

# NATURE

# TRAIL

Chennai Young Naturalists'  
Network

OCT' 2020 | Vol.1 Issue.2



## FEATURING:

- Wetlands around Chennai
- Interview: Kartik Shanker



# NATURE TRAIL

**Volume 1, Issue 2**

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*Nature Trail* is published quarterly in the months of January, April, July and October. It is a free e-Magazine by the Chennai Young Naturalists' Network that may be downloaded from the website.

**Our Mission-** To reach a broad spectrum of readers and ignite curiosity and scientific thinking towards the natural world, while also promoting young naturalists to develop a variety of skill sets.



## About the Chennai Young Naturalists' Network

The Chennai Young Naturalists' Network aims to provide a platform for young naturalists to interact with peers interested in wildlife and to explore various applications of a variety of skills. The hope is to help them grow not only in aspects connected to observation in the field but also to give them the opportunity to explore various career options. Meanwhile, we also aim to conduct outreach and educational events to help increase awareness and improve participation of the public in citizen science and other nature-related activities.

## From the Editor

Dear Readers,

As this edition comes out, I hope it finds all of you well, especially in light of these difficult times. Despite all this, I am sure many of us are looking forward to the onset of the winter bird migration, regardless of whether we will be watching from our homes or travelling to witness the same. Nevertheless, I hope you have a fun season while ensuring your safety.

Much like the first edition, we have covered a vast range of topics. We have also tried to cover a couple of articles that would be of interest due to the birds' migration. Also, having had a little more time, we have tried to make the design more appealing, starting from the added colours to the new illustrations. I hope you enjoy going through them just as much as we did in creating them.

--Mahathi Narayanaswamy, Designer



Chennai Young  
Naturalists Network

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**Cover Page photo-** *Flamingos at Pulicat by Melvin Jaison.*

**Contents Page photo-** *Ashy-crowned Sparrow-lark by Melvin Jaison.*

**Back Page photo-** *Golden Plovers at Kelambakkam by Vikas Madhav Nagarajan.*

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(*Ramadasa pavo*)- Rohith Srinivasan



Indian Moon Moth- Balakrishnan Ram



Oriental Rat Snake - Mahathi Narayanaswamy



Indian Courser- Melvin Jaison

## OBSERVATIONS FROM THE PREVIOUS QUARTER

With the butterfly migration just ending, the bird migration just setting in and moth activity peaking, the previous quarter has been quite eventful despite COVID-19 and the lockdowns. Many of our members took to observing the wildlife in the vicinity of their homes and documented a lot of these on our project on iNaturalist. Here are some of our observations.



(*Xyleutes strix*)- Rohith Srinivasan



(*Thyas honesta*)- Shivani Manivannan

## OBSERVATIONAL NOTES



*Twisha Mullappa* talks about the experience that got her into birding. She lists out her favourite birds and some interesting observations during her lockdown exploration from her kitchen balcony.

It was just another day at the park in my apartment complex in Perungudi, Chennai when a small iridescent purplish-black bird caught my attention. I found out that the bird was a Purple Sunbird. Since then, I got interested in seeing more birds but I did not know the names of the birds I spotted. I used the Merlin app to identify them and also took help from my parents. During this lockdown, I have seen more than 60 birds, most of them being frequent visitors on an empty patch of grassland behind my kitchen balcony.

I have seen the Asian Koel many times. The male koel is fully black, with red coloured eyes and a white beak. The female koel's whole body is sandy brown, with white spots and its tail has white stripes. When they fly, their bodies are shaped like semi-circles. In my opinion, the female koel is prettier than the male. I have observed that male and female koels have different echoic calls. I have also read that koels are lazy parents who sneak their eggs into a crow's nest and the crow does the job of a parent. I find koels smart and lazy at the same time.

One evening, I saw a Pied Kingfisher at a nearby pond. It is my favourite kingfisher. It has a dagger-like beak and hovers at a fixed position so that it can catch fish. I like the way it dives down. It is an awesome spectacle.

My favourite bird is the Indian Golden Oriole. I have seen the male a few times and it is unmissable. It is so beautiful that you cannot take your eyes off it. It is bright yellow, has a light red beak and has big black markings on its wings.

From my kitchen balcony, I can see a lot of Spot-billed Pelicans perching on the wires and towers in the Pallikaranai Marshland. For this reason, I call it "Pelicarnai Marshland". I also got to see them among several other birds when I visited the marshland recently.

I look forward to exploring birds further and in particular, hope to see the "Birds of Paradise" someday.

*All photos attached in the article were taken by Twisha Mullappa and she holds the copyright to them.*

*Twisha Mullappa is an 8 year old birder.*

## EXPLORING TAXA

### 1. INDIAN PITTA

Indian Pitta (*Pitta brachyura*) from IIT-M-  
Mahathi Narayanaswamy



Aditya Ramakrishnan has compiled information about the Indian Pitta covering its connections with humans to its lifestyle.

#### Indian Pitta

(*Pitta brachyura*)

**Weight:** 47-66 g

**Length:** 18-20 cm

#### TAXONOMY

**Kingdom:** Animalia

**Phylum:** Chordata

**Class:** Aves

**Order:** Passeriformes

**Family:** Pittidae

**Genus:** Pitta

**Introduction:** The Indian Pitta (*Pitta brachyura*) is a small passerine, endemic to the Indian subcontinent. The name 'Pitta' is derived from the Telugu word '*pitta*', meaning 'a small bird'. Based on its plumage, behaviour and call, the bird has different local names across India. Some parts of the country call the Indian Pitta '*nav-rang*', which means 'nine colours' in Hindi. This passerine's local name in Tamil Nadu stems from the time of day when its call is heard, namely, the '*aru-mani kuruvi*' or 6 O'Clock Bird.

**Range:** Found throughout much of the Indian subcontinent, the Indian Pitta resides in Northern and Central India and as far south as Mumbai during the summer months (typically from May till August-September). It migrates to peninsular India and Sri Lanka during the winter months. It has been recorded up to an altitude of 1,700 m. It breeds in the Himalayan foothills up to a height of about 1,200 m, ranging from the Margalla hills of Northern Pakistan up till Nepal and possibly Sikkim in India. The bird's presence is not well documented in the North-Eastern part of the subcontinent; but there have been records of it in Manipur, Assam, Bhutan, the Chittagong hills and South-East Bangladesh.

