

# Butterflies

Flying Colours of Patna Zoo

S. Chandrasekar, IFS  
Ankit Ranjan



# Butterflies

Flying Colours of Patna Zoo



**S. Chandrasekar, IFS**  
**Ankit Ranjan**



Department of Environment, Forest and Climate Change  
Government of Bihar



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CHIEF MINISTER  
BIHAR



PATNA

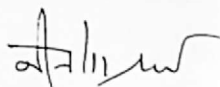
## Foreword

The butterfly counts not months but moments, and has time enough.

-Rabindranath Tagore

Butterflies are indicators of a healthy environment and healthy ecosystem. It gives me immense pleasure to know that Sanjay Gandhi Biological Park, Patna is home to a diverse range of colourful butterflies, preserved in its beautiful campus, despite surrounded by concrete buildings. I appreciate the initiative taken by the authors in documenting these flying beauties, which if not preserved will vanish forever and deprive the future generations from enjoying these colourful creatures. This book "Butterflies - The Flying Colours of Patna Zoo" will prove to be useful educational guide for people of all age groups and people with different field of interests, especially to the young kids who can get to know the rich biodiversity in Bihar.

I congratulate the authors of this book Shri S. Chandrashekhar and Shri Ankit Ranjan for Compiling this valuable source of information, in the form of a book, for better understanding and conservation of these rare living creatures, for the generations to come.



(Nitish Kumar)



# Message



नीरज कुमार सिंह

मंत्री

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बिहार सरकार

पत्रांक : .....

दिनांक : .....

## Message

I am happy to know that Sanjay Gandhi Biological Park, Patna popularly known as Patna Zoo is haven to numerous varieties of butterflies. The authors have taken keen interest to document these valuable butterflies for the benefit of the society and for the future generations. This is a good contribution to popularize the subject of butterfly conservation and its ecological role. I am sure this book "Butterflies-The Flying Colours of Patna Zoo" will be of immense help to teach the students and common people about these beautiful insects found around us and their conservation values.

I appreciate the authors of this book Shri. S. Chandrasekar, IFS, Conservator of forest and Shri. Ankit Ranjan for coming out with this valuable book for the benefit of people.

(Niraj Kumar Singh)



## Deepak Kumar Singh

Principal Secretary to the Government,  
Department of Environment, Forest and Climate Change  
Government of Bihar, Patna

### Message

“What the caterpillar calls the end of the world the master calls a butterfly” said by Richard Bach, an American Novelist, is a fact that testifies that the lives in this earth is unique like the uniqueness of its own. The butterflies represent the view that change is always permanent in one's life like their metamorphosis from one form to another in an amazing way all natural. Apart being admired for its beauty these colourful flying insects are indicators of the healthiness of an environment which is shared by all the living creatures including human beings. Everyone of us is facing the vagaries of climate change and the extinction of animal species is happening right in front of eyes, biotic pressure on the habitats of other living creatures is increasing exponentially in proportion with the increase in population, given these situations it is heartening to know that Patna, the capital city of Bihar is still abode for about 100 species of butterflies. This book is presenting the snapshot of all about the butterflies for an amateur butterfly watcher aiming to educate the zoo visitors about the conservation values of butterfly. This book will be a tool to evoke interest on this subject for people from all walks of life irrespective of the age.

I congratulate the authors of this book Shri. S. Chandrasekar, IFS, Chief Conservator of Forest and Shri. Ankit Ranjan for taking out valuable time from their routine for successfully coming out with this educative and colourful book and wish them to come up with similar books in series for creating awareness and compassion for wildlife conservation among the zoo visitors in particular and the common people in general in the days to come.

With Best Wishes,

Deepak Kumar Singh





## **Ashutosh, IFS**

Principal Chief Conservator of Forests (Development)  
Department of Environment, Forest and Climate Change,  
Govt. of Bihar, Patna.

### **Message**

Unlike other insects Butterfly is an insect which attracts everyone towards them and symbolize compassion and peace. These beautiful creatures have evolved along with their host plants and other flowering plants all these years in this earth and are still very much here in all our backyard to behold their beauty. People should endeavor to live in an eco-friendly way to protect other living mates on this earth to protect their own survival. The insects like Butterflies indicate the robustness and healthiness of the surroundings where we live. This book about butterflies will be a good medium to create awareness about the conservation of butterflies and garner the support of public to conserve nature. This pictorial documentation of butterflies in the form of a book will be a valuable addition to the records of biodiversity in Bihar. This book will be the first in the zoo education series for educating the zoo visitors and a valuable addition to the publications of the department, documented on various topics.

The endeavor of Shri. S. Chandrasekar, IFS and Shri. Ankit Ranjan to come out with this book is appreciable. I am happy to note that the authors have utilized their valuable free time in a productive way to document the butterflies within the campus of Patna Zoo.

**Ashutosh**



## Acknowledgements

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We would like to bring on record and thank Dr. Sasi Kumar, IFS., Tripura Cadre, an acclaimed photographer & Forester, presently working in Indira Gandhi National Forest Academy, Dehradun and Prof. Dr. Sunil Kumar Chaudhary, Professor and Head, Department of Botany, Tilkha Manjhi Bhagalpur University, Bhagalpur, known for researches on Gangetic Dolphin and its conservation, for triggering the spark to come out with a book on Butterflies.

We are grateful to Shri. Ashutosh, IFS., Principal Chief Conservator of Forest (HoFF), Bihar, Patna for constant encouragement and for the valuable suggestions all through the entire work.

The authors are equally grateful to all the forest officers of the Department of Environment, Forest and Climate Change, Government of Bihar for their words of appreciation which boosted the moral to the authors to finally compile this documentation in the form of a book.

We thank Mr. Deepak Kumar Singh, IAS., Principal Secretary, Department of Environment, Forest and Climate Change, Government of Bihar and the then Principal Secretary, Mr. Vivek Kumar Singh, IAS, for their interest in scientific documentation of biodiversity of Bihar in general and for recognizing our work on butterfly documentation.

Our sincere thanks to, Dr. Samir Kumar Sinha, Dy. Director & Division Head - Species Recovery & Protected Area Recovery, Wildlife Trust of India for his valuable time to correct the contents; Dr. Gopal Sharma, Scientist- E and Officer Incharge, Gangetic Plains Regional Center, Zoological Survey of India, Patna and Dr. Navneet Singh, Scientist - E, Zoological Survey of India, Kolkata for having helped us to identify the butterfly species with their expertise and for sparing their valuable time and for making valuable suggestions.





Our thanks are also due to all the officers and staffs of Patna Zoo for making the task, which was done during the leisure time, more comfortable during the documentation work in Patna Zoo.

The first author S. Chandrasekar would place on record a special and big thanks to the family members Sathya, Nilaa and Surya for bearing with the absence on holidays and Sundays continuously when out for photo documentation and for their love and constant encouragement to come out with this book.

The Second author Mr. Ankit Ranjan, who has contributed beautiful photographs, edited the photos and done layout & design of this book, would like to thank his family members, teachers and friends who were constantly encouraging him to pursue his passion for photography, especially the documentation of butterflies.

S. Chandrasekar, IFS

Ankit Ranjan



# Few words About this Book

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This book is primarily aimed to educate the zoo visitors in particular and the common people in general about the characteristics, life cycle and the behaviour of butterfly, and to make the readers identify different species of butterfly in Patna Zoo and at the same time to document the diversity of butterflies. Though this book is designed to kindle one's curiosity to watch and conserve butterflies in a responsible manner and as a scientific documentation of butterfly diversity in the Zoo.

This documentation as an education material in the form of a book will be very useful and handy for zoo visitors, butterfly watchers, photographers, kids and elders, teachers and students, biology scientists, poets, foresters, fashion designers, alike. Butterflies are free ranging insects, and their beauty can be appreciated more in its natural, undisturbed, unhindered, eco-friendly and free ambience like the one here in Patna Zoo. Nevertheless, they add colours to the environment around us similar to what the flowers do to the garden. This book can help one to identify the butterflies in their surroundings, the time and season to watch butterflies in brief.

The presence of butterfly in an area shows the healthiness of the environment, or to put it otherwise the butterflies are one of the biological indicators of a healthy environment. Everyone of us love to raise a beautiful garden in our backyard or in any of the empty land available around our home and try to tend it on our own and everyone wants it to be the most colourful one. No doubt, it is the flowers which add colours to the beauty of garden, apart from adding freshness to our otherwise restless mind. Similarly, the butterflies are like winged flowers which add colours to both the garden and the beholder. No wonder why many poets have wrote lots about the butterflies and no one will deny in saying butterflies are the flying flowers of the garden and make us to feel light, fresh and peaceful, merely by watching them flying.

Patna Zoo is one of the large zoos and a well-managed zoos in the country and has successfully bred various wild animals and earned the patronage of the visitors, so this book is aptly titled “Butterflies - Flying Colours of Patna Zoo”, which implies the successful management and the colourful butterfly diversity of the Patna Zoo.





Altogether 92 number of butterfly species were documented in this book. This book has 14 chapters with index to common/English names of butterflies for easy perusal and use.

Each family of butterfly has been given page margin of different colours for easy and quick retrieval of information especially during butterfly watching. In the outset, the biology of butterfly is given for the young and general readers to know all about what butterfly is. The photographs of each butterfly species are provided with common name, scientific name and its wing span, their status and they are placed sequentially as per the family.

This book will guide the reader to select appropriate host plants to attract particular species of butterflies and to create their own butterfly garden, rather this will serve as a guide to understand which butterflies are expected in a garden with the available host plants. Even an organic kitchen garden can be a butterfly garden. This book is designed to make readers to get the required information on the subject at ease without much difficulty and to practise butterfly watching and be an ambassador to conserve these precious winged jewels.

This book is a precursor to the documentation of the biodiversity of the Patna zoo campus in the years to come, in the form of book series on different life forms, in tune with the primary objectives of the zoo. Biological Classification and nomenclature is a dynamic field with the frequent changes reported on the basis of modern innovative technologies, interventions and discoveries.

Therefore, the readers who come across any mistake in this book or if you come across any new species of butterfly inside the Patna zoo campus, you are requested to kindly inform the zoo administration and to the authors to correct or to add them to the collection of species documented in the following reprint of this book.

All the photographs included in this book are clicked from the Patna Zoo premises.

S. Chandrasekar, IFS

Ankit Ranjan





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# 1

## Introduction

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Flying Colours of  
Patna Zoo



Common Leopard

S. Chandrasekar

## The flying Colours of Patna Zoo

Sanjay Gandhi Biological Park, Patna popularly known as 'Patna Zoo', the only zoo in Bihar, is one among the eminent and large zoos in the country and owing to its lush green vegetation it is known as 'Lungs of the Patna' it is located in the middle of the Patna town, historically important and the second highly populated city in the eastern India. The alluvial soil, river Ganges and its location near the Himalayas offer a unique climatic condition conducive for proliferation of diverse flora and fauna. Before its creation in the year 1969 as a botanical garden.

the landscape of this park remained as the forests in the backyard of the Governor House of Bihar (Raj bhawan). Presently, the zoological section houses 1250 animals belonging to 100 species in different natural immersion enclosures. The unique combination of natural factors offer a favourable environment for ex-situ breeding of animals housed in the zoo.

Modern zoos have always strove to achieve its objectives of conservation breeding, research, education and recreation to the common people in the area, and so has the Patna Zoo. Apart from the different animals housed, this park is haven to numerous tree species, free ranging-birds, mammals, reptiles, insects and medicinal plants. Diverse floral combination together with the mico-climatic pattern offers a conducive habitat for myriad of insects. Though this park is located in the middle of a concrete jungle like a closely knit buildings in Patna, still it supports a variety of flora and fauna in good numbers, some preserved since its long history as a small



patch of forest land and being situated adjoining to Patna Golf Club offers a soothing green space and picturesque scenic beauty to the denizens of the town.

Zoo is an ex-situ conservation area which helps making people aware about the importance of different animals and plants, apart from conservation per-se and doing research on them. The variety and the variability of the flora and fauna of the park, called as biodiversity, can best be conserved and can be a tool for educating people about its importance, threat and conservation options for its better understanding in a laymans language. Each species of

flora and fauna plays a crucial role in the ecosystem it abodes and some of them are admired for their beauty, agility and magnificence.

One among the groups in this zoo's biodiversity is butterfly, a winged insect, a joint-legged animal. The wings of the butterflies are covered by scales which give different colours to them and make unique within their taxonomic order, scientifically known as, Lepidoptera (Lepidos - Scales, ptera - wings) meaning 'scaly winged'. As per estimates there are 1501 species of butterflies found in India (Gaonkar, 1996).







Ankit Ranjan

# I N T R O D U C T I O N

Flying Colours of  
Patna Zoo

# 2

## Classification

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## Classification of Butterflies

The biological classification is the arrangement of all the known living organisms groups of similar species. if not systematically classified, it would be almost impossible to identify and study similar species. Animals and plants are classified into units called taxa based on factor common to each. There are millions of plants and animals found on this earth, if theydy them, understand them, or conserve them.

Biological classification has two functions. The first is to recognize and describe as completely as possible the basic taxonomic units or species. The second is to devise a way of grouping these units on the basis of their resemblance and relationships.

Species is the defining unit of the class. Closely related species belong to the same genus, related genera belong to a family, related families to an order and so on through classes, phyla and finally the kingdom. There are fewer divisions at each level, so while there are millions of species, there are only five kingdoms.

For examples, Insects belong to the class Insect, within the phylum Arthropoda - the joint legged animals.



Simply put, this is how butterflies are classified

**Kingdom**

Animalia (animals)

**Phylum**

Arthropoda (arthropods)

**Class**

Insecta (insects)

**Order**

Lepidoptera (butterflies and moths)

**Family**

Depends on the type of the butterfly, eg., Nymphalidae

**Genus**

Depends on the specific butterfly, eg., '*Danaus*'

**Species**

Depends also on the specific butterfly, eg., '*chrysippus*'

For example the nomenclature of the butterfly Plain Tiger is *Danaus chrysippus*. The first letter of the genus has to be capital and the first letter of the species has to be lower case and the entire scientific name has to be either italicized or underline.



In general, the butterflies are classified into five families as follows:

**Papilionoidae (commonly known as 'Swallowtails')**

Some of the biggest and most beautiful butterflies in India fall under this group. Most of these butterflies have tailed hind wings (like the wings of a swallow) hence the name swallow tails. Almost all these butterflies have long slender legs and the males are often seen mud-puddling. The forewings are long and narrow but the hind wings are broad. Many of their caterpillars look like bird droppings in the early instars. They have a longer life span compared to the other butterflies and some of these swallowtails can live for months.

**Nymphalidae (commonly known as 'Brush footed butterflies')**

They are given rather this unusual name because their first pair of legs is smaller in size, covered with hair and are seldom used. Although many of this family come to flowers, there are many others in this group who prefer overripe fruit, urine, animal droppings and dead crabs. This group is among the largest butterfly families seen in India. Some of the butterflies in this group include the Rajahs, Nawabs and Evening Browns.

**Pieridae (commonly called 'Whites and Yellows')**

These butterflies are called 'Whites and Yellows', because the underside of their wings are white and yellow in colour. Many of them also have red, yellow and black markings on them. They are mostly bask with their wings closed or partially open. Many of the male butterflies of the Pieridae family are seen mud-puddling in large numbers, mostly during the summer months on drying riverbeds and other damp patches. Some of the butterflies of this group include Grass Yellows, Orange Tips, Emigrants and Albatrosses.



### **Hesperiidae (Commonly called 'Skippers')**

These butterflies are mostly seen in the early hours of the morning or in the evening. They are commonly known as 'Skippers' because of their fast flight. Compared to the other butterflies, their bodies are stouter and heads larger in size. Their antennae too are somewhat different. Instead of the usual club-shaped antennae, their antennae are hook-like in shape. Most of the butterflies of this family have a long proboscis, which helps them to get nectar from flowers that have long corolla tubes. The Awls, Palm Darts and Swifts are some of the butterflies that belong to this family.

### **Lycaenidae (Commonly called 'Blues')**

Some of the smallest and delicate looking butterflies fall under this group. They are called the 'Blues' because they mostly bluish in colour on the upperside. Many of the caterpillars of the Lycaenidae family are tended to and protected by ants. Strangely some of their caterpillars feed on aphids, scale insects and even ant larvae. Besides flowers they feed on damp patches and bird droppings too. The Pierrots, Flashes, Silverlines and Lineblues are some of the butterflies that belong to this family.

The butterflies under family dominates the Patna Zoo landscape with (Lycaenidae Family) 29 numbers, with second largest by Nymphalidae family with 28 numbers, the Pieridae family with 17 numbers comes third, Hesperiidae family with 10 numbers comes fourth and the smallest family Papilionidae with 8 numbers are found in the premises of Patna Zoo. Altogether 92 number of butterfly species were documented in this book.

Among the butterflies found in Patna Zoo, the Blue Mormon is the largest and the Tiny Grass Blue is the smallest butterfly. It is to be noted that Blue Mormon is the second largest butterfly found in India. The largest moth found in Bihar is the Atlas Moth, which is the largest moth found in India.

# 3

## Parts of a Butterfly

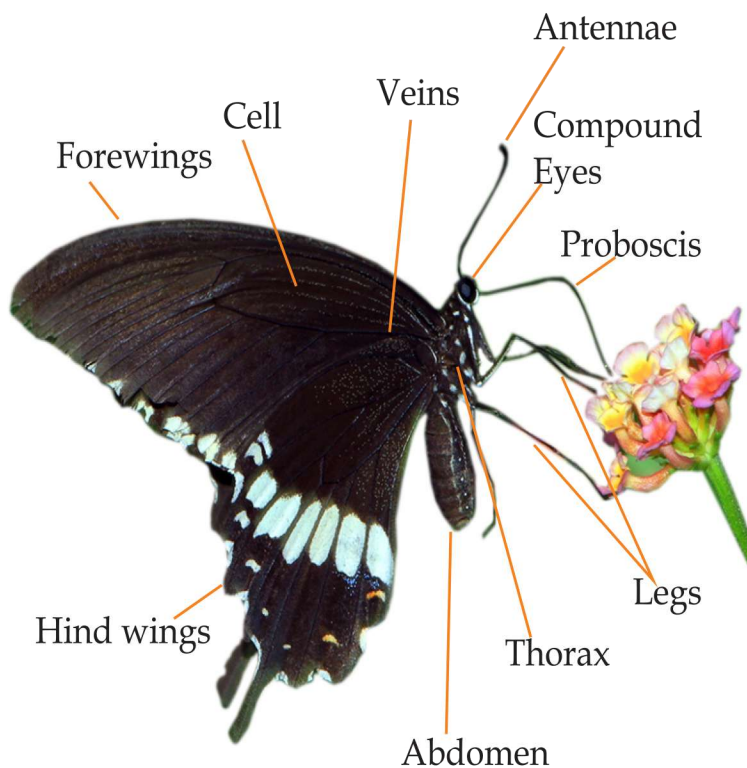
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Flying Colours of  
Patna Zoo

# PARTS OF A BUTTERFLY

Butterflies like any other insect have three body parts - the head, the thorax and the abdomen. The head contains the eyes, the proboscis and the antenna. Thorax is the middle section of the butterfly's body. The wings and legs are attached to the thorax. The abdomen mostly contains reproductive organs, digestive organs - the organs that digest food, and excretory organs - those that get rid of waste products. Altogether the body consists of 13 segments of which the first is the head; and next three compose the thorax; and the remaining nine the abdomen.



Parts of a Butterfly  
(Common Mormon)





### **Antennae**

For detecting smells, sense of orientation and balance. Antennae are the sensory organs of odour and touch.



### **Compound eyes**

For detecting colour and movement. Butterflies can see ultraviolet rays, which are invisible to human eyes.



### **Proboscis**

A long straw-like tubular organ used for drinking nectar or fluids. Normally coiled when not in use. Butterflies sip nectar through the proboscis after uncoiling it.



### **Legs**

Butterflies have three pairs of segmented legs. The legs are also used as sense organ to taste the food and detect their host plant. Their legs have sense organs or receptors called 'chemoreceptors', which are nerve cells that have the ability to sense certain chemicals. That is how they find flower nectar and the suitable plants to lay their eggs.



### **Thorax**

This part lies between the head and the abdomen and contains muscles that control the legs and wings of the butterfly. Wings are attached to the thorax.



### **Abdomen**

The distal part of the butterfly's body contains flexible tube with organ like heart, digestive and reproductive organs etc. Spiracles - a hole-like structure in the abdomen helps the butterfly to breathe.



