Indian Lepidoptera
(Insects as Umbrella species)
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Flutter by
Butterfly
Floating flower
in the sky
Kiss me with your
Petal wings
Whisper secrets
Tell of spring
Author Unknown

Welcome to the beautiful and colorful
World of Indian butterflies!!!!
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Contents

Dear All,

We have some very good news this time as the annual ButterflyIndia meet is happening in Arunachal Pradesh. This state is considered to be heaven for the Butterfly diversity supporting more than 850 species. So hope all the participants will have a wonderful time. We also have some bad news to share, till now I haven't seen any amateur lepidopterist readily contributing articles for this newsletter. As with any other project, initially many people showed interest in this newsletter but now with time all the enthusiasm seem to have been sapped for some reason. May be some of them are thinking that it's useless to publish in this newsletter. If that's the case, then I need to give some justification here. Unless and until people start publishing here, the quality cannot be improved. But till now whatever the articles have come in the previous issues are pretty decent ones. Since I have introduced a section on Identification, this will be very helpful for the amateurs who want to start with the Identification of common ones. I hope at least in future there won't be any dearth for the articles and I once again request the readers to contribute benevolently for this newsletter.

Happy insecting,
Kishen Das, Editor

Butterflies of Namdapha Tiger Reserve in Arunachal Pradesh, India

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Duration: May 29th to 7th June 2003

This is a list of the butterflies we identified during a 10-day visit to Arunachal Pradesh, specifically Namdapha Tiger Reserve. We identified about 140 species, with quite a few butterflies which we could not identify, in spite of photographs . The areas we visited included Deban (4 days), Hornbill, Haldibari and Bulbulia-the last 3 involving a 5 day trek into the forest.

Weather: Monsoon had not fully set in hence first 5 days were clear with loads of sunshine and then onwards it was raining. The unusual weather (for Namdapha) resulted in loads of butterflies.

I'm also quite sure that the abundance of species meant that quite a few butterflies were overlooked as well. We did not see many caterpillars, although the dense foliage meant that we must have overlooked them, especially as we were not looking for specific food plants.
Ramana and Vidya Athreya's faunal survey (1996-97) listed about 80 species of butterflies, so this list expands the identified butterflies from Namdapha significantly. I have not come across any other records of butterflies specifically from NTR and would appreciate information in this regard.
Another highlight was that we photographed about 70 butterfly species, which was astounding! We have also attempted to provide an insight into the status of the butterflies in terms of the sightings we had during the visit. While this is by no means accurate, it does give an idea of the relative status of the abundance of the various species in sanctuary.

C: Common-numerous sightings in all areas
LC: Locally common-common, but only in certain areas or suitable habitat

O: Seen occasionally
U: Only one or two sightings
P: Photographed

List of identified butterflies:

Family – Papilionidae

The Fivebar Swordtail *Pathysa antiphates pompilius* O Haldibari
The Tailed Jay *Graphium agammemnon* O, P
The Common Jay *Graphium doson* O
The Veined Jay *Graphium clanes* O, P
The White Dragontail *Leptocircus curius* U
Haldibari: A solitary sighting of the White Dragontail at the stream at Ho rnbill. Bright sunny morning after a brief shower resulted in lots of butterflies at the stream. Amongst the butterflies was the Dragontail. A very fast flier, the Dragontail was difficult to keep track off. The butterfly would sit on a moist spot with its wings partially open, but was very wary when I approached, and I could not get to photograph it. Often the butterfly would sit high up on a leaf. We watched the butterfly for about 15 minutes, after which it flew off into the forest.
The Common Bluebottle *Graphium sarpedon* O, P
Birdwing (Common OR Golden)species Troides species O
The Lime Butterfly *Princeps demoleus* O
The Great Windmill *Atrophaneura dasarada* O
The Common Batwing *Atrophaneura varuna* O
The Great Mormon *Princeps memnon* O
The Common Mormon *Princeps helenus* O
The Common Raven *Princeps castor* U
Deban FRH: A solitary sighting of two butterflies on the last day of our stay at Deban. Morning showers, followed by bright sunshine. The butterfly was spotted feeding on a moist spot on the path near the FRH.
The Red Helen *Princeps helenus* C
Deban, Haldibari, Hornbill
The Paris Peacock *Princeps paris* O, P

Family – Pieridae

The Psyche *Leptosia nina* O
The Indian Cabbage White *Pieris candida* C
The Spotted Sawtooth *Prioneris thestylis* U, P
Deban: Just one sighting of the butterfly amongst numerous other Pierids. The butterflies were sitting on moist moss on a rock, and feeding.
The Orange Albatross *Appias nero* LC, P
Deban: Sighted mud-puddling near a small pool of water near the Noa Dihang at the FRH. In the company of Spot and Plain Puffin, Leser Gull and some Jays and Swordtials. Just a couple of other sightings during the visit, always near damp spots or near water.
The Chocolate Albatross *Appias lyncida* C, P
Deban, Haldibari, Hornbill: Seen commonly in open areas, mostly near water, but also in forested areas.
The Plain Puffin *Appias indra* C, P
Deban, Haldibari, Hornbill: Seen in all areas, in suitable habitat.
The Spot Puffin *Appias lalage* U, P
Deban: Identified the butterfly at Deban FRH mud puddling with other Pierids. Perhaps overlooked amongst other commoner Pierids.
The PaleWanderer *Pareronia avatar* O
The Lesser Gull *Cepora nadina* C, P

Deban, Haldibari, Hornbill: The commonest butterfly during the visit. Seen everywhere in open areas, forest paths, near streams.
The Common Gull *Cepora nerissa* C, P
The Great Orange Tip *Hebomoia glaucippe* O
Deban, Haldibari, Hornbill
The Yellow Orange Tip *Irene pyrene* C
Deban, Haldibari, Hornbill
The Tailed Sulpher *Dercas verhuelli* O
Deban, Haldibari, Hornbill: Seen quite commonly near streams in the company of other Pierids.
The Tree Yellow *Gandaca harina* C, P
Deban, Haldibari, Hornbill
The Lemon Emigrant *Catopsila pomona* C
The Common Grass Yellow *Eurema hecabe* C
Deban, Haldibari, Hornbill
The Pale Clouded Yellow *Colias erate* O

Family – Lycaenidae

The Forest Pierrot *Taraka Hamada* U, P
Just one sighting of the butterfly along the trail leading to Haldibari. Spotted in shrubbery along the forest path.
The Angled Sunbeam *Curetis acuta* C, P
The Orchid Tit *Chliaria othona* O, P
Seen occasionally at Deban as well in other areas in open forest.
The Common Tit *Hypolycaena erylus* O, P
The Elbowed Pierrot *Caleta elna* C, P
Deban, Haldibari, Hornbill: The common Pierrot in the forest.
The Purple Sapphire *Heliophorus epicles* C, P
Deban, Haldibari, Hornbill
The Dark Cerulean *Jamides bochus* C, P
The Glistening Cerulean *Jamides elpis* C, P
Seen commonly in open forest and along the paths.
The Centaur Oakblue *Amblypodia centaurus* O, P
The Dark Himalayan Oakblue *Narathura rama* LC, P
The Forest Quaker *Taraka Hamada* U, P
Just one sighting in the Deban area, in dense forest.
The Margined Hedge Blue (*Lycaenopsis marginata*) or White Banded Hedge Blue (*L transpecta*) O, P
The Common Hedge Blue *Acetolepis puspa* O, P
Butterflies with wet season form underside markings-bold, blackish markings. End cell markings broad. Also, forewing spot in 2 almost vertical and hind wing spot in 3 vertical.
Seen feeding on dead crab in a stream.
The Dusky Hedge Blue *Oreolyce vardhana* U, P
The Dusky Bushblue *Amblypodia paraganesa* LC, P
Haldibari: The Dusky Bushblue was common only at Haldibari. Typically found along dense forest tracks, often deep in the foliage. Not seen anywhere else other than in the Haldibari area, where it was seen quite frequently.
The Tailless Lineblue *Nacaduba dubiosa* O, P
The Transparent 6-Line Blue (*Nacaduba kurava*) or Opaque 6-Line Blue *(Nacaduba beroe*) unconfirmed identification O
The Pointed Line Blue *Nacaduba helicoin* U, P
The Common Line Blue Nacaduba nora O, P
The Mandarin Blue *Charana mandarinus* U, P
The Long Banded Silverline *Spindasis lohita* U, P
The Tailless Bushblue *Amblypodia ganesa* LC, P

The Ciliate Blue *Anthene emolus* U, P
The Violet 4-Line Blue *Nacaduba vajuva* O
The Dark Blue Royal *Pratapa icetas* U, P
The Pale Grass Blue *Pseudozizeeria maha* O

Family – Nymphalidae

The Punchinello *Zemeros flegyas* O, P
The Common Punch *Dodona durga* O, P
The Dark Judy *Abisara fylla* U, P
The Tailed Judy *Abisara neophron* U, P
The Columbine *Stiboges nymphida* U
Enroute to Bulbulia from Hornbill: Only one sighting of the butterfly in dense forest. The butterfly had a slow, Psyche like flight, quite unlike any other butterfly. The butterfly settled on the underside of leaves, in low bushes alongside the road. WB mentions that this butterfly is rare, and this is probably the first record from Arunachal Pradesh.
The Club Beak *Libythia lepita* O
The Jungle Glory *Thaumantis diores* O, P
The Manipur Jungle Queen *Stichopthalma Sparta* U
One sighting along the forest path in dense jungle near Haldibari.
Peal's Palmfly *Elymnias peali* U, P
Trail to Haldibari. Solitary Peal's Palmfly along a stream. Above UPF+H blue shot with obscure longitudinal whitish spots along termen. Forewing apex produced. Tailed hindwing. UPH tornal area with rufous spot. UNH+F with reddish background streaked with whitish scaling. Obscure rufous tornal spot. Prominent white spot in 7, UNH. Talbot lists this as "V Rare, Assam to Northern Burma". Only one sighting.
The Common Evening Brown *Melantis leda* O
The Dark Evening Brown *Melantis phedima* O, P
The Banded Treebrown *Cyllogenes suradeva* O
The Plain Bushbrown *Mycalesis malsarida* U
Identified a butterfly at Miao, just outside the park.
The Common Five-ring *Ypthima baldus* C
The Common Four-ring *Ypthima hubneri* C
The Himalayan Fivering *Ypthima sacra?* U
The Dusky Diadem *Anadebis himachala* U, P
Bulbulia: A single sighting of the butterfly alongside the sulpher stream at Bulbulia. The Dusky Diadem has a slow flight, similar to other Satryrids. The butterfly was photographed sitting with its wings open on the upperside of a leaf near the stream.
The Common Mime *Chilasa clytia* Dimorphic form *dissimilima* O
The Tawny Rajah *Charaxes polyxena* O
The Variegated Rajah *Charaxes kahruba* O, P
Deban
Did not identify this butterfly in the field. However, on examining the photographs, realized that this was the Variegated Rajah. Seen by the riverside at Deban.
The Black Rajah *Charaxes fabius* O
The Common Nawab *Eriboea athamas (Polyura athamas)* O, P
Indian Purple Emperor *Apatura ambica* O, P
The Black Prince *Apatura parisatis* U
The Eastern Courtier *Sephisa chandra* U, P
Bulbulia: Just 2 sightings of the butterfly-at a stream close to Bulbulia, and alongside the sulpher stream at Bulbulia.
The Popinjay *Stibochiona nicea* O, P
The Leopard Lacewing *Cethosia cyane* U
The Circe *Hestina nama* O, P
The Rustic *Cupha erymanthis* C
The Cruiser *Cynthia erota* C, P