**Habitat:** In the breeding season, the Indian Pitta inhabits the dense undergrowth of evergreen and deciduous forests such as those of Sal, Oak and Teak. It is found in moist

ravines, dried-out rivers with grassy banks and areas of vegetation dominated by thorny scrub. We can see them in peninsular India and Sri Lanka during the non-breeding season, sometimes close to human habitations such as parks, tea and coffee plantations and gardens.

**ID Parameters:** The Indian pitta is a stoutly built, colourful bird ranging between 18 and 20 cm in size. Its crown is dark buff and there is a thick black band between the lores and nape. A thin white supercilium and a prominent white band below the eyes are present. Except for the scarlet rump and under-tail covert feathers, its breast and belly are buff-coloured. Wings and back are blue-green with a bright cobalt blue patch on the wing coverts. When the bird is flying or when the wings are spread, we can observe the black primary feathers with a white spot. The inner secondary feathers have white tips.



The tail is black and stubby with a blue tip and is not visible when the bird's wings are closed. The bill is stout and orange-brown with a black tip. Legs and feet are pink with brown claws. Both males and females look alike, while juveniles are duller in colour, with the scarlet regions in adults looking pink in non-adults.

The eggs are small, glossy white and oval-shaped with brown and maroon spots and speckles of various shapes. They typically hatch in 16-17 days.

**Behaviour:** The Indian Pitta is typically spotted alone or in pairs. They spend most of their time on the ground hopping around, hunting for insects to eat. They are fond of shaded, semi-damp areas and will quietly fly into a tree if disturbed.

Their call is a loud *wheet...peu*, or rarely, a loud, clear *wheew* coupled with other harsh sounds. They are especially vocal during the breeding season. Their flight is slow and feeble and they migrate in small flocks at night. Their globular nests are made up of twigs, leaves, bamboo and dry roots, with an entrance at the top or side.

**Diet:** The Indian Pitta mainly feeds on earthworms, slugs, small snails, millipedes, termites, ants and beetles. They have also been seen feeding on maggots from excrement and man-made waste disposal pits near urban areas. The fledgelings are fed earthworms and crickets. Some Indian pittas have even been seen feeding small frogs to their young.

**Threats:** IUCN lists the Indian Pitta as a "Least Concern" species. It is also one of the species listed in the Schedule 4 of India's Wildlife (Protection) Act, 1972. Despite this, its population is decreasing. The main threat to the Indian Pitta is habitat loss. Large parts of its range have been cleared for agriculture and urban development. During migration, a lot of these birds are caught and killed for food. The impact of the caged-bird trade on its population is thought to be quite small, although fledgelings are sometimes taken from their nests and reared as pets.

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## EXPLORING TAXA

### 2. COMMON DOTTED SKINK

Common Dotted Skink (*Lygosoma punctata*)  
from Chennai- Yuvan



Throughout much of India, Common Dotted Skinks are believed to be venomous. *Kavya G. V.* has compiled information about this harmless, oviparous reptile.

#### Common Dotted Skink

(*Lygosoma punctata*)

**Length:** 35-96 mm

#### TAXONOMY

**Kingdom:** Animalia

**Phylum:** Chordata

**Class:** Reptilia

**Order:** Squamata

**Family:** Scincidae

**Genus:** *Lygosoma*

**Range and Habitat:** The Common Dotted Skink is a rather secretive species known to occur throughout most of the Indian Subcontinent in a variety of semi-fossorial habitats.

**Diet:** Their diet consists of bugs, snails, worms and even fruits at times, hence they pose no threat to us humans.

**Description:** Trunk is moderately elongated, limbs are reduced, lower eyelid is scaly or with a transparent disc and nuchal scales are enlarged. A red colouration is usually seen on the tails of all young and half-grown specimens, but is completely absent in adults. The tail of the former, save for the basal region, is unspotted and possesses a uniform shade of red. As they grow older, the caudal scales tend to develop small spots (on the ventral surface) and gradually the colour disappears. In the young, black spots are contiguous, forming continuous lines. The dots are carried forward to the snout on the head but later form a more or less symmetrical pattern on the head scales.

#### **Interesting Adaptations and Defence:**

1. Death feigning tactics to evade predators.
2. A transparent visor that they can slide over their eyes to prevent them from getting scratched.

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*Kavya G.V.* is a 2nd year student at SRM Easwari Engineering College.



## EXPLORING TAXA

### 3. BAGWORMS



Bagworm - Adit Jeyan

Walking around our homes or the outdoors, many of us might have come across plant material simply hanging from various surfaces. These contain bagworms, one of the most neglected taxa in nature. *Supraja Narasimhan* has compiled information about these cryptic species that are present around us.

### Bagworms

#### TAXONOMY

**Kingdom:** Animalia

**Phylum:** Arthropoda

**Class:** Insecta

**Order:** Lepidoptera

**Superfamily:** Tineoidea

**Family:** Psychidae

**Morphology:** The adult male moths are typically black in colour with a wingspan of around 1.2- 3.6 cm. On the other hand, the females of several species lack wings or have non-functional wings that are smaller than the males' and in some species, the females even lack eyes, antennae and legs. The abdomen is long and tapers towards the end. The adult moths have vestigial mouthparts.

**Habits and Habitats:** Bagworms are globally distributed. They feed on lichens, grasses, conifer foliage and the leaves of angiosperm trees and shrubs, sometimes as specialists but often as generalists. Psychidae larvae are considered as pests of agricultural crops, especially of oil palm fields in Malaysia.

**Life Cycle:** Their life cycles are indirect i.e., the life stages involve- Egg, Larva, Pupa and Adult. The eggs are cylindrical and smooth. The larvae exhibit peculiar behavior by building spindle shaped silken cases reinforced with dry twigs, small sticks, dry foliage and debris around themselves. The size of the twig case enlarges as the larva grows inside. It pupates inside the case as it latches onto a twig with the help of a silky secretion.

