader. On the UN both the sexes have three marginal lines on both the wings, on a pale brown or brown background. FW has four discal lines while HW has six discal and basal lines. They are similar to the Line Blues and could be confusing. Habits are similar to those of the Line Blues.

227 COMMON CERULEAN

Plate No. 31

Jamides celeno celeno (Cramer) 1775

SL,IN,BU IN, BU 1,2 NR

WS- 27-36mm.

M UP pale bluish white. **F** similar but broad dark brown border. **UNF always 2 or 3 white costal dashes internal to the discal line above end-cell.** WSF with white lines on a dark grey or brown ground colour. DSF the bands are filled in by dark lines in between the pairs of white lines, forming broad bands; UNH may be darkened, making the markings indistinct.

A butterfly of moderate rainfall areas up to 2,000 m. This is the only cerulean found outside forested regions.

LIFE HISTORY - (Fig. VII.5). **Larva** green, woodlouse shaped; a darker dorsal line and a row of lateral spots. Larvae may be attended by ants. **Pupa**, typical shape of small blues; smooth; colour ranges from pink to brown, with black rounded spots and streaks.

LARVAL FOOD PLANTS - *Derris indica*, *Xylia xylocarpa*, *Abrus precatorius* and also on a variety of species of Legumes, *Trichilia connaroides*, *Butea monosperma* and possibly cardamoms.

228 METALLIC CERULEAN

Plate No. 31

Jamides alecto euryasces Fruhstorfer

SL,I,SK-BU SI,SK-BU 1,2 NR

WS- 25-34mm.

M UP shining violet-blue and more opaque. UPF dark border about 1 mm, increasing apically. UPH the marginal spots decreasing apically. Below, **UNF first and second line from base continuous across the cell to dorsum. The third line is up to V3 and fourth up to V4 and apically elbowed.**

Common in hilly regions. Habits similar to those of the others of the group. These are pests to the cardamom plantations. They attack flowers and young fruit and damage large number of plants. Common in these plantations, I observed a basking specimen being caught by a Robberfly and feed on it. It is common around Mangan, Singhik, Tashiding, Rangpo and Legship.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Bossenbergia rotunda*, *Elettaria cardamomum* (Scitaminaceae).

229 FORGET-ME-NOT

Plate No. 31

Catochrysops strabo (Fabricius) 1793

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

WS- 25-35mm.

Similar to the Gram Blues

UP pale blue, border narrow. **UNF the discal band broken into two portions and at the upper end there is small spot on costa mid-way between spot end cell and discal band. UNH a single very large orange crowned tornal spot. UNH two small black costal spots.**

A common butterfly at low elevations. In south India common during monsoons. Flies close to the ground for a short distance. Visits various low-growing flowers like *Alternanthera*, *Tridax*, *Phaseolus* spp. Also seen basking early in the mornings and late afternoons.

LIFE HISTORY - Larva light rose in colour, covered with tiny star-topped stems, a subdorsal line and the margin covered with light coloured longish hair; head yellow. **Pupa** light rose coloured, covered with stiff erect hairs; a black patch on the second segment and on the centre of the thorax.

LARVAL FOOD PLANTS - *Desmodium oojinense*, *Schliechera oleosa* flowers.

230 PEABLU

Plate No. 31

Lampides boeticus (Linnaeus) 1767

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

WS- 24-36mm.

M UP violet-blue with two tornal spots on HW. **F** dark brown, blue with obscure white outer discal band on HW. Both sexes **UN pale brown or whitish with narrow brown bands, no spots except for two orange crowned tornal black spot. In between the brown bands a broad whitish discal band.**

Found in Sikkim in lower hot valleys of the Rangpo, Rangeet and Teesta. I found one laying eggs on flowers of one of the leguminous plant, in October.

LIFE HISTORY - Larva pale green, slightly hairy on the sides; head ochreous pale brown. **Pupa** pale yellowish-green, posterior end round; a dark dorsal line and a double subdorsal series of small black spots.

LARVAL FOOD PLANTS - *Crotolaria striata* and various species of Legumes.

231 DARK CERULEAN

Plate No. 31

Jamides bochus Stoll (Cramer) 1782

SL,IN,BU,AN,NI SL,IN,BU,AN 1,2,3 C

WS- 25-34mm.

M UP brilliant dark metallic blue with very broad black border and apex on FW: **F** similar but with dull non-metallic blue and marginal black spots on the UPH. **M and F UN ochreous brown or brown, UNF inner submarginal line not lunulate, markings dull and narrow.**

Found all over India up to 2,000 m. Flight is very fast and flies close to the ground around bushes in shaded jungles. Visits various low-growing flowers; basks with wings closed and males bask with wings wide open. A common butterfly in the Teesta and Rangpo valleys.

LIFE HISTORY - Larva similar to that of *E. pandava*, but covered with minute hair and is olive-green in colour. **Pupa** is indistinguishable from *E. pandava*.

LARVAL FOOD PLANTS - *Xylia xylocarpa* and flowers of *Butea monosperma*.

232 GLISTENING CERULEAN

Plate No. 31

Jamides elpis palissa Fruhstorfer

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

WS- 28-36mm.

Similar to the Metallic Cerulean (228).

M UP pale shining blue, UPF border thread like and UPH traces of tornal spots. UN both sexes have markings similar that of the Metallic Cerulean.

Habits similar to those of the group.

LIFE HISTORY - Larva similar to that of *L. celeno*. Pupa is yellowish brown marked with dark dorsal band, and smooth. Pupa is formed inside the fruit or in the cluster of the dead leaves.

LARVAL FOOD PLANTS - *Elettaria cardamomum* and *Boesenbergia rotunda*.

PIERROTS AND ZEBRAS

They are usually small insects, with white, blue or black and white patterns on the UP, and on the UN all of them have black lines and spots on a white background. Some have metallic tornal spots. They fly close to the ground and visit low-growing flowers like the Silverlines. They also visit damp patches but not so commonly. While feeding and resting they sit with their wings closed. Occasionally they bask, with closed wings. Their larval food plants belong to *Zizyphus* species. Known to be attended by ants.

233 ZEBRA BLUE

Plate No. 32

Syntarucus plinius (Fabricius) 1793

SL,SI,SK-BU 1,2 NR

WS- 22-30mm.

M UP slightly transparent pale violet-blue. **F** UP, brown-blue basally and with dark spotted white area. Both sexes **UN** have, on white background, alternate irregular broad and narrow brown bands, which are broken into spots on HW.

Common in drier parts of the country, but in Sikkim it is found only at low elevations or in terai region but occasionally may be found up to 2,500 m. Settles on leaves and flowers. Early mornings it basks with wings wide open. Flies close to ground and territorial in behaviour. Attacks intruders of the same species. WB writes that while doing so it may chase the butterfly high into the air. In Sikkim I found it localised around its food plant *Plumbago zeylanica* in Rangpo. Interestingly, this plant is sticky and if one touches it, you need to rub the substance off. The butterfly is so light, but never gets stuck to the plant. In literature, it has been suggested that it may be an insectivorous plant. But still this butterfly lays its eggs on the sticky buds and flowers. This is a very interesting association and needs further detailed study.

LIFE HISTORY - Egg greenish white of typical Lycaenid shape. I saw one butterfly laying eggs on the flowers of *P. zeylanica*, Larva wood-louse shaped green and with dorsal ridge of minute protuberances.

Pupa greenish and smooth.

LARVAL FOOD PLANTS - *Plumbago zeylanica*, *Indigofera* sp., *Albizia lebek*, *Sesbania sericea* (Leguminosae).

234 COMMON PIERROT

Plate No. 32

Castalius rosimon rosimon Fruhstorfer

SL,IN,BU,AN,NI SL,IN,BU 1,2 R

WS- 24-32mm.

UP white with black spots and borders. Bases with metallic blue scales. **UN** white with black spots and streaks. Considerable variation in seasonal forms.

Very common in the south in monsoons. Habits similar to those of *Caleta caleta* (225). In the Himalaya found up to 2,500 m. Butterfly of more open areas and thinly wooded country. Visits flowers, damp patches. Fond of sunshine, it basks, particularly after the rains. I have seen it in the Western Himalaya.

LIFE HISTORY - Egg round, bluish white when freshly laid. Egg is generally laid on the young leaves or between the axis thorn and stem. Larva woodlouse shaped with rough texture, bright green, with two dorsal yellow line and small yellow spots. Pupa bright green, with yellow bands on the abdomen, two or three black spots. The pupa is fastened by the tail along a leaf horizontally and also by a lax body band.

LARVAL FOOD PLANTS - *Zizyphus rugosa*.

235 STRIPED PIERROT

Plate No. 32

Tarucus nara Kollar

SL,IN 1,2 NR

WS- 24-28mm.

Similar to the following two species (236 and 237).

UP, violet-blue with narrow black border. UN with basal streaks and marginal spots. **UNH streaks broken into numerous spots.**

Habits similar to those of the others of the genus.

LIFE HISTORY - Recorded in literature.**LARVAL FOOD PLANTS** - *Zizyphus* sp.**236 DARK PIERROT**

Plate No. 32

Tarucus ananda (De Niceville) 1883

SI,SK-DA 1,2 NR

WS- 22-28mm.

UP very dark purplish blue, dark border of 1 mm. F UP dark brown, no other markings. **UN both sexes discal spot in 5 is joined to outer discal band in UNF and UNH.**

Insect of thick jungles, it flies generally about 2-3 m from the ground. Visits damp patches. Flight is not very strong, but flies rapidly, particularly when disturbed or pursued. Also settles on low-growing leaves and flowers and around food plants.

LIFE HISTORY - (Fig. VII.2). **Larva** similar to *C. rosimon* and attended to by ants till it pupates. Larva feeds only on the parenchyma of the leaf. **Pupa** intensely glossy, colour varies from black to green with black markings.**LARVAL FOOD PLANTS** - *Zizyphus* sp., *Dendrophthoe* sp., and the plants associated with *Crematogaster* ants.**237 ASSAM PIERROT**

Plate No. 18

Tarucus venosus dharata Moore 1887

SK-AS 1,2 R

WS- 22-27mm.

Similar to the Dark Pierrot (236),

F UP dark brown with bases bluish and disc of FW whitish with obscure spots.

Habits similar to those of the Dark Pierrot. I came across this only once on Namchi road near Mamring feeding on the salt, on the muddy dry road. It was sitting in bright sunlight with wings folded and body perpendicular to the sun rays. On disturbing, while trying to photograph it moved about in the vicinity.

238 POINTED PIERROT*Tarucus callinara* But**239 DARK GRASS BLUE***Zizeeria knyasna***240 GRASS JEWEL**

Plate No. 32

Zizeeria trochilus trochilus (Freyer) 1844

SL,IN,BU 1,2 NR

WS- 15-22mm.

UP dark brown. **UNH with a row of jeweled marginal spots and ternal metallic spots.**

Insect of drier regions, weak flier flies close to the ground. Settles often on the ground and on low-growing flowers. They roost in groups in the grasses.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - Recorded in literature.

241 PALE GRASS BLUE

Plate No. 32

Pseudozizeeria maha (Kollar) 1848

SL,IN,BU CI-NI,BU 1,2 C

WS- 26-30mm.

M UP pale blue with black border. **F** UP, dark brown with basal blue scaling. **UNH** a row of metallic marginal spots, outer discal spot in 6 is mid-way between and in line with spots 5 and 7. **UNF** spot in cell, as well as bar end-cell.

One of the commonest butterflies of hilly regions, seen in open grassy patches and disturbed human habitations. Flies very close to the ground. Flight is weak, does not fly very far. Visits low-growing flowers and settles on leaves with wings closed. Basks in the mornings with wings partly, or rarely fully open. Occurs in Sikkim throughout the year up to 2,500 m wherever there is suitable habitat.

LIFE HISTORY - Eggs are laid singly on the UN of the leaves. **Larva** is green in colour. Sometimes larger caterpillars are attended by ants. Larva eats flower buds or young leaves, with which they blend very well, and are difficult to locate. **Pupa** is formed anywhere.

LARVAL FOOD PLANTS - Leguminosae plants, *Strobilanthes* sp. (Acanthaceae), *Oxalis corniculata*.

242 TINY GRASS BLUE

Zizula hylax

243 TAILED CUPID

Everes argiades hellotia Menetries

244 CHAPMAN'S CUPID

Everes hugelli dura Chapman

245 DUSKY BLUE CUPID

Everes dipora (Moore) 1865

246 FOREST QUAKER

Pithecops corvus De Niceville

247 BRIGHT BABUL BLUE

Plate No. 32

Azanus ubaldus Cramer

SL,IN,NE,NB 1,2 NR

M UP dark lilac blue, with broad borders. **F** brown. Both sexes UN on brown background, markings consist of slightly darker marginal spots, a discal band of linked spots and on the UNH two prominent black tornal spots, basal and costal spots.

Common in the dry scrub regions of the foothills and plains, although found sometimes up to 2,000 m in the hills. Flight is very fast, visits flowers; generally rests with wings closed. Males visit damp patches and are also seen basking early in the mornings.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Acacia nilotica* and *Acacia leucocephala*.

248 DULL BABUL BLUE*Azanus uranus* Butler**HEDGE BLUES**

The Ms are shiny blue butterflies with varying borders and often have a white discal patch on the wings. Fs are paler and the discal patch may be larger. Also have broader border. On the UN on white background they are marked with spots, streaks and discal lines. They are highly variable and hence are difficult to identify.

They are found from about 1,000-3,000 m in the Himalaya. Fond of visiting flowers, damp patches and droppings, where sometimes a huge congregation of these butterflies could be seen.

They are also seen basking early in the mornings or after the heavy showers in the mountains.

249 MARGINED HEDGE BLUE

Plate No. 32

Lycaenopsis marginata (De Niceville) 1883

KU-KR 2,3 NR

250 WHITE BANDED HEDGE BLUE*Lycaenopsis transpectus* (Moore) 1879

SK-BU 1,2,3 NR

WS- 30-36mm.

M UP, dark shining blue with 2 mm dark border. Large white discal patches on both wings. **F** UP markings are broader and blackish, white patches larger. Both sexes **UN grey with marginal lunules. UNH spot in 7 is round and no spot in base of 1b.**

Found up to 3,000 m in Himalaya. Habits similar to those of the other Hedge Blues. We have two specimens collected by Usha. In Sikkim, a very dark specimen is seen during the middle of the rains. There is a fresh brood in February.

251 QUAKER

Plate No. 32

Neopithecops zalmora Butler

SL,IN,AN,KU-BU 1,2 NR

Similar to the Forest Quaker (246).

UP dark brown, with variable white patch on the disc. UNH prominent black costal spot (smaller than that in the Forest Quaker), additional small black spot on dorsum.

A butterfly of thick forested regions, flies very close to ground; flight rapid, settles down often on the ground, leaves or on flowers. Males come to damp patches and droppings. In Sikkim it has been recorded as rarer than the Forest Quaker by the previous workers. In Arunachal Pradesh both of them seemed to quite common.

LIFE HISTORY- Larva woodlouse shaped; hairy, bright apple green with slightly darker line along the middle of the back. Pupa bright green with a darker dorsal line and a similar line forming the boundary of the abdominal segments; a row of black spots along these lines.

LARVAL FOOD PLANTS - *Glycosmis pentaphylla*.

252 MALAYAN

Plate No. 32

Megisba malaya sikkima (Moore) 1879

KU-BU,AN,NI KU-BU,AN 1,2 NR

WS- 20-30mm.

Similar to the Quaker (252).

UP dark brown with white discal patch usually on FW is prominent. UN white with row of discal and marginal spots. **UNH with large round black costal spot and four similar basal spots; spots on**

costa of of FW as well as spot in the cell. The Sikkim subspecies may be tailed. In WSF white patches may disappear.

Butterfly of evergreen forests. Flies close to the ground in forest glades or at the edges of the forests.

Ms are fond of settling on damp patches and cowdung.

Tailed subspecies is very common at lower elevations.

LIFE HISTORY - **Larva** light green, vermiform, middle segments swollen. **Pupa** thick, blunt at both ends.

LARVAL FOOD PLANTS - *Allophyllus cobbe* (Sapindaceae).

253 ALBOCERULEAN

Celastrina albocerulea (Moore) 1879

SI-KR 1,2 NR

254 PLAIN HEDGE BLUE

Celastrina lavendularis placida De Niceville

1,2,3 NR

255 PALE HEDGE BLUE

Plate No. 32

Celastrina cardia dilecta (Moore) 1879

SI-KR 2,3, NR

256 LARGE HEDGE BLUE

Plate No. 32

Celastrina hugelii oreana (Moore) 1883

KA-AS SK-AS 2,3 NR

WS- 34-50mm.

Similar to the Margined and the Hill Hedge Blues (250 and 258).

UP shining blue without white patches with narrow border not increasing towards the apex of FW. **F** dark blue with disc paler. Both the sexes UN has marginal lunules, outer discal band of UNF never enters 1b and marginal markings fainter. Discal spots on UNH are small, black and distinct.

Found almost everywhere, particularly near the streams and damp patches. Large congregation is observed on droppings.

LARVAL FOOD PLANTS - *Princepia utilis*.

257 HILL HEDGE BLUE

Celastrina argiolus sikkima (Moore) 1883

CH-KR SK-KR 2,3 NR

WS- 25-34mm.

Similar to the Margined Hedge Blue (249).

F with white disc. **M** with white disc in DSF. The border is much broader and continued with full width to tornus of FW in WSF. UN markings are obscure in WSF and generally smaller.

Habits similar to those of the preceding species.

258 HILL HEDGE BLUE

Celastrina argiolus jyntea (De Niceville) 1883

259 COMMON HEDGE BLUE

Plate No. 32

Acetolepis puspa gisca Fruhstorfer

SL,IN,BU IN,NB 1,2,3,4 NR

WS- 28-35mm.

M UP iridescent violet-blue with black margins, with or without discal patches. **F** broad borders, white discal patches. In DSF both sexes have white discal patches. UN markings coarse, **FW spot in 2 oblique and directed towards the spot end-cell. Spot in 3 vertical and directed towards the spot in 4.** Inner edges of spots in 2 and 5 irregular and an outer discal spot in 1b. **UNH with spot at base of 7.** Most common and abundant butterfly found up to 3,000 m. **Ms** visit damp patches in hot seasons. Found in open and near human habitations. It could be mistaken for the Lime Blue butterfly, which has somewhat similar markings.

LIFE HISTORY - **Larva** woodlouse shaped, green in colour covered with minute short hair, the sides are suffused with pink. Larva attended by ants. **Pupal** colour varies with environment from brownish white mottled with dark brown and a dark brown band from thorax to the centre of the abdomen.

LARVAL FOOD PLANTS - *Paracalyx scariosa*, *Xylia xylocarpa* (Leguminosae), *Hiptage benghalensis*, (Malthigiaceae), *Schliechera oleosa* (Sapindaceae). *Cratoxylum ligustinum* in Hongkong.

260 GRAM BLUE

Plate No. 32

Euchrysops cnejus (Fabricius) 1798

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

WS- 25-33mm.

UP dark bluish violet, UPH tornal black spots. **F** brown. **UNH discal band separated near tornus. Last spot near dorsum well separated from next in 1c.** Two tornal spots of equal size.

Very common throughout India up to 2,800 m. Strong flier, flies rapidly around shrubs and bushes, often rising high in the air. In south particularly common in and just after monsoon. It often visits flowers or various kinds like *Tridax*, *Alternanthera* and flowers of Leguminosae plants. Basks early in the morning with wings fully open.

LIFE HISTORY - **Larva** and **Pupa** are indistinguishable from that of the Forget-me-not (229).

LARVAL FOOD PLANTS - Leguminosae plants, to which it is sometimes a minor pest. *Phaseolus trilobus*, *Dolichos catjang*.

261 CHUMBI ARGUS*Polyommatus semiargus annulata* (Elwes) 1906

CU,SK 5 NR

262 COMMON MEADOW BLUE*Polyommatus eros arene* (Fawcett) 1904

SK,CU

263 MOUNTAIN BLUE

Plate No. 32

Albulina pheretes pharis (Fawcett) 1904

CU,SK 5 NR

265 AZURE MOUNTAIN BLUE

Plate No. 32

Albulina pheretes arcaseia (Fruhstorfer) 1904

SK 5 NR

WS- 26-30mm.

M UP purple blue . **F** brown with rarely basal scalings. **UN** very variable. **UNF** spots may be black or white. **UNH** all greenish or all brown or greenish only on the central patch, metallic green suffusion sometimes present or absent. **UNH** marginal elongate spots and cilia chequered.

Butterfly of very high altitudes found only from 5,000- 5,500 m. Earlier it has been collected from high altitude of Chumbi valley and N. Sikkim. Also found in dry regions of Western Himalaya.

266 LIME BLUE

Plate No. 32

Chilades laius (Cramer) 1780

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

WS- 25-30mm.

M UP dull purple-blue. Very thin border. **F** WSF dark brown and in DSF pale blue with brown borders. Both sexes **UN**, pale brown or grey with spots. **UNF** with a costal spot in angle formed by junction of spots in 7 and 9. **UNH** discal spot in 6 is out of line.

Fairly common butterfly up to about 1,200 m in Himalaya. Fond of damp patches, droppings and flowers. Habits similar to those of other blues. It is particularly common wherever its food plants, Citrus and Pomegranate is found.

LARVAL FOOD PLANTS - *Citrus* sp. and *Atalantia* sp.

267 PLAINS CUPID

Plate No. 32

Edales pandava (Horsfield) 1892

IN,BU,AN,NI 1,2 NR

WS- 25-35mm.

Similar to the Forget-Me-Not (229).

M UP lavender-blue with dark borders. **UPH** with black tornal spot in 2 and row of marginal spots. **F** UP similar but brownish. **UN** with discal bands etc. are present. **UNH** the tornal spot if present is large and orange crowned. Could be easily mistaken for the Forget-Me-Not (229), but on the underside more than three black basal spots are present.

Habits similar to others. Visits dung and droppings. I have come across this only twice in the Rangpo Valley. It is fairly common in plains of India.

LIFE HISTORY - The **Larva** is wood louse shaped, dark greenish with broad discal band and sides have number of faint oblique pinkish lines. Head is dark green. Larva is attended by ants. **Pupa** is dark green with darker dorsal band.

LARVAL FOOD PLANTS - *Xylia xylocarpa*, *Caesalpinia*, *Cycas revoluta*.

264 CHAPMAN'S BLUE

Everes diporides Chapman

RIODININAE

Twenty one species of Riodininae, commonly known as Punches and Judies are found in India. Three genera are found in Sikkim. These are brown butterflies, with yellowish or tawny markings. They are found in thick forests of hilly regions. Punches are found along streams while Judies in thicker jungles. They are weak fliers, flying very short distances and settling down immediately. Judies sit with their wings partly closed, while punches sit with their wings closed over the back. They visit damp patches and suck moisture from the leaves. WB writes that as a rule they do not visit flowers, but I have watched both Punches and Punchinellos feeding on Compositae flowers, particularly on *Anaphalis* sp. Punches are aggressive insects.

Sexes are dimorphic in some species, but the males do not have any secondary characters.

LIFE HISTORY -Eggs are dome shaped and white, and may be smooth, granulated or prickly. Larvae are cylindrical, smooth or with minute bristles. The head is small, like that of Pierids. Pupae are like those of Lycaenidae.

268 PUNCHINELLO

Plate No. 18 & 33

Zemeros flegyas indicus Fabricius 1897

MU-BU 2,3 NR

WS- 35-40mm.

UP purple brown or ochreous, with minute small white slightly elongated spots which are inwardly bordered by black spots. UN similar but ground colour paler.

Very common throughout the year from 300 m to 2,000 m. Often seen basking early in the mornings on a stone or a leaf with wings more than three-fourths open. Rests with wings closed. Flight rapid, flies very close to the ground. In Sikkim it could be seen everywhere up to 2,000 m. Seen feeding on the moisture and also on *Knoxia* sp.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Maesa chisia* and *M. montana*.

269 LESSER PUNCH

Plate No. 33

Dodona dipaea dipaea Hewitson 1866

MR-DA SK-AS 2,3 NR

WS- 35-45mm.

UP brown with yellowish spots on FW and **no dark yellow bar at end-cell. UN markings are narrower and UNH markings are very narrow and sometimes obscure.**

Habits as described for the subfamily. Common in Sikkim from about 1,800-3,000 m. I have come across this butterfly in Gangtok, and it has been collected from West and North Sikkim.

270 TAILED PUNCH Plate No. 33

Dodona eugenes venox Fabricius 1867

MR-DA SK-DA 1,2,3 NR

WS- 35-45mm.

Very similar to the preceding species but **HW slightly tailed along with the lobe. UN markings silvery white.**

Found along streams and shaded area. Interestingly, I have come across this butterfly between Yoksum and Bakkim twice at the same place even after an interval of eight years. It seems to be locally common. Sits with wings closed and sucks moisture. Also seen on bird droppings.

LIFE HISTORY - (Fig. VII.4). Larva slug shaped, pale emerald green, with two dorsal blue lines. Pupa is green.

LARVAL FOOD PLANTS - Bamboo (*Arundinaria*) and grasses.

271 **MIXED PUNCH**

Plate No. 33

Dodona ouida ouida Moore 1865

MU-DA NE-DA 2,3 NR

WS- 45-50mm.

UP dark brown with orange stripes, which are continuous on the FW. UPH with narrow bands.
UN pale reddish brown with yellow band on FW whose inner border is black. HW paler bands and markings obscure.

Habits similar to those of others of the group. Seen in both West Sikkim and South Sikkim. I have found this butterfly locally common in some areas in Gangtok. Seen basking or resting on *Eupatorium* leaves.

LIFE HISTORY -Recorded in literature.

LARVAL FOOD PLANTS - *Maesa chisia* (Myrsinaceae).

272 **STRIPED PUNCH**

Plate No. 18 & 33

Dodona adonira adonira Hewitson 1866

NE-NB NE-AS 2,3 NR

WS- 45-50mm.

UP dark brown with orange bands similar to that of the Mixed Punch (271). **UPH is more clearly marked with orange bands. UN background bright yellow with dark brown bands.**

Not very common in Sikkim. I have come across this species in West Sikkim, Rakadong and Tholung Valley. Observed to be territorial in behaviour with prominent patch and look out points generally on the ground.

LIFE HISTORY -Recorded in literature.

LARVAL FOOD PLANTS - *Maesa chisia* (Myrsinaceae).

273 **ORANGE PUNCH**

Plate No. 33

Dodona egeon (Doubleday) 1851

NE-DA 2,3 NR

WS- 5-50mm.

Very similar to preceding two species but **UPF bands are broken into spots. UPH the broad discal band is twisted.**

Habits as those of others of the genus.

274 **DARK JUDY**

Plate No. 33

Abisara fylla (Doubleday) 1847

MU-BU 1,2, NR

WS- 50-60mm.

Similar to the Banded and Straight Banded Treebrowns *L. confusa* and *N. verma*.

UP dark brown with a yellow apical band on FW. HW a row of black submarginal spots which are edged on outer side by pale creamish dots. F similar but paler with white apical band.

Common in densely wooded areas. Very wary. Seen up to 2,000 m. It has been recorded by DeN as common throughout the year in lower hot valleys. One early morning, in November, near Yoksum, I saw about five of them basking on *Eupatorium* leaves. Common in Geyzing, Yoksum, Tashiding and Chungthang areas.

LIFE HISTORY -Recorded in literature.

LARVAL FOOD PLANTS - *Maesa chisia* (Myrsinaceae).

275 **TAILED JUDY**

Plate No. 33

Abisara neophron neophron (Hewitson) 1866

NE-BU NE-SK 1,2 NR

WS- 45-55mm.

Similar to Dark Judy but paler brown and HW with long white tipped tail. UPF with a white discal band and an obscure white outer band.

Not a very common butterfly in Sikkim. I have seen it in the thickest jungles in West Sikkim.

276 SPOT JUDY

Abisara chela chela De Niceville 1886

SK-SS SK-AS 1,2 NR

WS- 45-55mm.

Similar to the preceding species, but has a shorter tail and a white spot on the upper end of the outer obscure white band.

Habits similar to those of the group.

The Spot Judy is rarer than the Tailed Judy.

277 PLUM JUDY

Plate No. 33

Abisara echerius suffusa Moore 1878

SL,SI,HI,AS,BU NC-CI-HI 1,2 NR

WS- 40-50mm.

M UP purple brown with obscure markings. F similar but brown in colour. HW prominently toothed. The bands in F are more whitish.

Insects of denser areas. Found deep inside thickets. Sits in a sunny patch with wings slightly open or widely open early in the mornings, generally about 1 to 2 m from the ground. Very wary. On settling it often keeps rotating in jerky movements on the leaf till it comes to the desired position. My friends have appropriately named it 'Dancing Judy'. In south India it is fairly common. In Sikkim I have come across only one **M** specimen in Narak area where it was basking with its wings three-fourths open.

LIFE HISTORY - **Egg** is laid, generally in the evening, on any part of the food plant or any small plant near it in a very dark and cool place. **Larva** is onisciform, olive-green with dark green and white lateral and ventral lines. It lives on the UN of leaves, sometimes it draws leaves closer and joins them with its silk and rests inside such pockets. Pupa is also sometimes formed in such chambers. **Pupa** rhomboid, grass green in colour, spotted with fine dark green squares; whitish dorsal line and four small black spots on front margin of thorax, a row of lateral black spots; belly whitish. It is formed on the UN of a leaf attached by tail and tight body band and is generally on a bed of white powder.

LARVAL FOOD PLANTS - *Embelia robusta*, *Ardisia* sp. (Myrsinaceae).

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

Aemonia 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

Plate No. 34

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.

284 COMMON DUFFER

Plate No. 34

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.

285 GREAT DUFFER

Plate No. 34

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.

286 RED CALIPH

Plate No. 34

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.

287 BLUE CALIPH*Enispe cynceus* Westwood

SK-BH 1 R

WS- 90-100mm.

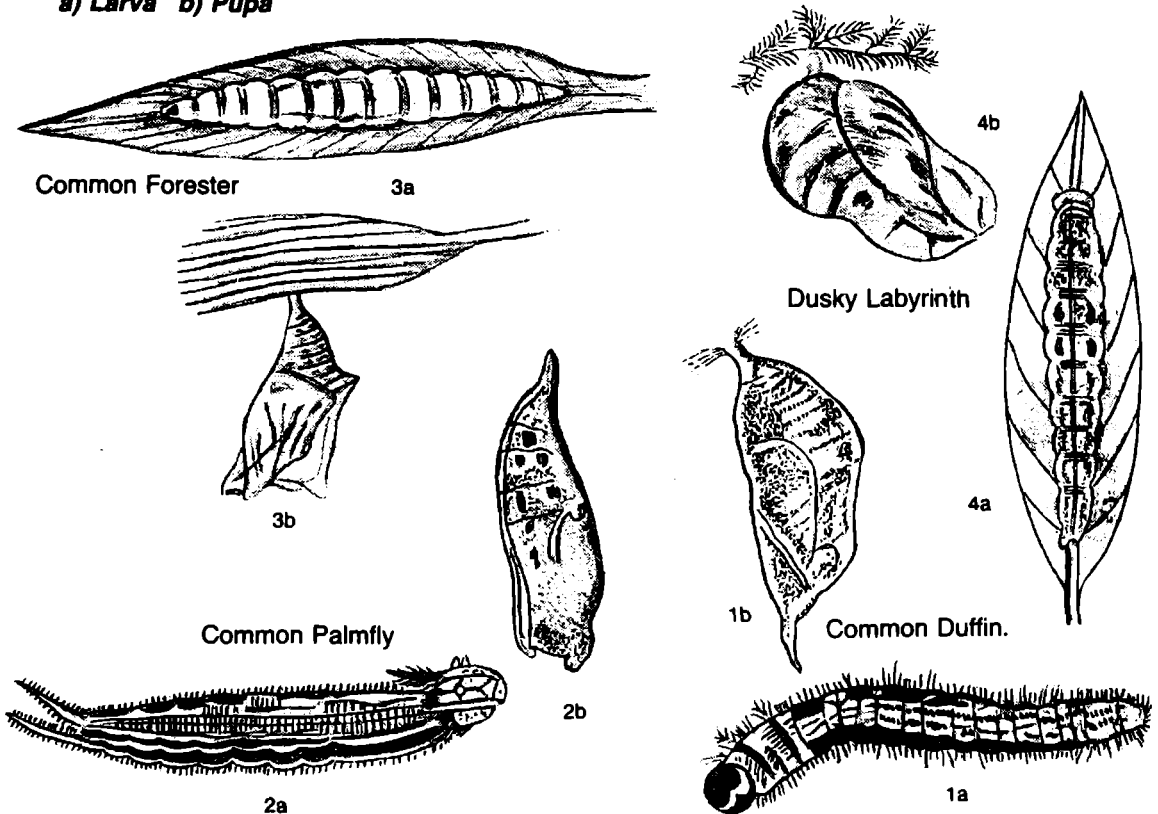
This species is recorded by DeN as very rare in Sikkim.

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 danaids.

LARVAL FOOD PLANTS - *Oryza sativa* and various grasses like *Eleusine*, *Panicus*, *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.

WSF: UPF black spots obscure and white spots absent. Prominent costal bar. Male margin shining white. UN with small white spots and fine striations. The subapical spots large, usually confluent in area 4, produced to join a black patch beyond the cell. UPH with two white black edged dots in area 2 and 3.

DSF: Similar. In F ochreous marking reaches the termen.

Four forms have been described from the Himalaya.

Habits similar to those of the others of the group, but not common and found in more forested areas as the preceding species.

LIFE HISTORY - Eggs are always laid in batches of 4 to 25 on the underside of bamboo leaves. Larva, has shiny black head without horns when newly hatched. Horns develop only after first moult. Adult larva is rugose, grass-green in colour, with dark green bands and white subapical band. Head bluish, with white hairs and two yellow horns of 2.25mm. A pair of tails of about 2mm. Pupa similar to that of 288 and 289, but bigger in size.

LARVAL FOOD PLANTS - Bamboos.

291 BRANDED EVENING BROWN

Cyllogenes suradeva (Moore) 1857

PALMFLIES

These are one of the most colourful insects belonging to this subfamily. They mimic the Blue Crows and the Tigers, some of them also mimic Jezebels. Occur only at the lower altitudes. WB writes they shun sunlight but I have seen Spotted Palmfly and Common Palmfly basking early in the mornings. Their food plants belong mainly to Palm and Banana family.

292 COMMON PALMFLY

Plate No. 35

Elymnias hypermnestra undularis (Drury) 1773

SL,SI,BE,DU-BU 1 NR

WS- 65-80mm.

M UP, blackish brown with a purple gloss. FW with marginal series of blue spots. **UPH** with a broad chestnut border. **UN** dark chestnut brown with fine striations. **F** reddish brown spotted with white. White apical band on UPF. On the UPH the submarginal spots obsolete. **M** and **F**, HW toothed.

M, mimics the Crows and **F** *D. genutia*.

Found along the lower hot valleys of the Himalaya up to 1,600 m. Generally in undergrowth, but comes out to bask in the mornings. Very fond of chequered shade. Flight weak, males settle frequently on the palm leaf. Males also seen to visit damp patches. **M** rest with wings closed for a long time.

LIFE HISTORY - (Fig.VIII.2). **Egg** not described. **Larva** is bright apple green, with square pink head and pair of yellow horns. The body with ashy yellow dorsal and subdorsal lines and blue and red spots in segments 8 and 9. Last segment has a pair of tails 6mm long, which are yellow at base with pink spots. **Pupa** apple-green, head with two short horns which are pink at the base. Also pink upper edge of wing case and spots in the cells. Abdomen is also spotted with yellow and pink spots. Pupa lies parallel to the leaf to which it is attached.

LARVAL FOOD PLANTS - Bamboos. Also *Areca*, *Arenga*, *Calamus*, *Cocos*, *Pheonix*, *Rhaphis* spp. etc. also have been recorded.

293 TIGER PALMFLY

Elymnias nesaea timandra Wallace 1869

294 SPOTTED PALMFLY

Plate No. 35

Elymnias malelas malelas (Hewitson) 1863

KU-DA SK-DA 1,2 NR

WS-80-100mm.

M UP dark brown with **FW blue shot and mauve or bluish spots. UPH unmarked. UN** dark brown with faint white striations. **F** blue shot area reduced, spots whiter. UPH whitish, striated with dark brown and veins broad black. UN dull brown, basal half striated, outer half evenly striated.

Mimics *Euploea mulciber* (520).

Its distribution is similar to that of the Striped Blue Crow: It is common from July to August. But we have also found it in November. A courting pair was observed in the morning around banana plantations. It has been observed from Tashiding, Legship, Yoksum and Naya bazaar.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - Banana.

295 BLUE STRIPED PALMFLY

Plate No. 35

Elymnias patna patna (Westwood) 1851

KU-DA 1,2 NR

WS- 80-100mm.

M and **F** are similar to preceding species but has **blue stripes instead of spots. UPH with marginal white spots. UN** dark brown with small bluish white marginal spots.

Mimics the Striped Blue Crow and the Double Branded Crow.

Habits similar to others of the genus; rather a rare butterfly.

LIFE HISTORY - Not recorded.

LARVAL FOOD PLANTS - Banana sp.

296 JEZEBEL PALMFLY

Plate No. 35

Elymnias vasudeva vasudeva (Moore) 1857

WS- 75-85mm.

M and **F** UP, **dull bluish with all veins broadly dark brown and tailed. F** UN pale and closely streaked with fine reddish brown lines. **M** darker UP and much heavily marked.

Habits similar to those of the group.

TREEBROWNS, FORESTERS AND LABYRINTHS

Tribe Lethini includes three genera in India commonly called as Treebrowns. They are generally tailed or toothed on the HW. On the UP they are brown butterflies with white apical bands, or spots on the FW and spots or ocelli on the UPH. On the UN they bear ocelli and various bands. These insects are identified on the basis of their underside markings, which are distinct for most of the species and are not very difficult to identify. They are generally insects of thick bamboo forests or found in grassy patches of the forests. They are shy insects and are weak fliers. On disturbing they fly very short distance and take immediate shelter in the under growths. They come to damp patches or saps but never visit flowers for nectar. As rule they shun sunlight and do not bask.

They seem to be highly diversified in Sikkim and are found from altitudes as low as ,100 m to 3,500 m. As many as 37 species occur in Sikkim. No detailed study of this group of insects is available. Possibly some of the species and subspecies are endemic to Sikkim only.

297 WHITE-EDGED WOODBROWN

Lethe visarava (Moore) 1865

SK-BU 1,2 NR

WS- 50-55mm.