The Common Yeomen *Cirrochroa tyche* C, P
The Large Yeomen *Cirrochroa aoris* C, P
The Vagrant *Issoria sinha* C, P
The Chocolate Pansy *Precis ipita* O
The Indian Red Admiral *Vanessa indica* O
The Common Jester *Symbrenthia hippoclus* O, P
The Tabby *Pseudergolis wedah* U
Deban: A single sighting of the butterfly on MV road, 2 km from Deban .
The Danaid Eggfly *Hypolimnas misippus* C
The Orange Oakleaf *Kallima inachus* O
The Common Map *Cryestis thyodamas* O
The Common Maplet *Chersonia risa* O, P
The Common Sailer *Neptis hylas* O
The Sullied Sailer *Neptis soma* U
The Yellow Jack Sailer *Neptis viraja* O
The Orange Staff Sergeant *Pantaporia cama* O, P
The Small Staff Sergeant *Pantaporia zeroca* O, P
The Common Sergeant *Pantaporia perius* O
The Sergeant Major *Abota ganga* U, P
Just on sighting along with a poor photograph on the forest path leading to Hadibari.
The Commander *Limenitis procris* O
The Panther *Neurosigma doubledayi* U
The Common Earl *Euthalia julii* U
The Blue Baron *Euthalia telchinia* U
The Streaked Baron *Euthalia jama* U
The Common Baron (?) *Euthalia garuda* U
The Plain Tiger *Danuas chrysippus* C
The Glassy Tiger *Parantica aglea* C
The Chestnut Tiger *Parantica sita* O, P
The Dark Blue Tiger *Tirumala septentrionis* C
The Common Tiger *Danuas genutia* C
The Striped Blue Crow *Euploea mulciber* C
The Magpie Crow *Euploea radmanthus* C
The Great Crow *Euploea corus* U
Only one sighting of the butterfly flying above the canopy in the Haldibari area.

Family – Hesperiidae

The Striped Dawnfly *Capila jayadeva* U, P
Hornbill: Photographed the butterfly sitting under a leaf on the trail to Hornbill. The only sighting.
The Chocolate Demon *Ancistroides nigrita* U
The Spotted Demon *Notocrypta feisthamelii* O
The Plain Banded Awl *Hasora vitta* O
The Tiger Hopper *Ochus subvittatus* U
Deban: Spotted the Tiger Hopper in the open area in front of Deban FRH on the last day, just after overnight rains. 3-4 butterflies in the same area, though the only sighting during the visit.
The Tri-colored Pied Flat *Coladenia indrani* U
Deban: A single sighting of the butterfly in forest near Deban FRH.
The Multi-spotted Flat *Celaenorrhinus pulomaya* O
The Chestnut Angle *Odontoptilum angulata* O
The Chestnut Bob *Iambrix salsala* O
The Tufted Ace *Sebastronyma dolopia* O, P
The Rice Swift *Baoris zelleri (Borbo cinnara)* O
The Dark Palm Dart (?) *Telicota ancilla* O

References:
The Butterflies of Sikkim Himalaya and their Natural History by Meena Haribal
Butterflies of the Indian Region by M.A. Wynter-Blyth
Illustrated Checklist of Nepal's Butterflies by Colin Smith
The Identification of Indian Butterflies by Brigadier W.H. Evans
The Fauna of British India including Ceylone and Burma by G Talbot
Bulletin of the Madras Government Museum

Function of eyespots in butterflies.

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The diversity of wing patterns among the Lepidoptera is paralleled by few other taxa and this morphological diversification is regarded as one of the most spectacular in nature. The different pattern elements such as stripes and spots differ both between and within species in shape, size and colour, generating this awesome diversity across the order Lepidoptera. Seasonal variation in the expression of wing patterns is not uncommon and is typical in some groups such as the bushbrowns (*Mycalesis* spp) and pansies (*Junonia* spp). Numerous researchers have endeavored to study the function and evolution of these wing pattern elements in Lepidoptera and butterflies, as with many other disciplines in evolutionary biology, have been choice organisms for such studies.

Despite the multifarious wing patterns seen among the butterflies intra-specific variance in these patterns is the exception rather than the rule; it is exemplified by some species such as *Melanitis leda* (Common Evening Brown) in which each individual bears a signature wing pattern marking, but such examples are quite rare. Why is the inter-specific diversity not reflected within species? It is only during the past decade or so that researchers have been finding out that butterfly species possess remarkable plasticity in their wing patterns. Artificial selection experiments have shown that butterflies can quickly develop wing patterns that are strikingly different to what is found in nature. The logical conclusion is that the forces of natural selection favor a certain wing pattern form that prevails in nature. This article focuses on three such factors that could have shaped the evolution of one important determinant of wing pattern – eyespots.

Eyespots are an integral component of the wing patterns in many butterflies. Butterflies may possess them either on the dorsal or ventral surfaces or both. The presence of conspicuous and large eyespots on the dorsal surface that are hidden at rest, coupled with cryptic coloration on the underside is thought to have an evolutionary significance in the avoidance of predation. An excellent example among the Indian butterflies is dry-season form of the ubiquitous *Junonia almana*. The underside mimics a dry leaf and thus aids camouflage. When disturbed, such butterflies effect a rather sudden change in appearance by flipping open their wings and revealing their eyespots, thus alarming or confusing potential predators such as birds. The predator may even be deceived into thinking that it is dealing with a much larger prey, due to the large pair of eyes. This provides an opportunity for the butterfly to escape. Indeed, experiments have shown that when these eyespots are obliterated by painting them over, the chances of survival are greatly reduced.

Some butterflies have eyespots both on the ventral and dorsal sides. The ventral eyespots are visible even during rest and a good example are the wet-season forms of many satyrines (browns) such the bushbrowns. Ventral eyespots are thought to play a role in enhancing the survival prospects of the butterfly not by repelling the attacker as in the previous case but, paradoxically, by attracting the prey towards themselves. The ventral eyespots are, very generally speaking, smaller than the dorsally located eyespots and are more marginally placed. Owing to the fact that they are visible at rest, they do can not scare away the predator approaching to take a bite by their sudden appearance. They instead divert the predator into

attacking the tips of the wings. The butterfly is saved insomuch as the body is unharmed. The butterfly may eventually manage to escape with only the loss of a small portion of the wings. Such beak marks are quite often seen in wild butterflies. However, this hypothesis has not been backed by experimental evidence.

Eyespots have also been shown to play a role in the evolution of the species by influencing female choice. Experiments in an African butterfly *Bicyclus anynana* (the Squinting Bushbrown) indicate that females prefer males with males with larger dorsal eyespots. Other experiments have shown that size doesn't matter, at least not the size of the eyespot *per se*. It seems that the females choose males based on the size and UV-reflectance of the dorsal eyespot's central white pupil. These results get additional corroboration from studies which have shown that butterflies are perceptive towards a broad spectrum of light that includes both visible and UV light.

It is thus clear that eyespots are evolutionarily significant to the butterfly. It is however unclear how exactly they affect the survival probabilities of a butterfly in nature. We still know little about how eyespots or other wing pattern elements are perceived by different predators and butterflies themselves. And we are only now beginning to understand the developmental aspects of these wing pattern elements, thanks to the recent advances in molecular techniques. In summary, this is an exciting area of research that is bound to yield many interesting findings.

THE BUTTERFLIES OF DELHI, INDIA – AN ANNOTATED CHECK-LIST

(INSECTA; RHOPALOCERA)
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Original Article from –

329 LARSEN, T. B. 2002. The butterflies of Delhi, India – an annotated check-list. *Esperiana*, 9:459-479 (slight corrections were made at proof stage).
(Readers must use above reference in their articles)

Introduction

This list of the butterflies of Delhi/New Delhi and its immediate environs is, I believe, of interest for a number of reasons. *First*, Delhi is a garden and parkland city, though now strongly polluted; the air is among the worst in the world on virtually any scale. The size of the city has expanded enormously during the past fifty years, but the total green areas has also increased somewhat and little of what was there has been allowed to disappear. During this time any trace of natural vegetation has been eliminated within thirty kilometres of the city, with a few gardens surviving at Suraj Kund and in the Agra area. *Second*, the population of the city has grown incredibly. When the first butterfly list was compiled in 1942, the population was probably about half a million. During the early 1960s when both Donahue and I collected, the total must have been around three million. When I returned to Delhi in 1984/1985, the population stood at some seven million and it is now pushing ten million. *Third*, the ecological composition of the fauna is more complex than in the surrounding areas. The Delhi Ridge supports the Afrotropical elements normally found further west, most of the city supports many of the hardier common plains butterflies, while the gardens and parks with their tall trees and exotic flora support species that are never found in the surrounding areas.

Previous studies on Delhi butterflies

Considering the role of Delhi in Indian history and its positions as capital city of Imperial India from 1911 to 1947, it is surprising that no general account of its butterflies was given till that of Jandu (1942, 1943). He recorded 62 species, lumping some together (*Tarucus* and Skippers), and made a few surprising omissions. These papers were overlooked by Donahue(1967) in his own very detailed and accurate account, recording 77 species, a few of which I omit. The degree of harmony between these two papers and my own observations is evidence that, freak occurrences apart, there is little likelihood of surprising

discoveries being made. The present paper consolidates those of Jandu and Donahue, taking into account my own childhood observations from 1951 to 1961 as well as the supplementary information given by Ashton (1972), who recorded four species previously undocumented. The combined lists of my predecessors reach a total of 81 species(with my deletions of a few improbable records). My own additions are only five: *Jamides bochus, Everes lacturnus, Ypthima asterope, Neptis nandina*, and *Junonia iphita.* The first four I observed during my stay in Delhi from April 1984 to April 1986, while the fifth only appears only in a collection I made during my childhood (1959) and voucher specimens are still on hand.

Harish Gaonkar (pers. comm.) informs me that the situation in 2000 does not differ much from that of 1986; there has been a small 'fugitive' paper on the Delhi Ridge which mentioned no butterflies worthy of note.

The Delhi environment

Delhi is situated on the alluvial Indo-Gangetic plain. Despite being a capital city it is actually ecologically richer and more diverse that the flat expanses of intensively cultivated agricultural land that surrounds it. The forests of Delhi's Ridge, conserved as hunting estates by the Mughal emperors and maintained as reserved forests by their English successors, are among the prime examples of well-preserved natural habitat still remaining in lowland northern India. The closest comparable forests are at Sariska in Rajasthan. The gardens and parks on New Delhi provide a somewhat more humid habitat than the Ridge, partly due to the ministrations of hordes of malis (gardeners). The Hauz Khas Rose Garden, close to where I was living in 1984 and 1985, yielded all but a dozen of the butterfly species ever recorded from Delhi. The Government Sunder Nursery near Humayun's Tomb is another excellent spot. In the 1950s the Lodi Gardens were particularly good, but they have now become too 'domesticated'. The parklands south of the Qutab Minar are also good, intermediate between the Ridge and the gardens.
While Delhi is ecologically well off compared with the surrounding plains, it is not a butterfly paradise. All told, 86 species have been recorded, though some of these are migrants and strays that do not form permanent populations. This is, however, twice as many as can be found in the surrounding agricultural areas.