**Courtship and Mating:** In most species, the females remain inside the case itself. The courtship process occurs when the females attract males by releasing pheromones. During the mating process, the male plunges its abdomen into an opening in the case while the other half of its body remains outside.



Bagworm - Balakrishnan Ram

Bagworms use a variety of material . This one from IIT Madras uses leaves - *Mahathi Narayanaswamy*



Bagworm hiding under a leaf to seek shelter- *Supraja Narasimhan*



After mating, the females lay eggs inside the case. When the eggs hatch, the larvae leave the old case to feed and form their own new cases using twigs, sticks and debris.

**The Log Case:** The Bag moth generally spends most of its life inside a twig case. The dry twigs, small sticks etc., used by the larvae are built in such a way that they appear like **"mini log houses"**. These structures are called **"cases"**, lending these moths their other name, "Case moths". The cases of these Bagworm moths are incredibly tough to break and are perfectly camouflaged in their natural habitat. So, it is difficult for birds and other insects to spot one, since the larva of the caterpillar remains protected inside the case, which ranges in size from less than 1 cm to 15 cm in some tropical species. The case shape, size and composition varies among different species.

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*Supraja Narasimhan is a content creator for a nature conservation forum.*

*Bagworm Moth(Eumeta sp) from IIT Madras- Mahathi Narayanaswamy*



*Bagworm from IIT Madras- Mahathi Narayanaswamy*



# BIRDWATCHING IN WETLANDS IN AND AROUND CHENNAI



Little Cormorants in an inland wetland from Chennai- Mahathi Narayanaswamy

*Wetlands, as aquifers, contribute much more to our urban lifestyle than we give them credit for. The Chennai landscape is blessed with both inland and coastal wetland ecosystems. Six hotspots that are frequented by both birds and birders in winter have been described by Melvin Jaison and Vikas Madhav in this article.*

## Inland Wetlands

There are many small wetlands in the region, especially in Kanchipuram district, known to attract many species of waterfowl and raptor. Thenneri, Uthukadu Lake, Parandur Lake, Chembarambakkam Lake, Red Hills Lake and Thaiyur are some of the numerous wetland ecosystems that attract many birds. The top three inland hotspots from the region have been described in this article.

### 1. Nayapakkam

Nayapakkam is a grassland-cum-lake ecosystem located near the Chennai-Bengaluru highway in Thiruvallur district. It can be split between two villages- Valarapuram and Nemam. Valarapuram holds a foraging ground for ducks, coots, bitterns and lesser grassland birds such as pipits and larks. The Nemam side is famous for raptors, hosting 5 species of the harrier (Western Marsh, Eastern Marsh, Pied, Montagu's and Pallid) during winter. Short-eared Owls were briefly found here before they moved to Kanchipuram. Peregrine Falcons and Kestrels are also common migrants here. A few resident raptors found

here include the White-eyed Buzzard, Red-necked Falcon and Short-toed Snake Eagle. Yellow wattle Lapwings are found year-round in the grassland habitat. Munias (Red, White-rumped, Tricoloured and Indian Silverbill) flock here in large numbers during the monsoon season. Both Nemam and Valarapuram host 3 species of the weaver bird (Common Baya Weaver, the uncommon Black-breasted Weaver and the Streaked Weaver). However, like any other grassland/lake habitat in the outskirts of Chennai, it's threatened by the advent of lake view apartments and plot sales.

### 2. Siruthavur

Located in Chengalpattu district, near

Thiruporur town, Siruthavur is one of the most birder-frequented water bodies in the region. Despite being a bird-hotspot with about 218 species recorded from this freshwater wetland, it is not a protected wetland like the Pallikaranai Marsh. It is the best place around Chennai to see all five species of munia together. It is also one of the only places in the North Tamil Nadu belt where the Woolly-necked Stork has been reported regularly and the Bristled Grassbird has been found. Home to 16 species of raptor, this wetland is also known as a breeding ground for Oriental Pratincoles and Indian Coursers. The more frequently used southern entrance has a mixture of

scrub and wetland vegetation. You can generally see species like the Pin-tailed Snipe, Short-toed Snake Eagle, Red-necked Falcon and Wood Sandpiper on a winter trip in the wetland parts of the lake. The scrublands are an ideal place to find the Eurasian Wryneck, Rain Quail, Yellow-wattled Lapwing, Brahminy Starling, Booted Warbler and Sykes's Warbler. The Northern entrance with its open habitat is seldom visited for birding. Birds like the Eurasian Wigeon, Little Ringed Plover and Pallid Harrier can be seen here with relative ease.

### 3. Pallikaranai Marshland

The Pallikaranai Marshland, present in the heart of Chennai, is one of the most well-known birding spots in the city. It originally spanned an area of around 50 sq. km. , but has been reduced to its current area of 6 sq. km. due to uncontrolled development. The marshland can be divided into four parts: the dump yard, Karapakkam, the NIOT Campus and the regular birdwatching area opposite the dump yard. 205 species of bird, including rare winter visitors such as the Pallas's Grasshopper Warbler, White-winged Tern, Black-naped Oriole and Grey-headed Lapwing have been recorded from this wetland. The Karapakkam side hosts reed birds such as bitterns (Black, Yellow and Cinnamon), snipes (Greater painted, Common and Pin-tailed), Slaty-breasted Rails and crakes (Ruddy-breasted and Baillon's). The NIOT campus is a nesting site for Painted storks, Spot-billed Pelicans and egrets, while Black Kites fly over the dump yard. Greater Flamingos occupy the regular birdwatching area, along with a few winter migrants such as Pied Avocets, stints, ducks and sandpipers. Black-headed Ibises and Glossy Ibises also forage along with the flamingos. One can see Spot-billed Pelicans roosting on the transmission towers near the NIOT campus at dusk. Rosy Starlings arrive in huge numbers during winter and can be seen performing murmurations. The raptors in the area include the Western Marsh Harrier, Shikra, Osprey, Black-winged Kite and Spotted Eagle. Interestingly, Pallikaranai also recorded a lone Egyptian Vulture in 2016.