### **Hind wings**

Lower wings, close to the abdomen.



## Fore wings

Upper wings, close to the head.



## Cell

This is an area enclosed by veins. The arrangement of veins around the cell is helpful in the identification of different groups of butterflies.



## Veins

These rib-like tubes support and reinforce the strength of the wings and take nourishment to them.

Each wing is made up of two closely pressed chitinous membranes (chitin is a natural polymer, a complex molecule), supported by a network of veins between them. The number and arrangement of wing veins are not the same in all butterflies and the distinction in venation helps in classifying butterflies. Covering the wings are thousands of colourful scales. It is these scales that make up the 'coloured powder' that comes onto our fingers when we hold a butterfly. The scales are arranged like overlapping roof tiles of varied shape. They contain pigments that give butterfly wings the colour and pattern. The wing colour patterns serve as a visual aid during courtship display and mating; the brightly coloured patterns of males serve as long-range communications. The wing colour patterns are diverse and are very useful in the visual identification of a butterfly.

The forewings of male butterflies have scent scales called 'Androconia'. These scales release pheromones that attract females of the same species. Pheromones are chemicals which help in communication. Their most important function is to attract the opposite sex.



### Upperside -

When a butterfly opens its wings, what you see is the upperside of the butterfly.



### Underside -

When a butterfly closes its wings, what you see is the underside of the butterfly.



# PARTS OF A BUTTERFLY

# 4

## Butterflies and Moths

---





*Oxymacaria pyreris* (Moth)

S. Chandrasekar

## BUTTERFLIES AND MOTHS

### 4.1. How a butterfly is different from a moth?

Looks alike butterflies, moths also belong to the same taxonomic order 'Lepidoptera' under which the butterflies are also classified. However, they are different from each other, and distinguishing one from the other can sometimes be difficult. There are few distinguishing characteristics which make their identification easier.



*Theretra Clathro* (Moth)

S. Chandrasekar

Grass Demon (Butterfly)

S. Chandrasekar



# BUTTERFLIES AND MOTHS

## Butterfly and Moth

S. Chandrasekar

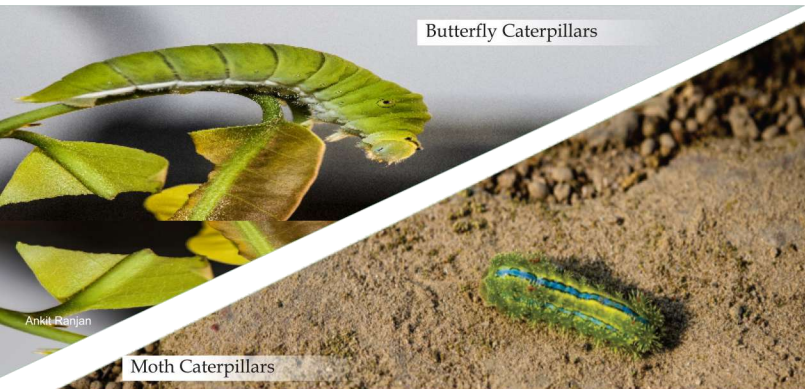


Auxa sp (Moth)



Common Crow (Butterfly)

Ankit Ranjan



# B U T T E R F L I E S A N D M O T H S

| Characteristic           | Butterflies                                                                                                       | Moths                                                                                                  |
|--------------------------|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Antennae                 | Clubbed, knobbed at the tip                                                                                       | Various types of antennae except clubbed.                                                              |
| Position of the antennae | Hold the antennae erect and extended in front of the face                                                         | Hold the antennae close to the wings                                                                   |
| Position at rest         | Sit with their wings closed over their back or fully open and generally the forewings do not cover the hind wings | Sit with their wings spread flat (roof like) over the abdomen, Forewings partly covering the hindwings |
| Time of flight           | Generally during The day                                                                                          | Except for a few, Most are nocturnal                                                                   |
| Caterpillar              | Smooth, shiny or covered with bristles                                                                            | Have tufts of hair or sometimes completely covered with hair                                           |
|                          | Caterpillar stage form a hardened Chrysalis                                                                       | Caterpillar stage form a soft Cocoon.                                                                  |
| Spining Silk             | Do not spin silk.                                                                                                 | Spin silk.                                                                                             |
| Colour                   | Usually bright and colourful                                                                                      | Usually drab and dull-coloured                                                                         |

## Do you know that silk comes from the moths and not from the butterflies?

Silk yarn, that is used to make garments and other articles, comes from silkworm's cocoon. Silkworms are caterpillars of the silk moths (not butterflies) and are not true worms. Silk is a single continuous strand of thread made of protein that is secreted from two salivary glands in the caterpillar's head.

The silk moth caterpillar protects itself by spinning a silken material around itself, to form a cocoon. To harvest silk, the silkworm is allowed to spin its cocoon and it is then put in boiling water to kill the pupa and help unwind the silk thread.

**Tussar Silk:** Tussar silk is produced by the larvae of several species of moth such as *Antheraea mylitta*, *Antheraea proylei*, *Antheraea pernyi* and *Antheraea yamamai*. The insects live in the wild on bushes and trees on which they feed. Tussar silk is spun by the worm in a single-shelled, oval cocoon, with a fine-grained, hard, non-flossy shell. The cocoons are generally yellow or grey and are hard and compact. Tussar silkworms feed on *Terminalia arjuna* (Arjun) , *Butea monosperma* (Palas), *Terminalia tomentosa* (Asan), *Shorea robusta* (Sal), *Syzygium cumini* (Jamun). In Bihar, the Bhagalpur city located 225 Kms South-East of Patna is known for Tussar silk industry. The Government of Bihar has launched 'Mukhya Mantri Tassar Vikas Yojana' involving Forest Department and Industries Department in the forests of selected districts to strengthen the raw material supply for the promotion of Tassar Silk industry and to conserve the tradition of silk weaving in the state.



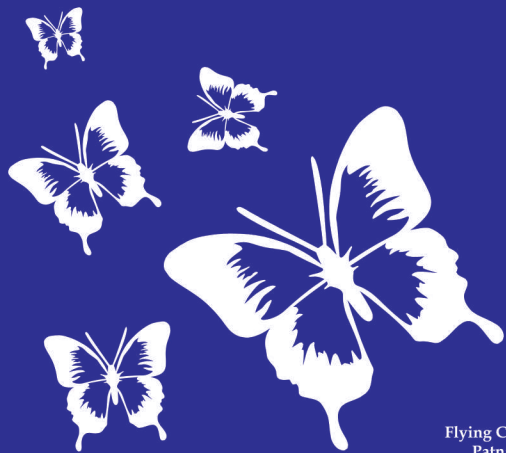
Moth

S. Chandrasekar

# 5

## The life cycle of a Butterfly

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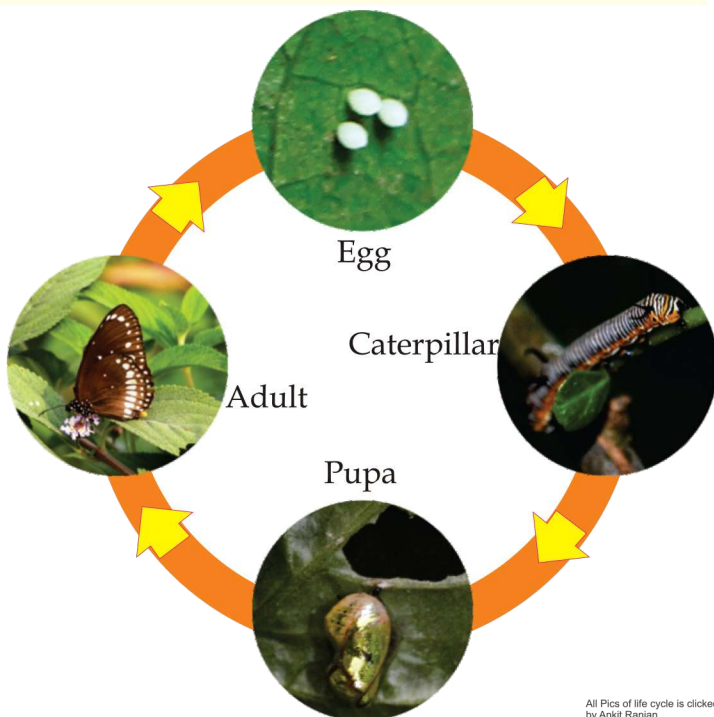


Flying Colours of  
Patna Zoo

## The life cycle of a Butterfly

Generally butterflies live not more than a season and they are prolific breeders, provided conducive weather conditions, absence of natural enemies and presence of favourable host plants. Butterflies are fast growing insects and life cycle of a butterfly is one of the most amazing and beautiful phenomenon of life forms on the earth. This group of insect has evolved through a very long journey in the evolutionary process and withstood different life formation stages on the earth for long. The process of changing from one form to another is called 'Metamorphosis' (means "to change"). The life-cycle of the butterfly has four distinct stages: the egg, the larva, the pupa (chrysalis) and the adult (called as imago).

The lifecycle of Common Crow butterfly is illustrated below for ease of understanding.





Ankit Ranjan

# L I F E C Y C L E

Flying Colours of  
Patna Zoo



Common Wanderer - Female

Ankit Ranjan

## Egg

The butterfly begins life as an egg. Eggs are laid mostly on the underside of the leaves of specific host plants around their habitat. The eggs are of size of a tiny pin-head. They are fixed to the leaf

with a sticky adhesive like substance, which hardens rapidly. The eggs attached to the leaves can withstand rough weathers. This stage generally lasts for about four days, provided the weather conditions are favourable.

## Caterpillar

The Caterpillar or Larva is like a swollen bag stuffed with organs. It has a long, worm-like body with ahead, and thirteen segments and are bereft of any wings. Except for the head, it lacks any hard structure. The head bears a pair of tiny eyes at the sides, the rudiments of antennae, a spinneret in the mouth for making strands of silk, a pair of mandibles and maxillae. Once the caterpillar emerges from the egg and it eats upon its egg shell. The caterpillars feed on the leaves of the host plant and are voracious eaters, and is therefore described as an eating machine. Most caterpillars are herbivorous, however, some caterpillars devour aphids, scale insects and even larvae of ants found in the host plant. Caterpillars go through several stages of development called Instars. At the end of each instar it moults and get a new skin. Butterflies generally goes through at least five instars.



Caterpillar

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Caterpillar

In order to escape from the eyes of the natural predators, the caterpillars develop different mimicking mechanism like big false eyes giving it a snake like appearance, caterpillars looking like birds droppings, looking similar to the colour of the leaves in the host plant, brightly coloured to distract the enemies and some caterpillars also produce pungent smell and have hairs which tingles the enemy upon touching as a defense mechanism to escape from the predators like birds, ants, dragonflies, wasps, spiders, lizards, etc. The caterpillar stage generally lasts from one week to six weeks.



Caterpillar (Common Mime)



Caterpillar (Mormon)



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Pupa of Common Wanderer

## Pupa

After final instar the caterpillar discards its skin and gets into a bag-like structure called the pupa, which is soft at first and hardens into shape. The pupa is often called a chrysalis in the case of butterflies. This is because the butterfly pupa is often shiny like a crystal. At this stage the tissues and structures of the caterpillar

are broken down and replaced with the wings and body parts of the adult butterfly. Some pupae look like dried leaves or like dried twigs to make them camouflaged on the host plant to escape the natural predators. Pupa stage generally lasts for one to six weeks.



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An emerging Butterfly



## Adult

At the end of pupa stage when the adult butterfly or the imago is fully formed, it breaks open the pupa and emerge out. The newly emerged butterfly needs one or two hours to get its wings dry and hardened in the sun. The butterflies are very susceptible to attack and capture during this time. However, most of the butterflies emerge in the dawn to find its nectar (feed), mate and continues the cycle of life.



## Life Span

The life span of butterflies varies. Some species may live for one or two weeks, while others may live for 1 to 2 months.





6

# Staying Alive

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# STAYING ALIVE

Flying Colours of  
Patna Zoo



## FOOD

Most of the butterflies feed on flower nectar, at the same time some of the butterflies never visit flowers. Instead they feed on plant sap, animal droppings, urine and human sweat. At times they even feed on blood and dead animals. Evening brown love toddy and beer.

Animal and bird droppings are relished by butterflies like Rajahs, especially blues. Barons and Castors are some of the butterflies that feed on overripe fruits. Some butterflies feed on dead crabs, fish and prawns.



The specific plants species preferred by the caterpillars are called larval host plant. The butterflies lay their eggs on specific plant species, which upon hatching shall play as a host plant for the voraciously feeding larvae. Caterpillars feed on leaves, flower buds and fruits like guava and pomegranates. The interrelationship between a butterfly and a plant reveals that no butterfly is evolved in isolation, neither did a plant.





Butterflies help in pollination - a process of transfer of pollen from one flower to another, propagation of the concerned plant species. Since plants cannot move, they utilize vectors such as wind, water and animals to accomplish this process for them. This bond is so well developed that certain plants grow only when pollinated by certain types of butterflies, eg., *Cadaba fruticosa* of peninsular India is pollinated only by the Pioneer butterflies. Psychophily is the name given to the system of pollination by butterflies. In this way, butterflies play a crucial role in an ecosystem in maintaining the genetic variability, an integral part of biodiversity.







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## Vanishing Butterflies

Though the butterflies are harmless insects, but the caterpillars, pupa and the adult butterflies have lot of natural enemies including birds, spiders, dragonflies, garden lizards, preying mantes, frogs, wasps, etc. with whom they face encounter from all around. Crab spider captures the butterflies by surprise, sting with their poison to paralyse them and suck their body fluid out of them. Birds are the major predators of butterflies and caterpillars. It is interesting to know that some of the caterpillars of Swallowtails (Papilionoidae) resemble the

colour and size of a bird's dropping, It is to evade depredation by the natural enemies. Sometimes the caterpillars are also destroyed by wasps. A wasp injects their eggs into the body of the caterpillars, which upon hatching feeds upon the caterpillar. Here, the caterpillar plays as the 'host' and the new hatchlings of the Wasp are the 'parasite'.



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Human beings are the most dangerous enemy of butterflies. Excessive use of pesticides on agricultural crops not only harms the humans who consume the products by slowly reducing the life expectancy but also it affects the butterflies and other beneficial insects

equally, which are good pollinators and plays an important role in the ecosystem. A healthy environment depends on them, so they have to be conserved. Butterflies acts as the messengers of the colourful flowers



in the garden. The nature has bestowed flowers to communicate with each other through these beautifully designed and winged post men(Courier), the butterflies.

## Camouflaging in Butterflies

Butterflies are not harmful insects and they are not offensive to other insects and animals. In order to escape from their enemies the butterflies have developed various defense mechanisms. Some of the interesting ways of defense mechanisms in butterflies are discussed here in short for a better understanding. At the caterpillar stage the larvae being slow in their movement has evolved to look like a leaf, have pseudo eyes in the posterior end of the body to scare away the enemies, some roll themselves into a leaf to escape from the eyes of the predator, some caterpillars look so similar to the bird droppings that it becomes difficult to find the caterpillar. Some of them look

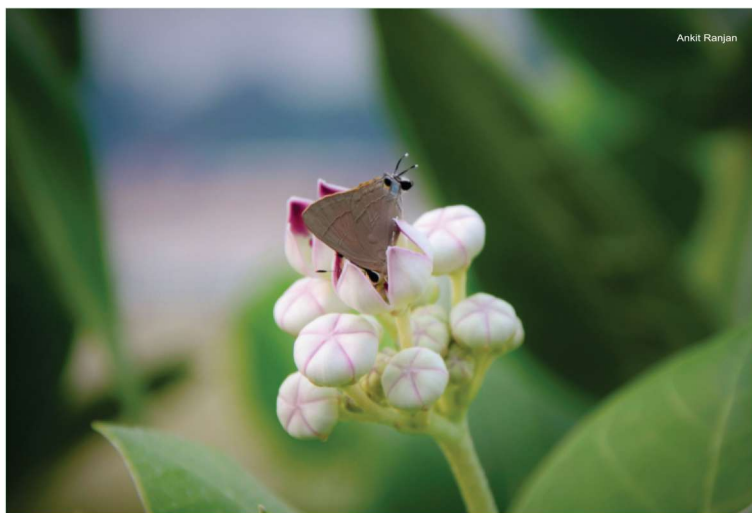


similar to dry leaves and twigs so that they evade the possible approach of the birds, spiders, frog, dragonflies, etc. Whereas, the caterpillars of the 'Blues' have developed a symbiotic relationship with the ants present in their host plants. In this case the caterpillars secrete a sugary solution which is fed by the ants. In return for the sugary feed, the ants guard the caterpillars from the enemies.

# STAYING ALIVE

By this way the butterfly evades the non-survival of the species by meticulously selecting right larval-host plant for egg laying.

At the adult butterfly stage their capacity to fly is the main defense mechanism to evade the enemies. The butterflies like Pansy and Evening Brown have large conspicuous eyes in their upperside to deceive the location of their head to their enemies. In case the predators hit those eyespots, it is the part of wings which gets destroyed, not the entire butterfly. In this way they escape from fatal attacks of their enemies.



like in the Peacock Pansy the colour of the underside becomes dark and faded as per the change in the season, to look similar to a dry leaf for better camouflage from the predatory eyes. The Oakleaf looks so similar to a dried leaf, that even one can find the midrib and veins of the leaves in the underside of the wings.

The predators are puzzled to find the butterfly if it is found perching among dry leaves. It is the natural selection in the evolution of such butterflies, which has



Plain Tiger



Danaid Egfly

passed on to and refined in the successive generations slowly as per the species composition and the presence of different types of predators. The presence of threats and the resultant natural selection process might be the reason for the present world's butterflies with numerous colourful wings, patterns and the amazing adaptations.

Some milkweed butterflies like Plain Tiger and Crimson Rose during the caterpillar stage feed on the poisonous leaves of the host plant and store the poison in their body. These caterpillars if attacked and eaten by the birds, they give a distaste which renders them unsavoury. Hence, the birds avoid predation of milkweed butterflies. There are many butterflies that are palatable to birds but in course of evolution have developed imitation of colour and pattern of the unpalatable butterflies and so these harmless butterflies too are also avoided by the birds taking them for unpalatable one. The latter group of butterflies are called Model; and their imitators are called Mimics. This form of mimicry is called Batesian Mimicry. A mutual resemblance between two or more closely related species of unpalatable butterflies is called Mullerian Mimicry.



# FAQ's on Butterflies

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### **Which is the best time to watch butterflies?**

Any outdoor location with enough number of wild plants with water body, rocks, hedges for sheltering and sandy patch for mud puddling is the best place to watch butterflies. Mostly the butterflies are seen in the day time. An hour after sunrise the butterflies start appearing and as the sunlight intensifies, after getting their wing muscles warmed, they start flying. Most butterflies are seen basking in the sun light before taking the flight. During winter cool morning one can easily approach closer to the butterflies than the summer mornings, because during cool mornings they take time to get enough warmth, as butterflies are cold blooded creatures. During summers the butterfly activity is much less, although they seen mud puddling.

Waiting near Lantana shrubs, Ixora species, Milkweeds will give an excellent opportunity to watch butterflies, as lot of them fondly visits these plants.



## What is Butterfly ranching?

Butterfly ranching involves collecting the eggs of butterflies from the wild and rearing them till their adult stage. The eggs laid by butterflies are collected by hand, and after hatching, the caterpillars are placed on their host plants. Once the immobile pupae are formed, they are either transported to different collectors or to butterfly farmers, who ultimately release them in the wild.

## What is mud puddling?

Apart from feeding on the nectar, the butterflies also suck moisture from the drying river bed or from moist exposed soils in the garden to intake sufficient moisture along with salt and other minerals nutrients. This behavior is called 'Mud Puddling'. Often the butterflies, mostly males, do this in groups. It is believed that since the nectar and tree sap do have sodium in it, to get sodium which is essential for many physiological functions including digestion, excretion and mainly reproduction, butterflies go for Mud-puddling. The Grass Yellows, Spot Swordtail, Tree Yellow, Lime butterfly are some of the butterflies often seen mud-puddling. Mud puddling may be done in groups or individually. The group may comprise single species or mixed species.



Mud Puddling

S. Chandrasekar



Basking

Ankit Ranjan

### What is basking?

Butterflies are cold-blooded creatures like other insects (only few exceptions). Thus, they require external heating source to keep their body warm for performing their normal physical and physiological activities by behavioural tactics, which is known as behavioural thermoregulation. In the early morning or evening the butterflies spread their wings and take sun bath, a behavior called 'Basking'. To regulate the body temperature they use techniques like wing orientation to sun light, abdominal height, and movement into and out of shade.