The distribution and seasonality of Delhi butterflies

Most of Delhi's butterflies are widespread and many are common. Most species do not appear to have small or localized populations , so that on the whole any of the species might be picked up anywhere. I concentrated on Hauz Khaz where I found nearly 80 percent of all the species ever recorded from Delhi. The Ridge has yielded some 70 percent of all species, as has the Sunder Nursery. However, a few are effectively limited to the Ridge(*Madais fausta* and *Appias libythea*), while some are effectively garden and park butterflies of New Delhi(*Pachliopta aristolochiae, Papilio polytes* and *Gegenes nostrodamus).*

Delhi has three main climatic seasons: the warm, wet monsoon and its aftermath from July till October/November; the cool, dry winter from November to February/March; and the hot dry season from April till the onset of the rains. This combination is responsible for the relatively low number of butterflies. Very many species that could well thrive under monsoon conditions cannot survive the cold of December/January and/or the extreme heat and desiccation of May/June.

The best season for observing and collecting butterflies in New Delhi is from about three weeks after the arrival of the monsoon till early November. Butterflies abound, and the numbers of both species and individuals are at their maximum in this season. Visits to two or three good spots during a single day may well turn up more that forty species, or half the Delhi total. Numbers, and the level of activity, drop precipitously with the advent of the cold weather in December. There is a slight, but only slight, increase in March/April during the advent of the hot weather when the flowering trees and shrubs break into that crescendo of colours for which Delhi is justly renowned. During the searing heat of May and June both the number of species and their quantities decline to the point where it is hardly felt worthwhile to bring out the net – a reluctance strongly reinforced by temperatures up to 50^0 which makes collecting highly exhausting.

Annotated Check-list

PAPILIONIDAE

Papilioninae

Pachliopta aristolochiae aristolochiae Fabricius, 1775
Common Rose
This butterfly is widely distributed, but scarce, in Delhi. It is most common in parks, but I have collected single specimens at unlikely spots such as Suraj Kund (May 1984) and Sultanpur Bird Sanctuary(October 1984). There are records from most months of the year, but the species is most common during the late monsoon and its immediate aftermath. The flight is slow and provocative; the wings are sometimes hardly moved at all. The species has an excellent mimic in the female of *Papilio polytes* f. *stichius.* The species has an excellent mimic in the female of *Papilio polytes* f. *stichius*. The numbers seen are so small that it is difficult to understand how a viable population is maintained, though the adult butterfly is very long-lived. The species is a well known migrant and I suspect the Delhi population might be dependent on migration of specimens in relatively unlikely places like Suraj Kund and Sultanpur supports such a view. The adult butterflies are fond of Lantana flowers and the Suraj Kund specimen came to water, most unusual in my experience with the genus. The host plant in Delhi is *Aristolochia indica* and perhaps ornamentals of the same genus. Jandu's records of *Luffa* and *Langearia* must be in error. Both are Cucurbitaceous creepers which could conceivable have been confused with *Aristolochia*, but which cannot have been used as a larval host plant.

Papilio demoleus demoleus Linné, 1758
Lime Butterfly
This is a common garden butterfly in Delhi and can be caught throughout the year. The normal larval host plant is cultivated *Citrus*, though it is also found on *Myrrayia koenigii* and other cultivated Rutaceous plants. Some Swallowtails feed on Umbellifers, but I have not found larvae on *Foeniculum* though it is accepted in captivity. The species is common, but it is decidedly scarce during winter. The larvae are easily found and bred from *Citrus*.

3. ***Papilio polytes romolus*** Cramer, 1775
Common Mormon
This is another familiar garden species feeding on *Citrus* and especially on *Murrayia koenigii*. It may be found in all months of the year but is most abundant during October. Except locally it is usually outnumbered by *Papilio demoleus*. The female occurs in three distinct forms: f. *cyrus* resembles the male; f. *stichius* is a near perfect mimic of *Pachliopta aristolochiae*; f. *romulus* is an equally good mimic of *P. hector*, a species not recorded from Delhi. Donahue and his group collected 18 females in the wild, while I bred 40 females from eggs and larvae found at random in Hauz Khas and the Sunder Nursery. The results were as follows:

Female form	Donahue	Larsen
Percent		
cyrus	*39*	*38*
stichius	50	62
romulus	11	0
Total	100	100
Number	18 (wild)	40 (bred)

Normally f. *cyrus* is considered to be relatively scarce in India and the relatively high proportion of this form in Delhi is doubtless due to the rarity of *Pachliopta aristolochiae*. The *romulus* form is very scarce in Delhi and is doubtless over-represented in the Donahue sample for the simple reason that all efforts would have been expended to collect the two observed specimens. I must have seen more that a thousand *P. polytes* females in Delhi but observed *romulus* only twice: once in 1957 and once in 1984. In southern India, where both mimics are common, *romulus* and s*tichius* stand at 40% each with cyrus being only 10%; in parts of southern China there are populations in areas without any models and here the *cyrus* is nearly 100%. The pupae of this butterfly can make a very distinct sound when wriggling their abdomens, a bit like the swishing of a heavy whip at a distance.

4. ***Graphium nomius nomius*** Esper, 1785
Spot Swordtail

There is but one record in print from Delhi of this magnificent butterfly. Donahue collected a female on *Lantana* in the Sunder Nursery on 20 July 1962. In July 1961 I had found the species to be moderately common in the Lodi Gardens and observed as many as a dozen in a single day. Jandu did not record it and I did not see it during the 1984-6 period. Since the spot Swallowtail is migratory it would appear that a temporary population established itself in Delhi in the early 1960s, and that it is not a permanent resident.

5. ***Chilasa clytia clytia*** Linné, 1758
Common Mime

There is a single record to the form that mimics the Blue Tiger (*Tirumala limniace*) from the Buddha Jayanti Park on the Ridge, where it was observed by Ashton during the second week of August 1957. Another form is an excellent mimic of *Euploea core*. The species can be quite common in optimal habitats, but it usually occurs very sparingly in cities such as Delhi or Dhaka.

PIERIDAE

Pierinae

6. ***Leptosia nina nina*** Fabricius, 1793
Psyche

This fragile little butterfly is local and not usually common in Delhi. There are records from several places in Delhi but it appears to be most frequent in the low, flat areas of the Ridge. Virtually all records are from August to November, but I did catch a few specimens in Hauz Khas during April 1984. The flight of this butterfly is the weakest of all Delhi Pierids. The genus is mainly an African one, and it was even suggested that the single Oriental species could be a subspecies of the African L. *alcesta.* However, the latter has a chromosome number of n=12 against n=19 in *L. nina*. the larvae feed on species of *Capparis* and *Crataeva*, as do most of the Delhi whites.

7. ***Delias eucharis*** Drury, 1773
Common Jezebel

This spectacular butterfly seems to be irregular in Delhi and perhaps is not a permanent resident. It was not recorded by Jandu. I saw many in the Qudsia Gardens in the early 1950s, but did not meet it in 1959 and 1961, nor in 1984-6. Donahue saw two in 1961 while Ashton found it frequently in 1963. Most records are from October and November, but it has been collected also in March. The flight is slow and serene, usually at some height since the larval host plants are parasite mistletoes on tall trees. The imagines are fond of Lantana. The genus *Delias* is related to the African *Mylothris* and both consist of essentially forest species. It is interesting that in each of the two genera one species has become adapted to city life throughout the range of the genera (*M. chloris* in Africa, *D. eucharis* in India and *D. hyparete* in East Asia). *D. eucharis* is almost certainly aposematic as evidenced also by its tendency to play dead when handled.

8. ***Pieris brassicae brassicae*** Linné, 1758
Common Cabbage White

This is a rare visitor to Delhi from where it never appears to have been recorded in print. A childhood friend of mine (B. Bøgh-Andersen) collected two females on 24 and 26 April 1961. The species is migratory and descends from its permanent haunts in the Himalaya to breed on the plains during winter. It

may be a pest on rape and mustard. In April 1985 I saw astonishing numbers halfway between Delhi and Moradabad and from thence to Hardwar and Ramnagar. With rape being grown so extensively near Delhi, a visit from these butterflies may well be expected from time to time, though I am fairly certain it did not happen during 1985. The issue is discussed in more detail by Larsen (1986).

9. ***Artogeia canidia indica*** Evans, 1926
Indian Cabbage White

This butterfly shows a clear parallel to the previous one, but it seems to be a rather more regular visitor, though not seen in Delhi every year. All records are from the months of February to April. Jandu did not meet with it. Donahue reports four specimens from 1963 and one from 1958. In April 1984 I found it not uncommon in Delhi, but with the onset of the heat it disappeared totally. During 1985 I saw only a single specimen at Sultanpur on 1 March, though it was abundant halfway between Delhi and Moradabad. In my garden at Hauz Khas, females laid eggs on cultivated *Iberis.*

10. ***Cepora nerissa phryne*** Fabricius, 1775
Common Gull

This one of the most common butterflies in Delhi, occurring during all months of the year in all habitats. The larval host plants are the broad-leaved *Capparis* species on which the eggs are laid singly. Summer specimens are larger and with the underside veins more prominently darkened than in winter specimens. The flight is very lively and flowers are avidly visited.

11. ***Belenois aurota aurota*** Fabricius, 1793
Caper White *or* Pioneer

This is a very common migrant butterfly, the caterpillars and pupae of which are sometimes superabundant on *Capparis aphylla* and *Maerua arienaria*. The eggs are laid in batches of up to a hundred. The flight is rapid, but the butterflies come readily to flowers. Unlike most Delhi butterflies they are at their most abundant from March to May, sometimes being entirely absent during the monsoon. Winter specimens tend to have more heavily marked undersides and a deeper tinge of yellow, especially in the female sex. Peaks of abundance on the Ridge and at Hauz Khas were not correlated.

12. ***Appias libythea libythea*** Fabricius, 1775
Southern Albatross

Both sexes may be recognized by their pointed wings and unmarked undersides. The species is the rarest of the Pieridae in Delhi with the exception of *Delias eucharis* and *Leptosia nina,* but it may be locally not uncommon in August on the Ridge. It is most frequently seen on the lower Ridge(e.g. Malcha Mahal) but I have seen it in Golf Links and there are scattered records from elsewhere in Delhi. Known records are from February, May and August to December. Jandu also records the related *Appias albina*, but there must be some mistake here since this species is most unlikely to occur in Delhi.

13. ***Ixias marianne*** Cramer, 1779
White Orange Tip

This is one of the most common and attractive of the butterflies in Delhi. It is somewhat scarcer during the hottest and coldest months but may be found throughout the year, together with *Ixias pyrene*. It has a rapid, restless dancing flight and is best seen on winter mornings when large numbers sometimes sun themselves on green vegetation. The females normally have orange wing tips which are not as brilliant as in the males and which have three black dots in the orange field. This serves to distinguish them from the white *Ixias pyrene* females. The larval host plants are species of *Capparis*. The eggs are deposited singly.