Pallikaranai Marshland- *Balakrishnan Ram*



Siruthavur- *Mahathi Narayanaswamy*



Nayapakkam- *Melvin Jaison*



## Coastal Wetlands

A deltaic or estuarine ecological feature, coastal wetlands are not as common as inland wetlands. They tend to be larger than most inland wetlands, with many of them being important fishing zones or have been used to extract salt. The three largest coastal water bodies in the region have been described below.

### 4. Pulicat Lake

Pulicat Lake is the 2nd largest brackish water lagoon in India, preceded by Chilika Lake. This lake houses 3 islands- Pernadu, Venadu and Irukkam and is shared by TN and AP. Historically, Pulicat had extensive mangrove vegetation which has now been reduced to patches due to the advent of the Dutch East India company in the region in the 16th century. The excessive growth of *Prosopis juliflora* (Seemai karuvelam) threatens the existing vegetation. The government doesn't monitor birding at Pulicat Lake and one can even bird alone by paying the local fishermen for a tour of the lake on their boats. Pulicat has recorded 212 species of bird with regular sightings of rarities such as the Eurasian Oystercatcher, Grey-tailed Tattler and White-winged Tern. A few pelagics such as Frigatebirds and Noddies can also be sighted here if one is lucky enough. Pulicat is famous for flamingos and waders. Both Greater and Lesser Flamingos are recorded here, with the Greater Flamingo being spotted year-round and the Lesser Flamingo being sporadic in its occurrence. During winter, a variety of waders including godwits, stints, sandpipers and plovers forage here. About 5 species of gull and 11 species of tern have been recorded here, usually flocking near the mouth

of the lake. Waterfowl such as the Red-crested Pochard, Northern Shoveller, Garganey and Northern Pintail can be seen easily in winter across the Sriharikota Range (SHAR).

### 5. Mudaliarkuppam and Cheyyur

The two most iconic birding locations along the East Coast Road (ECR) are undoubtedly the Mudaliarkuppam backwaters and Cheyyur wetlands. 211 species of bird including the Indian Skimmer, a rare passage migrant to Tamil Nadu, have been spotted here. In January, large flocks of Northern Pintail, Garganey and Northern Shoveler have been spotted. It is also known for its diversity of terns and gulls. The Slender-billed Gull has regularly been sighted here. Waders such as the Little Stint, Curlew Sandpiper, Dunlin, Terek Sandpiper and Lesser Sand Plover can be seen here frequently.

Other notable species reported from this location include the Long-toed Stint, Bar-headed Goose, Tawny Pipit and the Sykes's Short-toed Lark. The bridge on ECR (next to the TTDC boathouse) and the backwaters on the right of the road (while traveling south) past the boathouse are the best vantage points to watch the wintering congregations. The boathouse has a canteen and restrooms which are well maintained.

It is also a habitat for mudskippers and Strawberry Hermit Crabs. Sometimes, if you hire a boat and go birding, you might be lucky to see some intriguing interactions of waders. To spot the more elusive and rare species, take a right at Cheyyur town and drive till you find the backwaters.

### **6. Kelambakkam**

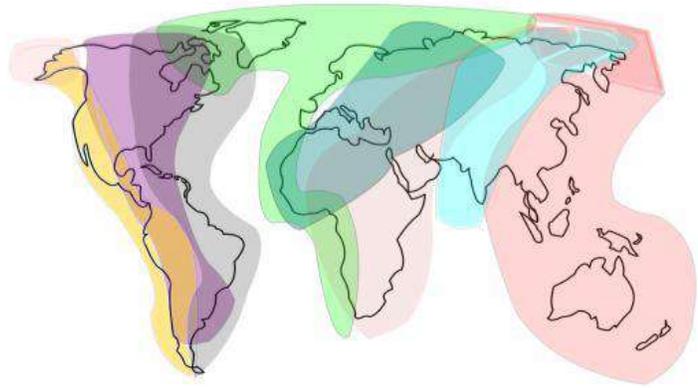
Located along the East Coast Road, after Muthukadu, Kelambakkam is a coastal wetland which is known to be a wader congregation site in winter and a Spot-billed Pelican roosting site in the pre-monsoon season. The presence of mudflats and intertidal habitats along this stretch of land allows it to host around 180 species of bird. The best vantage points to watch birds are along the ECR-OMR link road. Birders can park their cars on the side of the road and walk along the salt pans. Along the side road, one can spot birds such as the Striated Heron, Indian Cormorant, Common Redshank, Whimbrel, Eurasian Curlew and Greater Flamingo. In fact, for those who want to learn about waders, this is an excellent location for you to improve your wader identification without having to travel all the way to Pulicat! A variety of terns and gulls can be spotted at the bridge along the link road. After the toll plaza, towards Kovalam, birders can try their luck along the mudflats present in that zone. Birds such as the Pacific Golden Plover, Black-bellied Plover, Little Stint and Temminck's Stint are commonly seen in winter and if you're lucky enough, you may spot the Long-toed Stint, Bar-tailed Godwit and Common Ringed Plover.

*Vikas Madhav Nagarajan is a 4th year Chemical Engineering student at SSN-CE and Melvin Jaison is a 1st year student at Chengalpattu Medical College.*



Kelambakkam- Melvin Jaison

# AN INTRODUCTION TO BIRD MIGRATION



Migratory Bird Flyway Map - Tejaswini J.

*Animal migrations are some of the most epic events in the natural world and are a true testament to how amazing nature can be. Every year, millions of birds migrate across the globe in search of feeding and breeding grounds or to escape harsh weather conditions. However, migration is by no means an easy task and there are always birds that die due to sheer exhaustion or injury. In this article, Aravind Subramaniam walks us through the phenomenon of bird migration and tells us what we can do to help injured or disoriented birds.*

Innovations in transportation have made travel very accessible to us humans. Today, travel is no longer seen as a luxury, but as an essential part of some people's lives. However, in the natural world travel is more important for many organisms than it is for humans. Apart from routine local movements to find food for the day or to find a mate, organisms undertake various types of travel. However, in nature, the greatest travel endured by any organism is migration.

There are several species, including fishes, insects, amphibians, reptiles, mammals and birds that migrate large distances. The Monarch, King Salmon, Arctic Tern and the Globe Skimmer are some of the most well known migratory species in the world. Migration, like hibernation and aestivation, is an adaptation to escape harsh climatic conditions, reach breeding grounds and to get access to food. How species undertake these remarkable journeys remains a mystery, making them some of the most fascinating events in the natural world.