Sexes dimorphic. UPF cell evenly rounded. **UNH more than one band in the cell and markings are lilacine. UNH** ocelli in 2 and 6 always larger and more prominent than the rest. **UNH the centres of the ocelli from tornus to 4 are in straight line.** UPH with white border bearing black spots. **Female UP mostly white.** This is the only **F**, which is white in this genus.

Found in Sikkim-Darjeeling area from 1,000-1,800 m.

298 SCARCE WOODBROWN

Plate No. 36

Lethe siderea Marshall 1880

GH-NB 2,3 NR

WS-45-60mm

Similar to the following two species (299 and 300).

UNH ocelli from tornus to 4 are in straight line and no white border.

Habits similar to those of the group.

299 COMMON WOODBROWN

Plate No. 36

Lethe sidonis sidonis (Hewitson) 1863

KU-SS 2,3,4 R

WS- 45-60mm

Similar to the Small and Scarce Woodbrowns (298 and 300).

UNH ocelli form even arc. UNF with apical ocelli or spots. Very dark in WSF and UNH, ocelli in 2 and 6 much enlarged. DSF bronzy, UNH more variegated.

Habits similar to those of others of the genus.

We have seen and collected this species in North, East and West Sikkim.

LIFE HISTORY - **Egg** not described. **Larva** light green with two horns on the head and pale longitudinal and transverse lines. **Pupa** green, rarely red-brown, two tubercles on the head and sides whitish, ventral surface with whitish speckles.

LARVAL FOOD PLANTS - *Arundinaria falcate*.

300 SMALL WOODBROWN

Plate No. 36

Lethe nicetella De Niceville 1887

SK 2,3 R

WS- 48-55mm.

Similar to the Barred and Yellow Woodbrowns (301 and 302).

HW not caudate. **UNH ocelli form an even arc and not disintegrated.** UNF without apical spots or ocelli.

A butterfly of temperate region, flies close to the ground. Prefers undergrowths. Flight weak hardly ventures out of the undergrowth. So far recorded only from Sikkim and is rare.

301 BARRED WOODBROWN

Plate No. 36

Lethe maithrya De Niceville 1880

KU-SK 3 R

WS- 48-55mm.

Similar to the Small Woodbrown (300) and Yellow Woodbrown (302).

UNF, a wavy bar in the mid-cell and bordered by darker bars on both sides, of which the outer bar is narrower than the yellow bar and inner bar is about 3 to 4mm.

Habits similar to those of 299 and 302 We have a specimen from Lachen.

302 YELLOW WOODBROWN

Lethe nicetas (Hewitson) 1863

KU-MA 2,3 R

WS- 48-55mm.

UNH ocelli are equal and smaller. Area beyond discal band is yellow. **UNF no bar in the cell.** UNH discal silver line is more regular and crosses at origin of V3 and only waved in 1C. UNF the discal line is at right angle to costa.

303 SPOTTED MYSTIC

Lethe tristigmata Elwes 1887

304 DISMAL MYSTIC

Lethe ocellata lyncus De Niceville 1897

305 BAMBOO TREEBROWN

Plate No. 36

Lethe europa niladana Fruhstorfer 1911

SI,DU-BU,AN,NI DU-BU 1,2 NR

WS- 65-75mm.

Sexes dimorphic. UPF cell angled at apex. FW cilia chequered. **M** UPF no white band and **F** always with a discal band. Both sexes, **UN** paler, **UNH** no discal band, all ocelli very large and much disintegrated. **UNF** a pale band across the cell.

Found at low elevations in bamboo groves. Flies strongly but generally remains inside thickets. When flushed they might fly short distances and immediately take refuge in thickets. Some times a group of these insects could be seen on the same bamboo stem. On occasions, it rockets high up into the tree tops and is quickly out of sight.

LIFE HISTORY - **Egg** not described in literature. **Larva** is fusciform; green in colour, paler beneath. Head with a single short erect horn. Body is suddenly attenuated at eleventh segment.

LARVAL FOOD PLANTS - Bamboos.

306 COMMON TREEBROWN

Plate No. 36

Lethe rhorja rhorja (Fabricius) 1707

SL,SI,GI,KA-BU SK-BU 1,2 NR

WS- 60-70mm.

Similar to the preceding species (305).

UNF broad dark band in the cell continued to 1 and a narrow irregular outer band separated by a pale area. **UNF** the discal band is more irregular and continued to V1 in **F**. **UNH** with a discal band. **Ocelli** in 3, 4 and sometimes 5 are elongate and distorted. **Apical ocellus** is always conspicuously larger than ocellus in 2. **UPH** black spots larger.

Insect of thick forests, found in bamboo jungles from low elevations to about 3,000 m. They are active during early mornings and late evenings. They rest during afternoons with their wings closed and some-times head facing downwards, when they are difficult to locate because of their cryptic markings. Many of them come to sap, toddy, rotten fruits and sugar. Hardly visit flowers or damp patches.

LARVAL FOOD PLANTS - Grasses of the species *Apluda*, *Capillipedium*. *Microstegium* spp. have been recorded for other ssp.

307 BHUTAN TREEBROWN

Lethe margarita Elwes 1882

308 COMMON RED FORESTER

Plate No. 36

Lethe mekara mekara (Moore) 1857

SK-BU SK 1,2 R

WS- 65-75mm.

M UP paler brown and with brands. **F** with discal line at UPF angled at V4 and broken into spots **UN**. **UNH** tornal ocellus double pupilled, basal line straight and discal line sinuous, not bent much.

UPH, distal area more or less red, **F** with dusky red. **UPF** with prominent discal line. In the Sikkim subspecies the outer line is paler.

Found up to 2,100 m both before and after the rainy season. They fly close to the ground, hardly ever come out of the undergrowth. When disturbed they fly short distances and immediately dive into undergrowth and get lost. Seen in Tashiding and Yoksum area.

309 ANGLED RED FORESTER

Plate No. 36

Lethe chandica chandica (Moore) 1857

SK-BU SK 1,2 NR

WS- 65-75mm.

Similar to the Small Woodbrown (300).

UNH basal line irregular, discal line very much bent out in the middle in area 2 and 4, separated from the ocelli only by the width of the ocelli. M UPH with marginal red area obscure or absent. UPF with an obscure band from inner margin to V4. F upper side dusky red.

Habits similar to those of the genus. I have photographed one specimen near Gerathang, another collected from Sanklang.

310 SCARCE RED FORESTER

Lethe distans Butler 1870

SK-KR 1,2 R

WS- 70-80mm.

UNH the discal band not so much bent out in the middle between 2 and 4. M UPH outer marginal area bright red with prominent black spots particularly spots in 5 and 6 are very large. The spot in four is obsolete or minute. F mostly bright red. UN, the FW margin and tornal area of HW yellow. UNH the spots in 5 and 6 large and pear shaped and are double eyed.

311 COMMON FORESTER

Plate No. 36

Lethe isana dinarbas (Hewitson) 1883

CM-AS KU-AS 1,2,3 NR

WS- 50-60mm.

UNF with two dark bars in the cell close together to mid-cell. Outer bar in the cell straight, inner bar broad and single. M UNF the discal line sinuous and directed towards the tornus. F with broad white apical band.

Flight is slow and the insect settles often, especially along earthen banks on roadsides. I have come across this species in Gangtok and N. Sikkim, in forested regions.

LIFE HISTORY - (Fig. VIII.3). Recorded in literature.

LARVAL FOOD PLANTS - *Arundinaria* sp.

312 BROWN FORESTER

Plate No.36

Lethe serbonis serbonis (Hewitson) 1876

SK-NA SK 3,4 NR

WS- 60-70mm

UNF outer dark margin in the cell is concave and well separated from inner mark which is double. M, UPF large triangular band from mid-dorsum to veins 4 and 5. UNH pupils of ocelli in 3 to 5 dimmed out, but not disintegrated. F UP no band but dark band from UN shows through, 2 pale apical dots. UNH basal band straight.

In Sikkim, found from 1,000 m to 3,000 m, from June to September.

313 BROWN FORESTER

Plate No. 36

Lethe serbonis teesta Talbot 1937

314 **BLACK FORESTER**

Plate No. 36

Lethe vindhya (C. Felder) 1859

SK-BU 1,2 R

WS- 65-70mm.

UNF with one central bar and an oblique bar through outer part of the cell, continued below to HW across both wings as a narrow, usually straight line. UNH the ocelli prominently pale ringed which are not sharply defined in some. HW prominently tailed. UN, area beyond the discal line is prominently paler lilac and outer edge of dark basal line which passes through outer part of the cell UNF is prominently edged with lilac or whitish.

Habits as for the genus. I have seen it only once in the Rangpo Valley in thick forest.

315 **BAMBOO FORESTER**

Lethe kansa (Moore) 1857

KU-BU 1,2 NR

WS- 65-75mm.

Similar to the Common Red Forester (308):

But has no orange or red area on the UPH, but paler brown area on the outer margin. Spot in 4 is present and the spots are yellow ringed.

Habits as for the group. Found in Sikkim from 1,200-2,000 m, from April to June.

316 **TAILED RED FORESTER**

Plate No. 36

Lethe sinorix (Hewitson) 1863

SK-DA 1,2 NR

WS- 70-78mm.

UP, dark brown. UPH without a spot in area 4 and spots are placed in red area in M and orange area in F. UNH spot in area 4 is out of line and on the outside.

In Sikkim it has been collected from Lachen-Lachung Valley and Darjeeling area by earlier collectors.

317 **BLUE FORESTER**

Plate No. 36

Lethe scanda (Moore) 1857

SK-AS 2,3 R

WS- 58-65mm.

UP, purplish blue and unmistakable. UNF two bars in the cell and cell-end bar which are close to each other and the inner bar is broad. M UPF a dark band in mid V1, UPH prominent central dark band; UPF the discal line is bordered outwardly with pale yellowish line which is diffused outwardly.

The next two species also have a band along basal half of V3 and covered by hair pencils.

318 **PALE FORESTER**

Lethe latiaris (Hewitson) 1863

SK-KR 2,3 R

WS- 55-65mm.

UPH ocelli not prominently ringed. HW slightly tailed. M UPH with prominent central band and hair pencils. UNF the discal line crosses V2 much nearer to the end of it than the origin. M UPF unmarked. F UN a narrow white band on the FW which shows on the top from below as a pale brown band. UPF with two yellowish apical dots. UNH discal band straight.

Habits similar to those of the group.

319 FORESTER

Lethe bhairava (Moore) 1857

320 STRAIGHT BANDED TREEBROWN

Plate No. 18 & 37

Neope verma sintica (Fruhstorfer) 1911

KA-BU SK-NB 2,3 NR

WS- 55-60mm.

Similar to the following species.

HW more rounded and fringe not chequered and no apical spots on the FW. UP both the sexes with white apical band. **M**, with dark band at the base of 6 on the UPH. **M** and **F** UN, one obscure central bar in the cell UNF. **UNH ocelli are nearly perfect**. UNF with two or three apical spots.

Habits similar to those of others of the genus, but found in more forested areas between 1,200-3,000 m. Fond of settling on bark of trees and earthen banks along roads. Flight weak and very short.

321 BANDED TREEBROWN

Plate No. 37

Neope confusa confusa Aurivillius 1898

MU-BU MU-SK 2,3 NR

WS- 50-55mm.

HW tailed or long toothed. UPF, prominent white band across the apical area, obscure ocelli on a whitish background. UNH, ocelli almost regular, very rarely disintegrated, **apical ocelli are larger than that in 2**. UNF, with 3 spots from band to apex and a bar from costa across the cell, continues as a wavy line to 1b of HW. Another bar from apical ocellus to the basal line.

Very common butterfly between 200-2,500 m. Fond of visiting moist patches and salt encrustations. One was seen feeding from a vessel in which rice was cooked and a few rice grains were remaining in the vessel. Also has territorial habits. Very aggressive to any intruder. Seems to have definite favourite perches, with order of preference. Seen feeding on flowers of *Anaphalis*, and some other species of Compositae. They rest with their wings closed. Hardly ever seen basking.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Capillipedium*, *Microstegium*, and *Miscanthus* spp. have been recorded for Japanese and Australian ssp.

322 VEINED LABYRINTH

Plate No. 37

Neope pulaha pulaha Moore 1857

CM-BU CM-SK 2,3 NR

WS- 60-70mm.

Similar to the Tailed Labyrinth (324), but not prominently tailed. **UPF there are always two spots in area 2 and some yellow veins**, also the spot beyond the cell is rarely present, if present, it is placed in line with the spot in 4. UNF the costal bar beyond the cell is oblique.

Butterfly of both forested and open disturbed areas around human habitations. Very weak fliers, remain close to the ground, but when chased or disturbed go and sit at some higher reaches. Found along roads and streams. They sit with their wings closed, I have never seen them in sunny patches or basking. Often when they are sitting in the thickets and grassy patches it is difficult to locate them as their underside colour blends well with the surroundings. Found in the Himalaya up to 3,000 m. WB writes 'After settling some times they run on the surface for short distances. Also visit water. One individual could not be frightened away by me from an oak tree, where it settled on prominent places, their underside perfectly blending with the bark. These are pugnacious insects. The best time to catch them is when they are chasing other butterflies'. But I did not find them pugnacious at all.

LIFE HISTORY - Recorded in literature..

LARVAL FOOD PLANTS - *Pleioblastus* sp. has been recorded for the Formosan subspecies.

323 SCARCE LABYRINTH

Neope pulahina (Evans) 1924

SK-MA 2,3 R

WS- 60-70mm.

Similar to the preceding species.

But has always spot beyond the cell in continuation with two costal spots. UNF with pale costal bar placed at right angles to costa and continues to vein 4. UPF, markings pale and inner two-thirds of the cell nearly obsolete.

Rare in Sikkim. Found from 1,200 to 2,100 m.

324 TAILED LABYRINTH

Plate No. 37

Neope bhadra (Moore) 1857

SK-KR 2,3 NR

WS- 65-75mm.

UPF only one spot in area 2, no yellow veins. UNF two pale bars in the cell, central pale bar oblique, but straight. UNH with an ocellus in 1a.

Habits as those of the group. Found between 800-3,000 m.

325 DUSKY LABYRINTH

Plate No. 37

Neope yama yama (Moore) 1857

KU-DA KU-SK 2,3, NR

WS- 80-85mm.

UP, no yellow markings, plain dark brown obscurely marked. UN, highly variegated particularly UNH with complicated brown, yellow, grey and white markings. UNH a row of ocelli. UNF cell with three black bands interspaces filled with yellow colour. Discal band is obscurely white edged.

Habits as those of the group.

LIFE HISTORY - (Fig. VI.7). **Eggs** are laid on the underside of the leaf, in large numbers and rows of up to 34 on one leaf. **Larva** is straw coloured with dark head. When full grown larva is ochre-yellow with a huge brown dorsal stripe and a row of dark brown dots and head becomes reddish. Anal segments have yellowish spots. Larvae are gregarious and have been found living in groups of three to seven in nests made of three to four leaves. **Pupa** is short and dark and enclosed in sort of moss nest where it remains from September to following spring or June.

LARVAL FOOD PLANTS - *Arundinaria* sp. and *Bambusa* sp.

326 SMALL SILVERFORK

Plate No. 38

Zophoessa jalaurida elwesi De Niceville 1880

KU-SK SK 3,4 NR

WS- 50-55mm.

HW caudate. **UNF has two apical ocelli. UNH λ-shaped dark band from costa to lower edge of the cell. UNH basal area dark brown with two irregular narrow silver lines from costa across cell. UNF with one or two apical ocelli. In Sikkim subspecies only one apical spot UNF.**

A butterfly of bamboo forests, occurs between 2,000-3,000 m. Flies close to the ground and often settles on roads and paths. We found it locally common between Zuluk and Gnathang where the slopes were covered with bamboos.

327 MOELLER'S SILVERFORK

Plate No. 38

Zophoessa moelleri Elwes 1887

SK 2,3,4 R

WS- 45-55mm.

HW tailed. UNH a λ -shaped band from costa to end-cell. Area beyond the band is dark, end-cell band brown, bearing a straight pale broad band from costa across cell and very obscure basal band. UNF without apical ocelli.

Found in Sikkim up to 3,200 m. We have a specimen from Gangtok.

328 SMALL GOLDENFORK

Plate No. 36

Zophoessa atkinsonia Hewitson 1876

SK-BH 3,4 R

WS- 48-55mm.

UP, dark brown with fulvous or yellowish markings. UN ferruginous with yellow markings; area on either side of the dark band end-cell is yellow.

One specimen has been collected from Lachen. It is recorded to be rare in Sikkim.

329 LARGE GOLDENFORK

Plate No. 37

Zophoessa goalpara goalpara Moore 1865

SM-AS SK-AS 3,4 NR

WS- 65-80mm.

UP, brown with pale outer discal area and row of spots on the HW. HW tailed. UN pale to dark yellowish in colour. UNF cell three dark bands and the area in-between is yellowish. UNH, a brown inverted 'Y' from costa across the cell, with yellow colour on either side. UNH also with a brown irregular discal band and a row of ocelli.

An uncommon butterfly of the forested regions between 1,000-3,000 m. It has been observed by us in Gangtok. Earlier it has been recorded from Darjeeling, Lachen-Lachung Valley and from east Sikkim.

330 LILACFORK

Plate No. 37

Zophoessa sura Doubleday 1849

SK-NB 3 R

WS- 65-85mm.

Similar to the Goldenfork (329).

Upperside darker than the preceding species. UN, on the brown background lilac markings. UNF cell markings are two dark bars in the cell with lilacine band in between and a pale lilacine border at bar end-cell. UNH the inverted 'Y' marking on innerside is bordered by dark brown band and on the outside by lilac colour.

Habits similar to those of the preceding species. Only one specimen was seen in Gangtok at Hanuman Hill.

331 SCARCE LILACFORK

Zophoessa dura gammiei Moore

332 TREBLE SILVERSTRIPE

Plate No. 37

Zophoessa baladeva baladeva Moore 1865

GH-SK SK 2,3 NR

WS- 55-65mm.

UNF, four pale straight bands, the third from the base being silver and the others pale yellow. In addition a narrow pale bar end-cell. **UNH with two silver straight bands and one end-cell** and a row of marginal ocelli. V1 pale yellow. Pale basal markings across the cell.

It is very shy and an uncommon butterfly. Flies in the forested areas and along paths and streams. In Gharwal I have seen it drinking at a stream. In Sikkim I have come across it in Bakkim and in the Tholung Valley.

333 SINGLE SILVERSTRIPE

Zophoessa ramadeva ramadeva De Niceville 1888

WALLS

These are colourful insects with ocelli on the UN. Butterflies of higher altitudes found between 2,500-3,500 m. They are sun loving insects often seen basking on a prominent rock. Not much is known about the life history or ecology of the Indian species.

334 CHUMBI WALL

Plate No. 38

Chonala masoni (Elwes) 1897

SK-BH 3,4 NR

WS- 60-65mm.

Similar to *N. confusa* and *N. verma* (320 and 321).

UP, FW dark brown with broad apical white band and two apical dots. UNF, cell unmarked and prominent ocelli on UNF and UNH.

It is a locally common butterfly in the Upper Teesta Valley. Flies close to the ground and settles in the undergrowths. Very rarely basks. Other habits are like those of typical browns.

335 LARGE TAWNY WALL

Plate No. 7 & 38

Raphicera satricus satricus (Doubleday) 1849

SK-AS 3,4 NR

WS- 60-65mm.

UP black with tawny markings. UPF pupilled in 2 and 5 and two transverse bars in the cell. UN pale yellowish orange with ocelli and darker line. **UNH no dark lines in the cell.**

It is a butterfly of temperate regions. Found in the Himalaya between 2,500-3,500 m. It is again locally common in some regions only. It is often seen basking. Sometimes it visits the flowers of *Anaphalis* sp. It rests in shady undergrowths or under rocks with wings closed.

336 SMALL TAWNY WALL

Raphicera moorei mantra Butler 1867

SM-SK 3,4 NR

WS- 55-60mm.

Similar to the preceding species, but smaller.

UNH has 2 dark lines in the cell.

Habits as for the group, but found at slightly lower altitudes. Only one specimen has been photographed from Yoksum.

337 TIGER BROWN

Plate No. 39

Orinoma damaris Gray 1846

KN-KR 2,3 NR

WS- 75-80mm.

Resembles Blue Tigers. UP pale whitish with dark veins. **UPF basal half of the cell is yellow-orange with two black dots.**

Mimics the Glassy Tiger (512) and the Circe *Hestina* (398) *nama*.

Found in more forested areas, along the paths. Generally remains in the undergrowth, when disturbed, flying a short distance and taking refuge in the undergrowth. I have seen this species in the Western Himalaya also. In Sikkim I have seen it only twice.

338 DUSKY DIADEM

Plate No. 7

Ethope himachala (Moore) 1865

SK-BU 1,2 NR

UP brown a with complete series of marginal ocelli on both wings as well as on UN.

A butterfly of thickly forested regions. Basks early in the mornings and after heavy showers with wings wide open. Wary on closer approach. Flies close to the ground often resting on leaves. It was very common in Arunachal Pradesh, but has been recorded as not rare by earlier workers from Sikkim.

339 YELLOW OWL

Plate No. 39

Neorina hilda Westwood 1850

SK-AS 1,2 R

WS- 80-95mm.

M and F UP dark brown with a broad deep yellow band on FW and apical margin of UPH yellow. FW with obscure large black ocellus and white dots near apex. UN vandyke brown, with large black prominent ocelli in 2 and 6 of UNH and 5 of UNF.

In Sikkim has been recorded between 2,500-2,800 m. A forest insect; nothing much about it is known or recorded.

BUSHBROWNS

Bushbrowns are drab brown coloured medium-sized insects found in the secondary undergrowths. They have marked seasonal forms. WSF are darker with prominent ocelli and discal band on the UN. The DSF are generally cryptically marked and the ocelli are reduced to spots. Males have secondary sexual characters like brand, hair tuft on the UN of FW or UP of HW. They are extremely similar looking insects and are very difficult to identify, particularly the DSF. They are weak fliers, most of the time resting in the undergrowth with their wings folded on their backs. They do come out in the sun for very short but generally never sit with their wings wide open. They occur between low to medium altitudes, in the forested region as well as in scrub jungles and open grassy patches.

340 WHITEBAR BUSHBROWN

Plate No. 38

Mycalesis anaxias oemate Fruhstorfer 1911

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

WS- 48-55mm.

UP with well-defined discal line. **UPF with a subapical white band.** UPH in **M** without a large black discal patch. **M** UPF an elongate dark patch of hair pencils in the middle of 1b, UPH brand in 7 is black and tuft yellow. Hardly any difference in seasonal forms.

341 LILACINE BUSHBROWN

Plate No. 38

Mycalesis franscica santana Moore 1857

KU-BU 1,2 NR

WS- 48-55m.

UPF prominent ocellus in 2 and usually one in 5. **UPH no ocellus. UNF never ocellus in 3. M** UNF small prominent brown brand and tuft brown. **HW vein 3 from the cell. UN discal line lilacine and outwardly diffused.**

Habits similar to those of the group. Found up to 2,000 m. We have three specimens one each from North and West Sikkim and Gangtok.

342 CHINESE BUSHBROWN

Mycalesis gotama charaka Moore 1874

343 COMMON BUSHBROWN

Plate No. 38

Mycalesis perseus blasius (Fabricius) 1798

SL,IN,BU KN-BU 1,2 C

WS- 38-50mm.

WSF: **M**, UPF with a small and short brand near V2. **UPH ocellus in 2 not ringed. UNH a series of carved ocelli from 2-5 of which ocellus in 3 is shifted out of line.**

DSF: UN pale, ocelli reduced to dots.

Commonest of the group found in wetter and thickly forested areas. In the Himalaya it is found up to 1,500 m. They are very shy butterflies, with weak flight. When disturbed fly close to the ground for short distances and settle in the undergrowth. Males occasionally come to damp patches, sugar and salts. This butterfly is found throughout India.

LIFE HISTORY - **Egg** yellow green, spherical, base flattened. Laid singly on the blade of grass or rice plant. **Larva** green with paler green lateral stripes and a paler sub-apicular line; spiracles are white ringed with brown; Head chestnut clothed with hairs. **Pupa** blue-green with slightly darker line dorsally on the abdomen, and minute black spots half way along the antenna sheath.

LARVAL FOOD PLANTS - *Oryza* sp.

344 DARKBRAND BUSHBROWN

Plate No. 38

Mycalesis mineus mineus (Linnaeus) 1765

SL,IN,BU KU-BU 1,2 C

WS- 45-50mm.

UPF ocellus is situated in more or less pale area outwardly and inwardly defined by a dark line. Ocellus ring diffused into this area and never narrow and of uniform width or sharply defined. **M** UPF with brand. **HW brand** in area 7 on the upperside is **salmon-pink oval and rarely brown. UNH with a pale thin line, anteriorly bounding ocelli in 4 and 5, is deeply indented.**

Found in hills up to 2,000 m and plains at lower elevations. It may be commoner than any other Bush Browns but, because of the difficulty in identification, its status remains doubtful.

LIFE HISTORY - **Egg** green, shiny and finely pitted and dome-shaped. Egg is laid anywhere on the plant or on the ground close to the food plant. **Larva**, green with dorsal line and black markings on each segment. Surface of the body is covered with small semi-hyaline tubercles each bearing short black hairs. Head is brown. **Pupa** is grass green with yellow subdorsal rounded tubercles on segments 5 to 9 and black spot on segment 9 to 11. Larva pupates low down near the ground or on the leaf stalk or twig and suspended by the tail and is free-hanging.

LARVAL FOOD PLANTS - Grasses of the genera *Lopanthorum*, *Pogonanthum*, *Microstegium*, spp. etc. have been recorded elsewhere in the world.

345 LONG-BRAND BUSHBROWN

Plate No. 38

Mycalesis visala visala Moore 1857

IN,BU,AN IN, KU-AS 1,2 C

WS- 45-50mm.

Similar to the preceding two species (348 and 349). **M the brand is oval long and reaches the discal line.**

Habits as those of the genus. I have not recorded it so far owing to difficulty in identification in the field.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - Poaceae.

346 WOOD-MASON'S BUSHBROWN

Mycalesis suavolens tyleri Wood-Mason & De Niceville 1894

347 WHITE-EDGED BUSHBROWN

Mycalesis mestra vetus Fruhstorfer 1911

SK-AS SK-BH 1,2 NR

WS- 42-50mm.

UP ocelli small. Ocelli of 2 of UPF and 2 of UPH are of equal size. UNF **In addition to ocellus in two there are two apical ocelli.** UNH no ocellus in 3. UNF pale yellowish discal band showing through above. **UN base mottled or strlated.** UNF brand minute and black. UPH brand small and black and tuft brown.

Common between 1,500-1,800 m. in the Teesta Valley and Singhik and Chungthang.

348 MOORE'S BUSHBROWN

Plate No. 39

Mycalesis heri Moore 1857

KU-BH 1,2 NR

WS- 42-50mm.

UPF with a large ocellus in area 2 and there is always one in 3. **M** UPH brand black and tuft brown. It is recorded to be rare from Sikkim.

349 SALMON BRANDED BUSHBROWN

Mycalesis misenus De Niceville 1889

350 BRIGHT EYE BUSHBROWN

Plate No. 7 & 39

Mycalesis nicotia Westwood 1850

MU-KR 1,2 R

WS- 45-55mm.

Similar to *M. malsara* (351).

UN the basal area is mottled up to discal line. UPF ocellus in 2 is pupilled and much larger than the rest.

It is found up to 2,000 m. One specimen has been collected from Gangtok.

351 WHITELINE BUSHBROWN

Plate No. 7 & 38

Mycalesis malsara Moore 1857

SK-BU 1,2 R

WS- 40-50mm.

UP ocelli unpupilled. **UN mottled,** pale yellow or white band. Brands black and tufts brown. UP white discal line is clearly defined.

Common in Sikkim during October at low elevations.

352 NIGGER

Plate No. 7 & 39

Orsotrioena medus medus (Fabricius) 1775

SL,SI,SK-BU,AN,NI SK-BU,AN 1,2 C

WS- 45-55mm.

UP, vandyke brown with thin marginal pale border. UPH also has a very thin submarginal line. **No ocellus on the upperside.** **UN darker than UP, a white or yellowish discal line running across**

Scale : 5 cm

PLATE NO. 33



268



269 a



269 b



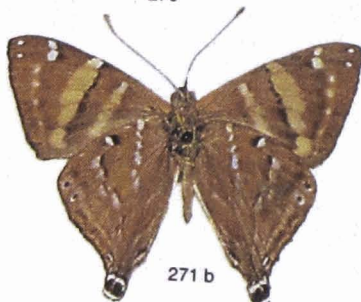
270



273



271 a



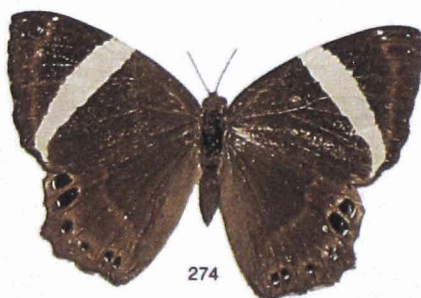
271 b



272 a



272 b



274



275



277 a



277 b

- 268 Punchinello
269 a Lesser Punch UP
269 b Lesser Punch UN
270 Tailed Punch UN
271 a Mixed Punch UP
271 b Mixed Punch UN

- 272 a Striped Punch UP
272 b Striped Punch UN
273 Orange Punch
274 Dark Judy
275 Tailed Judy
277 a Plum Judy ♂
277 b Plum Judy ♀

277 b



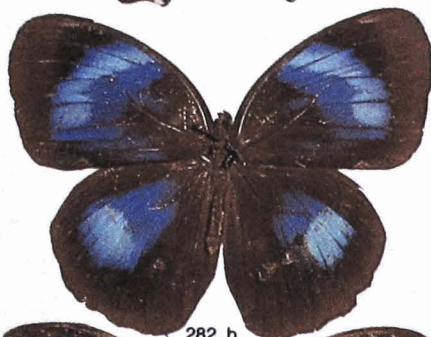
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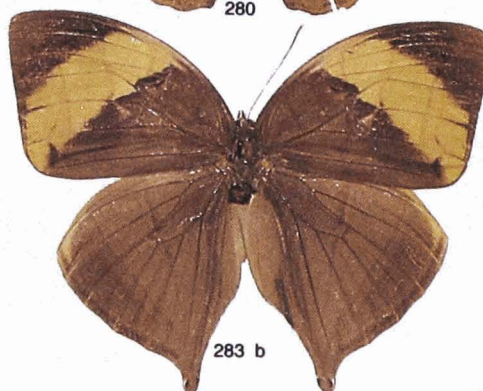
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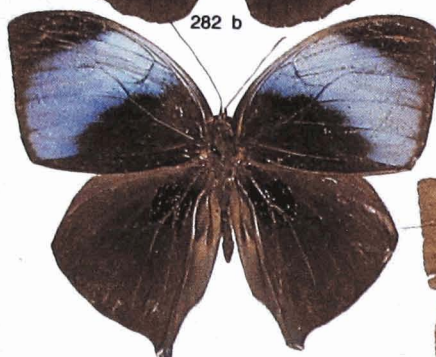
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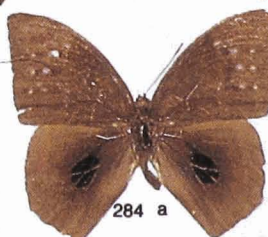
282 b



283 b



283 a



284 a



284 b



286



285 a



285 b

278 Common Faun

280 Chocolate Jungle Queen

281 Northern Jungle Queen

282 Jungleglory

283 a Kohinoor ♂

283 b Kohinoor ♀

284 a Common Duffer ♂

284 b Common Duffer ♀

285 a Great Duffer ♂

285 b Great Duffer ♀

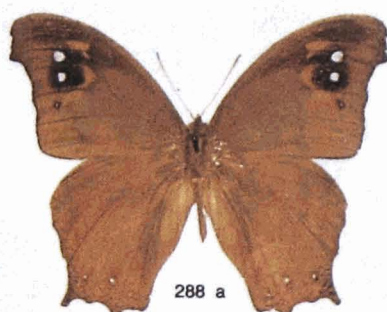
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Red Caliph

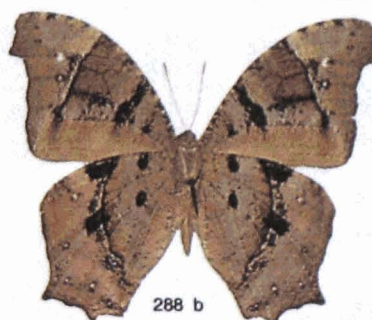
Scale : 5 cm



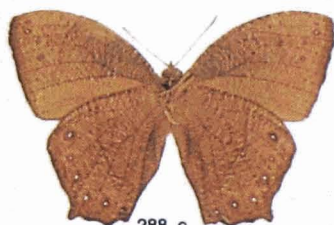
PLATE NO. 35



288 a



288 b



288 c



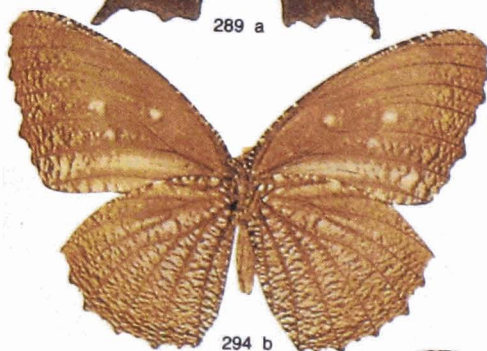
289 b



289 a



292



294 b



295



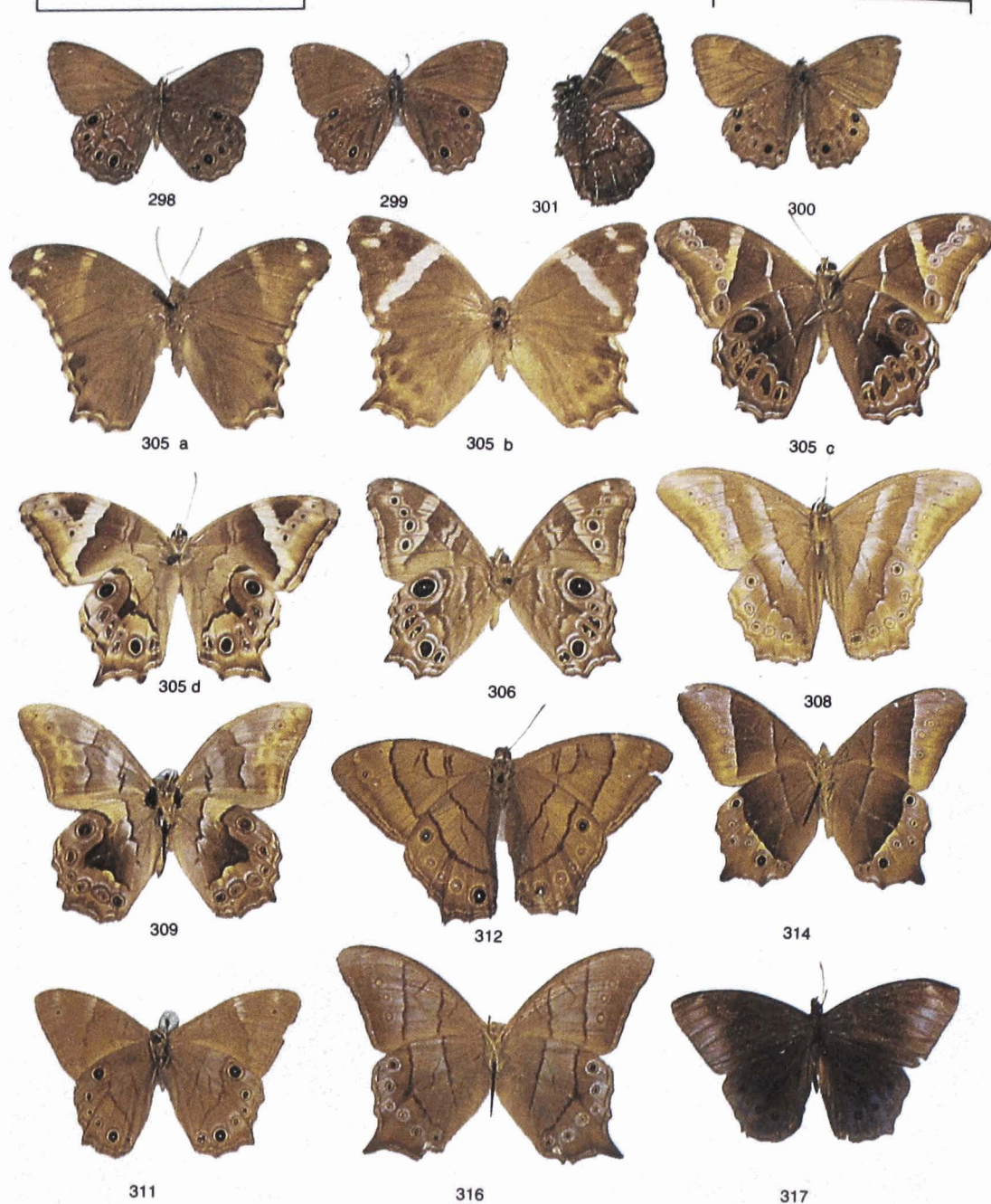
296



294 a

- 288 a Common Evening Brown UP
288 b Common Evening Brown UN ♂
288 c Common Evening Brown UN ♀
289 a Dark Evening Brown UP
289 b Dark Evening Brown UN

- 292 Common Palmfly ♂ UP
294 a Spotted Palmfly UP
294 b Spotted Palmfly UN
295 Blue Striped Palmfly
296 Jezebel Palmfly



- 298 Scarce Woodbrown UN
 299 Common Woodbrown UN
 300 Small Woodbrown UN
 301 Barred Woodbrown UN
 305 a Bamboo Treebrown ♂ UP
 305 b Bamboo Treebrown ♀ UP
 305 c Bamboo Treebrown ♂ UN
 305 d Bamboo Treebrown ♀ UN

- 306 Common Treebrown ♂ UN
 308 Common Red Forester UN
 309 Angled Red Forester UN
 311 Common Forester UN
 312 Brown Forester UN
 314 Black Forester UN
 316 Tailed Red Forester UN
 317 Blue Forester ♂ UP

Scale : 5 cm

PLATE NO. 37



320



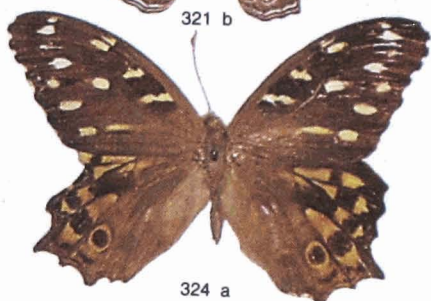
321 a



321 b



322



324 a



324 b



325



329 a



330 a



329 b



330 b



332

320 Straight Banded Treebrown UP 325 Dusky Labyrinth UN

321 a Banded Treebrown UP

329 a Large Goldenfork UP

321 b Banded Treebrown UN

329 b Large Goldenfork UN

322 Veined Labyrinth UN

330 a Lilacfork UP

324 a Tailed Labyrinth UP

330 b Lilacfork UN

324 b Tailed Labyrinth UN

332 Trebel Silverstripe UN



327



326



328



334 a



334 b



335 a



340 a



340 b



341



343 a



343 b



343 c



344 a



344 b



344 c



345 a



345 b



351

- | | | | | | | | | |
|-------|----------------------|----|-------|-----------------------|------|-------|----------------------|------|
| 326 | Small Silverfork | UN | 335 b | Large Tawny Wall | UN | 343 c | Common Bushbrown | ♂ UN |
| 327 | Moeller's silverfork | UN | 340 a | Whitebar Bushbrown | ♂ UP | 344 a | Darkbrand Bushbrown | ♂ UP |
| 328 | Small Goldenfork | UN | 340 b | Whitebar Bushbrown | UN | 344 b | Darkbrand Bushbrown | ♂ UN |
| 334 a | Chumbi Wall | UP | 341 | Lilacine Bushbrown | UN | 344 c | Darkbrand Bushbrown | ♂ UN |
| 334 b | Chumbi Wall | UN | 343 a | Common Bushbrown | ♂ UP | 345 a | Long-brand Bushbrown | ♂ UN |
| 335 a | Large Tawny Wall | UP | 343 b | Common Bushbrown | ♂ UN | 345 b | Long-brand Bushbrown | ♂ UN |
| | | | 351 | White-line Bush brown | | | | |



348



350



352



337



353



339 a



354 a



339 b



354 b

337 Tiger Brown

339 a Yellow Owl UP

339 b Yellow Owl UN

348 Moore's Bushbrown

354 b

350 Brighteye Bushbrown UN

352 Nigger UN

353 Ringlet UN

354 a Dark Catseye UP

Dark Catseye UN

- | | | | |
|-------|---------------------|-------|-------------------|
| 363 | Pallid Argus UN | 368 | Mountain Argus UN |
| 361 | Common Fourring UN | 373 | Common Satyr UN |
| 360 b | Common Threering UN | 371 | Great Satyr UN |
| 360 a | Common Threering UP | 369 b | Arctic Argus UN |
| 358 | Common Fivering UN | 369 a | Arctic Argus UP |

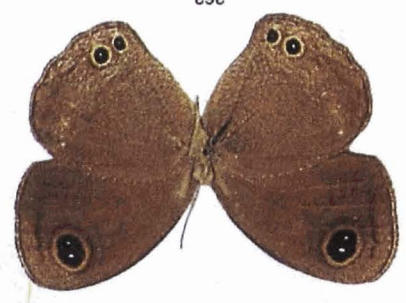
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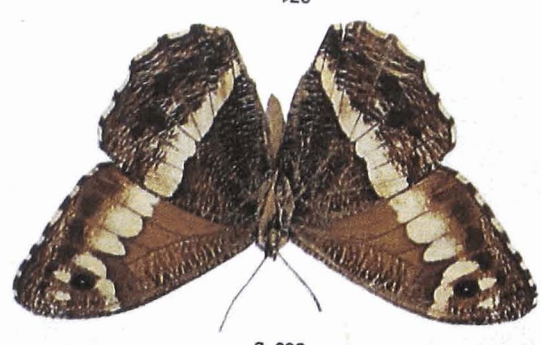
374



363



371



369 a



369 b



358



355



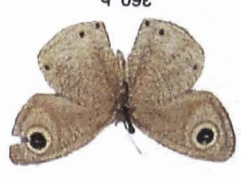
368



360 a



360 b



361



both wings. UNF two ocelli of almost equal size. UNH with two apical ocelli coalesced and enclosed by one ring. Two more ocelli in the tornal area. These ocelli in DSF may be reduced to spots.