14. ***Ixias pyrene sesia*** Fabricius, 1777
Yellow Orange Tip

The Yellow Orange Tip is almost as common as the White Orange Tip and both species usually fly in the same places at same time. The females normally do not have orange tips to the forewings and may be either white or yellow in roughly equal frequency. There is considerable seasonal variation; monsoon specimens having strong black bands on the hindwing upper side that are totally missing during the dry season. The eggs are laid singly on *Capparis sepiaria*. Both species of *Ixias* may come to mud-puddles, but only rarely.

15. ***Madais fausta faustina*** C. & R. Felder, ++++ ++++

Large Salmon Arab

The male of this butterfly in Delhi is quite similar to the nominate subspecies from the Middle East, but the variable female probably justifies the subspecies distinction. In Delhi, the host plant seems to be exclusively *Maerua arienaria* which effectively limits the butterfly to the Ridge and its extensions towards the *Qutub Minar*. Only strays are seen in Delhi proper. It is found throughout the year, most frequently in March and April and September to October. It is scarce or absent during the two coldest months. The sight of these bright salmon insects with their restless flight is a delight. During the dry season the females are invariably a deep salmon with black markings matching those of the male. From August till November the females are much more heavily marked with black, and the ground colour varies from dirty white to yellow and light salmon. Donahue was the first to link these forms to seasonal changes and my own observations fully support this. The Salmon Arab in the Middle East is an aggressive migrant, colonizing the East Mediterranean every year. In Delhi and northwestern India it seems to be localized and non-migratory. The eggs are laid singly, but the same fresh shoot of *Maerua* may contain several eggs laid by successive females. Egg-load assessment does not seem to apply to Madais fausta.

16. ***Colotis etrida etrida*** Boisduval, 1836

Little Orange Tip

This is an Indian endemic of the large African genus *Colotis*. It is common in Delhi and records cover most of the year. It apparently is absent from Hauz Khas during the monsoon proper, while it may be common on the Ridge. Monsoon and immediate post-monsoon specimens are often large and well marked. Extreme dry season specimens may be tiny, scarcely larger than a big *Zizeeria maha*. The species is generally very variable. The normal larval host plant is *Capparis aphylla*, but *C. sepiaria* is also acceptable.

17. ***Colotis danae dulcis*** Butler, ++++

Crimson Tip

This species has only been recorded by Jandu with the comment that 'it is rarer than the other members of the genus, and is available only in the summer months, May and June.' It is difficult to imagine that Jandu could have mistaken it for anything else. The crimson wing tips are very distinctive and serve to distinguish it from any manifestation of the variable *C. etrida. Colotis danae* in northwestern India is more of a desert butterfly and in my experience normally feeds only on *Cadaba* which does not occur on the Ridge. Possibly a temporary colony was established during the early 1940s. I suspect any specimens from Delhi should actually be ranged as ssp. *dulcis* Butler, doubtfully distinct from the Arabian ssp. *eupompe* Klug, 1832.

18. ***Colotis amatus amatus*** Fabricius, 1775

Small Salmon Arab

In Delhi the same subspecies occurs as in West Africa, Sudan and Arabia. It is possibly a recent invader to northwestern India from Arabia, since in southern and central parts of India the distinctive ssp. *modesta* Butler, ++++ occurs. The larval host plants are species of *Salvadora* and often-large numbers may be seen swarming around isolated trees. There are records from all months of the year, but individual colonies very in size during the year, occasionally going extinct. The eggs are deposited on the upper surfaces of leaves in clusters of up to 75 eggs, evenly spaced. On *Salvadora oleoides* 17 clusters averaged 22.8 eggs, while on the more broad-leaved *Salvadora persica* 106 clusters averaged 28.7 eggs. This is in sharp contrast to the following species which lays single eggs (Larsen 1988a)

19. ***Colotis vestalis vestalis*** Butler, 1876

White Arab

This attractive little butterfly is almost as common as the previous species and shares S*alvadora* as the larval host plant. Both species are frequently found on the same trees and bushes, where their inter specific competition appears to have led to radically different ovipositing habits and probably feeding preferences. Unlike the Small Salmon Arab which lays clusters of eggs on fresh leaves, the White Arab lays them singly on the bark of branches sometimes as far as 90 cm from the nearest foliage. The larvae forage on mature leaves (Larsen 1988a). Curiously, the third *Salvadora* feeding species *Colotis phisadia protractus* has not been recorded from Delhi; it too lays single eggs. The White Arab can be found throughout the year,

though numbers fluctuate. It is least common during the two coldest months of December and January. *Salvadora* is uncommon on the Ridge and most of the host plants are very old trees in Delhi proper.

Coliadinae

20. ***Catopsilia pomona*** Fabricius, 1775
Lemon Emigrant
I subsume under this species also the Common Emigrant (*Catopsilia crocale* Cramer). They have been seen in copula so often that there is little doubt that they are morphs of the same butterfly. The *pomona* form has red antennae and silver centred spots on the hindwing underside. The *crocale* form has black antennae and quite immaculate undersides. Intermediate specimens are, however, not unusual and there is much variation. The *crocale* form is the most common in Delhi and there is no clear-cut seasonal pattern in the occurrence of the two forms, both of which have been seen in most months of the year. Numbers vary markedly as is often the case with string migrants. Breeding experiments to obtain both forms from the same batch of eggs would finally settle the issue, but I never persuaded females to lay large numbers of eggs in captivity. However, this has now been done by Yata & Tanaka (1979), and they show that we are faced with a single variable species, with photoperiod as the main trigger mechanism for which form emerges. The preferred larval host plant is the Indian Laburnum (*Cassia fistula*). The full-grown larva has an unusual capability. When handled or attacked by ants it can give a jerk, which makes it, jump several inches. But this did not save one from being killed by ants during a photography session.

21. ***Catopsilia pyranthe*** Linné, 1758
Mottled Emigrant
I subsume under this species also the Indian from of the African Emigrant (*Catopsilia florella* Fabricius, 1775). For well over fifty years the two were considered distinct, but always with a note of caution. *C. pyranthe* differs from *C. florella* in its broader black wing tip markings on the forewing upper side, in having black instead of red antenna, and in lacking the small silver centered spots in the centre of the hindwing underside. This is much the same as in the previous species. The *pyranthe* morph is generally very common during the monsoon while the *florella* morph is more common during winter or spring, but there is little consistency and both forms overlap. Intermediates are few. Comparison of the male genitalia from Delhi and Ghana showed that *C. florella* from the two continents were rather different, while those from Delhi matched *C. pyranthe*. The larval host plants are low *Cassia* shrubs, though trees may also be used. The larvae are often tended by ants even in their earliest stages.

22. ***Eurema hecabe simulata*** Moore, 1881
Common Grass Yellow
This is one of the most common butterflies in Delhi and no one can have missed seeing it fluttering about in gardens. During the dry season the underside is well marked with rust coloured spots, while the wet season form has only very light grey markings. This may have given rise to the suggestion that the very similar *E. blanda* occurs in Delhi, but this is almost certainly incorrect. From the other Delhi *Eurema* species *E. hecabe* may be distinguished by the irregular inner margin of the black markings on the forewing upperside. At dusk the yellow underside stands out prominently to the human observer, in marked contrast to the camouflaged underside of the dry season morph of *E. laeta.* The eggs are laid singly on a large variety of Leguminose plants. The larva is extremely well camouflaged.

23. ***Eurema brigitta rubella*** Wallace, 1867
Small Grass Yellow
This species is the least common of the three Delhi *Eurema* but it can be numerous on the Ridge and small colonies are found in Delhi proper, mainly during the monsoon. The wings are more elongated and more evenly rounded than in *E. laeta* and the seasonal variation is much less dramatic. The larval host plants include many species of Leguminose plants. The species is somewhat migratory.

24. ***Eurema laeta laeta*** Boisduval, 1836
Spotless Grass Yellow
This butterfly is common on the Ridge but colonies also occur in the Delhi parks. Donahue found it common, and so did I, but Jandu did not. An outstanding feature of E. *laeta* is the radical seasonal

dimorphism. The wet season form is available in August and September. It has rounded wings and the underside is bright yellow without camouflage patterns. In late September or early October a large brood of dry season forms hatches. The wing shape is angular and the underside camouflaged; during the monsoon there are sometimes mixed emergences of wet and dry season forms in late September / early October. The dry and wet season forms are so different from each other that they were considered distinct species until 1931 when both were bred from the same batch of eggs. The dry season form seems to spend winter and spring in a state of sexual inactivity and generally low level of activity. On 20 January 1985 I dissected a female and found no fully formed eggs, and the same was true of 16 females dissected on 15 March 1985; I also marked about 20 *E. laeta* in Hauz Khas Park, one of which was seen nearby as late as on 12 May. Of 80 specimens marked on 10 November 1985, three were seen on 11 January 1986 in the same spot. The latest observation of a marked specimen was on 2 February 1986, more than 80 days later. There is little doubt that the dry season forms of *E. laeta* aggregate in suitable spots and spend winter and the dry season in a state of semi-quiescence. The larval host plants are species of Leguminose plants.

25. ***Colias fieldi*** Ménétriés, ++++ ++++
Field's Clouded Yellow

This is a migrant Palaearctic butterfly that only reaches Delhi rarely. Jandu considers it to be rare in November and December and Donahue only collected five in March 1963 and 1964. Ashton saw one in March 1964. I have not personally seen this butterfly. It breeds on the plains in irregular numbers and specimens only reach Delhi in particularly propitious years. The greatest chance of finding it will be in lucerne/alfalfa fields on which both the imago and the larva feed. The Pale Clouded Yellow (*Colias erate*), which is bright yellow instead of orange, has similar habits and might well occur in Delhi occasionally. It would be worthwhile monitoring Lucerne fields on the banks of the Jamuna River to look for the two *Colias* during March and April.

LYCAENIDAE

Theclinae

26. ***Deudorix isocrates*** Fabricius, 1793
Common Guava Blue

This species is quite uncommon in Delhi. Jandu records it from September to November and Ashton collected two females at Humayun's Tomb in October 1966. The larval host plant choice is catholic, including guava, pomegranate, *Gardenia*, tamarind, *Acacia,* loquat and much else as well. The species is probably not a permanent Delhi resident.

27. ***Rapala iarbus sorya*** Kollar, 1848
Indian Red Flash

This handsome Lycaenid is often known under the name *melampus* Cramer. While not common, it is very much more frequent than the preceding species. Most of the specimens are from October and November, though in 1984 I saw it also in April and May in Hauz Khas. It was much more common in October 1984 than in 1985. the species is unpredictable and unexpectedly turns up on *Lantana* or at a damp patch. I do not know its Delhi host plants, but elsewhere it feeds on a large variety of plants.

28. ***Spindasis vulcanus vulcanus*** Fabricius, 1775
Common Silverline

The upperside of this pretty butterfly is black and orange with no trace of blue, which will serve to distinguish it from the next species. Both are rather scarce and of similar habits. Notwithstanding their scarcity, it is surprising that Jandu found neither species. I have found the Common Silverline both on the Ridge and in Delhi town, usually few at a time, but in a given locality specimens will occur in the same spot time and time again throughout the year. It is the finest of the false head butterflies in Delhi. I know nothing of its Delhi host plants, but most African members of the genus are associated with *Acacia*. The presence of suitable ants to clear the honey gland of the larva is essential, and ants may be more important than the nature of the host plant.