This article aims to draw your attention to some of the challenges that birds face during their migration and how they are amplified in the modern world and what you can do to offset these to a small extent.

Migration is the seasonal movement of animals, seeking food, water sources and favourable conditions. In birds, it consists of 4 major types. Namely:

- **Complete Migration** - All individuals of a species will migrate.
- **Partial Migration** - Some individuals of the species may not migrate.
- **Differential Migration** - Each set of individuals has a different route, goal and distance to travel.
- **Interruptive Migration** - The individuals have complete liberty over choosing whether or not they travel. In other words, species might not migrate at all in some years and migrate partially or completely in others.

Across the world, some standard pathways are followed by several species of birds. Out of the eight major migratory flyway zones, three pass through Asia. The Central Asian-Indian flyway zone is the largest one in the region and most of the species that pass through India use this flyway zone. The map above shows the various flyway zones in the world.

Migration can be used to study and evaluate changes in the environment. Likewise, there are many perspectives which may help us unveil some valuable information.



A flock of migratory birds- Sand Plovers - Melvin Jaison

Although these migrations display how amazing nature really is, they sometimes come at a heavy cost, with some birds losing their lives. Long journeys leave birds exhausted and dehydrated and some individuals may suffer from severe stress. Apart from the risk of colliding with structures such as buildings, some are targeted by poachers.

### What to do when you come across an injured/exhausted bird?

1. Place the individual in a cardboard box or a basket. This is to prevent stressing the bird out and to ensure it is safe from cats and other predators.
2. Ensure fans are switched off!! Many a time these birds may be in temporary shock and may not be injured and may just need a safe place to recover. You do not want them getting struck by the fan in case they take flight.
3. Leave water in the box, fairly close to the bird but not right next to it. If required you can try to feed it after figuring out its feeding habits. However, do not try to force-feed it.
4. ID the individual. Never use Google Lens. Use the following instead. This may be useful in case you need to feed the bird or need specific help.
  - eBird portal
  - India Biodiversity Portal
  - iNaturalist
  - Merlin Bird ID
  - Reliable groups on WhatsApp and other social media
  - Any software designed specifically for the identification of birds
5. Don't let the public gather around. Try to keep the individual as isolated as possible to avoid further pain and trauma. Remember, too much stress can kill a bird.
6. As per the Wildlife (Protection) Act, 1972 it is illegal

to retain a wild animal with you. Ensure that it is released once it is fairly stable and if it needs further attention or time, hand it over to wildlife rescue organisations or the closest Forest Department office. Avoid taking it to a veterinarian or Blue Cross as much as possible. The bird should be transferred as soon as possible since some species, especially younger individuals, may quickly become dependent on human fostering. This is something organisations and individuals experienced in bird rescues know how to prevent.

7. Here are the details of some such organisations in Chennai you can contact in such a circumstance.
  - Besant Memorial Animal Dispensary, Besant Nagar - +914424466253
  - Forest Department - 044 2220 0335
  - People For Animals, Red Hills - 044 2632 1819
  - Cloud No. 9 Kennel & Nursing Care, Iyappanthangal - +9198411588852
  - Blue Cross of India. Velachery - 044 4627 4999
  - INCARE (Indian Center for Animal Rights and Education)

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- 'Ecological significance of migration'. Britannica. <https://www.britannica.com/science/migration-animal/Ecological-significance-of-migration>
- 'A safe house for birds'. The Hindu. <https://www.thehindu.com/news/cities/chennai/A-safe-house-for-birds/article16892232.ece>

*Aravind Subramaniam is pursuing his Masters at Periyar University.*



Crimson Rose (*Pachliopta hector*) - Aswathi Asokan

## PAPER ABSTRACT

**Title:** The Diversity and Evolution of Batesian Mimicry in *Papilio* Swallowtail Butterflies

**Author:** Krushnamegh Kunte

*Published in the author's journal compilation in 2009*

**DOI:**

10.1111/j.1558-5646.2009.00752.x

*It is intriguing to discover how organisms in nature find ways to protect themselves from predators. Butterflies are among nature's best mimics. Through this paper summary by Tejaswini J. we will learn about how certain swallowtail butterflies have increased chances of survival by mimicking other butterflies which possess relevant adaptations. The focus of the article will be on the southern part of the country.*

### GLOSSARY

*To help you understand some of the more technical words and terms in the article, Anooja A. and Aswathi Asokan have defined some of them.*

**1. Microevolution-** Microevolution is the change in allele frequency that is seen in a population over time, caused by mutation, selection, gene flow and genetic drift.

**2. Polymorphism-** The occurrence of two or more different forms in the population of a species.

**3. Sexually monomorphic mimicry-** A type of mimicry where both the male and the female mimic in the same mimetic form.

**4. Phylogeny-** A branch in Biology studying the evolutionary history of organisms.

**5. Polymorphic mimicry-** Species that are sexually monomorphic have the same or different mimetic forms.

**Target Taxon:** *Papilio* Swallowtail butterflies.

**Summary:** *Papilio* swallowtails display a spectacular diversity of forms within a species through Batesian mimicry. This is especially evident in the females of several swallowtails. Batesian mimicry is a means by which a harmless species increases its chances of survival by imitating the features of species that are venomous or bad-tasting to predators. Distinct evolutionary pathways have been created for sexual polymorphic and female-limited mimicry to obtain the number of morphs that can be seen today.

The evidence provided in nature within swallowtail butterflies suggests that they favour the evolution of mimicry. A graphic model connecting different mimicry types based on hypothetical pathways within the *Papilio* phylogeny has been created to understand the evolution of Batesian mimicry in these butterflies.

**Necessity for Evolution of Batesian Mimicry:** Batesian mimicry falls under the concept of directional evolution. It provides an enemy-free space ensuring a higher life expectancy for palatable species. Within the *Papilio* phylogeny, several evolutionary trajectories are observed. Vane-Wright suggested that two possible evolutionary routes could produce five types of mimicry. This type of diversity in mimicry increases the relative ecological fitness of mimetic individuals compared to non-mimetic individuals.