It is a very common butterfly in the wetter season at low elevations up to 1,600 m, particularly in the valleys wherever rice is grown. Very shy butterfly, remains close to the ground in the undergrowth. They do come out to bask in the sun early mornings but do so with their wings closed and sitting with their body parallel to the sun's rays. Their flight is weakest of all Satyrins and when disturbed they fly very short distances and settle in the grass or low-growing bushes. Very common in Rangpo, Khanni khola, Rangeet Valley and Legship, Mangan and Dikchu areas.

LIFE HISTORY - **Egg** not described. It is laid on the underside of the leaf. **Larva** is rose coloured, with two tapering horns on the head and two long anal processes. Horns are dark red. Body with white bands and lateral lines, dorsal faint bluish line. Sometimes larva is white-green; shy and does not feed greedily. If disturbed or alarmed curls up and drops down to the ground. **Pupa** is dirty white, with an iridescent golden gloss on the wings. Pupa is formed near the ground.

LARVAL FOOD PLANTS - *Oryza sativa* and *Imperata* sp.

353 RINGLET

Plate No. 39

Ragdia crisilda crito (De Niceville) 1890

SK-SB SK-MA 1,2 R

WS- 42-46mm.

A small white butterfly with three vertical bands and on UN with a row of ocelli which are prominent on the HW; beyond the ocelli, a submarginal and a marginal white bands.

As the common name suggests it is an easy butterfly to identify. Nothing much of its life is known except that it is a forest insect and flies low among the grass at low elevations.

354 DARK CATSEYE

Plate No. 39

Zipoetis scylax Hewitson 1863

SK-SS 1,2 NR

WS- 55-62mm.

UP similar *M. malsarida*.

UP dark velvety brown with two prominent black borders, without any ocellus. UN, ocelli on HW are bordered by silvery marginal bands. UNH ocellus in 2 is large and in 5 and 6 is double, i.e. is circled with one ring. UNF series of four ocelli.

Butterfly of lower elevations. It has been recorded in March and June from Darjeeling and the Teesta Valley. It is seldom seen owing to its skulking habits, and remains generally in the bushes. WB suggests the best way to flush out this insect is to beat the bushes on the roadside. Even if it comes out immediately it dives back into cover.

RINGS

The rings are small insects; on the UP they have ocelli on both FW and HW. On the UNF they have a large ocelli in area 5 and UNH has varying numbers of rings which form the basis for identification of these insects. They also have striations and band on the UN. Some of them have seasonal forms, in DSF the ocelli is reduced to spots.

They are weak fliers, keeping close to the ground. They are seen basking early in the mornings with their wings wide open. They also visit flowers, damp patches, dung etc.

355 HIMALAYAN FIVERING

Plate No. 40

Ypthima sakra sakra Moore 1857

SK-KR SK 2,3, NR

WS- 48-55mm.

UP brown, FW slightly oval bipupilled ocellus with yellow ring. UPH four similar unpupilled ocelli, of which, often the apical and tornal ocelli may be absent. **UN, ochreous brown, thickly striated with brown, UNH with five ocelli of which the two apical ocelli are coalesced and encircled by a common yellow ring. The next three ocelli are separate and the tornal ocelli is bipupilled.**

There is another very closely related species *Ypthima nikaea* found from the West Himalaya to East Nepal, which **has the two apical ocelli separated by a clear ring and then encircled by a common yellow ring.**

One of the most common butterflies found throughout the year. This butterfly does not have any seasonal forms. Found from about 1,000-2,800 m. Seen feeding on flowers of various species like *Ageratum* and *Anaphalis* spp., and many low-growing flowers. Flies close to the ground; flight weak and short when disturbed. Early in the morning it may be seen basking on a leaf. I have found this butterfly is one of the earliest to be on wing in the morning. They also visit damp patches. Males do show some territorial behaviour.

356 VARIEGATED FIVERING

Ypthima methora methora (Hewitson) 1865

SK-AS 1,2 NR

WS- 40-48mm.

Similar to the Common Fivering (358).

Larger, the subdorsal, discal and submarginal fascia are ill defined and only in traces, otherwise mottled uniformly.

It was common in the Tholung Valley during April-May. Visits low-growing flowers. Also seen basking late in the day.

357 EASTERN FIVERING

Ypthima persimilis Elwes and Edwards 1893

358 COMMON FIVERING

Plate No. 40

Ypthima baldus baldus (Fabricius) 1775

IN, BU CM-BU 1,2 C

WS- 35-48mm.

UPF one bipupilled large ocellus and UPH with two ocelli. UNF large bipupilled ocellus with broad pale ring around it. **UNH ocelli are three pairs of which middle pair is larger and the tornal ones are very small.** In DSF they may be represented by just small specks. UN striations are coarse and sub-basal bands are prominent in WSF. Subbasal, discal and submarginal fascia are well defined.

Very common throughout India up to 1,500 m. Generally in light and thick forests. Usually fly in the clearings in the undergrowths. Habits are typical of rings. Visits flowers of various low-growing species. Flight is typical, slow closing and opening of wings somewhat similar to those of *Psyches*. Basks early particularly on cold mornings and after the rains.

In Sikkim it is very common in Rangeet and Rangpo valleys. In Teesta Valley it is common up to Chungthang. Also common in inner valleys of West and South Sikkim.

LIFE HISTORY - Eggs similar to that of *Y. hubenri*: laid in groups. **Larva**, when young pinkish white, hairy with pinkish head. Adult is spindle shaped; reddish ochreous with head and body throughout sharegreened, covered with small tubercles, bearing very fine short hair; darker dorsal line. **Pupa** brown with paler markings; hangs freely from a leaf.

LARVAL FOOD PLANTS - Various grasses.

359 JEWEL FOUR-RING

Ypthima avanta Moore 1874

360 COMMON THREEERING

Plate No. 40

Ypthima asterope maharatta Moore 1884

IN,BA 1,2 NR

WS- 35-48mm.

UNH, with three ocelli which form a straight line.

Habits similar to those of the group. Very common in the peninsular India particularly in the rainy season. It has been recorded from lower hot valleys of Sikkim.

361 COMMON FOUR-RING

Plate No. 40 & 41

Ypthima hubenri hubenri Kirby 1871

IN,BU 1,2 NR

WS- 30-40mm.

UNH, with three tornal ocelli and one apical ocellus. UPH at least two ocelli in 2 and 3. Ocelli on UNH are not on dark band. UPH tornal half not white. Seasonal forms are known.

Habits similar to those of the group. In Sikkim I have yet to come across this species.

LIFE HISTORY - Egg light green. **Larva** green with darker dorsal line; tail slightly bifurcated. **Pupa** green if formed on the grass blade, brown if formed near the roots; head rounded. Body with dark brown wavy lines and spots.

LARVAL FOOD PLANTS - Grasses.

362 LARGE THREEERING

Ypthima newara Moore 1874

WN-AS 1,2 R

363 PALLID ARGUS

Plate No. 40

Callierbia scanda scanda (Kollar) 1844

KA-SK 1,2 NR

WS- 50-76mm.

UP chocolate-brown, becoming paler outwardly. **UN** prominently mottled. **White irroration very prominent.** **UNH two tornal ocelli and a row of three or four white spots towards the apex.** The subspecies from Lachung is larger and more richly marked with white irroration.

A very common butterfly along Chungthang to Lachung and Munshithang along the road in the month of August. It has a typical brown's flight. When disturbed flies dodgingly, generally towards the upperside of the valley and settle somewhere high out of reach. Some were seen basking for very short time. They visit flowers of *Cirsium arvensis*, in Mussorie area. In Uttarkashi I had watched a Paradise Flycatcher *Terpsiphone paradisi* capturing this butterfly and feeding it to its youngones.

364 PALLID ARGUS

Callierbia scanda opima Watkins 1927

365 RINGED ARGUS

Callierbia ananda ananda (Moore) 1857

366 RINGED ARGUS

Callierbia ananda caeca Watkins 1925

367 **MOTTLED ARGUS***Callierbia narasingha narasingha* (Moore) 1857**SATYRS**

Satyrs are large brown butterflies with a discal band running through both the wings. UN they are striated to a varying amount. Occur between 1,800 m to 3,500 m. They are fast flying butterflies, often sit on the ground with closed wings. They do not as rule visit flowers. There are two species which are smaller and found only between 3,500-4,500 m.

368 **MOUNTAIN ARGUS**

Plate No. 40

Paraoneis pumilus bicolor (Seitz) 1908

LA- KA, CM, SK CM, SK 4,5 NR

WS- 40-45mm.

UP brown with a tawny discal band. **UPF tawny band ill defined and diffused inwards**, UP dark brown border along the termen up to the edge of discal band.

Habits as those of the following species. Has been collected by earlier collectors from the northern frontier of Sikkim.

369 **ARCTIC ARGUS**

Plate No. 40 & 41

Paraoneis palaearticus sikkimensis (Staudinger) 1889

CM,SK 4,5 NR

WS- 40-45mm.

UP similar to Satyrs.

UP pale ohreous-brown with a narrow band of separated spots. **UN dark brown and both wings have discal white band. HW is highly speckled.**

A butterfly of higher altitudes between 3,200-3,500 m. Common in the upper reaches of Teesta and East Sikkim. Frequents open alpine patches. Flies very weakly, settling after a short flight. As the breeze in this area is so swift that when the butterfly settles, it is almost flat on the sides, even so while feeding on flowers. Visits various low-growing flowers. When disturbed often flies very fast in a dodging style, generally in the direction of breeze.

370 **NARROW BANDED SATYR***Aulocera brahminus brahminiodes* (Moore) 1892

CM,KA-SK CM 3,4 NR

371 **GREAT SATYR**

Plate No. 40

Aulocera padma padma Kollar 1844

KA-SK 3,4 NR

WS- 70-90mm

UP, dark brown with UPF the inner edges of discal spots in 1 to 3 nearer to the base and not in line with spot in 4. **UPH band reaches dorsum in M. The band is of even width on upperside and the veins crossing this band are black.** Two subspecies are found and both have been collected from Sikkim.

A. padma padma does not have a spot on the inner side in 5 while *A. padma loha* has a spot in 5.

Largest of the Satyrs and a very powerful flier. Occurs between 2,000-3,100 m or even higher in the Western Himalaya. Fond of hilltops and ridges. Often sits on the ground with closed wings and will take position on a rock or a prominent leaf and attack an intruder. The **M** is very aggressive. Two broods are

known from Sikkim, one in April and the other after the rains. I have come across this species in the Zema Valley, West Sikkim and East Sikkim.

372 GREAT SATYR

Aulocera padma loha (Doherty) 1886

373 COMMON SATYR

Plate No. 40

Aulocera swaha swaha Kollar 1844

CH-SK 2,3 NR

WS- 60-70mm.

UPH band distinctly narrows to inner margin and does not reach it. In **M** UPH the discal band is broad and enters the cell. UPF the discal spots usually coalesced, and larger. **UN pale straw coloured and tinged with yellow. Veins crossing the band are not black.**

Smaller of the genus. Flight is weak. Found above 1,500 m; prefers sunny places in forests.

LIFE HISTORY - Larva is brown with rough hairless skin.

LARVAL FOOD PLANTS - Grasses (Poaceae).

374 STRIATED SATYR

Plate No. 40

Aulocera saraswati Kollar 1844

SH-SK 2,3 NR

WS- 60-75mm.

UN very pale, white striations prominent, white band broad and straight on the UPH.

Found in more open areas as low as 1,000 m. I came across this species only once at Mangan.

CALINAGINAE

375 FREAK

Plate No. 42

Calinaga buddha gautama Moore

MU-BU SK 2,3 R

WS- 90-105mm.

UP ashy grey with white markings in the interspaces. **Thorax is partly or fully covered with orange hairs.**

Nothing much about its habits and ecology is recorded.

CHARAXINAE

These large, tailed butterflies are commonly known as Rajahs and Nawabs. Rajahs are orange, tawny or dark brown butterflies with black apical bands. On the UN they are cryptic, resembling dead leaves or wood. These markings are helpful in identification of closely allied species. Sexes are dimorphic. They belong to the genus *Charaxes*. Eight species are found in India, of which six are found in Sikkim. Some of the old world species have well-developed teeth on costa of the FW, which is used in defence against predators and in male-male interactions.

Nawabs are dark chocolate or white butterflies, some with pale discal bands. They belong to the genus *Polyura* (= *Eriboea*). These are highly diversified in Afro-tropical region.

They are forest canopy dwellers, found preferably near the food plants. Fs are not easily seen. These are very powerful fliers and keep to the upper foliage. They are territorial in behaviour and generally have a post very high on top of a tree, on some prominent leaf. They come down to decaying vegetable matter, droppings, over-ripe fruits and moist earth. De Vries writes "It is easy to catch an individual after it has been feeding on fermenting fruits for long-time, when it becomes intoxicated and docile. The butterfly may have difficulty in flying with its greatly distended abdomen and can be easily picked with ones fingers". Their habits are similar to those of the Barons and Dukes.

376 TAWNY RAJAH

Plate No. 39

Charaxes polyxena hierax Felder 1867

SL, SI, 1, 2 NR

WS- 80-100mm.

Similar to the Yellow and Scarce Rajahs (377 and 378).

UP tawny or chestnut. Ms more or less toothed, Fs tailed at V4. **M UPF black border with tawny markings from dorsum to V2 or V3. F discal band white and pale spots on the border.** There are several varieties of Ms in Sikkim and they are generally smaller.

Confined to heavily forested areas. A very active butterfly. They fly very high among the trees and food plants. I have observed them to come down to damp patches. They often bask on tree tops, from where they take short flights down and return to the same spot. When resting they sit with their wings closed, and resemble a dry leaf, and are well camouflaged. Generally a butterfly of lower elevations, found up to 1,200 m. Flight is rapid and powerful, consisting of dashes and dives.

LIFE HISTORY - **Egg** spherical and flattened slightly on the top, bright yellow when laid, soon becoming reddish brown with lighter spots. Always laid in twos or threes, on the upperside of the leaf. The place chosen for laying eggs is a very sunny situation in the forest, in the vicinity of water if possible. Often high up on the large trees. **Larva** is fusiform rich bluish with brown-yellow bands. Head large, six-sided with four curved horns. The colour of the head is blue-green with yellow marginal band flanked by a black line. The larva on emerging lives on the upperside of the leaf, making a bed of silk near the edge where it eats. **Pupa** is short, blue-green smooth and shiny, white line on the abdomen and white markings on the thorax.

LARVAL FOOD PLANTS - *Saccopetalum tomentosum* (Annonaceae), *Aglaia roxburghiana* (Meliaceae) and *Tamarindus indicus* (Leguminosae).

377 SCARCE TAWNY RAJAH

Charaxes aristogiton Felder 1867

SK-BU 1, 2 NR

WS- 70-95mm.

Similar to the previous species.

UPF with a black border narrower and inwardly bordered by a dark line. Apical tawny spots in 6. **UN purple tawny and very distinct. F never has pale discal band.**

Habits as those of the group.

378 YELLOW RAJAH

Plate No. 42

Charaxes marmax Westwood 1848

KU-BU 1,2 NR

WS- 90-120mm.

Similar to the Scarce Tawny Rajah but **UPF tawny spots into 7 and below uniform yellowish brown and markings are regular**. UNF black bar mid-cell broken into spots.

Habits and habitats are similar to those of the Tawny Rajah. According to De Niceville this is commonest of the group in Sikkim. But according to Sanders (in the 1940s), **Ms** are rather rare and **Fs** rarer. Seen up to 900 m. Probably locally common. I have not yet come across this genus in Sikkim

379 VARIEGATED RAJAH

Charaxes kaharuba Moore

380 BLACK RAJAH

Plate No. 42

Charaxes fabius fabius (Fabricius) 1781

SL,SI,KN-BU KN-SK 1,2 NR

WS-70- 80mm.

UP dark brown with pale yellowish discal band, dark in WSF and paler in DSF. HW with tails at V2 and V4. Tails longer in **Fs** and sharper in **Ms**.

Most widely distributed of the subfamily. Flies high, is hardly seen. But comes to over-ripe fruits, toddy juice, and often seen near water and shady nullahs. When it rests, sits with wings closed. I have often observed this butterfly getting attracted to some chemicals in the laboratory, possibly is attracted to alcohol. I also suspect it migrates in south India during August.

LIFE HISTORY - **Egg** spherical, with longitudinal ridges, translucent yellow with a broad dark red irregularly margined zone around the upper half. **Larva** sub-cylindrical, body dark green sometimes with large white circular mark on the seventh segment: head convex with horns and spines, body covered with irregular rows of small yellow tubercles. **Pupa** similar in shape to that of *C. polyxena*, dark green with minutely marbled white lateral abdominal line.

LARVAL FOOD PLANTS - *Tamarindus indicus* (Leguminosae).

381 COMMON NAWAB

Plate No. 42

Polyura athamas athamas (Drury) 1770

SL,SI,KU-BU KU-NB 1,2 NR

WS- 60-75mm.

UP dark brown with broad yellow discal band, width variable . UPH minute yellowish submarginal spots and are not clear on UNH.

Found generally in forested areas. Basks usually on tree-tops but often comes down to damp patches and dung. I have seen it feeding on a dead crab. Seen sometimes along the open forest paths. Settles down on low leaves with wings closed. Seen up to 1,900 m. Bell says that it never visits flowers, but I have seen it feeding on a Compositae creeper in Rangpo. The same observation was also made ten years ago, at the same place.

LIFE HISTORY - **Egg** is smooth, shiny, yellow and dome shaped; laid in a sunny spot on the upperside of the leaflet. **Larva** greenish in colour with flat hexagonal head and with four horns and a set of spines. The larva makes a bed of silk for itself on the upperside of the leaf on which it is feeding or on some other nearby leaf to which it returns after feeding each time. **Pupa** smooth yellow-green with white streaks and spots, formed under a leaf stalk or twig and hangs rigidly

LARVAL FOOD PLANTS - *Acacia suma/chundra*, *Acacia catechu*, *Delonix regia*, *Caesalpinia sappan*, *C. ruga*, *C. boducella*, *A. pennata*, *Albizia lebek*, *Albizia julibrisin*, *A. molluccana*, *Adenantha pavonia*, *Pithecollobium* sp. (Leguminosae), *Grewia* sp., (Tiliaceae).

382 PALLID NAWAB

Polyura arja (Felder and Felder) 1867

SK-BU 1,2 LC, NR

WS-75-85mm. FWL- 33mm

Similar to the previous species but **the band is paler greenish white**. UPH the submarginal spots whitish and slightly larger. **On UN these submarginal spots are outwardly black.**

Habits similar to those of the previous species. Seen in the Teesta Valley near Sangkalang and Legship area in West Sikkim.

383 MALAYAN NAWAB

Polyura moori sandakanus (Fruhstorfer) 1895

384 JEWELLED NAWAB

Polyura delphis delphis (Doubleday) 1443

385 STATELY NAWAB

Plate No. 42

Polyura dolon centralis Rothschild 1899

KU-BU NE-SK 1,2 NR

WS- 85-105mm.

UP white. **UPF black border increasing towards the apex, a row of submarginal white spots.** UPH reddish submarginal band followed by another paler band on the inner side. UN mostly whitish. UPF band cell-end up to V2 and a discal band up to V1. **UNH submarginal band lined inwardly with blue lunules.**

Very wary and difficult to catch. Found mostly on tree-tops. WB writes **Ms** often fight when intruding in each others territory, while thus engaged they are fighting they are less cautious and oblivious to the surroundings, and it is then one can catch them. WB has caught them successfully while sitting on a tree-top. Probably because of this habit many of them are eaten by the birds. They are locally common butterflies. According to Sanders they are abundant near Chungthang between 1,500 m and 1,700 m. I saw one specimen of this group near Bushuk but could not identify it clearly because of the distance.

386 GREAT NAWAB

Plate No. 42

Polyura eudamippus eudamippus (Doubleday) 1843

KU-BU KU-AS 1,2 NR

WS- 100-120mm.

Similar to the previous species, but the markings are heavier and enter into the cell of **UPF** and **two rows of submarginal white spots**. UPH has a row of white spots on the submarginal spots outwardly. UNF a row of black submarginal spots between the submarginal band and black margin. **UPF the band end cell is Y- shaped and another elongated spot mid cell.**

Ms are recorded to be common in Sikkim

APATURINAE

These are beautiful butterflies, recognised by the discal cell in the HW being open and by their stout thorax. The sexes are dimorphic. There are about 15 genera in the world, of which 10 occur in Sikkim.

The males have usually brilliant reflective blue, black, green, purple or golden colour on the upperside. The females are generally somberly coloured. In some species, females mimic the Sergeants and the butterflies of the Danainae group. Their host plants belong to the family Ulmaceae, particularly the genus *Celtis*. Their life history and ecology is hardly known. Their habits are similar to those of Charaxinae.

387 WHITE EMPEROR

Helcyra hemina Hewitson 1864

1,2 R

388 GOLDEN EMPEROR

Plate No. 43

Dilipa morgiana (Westwood) 1851

KA-SS 1,2 R

WS- 70-80mm

Sexes dimorphic. **M** UP dark brown, **FW with golden bronzy spots and white apical spots**. UPH base variable marginal area brown and rest bronzy gold. **Fs** are of several forms but generally golden coloured and duller, in some cases replaced by white.

One of the most beautiful butterflies, attracted to over-ripe fruits particularly to apricots and mangoes. Visits *Buddleia* blossoms. Essentially found in hilly regions between 1,800-2,100 m. Has been recorded from Arunachal Pradesh and Nepal in recent years.

389 SORDID EMPEROR

Plate No. 43

Apatura sordida sordida Moore 1865

SK-BU 1,2 NR

WS- 60-70mm.

Similar to the Banded and Bamboo Tree Browns (305 and 306).

Sexes dimorphic. **M and F UP dark brown with single pale discal band on UPF which is continuous in F and broken in M**. UN pale, ocellus in 2 of both the FW and HW. Ocellus on UPH is fulvous ringed and prominent.

Because of its resemblance to Satyrids it could be mistaken for one of those common species found in similar habitats. We have collected one specimen from West Sikkim in November. Dudgeon has also collected a few **Ms** and **Fs** in October and November from Sikkim. Nothing more about its natural history is known.

390 SERGEANT EMPEROR

Plate No. 43

Apatura chevana (Moore) 1865

SK-NB 1,2 NR

WS- 75-80mm.

Similar to the Sergeants.

UP brownish. **UPF** with horizontal bands as in the Sergeants, streak in the UPF cell from the base, **spot end-cell is double, whose inner margin is conjoined and outer margin well separated**, submarginal spots prominent. **Ms** very obscurely blue shot. **UN, silvery, with reddish brown narrow terminal and discal bands**. ON the UN very much resembles *Apatura ambica* the Indian Purple Emperor.

Very good mimic of Sergeants found in very similar localities as *Parathyma*. Flies at low and moderate elevations. DeN has recorded it as rare in Sikkim.

391 INDIAN PURPLE EMPEROR

Plate No. 43

Apatura ambica ambica Kollar

CH-DA KA-DA 1,2 NR

WS- 65-90mm.

UP dark brown, with single broad white discal band across both the wings, M is beautifully shot with blue. UN, silvery white with narrow reddish terminal and discal bands.

WB classifies it as one of the handsomest of all Indian butterflies. Flies up to 2000 m in the forested areas. **Ms** are common at lower elevations in Sikkim and Darjeeling. Very wary and fast on wing. Both sexes settle on damp patches with their wings spread across. They bask high on the trees. Fond of flying near streams and nullahs. Settle on rocks in their middle. Fond of carrion, dung and dropping etc.

I have seen one specimen, basking on top of a tree, in the Teesta valley near Mangan. Sanders also collected a few specimens from this area.

LIFE HISTORY - **Larva** green; tail pointed; head with a pair of spined tubercles: two pairs of lateral spines on segment 4 and 5. **Pupa** greenish white covered with white powdery bloom.

LARVAL FOOD PLANTS - *Ulmus wallichiana* in West Himalaya.

392 BLACK PRINCE

Plate No. 43

Rohana parisatis parisatis Moore 1857

SL,SI,KU-BU KU-BU 1,2 NR

WS- 40-50mm.

Sexes dimorphic. **M**, **UP velvety black with single apical spot in northern ssp**, while south Indian ssp has two or three apical spots. **F**, chestnut brown with darker spots and lines. Resembles the Castors.

Found in the forested and cultivated areas at the edges of forests. **Ms** common, **Fs** scarce. They bask on prominent rocks. They also visit rotten fruits, flowers and wet soil. One butterfly was photographed feeding on the saliva, on the finger.

LIFE HISTORY - **Egg** dirty white with a brown spot and a circle of five or six spots at one third of height from the base, 18 meridonial ridges. Eggs are laid on the underside of the leaves in a shady place at about one metre height from the ground. **Larva** fusciform with two long diverging horns on the head and spines, surface of the body smooth: canary yellow with lateral and subapicular green bands and dorsal row of 11 large green spot on each segment from 3-13. It lives on the underside of the leaves on a bed of silk, always fully stretched. **Pupa** is lengthened and laterally compressed, keeled along the dorsal line: green with dorsal carina tipped brown: formed underside of a leaf or stick and hangs parallel to the surface.

LARVAL FOOD PLANTS - *Celtis tetrandra*.

393 BROWN PRINCE

Rohana parvata Moore 1857

SK-AS 1,2 R

WS- 50-60mm.

Similar to **F** of *Rohana parisatis* but darker.

This is a very rare species.

394 PASHA

Plate No. 43

Herona marathus marathus Doubleday 1848

SK-BU,AN SK-SS 1,2 NR

WS - 70-90mm.

Similar to the Sergeants.

UP, dark brown; **UPF** with two tawny bands from costa and confluent near margin. **UPH** two horizontal bands as in Sailers but are also confluent near the margin. Basal tawny streak in 1b of **FW**.

Fairly common up to about 1,800 m. in Sikkim-Darjeeling area. It is very fond of over-ripe fruits. Seen visiting damp patches. When disturbed sits with head down and wings closed on the tree trunk, and is thus perfectly camouflaged. It is very difficult to catch it at that time. Seen in Chungthang and Mangan areas.

395 EASTERN COURTIER

Plate No. 43

Sephisa chandra (Moore) 1857

NE-KR 1,2 NR

WS- 75-90mm.

Similar to Western Courtier.

Sexes dimorphic. **M** UP with tawny spots. UPF outer discal band white. **F**, UP black with UPF large tawny spots in the cell, followed by two spots beyond. **Apex streaked with bluish between the veins. Terminal and discal spots blue.** **Fs** mimics Blue Crows and *Chilasa*. **F** form *chandrana*: Broad white bar across apex of FW otherwise as above. **F** form *albina*: Spots as in **M** but all white except for yellow spots in the cell and tawny markings on the HW replaced by white. Very rare.

Ms are fairly common and visit damp patches, dung, and flowers. Found in shaded nullahs bordering forested regions and along streams up to 1,500 m. I have come across it both in north Sikkim and west Sikkim.

Celtis australis has been recorded as food plant for western species.

396 PAINTED COURTESAN

Euripus consimilis consimilis (Westwood) 1850

SI, DU-DA, AN DU-DA 1, 2 NR

WS- 60-85mm.

Similar to the following species.

UPH red marginal spots from 1 to 3. UNH red basal markings. Otherwise markings as in the following species

397 COURTESAN

Plate No. 43

Euripus halitheres Doubleday and Hewitson 1848

SK-BU 1, 2 NR

WS- 65-85mm.

Similar to the Siren (399).

M UP cream coloured with dark black veins. UPF, a complete row of post discal spots, curved inwards near the costa. A row of four discal spots from 4 to 8. **HW toothed at V2 or 3.** **Fs** mimic the *Euploea* sp. Two forms are known.

Form *cinnamomeous* : UP dark brown with UPF blue shot towards the apex. HW, complete rows of marginal and submarginal spots. Mimics Blue Spotted Crow.

Form *isa* : It is a typical form and mimics the Magpie Crow. UPF brown with white streaks and UPH brown with large white discal patches. Could be differentiated from *E. radamanthus* by a lighter brown colour and UPF discal spots joined: a white streak in the cell and UPH almost white.

Form *nyctelius*: UP dark brown, UPF apex shot with blue, a row of white elongated spots and two submarginal spots in 1a and 2. UPH, base brownish shot with blue, row of long white discal spots and submarginal white spots.

These are insects of forested area, found up to 1,000 m. **Ms** are common and may go unnoticed because of their resemblance to the *Parantica* sp. They fly fast and bask with their wings partially open. They rest with wings closed. **Fs** mimic Danaids in flight and habits. We have collected one female of the form *cinnamomeous* from West Sikkim.

LARVAL FOOD PLANTS - Urticaceae, particularly *Trema orientalis*.

398 CIRCE

Plate No. 45

Hestina nama (Doubleday) 1845

MU-BU 1, 2 C

WS- 95-105mm.

Similar to the Chestnut Tiger (509) and the Tawny Mime (035).

UPF has pale streaks on black background. **The discal streaks and postdiscal spots are drawn inwardly and bifurcated outwards, forming arrow like markings pointing inwards.** FW cell streak broken into stripes and spots, complete row of marginal and submarginal spots.

A very common butterfly and seems to be commoner than its model in Sikkim. Found in both open country as well as forest edges. Very often sits on the paths and basks with wings partially open. Rests with folded wings in shaded areas on rocks or leaves. Very wary on closer approach. Visits flowers and

moist places. It is often difficult to distinguish in the field for a beginner as its flight and habits are very similar to the model's. It is also common in the Western Himalaya. Seen in Sikkim up to 2000 m in the Teesta, Rangeet and Rangpo valleys.

399 **SIREN**

Plate No. 45

Hestina persimilis persimilis Westwood 1850

OR,SK-SS 1,2 R

WS- 65-75mm.

Similar to the Courtesans (396 and 397).

The marginal spots are larger, complete, and in singles between the veins. HW white streaks are broader and a black spot on mid-costa sometimes diffused and may be obsolete. HW not so prominently toothed.

It is a rather rare butterfly, found at low elevations up to 1,500 m in the Himalaya. WB writes that the best place to look for it is in fruit orchards, when fruits are ripe.

LIFE HISTORY - Larva green with spines, on all segments and those on the longest. Pupa green with wing cases whitish, and three brown rings on last three segments

LARVAL FOOD PLANTS - *Celtis australis* (Urticaceae).

400 **POPINJAY**

Plate No. 44

Stibochiona nicea nicea (Gray) 1833-46

KU-SB KU-NB 1,2 C

WS- 60-80mm.

Similar to the Constable (401).

M UP velvet black and **F** UP dark green. UPF white and with prominent white marginal spots with a dull blue sub-marginal line. **UPH prominent row of black spots inwardly blue-bordered in Ms, and green bordered in Fs and outwardly white bordered.**

Common throughout up to 1,500 m. Fond of forested patches with sunlight filtering through. Very common in cardamom plantations in both north and south Sikkim. Basks on the upperside of the leaf with wings fully opened or three-fourths spread, even till late afternoons, up to about 3.00 p.m. Flight is very rapid but over a short distance; takes refuge on the underside of leaves. **Fs** are not as common as **Ms**.

401 **CONSTABLE**

Plate No. 44

Dichorragia nesimachus (Boisduval) 1836

KU-BU 1,2 NR

WS - 65-85mm.

UP dark green with white spots and streaks on the FW and a very prominent zigzag submarginal line on the HW, single in M and double in F.

Butterfly of hilly regions. Flies up to about 900 m. Has two broods, one before and the other after the rains. **Ms** visit damp patches, wastes and animal refuse. A species of lower elevations and seen almost throughout the year.

NYMPHALINAE

This is one of the largest subfamilies, represented in all parts of the world and includes small butterflies like Gem Silverspot which has a wingspan of 20-30mm. to the large butterflies like Yellow Kaiser 125-135mm. This subfamily includes Fritillaries, Pansies, Admirals, Tortoiseshells, Oakleafs, Sailers, Sergeants, Maps, Barons, etc.

They are very colourful sun-loving insects, generally sit with their wings wide spread. They are fond of flowers, also visit damp patches for salt, droppings, etc. They are found in almost all types of habitats from sea level to 5,500 m. They also occupy various niches in a given ecological habitat. Some of them fly high above the tree level. The flight is also very variable.

402 YELLOW KAISER

Plate No. 4 & 44

Penthema lisrada lisrada (Doubleday) 1845

SK-BU

WS- 125-135mm.

UP dark brown with pale bluish yellow marginal and outer discal streaks between the veins. UPH cell pale bluish yellow. UPF with pale yellow basal streak and two elongate spots in the cell.

One of the largest Indian butterflies, confined to thickly forested areas of low elevations, in deep jungles during summer. They feed on dung and moisture, when feeding they may not be easily disturbed. At one place as many as five of them were feeding on fresh cowdung. They sit with their wings wide open and also bask. Currently this butterfly has been classified by some authors as Satyrinae butterfly (Smart 1975). Probably rare in Sikkim and Darjeeling areas. A few specimens have been taken by the earlier collectors from Singhik and Dikchu areas between 800-1,500 m. Also a few specimens were collected by Bailey and Dudgeon from Daling and Singhal areas. I have seen a few specimens in Arunachal Pradesh during May. There is no recent record from Sikkim, probably with the loss of virgin forests the butterfly might have also been wiped out. Careful attention and search is required for finding out its correct status in Sikkim..

403 TABBY

Plate No. 46

Psuedergolis wedah Kollar 1844

KU-BU

1,2 NR

WS- 55-65mm.

Similar to the Chocolate Pansy (427) and the Castors (404 and 405).

UP golden brown with vertical discal lines on both the wings. **4 equidistant parallel lines in UPF cell.** UPH also has 4 lines in the cell but form two pairs of parallel lines.

Found near streams and shaded nullahs, in the neighbourhood of forested areas up to 2,000 m. Flight resembles castors sailing with wings held flat. Often sits on stones and rocks or on the ground. Visits damp patches, droppings and other wastes. One was seen coming to soiled socks. We have found them locally common in the Teesta and Rangeet Valleys.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Debregeasia bicolor*.

404 ANGLED CASTOR

Plate No. 45

Ariadne ariadne pallidior (Frusthorfer)

SL,IN,MU-BU MU-BU 1,2,3 NR

WS- 45-60mm.

Similar to the Common Castor (405) and the Tabby (403). Also F of the Black Prince and Brown Prince may be mimics.

UP reddish brown, with regular slender single lines. FW deeply concave between 3 and 4. Below darker brown with purplish brown markings.

Flight is typical, with slow beatings of wings and intermittently sailing like sailers with jerky and irregular movements. Seen basking, generally near food plants. Fly about 1.5 m above the ground, often settling on the leaves and low bushes with body parallel to the sun's rays. Found commonly in the lower

a) Larva b) Pupa.