Air temperature is warmer close to the ground than farther up. In the early morning the butterflies may perch and fly close to the ground. As the temperature soars it may go farther to keep its body cool. In extreme temperatures they close their wings and move into the shade, preferably beneath the leaves. Mud-puddling is also believed to be done by the butterflies to regulate the



Tawny Coster Basking

Ankit Ranjan

body temperature. The larvae do not vary their body temperature as adult butterflies do. But, larvae do move to the base of the host plant to avoid scorching sun.

### **What is Butterfly host plant?**

Most of the butterflies feed on flower nectars from wide variety of plants, but the female butterflies will only lay their eggs on the leaves of a specific food plant that the caterpillars will eat. Host plant or the Larval Host Plant is the one which is fed by the caterpillars. Each species of butterfly has its specific host plant. The adult female butterfly lay their eggs on the specific larval host plant, so that upon emerging out, the caterpillars (Larva) can feed on the right plant for its survival. This also helps one to indirectly identify the plant diversity by observing different butterflies in an area. For example: The Striped Tiger feed on the milkweeds and the Common crow has a long list of host plants on which they lay eggs. The Sweet neem or Curry leaf plant and lemon plant will attract the Common Mormon and the Lime butterfly to lay eggs.

### **How many butterfly species are found in India and the world?**

Scientists believe that there are about 18000 species of butterflies existing worldwide. In India 1501 species have been reported, of which 321 are Skippers (Hesperiidae), 107 Swallowtails (Papilionidae), 109 Whites and Yellows (Pieridae), 521 Brush-footed butterflies (Nymphalidae) and 443 Blues (Lycaenidae) (Isaac Kehimkar, 2008). Patna has little more than 100 species as per the documentation done so far. Butterflies like Monarch, Plain Tiger, Painted Lady, Small White are widely distributed in the world.







### **Where do butterflies spend the night?**

At night, or during inclement weather, most butterflies perch on the underside of a leaf, crawl deep inside the space between blades of grass, or into a crevice in rocks, or find some other shelter.

### **Do butterflies hurt?**

Butterflies do not have teeth or sting. The proboscis is used for sucking the flower nectar. So, it is a harmless insect.

### **Do butterflies grow in their life?**

Except the instars, the stages of growth during the caterpillar stage, the adult butterflies do not grow. They remain the same size all their life.

### **Are the butterflies herbivore or carnivore?**

Generally butterflies are herbivores.

### **Since how long the butterflies are found on the earth?**

It is believed that butterflies have lived on this earth for at least 150 million years.

### **What is the longevity of butterflies?**

Life span of butterflies is short, ranging a few weeks (Blues) to as long as eight months (Swallow Tails and some Nymphalids). Most of the butterflies live up to two to four weeks, if not predated or injured by the predators.





Common Jezebel

S. Chandrasekar

## What is Perching?

In Perching, the male butterflies wait while resting at a prominent locations on a bush or on a branch. The males dash out at the passing animals and objects with a short flight to know whether they are females of their own species, and come to the vantage position again until finding the right female of its species. If it turns out to be an appropriate female, they start courting.

Some male butterflies are territorial and chase away not only other males of their own species, but male butterflies of other species as well. They perch on a bush or a branch on a vantage point and make quick dashing sorties to chase away other intruders.



Silverstreak Blue - Perching on a Jamun leaf

S. Chandrasekar



## **Biggest and the smallest in the butterflies?**

The female of Alexandra Birdwing is the biggest butterfly in the world. Southern Bird wing is the biggest of India. Both Tiny Grass Blue and Eastern Grass Jewel are the smallest butterfly of India.

In Patna the Blue Mormon is the biggest and Tiny Grass Blue/Lesser Grass Blue is the smallest butterfly. It is to be noted that the Blue Mormon is the second largest butterfly in India.

## **Do butterflies migrate?**

Migration is the movement from one favourable place to another to avoid bad weather, find food, or reproduce. Migration is one among the variety of strategies that butterflies use in response to unfavourable conditions such as lack of food, insufficient food of the right quality, overcrowding or the onset of winter. The availability of larval host plants is one of the major factors for movements of the butterflies.

Migration in butterflies may be long-distance or short-distance (local movements). Long distance migration may take place across hundreds of kilometers. It is not exactly understood how butterflies find their way during migrations. Scientists are studying the how, why and where of butterfly migration by using different techniques, including tagging. The females lay their eggs in the migratory route.

In India, the Lime Butterfly, Common Emmigrant, Common Mormon, Painted Lady, Blue Tiger are some of the short-distance migrating butterflies.

The best example of long-distance migration is the Monarch butterfly of Indonesia. They travel thousands of kilometers and spread to Hawaii, Indonesia, the Canary Island and Australia. It takes generations to complete this long-distance migration.

# 8

## Conservation of Butterflies

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### Why conserving butterflies is important?

Butterflies play an important role in the ecosystem. The butterflies are fed by birds, reptiles and other predatory insects. Some butterflies serve as an agent for pollination of flowers, thereby helping to maintain the plant diversity. Butterflies have aesthetic value and are admired by all, young and elders. Conservation biologists use butterflies as indicator species to identify and monitor habitats that are critical for conservation.

### Protecting our Butterflies

The Wildlife (Protection) Act, 1972 has six schedules, each listing various species. The legal protection accorded to the species is the highest if it is listed in the Schedule I. The protection is second best if the species is listed in schedule II, and so on. There are severe punishments for offence against the protected species. Animals enlisted in Schedule V are under vermin. A total of 450 species of butterflies have been given protection under The Wildlife (Protection) Act, 1972; 128 species under Schedule-I, 303 species under Schedule- II and 19 species under Schedules- IV. Other schedules do not have any butterflies listed under them. Butterflies have also been given protection under the Biodiversity Act, 2002.



## Butterfly Watching

Butterfly watching is a delightful experience and can be done easily while you take a stroll in a garden or a forest area. Butterflies are best watched one hour after sunshine, when they bask in the sun to increase their body temperature. After getting enough warmth they start visiting the flowers for nectar and to chase their mates and competitors. The period between the monsoon and the winter is the best season to have glimpse of these winged colours.

Even rotting fruit or birds/animals droppings, a single potted plant of suitable species can also attract the butterflies in your back yard. Patna Zoo is one of the best and rewarding places in Patna to go for butterfly watching. Along with butterfly watching one can pursue photography as well. Both these activities can offer you a well conjugated hobby to pursue in your leisure time. Once you start photo documenting the butterflies in an area you can publish the butterfly diversity, which can further enrich the overall documentation of the biodiversity of that area. First step to butterfly watching is to secure a good field guide on butterflies, which are available in good numbers on the online stores. If you can afford, you can have a less expensive binocular. Of course a note book and pencil should also be with you while watching butterflies. Then take out some time from your routine to find a colourful, soothing and refreshing world of butterflies at the break of the dawn.



## Butterfly parks in India

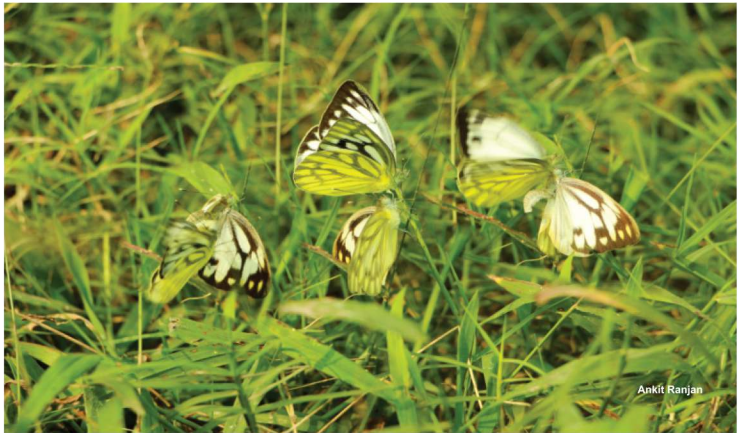
Most of the large zoos in the country have an exclusive butterfly parks.

1. Butterfly Park near Bannerghatta zoo in Bangalore;
2. Butterfly Park at Mysore Zoo;
3. Open Butterfly Park at Nandankanan zoo;
4. Butterfly Conservatory in Trichy (Tamil Nadu);
5. Butterfly Garden at TATA Steel Zoological Park, Jamshedpur;
6. Butterfly Garden of Kerala Forest Research Institute, Peechi;
7. Butterfly Safari Park, Thenmala Ecotourism Area in Kerala;
8. Butterfly Park at Shimla, Chandigarh and Pune;
9. Open Air Butterfly park at Rangrang in Sikkim;
10. Butterfly Conservatory at Ponda in Goa;
11. Ovalekar Butterfly Farm at Wadi, Thane;
12. Private Butterfly Park in Belvai village near Mangalore;
13. Butterfly Park at Ataria near Lucknow;
14. Butterfly Garden at Arignar Anna Zoological Garden, Vandaloor in Tamil Nadu are the well known Butterfly parks in the country.
15. Killkari Butterfly Park, Patna
16. Lucknow Zoo Butterfly Park, Uttar Pradesh



Flying Colours of  
Patna Zoo

In Sanjay Gandhi Biological Park the entire park is haven to numerous butterflies. To encourage the butterfly population the use of insecticides and chemical weed control methods are not used in the gardens and thick live hedges provides safe space with various host plants and natural open muddy place for mud puddling are maintained. The Biological Park, Patna has varieties of plants from herbs to trees belonging to different species, this offers varieties of larval host plants. The regular landscape management, tilling, irrigation, running waters, safe spaces free of disturbances, and animal enclosures makes this park suitable habitat for various species of butterflies, despite the fact that this park is located in the midst of the heavily populated Patna town as a small green island. The presence of butterflies, apart from other life forms, shows the environmental healthiness of the ambience of the park.



### **What are the best places to watch butterflies in Patna?**

Patna Zoo, Kilkari Butterfly Park, Rajendra Nagar, Patna University campus, Eco-Park, banks of the River Ganges, Taru Mitra Bio-reserve, Bihar Veterinary College Campus are some of the places in Patna where one can find butterflies in large numbers. Even a good house garden with variety of plants, not sprayed with insecticides and fertilizers, can attract various colourful butterflies.

## Butterfly Gardening

To have a butterfly garden one should have the basic knowledge about them. The important thing for developing a good butterfly garden is to know the suitable larval host plants for those butterflies commonly found in the area, the area should be open and sunny with some rocks around.

To provide shelter to butterflies at night and during inclement weather the garden should have live thick hedges. Mud puddling sites have to be provided and regular watering is necessary. Over ripe fruits in the garden should not be disturbed, as they help attract butterflies. One should plant the species preferred by butterflies and the plants should be in flowering successively for a longer period of time, to provide nectar, to retain the butterflies longer in your garden. Some garden plants like Verbena, Ixora, Poinsettia, Lantana, Pentas and common vegetable plants like cabbage, cauliflower, ladies finger, brinjal are good for butterflies. Butterflies prefer tiny flowers in cluster to have more nectar in one go. Other ornamental plants like Marigold, Dahlia, Cosmos, Periwinkle, Mexican Sun flower, Coat buttons, etc., also attract butterflies. Fruit trees like Guava and Lemon attract Lime butterfly and Common Mormon to lay eggs. Castor plant attracts Common Castor and Angled Castor butterflies.



Flying Colours of  
Patna Zoo

Map showing areas frequented by butterflies in Patna Zoo



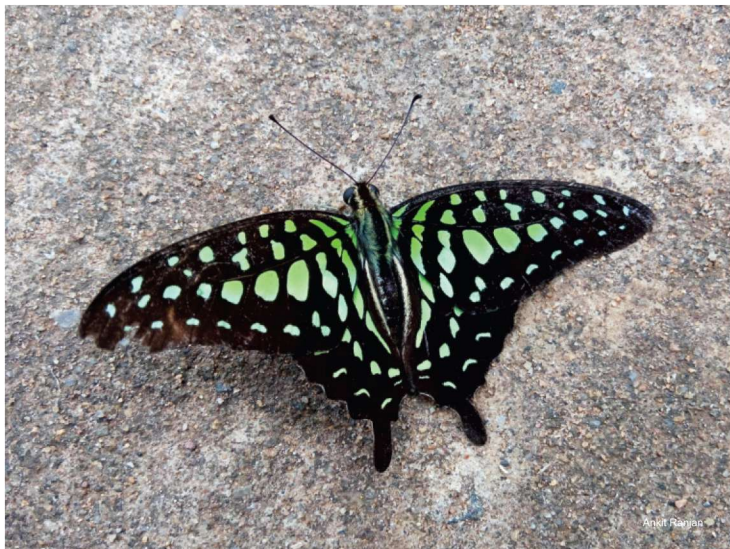




10

# Swallowtails

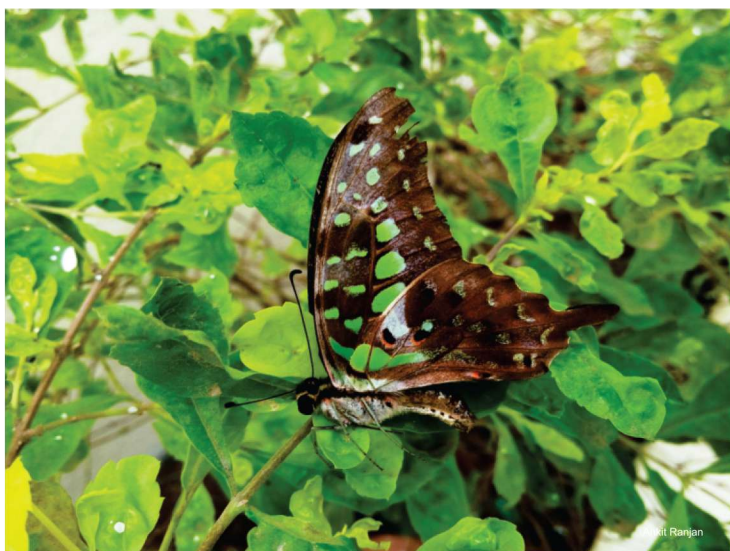
(Papilionidae)

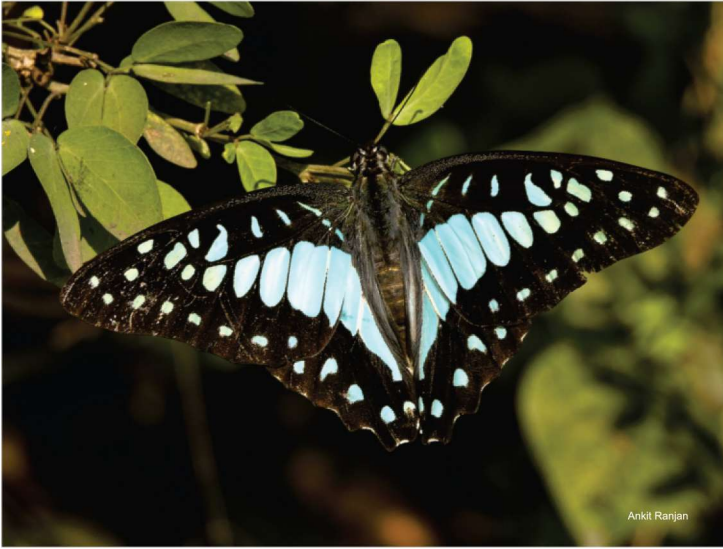


**Tailed Jay**  
*Graphium agamemnon*

🦋 85-100 mm

📅 Common

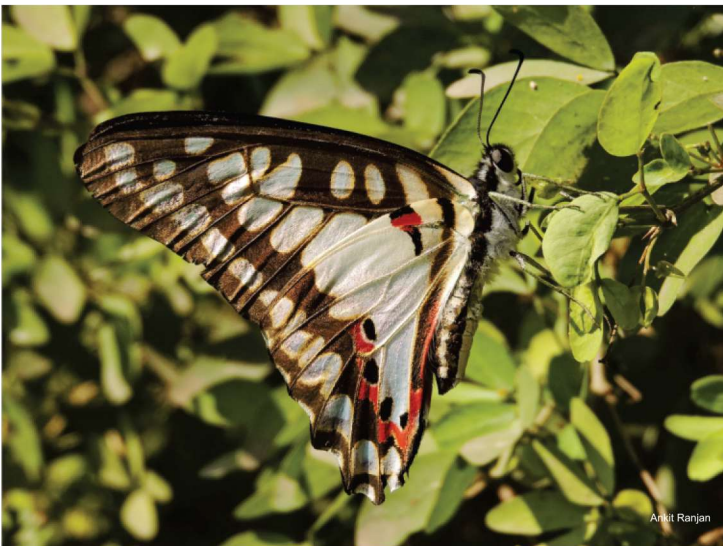




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**Common Jay**  
*Graphium doson*

 70-80 mm  Common



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**Spot Swordtail**  
*Graphium nomius*