**Why Study Papilionids as Batesian Mimics:** Previous studies could not test directionality and pathway models of Batesian mimicry on a large sample size of mimetic individuals as they were unavailable until recently. A recent study showing the molecular phylogeny of the *Papilio* swallowtails has helped the study of Batesian mimicry in the same. Approximately 25% of the 200 species are mimetic within their group. Overall, they exhibit all forms of mimicry found in butterflies, forming an ideal group to study Batesian mimicry.

**How was the study done:** The butterfly species were classified into 6 types: four mimetic and two non-mimetic types based on their wing colour patterns. All the *Papilio* species were considered to be Batesian mimics. The mimicry types were connected using common characteristics and polymorphism was neglected as it is not prominent in these butterflies. The remaining four types of mimicry that were mapped produced 16 character state paths.

The character state paths were traced by reconstructing their ancestral states using maximum likelihood criteria with a mathematical model. In short, this helped in ascertaining the ancestry of a butterfly.

**Conclusion:** Two important patterns became evident from the analysis:

1. Wing colour patterns are different among species and species groups. Most evolutions retain their sexual monomorphism in wing colouration as seen in the original species.

2. The distribution of various forms of a species exhibiting mimicry is not uniform.

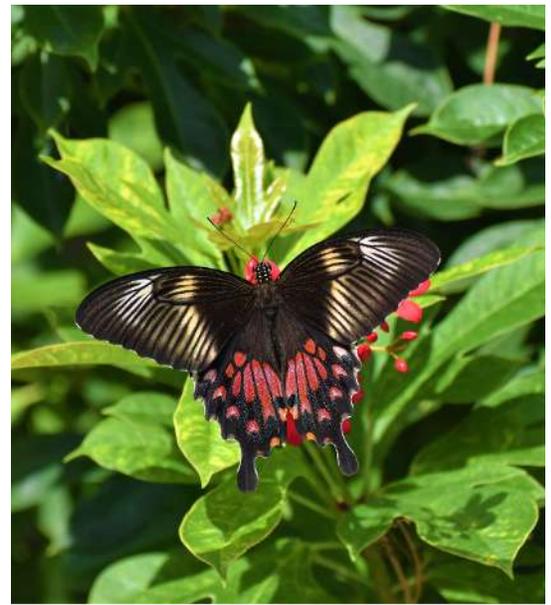
The evolution of a species to reach its final state is barely observable. There is insufficient evidence to conclude as to when and how the evolution of various mimics took place. Several character state paths are absent, especially state paths representing the loss of monomorphic mimicry or female-limited mimicry are not found in the *Papilio* phylogeny. The evolution of dimorphic mimicry followed a different trajectory, contrary to the one suggested by Vane-Wright. According to Vane-Wright, *P. erostratus* was expected to follow a three-step evolutionary path (sexually monomorphic non-mimetic ancestors to a monomorphic mimic, which evolves into a polymorphic mimic, and finally to a dimorphic mimic) but was instead found to have followed a two-step evolutionary path.

One of the significant findings of the research was the lack of evidence for the loss of Batesian mimicry because of various factors. Modifications in the model's selective pressures may result in its extinction, which could affect the wing pattern being mimicked. This makes it difficult to break down their genetic architecture. The evolution of a particular type of mimicry may initiate the evolution of others, which could lead to more complex mimics. When a mimetic species chooses to become a non-mimetic species, it could lead to the extinction of the mimetic species rather than the loss of mimicry. This kind of selection-diversification-extinction dynamics could be the reason for the speciation and wing colour pattern diversity in Batesian mimetic butterflies.

Citation-

1. Kunte, K., 2009. THE DIVERSITY AND EVOLUTION OF BATESIAN MIMICRY I/N PAPILO SWALLOWTAIL BUTTERFLIES. *Evolution*, 63(10), pp.2707-2716.

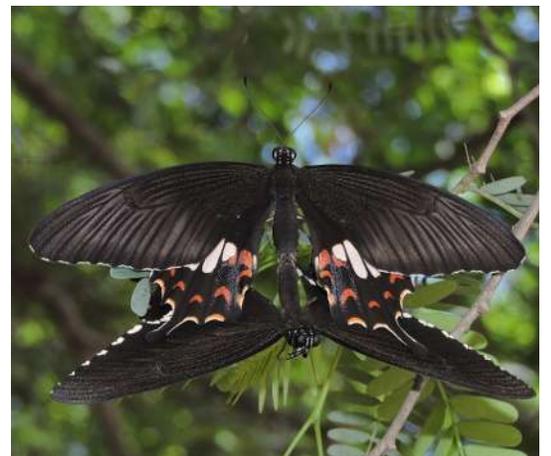
*Tejaswini J. is a 2nd year student in environmental sciences at JSS university.*



Common Mormon mimicking Crimson Rose-  
*Nanditha Ram*



Common Rose (*Pachiliopta aristolochiae*)- *Vikas Madhav Nagarajan*



Common Mormon mimicking Common Rose-  
*Mahathi Narayanaswamy*

## HOW WATER STRIDERS FLOAT ON WATER



Water Striders- Mahathi Narayanaswamy

How do Water Striders float on water while other insects/objects which are much lighter than them sink? To demonstrate this quality, we can make a simple model of the bug and try to understand how it works. This article by **Shivani Manivannan** engages our younger audience with an exciting activity!

### **MATERIALS REQUIRED**

1. Plates – 3
2. Thin copper wires (8-10cm long) - 3 per bug
3. Bowl of water
4. Liquid Soap
5. Scissors

I have always been amazed by the small, slender, dark coloured, six legged insects known as Water Striders. They are very interesting aquatic creatures found skating on the surfaces of lakes and ponds. Most insects would quickly sink and drown due to their weight, but the water strider floats and glides on the water's surface. This is a vital quality of the strider which helps it escape from predators and also catch smaller insects which fall into the water. To explain this let us first make a small model of a water strider before we start understanding the science behind it.