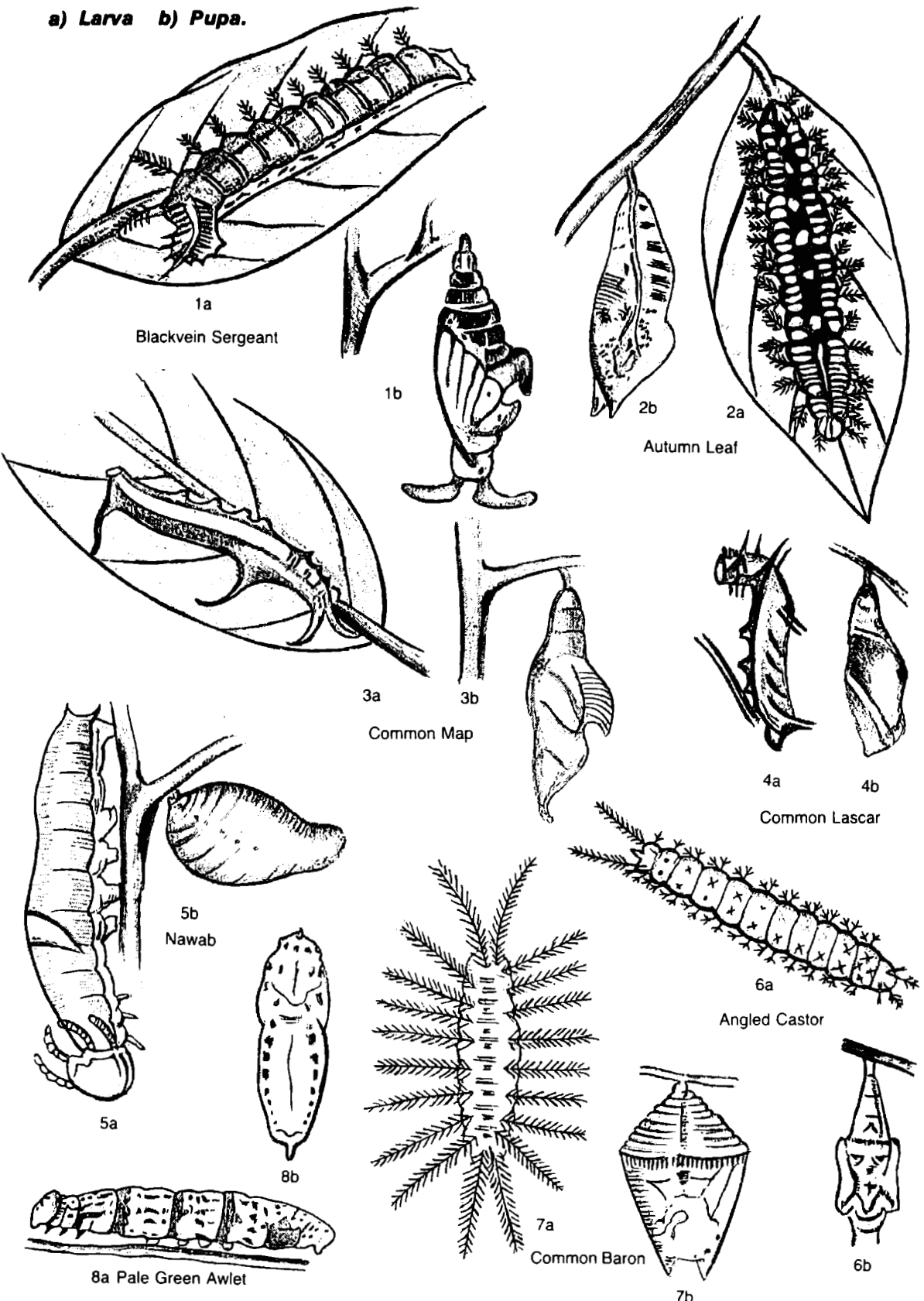


FIG IX LIFF HISTORY (Nymphalidae)

hot Valleys of the Rangpo and the Rangeet. This butterfly is more common in open areas while the Common Castor is an insect of forested region.

LIFE HISTORY - (Fig. IX. 6). **Egg** laid on the upperside of a leaf. **Larva** similar to that of *Cupha* and *Phlanta* except that the head has a pair of long horns, body white striated with dorsal band from 6-11, belly red black; Larvae are gregarious in the initial stages, very active and live on the upperside of the leaves, making a slight bed of silk; wriggles vigorously when touched. **Pupa** olive-green with a green-black dorsal patch on segment 9, speckled densely with light green; formed under a leaf or hangs from a twig perpendicularly or at an angle.

LARVAL FOOD PLANTS - *Ricinus communis*

405 COMMON CASTOR

Plate No.45

Ariadne merione assama (Evans)

PI, KA-BU SK-BU 1,2,3 NR

WS- 45-60mm.

Similar to the Angled Castor (404) but has **double undulating lines which are heavily waved**.

Habits similar to those of the Angled Castor but found in more wooded areas.

Both the species are found up to 2,300 m. Once a few Fs were flying in and out of a castor plant. There was a common garden lizard sitting well concealed on the leaf. As soon as any butterfly went near, it tried to catch it but only succeeded twice. There were many caterpillars on the same plant, but it did not bother about them, maybe because of the spines on them.

LIFE HISTORY - **Larva** green with longitudinal dark brown lines; head with a pair of branched spines and two dorsal and two lateral rows of short branched spines. **Pupa** very similar to that of the preceding species.

LARVAL FOOD PLANTS - *Tragia involucrata*, *Tragia plukenetii*, *Ricinus communis* (Euph.).

406 RUSTIC

Plate No. 45

Cupha erymanthis lotis Sulz 1776

SI, MU-BU,AN,NI MU-BU 1,2, NR

WS- 50-60mm.

Similar to the Leopard (407).

UP chestnut with black border and **broad yellow subapical band** and apical spots on the FW.

Insect of thickly forested areas. Weak flier, generally flies low with "an excursion every now and then to the tree-tops and dives into undergrowth if disturbed" WB. Often basks on the lower bushes up to about 2 m from the ground. Visits flowers particularly of *Eupatorium* in South India. It has been recorded earlier from Sikkim, I have seen once a northern subspecies in Arunachal Pradesh.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Flacourtia* sp.

407 COMMON LEOPARD

Plate No. 2 & 45

Phalanta phalantha (Drury) 1770

IN, SL,BU 1,2 NR

WS- 50-60m.

Similar to the Rustic (406) and the Small Leopard (408).

One of the commonest butterflies occurring up to about 2,000 m, in more open and drier areas and most abundant after the rains. Found almost throughout the year in the south. Flies fast; flight is quick with jerky movements. Visits flowers particularly *Tridax* sp., *Lantana camara* etc. Very difficult to photograph as it never sits for long on any flower. It is possible to photograph when it basks for fairly long time early in the mornings. It has a very strong territorial behaviour and chases any butterfly which comes within its range. In Sikkim it is very common in the Rangpo and Rangeet Valleys and up to Sanklang and Mangan in the Teesta Valley.

LIFE HISTORY - Egg laid on young shoots. Larva brown shiny, with black spines. Feeds on young leaves of *Flacourtia*. It turns green just before pupating. Pupa green with rose-crimson and golden spines on the dorsal side. Attached to the leaf horizontally,

LARVAL FOOD PLANTS - *Flacourtia montanta*, *Smilax* and *Salix* (doubtful).

408 SMALL LEOPARD

Plate No. 45

Phalanta alcippe alcippoides De Niceville 1886

SL, WG, SK-UR 1,2 NR

WS- 35-50mm.

Similar to the preceding species, but smaller. **UPF the cell has 5 or 6 lines excluding the bar end-cell.**

Habits are similar to those of the Common leopard but keeps forested areas. When disturbed they go and rest on the underside of the leaves. There are many specimens in various collections from this area. I found this butterfly very common in Assam, Sivoke and Miaho in Arunachal Pradesh.

LIFE HISTORY - Larva and pupa very much like those of the preceding species.

LARVAL FOOD PLANTS - *Rinorea bengalensis* (Viol.).

409 LARGE YEOMAN

Plate No. 45

Cirrochroa aoris aoris Doubleday 1847-48

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

WS- 80-90mm.

Similar to the Cruiser (507).

UP tawny orange with black zigzag border and row of discal spots; black narrow apex. **UPH the spots in discal area (upper three) are in straight line. F is darker and more heavily marked.**

Butterflies of more open areas, found particularly near nullahs and damp patches. Active till late afternoons. Often bask on forest paths and roads. Seen up to 1,500 m. Hardly visit flowers. One was seen squirting liquid from the tip of its abdomen on a patch of mica and then sucking it. They are very wary on closer approach. Very common in South Sikkim around Rangpo and Mamring and also around Mangan and Dikchu areas.

LARVAL FOOD PLANTS - *Hydnocarpus* sp. ?(Bixaceae).

410 COMMON YEOMAN

Plate No. 45

Cirrochroa tyche mithila Moore 1872

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

WS- 65-75mm.

Similar to the Large Yeoman except for the spots on the UPH, i.e. **of the upper three spots the second one is out of line.**

Habits are similar to those of the earlier species but found in more open areas and plains. Only one specimen was seen near Narak in Sikkim feeding on 'Kotus' (*Castanopsis indica*) flowers. Otherwise seems to be quite uncommon in Sikkim.

411 VAGRANT

Plate No. 45

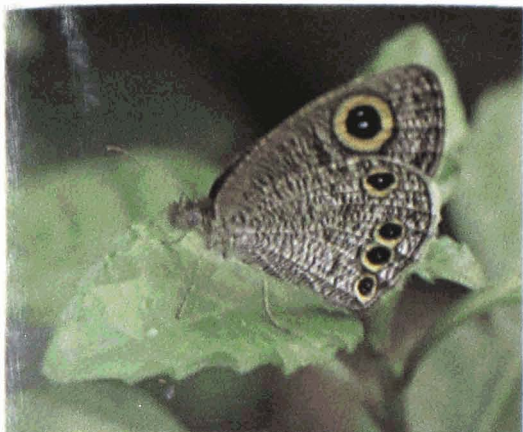
Issoria sinha sinha (Kollar) 1844

DU-BU 1,2 NR

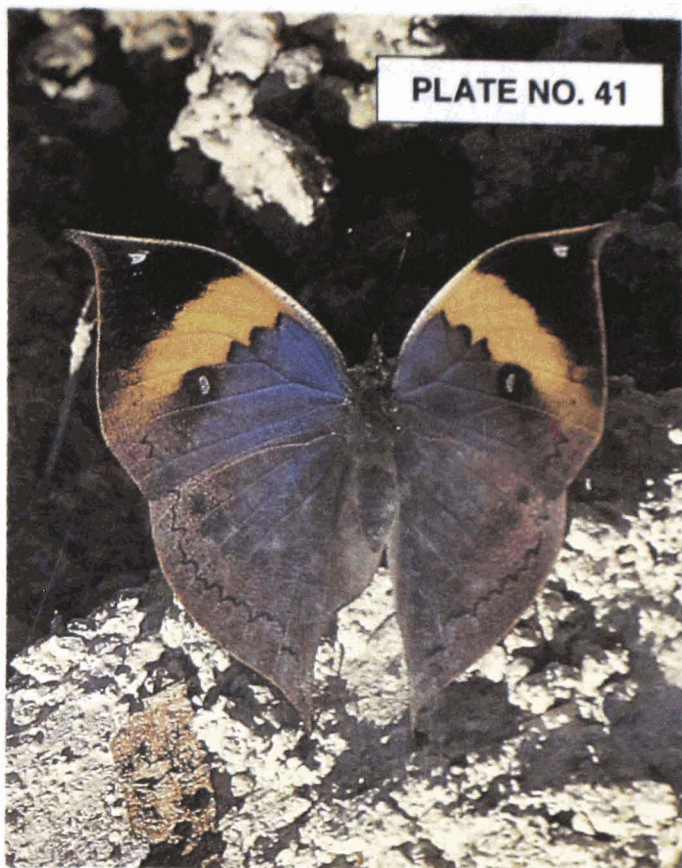
WS- 55-65mm.

UP golden tawny with narrow darker outer margins. **FW cell and base, apical markings beyond the cell, dusky.** HW terminal half dusky. FW apex produced and HW tailed.

Butterfly of moderately low elevations. So far I have not come across this butterfly anywhere in India.



The Common Fourring



The Orange Oakleaf basking



The Arctic Argus

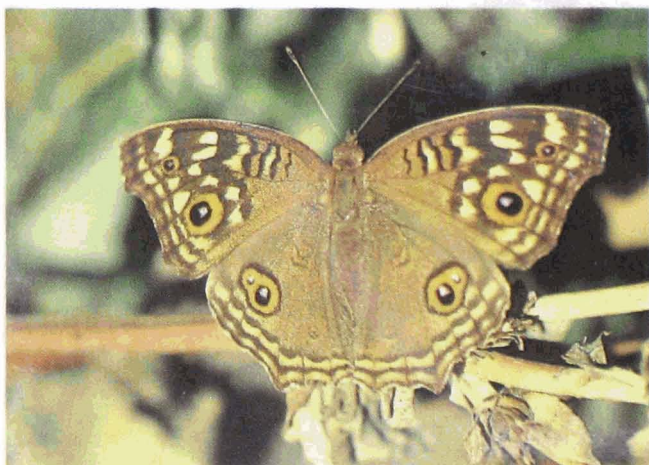


The Gem Silverspot



The Yellow Kaiser

The Lemon Pansy



The Common Maplet

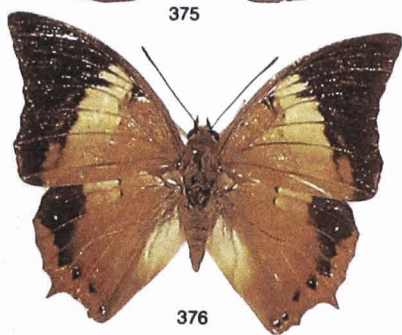




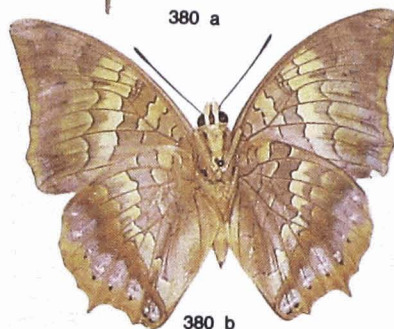
375



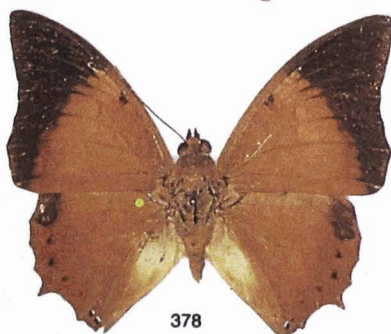
380 a



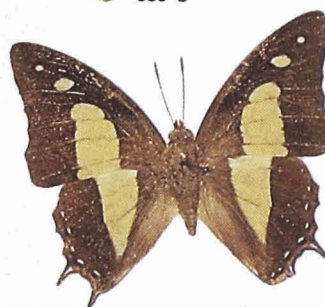
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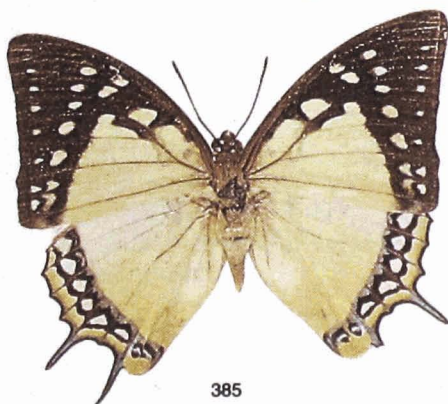
380 b



378



381



385



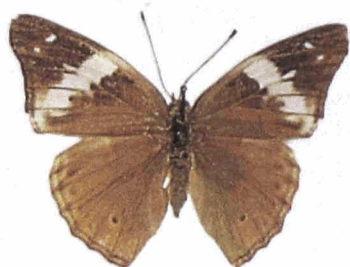
386

- 375 Freak
376 Tawny Rajah
378 Yellow Rajah
380 a Black Rajah UP

- 380 b Black Rajah UN
381 Common Nawab
385 Stately Nawab
386 Great Nawab

Scale : 5 cm

PLATE NO. 43



389



391



390 a



390 b



392 a



392 b



394



395



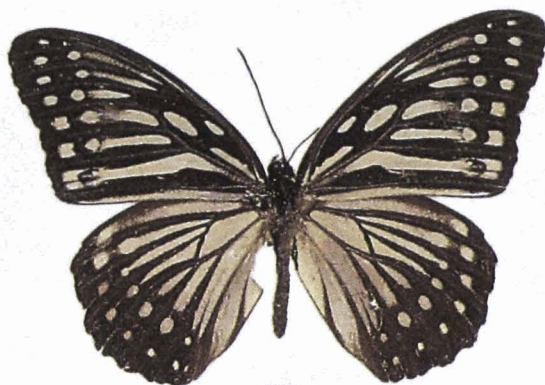
397



388

- 388 Golden Emperor ♂
389 Sordid Emperor ♂
390 a Sergeant Emperor UP ♂
390 b Sergeant Emperor UN ♂
391 Indian Purple Emperor ♂

- 392 a Black Prince ♂
392 b Black Prince ♀
394 Pasha ♂
395 Eastern Courtier ♂
397 Courtesan ♂



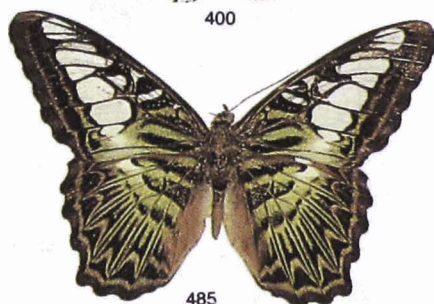
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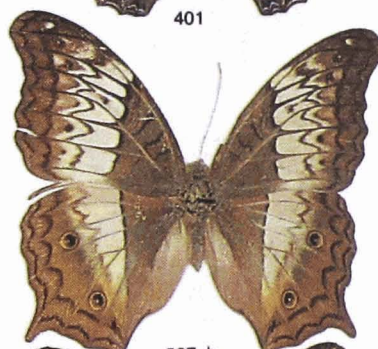
400



401



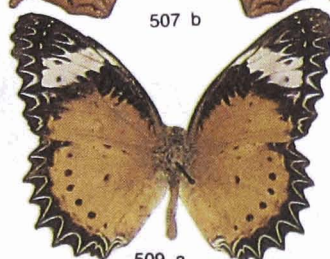
485



507 b



507 a



509 a



508 a



508 b

- 400 Popinjay
401 Constable
402 Yellow Kaiser
485 Clipper

- 507 a Cruiser ♂
507 b Cruiser ♀
508 a Red Lacewing ♂
508 b Red Lacewing ♀

509 a Leopard Lacewing

Scale : 5 cm

PLATE NO. 45



398



399



404



405 a



405 b



406



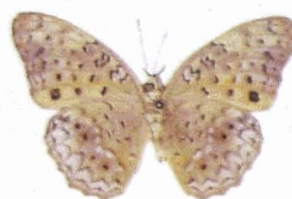
408



407 a



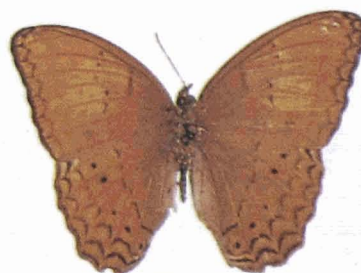
411



407 b



409



410

398 Circe

399 Siren

404 Angled Castor

405 a Common Castor ♂

405 b Common Castor ♀

406 Rustic

407 a Common Leopard UP

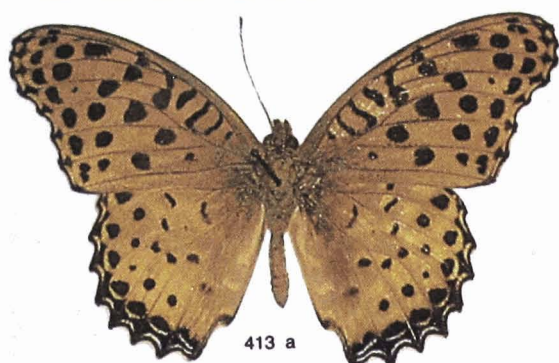
407 b Common Leopard UN

408 Small Leopard

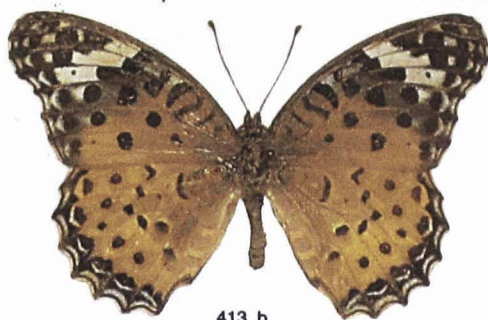
409 Large Yeoman

410 Common Yeoman

411 Vagrant



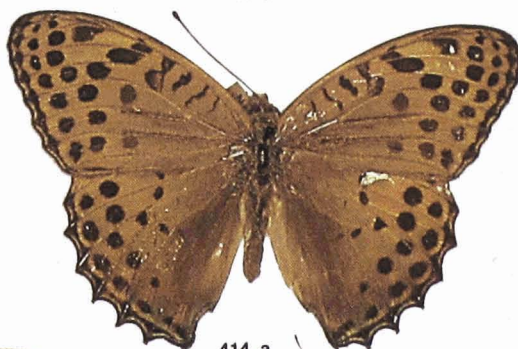
413 a



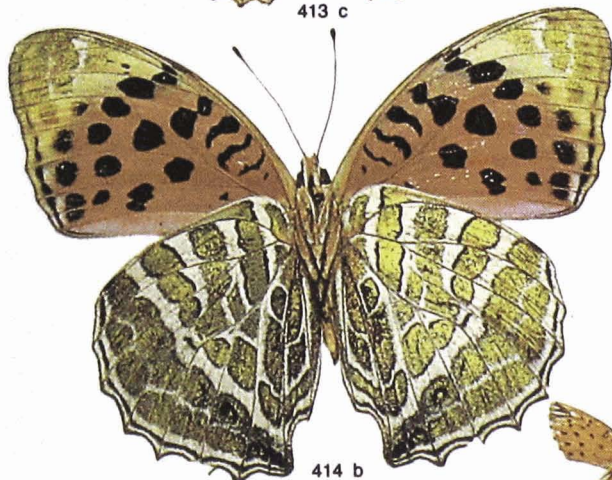
413 b



413 c



414 a



414 b



412 a



412 b



420



417 a



419 a



419 b



417 b

412 a Queen of Spain Fritillary

412 b Queen of Spain Fritillary

413 a Indian Fritillary ♂ UP

413 b Indian Fritillary ♀ UP

413 c Indian Fritillary ♂ UN

414 a Large Silverstripe ♂ UP

UP 414 b Large Silverstripe ♂ UN

UN 417 a Blackvein Fritillary UP

417 b Blackvein Fritillary UN

419 a Gem Silverspot UP

419 b Gem Silverspot UN

420 Mountain Silverspot UN

Scale : 5 cm

PLATE NO. 47



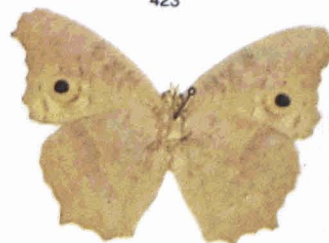
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423



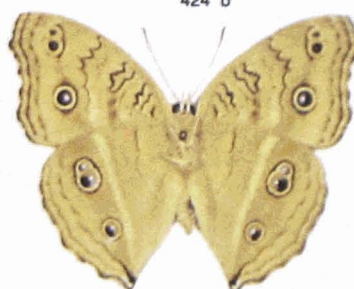
424 a



424 b



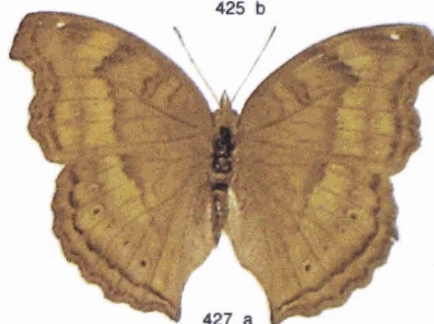
425 a



425 b



425 c



427 a



427 b



426

- 422 Yellow Pansy
423 Blue Pansy
424 a Lemon Pansy UP
424 b Lemon Pansy UN
425 a Peacock Pansy UP

- 425 b Peacock Pansy UN ♂
425 c Peacock Pansy UN ♂
426 Grey Pansy
427 a Chocolate Soldier UP
427 b Chocolate Soldier UN



428



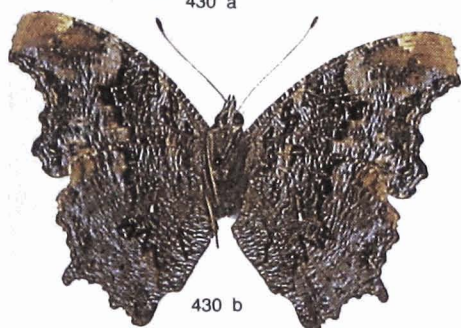
429 a



430 a



429 b



430 b



434



432



436 a



436 b



437 a



437 b



438

428 Indian Red Admiral

429 a Painted Lady UP

429 b Painted Lady UN

430 a Blue Admiral UP

430 b Blue Admiral UN

432 Mountain Tortoiseshell

434 Indian Tortoiseshell

436 a Common Jester UP

436 b Common Jester UN

437 a Himalayan Jester UP

437 b Himalayan Jester UN

438 Bluetail Jester UN

SILVERSTRIPE

They are bright orange butterflies with black to brown spots on the upperside and on the underside they have, on brown or green background, varying amount of silverstripes, streaks and spots, particularly on the HW. They are mainly butterflies of temperate region except for the Indian Silverstripe which is also found at lower altitudes and in the mountainous regions of South India. They are very easy to identify on the basis of their silver markings. Nothing much about their life history or ecology is known. Eight species of 4 genera occur in Sikkim.

412 QUEEN OF SPAIN FRITILLARY

Plate No. 46

Issoria lathonia issaea (Doubleday) 1864

BA-SK 2,3,4,5 NR

WS- 50-60mm.

UP tawny with black spots. **UNH yellowish brown with large silvery spots.** It is unmistakable, no other butterfly has such large silvery markings.

A common butterfly throughout the temperate regions of Europe and Asia. In the Himalaya common between 2,000-4,800 m. At lower elevations flies throughout the year, even in cold weather and snow. The flight is quick, close to the ground, in a zig-zag manner. Generally found in the pastures of high altitudes but at lower elevations found in temperate forest regions, in the forest clearings and paths. Visits flowers of *Taraxacum officinale*, *Primula denticulata*, *Gentiana* sp., *Aster* and various Compositae flowers. Seen often basking with wings three-fourths opened. In older specimens the scales are often lost completely and the wings become transparent when it may be difficult to recognise. Two such specimens were brought to me from the Natu La area.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - Violaceae. So far nothing specific has been recorded from Sikkim.

413 INDIAN FRITILLARY

Plate No. 4 & 46

Argyreus hyperbius hyperbius (Johanssen) 1764

CH-BU,CP, Mt Abu, SI,SL CP,MT ABU,CH-BU 1,2,3 NR

WS- 70-85mm.

M similar to the Leopard (405) and **F** to the Plain Tiger (516) and the Leopard Lacewing (509).

M UP tawny with black spots. **UNH base dark green and light brown or greenish brown distally. Discal silverstripes irregular and more or less broken into separate spots.** Silver markings are black edged inwardly. **F:** Apex dark blue and an apical white band, mimics the Plain Tiger *Danaus chrysippus*.

Occurs in the hilly regions between 1,000-3,000 m. Keeps more to open areas and cultivated fields and gardens. Visits flowers of *Zinnia*, *Tagetes*, *Fagopyrum* etc. They rest on the ground with their wings closed. Sometimes bask with their wings three-fourths open. Common around fields and open areas of the inner valleys like Geyzing, Gerathang, Chungthang and Gangtok.

LIFE HISTORY - **Egg** yellow with honeycomb-like markings. domed, higher than broad. Laid generally on the underside of a leaf of the food plant or near the food plant, close to the ground.

LARVAL FOOD PLANTS - *Viola* (Violaceae).

414 LARGE SILVERSTRIPE

Plate No. 46

Childrena childreni childreni (Gray) 1831

CH-BU KU-BU 2,3 NR

WS- 75-100mm.

Similar to the preceding species but larger. UPH toral area with blue suffusion. **UNH dark green with six silver bands; discal silver band straight.**

Occurs from about 1,800-3,000 m, higher elevation than the former in the cultivated and disturbed areas. Visits flowers of Compositae and Cruciferae. Fast flight, basks early in the mornings with wings wide open. In Sikkim it occurs in Gangtok, Yoksum, Penlongla, Bushuk, Lachen, Lachung, etc.

LARVAL FOOD PLANTS - Violaceae. But so far no specific species have been cited from Sikkim. have seen mating pairs twice but never seen the female laying eggs.

415 COMMON SILVERSTRIPE

Fabriciana kamala (Moore) 1857

416 SILVERSTREAK

Melitaea clara (Blanchard) 1844

417 BLACKVEIN FRITILLARY

Melitaea arcesia thibetana Fawcett

418 BLACKVEIN FRITILLARY

Plate No. 46

Melitaea arcesia sikkimensis (Moore) 1857

CH-SK SK-TI, CM 5 NR

WS- 40-45mm, *thibetana* WS- 35-40mm.

UP reddish brown to tawny with black spots. UNH veins dark; submarginal dark lines, inner paler bands. The discal dark line divides the central pale area into two portions, the outer being paler.

A typical high altitude butterfly found above 4,800-5,500 m. Flies very close to the ground, often sideways in the direction of the breeze. Basks on a rock or a leaf during sunny spells. Seen only in North Sikkim beyond Giagong to Chho Lamho area. Another very closely related ssp., *thibetana* occurs in the Chumbi valley.

419 GEM SILVERSPOT

Plate No. 46

Argynnis gemmata gemmata Butler 1881

SK-CM 4,5 NR

WS- 45-50mm.

Similar to the following species (420).

UP tawny or reddish brown with, black spots: base hairy and heavily black dusted. UN background brown to very dark reddish brown. **UNH the marginal silver markings are broad conical and pointing inwardly.**

This is also a moderately high altitude species occurring between 3,000-4,500 m. Fairly common. Elwes (1882) writes in his paper "I take the opportunity of figuring this species here as a coloured plate is necessary to give an idea of its beauty". Habits similar to those of the preceding species. Visits flowers of *Taraxacum*, *Aster*, *Waldheimia* etc. Like the Queen of Spain Fritillary, this also often loses all the scales and becomes very transparent.

420 MOUNTAIN SILVERSPOT

Plate No. 46

Argynnis gemmata altissima Elwes 1882

SK-BH 5 NR

WS- 33-36mm.

Similar to the preceding species (419).

UP markings as in the earlier species. UN background greenish. **Silver markings are narrower and elongated and irregular. Marginal silver markings of equal width throughout and nearly reaching the post discal spots.**

Habits are similar to those of the Gem Silverspot however found higher than the former but at Giagong both species were found flying together, beyond which the *gemma* was not seen. Visits flowers of *Bistorta* and *Saxifraga* spp.

421 STRAIGHTWING SILVERSPOT

Boloria pales eupales Frustrhorfer

PANSIES

These are medium-sized butterflies with bright colours and have eye-like markings on both wings. Some of them have seasonal forms. They are found in both forested and open areas. They are sun loving insects. Feed on various species of flowers. All the six species found in Sikkim are also found in India. The larval food plants belong to Acanthaceae family.

422 YELLOW PANSY

Plate No. 47

Precis hierta magna Evans 1923

SL,IN,BA SK-BU,AN 1,2,3 NR

WS- 40-60mm.

UP bright yellow butterfly with prominent violet patch in Ms and prominent violet-blue in Fs in the area 6 of UPH, giving it appearance of the face of a cat. UN cryptic.

A butterfly of open grassy patches in the forest clearings and fields in disturbed areas. Occurs up to 3,000 m in the Himalaya. Fond of the sunniest patches and stream beds and along the paths. On closer approach they fly about 5 m away and settle again. They have territorial patches and generally remain in the same area on the paths. Visit flowers of *Tridax*, *Tagetes*, garden flowers etc. Seen almost throughout the year. In Sikkim found in the Rangpo and Rangeet Valleys, also in Singhik and Mangan and around Gangtok.

LIFE HISTORY - Larva similar to others, light greenish brown, with dorsum velvety black on segment 3 and 4; double yellow line behind each black segment; all spines are black; legs dirty light brown. Head covered with minute conical yellow tubercles. Habits as those of *J. orithya*. Pupa greyish brown-red with lighter wings, sometimes almost white.

LARVAL FOOD PLANTS - In the lower altitudes *Hygrophila auriculata*, *Barleria* sp.

423 BLUE PANSY

Plate No. 47

Precis orithya ocyale Hubener 1816

SL,IN,BU,BA SK-BU and CN 1,2,3 NR

WS- 40-60mm.

UP shiny blue (variable). UPF basal two-thirds black and apex pale brown with white bands. Two ocelli on each FW and HW. Female duller.

Habits and habitat similar to that of the preceding species.

In Sikkim it not so common. Occurs up to 2,000 m in Sikkim. Seen in Gangtok, Legship, Mangan, and the Rangpo Valley.

LIFE HISTORY - Larva similar in shape to others of the genus, plumbeous black with orange neck, a jet black dorsal band spotted finely with white, which is surrounded by an orange ring; tubercles bordered with yellowish white. Larva lies along the stalks and stems of upright plants early in the mornings. Probably feeds at night. Pupa similar to others of the genus, but slaty dull grey all over; formed against the side of a stone or rock low down, sometimes on the stalk or leaf.

LARVAL FOOD PLANTS - In lower altitudes *Justicia procumbens*, *Justicia micrantha*, *Lepidagathis prostrata*. No specific records from Sikkim.

424 LEMON PANSY

Plate No. 41 & 47

Precis lemonias lemonias (Linnaeus) 1758

SL, IN, BU, SK-BU 1,2,3 NR

WS- 45-60mm.

UP dark brown with **eye-like markings** with orange rings in area 2 and 5, but **2 of FW and 5 of HW are prominent. UPF numerous lemon spots.** UN variable. Eye-like markings are prominent in WSF and some with out in DSF.

Very bold butterfly, often seen basking. Shows strong territorial and aggressive behaviour but not as much as the Peacock Pansy. Visits various species of flowers. Found almost throughout the year at the lower altitudes. In Sikkim found up to about 2,000 m. Commoner in South Sikkim.

LIFE HISTORY - Larva similar to that of *P. iphita*, head bilobed; body pale with deeper black dorsal line. All spines are red-yellow. Body is covered with minute whitish tubercles. **Pupa** is very similar to that of *P. iphita*.

LARVAL FOOD PLANTS - *Hygrophila auriculata*, *Nelsonia campestris* (*canascens*). Jute- *Cannabis sativa*, *Sida rhombifolia*, *Barleria prionitis*.

425 PEACOCK PANSY

Plate No. 47

Precis almana almana (Linnaeus) 1758

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

WS- 60-65mm.

Similar to the Baronet (506).

UP tawny red with large eye like markings on both FW and HW. The ocelli on the **UPH is large with peacock colour in the centre with yellow and black rings around it.** UN very variable. WSF with clear ocelli while DSF is like dry leaf. Sometimes intermediate forms are also found.

One of commonest and beautiful butterflies of India. Found in both open cultivated areas, disturbed wasteland as well as in the jungle clearings and paths. Early mornings basks in a sunny patch often surrounded by a darker shady area, when it looks like an orange-faced owl and scares away the potential invertebrate predator. Highly territorial in behaviour and chases away any intruder or perhaps it is on look-out for females and any flying object it sees probably goes to inspect whether a female. Visits flowers of various species like *Lantana*, *Tridax*, etc. At rest sits with the wings closed. Fairly common in Sikkim up to 1,800 m.

LIFE HISTORY - **Egg** is laid on the underside of a leaf. **Larva** smoky black, orange neck; surface of the body covered with minute hair. Spines light orange with black tips. **Pupa** greyish green with black and cream coloured markings. Pupa is formed under the leaf, stalk or stem and hangs freely and firmly fixed.

LARVAL FOOD PLANTS - *Hygrophila auriculata*, *Barleria* sp., *Gloxinia* sp., (Acanthaceae), *Osbeckia* (Melastomaceae), etc.

426 GREY PANSY

Plate No. 47

Precis atlites atlites (Johanssen) 1764

SL, IN, BU, AN 1,2 NR

WS- 55-65m.

UP greyish with brown lines and **orange centred complete row ocelli on both the wings.** UN variable as in other species.

The butterfly has been described as a butterfly of heavy rainfall region and does not occur in dry regions. But I have found this butterfly in heavily degraded areas. This may be due to availability of food plants. Habits are similar to those of the other pansies. In Sikkim it has been observed in and around the Rangpo valley.

LIFE HISTORY - **Egg** is barrel-shaped, green with 13 white longitudinal ridges. Otherwise surface is smooth. Laid on the grass or dead stem of a plant anywhere near its food plant. **Larva** velvety black with neck dull greenish. Surface of the body is covered with pure white hairs. Larva generally found lying fully stretched perpendicular to the stem or stalk. **Pupa** similar *J. almana*, but dull brown in colour.

LARVAL FOOD PLANTS - Same as for the preceding species.

427 CHOCOLATE SOLDIER

Plate No. 47

Precis iphita iphita (Cramer) 1779

SL, IN, MA, BU SK-BU 1,2,3 NR

WS- 55-80mm.

Similar to the Tabby (403) and the Castors (404 and 405).

UP brown with obscure darker bands and HW with obscure row of small ocelli of darker brown colour. UN markings variable. DSF and WSF forms are known Sikkim specimens are larger.

A butterfly of forested areas, though found in opener tracts up to 2,800 m in the Himalaya. Visits various species of flowers and damp patches. Flies close to the ground and often basks on the low bushes. Rests with wings closed.

LIFE HISTORY - Egg is laid among the young leaves. Larva black when young and reddish brown when fully grown. Pedicles dirty yellow with brown spine. Young larva puts up some leaves together with silk and protects itself. Pupa grey or dirty brownish black, with light spot on head and side of thorax. Pupa is formed near the ground on the underside of leaf, from a stick, underside of a ledge or a rock.

LARVAL FOOD PLANTS - *Carvia callosa*, *Justicia micrantha*, *Hygrophila auriculata*.

ADMIRALS AND TORTOISESHELLS

These are mostly butterflies of temperate regions found between 1,000 m and 4,000 m, although some of them like the Painted Lady and Indian Tortoiseshell are found below 1,000 m. On the upperside they are marked with various colours such as blue, red, yellow and orange. On the underside they are cryptically marked. The larval food plants belong to Urticaceae family.