29. ***Spindasis ictis ictis*** Hewitson, 1865

Common Shot Silverline

This pretty butterfly is about as common (or as rare) as the preceding one, and they are quite often seen together. However, while *S. vulcanus* does not show seasonal variation, they dry season form of *s. ictis* has an almost unicolourous beige underside with the bands so characteristic of the genus suppressed. The courtship flight of both species is so rapid as to make even the fastest Skippers seem almost clumsy in comparison; I know nothing of its host plants in Delhi.

Polyommatinae

30. ***Lampides boeticus*** Linné, 1758

Pea Blue

This is a ubiquitous migrant butterfly common throughout the Old World tropics and well into the temperate zone. There are records from all months of the year, but in my experience it is not always common in Delhi and sometimes absent. There seems to be a peak in March when it may be immensely common on the flower buds of Flame-of-the-Forest (*Butea).* The host plants encompass a wide range of Leguminose plants, and in larger plants the larvae often live inside the seed pods. Sometimes peas contain large numbers of larvae and it can be very real pest.

31. ***Leptotes plinius*** Felder, 1865

Asian Zebra Blue

This is the only Asian species in a genus with a number of African and Neotropical species that are very similar and demand examination of the male genitalia for certain identification. I have optimistically examined the genitalia of all slightly anomalous Delhi males, all of which were typical *L. plinius.* the species is common most of the year, though it sometimes goes missing, and may be abundant when few other butterflies are about. The larval host plants are many species of Leguminose plants, but in Delhi *Plumbago zeylanica*(Plumbaginaceae) seems particularly popular. This is an unusual choice for a Polyommatine butterfly, though it is shared by some African members of the genus.

32. ***Tarucus nara*** Kollar, 1848

Striped Pierrot

This is the first of four species that are difficult to tell apart, confused in earlier literature, and occurring under several invalid names. Thus Jandu only mentions *T. theophrastus* Fabricius, a species found exclusively in Africa and Arabia. *T. nara* is by far the most common member of the genus in Delhi. The male is smaller than in the other three species, with a prominent black spot on the forewing upperside and a uniform blue ground colour of greater density that that of *T. indica.* The dry season form often has the dark spots of the underside transformed to rust. Females of the genus cannot confidently be told apart. The names *extricatus* and *alteratus* both refer to *nara.* The habitat is open ground with a low growth of *Zizyphus.* Other species are more likely on taller *Zizyphus (ber)* trees. The larvae are avidly tended by ants and so well camouflaged that they would be difficult to find if it were not for the presence of agitated ants.

33. ***Tarucus balkanicus nigra*** Bethune-Baker, 1918

Balkan Pierrot

The upperside is darker than in *T. nara* and there is normally clear dark shading at the tornal angle of the forewings. The male upperside usually has defined black discal and post –discal spots that occur as rare aberrations in some other species. Among the literally thousands of Delhi *Tarucus* that I have seen, none has pertained to this species, but Donahue found three certain males, verified by genitalic examination (21 February 1963, 29 February 1964 and 20 August 1962, all on the Ridge). The larval host plants are *Zizyphus*. It may be noted that Donahue's collection contains 486 specimens of *T. nara*!

34. ***Tarucus indica*** Evans, 1932

Indian Pierrot

This species has a very light blue ground colour, the male has a 1mm broad indistinct margin in greyish-black, and the hindwings often have traces of the female pattern. Usually it is larger than *T. nara* and once you know it, determination even in the field is not difficult. Donahue only located two in his copious Delhi material. I have found it to be local, but on its chosen trees, usually taller *Zizyphus* (ber), a few can usually

be taken on every visit throughout the year. I have taken it on the Ridge, near the Qutab Minar and in Hauz Khas Park.

35. ***Tarucus callinara*** Butler, 1867
Spotted Pierrot
Both sexes have markings much more macular than those of the three others, which tend to form continuous bands. Donahue collected 15 specimens both on the Ridge and in Sunder Nursery. I had no difficulty in recognizing it in the field in Madhya Pradesh and I feel quite certain I have not seen it in Delhi. I have specialized in this genus, having described *Tarucus kiki* from Nigeria, making the first records of *T. grammicus* from Yemen, and finding *T. callinara* for the first time in Thailand. I am surprised that I have missed two of the species found by Donahue. The larval host plants are again *Zizyphus.*

36. ***Azanus ubaldus*** Cramer, 1782
Bright Babul Blue
This African butterfly is not common and somewhat unpredictable in the Delhi area. It may be met with on the Ridge and there is a vigorous population in Hauz Khas Park. Donahue secured only a dozen specimens. It is most common in October but single specimens have been recorded throughout the year (see also next species).

37. ***Azanus uranus*** Butler, 1866
Dull Babul Blue
I had always considered this butterfly to be a form of *A. ubaldus* till I saw larger numbers of both at water in Hauz Khas Park. Dissection showed very clear genitalic differences in the shape of the valve. A random simply yielded 16 *A. ubaldus* and 36 *A. uranus;* the latter is generally the more common in Delhi. The male Dull Babul Blue has a duller purple ground colour, a narrower black border to the wings, and a less distinctive – though still prominent – androconial patch. Females must be told apart by the underside. Both species use *Acacia* as the larval host plant, hence the name Babul Blues.

38. ***Azanus jesous*** Guérin-Méneville, 1847
African Babul Blue
The name *gamra* has been applied to Indian specimens but the name is not worthy of conserving and would not be applicable to Indian populations. Generally speaking, the species is uncommon in Delhi, though I found it numerous on the Ridge on 30 September 1984 and 3 November 1985. I have also seen a specimen in Hauz Khas on 22 June 1985, and a few more in November. The species is migratory and may be intermittent in Delhi, which is at the easternmost extreme of its distribution, which covers all of Africa and parts of the Middle East. The larvae feed on *Acacia*. Together with the two other members of the two other members of the genus it is one of the most consistent visitors to mud patches.

39. ***Pseudozizeeria maha maha*** Kollar, 1848
Pale Grass Blue
There are four rather similar Grass Blue in Delhi, two of which are common, one moderately common, and the last decidedly scarce. *Z. maha* is the largest of these and the pale, milky blue ground colour of the male is characteristic. The brown females can be difficult to tell apart from those of *Z. karsandra,* though the latter is usually smaller and flies in more xeric localities. *Z. maha* is generally common in shady gardens and parks. Like many Lycaenidae its larvae feed on Leguminose plants, but in Delhi it is much attracted to *Oxalis corniculata* which grows in dark places and it probably the most widely used host plant.

40. ***Zizeeria karsandra karsandra*** Moore, 1865
Dark Grass
This is one of the most common Delhi butterflies found on open ground all year round. The ground colour of the male is a much more intense purple than it the Pale Grass Blue and there is a broad, black marginal border. Normally the species is also smaller. The usual larval host plants are small Leguminose plants growing in open areas with *Medicago* as a firm favourite. The butterfly can be found throughout the year but is most common during and after the monsoon. Some authors consider the species con-specific with the African *Z. knysna* Trimen but the constant genitalic differences and the distribution argue in favour of full specific status for the Oriental *Z. karsandra.*

41. ***Zizina otis otis*** Fabricius, 1787
Lesser Grass Blue
Jandu considered this species very rare and I have collected but a single specimen in Hauz Khas Park (17 November 1984). However Donahue considered it common except during the monsoon and records no less that 74 specimens, while collecting only 23 of the common *Z. hylax* (see next species). *Z. otis* can be told apart from the similar *Z. karsandra* by the absence of the black spot in the centre of the underside forewing cell and by the black spot in space 6 of the hindwing underside which is strongly out of line with the others. The host plants are Leguminosae.

42. ***Zizula hylax*** Fabricius, 1775
Tiny Grass Blue
Despite its vernacular name this butterfly can be as large as *Z. maha* but also smaller than any of the others since the size varies considerably. The underside is chalky white with a much more 'neat' appearance than in the other Grass Blues. The presence of a black dot on the very costa of the forewing underside in the middle of the cell is a certain diagnostic feature. Donahue considered it scarce and it is unaccountably missing from Jandu's list. I have sometimes found it common on the Ridge and at Tughlaqabad, but normally single specimens are met with. The larval host plants are often unconventional including Acanthaceae and Euphorbiaceae. I have no records of it in Delhi proper.

43. ***Jamides bochus bochus*** Stoll, 1782
Dark Cerulean
The only Delhi record of this widespread butterfly is a female that I collected on 9 November 1985 in Hauz Khas Park. This was to be expected since the species is migratory. The male has a deep blue sheen that rivals the South American *Morpho* in intensity. When flying he looks like a series of intense, blue explosions. I have once in the Nilgiri Mountains seen a migration of this species and it looked like a flight of blue, day-time fireflies.

44. ***Prosotas nora ardates*** Moore, 1874
Common Lineblue
Both Donahue and Jandu consider the species very rare. The only dated records are from October 1962. It is probably an irregular visitor since it is normally an avid mudpuddler with other Blues that would be difficult to overlook despite its small size. The host plants are *Acacia.*

45. ***Euchrysops cnejus*** Fabricius, 1798
Gram [Lentil] Blue
Jandu described the species as very common. This is not so in my experience, and Donahue obtained only 33 specimens. The colour of the male is a much duller violet blue than that of the following species, *Catochrysops strabo,* which it otherwise resembles. Records cover most of the year. It feeds on many Leguminose plants including cultivated gram. Pest proportions rarely seem to be reached.

46. ***Catochrysops strabo strabo*** Fabricius, 1793
Forget-me-not
The butterfly may be found throughout the year, but it is only locally and occasionally common. Thus, in Delhi, it was very much more common in 1984 than in 1985. Jandu records it as uncommon in October and November, but Donahue and I have found it in most months of the year. The larval host plants are species of Leguminosae. The common name refers to the sky blue colour of the male, which differs from all other Delhi Lycaenidae.

47. ***Chilades laius laius*** Stoll, 1870
Lime Blue
This species is far from common in Delhi, though single specimens are met with from late July till December. I have never seen more than three or four on any one day. The species is seasonally dimorphic, the dry season form having brown tornal blotches on the hindwing underside. The eggs are laid on the fresh shoots of *Citrus*, hence the popular name. This is a most unusual host plant for a Lycaenid, but its congener *Chilades pandava* feeds on the equally improbable *Cycas.*

48. ***Chilades parrhasius*** Fabricius, 1793
Small Cupid
The Small Cupid has often been included in the genus *Euchrysops* but the genitalia are typical of *Chilades*. The specific names *contracta* and *minuta* have been used and in some older literature there is in addition confusion with *Euchrysops cnejus*. The species is very common in Delhi, not least during the hottest months when other butterflies are scarce. There is seasonal variation in the underside patterns, which may become quite indistinct during the dry season. In July large numbers feeding on flowers of *Vernonia* in Hauz Khas Park fall prey to spiders. The host plants of the larvae are mainly *Prosopis*, but also *Acacia* (Leguminosae).

49. ***Chilades putli*** Kollar
Grass Jewel
This tiniest of butterflies used to be considered a subspecies of *Freyeria trochylus* Freyer, but the two overlap largely in India, with the latter generally being mostly in the mountains. It has been placed in both *Freyeria* (an invalid name) and in *Euchrysops* from which the genitalia differ strongly. Placement in *Chilades* is a logical solution. The distinguishing characters of *C. putli* are the small size and the fact that the three black spots of the tornal area are not prominently crowned with orange; Donahue claims to have caught some intermediates. In Delhi it may be met with throughout the year and can be numerous, but it is localized and easily overlooked. The larval host plants are normally *Indigofera* (Leguminosae) or *Heliotropium* (Boraginaceae).