### **Procedure**

- Cut three equal pieces of thin copper wire (8-10 cm) with scissors.
- Twist these three copper wires together in the middle to form the bug's body.
- Curve the ends like insect legs. Make sure the legs are long and curve very gently with no sharp bends. Make two such bugs.
- Twist 3 more copper wires of similar length and weight into a small ball.
- Take three plates, fill two with plain water and the third one with soap water.
- Place the first bug in the plate containing plain water. Make sure all six legs touch the water at roughly the same time and that the bug's weight is evenly distributed. If it still does not work, try adjusting the shape of the legs. You want the wire to spread over and touch the water to the maximum extent possible.
- Place the second bug in a plate containing soap water.
- Place the wire ball in the plate containing plain water.

## Observation

The model bug placed in the plate filled with plain water floats, while the bug in the plate containing diluted soap water sinks. The wire ball weighing the same as the model bug also sinks.

## Why does this happen?

If you look closely, you will notice that the surface of the water acts like a thin membrane and the bug's legs make small dents on the surface of the water without breaking it. This property of water is called surface tension. Surface tension allows liquids to resist an external force owing to the cohesive nature of their molecules, especially on the surface. Water molecules at the surface are strongly pulled inwards and resist any external force, thereby behaving like a membrane. Along with this, the equal distribution of the bug's weight across its six legs (reducing the pressure exerted on the water) makes surface tension a greater force to overcome, thereby allowing the bug to stay afloat. In nature, water striders use a combination of several factors to stay afloat on the water's surface. Apart from the high surface tension of water and even distribution of its weight over its long legs, the water strider also has hydrophobic hairs on its legs which trap air and repel water, helping it stay afloat. The soap water has less surface tension than plain water and as a result the bug sinks. The ball that's made of the same material and has the same weight as the bug also sinks, showing that it is important to distribute the weight evenly across all six legs so that the object is not pulled downward by the force of its own weight

*Shivani Manivannan is a class 8 student at P S Senior Secondary School.*



Water Striders- Shivani Manivannan

# LIFE AS AN ECOLOGIST

## INTERVIEW WITH KARTIK SHANKER



*In a journey that started from turtle walks on the beaches of Chennai, learn more about Kartik Shanker's story of becoming a multi-faceted ecologist through his experiences in the field and otherwise, as someone who has studied a variety of taxa, written about the natural world in children's books, become the founding editor for a science communication magazine and the creator of the Dakshin Foundation. The questions for the interview were worded by Nanditha Ram and Mahathi Narayanaswamy and the interview was conducted by Nanditha Ram.*

### **1. Can you tell us a bit about yourself and what you do?**

My primary job is as faculty at the Indian Institute of Science (IISc), Bengaluru. I am also the founder trustee of the Dakshin Foundation, an NGO based in Bengaluru and the founding editor of the magazine, Current Conservation.

### **2. What do you do in each of your roles, as a Professor at IISc, a trustee of Dakshin Foundation and the Editor of Current Conservation? How do these roles fulfil your interests?**

My role as a professor at IISc fulfils my academic interest in science and research in ecology and evolutionary biology. At Dakshin, we work on application-oriented conservation, natural resource management, environmental sustainability and ensuring the well being of communities, while at Current Conservation, our goal is public dissemination of science. We started Current Conservation to communicate conservation science in easy language as it's taxing to read scientific papers and not everyone has a lot of time. So we combine engaging articles with attractive illustrations to communicate with a wider audience.

### **3. How and where did your interests in the Natural World start?**

Going back to the 1980s, after finishing school, those who were interested in Math or Physics would pursue Engineering and those interested in Biology would pursue Medicine. I don't remember wanting to become a doctor but I did apply for medical colleges before joining the zoology department at the Madras Christian College (MCC). In my second year, some students from my department who used to organise turtle walks asked me whether I would be interested in going along with them on a Friday or Saturday night. That is when it all began, starting with my first turtle. It happened to be on a full moon night and the thrill of seeing this creature which only comes on land during its nesting period got me hooked.

### **4. Your interest having started with turtles in Chennai, is there something you can tell us about the history of turtle walks in Chennai? About when or how they began?**

Around 1972-73, Romulus Whitaker, after starting the Madras Snake Park, began conducting turtle walks along with a couple of other people. In 1973, they set up the first turtle hatchery on the beach and among the first turtle

walkers were Preston and Anne Ahimaz. Later on, several other organisations such as the WWF (World Wildlife Fund) started conducting turtle walks and numerous students and people, perhaps not as many as today, started participating in them. By the 1980s, the Forest Department took over the maintenance of these hatcheries. In 1998, the second year after I started attending turtle walks, the Forest Department closed down its hatcheries. So some of us started the Students Sea Turtle Conservation Network (SSTCN), which continues to run till this day.

**5. Why did you choose to become an ecologist? Are there any experiences or memories that you could mention from the field when you were building your career?**

Not long after seeing my first turtle, I became interested in ecology as a subject and made a few visits to sanctuaries and national parks. Given my love for spending time in the field, I explored the possibility of becoming an ecologist and decided to do a PhD in the subject. During my PhD, I spent two years in Upper Bhavani, in the Nilgiris where I used to trap small mammals, rodents in particular. During my postdoctoral research, I spent several months in Orissa and saw my first arribada with over 1,00,000 turtles nesting. Then I saw my first leatherback, the world's largest living sea turtle at Galathea in Great Nicobar Island, which was an amazing experience.

**6. Can you tell us what a day in your life looks like?**

If you ask me about my routine as a faculty of IISc, it can sound rather monotonous. But it is actually quite exciting discussing science with your students and talking about new projects, data analysis and results. As an ecologist, the time you're out in the field fluctuates. Many of us do relatively little primary data collection ourselves by a certain stage in our careers, but we can go visit and help students with the same or at least observe them and get a chance to spend some time out in the field. I've done a lot of work in the Western Ghats in the 2000s, but more recently I've spent more time in the islands - the Andamans and Lakshadweep, where a lot of my students are doing marine research projects. Of course, any opportunity

to go diving with them is a bonus. So a day in the life of a professor in his office is quite different from the day in the field with students.