428 INDIAN RED ADMIRAL

Plate No. 48

Vanessa indica indica (Herbst) 1794

SI, SL, KA-NB KA-BU 2,3,4, NR

WS- 55-65mm.

Similar to the Painted Lady (429).

UP dark brown, FW with central red band divided on the Innerside by large black spots. Two rows of disjoint white apical spots, outer row very small. HW red marginal band with black spots in the centre. UN markings variable, could be mistaken for the Painted Lady but could be distinguished by not having a row of ocelli on UNH.

A very similar looking butterfly the Red Admiral *Vanessa atalanta* is found throughout Europe and North Africa but UPF red band narrower and not divided by black spots.

Found in open forest glades, open area, disturbed human habitations and gardens. Flight is rapid, low over the ground. Often basks on the grassy meadows or prominent leaves close to the ground. Sits with wings three-fourths or half open. This habit is similar to that of the Painted Lady. Attracted to droppings, dung, rotting fruits and also flowers. It is a very shy butterfly and difficult to photograph. Occurs in the Western Himalaya up to 3,000 m while in the Eastern Himalaya up to 2,500 m. In Sikkim I have seen it around Yoksum, the Tholung Valley, Mangan and Gangtok.

LIFE HISTORY - Larva spiny; young larva has reddish black spines and a pale yellow subapical line. At the third moult spines become pale yellow. Larvae found on nettles. They tie the leaves together and make a ball of the size of an orange, inside which they all feed together. When danger is sensed at the approach of a predator, all the larvae jerk in synchronized manner to scare away the intruder. Grown-up larva is very sluggish, when disturbed falls down as a ball to the ground. Pupa very similar to that of *V. atalanta*, but darker brownish green; spines and thoracic protuberances tipped with golden bronze; wing cases are dull smoky.

LARVAL FOOD PLANTS - Nettles.

429 PAINTED LADY

Plate No. 48

Cynthia cardui (Linnaeus) 1758

IN, BU, SI 1,2,3,4,5

WS- 55-70mm

Similar to the preceding species but could be distinguished by having golden tawny markings with some pink colour instead of reddish markings which covers nearly two-third basal area. Black spots smaller. HW golden tawny markings in basal area and with red submarginal band having two rows of black spots of which inner ones are larger and more rounded.

One of the most widely distributed butterflies of the world. Found on all continents except South America and Antarctica. In Europe and America and North Africa there is a regular migration and outbursts in population. In India also such outbursts have been observed in various parts of the country. It is a polyphagous insect and has a variety of food plants from various families. Due to this reason it has adapted itself to various types of terrains and habitats. It is found from sea level to as high an altitude as 4,300 m and even in the desert regions.

It is seen in open cultivated area as well as disturbed human habitations, gardens along the paths etc. "It flies strongly and swiftly, in a dashing and discontinuous manner, often doubling in its tracks and returning swiftly to the side. Every now and then it fights with another of its own species, the pair of them sometimes may be seen rocketing together high up into the air" WB. Early mornings particularly in cooler weather, seen basking on a prominent rock or leaf. Basks with both the wings fully open or FW partly covering the HW when it is difficult to recognise as it is very well camouflaged with the background. When rests, sits with wings closed or partly closed.

LIFE HISTORY - **Egg** laid singly on young shoots. **Larva** bright yellow, smudged and spotted black, sometimes completely black; broad marginal yellow band and double yellow dorsal lines; surface velvety, dorsally covered with longish white hairs. Segments 3 and 4 have two branched spines and 5-12 dorsal spines; the spines nearer the front margins are longer than the others. Larva makes a hiding place amongst young leaves by drawing them together with silk. At later stage it makes a cell at the tip of the leaf with an untidy web of silk. When disturbed it falls to the ground. **Pupa** similar in shape to that of *Precis*; colour from green to gold or pink-brown to gold, golden colour strongly developed dorsally and on the points; fixed to a horizontal or vertical surface hanging perpendicularly down, free but firm.

LARVAL FOOD PLANTS - *Zornia diphylla*, *Artemesia*, *Blumea*, *Debregeasia bicolor* and many other plant species, particularly belonging to the families Malvaceae, Urticaceae, Boraginaceae, Leguminosae.

430 BLUE ADMIRAL

Plate No. 48

Kaniska canace canace (Linnaeus) 1767

SI, SL, CH-BU SK-BU 2,3 NR

WS- 55-70mm.

UP Indigo-blue with paler blue discal band on both the wings. UN cryptic, markings resemble those of the Indian Tortoiseshell but has a longer tail.

Found in well-forested areas of the hilly region. Generally near water and streams. Seen sitting along the forest paths; when disturbed will fly fast ahead and sit. If further disturbed might fly a little ahead and come back and sit in the original place. They have regular beats on the path and remain in the same area. Like other relatives basks with wings partly closed. Visits flowers, over ripe fruits, sugar, honey and sap. So far I have not come across this butterfly in Sikkim but seen it several times in the Western Himalaya.

LARVAL FOOD PLANTS - *Smilax* (Liliaceae), *Dioscorea* sp., (Dioscoriaceae).

431 EASTERN COMMA

Polygonia egea agnicula (Moore) 1872

432 MOUNTAIN TORTOISESHELL

Plate No. 48

Aglais urticae rizana (Moore) 1872

CH-SK, Safed Koh 5 NR

WS- 50-60mm.

Very similar to other Tortoiseshells but FW produced at V6. **HW prominently toothed at V4. UPH blue spots not inwardly bordered fuscous** Above prominent yellow patches. UPF black spot mid 1 extending to base.

A butterfly of very high altitudes, found above 3,000-4,500 m, in high rocky valleys of the Himalaya. Seen visiting flowers of *Lagotis* and *Aster* spp., etc.

LIFE HISTORY - Eggs laid in the batches on the underside of nettle leaves. Larva is yellowish, densely speckled with black and marked with yellowish spines and lines, or it may be black with yellowish spines. They are gregarious until the last instar. They spin a web of silk over the terminal leaves of the nettle, when these are consumed they spin another web. Pupa dark brownish to pinkish-brown with patches of gold.

LARVAL FOOD PLANTS - Nettles, but unknown Indian subspecies.

433 LADAKH TORTOISESHELL

Aglais ladakensis (Moore) 1878

434 INDIAN TORTOISESHELL

Plate No. 1 & 48

Aglais cachmirensis aesis (Kollar) 1844

Waz, Safed Koh, CH-SK SM-SK 1,2,3,4,5

WS- 55-65mm.

Similar to the foregoing two species, but UP more brownish. UPF inner fuscous border broader and the yellow areas more developed in Sikkim specimens. Discal spots in 2 and 3. **UPH the marginal spots blue centred inwardly with fuscous border.**

One of the commonest species of the Himalaya. Seen in all kinds of terrain. I found it highly territorial in Sikkim area. Visits various flower species like *Taraxacum officinale*, *Aster sikkimensis*, *Gentiana carinata*, *Primula denticulata*, *Tagetes* sp., etc. In the Himalaya it is found from 900-4,800 m.

LIFE HISTORY - Larva and pupa are very similar to those of *A. urticae*

LARVAL FOOD PLANTS - *Urtica* sp.

435 CAMBERWELL BEAUTY

Nymphalis antiopa yedanula Frusthorfer

JESTERS

They are dark brown butterflies with horizontal chestnut- yellow bands. The HW is toothed at 3. On the underside they are either marked cryptically or with black and have silvery blue tomal markings.

436 COMMON JESTER

Plate No. 48

Symbrenthia lilaea khasiana Moore 1874

EG, KU-BU 2,3 NR

WS- 45-55mm.

Similar to the Yellow Sailers.

UP brown with yellow to tawny horizontal bands as in the Sailers and Sergeants, but **HW toothed prominently. UN yellow with dark reddish brown irregular markings.**

Very common butterfly of the hilly regions. Found in open patches, forest glades and even in urbanised wastelands. Visits damp patches: generally seen around streams and nullahs. Often basks on the ground or on the prominent leaves. Attracted to flowers of *Buddleja*, *Eupatorium*, *Lantana* spp., etc.

Three brooded in the Himalaya. Found almost everywhere in Sikkim up to 2,000 m.

LIFE HISTORY - Larva brown, with three rows of branched spines, black head and lighter reddish brown lateral line. Pupa head bifid, brown with darker streaks and spots. Tail pointed. The body is narrow in the middle.

LARVAL FOOD PLANTS - *Debregeasia bicolor* (Urticaceae).

437 HIMALAYAN JESTER

Plate No. 48

Symbrenthia hypselis cotanda (Moore) 1874

KA-BU KU-BU 2,3,4 NR

WS- 45-55mm.

Similar to the Common Jester (436).

UN with black spots and a series of elongated green-blue silvery marginal and tornal spots.

Found in more wooded areas and less common than the Common Jester. Habits similar to those of the preceding species. In Sikkim seen in Gangtok, Mangan, Tashiding, the Tholung valley etc.

438 BLUETAIL JESTER

Plate No. 48

Symbrenthia niphanda niphanda Moore 1874

KA- AS 1,2 R

WS- 50-60mm.

Similar to the preceding species.

UNH submarginal blue spots smaller and more rounded.

Habits similar to those of the preceding species. But rather rare.

439 DANAID EGGFLY

Plate No. 5 & 49

Hypolimnias misippus (Linnaeus) 1764

IN, BU, SL, AN and Nicobar 1,2 NR

WS- 70-85mm.

M UP black with **with blue shot, sharply defined white oval discal spots**. HW no marginal white spots. **F** Mimics Plain Tiger *Danaus chrysippus* but the **margin has zigzag black and white border**. **Ms** and **Fs** have very different habits. **Fs** are shy and found mostly near food plants and are difficult to see as they generally sit under a leaf, slightly at higher positions, although once in a while they are found basking.

Ms found in open areas, forest clearings and paths. Generally sit on a prominent leaf in sunlight and keep watch on the territory, from where any intruder is chased away and return back to the same perch. It is often very easy to photograph it at such perching spots if the photographer has the patience to wait for a long time. In the Himalaya found up to 2,200 m. So far I have not seen this species in Sikkim, although it has been recorded from this region in the earlier literature.

LIFE HISTORY - Larva and pupa are very similar to those of the following species.

LARVAL FOOD PLANTS - *Portulacca oleracea*.

440 GREAT EGGFLY

Plate No. 2, 5 & 49

Hypolimnias bolina (Linnaeus) 1758

IN, SL, BA, PA, BU, An&Ni 1,2 NR

WS- 70-110mm.

M similar to the preceding species but the **blue patch is diffused and markings are irregular**. **UPH with a row of white spots**. **F**- Mimics, the Crows, i.e. *Euploea* sp., and identified by having **wavy black and white border on HW** and **UPF** has a shot of blue gloss above the cell near to the margin. Generally larger than the **M**.

Commoner than the Danaid Eggfly. Very abundant in the lower hot valleys of the Rangeet, Teesta and Rangpo. Also seen in Gangtok. Habits similar to those of the preceding species.

LIFE HISTORY - **Egg** spherical, grassy green; laid singly or in groups of six to seven, on the UN of very young leaves, just above the ground. **Larva** cylindrical and spiny black with greyish satiny marbling; head, yellow heart shaped with long black horns; neck orange; all spines are dirty reddish yellow in colour. **Pupa** dark brown-grey, splotched with grey wings, a dorsal row of 6 sharply conical tubercles from segments 6-11; formed on the underside of a leaf fixed by the tail; freely hanging.

LARVAL FOOD PLANTS - *Sida rhombifolia*, *Portulacca oleracea*, *Elatostemma cuneatum*, *Fleurya interrupta*.

AUTUMN LEAFS AND OAKLEAFS

As the name suggests when they sit with their wings closed they resemble a dried leaf. They are large butterflies and have tawny orange, blue or steel violet blue colours on the UP. They are butterflies of the forested area. Their flight is quick and short, they take immediate refuge in the undergrowth. Their larval food plants belong to Acanthaceae family.

441 AUTUMN LEAF

Plate No. 49

Doleschallia bisaltide indica Moore 1881

SL, SI, Merugui, SK, BU SK-BU 1,2 NR

WS-75-100mm.

UP rich tawny brown with broad black apex bearing a tawny band. FW apex produced but not as much as in the Oakleaves. **UNH has two ocelli in 2 and 5.**

Habits and habitats are similar to those of the Oakleaves.

In Sikkim occurs in the Teesta valley around Mangan, Singhik and Dikchu and also seen in the Tholung Valley.

LIFE HISTORY - (Fig. IX.2). **Larva** black with white stripes and black branched spines. **Pupa** brown, hanging freely from the support.

LARVAL FOOD PLANTS - *Strobilanthes* sp.

442 BLUE OAKLEAF

Plate No. 49

Kallima horsfieldi Kollar 1844

SK-DA 1,2 NR

WS- 85-110mm.

UP indigo-blue to dark greenish blue with **pale blue to whitish discal band and broad black apex on the FW**. UPF dark basal area does not extend beyond the cell which is defined by a black bar. UN the markings have a resemblance to a dried leaf with a midrib and silvery transparent spot which look like fungus markings.

Generally found in heavily forested areas. They settle on the twig or branch with their wings closed, when they resemble a dried leaf, hence the name **Oakleaf**. When they are disturbed they fly fast in a zigzag manner and suddenly take refuge on a tree or a twig and become undetectable. They come to damp patches, over-ripe fruits, sap, etc. Seen feeding on sap of *Angiessus latifolia*. Some times early in the mornings they might bask with wings three-fourths open. In Sikkim it has been observed by us in the Tholung Valley, where they were locally common.

LIFE HISTORY - **Egg** dome-shaped, 12 longitudinal ridges dark green in colour. Laid singly on the UN of the leaf near the ground. **Larva** similar to that of *H. bolina*; head shiny black with two divergent horns, body reddish brown, body surface covered with fine hairs and flesh-red spines with black bristles. Larva sluggish; feeds generally early in the mornings and evenings. **Pupa** is similar to that of *H. bolina* but black-brown and yellowish pink; formed generally on a leaf close to the ground.

LARVAL FOOD PLANTS - *Carvia callosa*, *Lepidagathes cuspidata* (Acanthaceae), in South India.

443 ORANGE OAKLEAF

Plate No. 41 & 49

Kallima inachus inachus (Boisduval) 1836

KA-AS NE-AS 1,2 NR

WS- 85-110mm.

UP dark violet-blue to deep steel blue with **orange discal band and broad black band on the FW**. Below very much like the preceding species.

Habits and habitats are similar to those of the Blue Oakleaf.

LIFE HISTORY - **Eggs** dark green, round, ribbed vertically with creamy yellow lines. Laid on the food plants or anywhere near the food plants. One butterfly was recorded to lay eggs on *Girardia heterophylla*, ferns, *Polygonum orientalis* and *Strobilanthes capitatas*. **Larva** very similar to that of the Yellow Coster.

LARVAL FOOD PLANTS - *Strobilanthes capitatas* (Acanthaceae).

444 MARBLED MAP

Cyrestis cocles cocles (Fabricius) 1787

445 COMMON MAP

Plate No. 49

Cyrestis thyodamas thyodamas Boisduval 1836

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

WS- 50-60mm.

White to pale cream coloured butterfly with narrow wavy lines. UPF apical and terminal dark areas. **Apex of HW cut off, giving the appearance of being beaked.** HW tailed and lobed.

The Marbled Map *C. cocles* is very similar but has ivory colour with slightly darker cream wavy lines.

It is very beautiful delicate looking insect with very slow jerky flight. While sailing keeps wings in horizontal position for longer time than any other Indian butterfly. When disturbed flight is very erratic and fast. Sits on the leaf with wings held flat or pressed on to it. Seen often near the streams and moist patches. Also fond of flowers of *Buddleja* and a Compositae creeper which is common near Rangpo. In Western Himalaya it visits flowers of Horse Chestnut.

LIFE HISTORY - (Fig. IX3) **Egg** highly dome-shaped almost conical, ridged longitudinally; an aperture at the top filled with a deeply dentate flat cap like a cogged wheel, the cogs fitting into the corresponding openings round the top of the body of the egg; shiny yellow. Eggs are generally laid on the underside of the young leaf. **Larva** spindle-shaped, with a pair of outward curved long horns on the head, a long recurved, dorsal horn on segment 6 and another on segment 12 curved forward; dark brown with broad yellow spiracular band from segment 7-14; belly watery reddish brown. Larva does not eat the egg shell. Lives on the underside of the leaf; eats the leaf from the edge onwards. **Pupa** is similar to that of *Parathyma* and *Moduza*, olivaceous brown, smooth slightly shiny.

LARVAL FOOD PLANTS - *Ficus bengalensis*, *Ficus religiosa*, *Ficus glomerata* and other *Ficus* sp.

446 COMMON MAPLET

Plate No. 49

Chersonesia risa risa (Doubleday and Hewitson) 1850

NE-BU 1,2 NR

WS- 40-45mm.

UP golden tawny colour with 9 reddish brown parallel lines. 6th line from the base is a straight line. In *Chersonesia rahria* the Wavy Maplet the 6th line is wavy.

Found at low elevations. Flight very fast, suddenly disappears into the undergrowth if disturbed and will take refuge under a leaf, when it is very difficult to locate. Basks only after the sun is quite high. Very common in Arunachal Pradesh. Only one specimen has been collected from West Sikkim by us.

SAILERS AND SERGEANTS

These are brown to black butterflies with pale white or tawny to yellow horizontal stripes. In many species of Sergeants, sexes are dimorphic. The sergeants also have a white band on the abdomen. In the Sailers the cell streak is divided into maximum two spots and are always present, while in Sergeants the cell streak is broken into more than two spots or it may be present as a small spot except in the Studded Sergeant which has streaks as in Sailers.

They are medium altitude butterflies and occur up to 1,800 m. They love sunshine, and are fond of basking. Some species visit flowers but not commonly. They visit damp and salt patches. They are considered to be Batesian mimics and many other species mimic these butterflies. Nothing much of the study of their palatability and ecology has been carried out. It will be an excellent subject to study mimicry.

447 CHESTNUT STREAKED SAILER

Plate No. 50

Neptis jumbah jumbah Moore 1857

SI,BE,SK-BU 1,2 NR

WS- 95-110mm.

UPF centres of discal spots in 2,3 and 5 are in line and direct to costa. UPH outer discal spots reduced and form a continuous line. **UNH with prominent discal row of large dark chestnut spots and dark spot in the cell near the base.** UNF usually with prominent dark chestnut streaks beyond the cell.

Habits similar to those of the Common Sailer but found in more forested regions and only in the lower valleys of Sikkim.

LIFE HISTORY - Egg is dome-shaped, broadest above the base, green. Larva rosy brown dorsally suffused with smoky on segments 4-8: body covered with small short setiferous yellow tubercles. Larva has shape and habits similar to that of *N. hylas*. Pupa dark red-brown to yellow: strongly suffused with gold, and subdorsal golden patch.

LARVAL FOOD PLANTS - *Bombax ceiba*.

448 HIMALAYAN SAILER

Neptis mahendra Moore 1872

449 COMMON SAILER

Plate No. 50 & 57

Neptis hylas varmona Moore 1872

IN, SL, BU IN, KU-SK 1,2,3 NR

WS- 50-60mm.

UPF centres of discal spots in 2 and 3 are not in line with 5 and are directed below the apex on the termen of the FW. End- cell outwardly sharp. **UPH discal spots do not widen near the costa.** **UN the white bands are black edged.** Another species *N. sappho* (= *astola*) is similar but UN has dark ferruginous colour and white bands are not black edged.

Himalayan Sailer *N. mahendra*, is also similar to the above but has the costal streak as broad as the spot below, discal spot end cell is outwardly blunt and UN markings are not so prominently black edged.

UPH discal spots widen towards the costa.

Most widely distributed of the sailers found from sea level to 2,400 m. Common in forested areas as well as disturbed human habitations and gardens. Flight is typical, consists of a few wing beats and sailing. Found along forested paths and nullahs. Often basks or patrols territory. Visits flowers and damp patches I have also seen it coming and settling on the human body sweat. Very bold butterfly allows you to approach very close. When it is basking it is quite easy to photograph. Rests with wings closed. Found throughout the year. DSF are smaller in size.

LIFE HISTORY - Egg laid singly on the upperside of the leaf, generally at the tip. Larva similar to that of *P. hordonia*, but dark, covered with yellow tubercles on segments 3,4,6 and 12 of which the tubercles on 4 is double the length of the others. Larva makes a bed for itself on the tip of a midrib, gradually eating pieces of the leaf and leaving it free and hangs it by silk from its perch giving an appearance of dead leaf. The larval colour varies according to environment. Pupa pearly greenish yellow, with olive-brown lines on the wing cases and shoulder. A golden suffusion on the abdomen.

LARVAL FOOD PLANTS - *Bombax ceiba*, *Helicteres isora* (Sterculiaceae), *Nothapodytes nimmoniana* (Olacaceae), *Grewia tiliaefolia*, *Triumfetta*, *Corchorus* (Tiliaceae), *Paracalyx scariosa*, *Flemingia* sp., *Mucuna purpurea*, *Xylia*, *Canavalia ensiformis*, *Vigna unguiculata* (Leguminosae).

450 COMMON SAILER

Neptis sappho astola Moore 1872

KA-KR 1,2,3 NR

451 SULLIED SAILER

Plate No. 50

Neptis soma soma Moore 1858

MU-BU,AN MU-BU 1,2,3 NR

WS- 50-60mm.

UP white bands narrower. **UNF cell streak often joined to the spot beyond. UN ferruginous, markings are not black edged.** Spots between the outer discal band and the discal band on upperside very obscure and faintly seen UN. **UPH discal band does not enter the base of 3; if it does, there is an equal amount of space in area 2.**

Habits are similar to those of the other Sailers. Fairly common in Sikkim particularly in the lower valleys up to 1,700 m.

452 CLEAR SAILER

Neptis clinia susruta Moore 1872

SI,CI,NE-BU,AN NE-BU 1,2 NR

453 YERBURI'S SAILER

Plate No. 50

Neptis yerburi

KA-BU NE-AS 2,3 NR

WS- 58-60mm.

Similar to the Clear and the Broad Banded Sailers (452 and 454).

UPF 3 upper marginal spots shifted in right angles to costa. UPH white band expanding to costa. **UNH two equally prominent marginal bands.** The Broad Banded Sailer also has two prominent marginal bands but cell streak is conjoined both on upper side and lower side. UPF discal spot in 2 is outwardly rounded.

Typically found in well-wooded nullahs and ravines between 1,200-2,000 m.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Celtis australis* (Urticaceae) in Mussorie.

454 BROAD BANDED SAILER

Plate No. 50

Neptis sankara amba Moore 1844

KA-BU,AN NE-BU 1,2 NR

WS- 65-75mm.

A larger butterfly than other Sailers. Markings broader, **UPF cell-streak spot conjoined.** UNH basal costal streak narrow and not prominent than the streak in base cell or both may be absent or obscure. **UPF spots forming discal bands well separated.** UNH of two marginal bands is well defined and slightly broader.

Insect of damp forests. Flies high above the ground than others of the group. Stronger on wings, beating up and down along streams and flying round trees. In Sikkim found up to 1,200 m.

455 DINGY SAILER

Plate No. 50

Neptis pseudovikasi Moore 1905-1910

KU-AS 1,2 NR

WS- 60-70mm.

UP dark smoky brown with very narrow markings and not very clearly defined. UPF discal spot in 2 is quadrate.

Habits as for those of the group.

456 DINGIEST SAILER

Neptis harita harita Moore 1874

BE-BU 2,3 R

WS- 55-60mm.

Similar to the Dingy Sailer (455).

But the discal spot in 2 of UPF is crescent-shaped.

Habits as for those of the group.

457 PLAIN SAILER

Plate No. 50

Neptis cartica cartica Moore 1872

SK-BU SK-AS 1,2 NR

WS- 55-70mm.

Similar to the the Dingy (455) and the Rich Sailers (458).

UNH basal streaks broad and no pale streak at the base cell. UP markings white or sullied. **UPF prominent discal spot in 3, UPF has a highly zigzag margin.**

Found at low elevations. Habits similar to those of other sailers. Because of its very close resemblance to other species it may go unnoticed. Not common in Sikkim.

458 RICH SAILER

Neptis nashona nashona Swinhoe 1896

459 YELLOW SAILER

Plate No. 50

Neptis ananta ochracea Evans 1924

CM-BU NE-DA 1,2 NR

WS- 55-70mm.

Similar to the Green Sailer (466), the Sergeant-major (488) and the Pasha (394).

Large. **UP bands are orange-yellow.** UNH basal costal streak broad and no streak at the base of the cell. **UPF discal spot in 1 is well separated from 2.** UN dark ferruginous ochreous.

Found in well wooded nullahs and forest edges near water between 400-2,000 m. It has been collected from the vicinity of Pashok. No recent record.

460 SMALL YELLOW SAILER

Plate No. 50

Neptis miah miah Moore 1857

SK-BU SK-AS 1,2 NR

WS- 45-60mm.

Smallest of the Sailers, similar to the Yellow Sailer(459).

UPF discal spot in 1 and 2 conjoined or very close. UNH basal costal streak narrow, with obscure streak in base cell.

Fairly common in Sikkim during summer and October. Visits damp patches of hill streams. Seen basking in the mornings. I have come across this species in North and South Sikkim. Not very common.

461 VARIEGATED SAILER

Neptis antilope elba Evans 1924

462 PALE HOCKEY STICK SAILER

Neptis manasa manasa Moore 1857

463 HOCKEY STICK SAILER

Neptis nycteus De Niceville 1890

464 BROAD STICK SAILER

Plate No. 50

Neptis narayana nana De Niceville 1888

NE-MA 2,3 R

WS- 60-70mm.

UP markings white or yellow. UPF cell-streak extending into base of 3. **UNF small costal spots not continued to cell streak.**

465 GREAT YELLOW SAILER

Plate No. 50

Neptis radha radha Moore 1857

KU-BU KU-AS 2,3 R

WS- 70-80mm.

Similar to the preceding species.

But UNF the costal spots are larger and continued to cell- streak.

Habits as for those of the group.

466 PALE GREEN SAILER

Plate No. 50

Neptis zaida bhutanica Doubleday

MU-BU NE-BH 2 R

WS- 65-75mm.

Similar to the Yellow Jack Sailer (467).

UP markings pale ochreous but **central band on UPF nearly white, spot in 1 well separated from 2.**

UNF no costal spots above the end cell streak. UN yellow-brown and all markings well defined.

Found between 900-2,000 m in well-forested nullahs. It has a leisurely flight and is found singly. Settles on damp patches. WSF and DSF forms are known. Elwes has taken specimens of this species from the forests above Rangbi at about 1,000 m.

467 YELLOW JACK SAILER

Plate No. 50

Lassipa viraja viraja Moore 1872

SI,EG,KU-BU KU-BU 1,2, NR

WS- 55-75mm.

Similar to the preceding species but UP, markings are yellow. **UPF discal spots in 1 and 2 are conjoined.** Bands are narrower and UN darker and all markings have sharply defined edges.

Flies at low elevations up to 1,000 m. in thick evergreen jungles. Not rare in Sikkim particularly in the lower hot valleys. Extremely fast on wing. I have seen it in Mangan area.

468 SHORT BRANDED SAILER

Plate No. 50

Phaedyma columella ophiana (Moore) 1872

SI,DU-BU,NI DU-BU 1,2 NR

WS-60-70mm.

Similar to the Common(450), Himalayan(448) and Chestnut Sailers(447).

UPF discal spots in 2 and 3 is in line with 5 and line being directed towards costa well before apex. UNH basal markings consist of a narrow short white costal streak at base, brown streak outside it, which reaches and runs along costa and a pale streak beyond the brown streak running across the base of the cell. **UPH prominent outer discal band of separate white spots. UN termen broadly chequered, black at the end of the veins and white in-between.**

Found in hilly regions of well-forested country. Often seen basking along forest paths. I have yet to encounter this species in Sikkim.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Dalbergia* sp.

469 COMMON LASCAR

Plate No. 50

Pantoporia hordonia hordonia (Stoll) 1791

SL,SI,DU-BU,AN SI,DU-BU 1,2 NR

WS- 45-50mm.

Smaller, has seasonal forms. **UPF discal spots well separated.** UPH postdiscal yellow band narrow with an ochreous line on the dark margin, UPF marginal lines much less zigzagged but often in WSF prominently so in the middle.

A butterfly of forested area although I have seen in near human habitations; found up to 1,800 m. Flight very weak keeps close to the ground, settling frequently either on the ground or on low-growing bushes, basking on a prominent leaf. A mating pair was observed late in the evening on a low growing creeper near Mangan in November.

In south India Bell found two distinct forms of larvae feeding on different food plants at the same time and place and season. So he felt further study is needed to check whether there are two species whose adults are identical but different life-history. This would be an interesting project to investigate further.

LIFE HISTORY - (Fig. IX 4). **Egg** like a sea urchin but higher than broader of azure-blue colour. Laid on the top surface of the leaves. **Larva** cylindrical, thickest in the middle. Short conical grey-green fleshy lateral tubercles on segments 3, 4, 6 and 12. The young larva on emerging cuts the midrib of the leaf nearly enough, then cuts the leaflets at their bases, attaching them by silk thread to their respective places and cuts pinnae through several places fastening them in same way with the silk to the plant from becoming detached and falling to the ground. It lies in the middle of the so formed cell and eats these withered leaves as long as they are not too dry. At such times the larva resembles very much a dried leaf and gets protection from predaceous spiders and birds to some extent. **Pupa** green in colour and similar to the Chestnut Sailer darker on the wings. Pupa and larva are much parasitised by the ichneumon flies.

LARVAL FOOD PLANTS - *Acacia concinna*, *Acacia megadalane*, *Albizia odoratissima*.

470 ORANGE STAFF SERGEANT

Plate No. 51

Parathyma cama (Moore) 1857

MU-BU 1,2, NR

WS- 60-75mm.

M similar to the Staff (475) and Small Staff Sergeants (476).

Sexes dimorphic. **UPF cell streak always obscure and almost continuous; ferruginous; no white spot end-cell.** UPH outer discal band obscure UNF cell-streak continuous. **F UPF outer discal spot in 4 smaller and just connected to the outer edge of spot in 5, not a continuous even edged apical band.**

Found in hilly regions between 300-1,200 m. Habits are similar to those of the following two species. **Ms** are common. **Fs** because of their resemblance to other commoner species, may be going unnoticed.

471 COLOUR SERGEANT

Plate No. 51

Parathyma nefte inara (Doubleday and Hewitson) 1850

SI,MU-BU 1,2 NR

WS- 55-70mm.

Sexes dimorphic. **M** UP discal band white, blue tinged at the edges. **FW no prominent spot in 3, orange apical markings and cell streak broken but obscure with prominent white spot end cell.** UPH with orange outer discal band. **UNF cell streak much broken.** **F UPF discal spots in 4-6 form a continuous even edged bands and markings broad and orange.**

A butterfly of moderate rainfall areas of the hilly regions. Flies in thick forest, often settles on a high prominent leaf from which it takes short rapid flights. Common at low elevations.

LIFE HISTORY - (Fig. IX.1). **Larva** cylindrical with six rows of branched brown spines like those of *A. ranga* but dorsal spines are longer than lateral spines; body green with a large brown patch on 9th segment; head covered with short simple brown spines and white tubercles. Pupa very similar to that of the preceding species, but for curious processes on the back, the posterior one is much longer and more inclined forwards.

LARVAL FOOD PLANTS - *Glochidion* (Euphorbiace).

472 BLACKVEIN SERGEANT

Plate No. 51 & 57

Parathyma ranga ranga (Moore) 1857

SI,SK-BU CN-BU 1,2 NR

WS- 55-70mm.

M and **Fs** UP **white bands are prominently crossed by black veins**. UN bands are much more prominent. Centres of spots in 2 and 3 pointing to costa. Discal spots in 1b not joined to spot in 2. **No cell streak, but bluish spots**. **M** UPH discal band is sullied or absent. In **F** discal band is much broader, outer discal band more prominent and whiter.

Found in evergreen regions up to 1,500 m. Flies near water and streams. Seen along the forest paths and clearings. Visits damp patches, flies close to the ground. Often basks with wings spread out and sometimes with the FW pressed below the horizontal plane. Found **Ms** commoner than **Fs** in the lower southern Rangpo and Rangeet Valleys. Also up to Sanklang in the Teesta valley.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Olea dioica*, *Lonicera* sp.

473 STUDDERED SERGEANT

Plate No. 51

Parathyma asura asura (Moore) 1857

KU-BU KU-TA 1,2 R

WS- 65-75mm.

Similar to the Common Sergeant (474).

HW a row of black spots on the discal band. UNH ferruginous or dark chocolate.

This is rather a rarer species, found near forested regions along streams and nullahs. Fond of visiting moist patches and basking. I have come across this species only in the Western Himalaya.

474 COMMON SERGEANT

Plate No. 51

Parathyma perius (Linnaeus) 1758

SI,SM-BU 1,2 NR

WS- 60-70mm.

Similar to the Studded Sergeant (473).

UPH discal band with black spots on inner margin and a wavy marginal band. UN yellow with white spots edged with black, **outer discal band of UNH with a series of black spots towards inner edge**.

A butterfly of low elevations, found in fairly open country and around human habitations. Flies close to the ground. Settles on damp patches (although WB writes never settles). Flies low among bushes and shrubs resembles the Sailors in flight. I photographed one feeding on *Hibiscus esculentus* vegetable which were cut and put for drying in Nepal. In Sikkim seen it around Tashiding and Ryngym monastery in north Sikkim.

LIFE HISTORY - **Egg** not described. **Larva** dark yellow green, cylindrical like that of *Limenitis*. Three rows of red pedicelled greenish spines. Head round with 8 sharp shiny brown spines, inside this towards the front another 10 conical tubercles; each segment from 3-13 bears hard pedicles of sharp spines of blood-red colour. Base of the abdomen and legs dark red-brown and belly greenish. **Pupa** is like that of *Modusa* sp., red-brown in colour with suffused gold on wing cases. Formed on the underside of the leaf generally very low down near the ground.

LARVAL FOOD PLANTS - *Glochidion relutinum*, *Glochidion lanceolarium*.