50. ***Everes lacturnus syntala*** Cantlie, 1963
The Indian Cupid
I found this distinctive little butterfly common in the Hauz Khas Park in April, May and June of 1984, but it was not to be seen during 1985. These are the only Delhi records and it seems that migrants must have set up a temporary breeding population. The European *E. argiades* is known to migrate. The Indian Cupid is the only non-montane species in the genus, penetrating the Oriental Region proper.

NYMPHALIDAE

Satyrinae

51. ***Melanitis leda*** Linné, 1758
Common Evening Brown
This unmistakeable butterfly is not normally very common in Delhi. As the vernacular name implies, it is of crepuscular habits, and one of the best places to collect it is at night in the buildings of Delhi's Palam [now Indira Gandhi] Airport, where it is attracted to the bright lights. Some time after the outbreak of the monsoon in July or August there is a sudden emergence of the wet season form, but in very varying numbers from year to year. In the beginning of October there is an emergence of the dry season form, in which the eye-spots of the wet season are suppressed in favour of a camouflage pattern. The period from 5 to 20 October is the only one where both forms - and occasionally intermediates – may be met with. During November, December and January occasional dry season forms are met with, but of some twenty females dissected, none had fully formed eggs. There are no Delhi records from February till July. The larval host plants are grasses and, as is the case for most Satyrids, a wide variety of species is acceptable. An experimental breeding of the species under natural conditions to determine what happens between October and July is a desideratum.

52. ***Mycalesis perseus tabitha*** Fabricius, 1793
Common Bushbrown
This butterfly resembles the preceding one in its habitats, timing and seasonal dimorphism, but it is on the whole rarer, more local and does not come to light at night since it is not crepuscular. Jandu reports specimens also from April and May but this is not normally so. On the Ridge it is only found in the low-lying areas. The species is feeble on the wing, does not fly much and is easily overlooked. The heavily ocellated underside of the wet season form does not vary while the dry season form is highly variable. The larval host plants are grasses, most species of Satyrinae usually accepting a wide range.

53. ***Orsotrioena medus medus*** Fabricius, 1775
Nigger
The Nigger is on of the more surprising members of the Delhi fauna since it is not found closer than the forests of Madhya Pradesh. I collected a single specimen in Delhi in August 1961 and in reply to a letter the late Wynter-Blyth responded: "I think your catch of *Orsotrioena* is most unusual". It does appear to be resident, though, since Jandu also records it in small numbers in gardens during the month of August. He never gives specific localities. My own specimen was from the Delhi Gymkhana Club. Seasonal variation is very strong, but the species can be told from *Mycalesis perseus* by the hindwing underside which has only three eyespots. The host plants are grasses.

54. ***Ypthima asterope mahratta*** Moore,
Common Three-Ring
The two Delhi *Ypthima* are similar in size and colour but can always be told apart by the presence in *Y. asterope* of a brown loop encircling the apical eye-spot of the forewing, especially on the underside. This feature, which can also be seen on the upper surfaces, is lacking in *Y. inica*. It is not a common species and neither Donahue nor Jandu found it. I took small numbers, often in the company of *Y. inica*, in places where Donahue and Ashton also collected. I have records from the months of March, April, June, July and August. The flight is not rapid but it makes progress in a series of twists and turns that can make its capture difficult. The larval host plants are grasses.

55. ***Ypthima inica*** Hewitson, 1864
Lesser Three-Ring
This little butterfly is somewhat more common than *Y. asterope* but is still generally quite scarce. In habits and habitat choice both *Ypthima* are similar. This species has been recorded most months of the year. The larval host plants are grasses. During the dry season the three eye-spots of the hindwing underside are suppressed.

Charaxinae

56. ***Charaxes solon solon*** Fabricius, 1793
Black Rajah
This rare butterfly is mentioned from Delhi by Wynter-Blyth, who could not give any details of the original source to Donahue in response to a letter. However, the species is widespread in peninsular India and feeds on *Tamarindus indica,* so to rule it out a altogether appears dangerous. If it is resident in Delhi it must be very rare since the *Charaxes* often find their way into houses and gardens in search of rotting or fermenting food.

Nymphalinae

57. ***Ariadne merione tapestrina*** Moore, 1884
Common Castor
This Common Castor is a very distinctive butterfly with its gliding flight, sailing through the air, from time to time exposing its nearly black underside with a wing beat. Donahue did not collect it and refers only to a specimen in IARI, but I found several in July/August of 1959 and 1961. it now appears much more common in Delhi, especially in October and November when it may be abundant. The adult butterflies, especially the females, visited white *Lantana* in the mornings, which is unusual and may be due to the *Lantana* nectar fermenting in situ. Both sexes are otherwise especially attracted to the oozing sap from fruit pods of *Abutilon*. The eggs are laid singly on the underside of leaves of the Castor plant *(Ricinus).* There are twenty or so vertical keels on the chalky white egg which is adorned with very long, hair-like, brittle thorns. The larva lives on the upper surface of the leaves and , when not eating, rests along the ribs where it is well camouflaged. The pupae are dimorphic, being either brown or green. The dimorphism is genuine, there being no transitional forms. In my field notes from 1959 I also recorded the Angled Castor *(Ariadne ariadne* Johansson) as being rare in Delhi. This is not improbable but I have no surviving voucher specimens. The presence of the Tabby (*Pseudergolis wedah*) in Delhi (specimen at IARI) hardly seems credible.

58. ***Symphaedra nais*** Forster, 1771

Baronet

One specimen of this distinctive butterfly was apparently captured in Delhi on 2 April 1958 by M.G. Ramdas Menon. The species is found in much of peninsular India and is a known migrant so the record is not improbable. It is very common in Gir Forest in Gujerat (pers. obs.).

59. ***Neptis nandina*** **ssp?**

Clear Sailer

To my greatest possible surprise I caught a female of this butterfly near the Hauz Khas ruins on 17 November 1984. It is the only *Neptis* known from Delhi, and with their colour pattern and characteristic flight *Neptis* are not easily overlooked. From the very summary description in Eliot (1969) it looks like the single specimen mentioned from Dehra Dun; it is certainly not ssp. *susruta* Moore, 1872 from Nepal. It may have been accidentally brought in with firewood from the Terai. The Common Sailer (*Neptis hylas*) would have been a much less surprising find, and could make its own way from the Himalayan Terai.

60. ***Vanessa cardui cardui*** Linné, 1758

Painted Lady

This is the cosmopolitan among Indian butterflies, being found practically world–wide thanks to its migratory habits. Jandu saw it throughout the year in Delhi, especially in September and October, but there are certainly fluctuations. Donahue caught only two, one 20 January 1962 and 23 March 1963. Ashton recalls it as common in October 1963. I found none during 1984, but saw a worn specimen on the Ridge on 3 August 1985, a fresh male in Hauz Khas on 19 October, another on 2 November and one on 26 January 1986. On 1 February 1986 I saw yet one in Golf Links. In April 1985 it was common on the plains adjoining the Himalaya between Hardwar and Ramnagar.

61. ***Junonia orithya ocyale*** Hübner, 1816

Blue Pansy

This is the most common of the Delhi Pansies, being found in varying numbers practically everywhere throughout the year. Seasonal variation is not as strong as is the case in *J. almana and J. lemonias.* The flight is very rapid, usually close to the ground. Where there are stands of the common weed, *Tridax*, large numbers of all three common Pansies and many other butterflies. The larvae often feed on Acanthaceae like the other *Junonia*, but also on *Convolvulus* and *Lippia*.

62. ***Junonia lemonias lemonias*** Linné, 1758

Lemon Pansy

This butterfly is common and has been recorded throughout the year. It is less at home in very open country than are *J. orithya* and *J. hierta,* but otherwise the habits are the same. The wet season form occurs from late June (even when the monsoon has not broken) till October when the dry season form with suppressed eye-spots on the underside and more falcate forewings takes over. The dry season form itself is variable, some specimens of the underside being washed with the most pretty of purple colours. The larval host plants are normally *Acanthaceae,* but *Sida* and jute (Malvaceae) have also been recorded.

63. ***Junonia almana almana*** Linné, 1758

Peacock Pansy

This is another relatively common butterfly that may be caught throughout the year, though it is most uncommon during winter. The Peacock Pansy displays seasonal variation that is more dramatic than in any other Delhi butterfly except *Melanitis leda*. The wet season form has rounded wings, the underside has prominent eye-spots, and there are no camouflage patterns. The dry season form has no eye-spots, is strongly camouflaged, has very falcate forewings and a tail on the hindwings giving it the strongest possible resemblance to a dead leaf. There seems to be no breeding between the emergence of the dry season form and late February early March. Some time in April the 'wet' season form emerges at the time when the flowering shrubs and trees of Delhi break out in their annual exuberant symphony of colours. The term 'active' would appear to be better than the term 'wet' for the seasonal form. The larval host plants are mainly a range of Acanthaceae, but the sensitive plant *Mimosa pudica* (Leguminosae) has also been recorded.

64. ***Junonia hierta hierta*** Fabricius, 1793

Yellow Pansy

This is yet another attractive Pansy that is quite common, especially on rough open ground such as is found on the Ridge. In habits and flight it is similar to the other common Pansies, but it is rarely as common as the Blue. Seasonal dimorphism is less than in the other four members of the genus while sexual dimorphism is rather stronger. The larval host plants are low Acanthaceous plants.

65. ***Junonia atlites atlites*** Linné, 1758

Grey Pansy

Donahue did not record this distinctive species but Jandu found it to be very rare in October and November. Bent Bøgh-Andersen, son of the then Danish ambassador to India (1960-62), caught a specimen (no date), and Ashton saw two in late September and early October 1966 respectively. I caught a single male in Hauz Khas Park on 4 November 1984. The species is known to be a migrant and may occur very abundantly in the Terai, so Delhi specimens are almost certainly accidental strays from normal migration routes. Though it may occasionally breed in Delhi (and there is no evidence of this), it is certainly not resident. The larval host plants are the usual Acanthaceae.

66. ***Precis iphita siccata*** Stichel, ++++ ++++

Chocolate Pansy

The only records of the Chocolate Pansy from Delhi are from 19 July 1959 when I collected a small series in the area adjacent to the Gymkhana Club. Obviously a pregnant female had oviposited, but the species is definitely not normally resident in Delhi, which is much drier than its natural habitat. The larval host plants are Acanthaceae.

67. ***Hypolimnas misippus*** Linné, 1758

Diadem or Danaid Eggfly

This butterfly, with it striking sexual dimorphism, where the female is a perfect copy of the Plain Tiger (*Danaus chrysippus),* occurs in Delhi in variable numbers. It may be common during the latter part of the monsoon and its aftermath, but this is not case every year. In this respect it resembles the Giant Eggfly (*Hypolimnas bolina).* Usually the Danaid Eggfly is the more common of the two, but in some years the situation is reversed. Neither species is usually seen from February to July/August and the impression is that they are invasive species that follow the monsoon. Both are known migrants. There are three female forms matching those of the model, but in Delhi only the typical form is common. The larval host plants are several, with *Portulaca* (Portulacaceae) as a firm favourite. The females are often seen clambering about in flowerbeds laying eggs on the tiny *Portulaca,* and wandering larvae on the ground are often met with.