75-90 mm

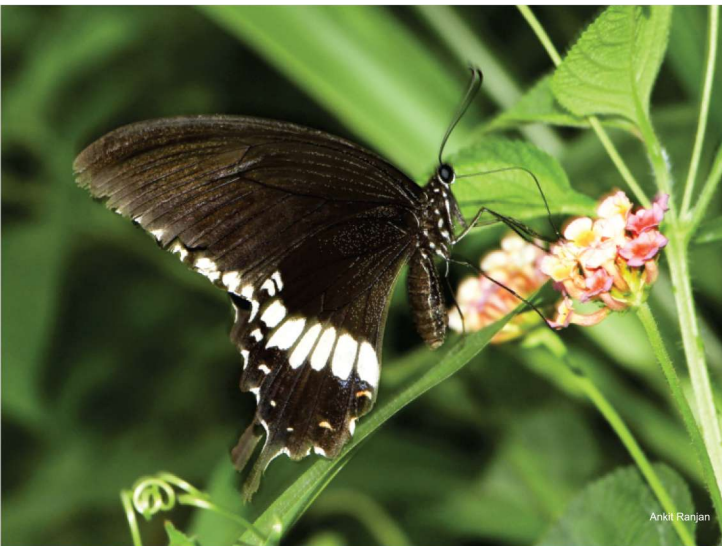
Locally common





**Common Mormon (Male)**  
*Papilio polytes*

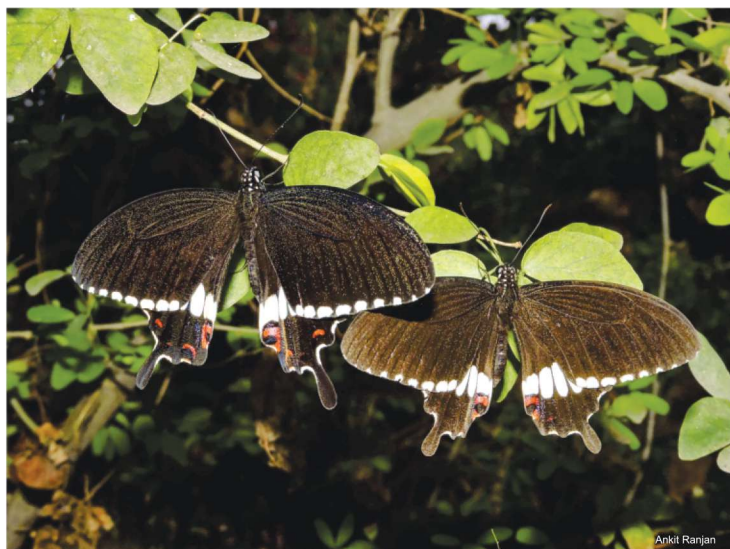
90-100 mm Very Common

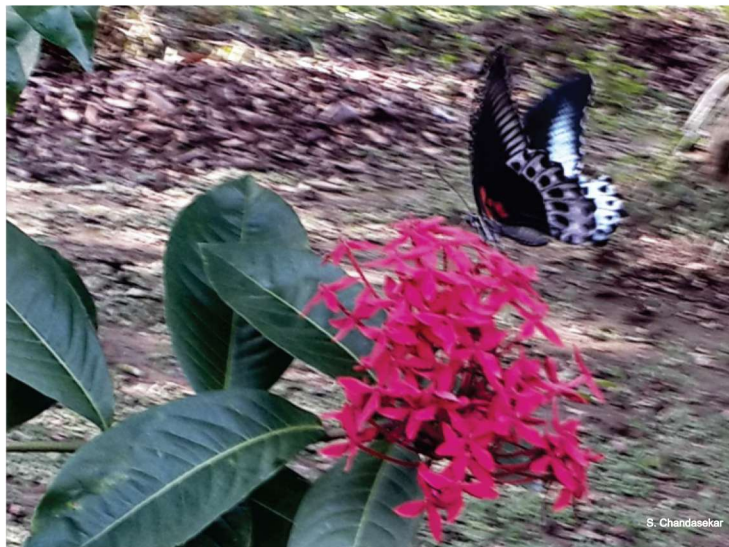




**Common Mormon (Female)**  
*Papilio polytes*

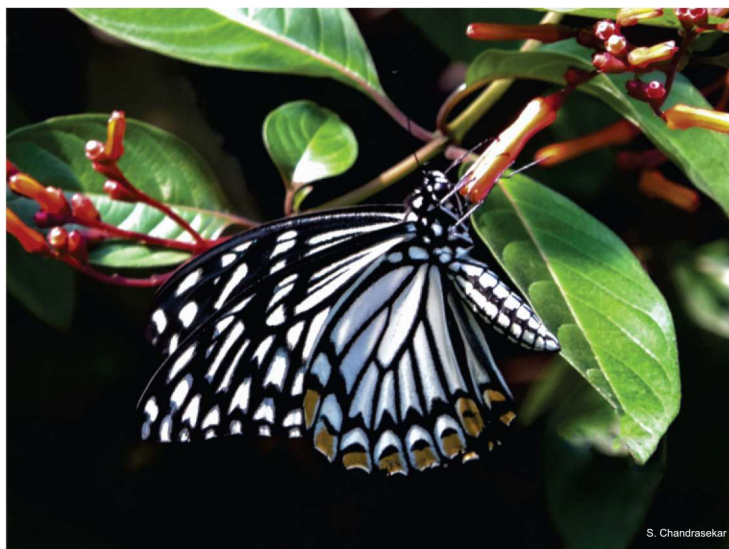
🦋 90-100 mm 📏 Very Common





**Blue Mormon**  
*Papilio polymestor* Cramer

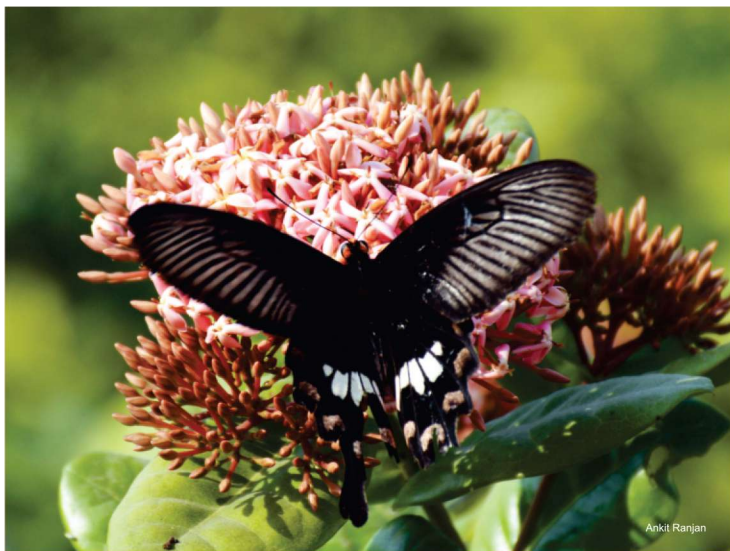
🦋 120-150 mm 📅 Not rare



**Common Mime**  
*Chilasa clytia*

🦋 90-100 mm 📅 Not rare, locally common

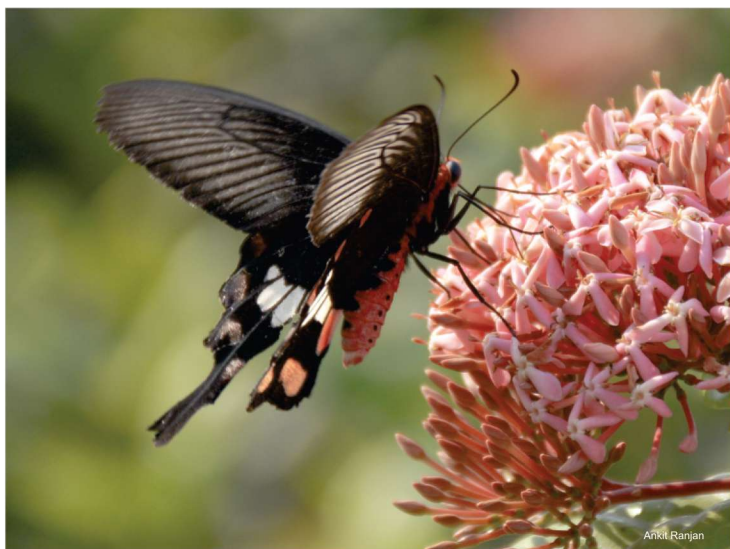




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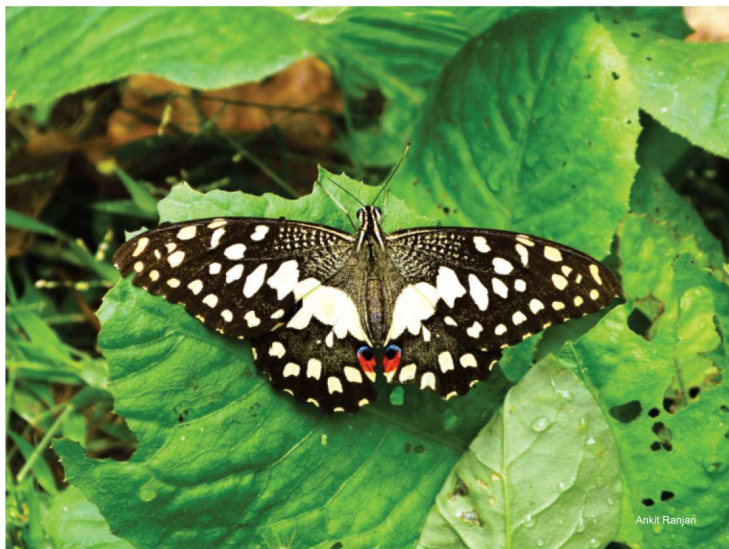
**Common Rose**  
*Atrophaneura aristolochiae*

80-110 mm Common



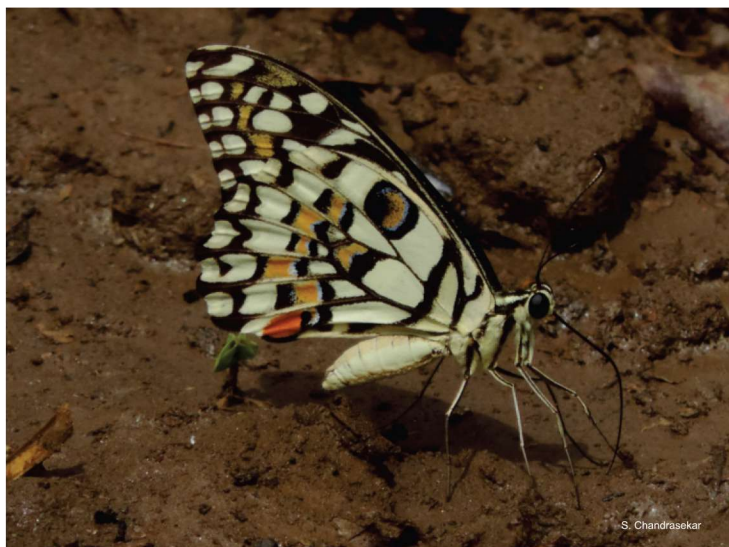
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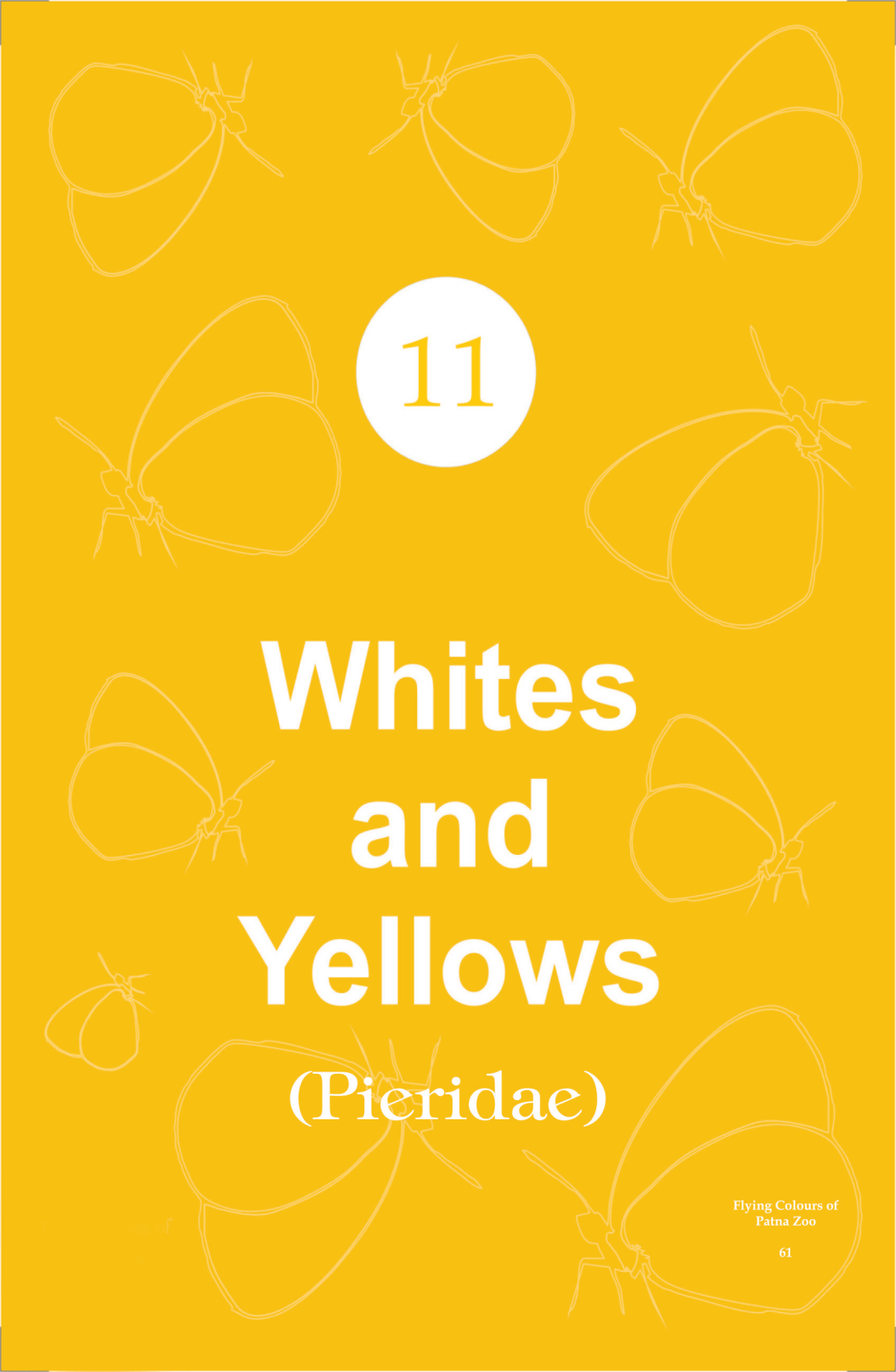


**Lime Butterfly**  
*Papilio demoleus*

80-100 mm    Very Common





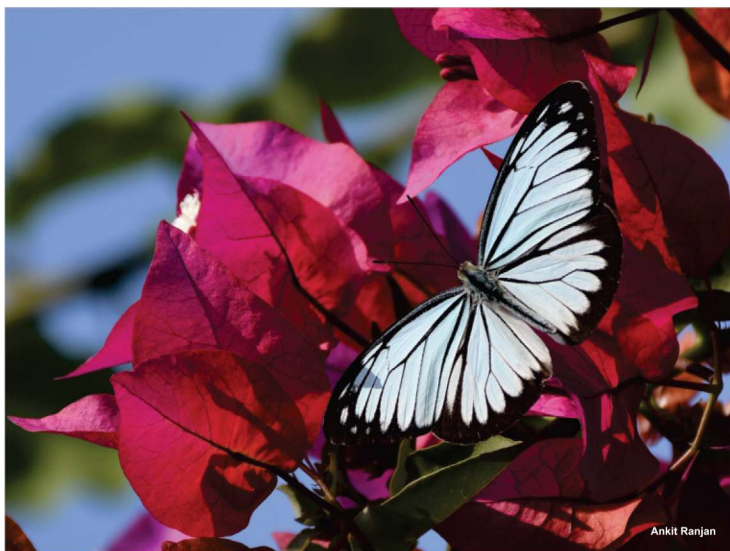


11

# Whites and Yellows (Pieridae)

Flying Colours of  
Patna Zoo





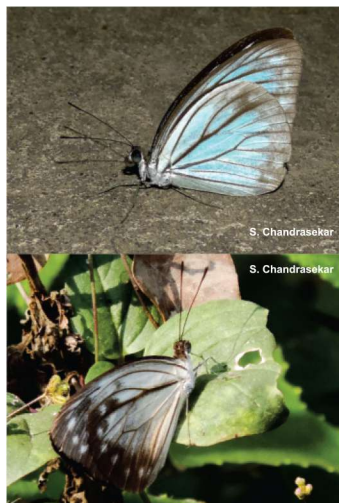
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## Common Wanderer *Pareronia valeria*

🦋 65-80 mm 📏 Common



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**Common Jezebel**  
*Delias eucharis*

 66-83 mm  Common

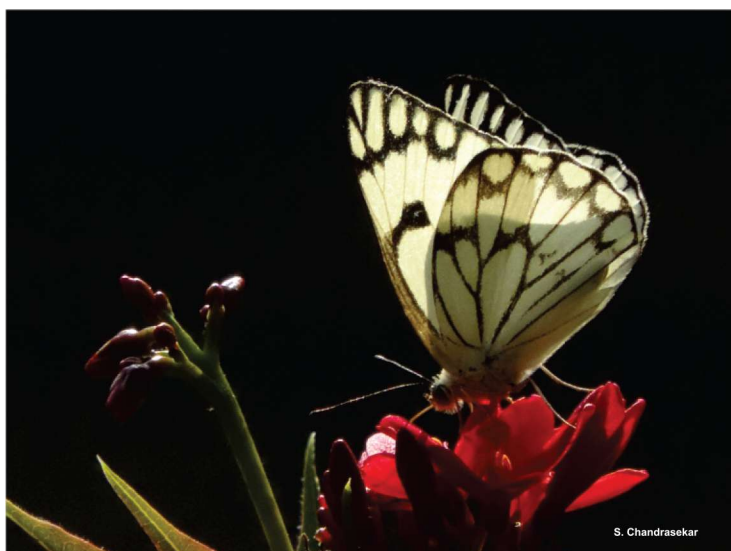




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**Pioneer**  
*Belenois aurota*

40-55 mm Common



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## One-Spot Grass Yellow *Eurema andersonii*

🦋 38-45 mm 📱 Not rare



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**Indian Cabbage White**  
*Pieris canidia*

45-60 mm 📏 Common



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**Common Grass Yellow**  
*Eurema hecabe*

40-45 mm 📏 Locally common





**Psyche**  
*Leptosia nina*

🦋 35-50 mm 📖 Common



**Pale Wenderer**  
*Pareronia avatar*

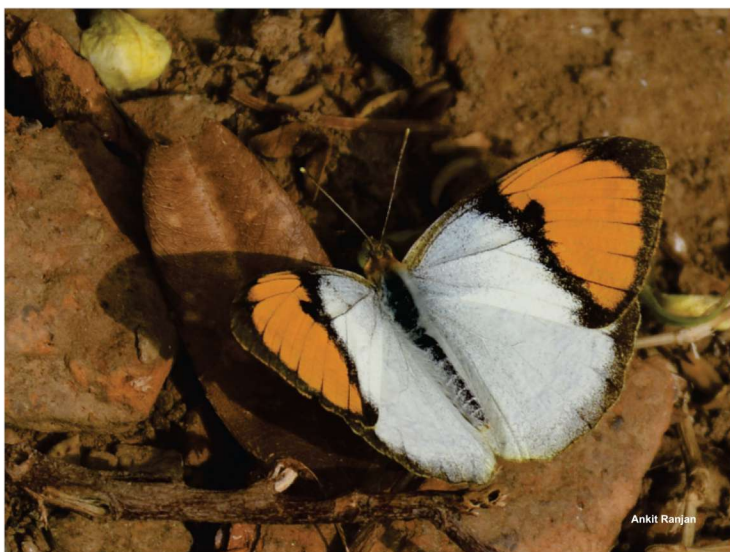
🦋 60-90 mm 📖 Rare



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**Mottled Emigrant**  
*Catopsilia pyranthe*

🦋 50-70 mm 📖 Common



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**White-Orange Tip**  
*Ixias marianne*

🦋 50-55 mm 📖 Common



## Yellow-Orange Tip *Ixias pyrene*

🦋 50-70 mm 📏 Common



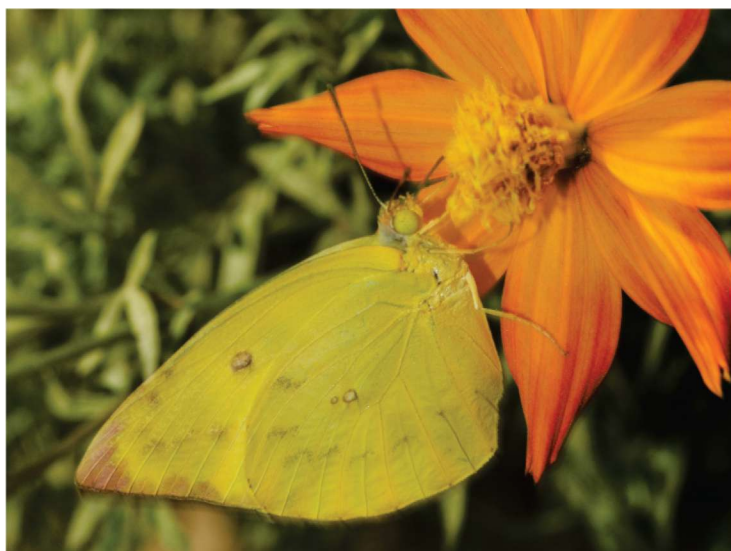




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**Common Emigrant**  
*Catopsilia pomona*

🦋 55-80 mm 📱 Common







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## Spotless Grass Yellow *Eurema laeta*

🦋 30-45 mm 📱 Common



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**Tree Yellow**  
*Gandaca harina*

35-45 mm Not rare



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**Lesser Albatross**  
*Appias wardii*