Scale : 5 cm

PLATE NO. 49



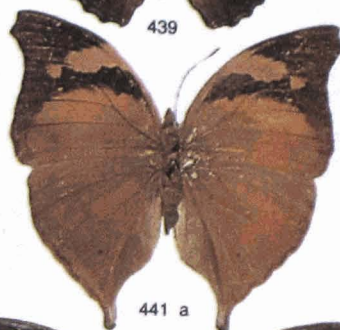
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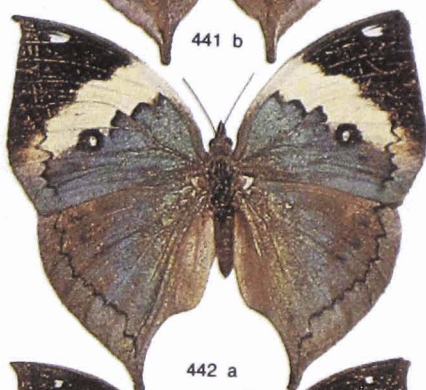
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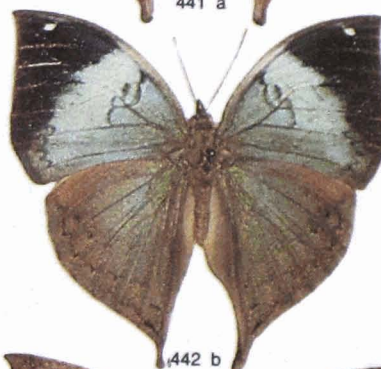
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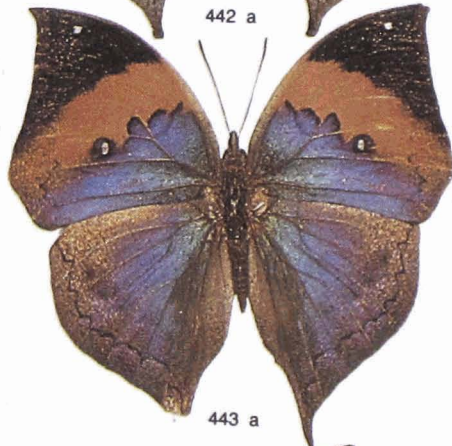
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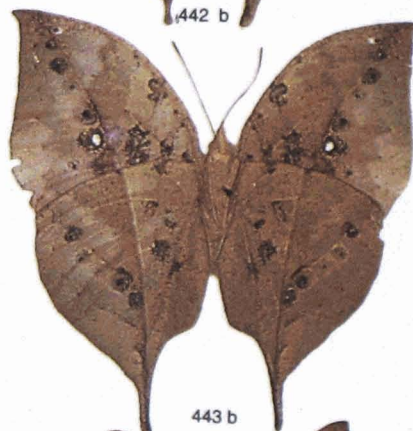
442 a



442 b



443 a



443 b



445



446

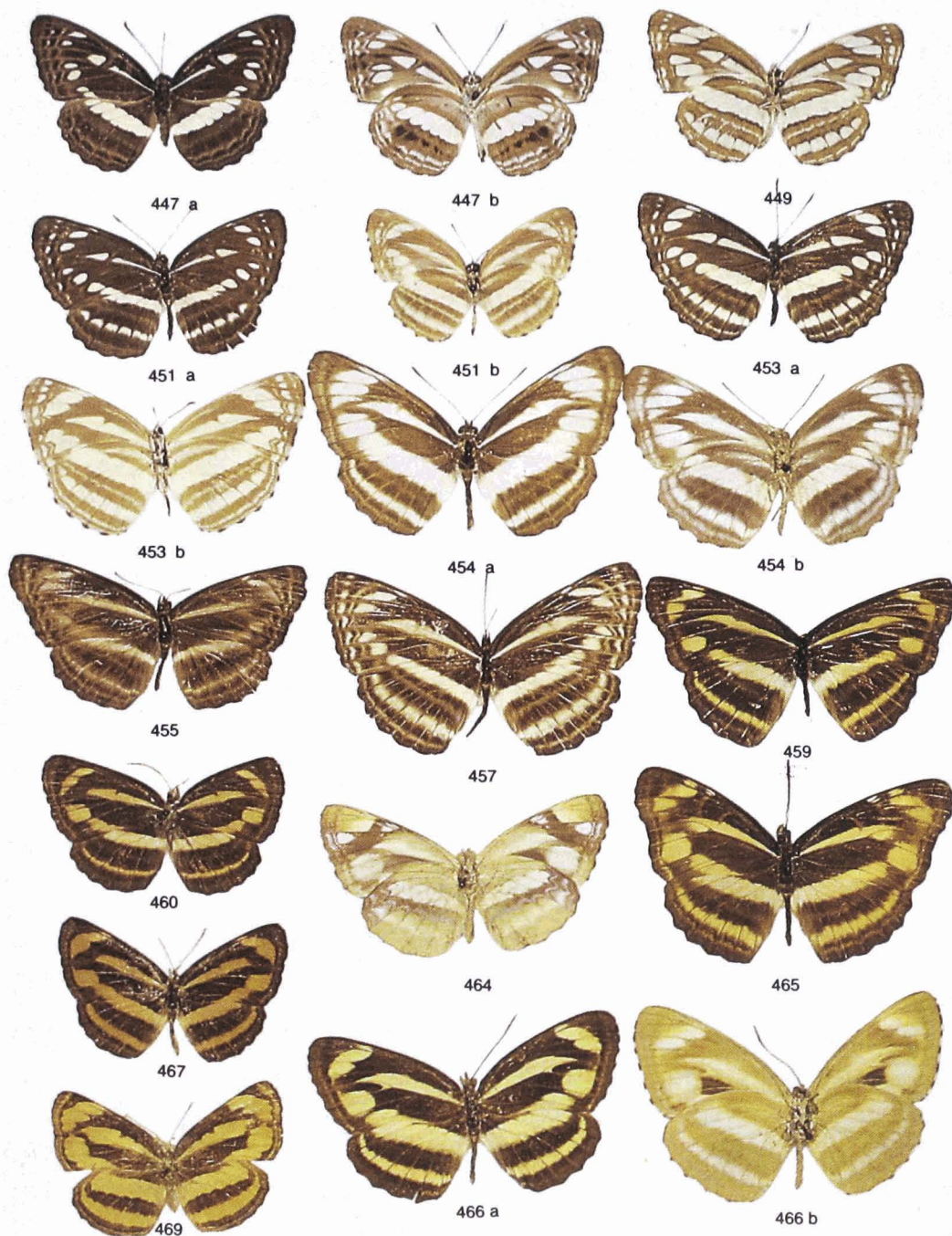


403

403 Tabby
439 Danaid Eggfly ♂
440 Great Eggfly ♂
441 a Autumn Leaf UP

441 b Autumn Leaf UN
442 a Blue Oakleaf UP
442 b Blue Oakleaf UP
443 b Orange Oakleaf UN

443 a Orange Oakleaf
445 Common Map
446 Common Maplet



- 447 a Chestnut Streaked Sailer UP
 447 b Chestnut Streaked Sailer UN
 449 Common Sailer UN
 451 a Sullied Sailer UP
 451 b Sullied Sailer UN
 453 a Yerburi's Sailer UP
 453 b Yerburi's Sailer UN
 454 a Broad Banded Sailer UP
 454 b Broad Banded Sailer UN

- 455 Dingy Sailer
 457 Plain Sailer
 459 Yellow Sailer
 460 Small Yellow Sailer
 464 Broad Stick Sailer
 465 Great Yellow Sailer UP
 466 a Pale Green Sailer UP
 466 b Pale Green Sailer UN
 467 Yellow Jack Sailer

Scale : 5 cm

PLATE NO. 51



470 a Orange Staff Sergeant ♂ UP
 470 b Orange Staff Sergeant ♂ UN
 470 c Orange Staff Sergeant ♀ UP
 471 a Colour Sergeant ♂ UP
 471 b Colour Sergeant ♂ UN
 471 c Colour Sergeant ♀ UP

472 a Blackvein Sergeant ♂ UP
 472 b Blackvein Sergeant ♂ UN
 472 c Blackvein Sergeant ♀ UP
 473 a Studded Sergeant UP
 473 b Studded Sergeant UN
 474 a Common Sergeant UP

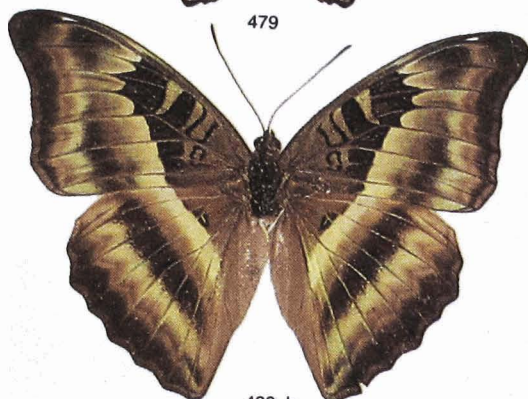
474 b Common Sergeant UN
 475 a Staff Sergeant ♂ UP
 475 b Staff Sergeant ♂ UN
 476 a Small Staff Sergeant ♂ UP
 476 b Small Staff Sergeant ♂ UN
 477 Hill Sergeant



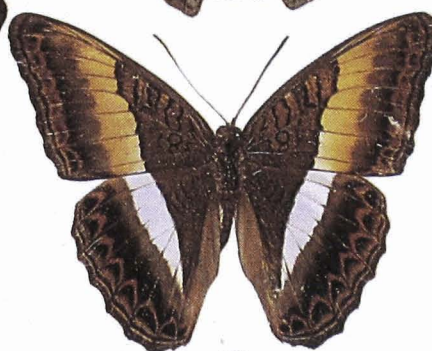
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480 a



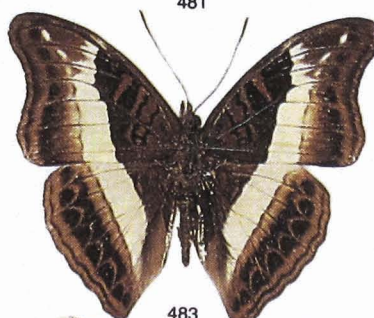
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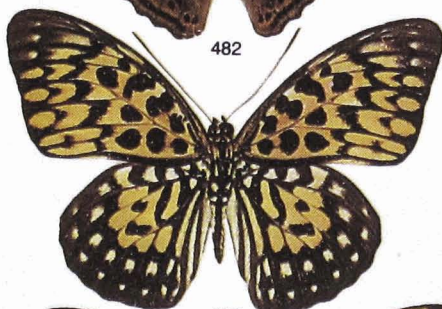
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482



483



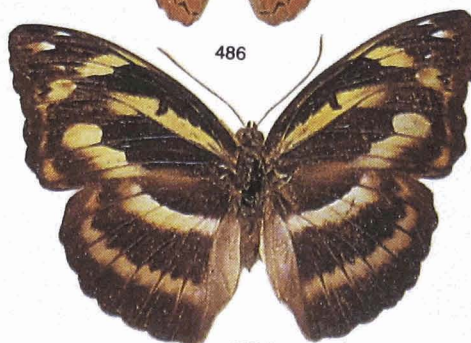
487



486



488 a



488 b

479 Commander

480 a Commodore ♂

480 b Commodore ♀

481 Bicolour Commodore

482 Green Commodore

483 White Commodore

486 Knight

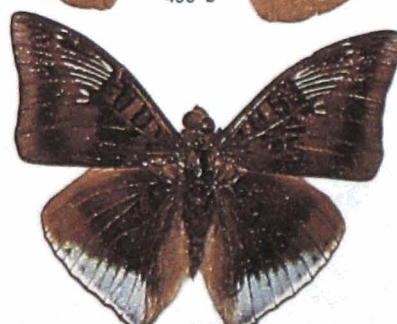
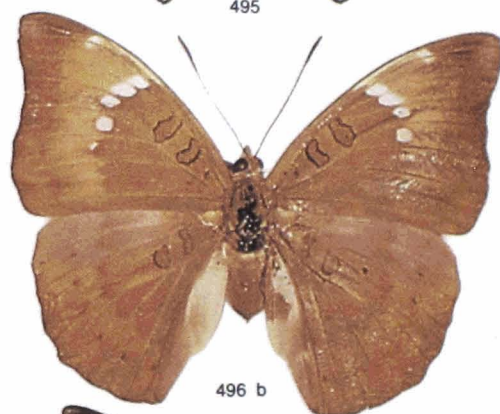
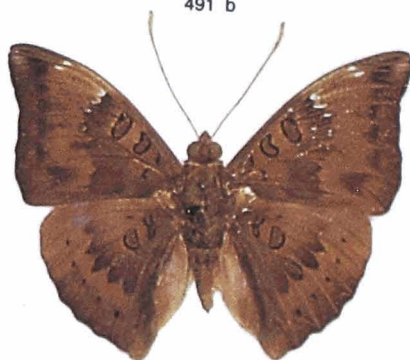
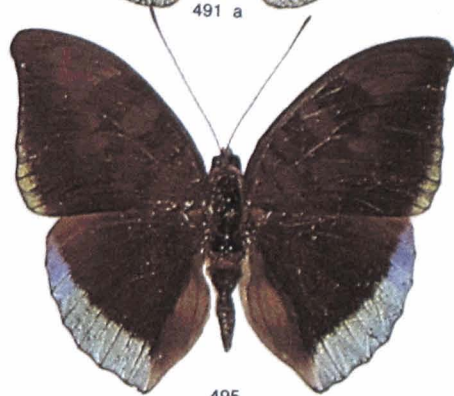
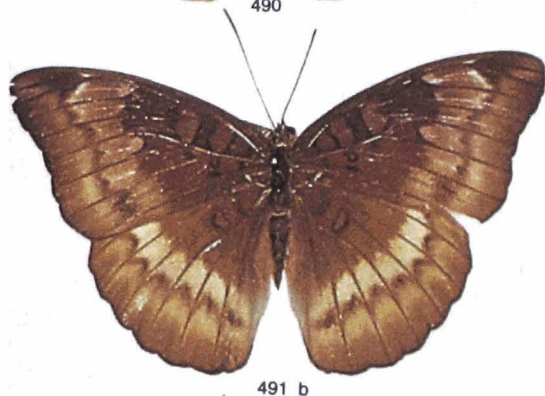
487 Panther

488 a Sergeant-Major ♂

488 b Sergeant-Major ♀

Scale : 5 cm

PLATE NO. 53



490 Grey Count

491 a Common Earl ♂

491 b Common Earl ♀

495 Blue Baron

496 a Common Baron ♂

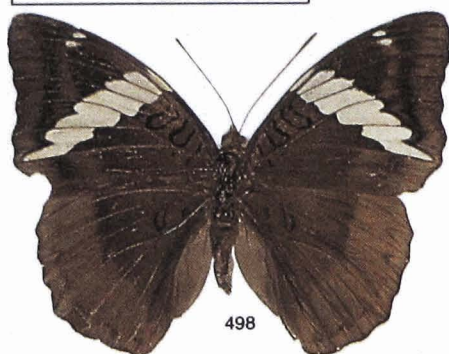
496 b Common Baron ♀

497 Streaked Baron

498 White Edged Blue Baron ♂

PLATE NO. 54

Scale : 5 cm



498



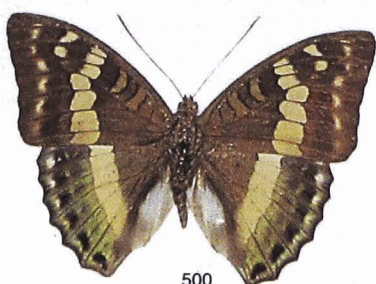
499 a



499 b



499 c



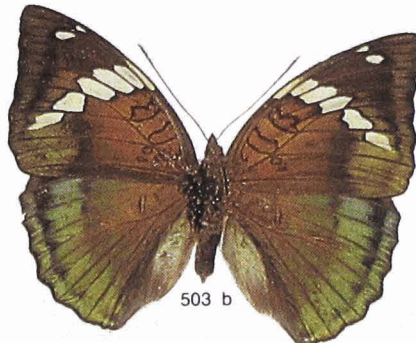
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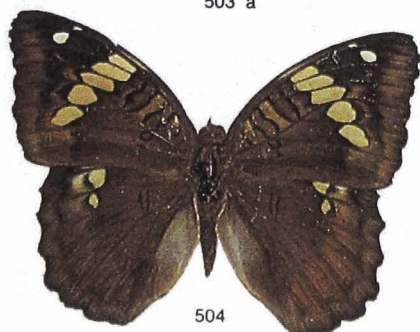
501



503 a



503 b



504



506

498 White Edged Blue Baron ♀

499 a Gaudy Baron ♂ UP

499 b Gaudy Baron ♂ UN

499 c Gaudy Baron ♀ UP

500 French Duke

501 Blue Duchess

503 a Bronze Duke ♂

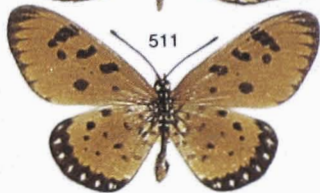
503 b Bronze Duke ♀

504 Green Duke

506 Baronet

Scale : 5 cm

PLATE NO. 55



- 510 Tawny Coster ♂
511 Yellow Coster ♂
512 Glassy Tiger ♂
513 Chestnut Tiger

- 514 Chocolate Tiger ♂
515 Blue Tiger ♂
516 Dark Blue Tiger ♂
517 Common Tiger ♂
518 Plain Tiger ♂



- 519 Double-branded Crow ♂
 520 a Striped Blue Crow ♂
 520 b Striped Blue Crow ♀
 521 Blue Spotted Crow ♂
 522 Blue King Crow ♂

528

- 523 Magpie Crow ♂
 525 Long Branded Blue Crow ♂
 526 a Common Crow ♂ UP
 526 b Common Crow UN
 527 Common Beak
 Club Beak

475 STAFF SERGEANT

Plate No. 51

Parathyma selenophora selenophora (Kollar) 1844

MU-BU 1,2 NR

WS- 55-75mm.

MVery similar to the following species,

F similar to the Himalayan Sergeant and **M** similar to the Colour Sergeant (471).

UNF cell streak divided, beyond this dark triangular spots. The apical spots well separated. In **M** the reddish mark in the cell prominent. **F** UPH has outer discal band, all markings are prominent. UPF cell streak with pointed end-cell spot. Outer discal markings triangular pointing inwards up to 4 .

Occurs up to 1,800 m. Two broods have been recorded from Sikkim. Found near streams and rivers. Basks early in the morning with wings open. Seen four specimens basking near Tholung bridge early in the morning. Also seen in Tumin khola along the Teesta Valley.

LIFE HISTORY - Larva similar to that of *P. nefte* but dorsal patch is much smaller and has some white spots on the sides. Pupa is similar but there is slight difference in the shape of processes of head and thorax.

LARVAL FOOD PLANTS - *Adina cordifolia* (Rubiaceae).

476 SMALL STAFF SERGEANT

Plate No. 51

Parathyma zeroa (Moore) 1872

KU-BU 1,2 NR

WS- 50-65mm.

Similar to the preceding species.

M UNF cell streak continuous, apical spots conjoined.

F similar to *P. opalina*.

Habits as those of the group. **Ms** are commoner than **Fs**. Seen up to 1,100 m from March to December.

477 HILL SERGEANT

Plate No. 51

Parathyma opalina orientalis Elwes

KA-BU NE-BU 1,2 NR

WS- 55-70mm.

UPF spots from 1b to 3 directed to termen and in line with spot in 4. Cell streak twice divided and well separated from the spot beyond.

Found between 1,100-1,800 m. Becomes rare in the Eastern Himalaya. Keeps more to open areas; flight weak. Found in sunny nullahs where it beats up and down often in the company of the Common and Himalayan Sailors. Settles on damp patches, stones or leaves and bushes. **Fs** mostly found near food plants. Recorded as double brooded in Sikkim. Has seasonal forms.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Mahonia nepalensis*, *Berberis chitria*, *B. lycium* (Berberidaceae).

478 BHUTAN SERGEANT

Parathyma jina jina (Moore) 1857

COMMODORES AND COMMANDERS

These are medium to large-sized butterflies found at low elevations. They are brown, green to tawny orange and have a discal band on both wings. They are also sun-loving butterflies and visit damp patches and sometimes flowers like *Tagetes* and Marigold. They are territorial insects and have a perch high on the tree and come down very often to chase away intruders and return back to the same perch.

479 **COMMANDER**

Plate No. 52

Moduza procris procris (Cramer) 1877

SI,SL,MP,DU-BU,AN DU-BU 1,2 NR

WS- 60-75mm.

Similar to the White Commodore (483).

UP reddish brown with white discal band on both wings. HW with two rows of marginal spots. The border is wavy going deeper inside between the veins compared to the White Commodore.

Occurs in forested regions along the river valleys and streams in the hilly regions, but may be also found in open areas and around human habitations. Very fond of visiting damp patches where it is easily caught or photographed as it is not disturbed by anybody while drinking. It also visits various garden flowers like *Tagetes*, marigold, etc. Generally sits with wings wide open while feeding on the salts and moisture. But sits with wings closed while resting or while feeding on the flowers. Ms show strong territorial behaviour, sometimes keep to a prominent look-out point and often fly down to chase intruder and return to the same spot. It is common in the lower Teesta Valley up to about 1800 m.

LIFE HISTORY - **Egg** laid on the tip of the leaf. **Larva** is dirty grey to chestnut-brown, with blackish blotches, with thin white dorsal line on segments 2-4. Body cylindrical with yellow-brown fleshy spined process, laterally flattened on segments 3-12. Larva does not eat midrib but in a straight line at right angles to the midrib, throws up a rampant of its droppings in the web along the eaten ridge, thus separates the midrib from the leaf surface. **Pupa** dull chestnut marked with white and grey. Similar to that of *Parathyma*. Looks like a small withered and twisted leaf. Head with two foliaceous hammer-shaped processes which meet at their ends leaving a circular hole.

LARVAL FOOD PLANTS - *Cadaba fruticosa*, *Mussenda frondosa*, *Wendlandia exserta* and Almond tree.480 **COMMODORE**

Plate No. 52

Limenitis danava (Moore) 1857

SM-BU 1,2 NR

WS- 80-85mm.

M UP dark brown with obscure brown discal bands; HW tornal area green. F, larger, markings similar but UP greenish brown, with pale discal bands.

A butterfly of the forested regions. Found along streams and nullahs. Other habits are similar to those of the Commander. Occurs from the lower altitudes to about 2,800 m. We have collected a specimen in December from West Sikkim.

481 **BICOLOUR COMMODORE**

Plate No. 52

Limenitis zayla Doubleday and Hewitson 1850

SK-AS 1,2 NR

WS- 80-95mm.

UP olive-brown, discal band deep yellow on FW and white on HW.

One of the beautiful insects of very dense jungle in the hills up to 2,000 m. It has been recorded as common near Darjeeling from June-August.

482 **GREEN COMMODORE**

Plate No. 52

Limenitis daraxa Doubleday and Hewitson 1850

SK-KR 1,2 NR

WS- 60-70mm.

Similar to the Blue Bottle (021).

UP dark brown with greenish discal band on both the wings which is curved towards the apical spots on the FW.

Insect of hilly regions, flies between 1,300-1,700 m. Fs are rare. Seen coming to damp patches. Fond of basking early in the mornings. Very wary on closer approach. When disturbed goes away quickly to the

next spot only to return to the earlier spot after some time. Seen in Rakadong area, Tumin Khola, Rangpo Valley and also collected from West Sikkim.

483 **WHITE COMMODORE**

Plate No. 52

Limenitis dudu Westwood 1850

NE-SS 1,2 NR

WS- 80-95mm.

UP dark brown; **discal band white curved away from the apical spots on the FW.** UN mauve. FW produced at toms and concave below apex.

Ms fairly common while Fs rare. Seen between 1,200-1,500 m. Flies around tree tops on the highest points on the ridges. We have one specimen collected from West Sikkim.

484 **SCARCE WHITE COMMODORE**

Limenitis zulema Doubleday and Hewitson 1850

SK-DA 1,2 R

WS- 60-75mm.

Very similar to the Commander (479) and the preceding species (483).

Discal band on the UPH is tinted with blue and UPF bears two rows black spots outside the discal band and no pale wavy lines on the margin. Border more indented, venations very different.

Recorded to be very rare in Sikkim, up to 1,200 m. In Daling it has been found in May and June from 500-1,500 m. Also recorded from Sivoke in April.

485 **CLIPPER**

Plate No. 41

Parthenos sylvia gambrisius (Fabricius) 1787

SL,SI,EG,NEI NEI 1,2 R

WS- 95-110mm.

Similar to the female Cruiser (507).

UP pale bluish green semi-transparent white spots on disc. HW veins black on disc, 2 black lines between each followed by a series of marginal black markings. FW apex white-tipped in DSF.

Confined to thick jungles between 300-1,500 m. One of the most beautiful butterflies, very strong on wing. Flight is quick and sails for a short stretch, with wings held well below the horizontal plane. Generally keeps high among the trees, sitting on prominent leaves whence it often takes short flights to return to the same spot. Visits flowers of *Eupatorium* and damp patches. Very wary on closer approach.

Status in Sikkim is not very sure. If at all found will be only in lower hot valleys. Only one specimen from the collection labeled as Sikkim was seen. Further in east it is fairly common in Assam and Arunachal Pradesh.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Modecca* sp.(Passifloraceae).

486 **KNIGHT**

Plate No. 52

Lebadea martha martha (Fabricius) 1787

NE-BU NE-BH 1,2 NR

WS- 62-75mm.

Similar to the Commodore (480).

UP tawny-red with white discal bands, followed by a series of white crescents on FW and black crescents on HW. **FW apex white-tipped and rounded.**

Confined to low elevations. Flight is weak, settles frequently with the wings outspread on leaves in the sunshine. Recorded to be flying in spring in Sikkim. One possible record from Singhik on Poinsettia flowers in November.

487 **PANTHER**

Plate No. 52

Neurosigma doubledayi doubledayi (Westwood) 1848

SK-DA SK-CHITTAGONG 1,2 NR

WS- 80-100mm.

M DSF, UP orange with 9 black spots and two lunular black bands on the FW. UPH basal two-thirds deep orange with black markings. Outer one-third black with two rows of whitish spots. **M** WSF and **Fs** with only bases of FW and HW orange, rest of the background replaced by white.

Flies at moderate altitudes of 1,300 m to 1,500 m. Recorded to be rare in Sikkim, flies in spring and again in October.

488 **SERGEANT-MAJOR**

Plate No. 52

Abrota ganga ganga Moore 1857

NE-BH 1,2 NR

WS- 75-90mm.

Similar to the Sergeants

Large, **M** UP yellowish brown; UPF dusky cell-streak joined by two well separated spots beyond. HW with four dusky lunular bands of which the central two are well separated. In WSF **F** similar but the markings are replaced with dusky yellow bands similar to **Fs** of Sergeants,

Habits are similar to those of Sergeants and fly in the same habitat as their models between 800-1,200 m.

489 **ARCHDUKE**

Lexias khasiana (Swinhoe) 1893

BARONS, DUKES AND DUCHESSES

These are generally green, yellow, blue, orange to brown butterflies with discal bands and white apical bands. Some have marginal borders. Sexes are dimorphic. **Fs** generally with apical white bands or with paler discal and marginal bands. They are butterflies of forested regions, found along nullahs and bright sunlight patches in the forests. **Ms** are sun-loving insects and generally remain in the upper canopy coming down to damp patches. They fly with their wings pressed below the horizontal level. **Fs** remain in the canopy in and are rather uncommon.

The larval food plants belong to Anacardiaceae family. All the larvae have long spiny processes. Pupae are pyramidal in shape.

490 **GREY COUNT**

Plate No. 50

Tanaecia lepidea lepidea (Butler) 1868

SI,EG, KU-BU KU-AS 1,2 NR

WS- 65-80mm.

UP dark brown with pale grey border on HW, continuing on FW narrowing towards apex, ending below the apex. UNF outer discal line wavy and parallel to termen and brownish.

A butterfly of wetter regions. Flies in the clearings of the forest and along paths. Flies close to the ground, often seen basking on low-growing bushes or on the ground or along the paths. Fond of rotten fruits and sap.

LIFE HISTORY - **Egg** no description available. **Larva** limaciform, with a long process all around from segments 3-12. spines are fewer, tipped with yellow, some times spines stick straight up and are

completely yellow. Larva lies on the middle of the leaf, not far from ground in the shady places in damp jungles. Pupa is pyramidal, green in colour; a shiny golden band in centre of the segment 7 over apex of the pyramid. Pupa is attached on the underside of the leaf.

LARVAL FOOD PLANTS - *Melastoma malabathricum* and *Careya arborea* in South India.

491 COMMON EARL

Plate No. 53 & 57

Tanaecia julii appiades (Menetries) 1857

KU-SK 1,2 NR

WS- 65-85mm.

Similar to the Blue and the White Edged Blue Barons (495 and 498).

Sexes dimorphic. **M** UP dark brown with **blue margin only on the HW**. UN light brown, HW total half green and with marginal and discal black spots. **F** UP paler brown, without blue margin on the HW. The area between the discal bands on the UPF whitish. White spots at the upper end of each discal bands.

F similar to the Plain earl and other Fs.

One of the commonest butterflies of Sikkim. Found all year round at lower elevations. Occurs in forested areas as well as the gardens and around human habitations. Very common in cardamom plantations. Flies close to the ground and often settles on the ground and basks. When disturbed would fly away and sit in some undergrowth with its wings closed.

492 PLAIN EARL

Tanaecia jahnu jahnu (Moore) 1857

493 POWDERED BARON

Euthalia kesava arhat Frustrhorfer

NE-BU 1,2 NR

WS- 50-80mm.

Similar to the preceding species.

M UP dark brown or black with **marginal half of HW and discal band of FW powdery blue**. **F** pale brown with two dark discal lines and the area between much more paler than in the Fs of other species. UPH two streaks in the cell.

Habits similar to those of others of the group but found at lower elevations through April to December.

494 GREY BARON

Euthalia anosia saitapherne Frustrhorfer

495 BLUE BARON

Plate No. 53

Euthalia telchinia (Menetries) 1857

SI,NE-BU 2,3 R

WS- 70-85mm.

M similar to the Common Earl (491).

UP M the **blue margin extends to FW** up to V3 and narrowing towards the apex of the FW. **F** pale brown, with inclined broad brown border from apex to 2/3 along dorsum, continued on HW just beyond the cell. **UPF 5 dusky spots in a curved row beyond the cell**. UN warm yellowish.

It is recorded from June to October from Sikkim. Habits similar to those of others of the group. Sits on the ground, often has a particular spot in the sunny patch. On disturbing it will go to next spot to return to the same spot after some time, this habit makes it easier to photograph this species, if one waits at its favourite place without much movements. One specimen seen in Orchid Sanctuary in Gangtok in August.

496 COMMON BARON

Plate No. 53

Euthalia aconthea suddhodana Frustrhorfer

SL,SI,EG,KN-BU,AN BE,NE-BH 1,2 NR

WS- 55-75mm.

UP dark brown with darker markings on the FW with more or less complete row of white spots from 2 to 6, but may be smaller in Ms. Spots beyond cell always present. F discal spots dusky, in 2 or 3 it may be absent. **UPH with marginal band of black spots.**

Found generally in forested areas. But as mango is the food plant which grows in almost all places it is found now even in cities and crowded markets where one can see it beating along some areas and feeding on rotten vegetables and fruits. Flight strong, flies with typical wing beats and sailing. When sailing wings are held lower than the horizontal plane. Often basks on the ground and on top of trees on some prominent leaf in a sunny patch. Has territorial habits, often returns to the same spot. Visits damp patches, rotten fruits, toddy and sap etc. I have seen it coming to alcohol drums in a chemical factory where there usually used to be some spillage. In Sikkim it is common in the lower hot valleys of the Rangpo and Rangeet and in Singtam.

LIFE HISTORY - (Fig. IX.8). **Egg** not described. **Larva** green in colour, with long spiny processes. While resting it lies on top of the leaf in such manner the body is along the midrib and the long processes are parallel to the branching leaf veins, when lying thus it is difficult to locate. **Pupa** green, pyramidal with shiny golden spots on the apex and at the base of the pyramid. Generally attached on the underside of a leaf.

LARVAL FOOD PLANTS - *Mangifera indica* and *Anacardium occidentale* (Mango and cashew nut).

497 STREAKED BARON

Plate No. 53

Euthalia jama jamida (Felder) 1866

SK-BU 1,2 NR

WS- 55-85mm.

Similar to the **M** White-edged Blue Baron (498).

UP dark brown, F paler. **UPF narrow white streaks beyond cell forming an irregular 'Y/V' with the arms reaching costa.** Narrow terminal streaks just below the apex.

Fairly common at low altitudes. Habits similar to those of the others of the group.

498 WHITE-EDGED BLUE BARON

Plate No. 53 and 51

Euthalia phemius (Doubleday and Hewitson) 1848

SK-BU 1,2 NR

WS- 40-70mm.

Similar to the preceding species.

M with blue margin on the HW. FW with white discal streaks near costa. F paler brown with broad discal band on UPF from costa to termen at V1. Two prominent apical spots.

Habits and habitats are as those for the preceding species.

499 GAUDY BARON

Plate No. 54

Euthalia lubentina indica Fabricius

SL,SI,KN-BU BO-BE,KN-BU 1,2 NR

WS- 60-80mm.

UP emerald-green with red and black spots on the HW. M with a 'Y' shaped band of small white spots on the FW apex. F similar but UPF with large white discal band of irregular spots.

Found in heavily forested areas throughout India. They visit rotting fruits and damp patches. They generally bask on tree-tops, sometimes descending to the ground. Seen in the North-western Himalaya up to 3,000 m. on Nag Tibba, but usually up to 1,500 m. I have come across this species in the Rangpo Valley only. A beautiful F was basking on a low-growing bush late in the afternoon.

LIFE HISTORY - Eggs are laid on sunny patches and not in the shade as in the others of the genus. Larva and pupa similar to those of the others of the group. Larva is yellowish green, large brown lilac dorsal patches on segments 3, 4, 6, 7 and 10-12. The processes are purple tipped. Pupa is attached rigidly at an angle of 45° to the leaf surface.

LARVAL FOOD PLANTS - *Dendrophthoe falcata* and *Scurrula parasitis*.

500 FRENCH DUKE

Plate No. 54

Euthalia franciae franciae (Gray) 1846

SK-KR SK-BH 1,2 R

WS- 75-90mm.

UP green with broad white discal band and markings slightly diffused. Resembles *Limenitis* group but has greenish colour. UPF submarginal row of whitish spots. **UPH submarginal row of triangular black spots, arrows pointing inwardly.**

In Sikkim it has been recorded from the heaviest of the jungles (which hardly exists now) in mid-summer up to 1,500 m. One specimen was photographed in the Tholung Valley.

501 BLUE DUCHESS

Plate No. 54

Euthalia duda Staudinger 1886

SK-AS 1,2 R

WS- 90-100mm.

UP dark brown with continuous white vertical band reaching FW dorsum just after the middle and continued on HW to V1 and outwardly bordered bright greenish blue. In *Euthalia durga* white band is black-edged outwards and in *E. duda* not so black-edged.

Flies between 1,200-1,500 m. Both are rare. DeN writes that it is fairly common in Sikkim. Dudgeon and Elwes have collected a few specimens from Sikkim and found *E. durga* to be very rare. Otto Moller has collected several specimens from Sikkim between June and August. I came across a group of about ten specimens of *E. duda* feeding on *Syzigium* sp. flowers in month of October in the Teesta Valley around 1,400 m. All the specimens looked freshly emerged as they were in good condition.

502 BLUE DUKE

Euthalia durga durga (Moore) 1857

503 BRONZE DUKE

Plate No. 54

Euthalia nara nara (Moore) 1859

SK-BU 1,2 R

WS- 70-95mm.

UP bronzy olive-green. M with prominent dusky spots in 2 and 3. UPH prominent yellow area in 6 and 7. F UPF with a narrow white discal band, spot in 4 narrow, elongated and pointed and well separated from spots on the either side.

Habits similar to those of others of the group. May be very rare in Sikkim and found only in the heavily forested areas.

504 GREEN DUKE

Plate No. 54

Euthalia sahadeva sahadeva (Moore) 1859

NE-BU NE-BH 1,2 R

WS- 80-105mm.

UP dark green, FW with pale yellow discal spots (white in F) up to v2 and directed to tornus. Band consists of well separated spots. Lower apical spot very much larger than the upper apical spot and

nearer to the margin. **Discal spot in 3 with its inner edge against the centre of spot in 4.** UPH pale discal spots separate but sometimes continued; but often in 6 and 7 and smaller.

Similar species *E. patala* found in the West Himalaya., where inner edge of spot in three is against the inner edge of spot in 4.

Found up to 1800 m. in Sikkim. I photographed a specimen in the Orchid Sanctuary in Gangtok, presumably having a territory in that place as I found it in the same place a few days later also.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Quercus* sp.,

505 GRAND DUKE

Euthalia iva Moore

506 BARONET

Plate No. 54 & 57

Symphaedra nais Forster 1771

SL,SI,DU-SK 1,2 NR

WS- 60-70mm.

Similar to the Peacock Pansy (425).

UP bright orange, FW with black bars, including bar end-cell. HW large black spot mid costa, black margin and a row of discal spots. Tip of antennae orange.

A butterfly of lightly forested regions up to 1,000 m. Locally common in monsoons. Very fond of sunshine, basks along forest paths or on a prominent low-growing leaf. Flight is typical gliding and fluttering; very close to the ground. When disturbed flies very short distance and settle down again. Generally territorial, particularly near its food plant and flies up and down its boundary. Often chases butterfly of the same or of other species. I once found two males in nearby area and I removed one male occupying a territory close to the food plant tree and released him about 200 m away. By the time I came back to the spot already the other male who was in the nearby territory had occupied the vacated territory. This male had very tattered wings while the earlier male looked fresh and undamaged. So the possibility is that the older males are displaced by the younger males. Generally sits with body parallel to the sun's rays. Shy but with patience easy to photograph because of its habit of returning to the same place. I have not seen this species so far in Sikkim but it has been recorded from the lower hot valleys.

LIFE HISTORY - **Egg** green, hemispherically dome-shaped, with colourless thickened hair-like process at each intersection of the cell walls. **Larva** similar to that of other *Euthalia* sp., green coloured with circular deep violet large spot on each segment 4-12, red-tinged yellow centre, bordered black. The yellow center develops only when the larva is full green and black. Young larva feeds from the sides and prefers older leaves to young. **Pupa** is green coloured, shaped similar to that of other *Euthalia* sp., Segment 7 broadly gold with apex and each extremity with black and golden markings on segment 3.

LARVAL FOOD PLANTS - *Shorea robusta* (Dipterocarpaceae), *Diospyros melanoxylon* (Ebanaceae).

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.

ACRAEINAE

These are small butterflies, highly diversified in the Afro-tropical region. Only two species are found in India and both of them occur in Sikkim. They are orange-yellow butterflies with longer FW. They love sunshine; flight is weak and often sailing. They are seen basking early in the mornings. They visit flowers of various species like *Tridax*, *Lantana*, *Vitex* etc. They fly about 1 m from the ground to about 2-3 m. The larval food plants belong to the Passifloraceae and Urticaceae family.

510 TAWNY COSTER

Plate No. 1, 2 & 55

Acraea violae Horsfield 1829

SL,IN,BU 1,2 NR

WS- 30-35mm.

UP, tawny-orange, with black cell streaks on UPF and darkened veins on both the wings. UNH a row of white marginal spots on black broad border.

Habits as described for the subfamily. In Sikkim they seem to be locally common. Occur at lower altitudes up to 1,500 m in West and South Sikkim.

LIFE HISTORY - **Egg** yellow with longitudinal ridges; laid generally on the underside of the young leaves in groups of about 15 to 20, but sometimes up to about 40. The upperparts of egg turn black as the larva is about to hatch. **Larva** when young is reddish brown with minute hairs, and are gregarious in the first three instars. A full-grown larva is reddish brown with branched spiny tubercles.

I have been rearing many of these larvae. Once, when the wild food plant was not available easily, I fed them with a garden variety of Passion flower whose, even young leaves were fairly tough. The normal feeding on wild passion flowers is about 7 to 10 days. But the larvae took more than a month to pupate when being fed on the garden variety. I also observed cannibalism of a pupa by a larva. I had left a newly formed pupa along with the three almost full-grown larvae in the morning in a covered bottle. When I returned in the evening I found the pupa missing. **Pupa** when freshly formed is pinkish with black chained spots with the centres of the chain orange. Later the pupa becomes white and the markings become prominent. Pupa hangs freely from the tail and formed under leaves or any suitable support like stems etc.

LARVAL FOOD PLANTS - *Passiflora foetida* and other related species.

511 YELLOW COSTER

Plate No. 55

Pareba vesta (Fabricius) 1787

KU-BU NE-AS 1,2 NR

WS- 30-35mm.

UP yellowish with darkened veins. In F the veins are broadly darkened.

Habits as described for the subfamily. In Sikkim this butterfly seems to be very common up to 2,000 m. The larvae hibernates during winter near the ground and as soon as the weather is suitable they all come out. In 1991 March in Sikkim we observed these larvae almost everywhere, as soon as the weather became clear for two days. I saw them on the grasses, *Viola* and many other species of plants including the plants belonging to Urticaceae. Many of the larvae were far away from the food plants. So we collected them tried to rear on various plants as I was not very sure about the species. Finally I succeeded in rearing them on *Pouzolzia* and *Boehmeria* species. Later we also observed larvae feeding gregariously on many species of Urticaceae plants.

LIFE HISTORY - **Eggs, larvae and pupa are very similar** to the preceding species. Except the larvae have some whitish-pink patches on the dorsal side on each segment which is observed only when the larva is fully stretched.

LARVAL FOOD PLANTS - *Passiflora*, *Urtica*, *Pouzolzia*, *Debregeasia*, *Boehmeria* spp., etc.

DANAINAE

MILKWEED BUTTERFLIES

They are also known as 'Milkweed Butterflies' as their larval food plants belong to the families like Asclepiadaceae, Apocynaceae and Moraceae which produce milky sap containing many types of poisonous substances which are harmful or distasteful to other animals. The adult butterflies and the larvae are generally brightly coloured and strikingly marked.. There are about 150 species of Danainae butterflies in the world of which 15 are found in Sikkim. In India there are five genera and all these except *Idea* are represented from Sikkim.

They are sun-loving butterflies, with slow flight. They are lowland butterflies found up to about 2,500 m, and frequent open forest, woodlands, forest margin lands and roughly cultivated areas. They are attracted to flowers; seen on damp mud and salt patches and mammal droppings etc.

Eggs. Eggs are barrel-shaped much higher than wider, flattened at the base but pointed apically. The surface is decorated with a net-work of longitudinal ribs and transverse ridges, the micropylar area is being more finely reticulated. Hatching time varies from about 3- 4 days at 25°C, 8-12 days at 18°C. They are usually laid on the underside of leaves, but I have seen them laying on any vegetative parts of the food plant or near the food plant on some other creepers.