68. ***Hypolimnas bolina jacintha*** Drury, 1773

Giant Eggfly

The male of this butterfly is larger than the previous one, but similar on the upper surfaces. Their undersides are very different. The female is an excellent mimic of the Common Crow (*Euploea core*). In habits and timing the Giant Eggfly is close to the preceding species. In October/November the females are very large and the white bands of the underside are obliterated, thus trading part of the *mimicry* effect for improved camouflage. In 1961 the species occurred in large numbers and as noted also by Donahue, all were females. Sir *Cyril* Clarke established that all female broods were a regular feature in this species, but that this was not due to a genuine shift in sex ratio but an effect of early death of all male larvae through a sex-specific bacterium. In 1984 and 1985 both sexes were present. The larval host plants are *Portulaca* (Portulacaceae) and various weeds. In August 1983, large numbers were transported by a typhoon from India (Larsen & Pedgley 1991)

69. ***Argyreus hyperbius hyperbius*** Linné, 1763

Indian Fritillary

This largely montane butterfly is rare in Delhi an only a handful of specimens are known. Jandu does not record it, but Donahue found a male in Sunder Nursery on 13 April 1962 and a collaborator found one on the Ridge on 27 March 1964. Ashton took a male on 16 March 1964. Bent Bøgh-Andersen took two males in late March 1961. The most surprising record is three specimens that I collected in a Jor Bagh Garden in

late July 1961, obviously survivors or progeny of the brood earlier collected by Bøgh-Andersen. Records from the plains are relatively few, occurring more frequently the closer one comes to the mountains, and despite the July records it is at best an irregular winter migrant. The larval host plants are violets and *Labelia (*?); the former are cultivated in Delhi in winter and grow as weeds. In late December 1985 I found *A. hyperbius* of both sexes very common on both sides of the River Chambal in the dacoit-infested ravines on the Agra-Gwalior road. I cannot imagine a more unlikely place for this butterfly but was, unfortunately, not able to find the larval host plant which, under the circumstances, could not have been *Viola*. They were definitely breeding there, since I caught some whose wings were not fully hardened (for details see Larsen 1988b).

70. ***Phalanta phalantha phalantha*** Drury, 1770
Common Leopard

Typesetters and proof-readers usually refuse to accept that the spelling difference between the generic and specific names can be correct, but due to historical accident it actually is. All earlier authors record the species only from July till November. I have also seen a few in February and March, as well as in December. It is sometimes very common locally but, as noted also by Ashton, there is not necessarily synchrony of abundance between the Ridge and the New Delhi populations. This may be because the larval host plants on the Ridge are normally *Maytenus(= Gymnosporia*), while *Salix* is the common Delhi plant. The larvae are gregarious, extremely active, and when handled drop off the branch on which they are feeding. The pupae are minor works of art, being jade green with golden ornamentation, though some ten percent are pink; only the pupae of *Euploea* are moe beautiful. The pupal dimorphism is parallel to that of the Plain Tiger (*Danaus chrysippus*) which is also about ten percent pinkish-brown.

Acraeinae

71. ***Acraea violae*** Fabricius, 1775
Indian Acraea or Tawny Coster

This is one of two Indian species in a subfamily, which has numerous representatives in Africa, and somewhat fewer in Latin America. It is widely distributed in India, but is uncommon in the Delhi area. It is known in older literature as *Telchinia violae,* but there is no justification for erecting a separate genus for the species, which is closely related to the African and Arabian *A. neobule.* The name *terpsichore* auct. is erroneously used for *terpsicore* Linné, 1758; this is actually a senior synonym of *Acraea issoria* Hübner, 1816, but under the new Code of Zoological Nomenclature 2000 should not be resurrected since it was never correctly used (H. Gaonkar pers. comm.). The species has been recorded only twice from Delhi. Ashton caught some in Delhi (Rouse Avenue) on 12 March 1964 and I caught three in Hauz Khas Park on 19 and 20 May 1984, where none was met with in 1985. The larvae have been recorded from *Malvaceae, Cucurbitaceae* and *Passifloraceae* (*Passiflora*, *Adenia*). The species does not seem to be a permanent resident in Delhi and is a known, if not persistent and regular, migrant.

Danainae

72. ***Danaus chrysippus chrysippus*** Linné, 1758
Common Tiger

This must be the most widely known and recognised of all Delhi butterflies, being large, spectacular and common all the year round. The form with white hindwings is virtually unknown in Delhi while form *dorippus* without the usual black and white wing tips is very rare. I have taken only four in October and November 1984, which must be less than one in a thousand of all specimens seen. The phenotype indicates that all four were heterozygous. I have taken a single specimen of a very rare form, which lacks the orange tinge much as the 'white' *Rewa* tiger strain does. Males of this butterfly may sometimes be seen in large numbers imbibing *pyrrolizidine* alkaloids from the common weed *Ageratum conyzoides*. The preferred host plant is *Calotropis procera* but many other *Asclepiadaceae* are also used. The early stages are much parasitized by *Ichneumonid* wasps and *Tachinid* wasps.

73. ***Danaus genutia genutia*** Cramer, 1779
Striped Tiger

In older works this butterfly is listed as *D. plexippus,* a somewhat similar American species. It is not particularly common in Delhi and fluctuates in numbers from year to year. It has been recorded from all months of the year but is most common during the monsoon and its aftermath. In 1984 the species was tolerably common, but in 1985 I only saw a handful. The larval host plants are Asclepiad creepers, but never *Calotropis,* the preferred host plant of *D. chrysippus.* The Striped Tiger is less well adapted to arid conditions than is *D. chrysippus.* In August 1983, large numbers were transported by a typhoon from India (Larsen & Pedgley 1991).

74. ***Tirumala limniace exoticus*** Gmélin, 1790
Blue Tiger
This fine species is the largest of the Delhi butterflies. It is sporadic of occurrence and whenever it appears in numbers it is the result of migrants' successes in breeding during the monsoon. There are records from all months except December, but numbers are small and I doubt that it is a permanent resident. Ashton found it very common in August 1967 but during 1984 and 1985 I have, all told, seen less that fifty. In August 1983, large numbers were transported by a typhoon from India (Larsen & Pedgley 1991).

75. ***Euploea core core*** Cramer, 1780
Common Indian Crow
The situation in respect of this migrant butterfly is much the same as for the Blue Tiger. It is not a permanent resident but may breed and build up a considerable population during the monsoon, though it does not do so every year. During the 1984 and 1985 seasons I did not see more than a score of specimens. In August 1985 single female oviposited in Hauz Khas Park during a period of at least ten days. I collected and bred some 35 specimens but saw no more in the park. The larvae were dimorphic, some being normal 'orange' and some 'white'. I saw the female ovipositing only on *Nerium oleander,* but in captivity the larvae also fed on *Ficus religiosa* and *Calotropis procera.* The speed of transformation was remarkable. A fresh egg from 13 August hatched as an imago seventeen days later. The silvery pupa is quite spectacular. Both sexes can 'play dead' for longer than other aposematic species, an issue discussed in more detail by Larsen (1991).

HESPERIIDAE

Coeliadinae

76. ***Hasora chromus chromus*** Cramer, 1782
Common Awl
The Common Awl is a migratory species that may not be a genuine resident of Delhi. All records are from the monsoon and its aftermath. Normally it is uncommon in Delhi. The male is deep chocolate above with a prominent androconial streak, while the female has two hyaline spots. The purplish underside of the hindwings with the white transverse stripe makes it unmistakable in Delhi, though there are similar jungle species. The eggs are laid singly on the fresh shoots of *Pongamia.* In common with other Skippers the larva lives in an envelope spun from leaves of the host plant and also pupates inside such a shelter.

77. ***Badamia exclamationis*** Fabricius, 1775
Brown Awl
This is the only other large Skipper in Delhi and its pointed wings make is quite unmistakable. The Brown Awl is not a Delhi resident but migrants may breed here and in some years large populations can build up. This happened in the Lodi Gardens in July 1961. Normally it is scarce and during my recent two years in Delhi I have not seen more than half a dozen specimens. The larval host plants are, among others, *Terminalia, Combretum* (Combretaceae), *Hiptage benghalensis* (Malpighiaceae), and *Ficus* (Moraceae).

Pyrginae

78. ***Spialia galba galba*** Fabricius, 1793
Indian Grizzled Skipper
This is the only Indian representative of a genus that is particularly well developed in East Africa and in the Middle East. It is the only Delhi representative of its subfamily, though one would have suspected *Gomalia*

elma also to be present. The precise white spotting on a black background makes it easy to recognize. It has been found in many localities and in most months of the year but cannot be called common, even though it is probably often overlooked because of its unobtrusive habits. It feeds mostly on low Malvaceae and in captivity happily accepts garden hollyhock (*Althaea).*

Hesperiinae

79. ***Matapa aria aria*** Moore, 1865
Common Redeye
The only records are those of Jandu who considered it very rare in August. Doubtless its status is that of a rare vagrant. Though living very unobtrusively near palms, the host plants, it comes readily to light and gives its presence away. The eyes are truly red and stay red after death.

Note: *Gangara thyrsis thyrsis* Fabricius, 1775 (the Giant Redeye) is explicitly recorded from Delhi by Evans (1949), but as only one of three from northwestern India, the others being from Kangra. It is a huge and unmistakable skipper with ochreous spots on the forewing and Donahue (pers. comm.) agrees it should not be included in a Delhi list.

80. ***Suastus gremius gremius*** Fabricius, 1798
Indian Palm Bob
This butterfly may immediately be distinguished from the other Skippers by the presence of black spots on the hindwing underside. Found throughout the year, it is not normally common in Delhi, though locally it may flourish for a single brood. It is rarely seen except on *Lantana* flowers, which may indicate that it stays high when not feeding. The usual host plant is palms, but it can feed on grasses and has been noted as a minor rice pest.

81. ***Telicota colon colon*** Fabricius, 1775
Pale Palm Dart
This is the only orange Skipper yet recorded from Delhi where it is a rarity. Donahue and his collaborators got seven, and during 1984-6. I collected only two. However I recollect that one of my childhood summers (probably 1959) yielded large numbers in Jor Bagh. Jandu does not report it and it may not be a permanent resident. All specimens but one are from the September-November period. The exception is a female that I caught at Sultanpur on white Lantana on 16 March 1985, a most unexpected capture. Despite the colloquial name, the species apparently feeds mainly on sugar-cane.

82. ***Pelopidas thrax thrax*** Hübner, 1821
Branded Swift
With this species we come to a group of four very similar Skippers. The first two are rather larger than the others and the male forewing upperside of both carries a prominent androconial streak and both sexes have two well developed hyaline spots in the forewing cell. The androconial streak is white in *P. thrax,* black in *P. mathias.* Females are almost impossible to tell apart by external character, though the white spots of the hindwing underside are less precise in the present species. *P. thrax* has been recorded from most months of the year but is rarely as common as *P. mathias.* The larval host plants are grasses.