67-76 mm Locally not rare



**Three-Spot Grass Yellow**  
*Eurema blanda*

40-45 mm Common



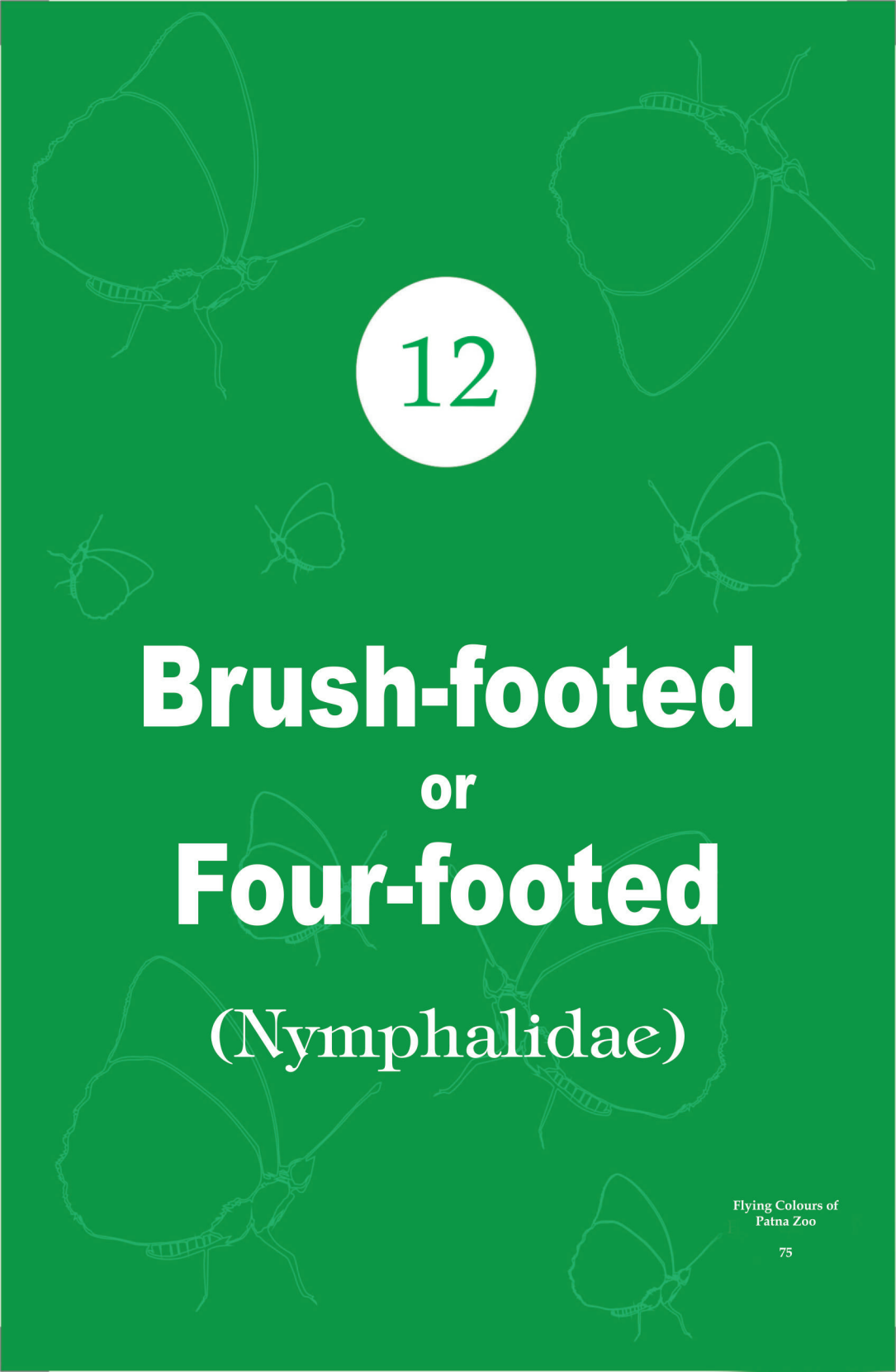
**Common Gull**  
*Cepora nerissa*

40-65 mm Common



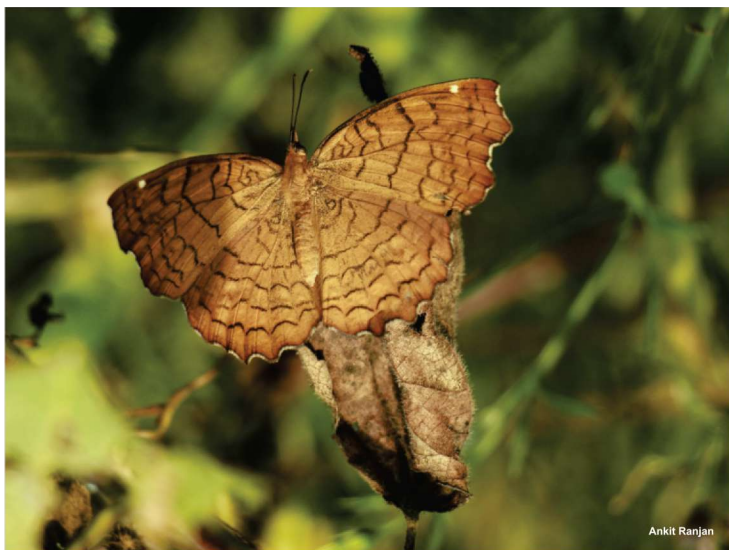






12

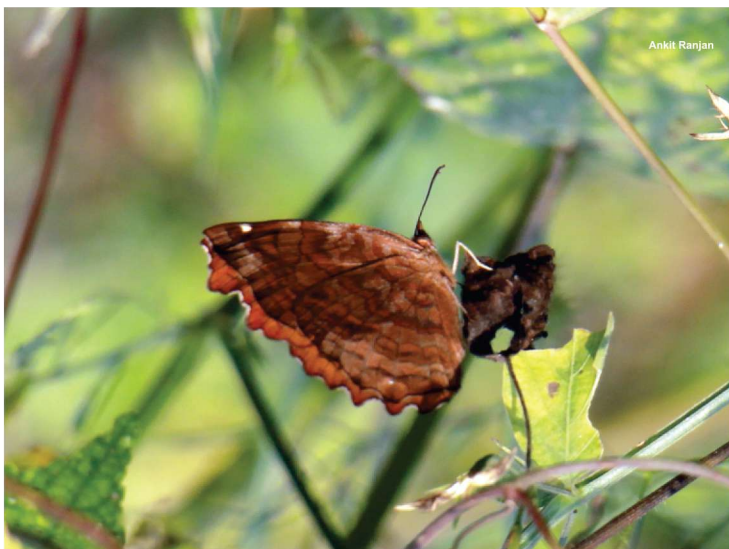
**Brush-footed**  
or  
**Four-footed**  
(Nymphalidae)



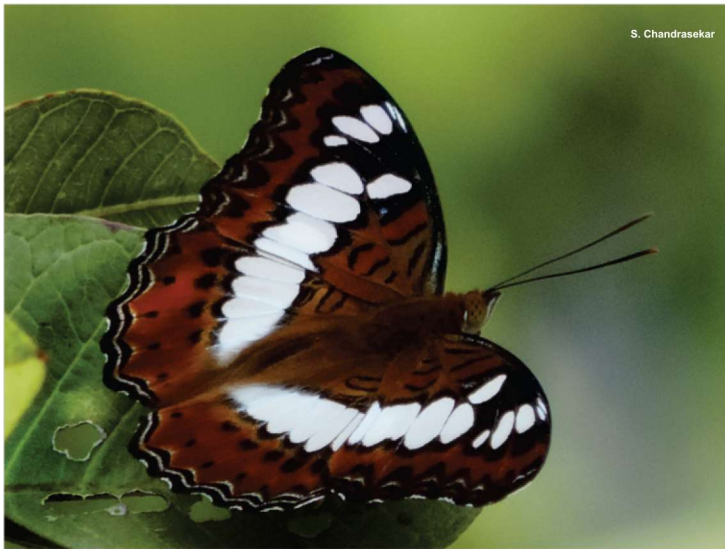
Ankit Ranjan

**Angled Castor**  
*Ariadne ariadne*

 45-60 mm       Uncommon

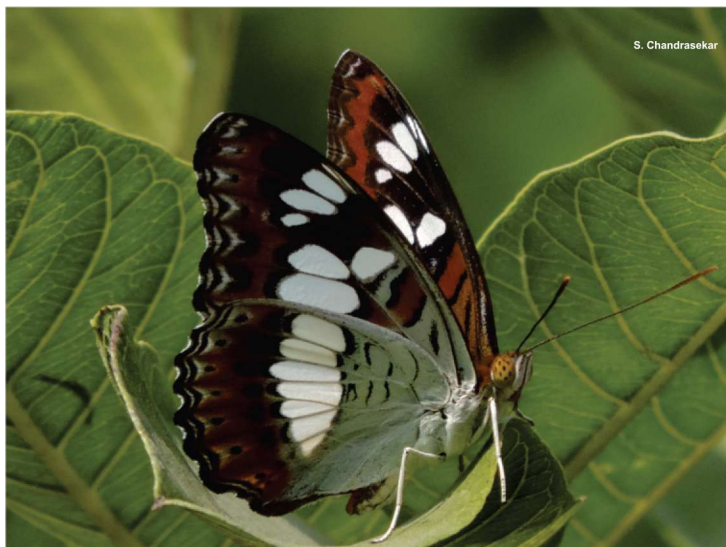


Ankit Ranjan



**Commander**  
*Moduza procris*

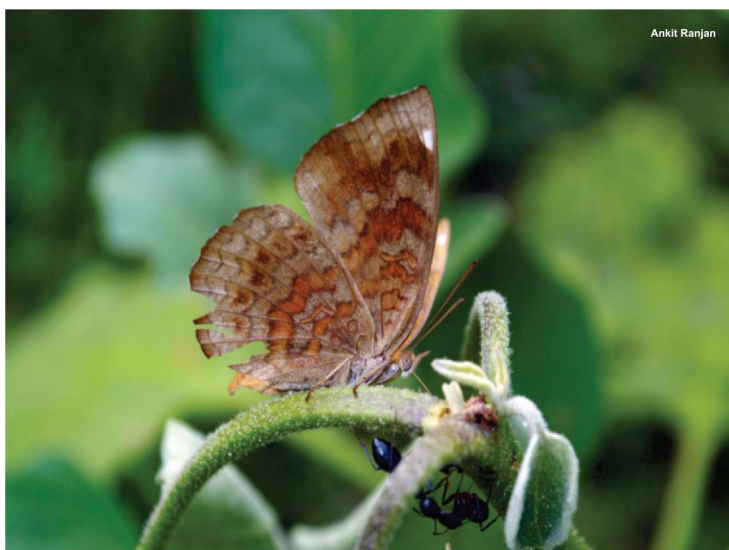
 60-75 mm  Common





**Common Castor**  
*Ariadne merione*

 45-60 mm     Common



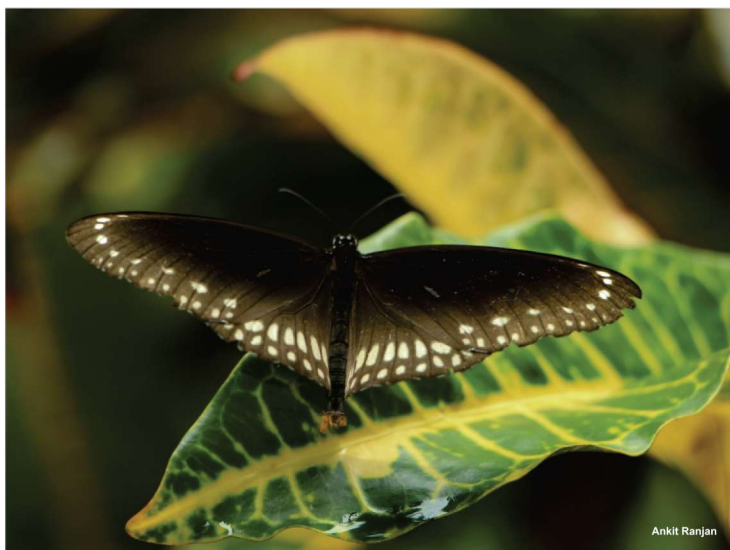




**Common Baron**  
*Euthalia aconthea*

 55-80 mm     Common

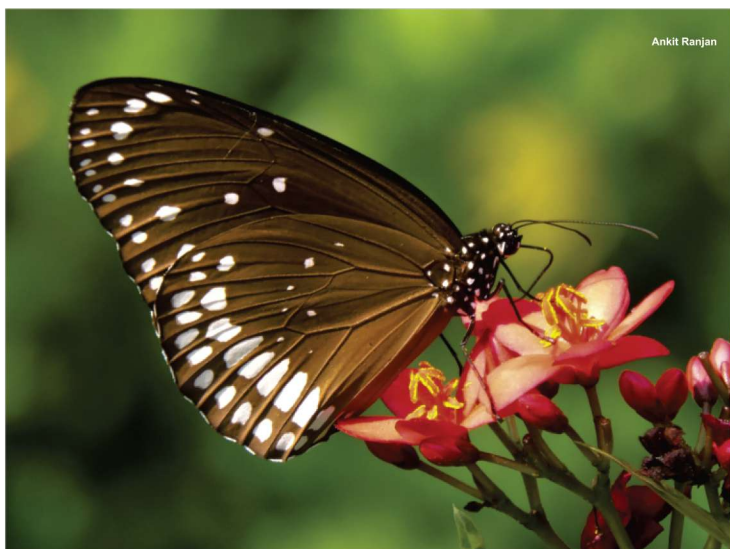




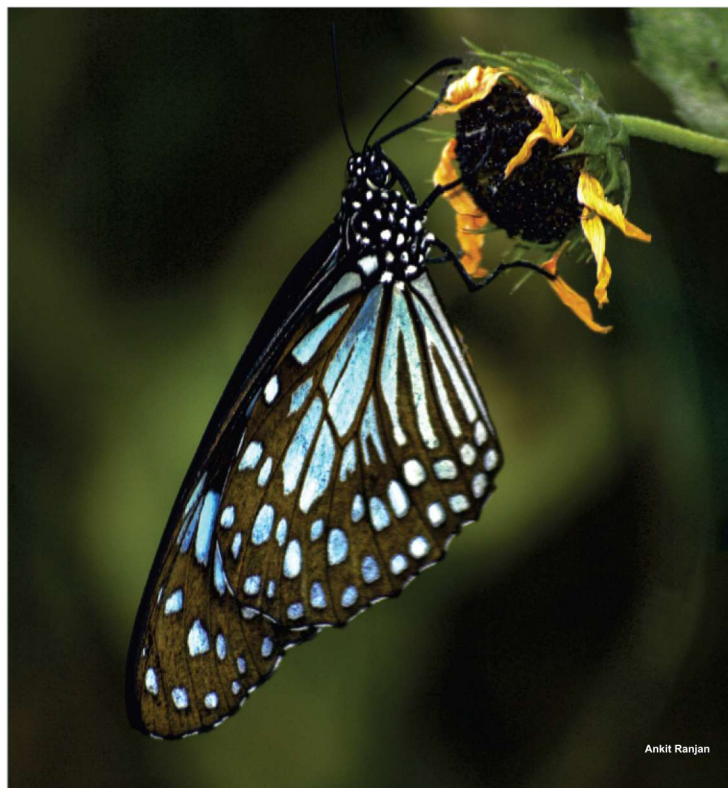
Ankit Ranjan

**Common Crow**  
*Euploea core*

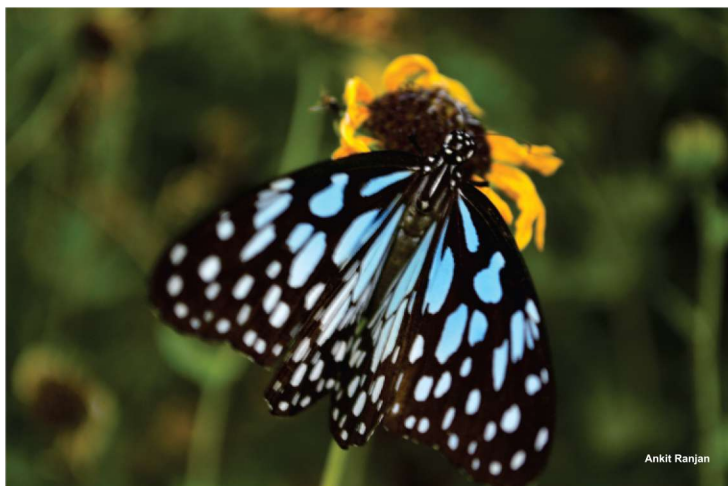
 85-95 mm       Common



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**Blue Tiger**  
*Tirumala limniace*

 90-100 mm  Common





**Chocolate Pansy**  
*Junonia iphita*

 55-80 mm       Common



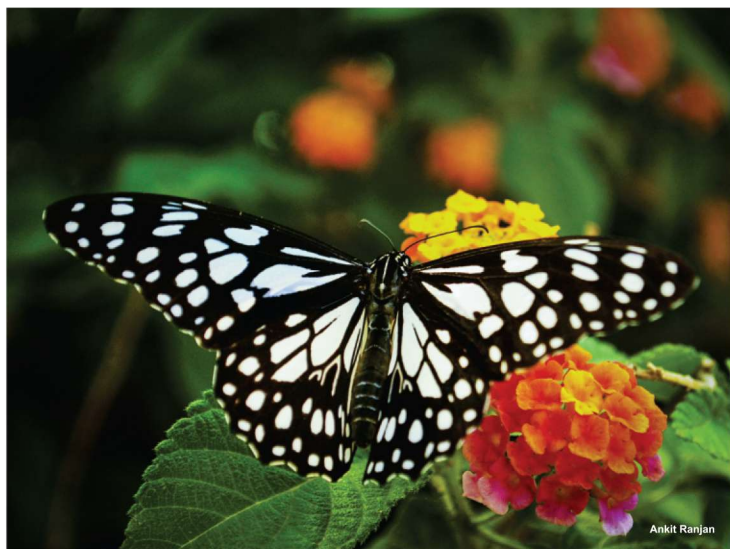




**Blue Pansy**  
*Junonia orithya*

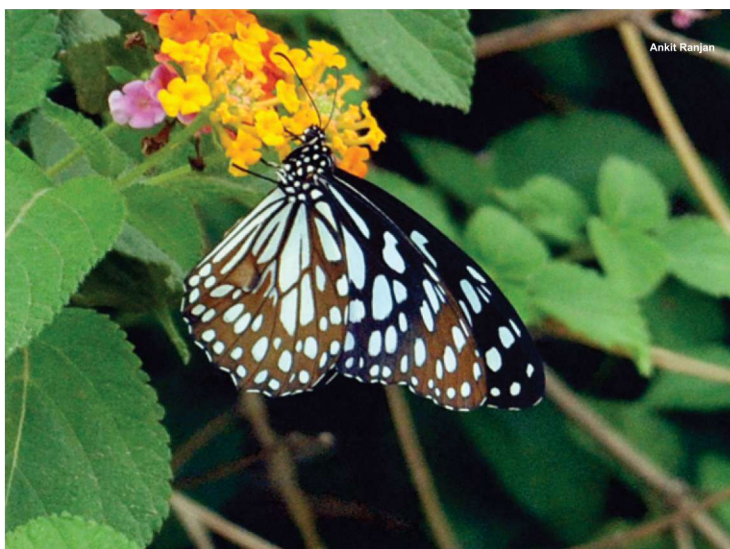
 45-60 mm     Common





**Glassy Tiger**  
*Parantica aglea*

 70-85 mm  Common





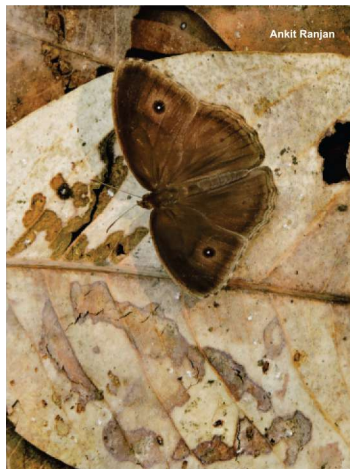
S. Chandrasekar

## Common Bushbrown *Mycalesis perseus*

 38-55 mm  Common

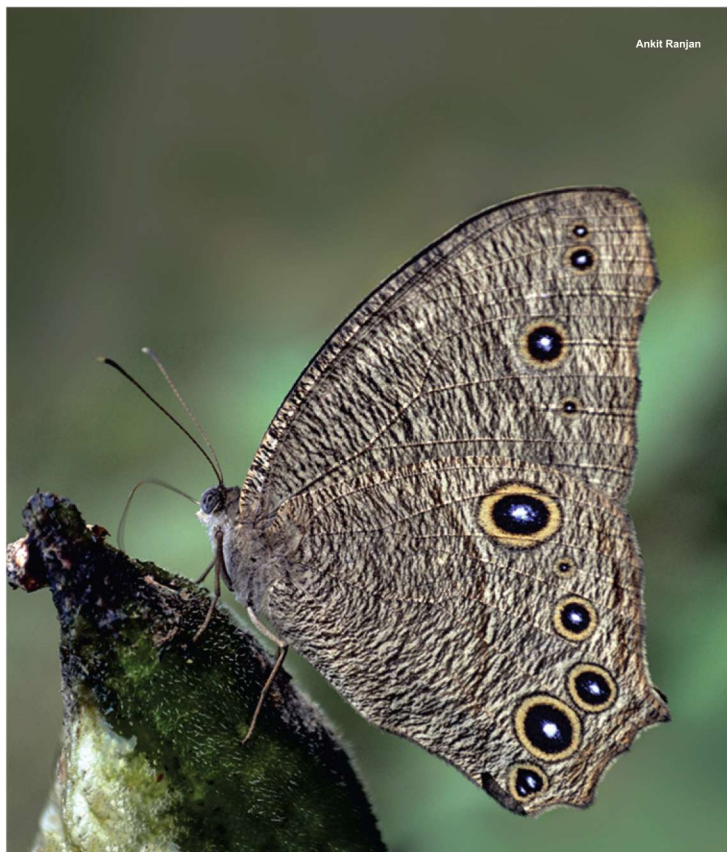


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## Common Evening Brown *Melanitis leda*