Larvae. There are five larval instars. Larvae are usually patterned with complete or incomplete loops and stripes. The markings are more clearly defined in the later instars. These are adorned with one or more pairs of flexible tubercles which contain hemolymph and are covered with fine hairs. These are mobile and may be waved violently when the larva is disturbed. The larva might curl up and fall down to the ground even with mild tactile stimulation. They are found towards the top end of the plants. Earlier instars might start feeding from any points on the leaf leaving intact the veins while the later instars feed from the edge of the leaves. They feed during day time.

Pupae. Often they do not pupate on food plants but search for a suitable site. The larva spins a pad of silk, then the larva hangs with head downwards by means of anal claspers assuming J- shape and the markings become translucent and the larval skin is shed. Pupa then attaches itself to the silk pad by means of cremaster. Development period is from 10 to 15 days depending on environmental conditions. Pupae have brilliant silver and gold markings. Electron microscopy studies have shown 250 regularly spaced alternating electron-dense and - clear layers forming a band of interference system, which give the golden or silver colour to the pupa. Coloration depends on the pigments involved. Rothschild (1978) has shown the carotene-free diet produces silver markings. These markings may camouflage the larvae by reflectance, and may also function as a warning. Dimorphism is shown in pupae, depends on the surrounding colour during prepupal stage. But I have tried experiments with *T. limniace* several times using various coloured backgrounds during prepupal stage but always the pupae produced were green in colour with golden markings.

Average life expectancy in an adult butterfly of this group is about 60-70 days and up to 6 months in over-wintering individuals.

Danaids are known to get attracted to some species of plants containing pyrrolizidine alkaloids which are the semio- chemicals or sex attractant pheromones of males, where many male adult butterflies have been found to congregate and feed on the bruised or damaged parts of the plant.

In this family males have special scent organs and also possess a pair (except for the genus *Idea* which posses two pairs) of abdominal hair pencils, a diagnostic character of the group. In addition to this the wings often bear various modified scales, occasionally housed in distinct pouches or pockets on the UNH. They also some times bear brands or open patches of specialised sex scales. Hairpencil contents of many of the species have been studied and are found to contain volatile chemicals which have been ingested from the food plant and modified by biochemical reactions. Terpenes like ocimene, linalool and nerol and derivatives of pyrrolizidine alkaloids have been identified from these hair pencils. In many species wings and some of the body tissues store cardenolides or heart poisons which are sequestered from the larval food plants, which have prominent emetic and antifeedant activities on the predators. The transport of alkali metal ions such as Na⁺ and K⁺ requires an enzyme ATPase which is dependent on these ions and the cardenolides inhibit this enzyme with lethal effects on nerves and muscles including the heart muscles.

These butterflies remain mostly untouched by most of the predators. But a few species like tree shrews, mice and lizards and some species of birds like Ashy Wood Shrikes and Ashy Swallow Shrikes are known to feed on these species. There are also evidences of the Paradise Flycatcher feeding on these butterflies.

These butterflies migrate in large numbers to the south in winter and to the north in summer. There are quite a few records of migration in south India in literature but not much has been recorded from north and Himalayas. This would be an interesting exercise for those who wish to study further.

512 GLASSY TIGER

Plate No. 55

Parantica aglea melanoides (Moore) 1883SI, SL, KA-BU, EI 1,2,3 NR
WS- 75-80mm.

Similar to the male Courtesan (397), the Siren (399), the Tiger Brown (337), the Great Blackvein (59) and the female of the Common Wanderer (73).

A transparent blue-brown butterfly. **FW cell pale with two streaks and streaks in the basal area 1b below the cell** are much broader and the black background reduced to a line. All the submarginal spots are well developed.

Flies slowly and lazily close to the ground often along shady path or a nullah. Visits flowers like *Ageratum conyzoides*, *Crotolaria*, *Castanopsis* sp., and many other nectar containing flowers. Males also visit pyrrolizidine containing plants. In Sikkim found up to about 2,100 m and is fairly common.

LIFE HISTORY - **Larva** blackish brown claret on the underside with three rounded yellow spots on each segment and also bluish white spots and streaks on the dorsal half; two pairs of tentacles on segments 3 and 12 of which the front ones are double the length of the hind ones, **Pupa** yellowish green with black spots and golden dorsal, lateral and spiracular blotches.

LARVAL FOOD PLANTS - *Tylophora carnososa*, *Cryptolepis buchanani*, *Ceropegia bulbosa*, *Ceropegia lawii*, *Calotropis* sp.

513 CHESTNUT TIGER

Plate No. 55 & 57

Parantica sita sita (Kollar) 1844KA-BU 1,2,3 NR
WS- 75-80mm.

It is mimiced by the Circe (398), the Tawny Mime (039) and Great Zebra (018).

HW clear chestnut: pale markings are hyaline and squarish. FW spots beyond the cell in area 2 and 3 are larger and sometimes united. **HW cell streaked.**

Strong soaring flight often well above tree level. Flies lazily in bright sunny patches of forested paths. DeN records it as rather rare in Sikkim but now according to our survey it seems to be fairly common up to 2,100 m. The mimics also fly along with this, rendering identification difficult, but an experienced lepidopterist can easily distinguish them from others. In Sikkim it has also been recorded up to 2,700 m. Visits moisture and human sweat. Also seen on the flowers of *Gynura*, *Ageratum conyzoides*, *Cedrella serrata*, *Rhus javanica* and Chestnut tree.

LIFE HISTORY - **Egg** white with longitudinal ribs, laid singly on young leaves. **Larva** yellow-green with rows of yellow spots; head black with grey spots on the face; two pairs of tentacles on 3 and 12 segments of which the front ones longer. **Pupa** pale emerald green with golden yellow spots.

LARVAL FOOD PLANTS - *Marsdenia roylei*, *Asclepias curasavica*, *Hoya carnosum*, *Tylophora* sp.

514 CHOCOLATE TIGER

Plate No. 55

Parantica melaneus platiniston (Fruhstorfer) 1910NE-BU 1.2 NR
WS- 85-105mm.

Very similar to the former but the HW is deep chocolate-brown and cell entire. On the FW spots beyond the cell in discal area 2 and 3 are small and well separated.

A butterfly of more forested areas and found in similar habitat to that of Chestnut Tiger. Seen feeding on moist earth, but it seems rather rare in Sikkim. I have come across it only twice, once near Mangan and other in South Sikkim.

It has been recorded to visit pyrrolizidine alkaloid containing plants.

515 BLUE TIGER

Plate No. 55

Tirumala limniace leopardus (Butler) 1866IN,BU,SL 1,2 NR
WS- 90-100mm.

Similar to the Dark Blue Tiger (516).

FW basal streaks below the cell in area 1b are much larger and often coalescent. HW cell with a forked broad streak, the lower branch with a hook or spur-like projection.

Flight slow, but faster on migration. Settles frequently on wet roads; visits flowers containing nectar and also like other males of the family, pyrrolizidine containing plants such as *Crotalaria* sp., *Heliotropium indicum*, *Adelocaryum celastenum*. Found almost in all type of areas, but woodlands, gardens, edges of forests, etc. seem to be preferred. In Sikkim it is only common in the Rangpo and the Teesta valley. In the higher altitudes and in the northern region it is replaced by the Dark Blue Tiger.

LIFE HISTORY - Egg pale yellowish to white with longitudinal ridges, laid generally on the underside of the leaves or anywhere on the leaves or even near the food plant. Larva bluish white with black rings; two pairs of tentacles on segments 3 and 12 of which the front ones are longer. Pupa greenish with golden spots, formed generally on the food plants, sometimes away from the food plants on the underside of leaves; free hanging.

LARVAL FOOD PLANTS - *Dregea volubilis*, *Calotropis gigantea*, *Marsdenia* sp., *Tylophora asthamatica*, etc.

516 DARK BLUE TIGER

Plate No. 55

Tirumala septentrionis (Butler) 1874

SL,SI, KU-BU 2 NR

WS- 75-95mm.

Similar to the Blue Tiger (515).

The background colour is darker and the paler colour is more bluish but narrower. **FW in area 1b below the cell with two narrow streaks which are well detached, the upper one forming an oval patch. Width of streak in the FW cell less than half the length of the cell.** HW with two cell streaks united at the base and wide apart distally.

Slow flying; fond of flowers. Seen feeding on flowers of *Cirsium* sp., Visits moist places. Found in both open as well as wooded areas up to 2,000 m in the Himalaya. Particularly common in the Teesta Valley around Dikchu, Mangan and Sangklang. One specimen was collected from a spider's web.

LIFE HISTORY - Egg white laid singly on individual leaves. Larva white with two pairs of fleshy tentacles and black rings. Pupa green with golden spots similar to those of the Blue Tiger.

LARVAL FOOD PLANTS - *Vallis dichotoma*, *Dregea volubilis*.

517 COMMON TIGER

Plate No. 1 & 55

Danaus (Salathura) genutia (Cramer) 1779

IN,SL,BU 1,2 NR

WS- 70-80mm.

Mimics the Tiger Palmfly (293), the Lacewings (508 and 509).

Tawny or orange butterfly with black stripes, and white and black apical bands.

Very closely related to the the American and European Monarchs. It is one of commonest species found throughout the Indo-Australian region.

Found in variety of habitats. Flies close to the ground. Visits flowers of *Celosia argentea*, *Lantana camara*, *Urena lobtata*, *Castanopsis indica* *Sapindus* sp., *Rhus javanica* etc. Prefers forest vicinity, woods overgrown with bushes and scrub. Males are attracted to pyrrolizidine sources. A very common species in the Rangpo Valley, but becomes very rare outside this area. Also seen between Namchi and Rangpo. These butterflies are known to migrate in large numbers in the plains and hills of South India. But so far nothing has been observed or cited in literature from Sikkim.

LIFE HISTORY - Eggs are laid singly on the underside of leaves. Larva velvety black, with bluish white and yellow spots and white lines; a yellow lateral band with black spiracles; three pairs of fleshy tentacles on 3, 6 and 12 of which the first pair is long and movable, others are fixed. Pupa green with golden spots, formed on the underside of a leaf or twig.

LARVAL FOOD PLANTS - *Asclepias curasavica*, *Ceropegia lawii*, *Ceropegia intermedia*, *Cynanchum dalhousiae*, *C. liukiensis*, *Marsdenia tinctoria*, *Marsdenia tomentosa*, *Tylophora camosa*, *Raphistemma pulchellum* and many other plants belonging to Asclepiadaceae.

518 PLAIN TIGER

Plate No. 55

Danaus (Anosia) chrysippus (Linnaeus) 1758

SL, IN, BU 1,2 C

WS- 70-80mm.

Mimiced by the female of the Danaid Eggfly (439), the Leopard Lacewing (509) and the female of the Indian Fritillary (413).

An ochreous to tawny-brown butterfly with a subapical white and a black band. No black veins, two other forms *dorippus* and *transiens* are also found in India, but are not recorded from Sikkim so far.

This has a still larger distribution than the preceding. Found throughout Afro-tropical region including some records from southern Europe and Indo-Australian and Oriental region up to Japan. A butterfly of open areas, it is also found in lightly wooded country. Visits flowers and pyrrolizidine containing plants. Seen rather rarely outside the Rangpo Valley where it is fairly common as its food plant is very common in this valley. Found in the Himalaya up to 2,500 m.

LARVAL FOOD PLANTS - *Calotropis gigantea*, *Cryptolepis buchnani*, *Asclepias curasavica*.

519 DOUBLE-BRANDED CROW

Plate No. 56

Euploea sylvester hopei Fabricius 1793

SI, HI 1,2 NR

WS- 85-95mm.

Mimiced by the Mimes and Palmflies.

UP dark brown with blue gloss in FW (South Indian subspecies does not have blue gloss) and a **submarginal series of bright blue spots and marginal series of dots**. UPH glossed with blue over discal area. M on UPF in area 1b **two long brands 1.5-2mm x 12-14mm**.

Flight rapid and sailing, settles on damp patches, flowers and dry twigs. In South India it is seen up to 2,000 m, but in Himalayas in the lower hot valleys. We have one specimen collected from West Sikkim.

LIFE HISTORY - for *coreta* ssp.- **Egg** laid on the underside of a leaf. **Larva** violet-green UP and chocolate-green UN; three pairs of tentacles of which the front one on 3 is longest and on anal side shortest; yellow spiracular line and segment 2 light yellow, with a shiny black subdorsal spot. The larvae are often attacked by wasp parasites. **Pupa** similar to that of *E. core*, shiny silvery with pale brown markings.

LARVAL FOOD PLANTS - *Ichnocarpus frutescens*, *Ficus* sp., no specific records for Sikkim.

520 STRIPED BLUE CROW

Plate No. 56

Euploea mulciber mulciber Cramer 1777

SL, SI, HI 2,3 C

WS- 90-100mm

M UP glossy black, **UPF with blue gloss and with discal, marginal and submarginal spots. Spot in the cell present. UPH unspotted, apical half has greyish scales and a small yellow patch of specialised scales.** F, similar to except on the **HW narrow white discal streaks. UPF blue glossed area smaller**, base not blue glossed in Sikkim ssp.

Commonest of the danaiids. Found almost up to 2,500 m. Flies about 1-6 m above the ground. Fs may fly lower over bushes and scrub. Found in almost all types of terrain although preferably adjacent to forested areas. Attracted to flowers of *Ageratum conyzoides*, which is rather a common wasteland plant in Sikkim, *Lantana camara*, 'Kotus', and many other nectar sources. Ms may also be attracted to pyrrolizidine containing plants although I do not have any specific record. *Ageratum* sp., belong to Boraginaceae family, and studies have shown that some of the genera from this family have pyrrolizidine alkaloids. But studies (Almeida 1988) have shown absence of these alkaloids in *A. conyzoides*. However it may be worth reinvestigating this, because possibly the season they sampled may not have recognisable quantity of the alkaloids. They are also attracted to dung, urine, salt sources, wet rocks and damp patches. DeN has recorded it to swarm at times. But no migration of this species has been recorded so far.

LIFE HISTORY - Larva pinkish white with yellow blotches; the segments are divided by a black line which is anteriorly bordered by a narrow transverse pink band and purple-brown stripes: four pairs of long fleshy tentacles which are pink at the base and black at tips. Pupa metallic golden-brown with a darker anterior stripe.

LARVAL FOOD PLANTS - *Ichnocarpus* sp., *Nerium oleander*, *Oleander* sp., (Apocyanaceae). *Ficus* sp. (Moraceae) and *Argerea* sp.?

521 BLUE SPOTTED CROW

Plate No. 56

Euploea midamus rogenhoferi Linnaeus 1758

NEHI 2,3 R

WS- 95-105mm.

M UP dark brown with UPF entirely blue glossed. A cell spot and discal series of bluish spots and marginal and submarginal white spots. UPH unspotted with apical half greyish scales and specialised yellow scales as in the Striped Blue Crow. UPF specialised brand in area 1b of 1.2mm x 10mm. F similar but without specialised scales.

Usually flies high, about 3 m above ground, often sails. Found typically in lower hills and forested areas of plains. Ms can be seen with their hair pencils extended. Other habits similar to those of the preceding species. Recorded to be very rare in Sikkim; found only in the lower outer valleys from April to November. **LIFE HISTORY** - Recorded in literature.

LARVAL FOOD PLANTS - *Nerium oleander*, *Strophanthus dichotoma*, *Ficus* sp.

522 BLUE KING CROW

Plate No. 56

Euploea klugii klugii Moore 1858

SL,IN, NE,BU 1,2 C

WS- 85-100mm.

Similar to the Common Crow (526).

UP dark brown with blue shot discal areas on both wings. In south Indian subspecies blue gloss may not be present. Both wings with complete series of marginal and submarginal of white spots. UN similar to *E. core* but **there is no spot in the cell of both the wings. M has an oval brand in area 1b 2mm x 3-4mm.** Also has greyish scales on the apical half of UPH and specialised yellow scales.

The South Indian subspecies is very common. In Sikkim it is recorded to be associated with wet forested areas of the lower elevations, up to 1,500 m. Habits are similar to other crows. Since it is very similar to the other two species it may go unnoticed. Proper study is required to assess its presence. It has been recorded by DeN as very rare found only in the lower hot valleys and Terai.

LIFE HISTORY - Larva very similar to *E. core* except that the tentacles are held curled. Prepupal stage is light green. Pupa generally larger than *E. core* but bright green suffused with gold; small lateral black spots on segments 4,6 and 11. Habits of larvae are as that for *E. core*. Although I have seen numerous specimens of this so far I have never come across its larva or pupa.

LARVAL FOOD PLANTS - *Ficus hispida* and other *Ficus* sp. and also possibly *Streblus asper*.

523 MAGPIE CROW

Plate No. 56

Euploea radmanthus Fabricius 1973

EHI 1,2 NR

WS- 80-90mm.

Mimiced by F of the Courtesan *Euripus halithares* (397).

M UP blue on black background. **Large white discal spots on both the wings.** F similar but brownish background and no blue gloss. The Sikkim species has a larger white patch on the HW.

A beautiful butterfly of low lands and hills, up to about 1,200 m. Fs are found in the forested areas, generally at higher altitudes. Ms visit flowers, moist patches and salt patches etc. Ms seem to be territorial, remain in the same area throughout the day. Habits similar to those of the others of the

genus. I have come across one courting pair near Tashiding monastery late in the evening, which was flying together higher and higher till they became specks in the sky. It is quite common further east in Assam and Arunachal Pradesh.

LIFE HISTORY - Unknown for Indian ssp.

LARVAL FOOD PLANTS - *Ichnocarpus* sp., *Ficus* sp.

524 STRIPED BLACK CROW

Plate No. 8

Euploea doubledayi Felder and Felder 1865

NE 1,2 R

WS- 85-100mm.

An unmistakable butterfly, **FW not spotted except for a brand of about 2 x12-13mm, in area 1b in M. HW a row of marginal spots and a row of long discal streaks.**

Rare in Sikkim. Habits similar to those of others of the genus. It is fairly common in Assam and further east. **Ms** are attracted to pyrrolizidine sources.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Ichnocarpus* sp., *Ficus tinctoria* and other species.

525 LONG BRANDED BLUE CROW

Plate No. 56

Euploea algea deione Fruhstorfer 1910

NE 1,2 R

WS- 95-100mm.

UP dark brown, **FW and discal area of HW glossed with blue. Unspotted except for a few spots in discal area on the FW. M with a long brand of 2mm x 13mm.**

It has lazy and gliding flight. Keeps close to the ground. Occurs up to 700 m, sometimes to 1,250 m. Found in forested areas, near water courses, also in scrub jungle and open cultivation. Commonly found on flowers, salt and wet mud patches. **Ms** are attracted to pyrrolizidine sources. **Ms** probably have territory and remain in the same territory. I observed one **M** late in the evening in the Rangpo Valley. From a distance I could identify this butterfly with binoculars. I waited for it to come down closer to the road. After some time it did drift towards the road. When I tried to catch, it escaped and flew away up the mountain along a dry nullah. Next day I visited the same area again in the evening and found the butterfly in the same spot. This time I could net it. It was flying with its hair pencils out. The odour of the hair pencils has similarity to the odour of *Euploea klugii* pheromones. After photographing the hair pencils I released the butterfly.

LIFE HISTORY - Unknown for Indian ssp.

LARVAL FOOD PLANTS - *Ichnocarpus*, *Ficus* spp. elsewhere in the world.

526 COMMON CROW

Plate No. 3 & 56

Euploea core core Cramer 1790

SL,IN,NE,BU 1,2,3 C

WS- 85-95mm.

Similar to the Brown King Crow (522) and mimiced by the Common Mime (40) and the female of the Common Raven (51).

A brown butterfly with a complete row of marginal and submarginal white spots. **M has a small brand of about 1 x3-4mm., in area 1b. UN there is a spot in cell of both wings and UNF no discal spots in front of the cell in area 4 and 5. F** is very difficult to distinguish from other two species namely *E. klugii* and *E. sylvester*.

A very common butterfly, particularly in the plains. In Himalayas it is found up to 2,550 m. Flight is weak and sails a few metres above the ground. Found in almost all types of terrain. Visits flowers patronised by the Plain and Common Tigers. They generally fly during early mornings and evenings and rest in groups during the afternoons, particularly near food plants.



The Common Sailer



The Chestnut Tiger at the stream



The Common Earl



The Baronet

The Blackvein Sergeant



The Dart

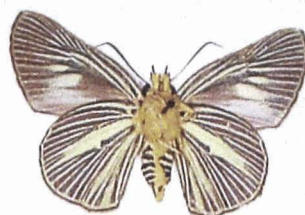




530



534



535 c



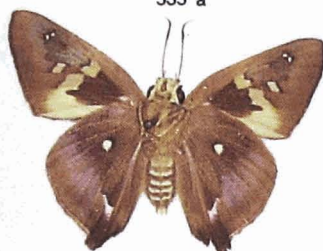
535 a



535 b



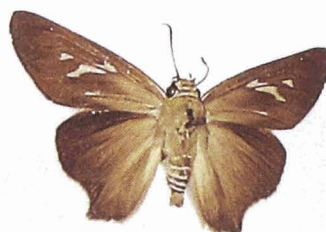
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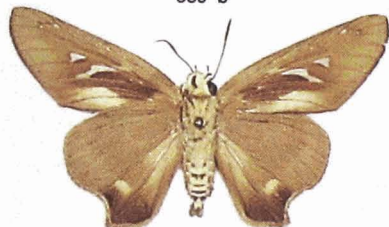
539 b



540



541 a



541 b



543



553



559



568



571

530 Orange Awlet

534 Small Green Awlet

535 a Pale Green Awlet ♀ UP

535 b Pale Green Awlet ♂ UP

535 c Pale Green Awlet ♂ UN

539 a Common Awl UP

539 b Common Awl UN

540 Plain Banded Awl

541 a Brown Awl UP

541 b Brown Awl UN

543 Indian Awlking

553 Multispotted Flat

559 Common Spotted Flat

568 Fulvous Pied Flat

571

Tricoloured Pied Flat

Scale : 5 cm

PLATE NO. 59



573 a



573 b



580



584 a



584 b



588



589 a



589 b



590



591



599



620



595



617 a



617 b

573 a Small Common Flat UP
573 b Small Common Flat UN
580 Dusky Yellowbreast Flat
584 a Water Snow Flat UP
584 b Water Snow Flat UN

588 Tawny Angle
589 a Chestnut Angle UP
589 b Chestnut Angle UN
591 Indian Skipper
595 Tiger Hopper

599 Grey Scrub Hopper
617 a Chestnut Bob UP
617 b Chestnut Bob UN
620 Chocolate Demon
590 Spotted Angle



622



623 a



623 b



627 b



627 a



629 a



632 a



632 b



629 b



634



639



685 a



685 b



652

622 Spotted Demon

623 a Grass Demon UP

623 b Grass Demon UN

627 a Indian Palm Bob UP

627 b Indian Palm Bob UN

629 a Wax Dart UP

685 a Blank Swift UP

629 b Wax Dart UN

632 a Tree Flitter UP

632 b Tree Flitter UN

634 Gaint Redeye

639 Common Redeye

652 Common Dartlet

685 b Blank Swift UN

Also visits pyrrolizidine sources. Since it has diversified food plants it is one of the most widely distributed butterflies of India. Found almost through out the year. In south they are known to migrate both in summer and winter seasons.

LIFE HISTORY - Egg is typical of danaids, yellow in colour laid either on the upperside or the underside of the leaves or on any vegetative parts preferably at the tip of the growing parts. Larva is black and red striped with four pairs of tentacles on segment 3, 4, 6 and 12 of which the tentacles on 3 are longest.. The young larvae while feeding on certain plants, particularly *Cryptolepis buchanani* and *Hemidesmus indicus* they avoid main rib or cut off small portions to allow the latex to ooze out and then feed. Pupa is metallic gold which turns black just before hatching.

LARVAL FOOD PLANTS - *Ficus religiosa*, *Ficus glomerata*, *Streblus asper*, *Holarrhena antidysenterica*, *Nerium oleander*, *Nerium odorum*, *Ichnocarpus frutescens*, and many more including those mentioned above.

LIBYTHEINAE

In India it is represented by only two species. They are commonly called **Beaks** because their labial palpi are modified into a long snout like process in front of the head.

527 COMMON BEAK

Plate No. 56

Libythia lepita lepita Moore 1857

KA-BU 2,3 NR

WS- 40-50mm.

UPF with no dark yellow spot in 1b, end-cell spot separate from streak or joined by a narrow streak. Apical spots well separated. UPH the horizontal yellow band narrow and does not touch the dorsal margin.

Has a variety of flights, like rapid flight, skipping and sailing, etc. The highest limit of occurrence of this species is the lowest limit of *myrrha*. It has been recorded as rarer than the *myrrha*.

528 CLUB BEAK

Plate No. 56

Libythia myrrha myrrha Godart

KA-BU 2,3 NR

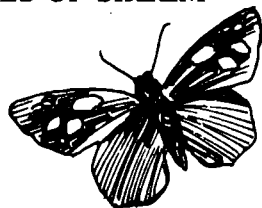
WS- 45-55mm.

UPF the cell-streak is joined by spot beyond, giving a club-like appearance. The apical band is joined and HW with broad yellow band which touches the base.

Occurs in the forested regions, in and around forest streams of the mountainous regions between 2,000 m to 3,000 m. Seen basking early in the mornings. They also visit damp patches and flowers, but rarely. I have observed it on the flowers of *Anaphalis* sp. in the Gharwal Himalaya. I have seen both the species in Western Himalaya, but so far not come across it in Sikkim.

LIFE HISTORY - Eggs are laid on the young leaves or shoots. Larva similar to that of *Catopsilia* sp., dark green in colour covered with minute bristles; a thin light yellow dorsal line from segment 4-12 and a narrow supra-apical band from head to anal end. Larva lives on the UN of the leaves and eats everything except for the ribs and veins. When disturbed it falls down with silk. It rests with true legs off the surface in the air, bunched together with head curved and often to one side. Pupa light green, top with yellow carnations, a black speck on the abdominal peak and is similar to that of *Ariadne* sp.

LARVAL FOOD PLANTS - *Celtis tetrandra* in south India.



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 nominal 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

Plate No. 58

Bibasis amara (Moore) 1865

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 exclamationis (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

itself by webbing edges of the leaf together. **Pupa** is formed in rolled up leaves, with thick white strands of silk. Dark yellowish ground colour of pupa later becomes chalky white (Dudgeon). But Davidson et al. write that pupa is dark brown with wing cases nearly white. The cell is covered with white powder.
LARVAL FOOD PLANTS - *Terminalia belerica*, *Combretum extensum* (Combretaceae).

542 BRANDED AWL KING

Choaspes plateni stigmata Evans 1932

543 INDIAN AWL KING

Choaspes benjaminii japonica Murray 1875

544 AWL KING

Choaspes xanthopogon Kollar 1844

545 AWL KING

Choaspes hemixanthus furcata Evans 1932

PYRGINAE

546 LIDDERDALE'S DAWNFLY

Capila lidderdali (Elwes) 1888

547 PALE STRIPED DAWNFLY

Capila zennara (Moore) 1865

548 STRIPED DAWNFLY

Capila jayadeva (Moore) 1865

549 MARBLED FLAT

Lobocla liliana liliana (Atkinson) 1871

550 BHUTAN FLAT

Celaenorrhinus flavocincta (De Niceville) 1887

551 DOUBLE SPOTTED FLAT

Celaenorrhinus pyrrha De Niceville 1889

552

Celaenorrhinus ratna tytleri Evans 1926

553 MULTISPOTTED FLAT

Plate No. 58

Celaenorrhinus pulomaya pulomaya (Moore) 1865

NWH-AS SK-AS

WS- 45mm.

M UP, dark purplish brown covered with yellow hair near the bases. FW with five semi-hyaline subapical spots. UPH with three rows of orange-ochreous spots, all but outer one of the upper rows are hidden by brownish ochreous hair. Cilia of HW orange or ochreous. F similarly coloured but spots on the FW larger, the bands outwardly oblique, while in M it is straight.

Found from about 2,000 m to 3,000 m. They visit various flowers. While feeding they sit with their wings closed or fully open depending on the shape of the flower.

554 MUSSOURI PIED FLAT

Celaenorrhinus pero lucifera Leech 1894

555 PIED FLAT

Celaenorrhinus morena Evans 1924

556 DE NICEVILLE'S SPOTTED FLAT

Celaenorrhinus plagifera De Niceville 1889

557 MOORE'S SPOTTED FLAT

Celaenorrhinus sumitra (Moore) 1865

558 LARGE SPOTTED FLAT

Celaenorrhinus patula De Niceville 1889

559 COMMON SPOTTED FLAT

Plate No. 58

Celaenorrhinus leucocera (Kollar) 1884

IN, AN, NUR-TA

WS- 45-55mm.

M UP blackish brown with green ochreous hair near the bases, with five apical and five discal spots. UPH medial and discal series of small orange-ochreous spots. Some of the discal series very obscure. F like M but two large discal bands UPF disconnected.

The butterfly is common in the thick forests of the hills. It is most widely distributed and abundant from the plains to 2,800m. Rests with wings widely open on the underside of leaves. Sometimes it basks in bright sunlight. Flies early in the morning or at dusk, but may fly throughout the day if weather is suitable. They also visit flowers, I have observed it in Rangeet valley feeding on one of the yellow bell shaped flowers. Also recorded from Rhenok area.

LIFE HISTORY - Larva dark indigo green coloured, cylindrical with segmental margins yellowish. A dark pulsating dorsal line and a thin white marginal line. It rests on the underside of the leaf with head to one side. It folds the leaf from the upper edge and secures it with silk and lies with its back towards the surface of the leaf. Pupa is long, shiny rich brown-golden in colour, spindle-shaped and attached by tail and a body band.

LARVAL FOOD PLANTS - *Eranthemum* sp. of Acanthaceae.

560 COMMON SPOTTED FLAT

Celaenorrhinus putra putra (Moore) 1865

561 HIMALAYAN SPOTTED FLAT

Celaenorrhinus munda munda Moore 1884

562 HIMALAYAN SPOTTED FLAT

Celaenorrhinus munda maculicornis Elwes and Edwards 1897

563 SMALL BANDED FLAT

Celaenorrhinus nigricans nigricans (De Niceville) 1885

564 SCARCE BANDED FLAT

Celaenorrhinus badia (Hewitson) 1877

565 HIMALAYAN YELLOW FLAT

Celaenorrhinus dhanada dhanada (Moore) 1865

566 HAIRY ANGLE

Darpa hanria Moore 1865

567 ZIGZAG FLAT

Odina decoratus Hewitson 1867

568 FULVOUS PIED FLAT

Coladenia dan festa Evans 1949

569 FULVOUS PIED FLAT

Coladenia dan fatua Evans 1949

570 FULVOUS PIED FLAT

Coladenia dan fabia Evans 1949

571 TRICOLOURED PIED FLAT

Plate No. 58

Coladenia indrani indrani (Moore) 1865

SL, PI KN-AS 1,2 NR

WS- 35-40mm.

M UPF with three elongated subapical spots, conjoined discal spots, twice as large and irregular. UPH with row of black spots and cilia chequered. **F** UP like **M**, but below the subapical spots generally there is a small dot. UNH paler.

Similar to *Coladenia dan dan*, but could be distinguished by separate and often prominent black spots on UPH and marginal row of yellow spots on UPF. On the UNH at least the basal black spots are prominent.

The insect is common throughout the year at low elevations. The DSF is golden yellow and darker in WSF. It is fond of shade, and found resting on the leaf, stone or near the ground.

There are quite a few closely related species and it is not easy to distinguish between them in the field just by observations.

LIFE HISTORY - Larva dark greenish-chocolate, abdomen bluish. Posterior half of the segment pure white, head round, clothed with very short star shaped hair, mixed with long red hair about the mouth. Pupa dark red-brown in colour, strongly glossed, stout and some what constricted in the center. Head with a knob like process between the eyes, pointing forwards and constricted at the base, covered with short red bristles.

The larva of *Coladenia dan* is also similar and difficult to distinguish but has black- brown head and body greenish chocolate. Pupa is dirty greyish white.

LARVAL FOOD PLANTS - *Xylia dolabriformis*, *Grewia microcos* and many other plants of different orders.

572 BROWN PIED FLAT

Coladenia agni agni (De Niceville) 1883

573 SMALL COMMON FLAT

Plate No. 59

Sarangesa dasahara dasahara (Moore) 1865

SL,PI, NWH-BU

WS- 30-35mm.

M UP dark brown with three similar subapical spots and a minute dot at the upper end of the cell, with another above it. A very indistinct dorsal and middle bands, slightly darker than the ground. HW also with indistinct discal and marginal bands. **F**, similar to **M** but in FW there is an additional spot UN the cell and all the three spots being in straight line.

Common all over India up to 2,500 m. Flies low over the grasses and bushes in the jungle and in fairly open country, hills and plains. Visits low growing flowers, rests on the underside of leaves and basks on the upperside. Flies both in sunny as well as shaded areas.

574 TYTLER'S WHITE FLAT

Satarupa zulla zulla Tytler 1915

575 LARGE WHITE FLAT

Satarupa gopala (Moore) 1865

576 HIMALAYAN WHITE FLAT

Seseria dohertyi dohertyi Watson 1893

577 SIKKIM WHITE FLAT

Seseria sambara sambara (Moore) 1865

578 OLIVE FLAT

Chamunda chamunda (Moore) 1865

579 WHITE YELLOWBREAST FLAT

Daimio sinica narada (Moore) 1884

580 **DUSKY YELLOWBREAST FLAT**

Plate No. 59

Daimio phisara phisara (Moore) 1884

WS- 35-45mm. KU-TA

UP brownish-black. FW with sub apical semi-hyaline white dots from near the costa, the middle one is shifted inwards. Discal series of spots some are large and quadrate. **HW with a discal band a little before the middle, the inner edge straight but uneven, outer area of the wings greyish, containing a row of blackish spots.** Fs paler than Ms and also the spots and bands are broader and larger.

Habits similar to Snow Flats. Nothing much has been recorded in the literature.

581

Tagiades japetus ravi Moore 1865

582 **LARGE SNOW FLAT**

Tagiades gana athos Plotz 1884

583 **LARGE SNOW FLAT**

Tagiades parra gala Evans 1949

584 **WATER SNOW FLAT**

Plate No. 59

Tagiades litigiosa litigiosa (Moschler) 1878

SL,IN,BU,NE IN,NE,BU

WS- 37-44mm.

UP FW dark blackish brown, with small apical dots and spots. **HW basal half is black, remaining pure white, with a row of marginal spots.**

Butterfly of lower elevations, but also found up to 2,000 m. Sits with wings open on top of the leaves. The black and white markings on the wing provides some amount of camouflage, as it can pass off for birds droppings. They are fond of basking in the sun. They also visit flowers of *Tridax*, *Eupatorium* and some Compositae flowers. In Sikkim I have come across this in West Sikkim and Rangpo valley.

LIFE HISTORY - Egg not described. **Larva** is smooth, with large bilobed head. Bluish green in colour, darkest on the back, has a white band and chestnut head. Mandibles are large and black. "The larva has curious habits. It cuts out an oval piece of a leaf with margin deeply toothed or scalloped, this is attached to the leaf by a narrow neck, including one of the principal veins of the leaf and bent over so as to form a cell with open archways all around. In this cell larva lives and rushes at any intruders with its jaws extended. Larva pupates in this cell. Sometimes larva remains there for a very long time, nearly two months, in some sort of hibernation, this is so, particularly in the cold weather." (Moore). **Pupa** is transparent olive green, margin of dorsal segment is brownish, two white enamel like, triangular marks laterally on the wing case line. Pupa is attached by tail and a body band.

LARVAL FOOD PLANTS - *Dioscorea oppositifolia* and other Dioscoriaceae and *Smilax* sp. (Liliaceae).

585 **SPOTTED SNOW FLAT**

Plate No. 59

Tagiades menaka menaka (Moore) 1865

KU-AS

WS- 43-55mm.

Similar to the previous species, but **has two more spots on the inner side of the submarginal spots on UPH.**

Habits similar to those of the group.

586 FLAT

Tagiades cohaerens cynthia Evans 1934

587 YELLOW FLAT

Mooreana trichoneura pralaya (Moore) 1865

588 TAWNY ANGLE

Plate No. 59

Ctenoptilum vasava vasava (Moore) 1865

SK-TA 1,2 NR

WS- 35-40mm.

Upperside ochreous ferruginous, with lot of white spots. UPH with a cluster of white spots and toothed at 3. UN much paler and duller, markings similar to the UP. F is considerably larger.

Habits as those of the group.

589 CHESTNUT ANGLE

Plate No. 59

Odontoptilum angulata angulata (Felder) 1862

SI, SI,KU-AS 1,2 NR

WS- 40-45mm.

M UP chocolate brown. UPF with broad chestnut band in the middle, similarly coloured highly sinuous discal band with two semi-hyaline subapical whitish elongate spots close to costa. F, HW covered with long whitish hair and crossed by narrow whitish ante-medial and post-medial bands. UNH whitish with brown submarginal spot. Body and legs are white. F similar but UPF two lunular bands on the brown discal band.

Common in the hills. Comes to damp patches and fond of flowers. It prefers shady nullahs. Rests on the underside of the leaf with wings wide open. In Sikkim I have come across this species once only in Rangpo valley, near a stream, where it was feeding on a mica patch late in the afternoon.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Allophylus cobbe* (Sapindaceae). *Microcos paniculatum* in Hongkong.

590 SPOTTED ANGLE

Plate No. 59

Caprona agama agama Moore 1857

HESPERIINAE

591 INDIAN SKIPPER

Plate No. 59

Spialia galba (Fabricius) 1793

SI, EHI, 1,2 C

WS- 25mm.

UP dark brown with numerous white spots, and fringes chequered.

Very common all over India up to 1,800 m. Flies close to the ground in the sunshine, often basks with HW widely open and FW partly closed. While resting it sits with wings closed.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Waltheria indica*.

592

Carterocephalus avanti avanti De Niceville 1886

593 **FOREST HOPPER**

Astictopterus jama olivascens Moore 1878

594 **ATKINSON'S BOB**

Arnetta atkinsoni Moore 1878

595 **TIGER HOPPER**

Plate No. 59

Ochus subvittatus subradiatus Moore 1878

EHI 1,2 NR

WS- 22-25mm.

UP, vandyke brown with one or more chrome yellow streaks and dark veins. **UNH yellow with brown streaks and marginal row of brown spots. UNF dark brown with costal chrome yellow streaks from base to outer margin.**

Two specimens were seen in Arunachal Pradesh feeding on low growing flowers. The butterflies were flying even during drizzles and cloudy weather at an altitude of about 600 m.