83. ***Pelopidas mathias mathias*** Fabricius, 1798
Small Branded Swift
This is probably the most common of the Delhi Skippers, being found in all habitats most of the years. It often flies with *P. thrax,* and both are at their peak of abundance during and immediately after the monsoon. These Skippers are fond of basking in the sunshine with the hindwings fully open and the forewings only partly open, an unusual posture for a butterfly. The flight is extremely fast but both sexes are fond of flowers and may be collected when at rest. The larval host plants are grasses.

84. ***Parnara bada bada*** Moore, 1878
African Straight Swift
If a Delhi Skipper has no brand and is without a prominent white spot on the upperside of space 1b on the forewings, it is this species, which normally also lacks any white spots in the forewing cell. The size is

inferior to that of the two *Pelopidas.* Donahue and his collaborators obtained only six specimens. I collected five or six in 1984 but did not see it in 1985. All records are from August till November and it may not be a permanent resident. The larval host plants are grasses. It used to be considered a subspecies of *Parnara naso* Fabricius, 1793 from Mauritius.

85. ***Borbo cinnara*** Wallace, 1866
Rice Swift
The Rice Swift can be separated from the two *Pelopidas* by the lack of an androconial streak in the male and by the absence of a white spot in the cell of the hindwing underside(which may be missing also in lightly marked *P. thrax).* There is usually only a single hyaline spot in the forewing cell of B. *cinnara, but* a well marked female may resemble the *Pelopidas* in having two. While not very common, it is more frequent than *P. naso.* Like that species it is limited to the monsoon period, and whether resident or migrant remains to be determined. The larval host plants are grasses.

86. ***Gegenes nostrodamus*** Fabricius, 1793
Mediterranean Skipper *or* Dingy Swift
This Skipper resembles the other Swifts in shape and flight pattern, but the male is usually unmarked on the upperside and the female's white spots are not hyaline. It is not a common butterfly and is mainly found in the Sunder Nursery where it aggregates on *Gomphrena globosa* flowers, sometimes in numbers. I have seen up to twenty on one occasion. Throughout its range the species is mainly found in gardens and other irrigated areas, having penetrated down the Nile to Khartoum, Sudan, although otherwise absent from tropical Africa. The larval host plants are grasses.

Discussion

The 86 butterfly species in Delhi constitute quite a high number, given its climatic extremes. In the whole of eastern Oman, with its mountain massifs, there are only 50 species. However the 86 butterflies of Delhi are not equally common. In fact fifteen must be considered so scarce that they may be classified as accidentals, whether or not they arrived because of their own powers of flight or were accidentally transported. In contrast, about eleven species are so common that they can be met with practically anywhere, at any time of the year. A further seventeen are common but show distinct seasonal preference, usually being scarce from December till April. Another seventeen are fairly common, possibly only during some part of the year. They cannot be missed by anyone monitoring the situation with a little care in the course of a season. Nineteen species may be classified as scarce; they have to be looked for carefully, are only found in restricted numbers, and may not occur every year. A few are residents, but most are regularly arriving migrants whose breeding potential in Delhi is weak. The data are summarized in table A.

TABLE A. The Delhi butterflies by categories of abundance

Category	Number	Percent
Very common	11	13
Common	17	20
Fairly Common	24	28
Scarce	19	22
Accidental rare	15	17
TOTAL	86	100

I might point out that during my stay in Delhi in 1984-6, I collected all the species listed except for *C. clytia, D. eucharis, C. danae, C. fieldi, D. isocrates, T. balkanicus, T. callinara, P. nora, C. fabius, E. nais, A. hyperbius, O. medus and M. aria,* in all thirteen species, three of which I did collect as a child. My personal record is thus 85 percent of the total indicating that a good coverage is possible in a limited time.

Biogeographically Delhi's butterfly fauna is dominated by widespread and common Oriental butterflies with a total of 54 species. Sixteen are classified as Palaeotropical since they are widely distributed in Asia, Arabia, and Africa while their ultimate origins cannot be determined. With only four species the Afrotropical element is very small, and the desert adapted Eremic group contains only six, even with the inclusion of all four *Tarucus.* Only five temperate Palaearctic species have been recorded, mainly as scarce migrants. The total picture is summarized in table B.

Table B. Zoogeographical composition of the Delhi butterflies

Category	Number	Percent
Afrotropical	4	5
Oriental	54	63
Palaeotropical	16	18
Eremic	6	7
Palaearctic	5	6
Ubiquitous(*Vanessa cardui)*	1	1
Total	86	100

Many butterflies have a great migratory potential, though this is not necessarily always exercised. Resident populations may receive reinforcement through migration and may occasionally give rise to migration. In areas of climatic stress whole populations are regularly wiped out by extremes of weather in places where they have survived for years. Migratory potential allows for immediate re-colonization. Thus in areas of climatic extremes and unpredictable rainfall, many of the butterflies present are migratory. This is also the case in Delhi. Of the total, only 36 are definitely non-migratory, while nearly as many are strong/regular or even obligatory migrants, many of which with no permanent foothold in Delhi.

Table C. The migratory status of the Delhi butterflies

Category	Number	Percentage
Non-migratory	36	42
Suspected migrants	8	9
Weak migrants	8	9
Strong migrants	17	20
Obligatory migrants	17	20
Total	86	100

In all, 36 species are not under suspicion of migratory behaviour, while a further eight are suspected migrants. Another eight are definite migrants that perhaps do not migrate regularly or very far. Seventeen are regular long distance migrants which sometimes move in immense numbers. The final seventeen are those where migration appears to play such a major role in their biology that the species might not survive without it. The total picture is summarized in Table C.

Table D. Number and percent of migratory butterflies in Delhi

Area	Total species	Migrants	Number	Percent
Lebanon	151		26	18%
East Jordan	81		20	25%
Yemen (North)	122		33	27%
Northeast Oman	48		20	42%
DELHI	**86**		**42***	**49%**
Hejaz	36		18	50%
East Arabian Coast	28		15	57%
United Arab Emirates	23		15	65%

Data are from Larsen (1982), Larsen & Nakamura (1983), and Larsen & Pedgley (1985); *not including suspected migrants

Taken with other similar data, table D shows that the larger the butterfly fauna, the lower is the proportion of migrants. This is not surprising, since the higher numbers are due to species that have adapted carefully to local, predictable habitats. The contrast between East Jordan and Delhi in table D is strong. Most migration seems to have developed as a survival mechanism for butterflies inhabiting poor habitats, with constant threat of drought, where migration may be an easier way out that the need for specializations to unpredictable sub-desert conditions.

Concluding remarks

All told, the Delhi butterfly fauna, while relatively rich and of much interest, contains little that is surprising. The resident species are all well known from similar habitats, and the proximity of the Himalaya and the Deccan forest will mean that unexpected strays occur from time to time. There are also not many surprising absentees. The most surprising member of the fauna is *Orsotrioena medus* which appears to be a scarce resident as it was found in the 1940s and again in the 1960s. It is definitely not migratory.

Notwithstanding the fact that Delhi's butterflies must rate as quite well known, this should not deter anyone from continued monitoring. An answer is still needed to the question of whether the scarce species are truly resident or whether they are regular immigrants. Most of all, a thorough study of the two Satyrids, *Melanitis leda* and *Mycalesis perseus,* throughout the year is needed, and a comparison with the pattern of *Junonia almana*. How do they spend the period from January(when a few dry season morphs are still met with) till July/August when the wet season form appears? My own marking experiments which demonstrated that *Eurema laeta* can spend at least three months of winter (and probably longer) as an adult are also worth following up.

There are a couple of similar studies of major towns, though none is taken as far as the 1980s. One on Lucknow (de Rhé Philipe 1902) is probably not sufficiently in-depth, but Calcutta was studied between 1880 and 1944 and should have a fine baseline for current comparisons (Rothney 1882, Sanders 1944, Sevastopulo 1944). Both faunae are rather different from Delhi. I am currently studying the butterflies of Dhaka, Bangladesh which are very different from Delhi and even next-door Calcutta.

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Butterfly Identification – Roses

Text and Photographs
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Mysore

Word: "Rose"
Noun:
1) A dusty pink colour
2) Any of many shrubs of the genus Rosa that bear roses

Species: There are 3 species of Roses, namely Common Rose (Pachliopta aristolochiae), Crimson Rose (Pachliopta hector) and Malabar Rose (Pachliopta pandiyana).

Identification: Roses are easy to identify because of their size and coloration of body and the wings. As the name suggests the body will be rose in color and they also have rose spots on the hindwings. In case of Common Rose the forewings will have pale white coloration on the black background and hindwings will possess a white area surrounded by series of rose color spots. Crimson Rose will have two white bands on the forewing and hindwing will have 2 series of rosy spots. Malabar Rose looks similar to that of Common Rose, only difference is that the white area on the hindwing will be much broader and the butterfly looks duller than Common Rose and Crimson Rose.

Habitat: Both Common Rose and Crimson Rose are pretty common through out India in Plains, Scrub Jungles, Deciduous forests, Semi-evergreen Forests, Farms, Gardens etc. Distribution of Malabar Rose is restricted to central and southern Western Ghats.

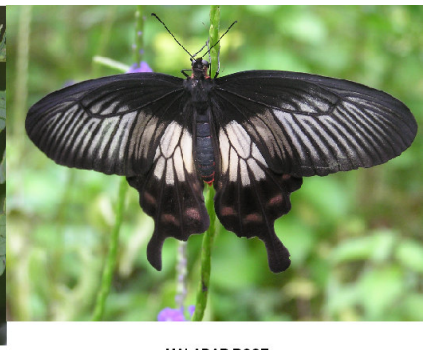
Host Plants: Aristolochia spp. and Thottea siliquosa

Behavior: The roses can be seen basking in the early morning and usually they bask in-groups (At least 2 – 5). Once they are warmed up they will be quite active during the day often visiting the nectar plants. The females can be regularly seen busily fluttering near their host plants. The females spend lot of time investigating their host plants before laying eggs. Roses also occasionally mud-puddle but not in-groups.

What you can do? Roses are considered to be highly unpalatable to small birds and mammals. For the same reason Common Mormon (Papilio polytes) mimics this butterfly. Despite of this fact I have seen Bulbuls and Bee-Eaters happily feeding on the Roses. It would be interesting to study what happens to the birds that feed on the adults and caterpillars of Roses.


COMMON ROSE


CRIMSON ROSE


MALABAR ROSE

Invitation: ButterflyIndia Meet - 2006

Vijay Barve, Bangalore
Moderator, ButterflyIndia

Dear Friends,

I am happy to invite you all to "ButterflyIndia Meet 2006". This year the meet is planned at Jairaampur in Arunachal Pradesh (More details on how reach will be posted soon). The meet is scheduled between 20-25th August 2006.

Primary objective of this email is to get a number, which will help in better planning. More details on formal registration will be made available in the due course.

The agenda of the meet is going to be full of field sesions and interactive sessions on topics related to butterflies like identification, conservation etc. (The draft is under preparation and will be posted soon.)

Anyone interested in serious butterflying is welcome for this meet. We expect them to be members of ButterflyIndia yahoogroup.

To express your interest in this meeting please click on the link here and enter the detail in the Yahoogroups database(You need to log in using yahoo id), or send an email to me .

Regular updates on the meet will be available at here.

Regards,

Vijay Barve
For ButterflyIndia

For more details write to Vijay Barve - vijay.barve@gmail.com or Arif - arif_arunachal@yahoo.com