Flying Colours of  
Patna Zoo

86

 60-80 mm  Common

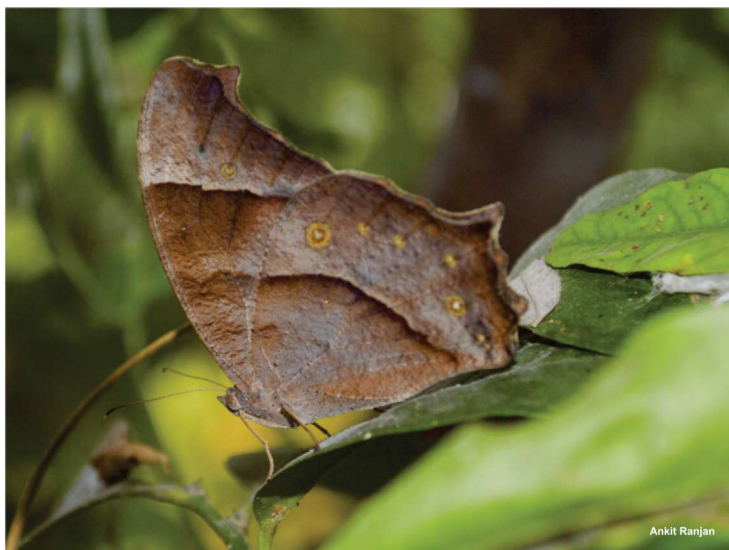




**Great Evening Brown**  
*Melanitis zitenius*

80-95 mm Rare





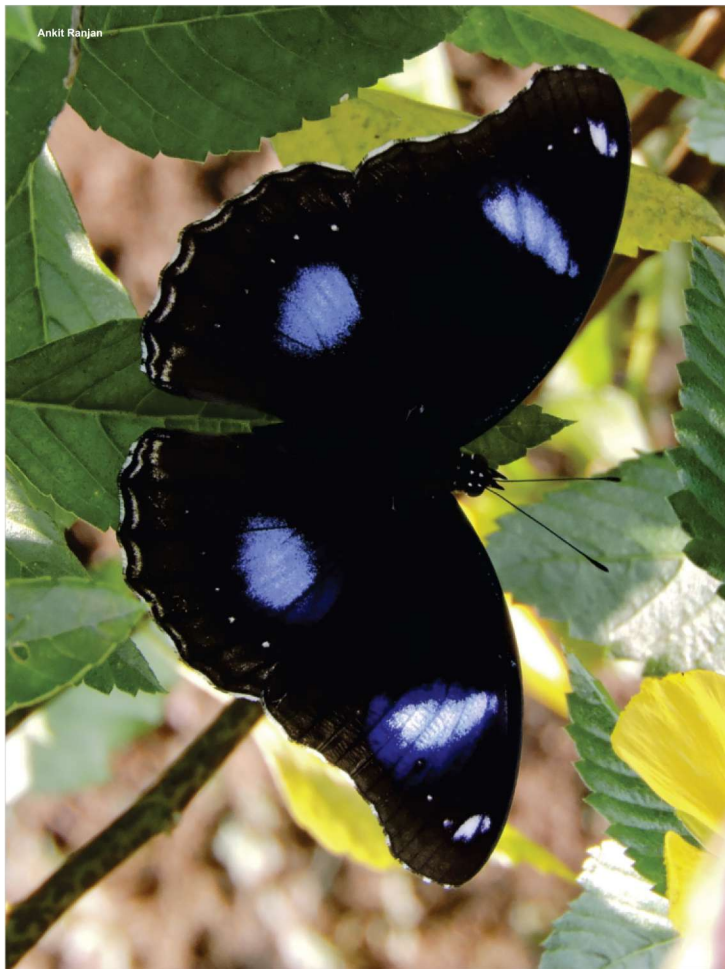
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**Dark Evening Brown**  
*Melanitis phedima*

🦋 60-85 mm 📖 Not rare



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**Great Eggfly (Male)**  
*Hypolimnast bolina*

70-110 mm Common



**Great Eggfly (Female)**  
*Hypolimnastis bolina*

 70-110 mm       Common





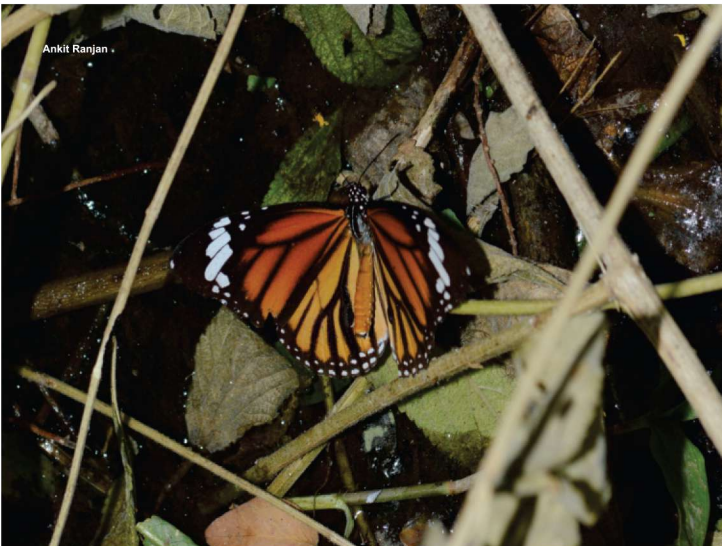


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## Striped Tiger

*Danaus genutia*

 72-100 mm     Common



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**Double-Branded Crow**  
*Euploea sylvester*

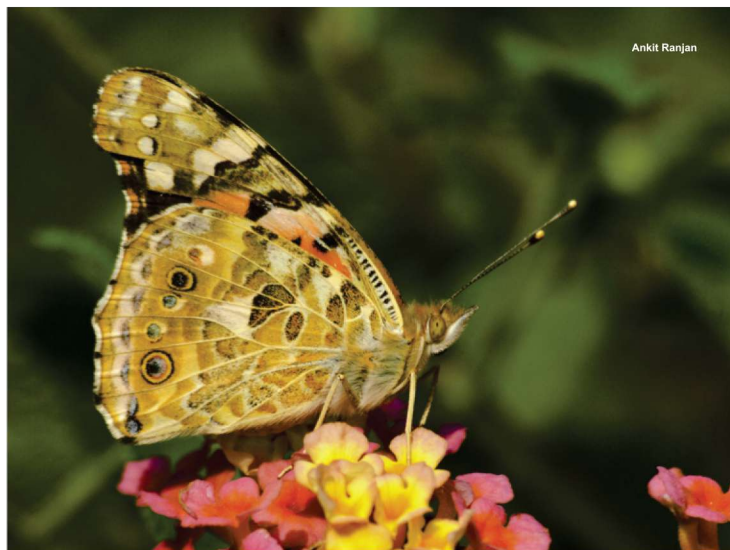
95-105 mm Locally common



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**Common Sailor**  
*Neptis hylas*

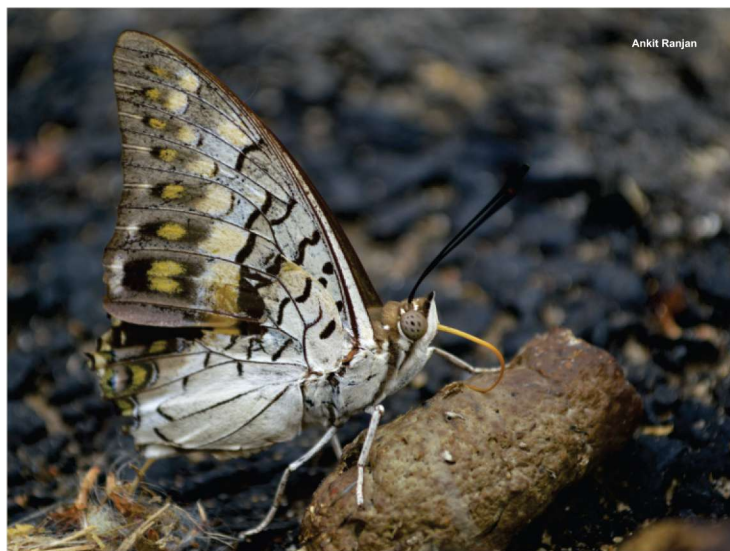
50-60 mm Common



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**Painted Lady**  
*Vanessa cardui*

🦋 55-70 mm 📖 Common



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**Black Rajah**  
*Charaxes solon*

🦋 70-80 mm 📖 Not common



## Peacock Pansy *Junonia almana*

 60-65 mm  Common

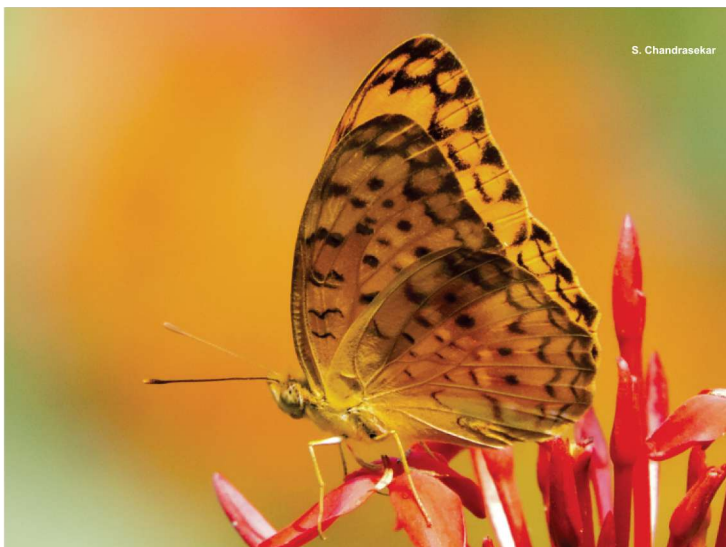






**Common Leopard**  
*Phalanta phalantha*

 50-60 mm     Common





**Grey Pansy**  
*Junonia atlites*

🌱 55-65 mm 📖 Locally Common

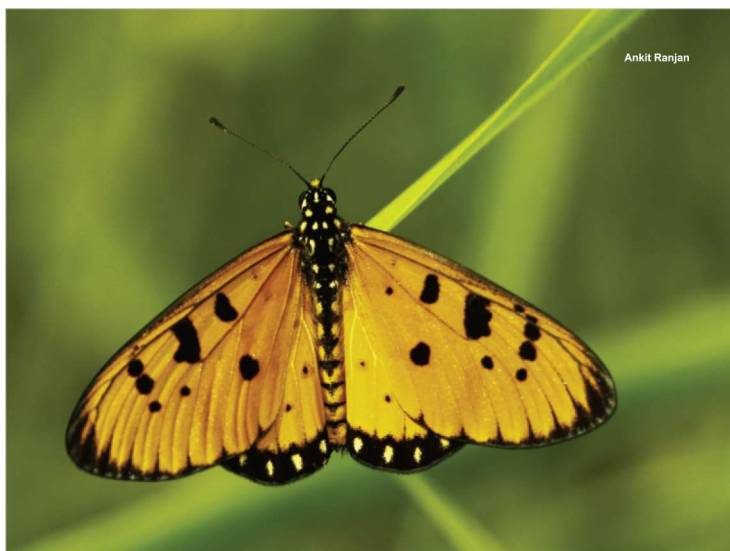




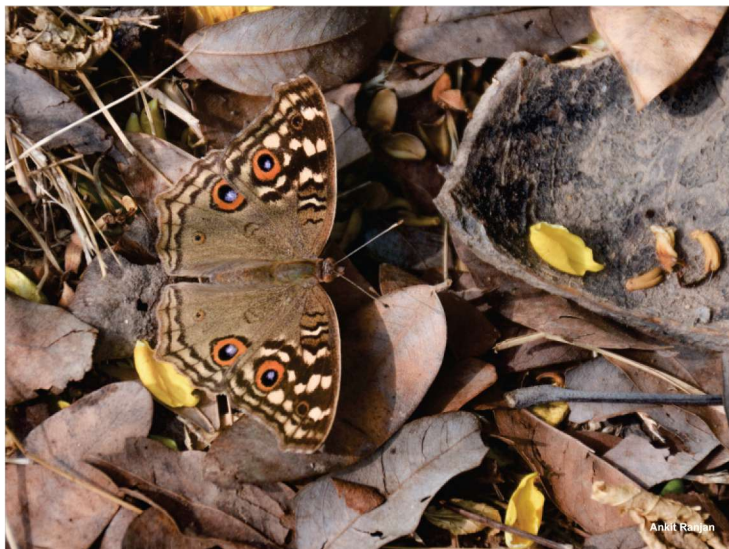
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## Tawny Coster *Acraea violae*

 50-65 mm  Common

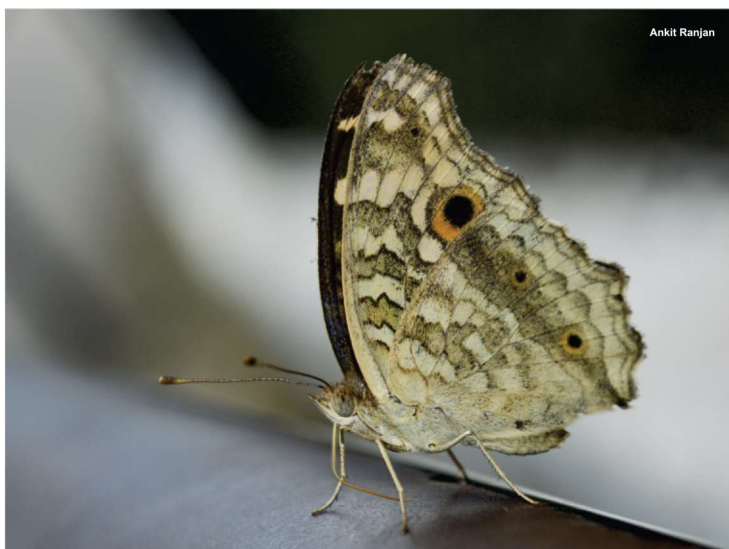


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**Lemon Pansy**  
*Junonia lemonias*

 40-60 mm       Common







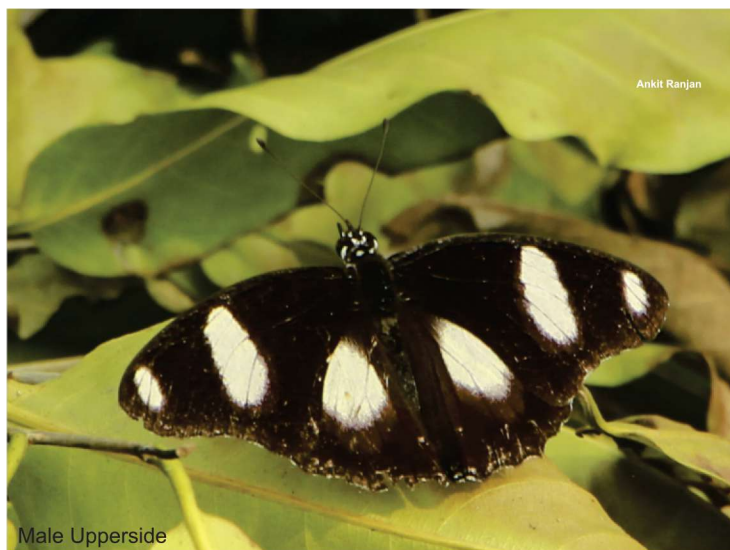
Female Upperside



Female Underside

## Danaid Eggfly *Hypolimnastis misippus*

 70-85 mm  Common



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Male Upperside



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**White-Bar Bushbrown**  
*Mycalesis anaxias*

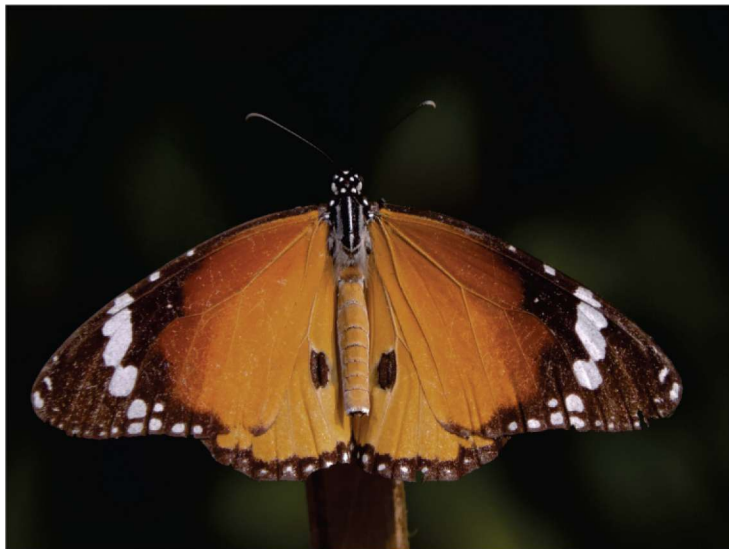
🦋 48-55 mm 📏 Not rare



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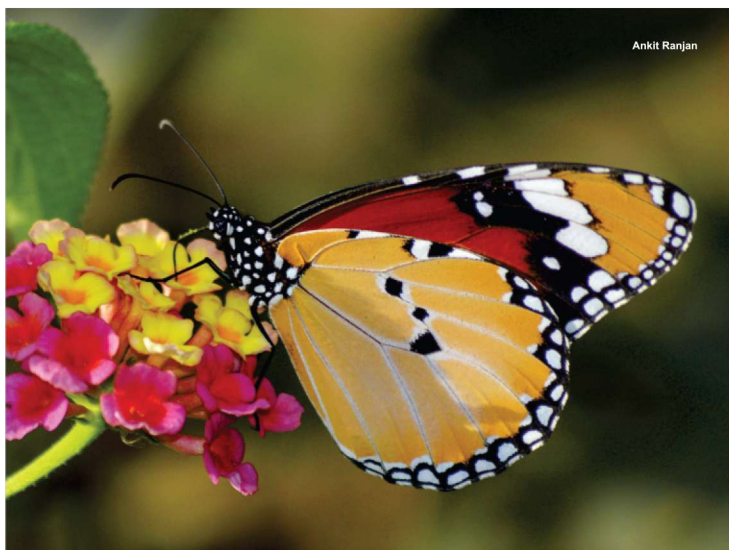
**White-Line Bushbrown**  
*Mycalesis malsara*