596 **HEDGE HOPPER**

Baracus vittatus septentrionum Wood-Mason and De Niceville 1887

597 **BLUE SPOTTED SCRUB HOPPER**

Aeromachus kali (De Niceville) 1895

598 **VEINED SCRUB HOPPER**

Aeromachus stigmata stigmata (Moore) 1878

599 **GREY SCRUB HOPPER**

Plate No. 59

Aeromachus jhora jhora (De Niceville) 1885

600 **TUFTED ACE**

Sebastonyma dolopia Hewitson 1868

601 **GRAHM'S ACE**

Sovia grahami Evans 1926

602 **LUCA'S ACE**

Sovia lucasii separata Moore 1882

603 **MUSSOORIE BUSH BOB**

Pedesta masuriensis masuriensis (Moore) 1878

604 **BROWN BUSH BOB**

Pedesta pandita (De Niceville) 1885

605 **NORTHERN SPOTTED ACE**

Thoressa astigmata cerata Hewitson 1876

606 **OLIVE ACE**

Thoressa gupta gupta De Niceville 1886

607 **GHARWAL ACE**

Thoressa aina De Niceville 1890

608 **BANDED ACE**

Halpe zema zema (Hewitson) 1877

609 **PLAIN ACE**

Halpe kumara De Niceville 1885

610 **KNYVETTI'S ACE**

Halpe knyveti Elwes and Edwards 1897

611 **SIKKIM ACE**

Halpe sikkima Moore 1882

612 **INDIAN ACE**

Halpe homolea molta Evans 1949

613 **ACE**

Halpe acruata Evans 1937

614 **LIGHT STRAW ACE**

Pithauria stramneipennis stramneipennis Wood-Mason and De Niceville 1886

615 **DARK STRAW ACE**

Pithauria murdava (Moore) 1865

616 **BRANDED STRAW ACE**

Pithauria marsena (Hewitson) 1866

617 CHESTNUT BOB

Plate No. 59

Iambrix salsala salsala (Moore) 1865

SL, SI, EH 1, 2 NR

WS- 26-30mm.

UP, dark brown with orange scales. **UPF** with minute orangish discal spots. **UN** similar to upper side but paler, **silvery white spots** on both wings but the spots on **HW** are prominent and black edged.

Insect of thicker jungles. Flies close to the ground and sits after a very short flight. Flight is dodging. Common in the Western Ghats during monsoons. Visits low growing flowers and also has been observed on droppings and dung. Basks early in the mornings with closed wings, exposing the wings fully to the sun by keeping its body perpendicular to the sun's rays. In Sikkim I have come across this species in Rangpo valley.

LIFE HISTORY - **Egg** is smooth, dome shaped and red in colour; laid on the upperside of the blade of bamboo or leaf near the ground. **Larva** watery green, cylindrical with the sides yellow and dorsally minutely spotted with green; dorsal and subdorsal dark green line. The head is dirty yellow and triangular in shape when viewed from the front. The larva makes a lax cell initially, but later often lies on the open surface of the leaf.

Pupa is stout, circular in transverse section, the head is broad and eyes are prominent. Thorax slightly humped and dark brown and the surface is slightly hairy. **Pupa** is generally formed inside the cell and is covered with white powder.

LARVAL FOOD PLANTS - *Bambusa arundinaceae* or grasses, generally broad leaved coarse grass.

618 DARK VELVET BOB*Koruthaialos butleri* Wood-Mason and De Niceville 1883

619

Stimula swinhoei swinhoei Elwes and Edwards 1897**620 CHOCOLATE DEMON**

Plate No. 59

Ancistroides nigrita diocles (Moore) 1865

BE, SK-BL 1, 2 NR

WS- 48-60mm. FWL 26mm.

UP deep glossy brown without any markings. **UN** similar but paler. **F** is paler than **M**.

Common butterfly in the lower hot valleys, particularly in October and November. Flight is weak; flies about 1 m to 2 m from the ground. Seen in the scrub area and disturbed human habitations too. Basks with its wings partly open on some prominent leaf about 1-2 m from the ground.

621 COMMON BANDED DEMON*Notocrypta paralysos asawa* Fruhstorfer 1911**622 SPOTTED DEMON**

Plate No. 60

Notocrypta fiesthamelii alysos Moore 1865

MU-BU

WS- 38-50mm.

UPF always with two or three apical spots. **UNF** discal band joined by a more or less well developed yellowish white patch.

A butterfly of forested region, keep to the shaded areas in the forests. Fly close to ground; flight rapid, usually return to same perch. They feed on low-growing flowers, generally early in the mornings or evenings. They rest under the leaves during the hot day. In Himalaya found up to about 2,000 m. I have collected a few specimens from Munshithang in North Sikkim.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANT - *Hydechium spicatum*.

623 GRASS DEMON

Plate No. 60

Udaspes folus (Cramer) 1775

SL,SI,HI 1,2 NR

WS- 40-48mm.

UP dark brown. FW with white spots in discal and sub-apical area. HW with large discal area. Margin of both wings chequered with black and white. UN similar, but with whitish scales.

A very common butterfly found in damp forested area along the paths and edges of the forests. Flies in chequered sunlight, close to the ground. Flight is quick and for very short distances. Visits low growing flowers. Often seen basking early in the mornings with HW fully expanded and FW partly opened.

LIFE HISTORY - **Egg** not described. **Larva** very dark watery indigo-green, with dark pulsating dorsal line. Segments 2 and 3 are yellow and the last segment whitish. Two whitish dots at two thirds distance from the the anterior side. The full grown larva has the habit of resting with first three segments contracted, so as to give the appearance of being humped. The head is relatively small and dark. Larva always lies closely applied to the leaf by turning over triangular piece from the edge on the upper surface of the leaf. **Pupa** cylindrical, watery bright green in colour, slightly constricted dorsally, behind thorax produced into a long conical stout with squarely blunt tip. The abdomen is drawn into pointed tip.

LARVAL FOOD PLANTS - *Curcuma aromatica*, *Zingiber* sp.

624 FOREST BOB

Scobura cephalis (Hewitson) 1876

625 FOREST BOB

Scobura isota Swinhoe 1893

626 GRASS BOB

Suada swerga swerga (De Niceville) 1883

627 INDIAN PALM BOB

Plate No. 59

Suastus gremius gremius (Fabricius) 1798

SL,SI 1,2 NR

WS- 32-42mm.

UP, brown with FW having few discal and apical spots. **UNH with greyish scales and dark brown discal spots.**

Found at lower elevations up to 1,200 m. It is easily identified by its greyish scales on the UNH. A fast flying butterfly, once disturbed from a place it is difficult to locate again. Flies close to the ground; often sits on the low plants and basks with its HW fully open and FW partly open. Visits low growing flowers particularly *Anaphalis* sp. and some other Compositae plants.

LIFE HISTORY - **Egg** not described. **Larva** cylindrical, green with minute green spots and spiracles pure black. The head is large round and whitish. Larva makes a strong cylindrical cell of a leaf longitudinally folded, which it clothes densely with silk, rendering it difficult to tear open. The cell is thickly covered with white powder. **Pupa** is brown-green in colour, with head and abdomen slightly yellowish. Thorax slightly humped, eyes prominent, spiracular expansions of segment 2 is large and ear shaped and brown in colour.

LARVAL FOOD PLANTS - Palms, *Caryota urens*, *Cocos*, *Calamus*.

628 CEYLON PALM BOB

Suastus minuta aditia Evans 1943

629 WAX DART

Plate No. 60

Cupitha purrea Moore 1877

630 PURPLE AND GOLD FLITTER

Zographetus satwa (De Niceville) 1884

631 PURPLE SPOTTED FLITTER

Zographetus ogygia ogygia (Hewitson) 1866

632 TREE FLITTER

Plate No. 60

Hyarotis adrastus praba (Moore) 1865

SL,SI,EI 1,2 NR

WS- 38-48mm.

Similar to the Spotted Demon (622).

UP black with large transparent disjointed spots across the cell and two medium sized and three smaller spots. Fringes of both wings chequered with brown and white. UN dark brown, outer half dark ochreous, bearing a centrally diffused dark brown band. UNH with irregular broken central white band.

Found in lower hot valleys. It has a very swift flight and also visits flowers for a very short period. Flies quite high and keeps to the tree tops.

LIFE HISTORY - Recorded in literature.

LARVAL FOOD PLANTS - *Phoenix aculis*.

633 SPOTTED YELLOW LANCER

Plastingia noemi De Niceville 1885

634 GIANT REDEYE

Plate No. 55

Gangara thyrsis thyrsis (Fabricius) 1775

SI,EI, 1,2 R

WS- 70-76mm.

UP chocolate brown. FW with large quadrate semi-transparent yellow spots. HW unmarked. Eyes red.

One of the largest Skippers. It has crepuscular and nocturnal habits. Found near palm trees in the forested areas. Flight is rapid; visits flowers. Rests with its wings folded over its back on tree trunks, rocks and on the underside of the leaf in the darkest part of the jungle during day time. It has been even recorded from the forests of Bombay. So far I have not come across this species anywhere in India. A Japanese Lepidopterical Society Expedition has recorded it recently from Nepal.

LIFE HISTORY - Egg not described. Larva cylindrical, rose- brown in colour, segments 2 and 3 are sea-green on the sides. Head is dark brown in colour, large and heart-shaped. The larva exudes a white secretion from the surface which hides green colour and leaves only the brown to appear in patches. This secretion takes the form of long feathery threads, arranged in branches dorsally, being most densest on the sides of first three segments. The full grown larva is 62mm in length. The larva lies with its head turned on its side. Pupa is hidden in the three rolled up leaves, fixed by the extremity of the abdomen to a woven tripod in such a manner that it can move freely in any direction. Davidson et al. writes that the pupa is attached only by the tail. The cell is covered with white powder. If the pupa is touched or disturbed it makes a loud rattling noise to scare away the intruder. Pupa is about 40 mm in length. The butterfly emerges in the afternoon around 3 to 5 p.m.

LARVAL FOOD PLANTS - Palms.

635 BANDED REDEYE

Gangara lebadea lebadea (Hewitson) 1886

636 PALM REDEYE

Erionata torus Evans 1941

637 PALM REDEYE

Erionata thrax thrax (Linnaeus) 1767

638 REDEYE

Erionata acroleucus apex (Semper) 1892

639 COMMON REDEYE

Plate No. 55

Matapa aria (Moore) 1865

SI, EI 1,2 NR

WS- 40-45mm.

UP brown with out any markings. UN, paler and without any markings. **Prominent red eyes.**

Common in thickly forested areas, particularly in bamboo jungles. Generally remains in thickets, rarely comes out particularly, in the mornings to bask. Basks with wings closed but exposing maximum wing surface to the sun by keeping the body perpendicular to the sun's rays like many other Skippers. Found along the forested paths and edges of the forests. Visits flowers of *Lantana*, *Leea* and other low growing flowers.

LIFE HISTORY - **Egg** not described. **Larva** pure opaque white with bluish tinge and cylindrical in shape. Spiracles black and a narrow collar at segment 2. Head is heart-shaped and reddish yellow in colour. **Pupa** is formed in the cell attached by the tail and thorax humped. Prominent eyes. Makes rattling noise when disturbed.

LARVAL FOOD PLANTS - Bamboos.

640 DARK BRAND REDEYE

Matapa druna (Moore) 1865

641 GREY BRAND REDEYE

Matapa cresta Evans 1949

642 BLACK VEINED REDEYE

Matapa sasivarna Moore 1865

643 PURPLE REDEYE

Matapa purpurascens Elwes and Edwards 1897

WS- 48-54mm.

UP dark brown with purple gloss. **Tip of the abdomen and cilia orange.** Eyes red.

It is also an insect of the forested areas. Habits similar to those others of the group.

I have encountered this species only once in Rangpo, and observed something very interesting. I saw this butterfly sitting on a *Maranta* plant and curling its abdomen. I thought it was laying eggs, so I went closer to observe it. On closer observation I realised that it was sitting close to a dry bird dropping and

had curled its abdomen to squirt a droplet of water on to the drooping to dissolve the salt contents and to feed on the dropping. After a few seconds it squirted some more liquid and continued feeding. In about five minutes it squirted liquid seven times. I could not wait longer as the bus for Gangtok was ready to leave.

644 SPOTTED REDEYE

Pudicitia pholus (De Niceville) 1889

645 GREEN STRIPED PALMER

Piradana hyela major Evans 1932

646 NONSUCH PALMER

Cyrina cyrina cyrina Hewitson 1876

647 SUB-HYALINE DARTER

Ochlodes subhyalina pasca Evans 1949

648 ASSAM DARTER

Ochlodes siva siva Moore 1878

649 HIMALAYAN DARK DART

Taractrocera danna (Moore) 1878

650 COMMON GRASS DART

Taractrocera maevius sagara Moore 1865

651 COMMON DARTLET

Oriens goloides (Moore) 1881

652 COMMON DARTLET

Oriens gola pseudolus (Mabille) 1883

SI, EI 1, 2 NR

Plate No. 60

653 BRANDED DART

Potanthus rectifasciata (Elwes and Edwards) 1897

654 COMMON DART

Potanthus pallida Evans 1932

655 COMMON DART

Potanthus pseudomaesa clio Evans 1932

656 **COMMON DART**

Potanthus sita Evans 1932

657 **CHINESE DART**

Potanthus confucius dushta Fruhstorfer 1911

658 **SIKKIM DART**

Potanthus mara mara Evans 1932

659 **DART**

Potanthus nesta nesta Evans 1934

660 **DART**

Potanthus pava pava Fruhstorfer 1911

661 **PALM DART**

Telicota colon colon (Fabricius) 1775

662 **DARK PALM DART**

Telicota linna linna Evans 1949

663 **DARK PALM DART**

Telicota ancilla bambusae (Moore) 1878

664 **DARK PALM DART**

Telicota ohara jix Evans 1949

665 **PLAIN PALM DART**

Cephrenes chrysozona oceanica Mabille 1904

666 **STRAIGHT SWIFT**

Parnara guttatus mangala (Moore) 1865

667 **STRAIGHT SWIFT**

Parnara naso bada (Moore) 1878

668 **RICE SWIFT**

Borbo cinnara (Wallace) 1866

669 BEAVAN'S SWIFT

Borbo bevani (Moore) 1878

670 LARGE BRANDED SWIFT

Pleopidas sinensis (Mabille) 1877

671 SMALL BRANDED SWIFT

Pleopidas agna agna (Moore) 1865

672 SMALL BRANDED SWIFT

Pleopidas thrax masta Evans 1949

673 LARGE BRANDED SWIFT

Pleopidas subochracea subochracea (Moore) 1878

674 SMALL BRANDED SWIFT

Pleopidas mathias mathias (Fabricius) 1798

675 GREAT SWIFT

Pleopidas assamensis (Wood-Mason and De Niceville) 1882

676 SWIFT

Polytremis lubricans lubricans Herrich-Schaffer 1869

677 HIMALAYAN SWIFT

Polytremis discreta discreta (Elwes and Edwards) 1897

678 YELLOW SPOT SWIFT

Polytremis eltola eltola (Hewitson) 1869

679 PAINTBRUSH SWIFT

Baoris farri farri (Moore) 1878

680 SWIFT

Baoris pencillata unicolor (Moore) 1883

681 FIGURE OF 8 SWIFT

Baoris pagana De Niceville 1887

682 YELLOW FRINGED SWIFT

Caltoris aurociliata (Elwes and Edwards) 1897

683 AUSTEN'S SWIFT

Caltoris cahira austeni (Moore) 1883

684 SWIFT

Caltoris confusa Evans 1932

685 BLANK SWIFT

Plate No. 60

Caltoris kumara moorei Evans 1926

WS- 44mm.

UP-dark olive brown, FW with six semi-transparent small yellowish spots in a continuous series. HW without any markings. UN paler and ochreous tinted.

A very common butterfly in all seasons. Basks with HW fully open and FW partly open. Also visits flowers early in the mornings. Has territorial habits and often returns to the same perch. Flight very rapid.

LIFE HISTORY - **Egg** not described. **Larva** cylindrical, light yellow in colour with semi-elliptical head, suffused with black. **Pupa** is pale green, slender, smooth and with sharp frontal process or snout. Very similar to *C. conjuncta*.

LARVAL FOOD PLANTS - Grasses.

686 PURPLE SWIFT

Caltoris tulsi tulsi (De Niceville) 1883

687 TUFTED SWIFT

Caltoris plebeia (De Niceville) 1887

688

Caltoris philippina philippina Hers-Sch 1869

689 COMMON WIGHT

Iton semamora (Moore) 1866

REFERENCES

- Ackery P. R. (1975). A guide to the genera and species of Parnassiinae (Lepidoptera-Papilionidae). *Bull. Br. Mus. nat. Hist. (Ent)*, **31**(4):73-105. [TX]
- Ackery P. R. (1988). Host plants and classification : A review of Nymphalid butterflies. *Biol. J. Linn. Soc.*, **33**:95-203. [CE]
- Ackery P. R. & Vane-Wright R. I. (1984). *Milkweed butterflies: their cladistics and biology*. British Museum of Natural History, London.
- Aitken E. H. (1893). The Larva and Pupa of *Spalgus epius* *J. Bombay nat. Hist. Soc.*, **8**:485. [LH]
- Ali S. (1945). *Birds of Sikkim* (reprinted in 1989). Oxford Univ. Press. New Delhi. [SK]
- Almieda M. R. and Ravindran (1988). Relationship between the pyrrolizidine alkaloids, Danainae butterflies and *Ageratum conyzoides* *J. Bombay nat. Hist. Soc.*, **85**:241. [CE]
- Angel H. (1975). *Photographing Nature- Butterflies*. Fountain press, Argus books Ltd, Hertfordshire, UK. [PN]
- Antram C. B. (1924). *Butterflies of India*. Thacker, Spink and Co. [RI]
- Bailey F. M. (1911). List of butterflies caught by Capt. F. M. Bailey in south-eastern Tibet. *J. Bombay nat. Hist. Soc.*, **23**:532. [RL]
- Bean A. E. (1989). Observations on the occurrence and habits of *Nacaduba* complex of Lycaenidae (Lepidoptera). *J. Bombay nat. Hist. Soc.*, **85**:332-363. [TX]
- Bell T. R. (1911-16). Common butterflies of plains of India (including those met with at the hill stations of Bombay presidency). *J. Bombay nat. Hist. Soc.*, **19**:16-58, 438-474, 635-682, 846-879; **20**:279-330, 1115-1136; **21**:517-544, 740-766, 1131-1157; **22**:92- 100, 320-344, 517-531; **23**:73-103, 481-501; **24**:656. [RLH]
- Bennet S. S. R. (1987). *Name changes in flowering plants of India and adjacent regions*. Triseas Publishers, Dehra Dun, India. [PL]
- Bingham C. T. (1905-07). *Fauna of British India -Butterflies Vols. I and II*. [G]
- Biswas K. (1956). *Common medicinal plants of Darjeeling and Sikkim Himalayas*, West Bengal Govt. press, Alipore, Calcutta. [PL]
- Boppre M. (1983). Leaf scratching -A specialised behaviour of danainae butterflies (Lep.) for gathering secondary substance. *Oecologia (Berlin)* **59**:414-416. [CE]
- Boppre M. and Vane-Wright R.I. (1989). Androconial systems in Danainae (Lepidoptera)). Functional morphology of *Amaurius*, *Danaus*, *Tirumala* & *Euploea*. *Zool. J. Lin. Soc.*, **97**:101-133. [BI]
- Brower L. P. (1984). Chemical defence in butterflies in *The Biology of butterflies*: (Eds. Ackery & Vane-Wright) Princeton University Press, NJ. [BI]
- Clench H. K. (1979). How to make regional lists of butterflies: Some thoughts *J. Lep. Soc.*, **33**(4):261-281. [G]
- Collins N. M. and Morris M. G. (1985). *Threatened swallowtails of the world*. The Red data book IUCN, Cambridge, U.K. [TX RL]
- Cooke T. (1967). *Flora of the presidency of Bombay. Vols-I, II, III*. Bot. Surv. India, Reprint. [RL, TX]
- Corbet A. S. and Pendlebury H.M. (1956). *The butterflies of Malay peninsula*. Revised by Corbet A. S. and Eliot J. N. 2nd edition. Oliver and Boyd London. [G, RL]
- Daccordi M., Triberti P. and Zanetti, A. (1987). *Simon and Schuster's guide to butterflies and moths*. Simon and Schuster Inc., N.Y. [G]
- Davidson J., Bell T. R. and Aitken E. H. (1896). Butterflies of North Canara, district of Bombay presidency. *J. Bombay nat. Hist. Soc.*, **10**:237, 372-393, 568-584; **11**:22-63. [LH]
- Davidson J., Bo, C. S. and Aitken E. H. (1890). Notes on The larvae and pupae of some butterflies of Bombay presidency. *J. Bombay nat. Hist. Soc.*, **5**:260-269, 349-379. [LH]
- De Niceville L. (1881). A list of butterflies taken in Sikkim in October. *J. Asiat. Soc. Beng.*, **50**(2):49-60. [RL]

- De Niceville L. (1882). Second list of butterflies taken in Sikkim in October. *J. Asiat. Soc. Beng.*, **51**(2):54-66. [RL]
- De Niceville L. (1883). Third list of butterflies taken in Sikkim. *J. Asiat. Soc. Beng.*, **52**(2):92-100. [RL]
- De Niceville L. (1885). Fourth list of butterflies taken in Sikkim. *J. Asiat. Soc. Beng.*, **54** (2):1-5. [RL]
- De Niceville L. (1989). Butterflies; pp.116-187 in *Gazetteer of Sikkim*. [RL]
- De Niceville L. (1900). The Food Plants of the butterflies of the Kanara district. *J. Asiat. Soc. Beng.*, **69**(2):187-278. Part I and II. [LH]
- DeVries P. J. (1987). *The butterflies of Costa Rica and their natural history*. Princeton University Press, New Jersey. [RL]
- DeRhe-Philipe G. W. V., (1911). Notes on some butterflies from the Indian region. *J. Bombay nat. Hist. Soc.*, **20**:755-760 [RL]
- Dudgeon G. C. (1895). Life History of *Kallima inachus* Boisduval. A Nymphalinae butterflies. *J. Bombay nat. Hist. Soc.*, **9**:342. [LH]
- Eguchi E. & Mayer-Rochow V.B. (1983). UV photography of 43 species of Lepidoptera representing 10 families. *Ann. Zoo. (Japan)*. **56**(1):10-18. [G]
- Ehrlich P. R. (1958). The comparative morphology, phylogeny and higher classification of the butterflies. *Kans. Univ. Sci. Bull.*, **39**:305-370. [TX]
- Ehrlich P. R. & Raven P.H. (1965). Butterflies and plants: A study in co-evolution. *Evolution* **18**:586-608. [CE]
- Eliot J. N. (1969). An analysis of the Eurasian and Australian Neptini. *Bull. Br. Mus. nat. Hist. (Ent)*. (Suppl.) **15**:155. [G]
- Eliot J. N., (1973). The higher classification of the Lycaenidae (Lepidoptera) A tentative arrangement. *Bull. Br. Mus. nat. Hist. (Ent)*. **28** (6):373-506. [TX]
- Elwes H. J. (1882). On a collection of butterflies from Sikkim. *Proc. Zool. Soc. Lond.*, 398-407. [RL]
- Elwes H. J. and Moller O. (1888). A catalogue of the Lepidoptera of Sikkim. *Trans. Ent. Soc. Lond.*, 269-465. [RL]
- Evans W. H. (1932). *Identification of Indian butterflies*. Bombay natural History Society, Bombay. [TA]
- Evans W. H. (1949) A catalogue of Hesperidae of Europe, Asia and Australia. *Bull. Br. Mus. nat. Hist. (Ent)*. . [RL, TX]
- Feltwell J. (1986). *The Natural History of butterflies*. Croom Helm Ltd, Kent. [BI]
- Ford E. B. (1971). The Lepidoptera in scientific research. *J. Lep. Soc.*, **25**:155-168 [G]
- Freshfield D. (1903). *Around Kanchenjunga*.
- Ganguly A. K. (1982). *Report of the task force on environment and developement in Sikkim*. Dept of Environment, Govt. of India, New Delhi. [SK]
- Gaonkar H. (1990). The proposed classification of families and subfamilies of Indian butterflies. *Personal communications* . [TX]
- Green E. E.(1911). Larva of *Vanessa indica*. *J. Bombay nat. Hist. Soc.*, **20**:870. [LH]
- Hannington F. (1911). Larva of *Vanessa indica* and *Vanessa kashmirensis*. *J. Bombay nat. Hist. Soc.*, **20**:871. [LH]
- Haribal M., Mulla N. D. & Chaturvedi N. (1988). The Butterflies of Sikkim. *J. Bombay nat. Hist. Soc.*, **85**:271-280. [RI]
- Haribal M. (1990). Behaviour of Indian Tortoiseshell Butterfly *Aglais* (= *Vanessa*) *caschmirensis* (Kollar) in the Himalaya. *J. Bombay nat. Hist. Soc.*, **87**:163-164
- Hemming F. (1967). The Generic names of the butterflies and their type species (Lepidoptera: Rhopalocera). *Bull. Br. Mus. nat. Hist. (Ent)*. **9**. [TX]

- Holloway J. D. (1974). The biogeography of Indian butterflies in *Ecology and Biogeography in India*. (Ed. Mani M.S. Junk Publishers). [BG]
- Honda K. (1986). Visual and chemical cues. *J. Chem. Ecol.*, **12**:1999-2006. [BI]
- Hooker J. D. (1855). *Himalayan Journals*, Vol 1-2, John Murphy London.
- Horn D. J. (1978). *Biology of insects* (Revised edition), W.B. Saunders and company Philadelphia Pa 19105. [BI]
- Igarashi S. (1979). *Papilionidae and their early stages*. Vols.-I and II Kodansha, Tokyo. [TX, LH]
- Igarashi S. (1987). On the life history of the *Tienopalpus impirialis* in northern India and its phylogenetic position in the Papilionidae. *Trans. Lep. Soc., Japan*. **38**:115-151. [LH]
- Ives J. D. and Messorli B. (1989). *The Himalayan dilemma*. pp.52 Routledge, London. [HI]
- Johnston G. and Bernard (1984). *This is Honkong series- Butterflies*. Hongkong. [RL, LH]
- Kapadia H and Mehta S (1990). *Exploring the hidden Himalaya*. Hodder and Soughton, UK. [HI]
- Kristensen N. P. (1976). Remarks on the family level phylogeny of butterflies. *Z. Zool. Syst. Evol. Forsch.*, **14**:25-33. [TX]
- Mackinon P. W. and De Niceville L. (1899). List of butterflies of Mussorie in Western Himalaya and neighbouring regions. *J. Bombay nat. Hist. Soc.*, **11**:205-221. 368-389. 585-605. [LH]
- Mani M. S. (1974). *Ecology and biogeography in India*. The Heague, Junk Publishers Denmark. [BG]
- Mani M. S. (1986). *Butterflies of Himalaya*. Oxford and IBH, New Delhi.
- Marshall G. F. L. and De Niceville L. (1883-1890). *Butterflies of India, Burmah and Ceylon* -.Vols. I, II and III. Central Press CO. Calcutta. [G]
- Lall J. S. (1981). Sikkim pp.217-235 in *The Himalaya: Aspects of change*. (Eds. Lall J. S. and Moddie A. D.) Oxford University press Delhi. [HI]
- Miller L. D. (1968). The higher classification, phylogeny and zoogeography of the Satyridae. *Mem. Am. Ent. Soc.*, **24**:1-174. [TX]
- Moore F. (1890-1909). *Lepidoptera Indica*. Vols. I-VII Lovell and Reeve London. [G]
- Norman T. (1950). Early stages of *Lycaenopsis hugelii* . *J. Bombay nat. Hist. Soc.*, **49**:569. [LH]
- Parsons R. E., (1947). Early stages of the butterfly *Delias aglaia* Linn. *J. Bombay nat. Hist. Soc.*, **47**:556. [LH]
- Peile H. D. (1937). *A guide to collection of butterflies in India*. Staples Press, London. [SK]
- Polunin O. and Stainton A. (1987). *Concise flowers of Himalaya*. Oxford University Press, Madras. [PL]
- Preston-Mafham Rod and Ken. (1988). *Butterflies of the World*. Blandford Press London. [BI]
- Raina V. K. and Srivastva B. S. (1981). Tectonic evolution of Sikkim-Himalaya. *Contemp. Geosci. Res. in Himalaya*, Dehra Dun., Vol. 1. [GEO]
- Riley N. D (1927). The Rhopalocera of the third Mt Everest Expedition. *Trans. Ent. Soc. London*, **75**:119-129. [RL]
- Riley N. D. (1922). The Rhopalocera of Mt. Everest 1921 Expedition. *Trans. Ent. Soc. London*, **70**:461-483. [RL]
- Riley N. D (1929). *Heliophorus*, Revisional notes on the genus. *J. Bombay nat. Hist. Soc.*, **33**:384. [TA]
- Robson S. (1894). Life history of *Camena cleobis* Godart. A Lycaenid Butterfly *J. Bombay nat. Hist. Soc.*, **9**:339. [LH]
- Robson S. (1895). The Life history of a nymphalinae- (*Athyma opalina*). *J. Bombay nat. Hist. Soc.*, **9**:338. [LH]
- Rolla Rao S. (1963). A botanical tour in the Sikkim State, Eastern Himalaya. *Bull. Bot. Sur. India.*, **5**:165-205. [PL]

- Roonwal M. L. and Chandra A. (1963). A catalogue of Lepidoptera Collection in FRI, Dehradun. *Indian Forester Leaflet* 124 (4):295-426. [MRL]
- Rothschild M., Gardiner B. and Mummery R. (1978). The role of carotenoids in the "golden glance" of danaid pupae (Insect- Lepidoptera). *J. Zool. Lond.*, 186:351-358. [CE]
- Rustomji N. K. (1981). Sikkim, Bhutan and India's North Eastern Borderland. pp. 238-252 in *The Himalaya: Aspects of Change* (Eds. Lall J. S. and Moddie A. D.) Oxford University Press Delhi. [H1]
- Sanders D. F. (1942). Notes on the Butterflies of India. *J. Bombay nat. Hist. Soc.*, 52:803. [G]
- Sevastopulo D. G. (1973). Food plant of Indian Rhopalocera. *J. Bombay nat. Hist. Soc.*, 70:156-183. [LH]
- Shields O. (1989). World number of butterflies. *J. Lep. Soc.*, 431 (3):178-183. [G]
- Shirozu T. and Shima H. (1979). Natural groups of the genus *Ypthima* Hubner, mainly from Asia. *Sieboldia* 4(4):242-280. [TA]
- Shreshta R. S. (1991). *Provisional population totals in Sikkim: Census of India 1991*. Govt. of India, New Delhi. [SK]
- Silberglied R. E. (1989). Visual communication and sexual selection among butterflies. pp. 207-223. In the biology of butterflies (Eds. Vane-Wright R. I. & Ackrey P.). Princeton Univ. Press, N. J.
- Smart P (1975). *The illustrated encyclopedia of the butterflies of the world*. Salamander Books Limited, London. [G]
- Smiles R. L. (1982). The taxonomy and phylogeny of the genus *Polyura* Billberg (Lepidoptera: Nymphalidae). *Bull. Br. Mus. nat. Hist. (Ent)*. 44(3):115-237. [TX]
- Smith C. (1988). *The butterflies of Nepal*. Tribhuvan University Khatmandu. [RL]
- Swinhoe C. (1910-13). *Lepidoptera Indica*. Vols. VII-X. Lovell and Reeve London. [G]
- Talbot G. (1978). *Fauna of British India: Butterflies*. Vols. I and II. (Reprints) Today and Tomorrow's Printers and Publishers (Reprint). New Delhi. [G]
- Tikader B. (1967). Gregariousness & Mimicry during cocoon stage by the butterflies *Eurema hecabe*. *J. Bombay nat. Hist. Soc.*,
- Tite G. E. (1963). A synonymic list of the genus *Nacaduba* and allied genera. *Bull. Br. Mus. nat. Hist. (Ent)*, 14:197- 259. [TX]
- Tytler H. C. (1915). Notes on some new and interesting butterflies from Manipur and Naga Hills. *J. Bombay nat. Hist. Soc.*, 24:119-155. [RL]
- Vane-Wright R.I. & Ackery P. R (1988). *The biology of butterflies*. Princeton University Press, NJ. [BI]
- Varshney R. K. (1977). Index Rhopalocera indica: An idea of local list of butterflies from India and neighbouring countries. *Rec. Zool. Sur. India* 73:159-178. [RL]
- Varshney R. K. (1977-1990). Revised nomenclature for taxa in Wynter- Blyth' book on the butterflies of Indian Region -II. *J. Bombay nat. Hist. Soc.*, 76:33-40; 82:309-321; 87:53-61. [TX]
- Williams C. B. (1930). *Migration of Butterflies*. pp. 296- 301. Oliver and Boyd, Edinburgh, U.K. [G].
- Wynter-Blyth M. A. (1957). *Butterflies of the Indian region*. Bombay Natural History Society, Bombay. [G]

GLOSSARY

Anastomosed – interconnected or to form network.

Area – space between the veins numbered in accordance with the number of the vein immediately below, also called interspace.

Bar end-cell – bar or band touching the apical end of the cell.

Caudate – having a tail.

Cilia – hair-like fringes edging the wings or tails.

Conjoined – joined or connected.

Cremaster – an anal process of the pupa by which it is attached to the surface.

Crenulate – description of the outer edge of the wing when it is convex at the end of each vein and concave between them.

Dentate – as crenulate, but projection at the end of each vein tooth-like.

Discocellulars – veins enclosing the cell of the wing.

Emarginate – serrated.

Falcate – sickle-shaped or convexly curved.

Filiform – thread-like.

Fusiform – spindle-shaped.

Glaucous – covered with a fine greenish or bluish hair.

Gregarious – growing together or in a group.

Ground colour – major or predominant colour.

Integument – an external covering.

Limaciform – slug-like.

Longitudinal – parallel.

Lunules or lunulate – crescent-shaped.

Onisciform – woodlouse-like.

Osmeterium – Fleshy, tubular processes producing a penetrating odour and capable of being projected through a slit in the prothoracic segment of certain Papilionid larvae.

Pilose – hairy or having scattered soft or moderately stiff hair.

Precostal cell – a small area enclosed by veins towards the base of vein 8 on the HW.

Precostal vein – a short veinlet at the base of the HW.

Sclerotised – hardened insect integument by deposition or formation of substances other than chitin.

Setose, setiferous – with or bearing setae (hair-like structures).

Spinneret – an organ of the larval tongue serving to spin the silk.

Spiracle – a small opening in the outer cuticle by which air enters the respiratory system.

Surnal plate – a sclerotised plate on the last abdominal segment of the larva.

Striated, strigae – consisting of fine lines.

Trivial name – common name.

Tubercle – a small protuberance or nodule.

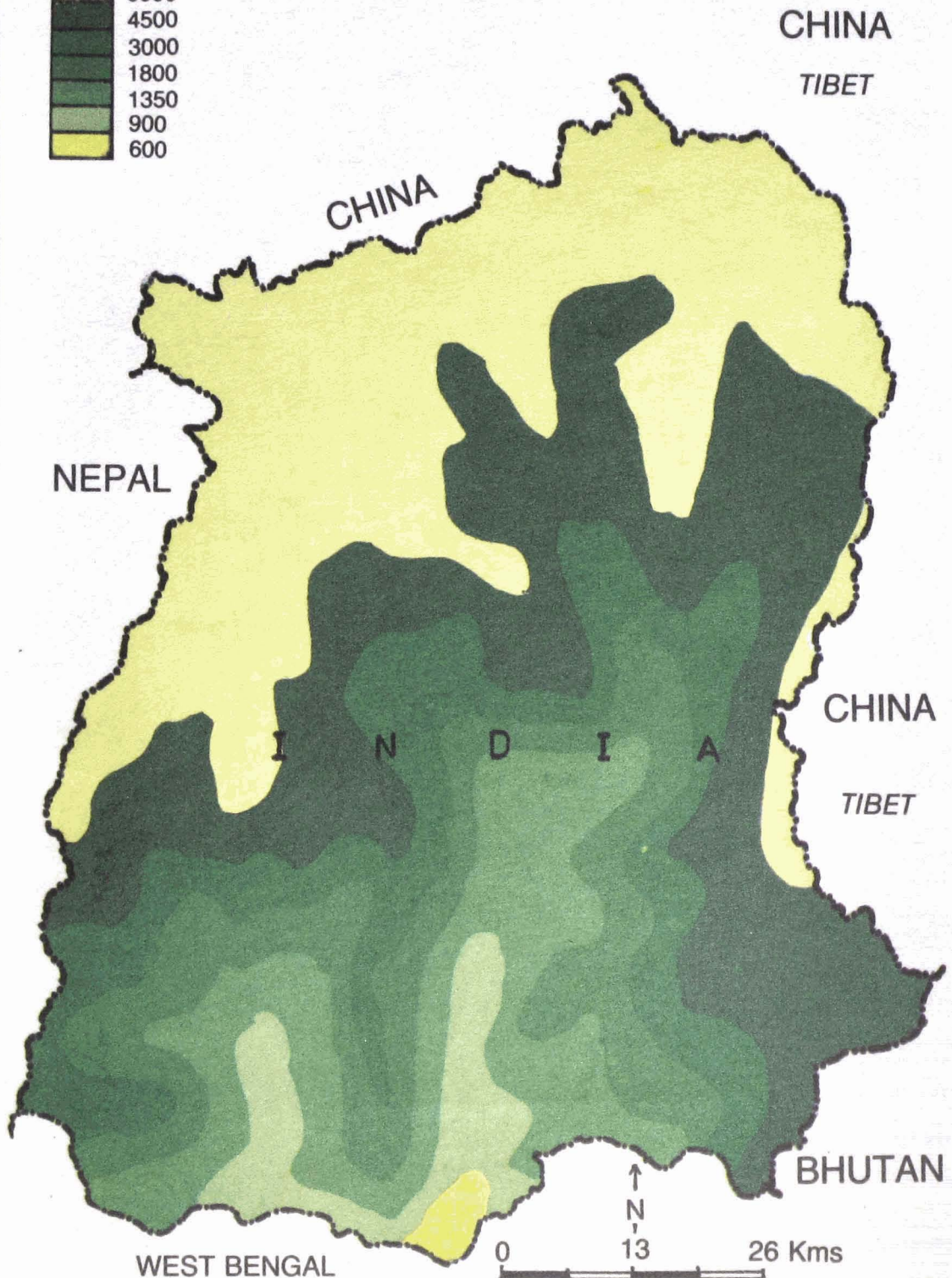
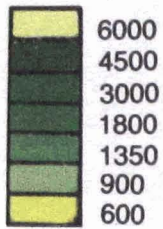
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SIKKIM PHYSICAL

ALTITUDE
(In Meters)





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.