🦋 40-50 mm 📏 Common



**Plain Tiger**  
*Danaus chrysippus*

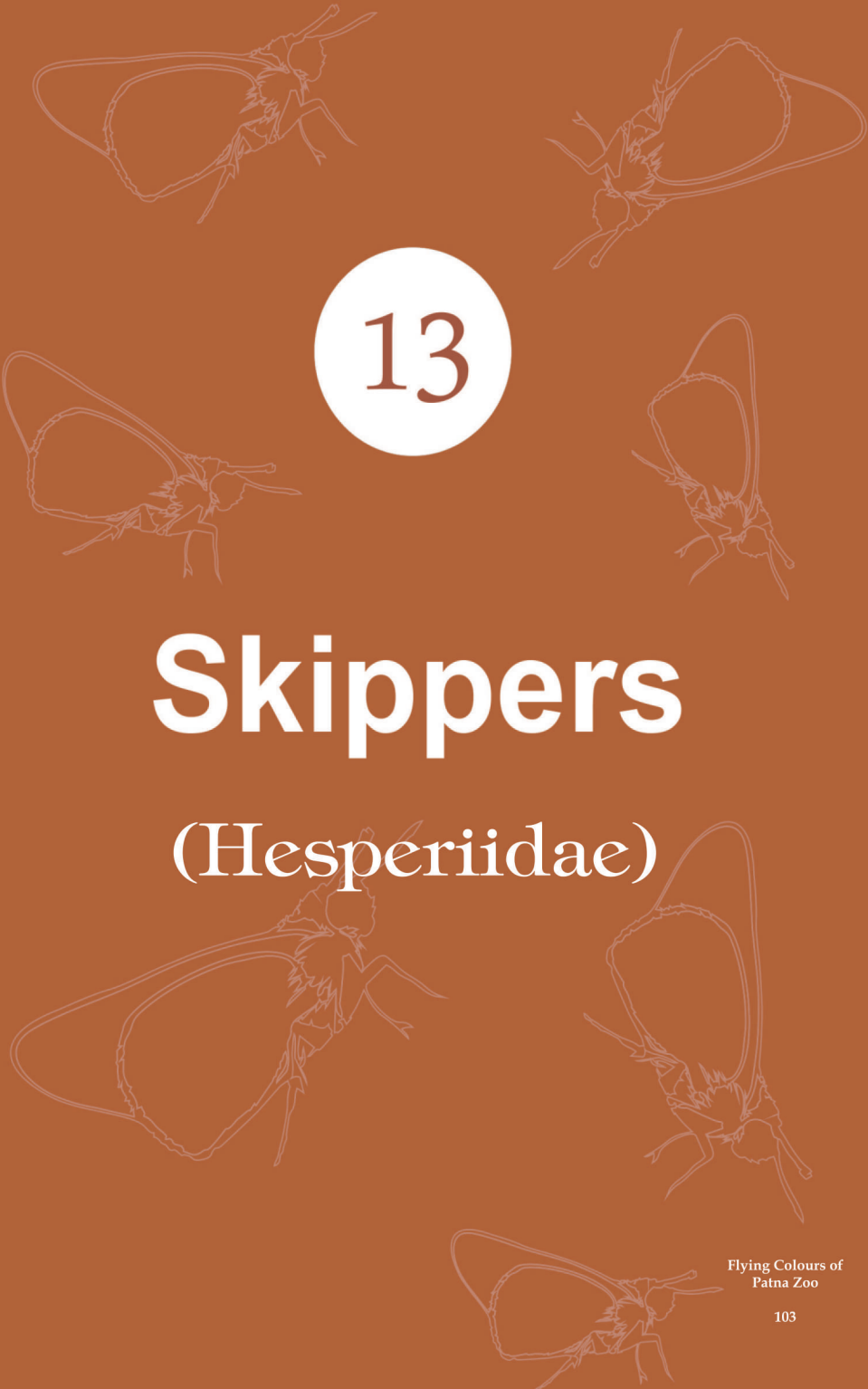
 70-80 mm       Common







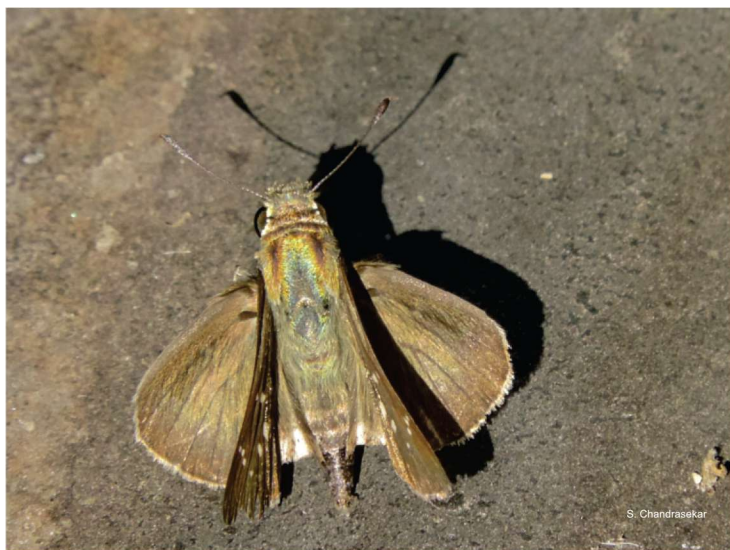




13

# Skippers

(Hesperiidae)



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**Blank Swift**  
*Caltoris kumara*

 42-46 mm

 Common



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**Conjoined swift**  
*Pelopidas conjuncta*

 45-52 mm

 Not rare



**Tamil Grass Dart**  
*Taractrocera ceramas*

🌱 23-30 mm

📋 Locally abundant



**Dark Palm-Dart**  
*Telicota ancilla*

🌱 33-36 mm

📋 Common



Ankit Ranjan

## Straight Swift *Parnara guttatus*

 32-38 mm

 Common





**Common Dartlet**  
*Oriens goloides*

 24-28 mm

 Common



**Rice Swift**  
*Borbo cinnara*

 30-36 mm

 Common

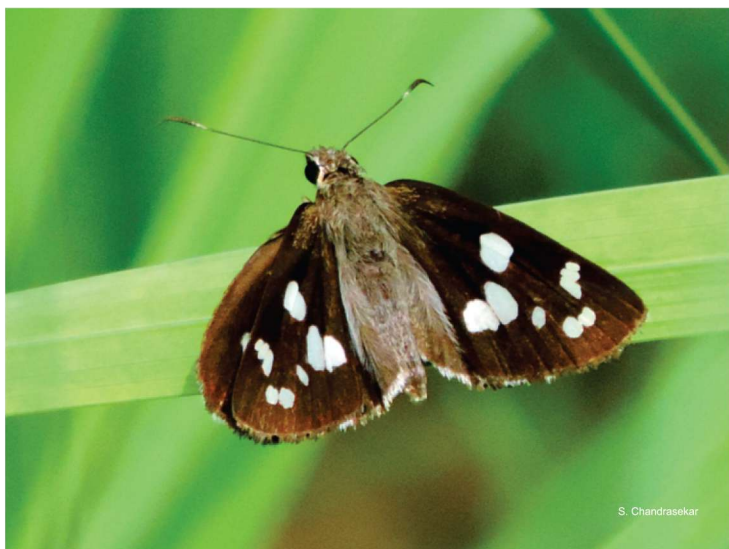


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## Grass Demon *Udaspes folus*

48-40 mm

Not uncommon



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**Indian Palm Bob**  
*Suastus gremius*

 32-45 mm

 Common



**Small Branded Swift**  
*Pelopidas mathias*

 32-38 mm  Common





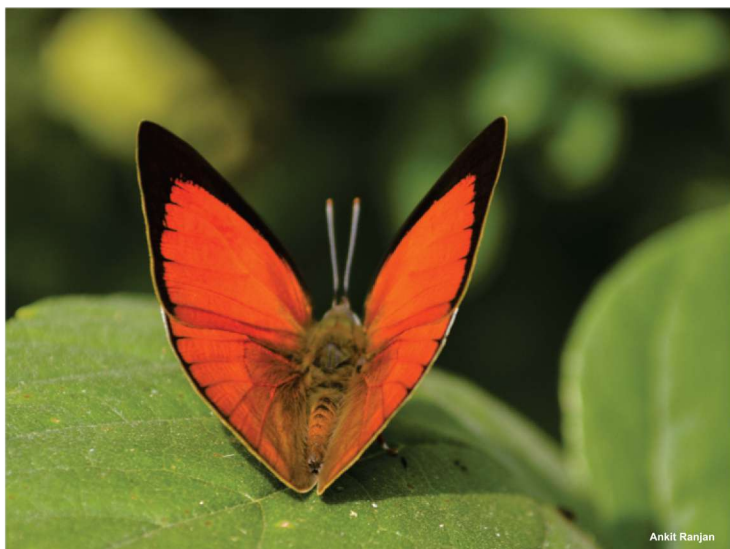




14

# Blues

(Lycaenidae)

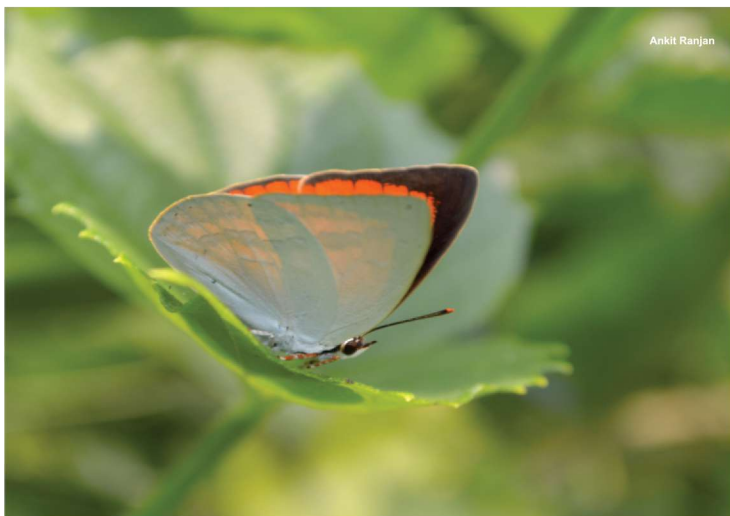


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## Indian Sunbeam *Curetis thetis*

🍄 40-48 mm

📅 Not rare



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**Pointed Pierrot**  
*Tarucus indica*

🌿 22-30 mm

📅 Common



**Plains Cupid**  
*Chilades pandava*

🌿 25-35 mm

📅 Locally Common



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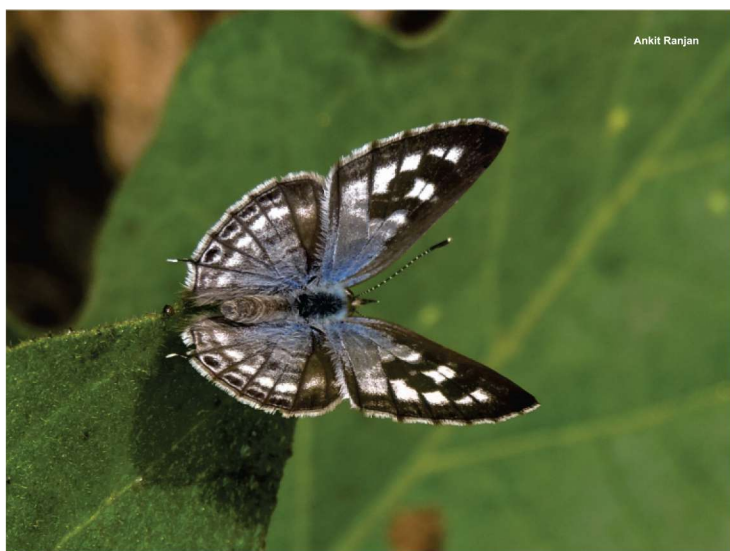
## Rounded Pierrot *Tarucus nara*



24-28 mm



Not rare



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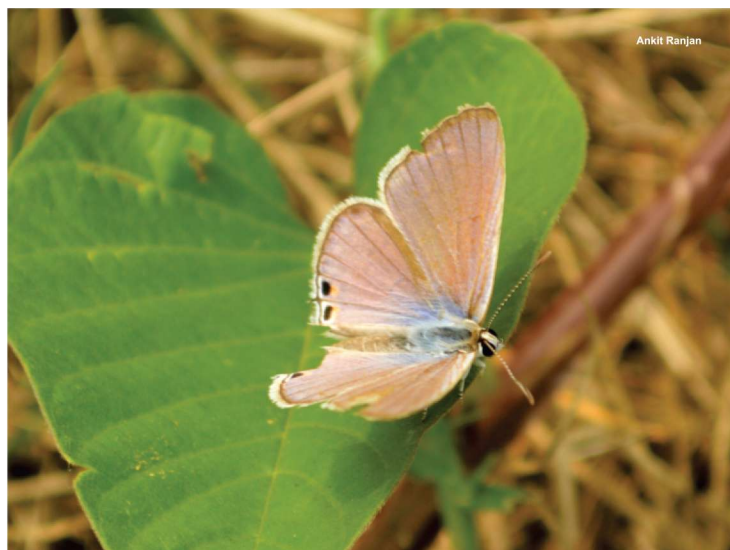




## **Gram Blue** *Euchrysops cnejus*

 25-33 mm

 Common

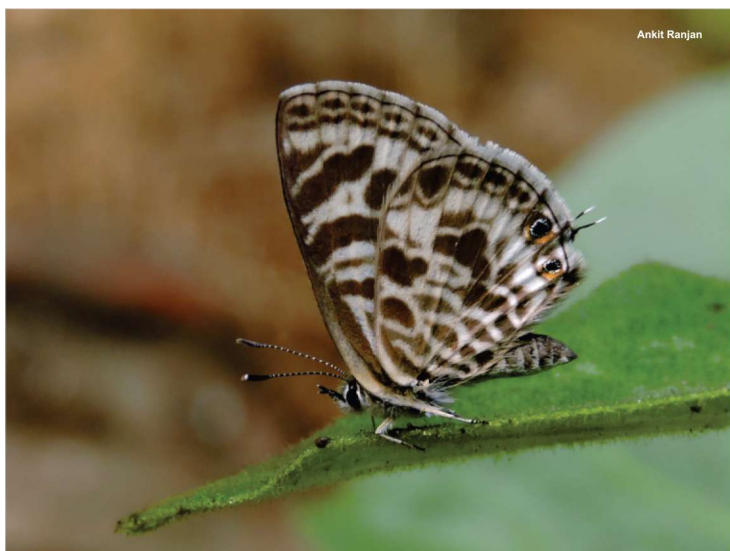




**Forest Pierrot**  
*Taraka Hamada*

 20-30 mm

 Not rare



**Zebra Blue**  
*Leptotes plinius*

 22-30 mm

 Common



**Common Pierrot**  
*Castalius rosimon*

 24-34 mm

 Common





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## White-Branded Royal *Dacalana cotys*



33-37 mm



Not common



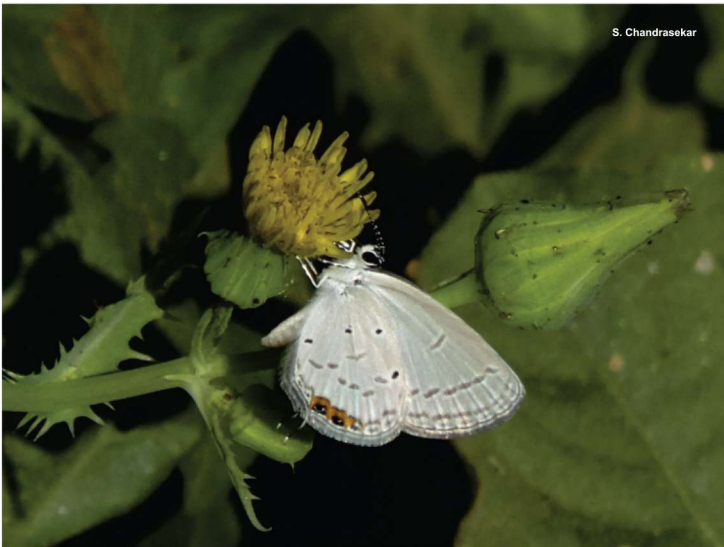
S. Chandrasekar





**Tiny Grass Blue**  
*Zizula hylax*

🌿 16-24 mm      📱 Common



**Indian Cupid**  
*Everes lacturnus*

🌿 22-28 mm      📱 Not rare

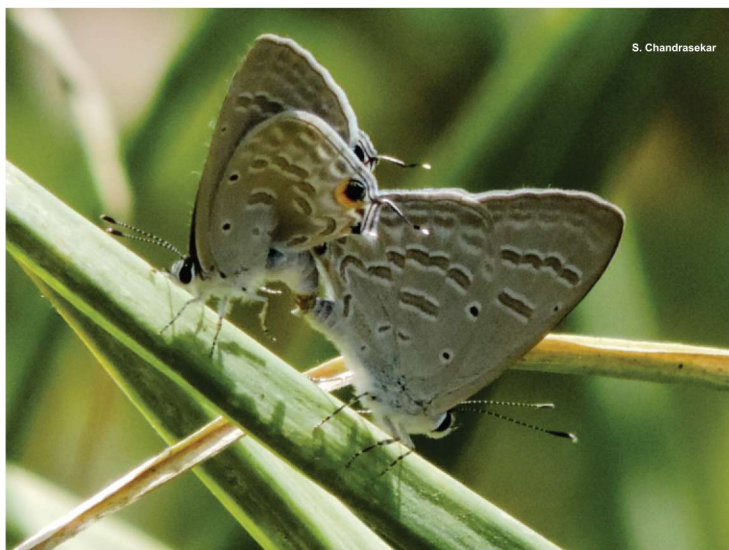


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## Forget Me Not *Catochrysops strabo*

🦋 25-35 mm

📅 Common



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## Small Cupid *Chilades pandava*

🦋 25-35 mm

📅 Locally common

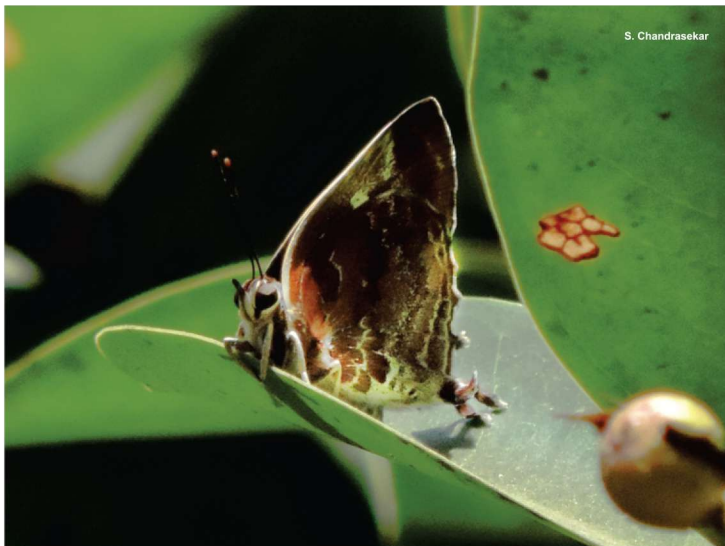


## Silverstreak Blue

*Iraota timoleon*

 40-48 mm

 Locally not rare

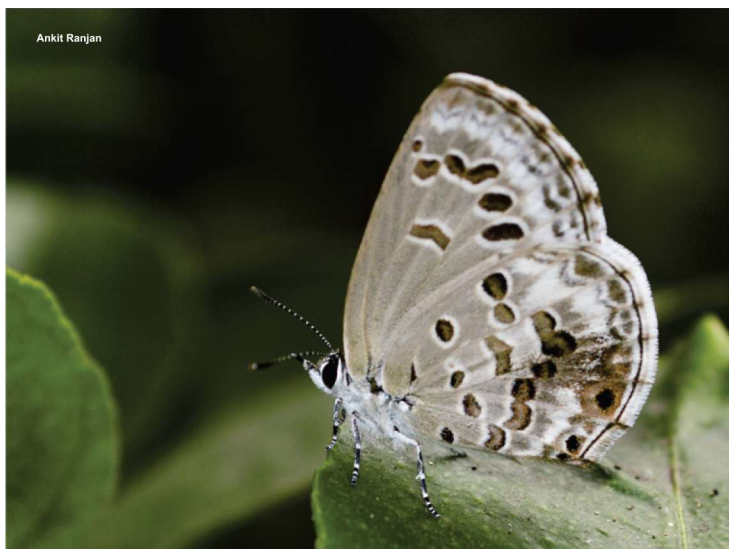




**Peacock Royal**  
*Tajuria cippus*

🦋 31-45 mm

📖 Uncommon



**Lime Blue**  
*Chilades lajus*

🦋 26-30 mm

📖 Common





**Dull Babool Blue**  
*Azanus uranus*

🦋 20-25 mm

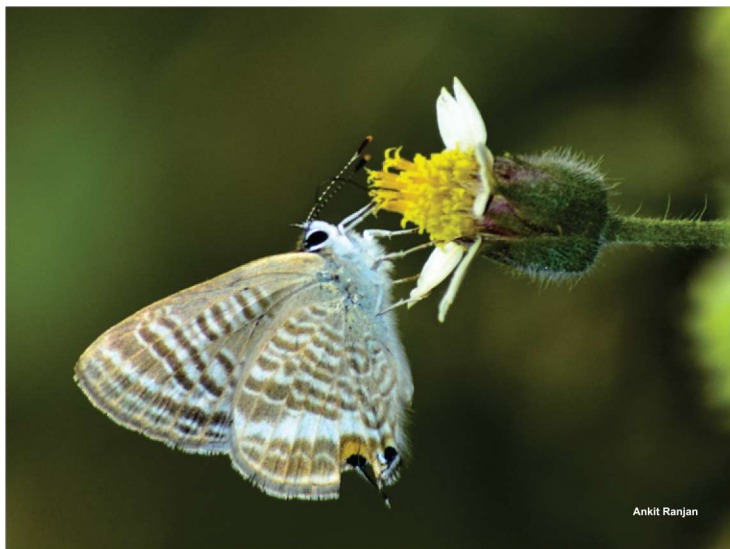
📅 Common



**Pale Grass Blue**  
*Pseudozizeeria maha*

🦋 26-30 mm

📅 Common

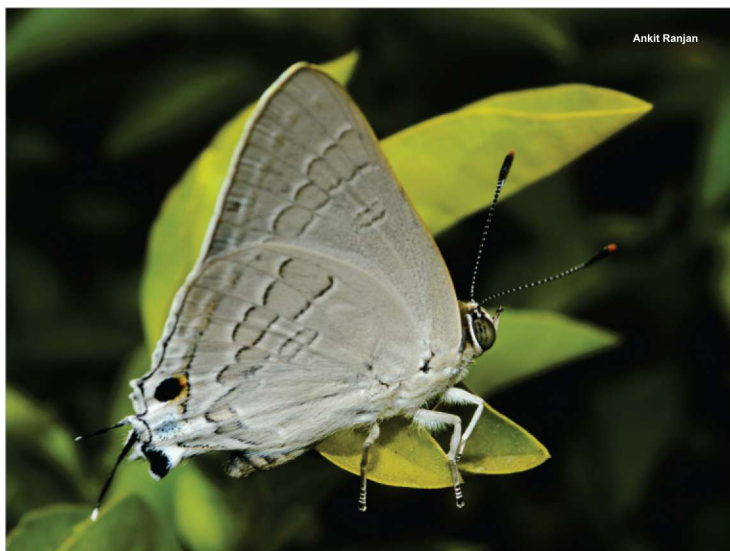


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**Pea Blue**  
*Lampides boeticus*

🦋 24-36 mm

📅 Common

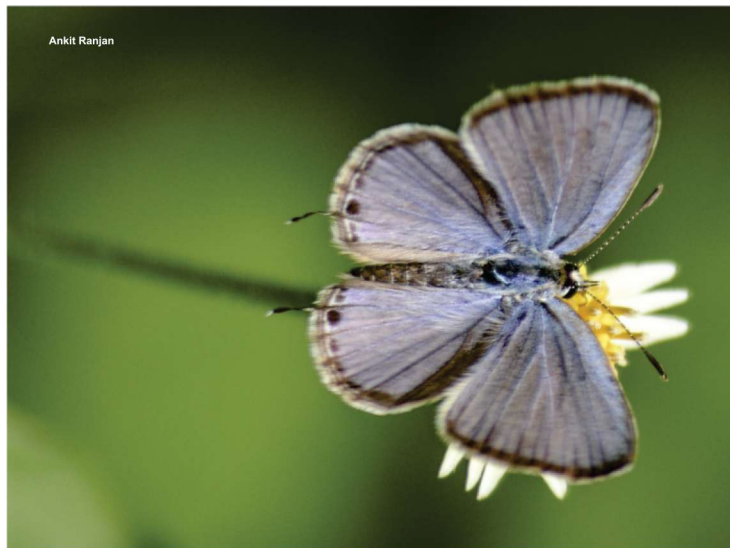


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**Guava Blue**  
*Deudorix isocrates*

🦋 34-50 mm

📅 Common



**Bright Babool Blue**  
*Azanus ubaldus*

 20-25 mm

 Common





**Common Cerulean**  
*Jamides celeno*

🦋 27-40 mm

📅 Common



**Common Ciliate Blue**  
*Anthene emolus*

🦋 28-35 mm

📅 Common





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**Scarce Shot Silverline**  
*Spindasis elima*

🦋 28-42 mm 📖 Not Common



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**Common Shot Silverline**  
*Spindasis ictis*

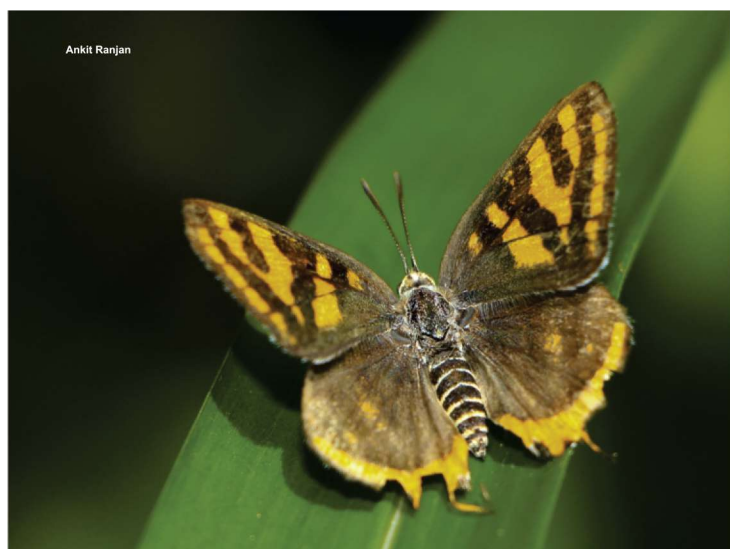
🦋 27-35 mm 📖 Locally common



## Common Silverline *Spindasis vulcanus*

 26-34 mm

 Common

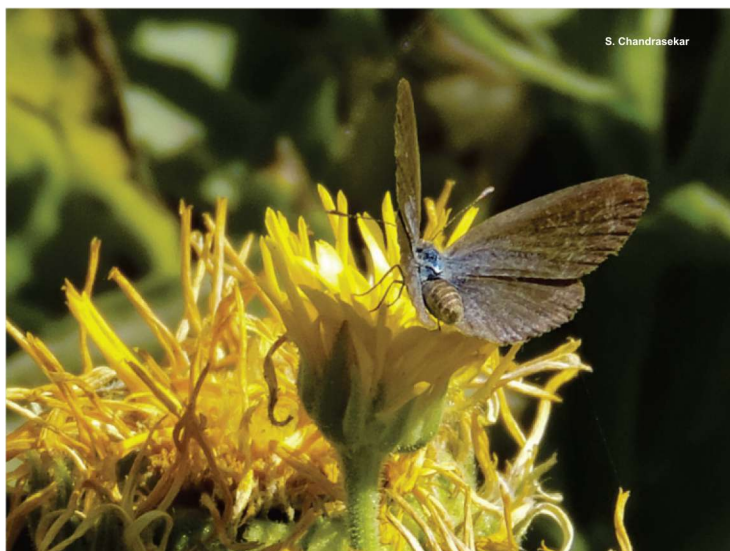




**Lesser Grass Blue**  
*Zizina otis*

 19-26 mm

 Common





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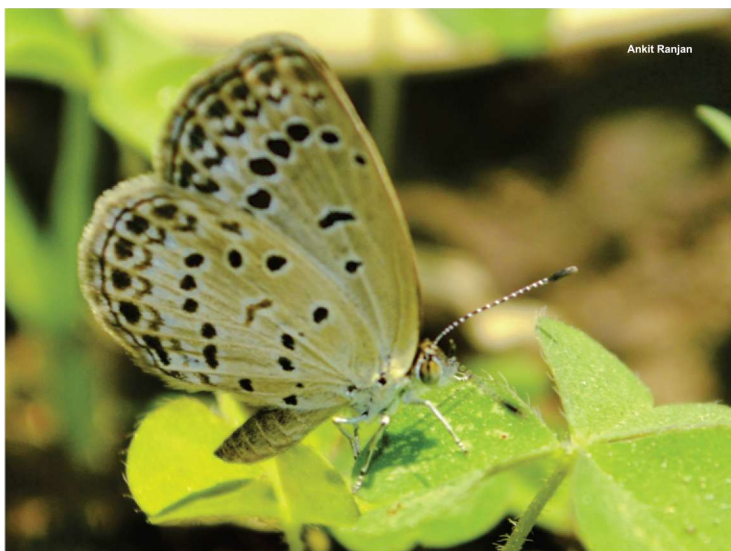
**Leaf Blue**  
*Amblypodia anita*



45-52 mm



Not rare



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**Dark Grass Blue**  
*Zizeeria karsandra*



18-24 mm



Common



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## List of Some Common Host Plants and related Butterflies:

| Sr. No. | Scientific Name (Common Name)                                                                                                            | Butterflies                                                         |
|---------|------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| 1.      | <i>Cassia fistula</i> (Indian Laburnum/ Golden Shower Tree/ Amaltas)                                                                     | Common Emigrant and Mottled Emigrant.                               |
| 2.      | <i>Pithecellobium dulce</i> (Monkey Pod/ Jalebi/ Ganga Imli)                                                                             | Common Grass Yellow<br>Three Spot Grass Yellow                      |
| 3.      | <i>Polyalthia longifolia</i> (False Ashok or Indian Mast tree/ Debdaru)<br><i>Polyalthia pendula</i> (False Ashok or Mast tree/ Debdaru) | Common Jay<br>Spot Swordtail                                        |
| 4.      | <i>Hedychium spicatum</i> (Ginger Lilly/ Kapur Kachari)                                                                                  | Grass Demon skipper                                                 |
| 5.      | <i>Portulaca sp.</i> (Moss Rose/ Nonia)                                                                                                  | Danaid Eggfly and Great Eggfly                                      |
| 6.      | <i>Nerium oleander</i> (Oleander/ Kaner/ Kanail)<br><i>Ficus spp.</i> (Peepal, fig, Banyan tree, etc./ Peepal, Bargad, Pakad, Gullar)    | Common Crow<br>Silverstreak Blue                                    |
| 7.      | <i>Cocus nucifera</i> (Coconut/ Naariyal)<br><i>Areca catechu</i> (Betel Palm/ Chamarpushpa/ Guva)                                       | Palm Bob Skipper                                                    |
| 8.      | <i>Bambusa spp.</i> (Bamboos/ Baans)                                                                                                     | Foresters                                                           |
| 9.      | <i>Croatalaria sp.</i> (Rattlepod/ Khul- Khuli)                                                                                          | Milkweed Butterflies (Plain Tiger, Striped Tiger, Blue Tiger, etc.) |
| 10.     | <i>Heliotropium indicum</i> (Indian Turnsole/ Hathajori)                                                                                 | Milkweed Butterflies and Crows.                                     |
| 11.     | <i>Capparis spp.</i> (Rheed's Caper or Chavruka)                                                                                         | Common Wanderer                                                     |
| 12.     | <i>Aristolochia bracteata</i> (birth wort or Pipe vine/ Hukka Bael)                                                                      | Common Rose and Crimson Rose                                        |
| 13.     | <i>Aegle marmelos</i> (Golden apple or Bael)                                                                                             | Lime Butterfly                                                      |
| 14.     | <i>Michaelia champaca</i> (Champa)                                                                                                       | Common Jay                                                          |
| 15.     | <i>Cymbopogon sp.</i> (Lemon grass/ Gandhatrina/ Aghin Ghas)                                                                             | Rice Swift skipper                                                  |
| 16.     | <i>Zizyphus mauritiana</i> (Indian Plum or Ber)                                                                                          | Common Silverline                                                   |





# H O S T P L A N T S

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| 17. | <i>Psidium guajava</i> (Common Guava/ Amrudh)<br><i>Punica granatum</i> (Pomegranate/ Anar)<br><i>Tamarindus indica</i> (Tamarind/ Imli)                                                                        | Guava Blue<br>Silverstreak Blue |
| 18. | <i>Dendrophthoe falcata</i> (Mistletoe – a Parasitic plant/ Banda/Bandaba)<br><i>Helicanthus elastic</i> (Danser, a Mistletoe species)                                                                          | Peacock Royal (Blues)           |
| 19. | <i>Abrus precatorius</i> (Indian Licorice or Gaungchi/ Ratti)<br><i>Milletia pinnata</i> (Pungam Oil Tree or Karanj)                                                                                            | Indian Sunbeam                  |
| 20. | <i>Cycas revoluta</i> (Sago Palm – a Gymnosperm/ Cycas/ Jangli madan mastkaphul)<br><i>Acacia nilotica</i> (Babool)<br><i>Acacia catechu</i> (Khair)                                                            | Plains Cupid                    |
| 21. | <i>Butea monosperma</i> (Flame of the Forest or Palas)<br><i>Pisum sativum</i> (Pea/ Muttor)<br><i>Vigna spp.</i> (various species of grams)                                                                    | Gram Blue                       |
| 22. | <i>Oryza spp.</i> (Paddy) And other grasses.                                                                                                                                                                    | Common Bushbrown                |
| 23. | <i>Dalbergia sishoo</i> (Indian Rosewood or Shisham)<br><i>Bombax malabaricum</i> (Silk Cotton Tree or Semal)                                                                                                   | Common Sailer                   |
| 24. | <i>Hibiscus spp.</i> (Chinese Rose or Urhul)<br><i>Portulaca oleracea</i> (Little Hogweed)<br><i>Barleria cristata</i> (Bluebell Barleria/ Neel Jhinti)<br><i>Abutilon indicum</i> (Indian Abutilon or Atibala) | Danaid Eggfly and Great Eggfly  |

# H O S T P L A N T S



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| 25. | <p><i>Hygrophila auriculata</i> (Marsh Barbel or Gokulakanta)</p> <p><i>Barleria spp.</i> (Bluebell Barleria/ Neel Jhinti)</p> <p><i>Justicia procumbens</i> (Water Willow or Pitpapada)</p> <p><i>Sida rhombifolia</i> (Arrowleaf Sida or Atibala)</p>                                     | <p>Peacock Pansy</p> <p>Lemon Pansy</p> <p>Grey Pansy</p> <p>Blue Pansy</p> |
| 26. | <p><i>Ricinus communis</i> (Castor Oil Plant/ Arandi)</p> <p><i>Tragia involucre</i> (Indian Stinging Nettle or Peeth Parni)</p>                                                                                                                                                            | <p>Common Castor</p> <p>Angled Castor</p>                                   |
| 27. | <p><i>Flacourtia montana</i> (Mountain Sweet Thorn)</p> <p><i>Xylosma longifolium</i> (Xylosmas/ Katai/ Kattari)</p> <p><i>Mangifera indica</i> (Mango Tree/ Aam)</p> <p><i>Populus deltoides</i> (Poplar Tree)</p> <p><i>Tridax procumbens</i> (Coat Buttons/ Khal Muriya/ Tal Muriya)</p> | <p>Common Leopard</p>                                                       |
| 28. | <p><i>Mitragyna parviflora</i> (Kaim or Guri)</p> <p><i>Mussaenda frondosa</i> (Dhobi plant)</p> <p><i>Neolamarckia cadamba</i> (Kadam)</p>                                                                                                                                                 | <p>Commander</p>                                                            |
| 29. | <p><i>Capparis rheedi</i> (Caperbush/ Karir)</p> <p><i>C. sepiaria</i> (Kabra/Himsra)</p> <p><i>C. spinosa</i> (Wild Passion Fruit/Kabra)</p> <p><i>Cadaba fruitcosa</i> (Kodhab)</p> <p><i>Cleome viscosa</i> (Spider weed/Hulhul)</p>                                                     | <p>Psyche</p> <p>Pioneer</p>                                                |



# H O S T P L A N T S

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| 30. | <i>Dendrophthoe falcate</i><br>(Mistletoe/Banda/Bandaba)<br><br><i>Helicanthes elastic</i> (a Mistletoe species)<br><br><i>Scurrula parasitica</i> (a Mistletoe species/ Banda)<br><br><i>Viscum sp.</i> (Common Mistletoe/ Banda/Bandba)<br><br><i>Bridelia retusa</i> ( Spinous Kino Tree/ kaji) | Common Jezebel                                                              |
| 31. | <i>Citrus spp.</i> (Lemon Tree, etc.)                                                                                                                                                                                                                                                              | Blue Mormon                                                                 |
| 32. | <i>Aegle marmelos</i> (Bael)                                                                                                                                                                                                                                                                       | Common Mormon                                                               |
| 33. | <i>Cassia fistula</i> (Amaltas)<br><br><i>Cassia tora</i> (Chekwad)<br><br><i>Cassia alata</i> (Ergaj)                                                                                                                                                                                             | Common Grass Yellow                                                         |
| 34. | Grasses                                                                                                                                                                                                                                                                                            | Common Evening Brown<br><br>Common Four Ring                                |
| 35. | <i>Cocos nucifera</i> (Coconut Tree/ Naariyal)<br><br><i>Borassus flabellifera</i> (Palm Tree/Taad)<br><br><i>Areca catechu</i> (Betel Palm/ Chamarpushpa/ Guva)<br><br><i>Calamus rotang</i> (Rattan Palm/ Cane/ Beth)<br><br><i>Phoenix loureiroi</i><br>(Ghats Date Palm/ Khajuri)              | Common Palmfly                                                              |
| 36. | <i>Tamarindus indica</i> (Imli/Tamarind)                                                                                                                                                                                                                                                           | Black Rajah                                                                 |
| 37. | <i>Mangifera indica</i> (Aam/Mango)                                                                                                                                                                                                                                                                | Common Baron                                                                |
| 38. | <i>Calotropis gigantea</i> (Madara/Aak)<br><br><i>Asclepias curassavica</i> (Kakatundi)                                                                                                                                                                                                            | Plain Tiger<br><br>Striped Tiger<br><br>Blue Tiger<br><br>Glassy Blue Tiger |



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| 39. | <i>Mimusops elengi</i> (Moulsri)<br><i>Asclepias curassavica</i> (Kakatundi)<br><i>Nerium odorum</i> (Oleander/ kanail)                                                                                                        | Common Indian Crow                  |
| 40. | <i>Ziziphus mauritiana</i> (Ber)                                                                                                                                                                                               | Common Pierrot<br>Common Silverline |
| 41. | <i>Lantana camara</i> (Putoos)                                                                                                                                                                                                 | Tiny Grass Blue                     |
| 42. | <i>Butea monosperma</i> (Flame of the Forest/ Palas)<br><i>Pisum sativum</i> (Pea/ Muttor)                                                                                                                                     | Gram Blue<br>Pea Blue               |
| 43. | <i>Millettia pinnata</i> (Pungam Oil Tree or Karanj)<br><i>Butea monosperma</i> (Flame of the Forest/ Palas)<br><i>Saraca asoca</i> (Ashoka Tree/ Sita Ashok)<br><i>Abrus precatorius</i> (Indian Licorice or Gaungchi/ Ratti) | Common Cerulean                     |
| 44. | <i>Millettia pinnata</i> (Pungam Oil Tree or Karanj)<br><i>Abrus precatorius</i> (Ratti)                                                                                                                                       | Indian Sun Beam                     |
| 45. | <i>Oryza sativa</i> (Paddy/ Dhaan)                                                                                                                                                                                             | Bush Hopper<br>Rice Swift           |
| 46. | <i>Curcuma aromatica</i> (Turmeric/ Haldi)<br><i>Zingiber officinalis</i> (Ginger/ Adhrak)                                                                                                                                     | Grass Demon                         |
| 47. | <i>Cleome viscosa</i> (Hulhul)                                                                                                                                                                                                 | Psyche                              |
| 48. | <i>Aristolochia indica</i> (Hookka Bel)                                                                                                                                                                                        | Common Rose<br>Crimson Rose         |





# References

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S. Chandrasekar

Flying Colours of  
Patna Zoo

# About the Authors

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**S. Chandrasekar**, is an Indian Forest Service Officer of 2003 batch borne to Bihar cadre. He is a graduate in Forestry from the Forest College and Research Institute, Mettupalayam, Tamil Nadu (Tamil Nadu Agriculture University, Coimbatore). Presently this first author is holding the post of Member Secretary, Bihar State Pollution Control Board, Patna in the Rank of Chief Conservator of Forests. Butterfly watching, documentation of insects and Photography are his hobbies. He has served as the Director, Patna Zoo (Sanjay Gandhi Biological Park) between July, 2013 and April, 2016.



**Ankit Ranjan** is hailing from Nalanda district and is presently doing his PhD in Photography from the Banasthali Vidyapith, Rajasthan. While doing the photographic documentation on Butterflies of Patna zoo he was an under-graduate in Fine Arts from the College of Arts and Crafts, Patna. He has attended various training related to butterflies. He has served as Zoo Educator in Patna Zoo. He has created the first butterfly garden (in 2016) of Bihar in the Kilkari Bihar Bal Bhawan (an organization under the Department of Education, Government of Bihar) in Patna, Bihar and presently, Ankit as Director of Pathaktoli Research Studios, is linking environment and art together through Research on Butterflies, Visual Design and Photography. Ankit is also associated with butterfly park of Lucknow Zoo and has been maintaining the butterfly garden since September, 2018. He was awarded Research Scholarship Grant in Photography from the Lalit Kala Akademi, Ministry of Culture, Government of India and was also awarded 'Young Artist Scholarship in Photography' from the Center for Cultural Resources & Training, Ministry of Culture, Government of India. He has organized numerous solo and group photo exhibition on various themes including butterflies on various occasions and various platforms.



Sanjay Gandhi Biological Park, Patna