**7. As an ecologist, is there anything you would like to share with anyone who is looking to do the same? Are there any programmes or institutions you would recommend?**

People often get caught up in the thought that they can make an impact only if they have some sort of stellar academic record. However, ecology is in itself a very vast interdisciplinary field, where students from all academic backgrounds have various things they can contribute. I would say those who are interested in pursuing a career in ecology need not specialise too early in life and can keep it as broad as possible. Secondly, people get carried away with the idea that doing a PhD is the only pathway to many ends, but it is mostly necessary only if you're looking to become a professor and pursue an academic career. There are many kinds of training required in this diverse field such as communication, outreach, field conservation and working with local communities. This should encourage you to have an open and creative mind, as opposed to thinking that only academia matters.

Many private colleges offer interdisciplinary degrees at the undergraduate level, in contrast to single focus streams. I would personally recommend the BS/BS-MS programmes at the IISERs and IISc. Ashoka, Krea, FLAME, Azim Premji University and Ambedkar University are also good colleges to pick from as they have very integrative UG programmes. However, many of these are expensive and highly competitive, so don't worry if you don't opt for any of these.

The traditional city colleges - Madras Christian College, St. Joseph's and St. Xavier's among many others - are also good places to choose. Nowadays the options are limitless, there are so many courses that one can even do online, depending on your interests. For a Masters degree in India, there are a few institutions that offer degrees in ecology and wildlife conservation like WII (Dehradun), NCBS (Bengaluru) and Pondicherry University to name a few. There are various paths students can take to reach their goals and I feel they should not worry about every step along the way.

**Two tree-frogs belonging to the genus *Raorchestes* described by Kartik's student, Vijayakumar and their team**



*(Raorchestes emeraldi)* - S. P. Vijayakumar



*(Raorchestes echinatus)* - S. P. Vijayakumar

**8. You have written papers on a plethora of taxa, including analysing the flock patterns of fish and birds. How do you manage all these interests and ensure that you have the necessary information to write on all of them?**

I try and put my work into two or three baskets. I am primarily an evolutionary biologist who has worked on the historical biogeography of frogs, snakes, lizards and other taxa, using DNA analysis to look at the evolutionary history of these groups. Secondly, I am interested in the ecology and evolution of communities across different taxonomic groups, such as mixed-species foraging groups in bird flocks and reef fish. My obsession with marine turtles is out of that loop. One of the reasons I don't call myself a herpetologist is because a typical one will have vast taxonomic knowledge and specialise at least in some groups, but that's not something that I try to accomplish. I prefer that my students come with some background of fieldwork and familiarity with some taxonomic group. I help them with fundamental ecological questions, design projects, ask inquisitive questions, data collection and analysis to arrive at inferences.

**9. Your PhD work is your only work on mammals. Why did you choose small mammals and not turtles, which appears to have been your main area of interest back then?**

At IISc, my supervisor Prof. Sukumar was a specialist in

elephants, forest dynamics and climate change. He offered me an opportunity to work in forest communities in the Nilgiris where he had a lot of ongoing projects on forest-related subjects. He had just received a grant to carry out diversity studies in the area. My initial proposal was to look at the reptiles, amphibians and small mammals in the Nilgiris. Early on I realised that very little was known about many of the species I would encounter in the Nilgiris like bush frogs and shieldtail snakes and that if I was to work on them, then much of my time would be spent on identification and taxonomy rather than their ecology. As a result, I focused on small mammals. However, after that, I did fulfill my interest to work on sea turtles starting with my postdoc. And then, one of my students did his PhD on bush frogs and I'm hoping to start work on shieldtails with a postdoc, so some of those dreams are being fulfilled vicariously.

**10. You mentioned that there was little taxonomic information on bush frogs and shieldtail snakes when you were working on your PhD. I think today there is more information on these groups however there remains very little information on several other groups such as insects. Is this correct? Would you like to comment on the growth of taxonomy in India?**

There have been drastic changes in the past few decades. From the 18th and 19th centuries onwards, there was always a fine tradition of taxonomy all over the globe

which was passed on to many Indian taxonomists who were active in the 20th century. The newly formed government promoted the zoological and botanical surveys of India but unfortunately over the decades, this (taxonomy) became a less attractive field with fewer people. India does not boast of any national museum or centre that can attract youngsters and show them how exciting it can be. Traditional taxonomy has been in decline, however many molecular methods and genetic tools became available, which has resulted in the discovery of many species.

**11. Today larger mammals are studied more than smaller mammals that are getting pushed to the brink of extinction. Despite this, the overall image is that mammals are well studied. As an ecologist whose PhD work was on small mammals would you like to comment on this?**

Many taxonomic groups haven't been studied extensively from freshwater fish to invertebrates. Though there is a lack of information, we know there are many species of small mammals and fish that may be endangered due to various reasons. On the other hand, in some parts of the country, the populations of some of the larger mammals are doing well. For example, the population of Gaur has increased dramatically in the Upper Nilgiris. On my last visit there, it seemed like there had been an increase in the populations of Sambar Deer, Black-naped Hare and Leopard, even a bear had been spotted for the first time. The Olive ridley and several other sea turtle species have seen significant growth in their populations both in India and abroad. Sometimes we're caught up with only the large iconic species and don't monitor what happens to the rest of the ecosystem. I do not support single-species conservation initiatives since there are somewhere between 10 and 30 million species on earth and it is impractical to be focussing on each species individually. We need a more holistic approach to ecosystem management, habitat conservation and balancing ecosystem functions with human needs.



Photo- Meera Anna Oomen



Photo- Mahima Jaini



Photo- Maya Khosla

## 12. Why and how important do you think is the involvement of the youth and public in conservation?

A career in ecology is certainly being opted for more than it was before and it continues to grow as a field. On the whole, in our society, the environmental movement is becoming more prominent with many NGOs getting set up, heightened student involvement and citizen science initiatives becoming more widespread.

I think it's important for everyone to understand the gravity of environmental issues and find ways to approach them. If people have some sort of emotional connection to something, they will want to protect it or sustain it. For example, some tiger conservation measures want to displace forest-dwelling communities and move them to agricultural lands but that is counter-productive since you are forcing people who have a strong connection with nature to move elsewhere. People will talk about the damage to the environment caused by fuelwood collection and similar activities, but all of that does not even compare to the negative impact on the environment we all have as urban dwellers and global travellers. We must all try and build a relationship with nature that allows us to engage with it sustainably.

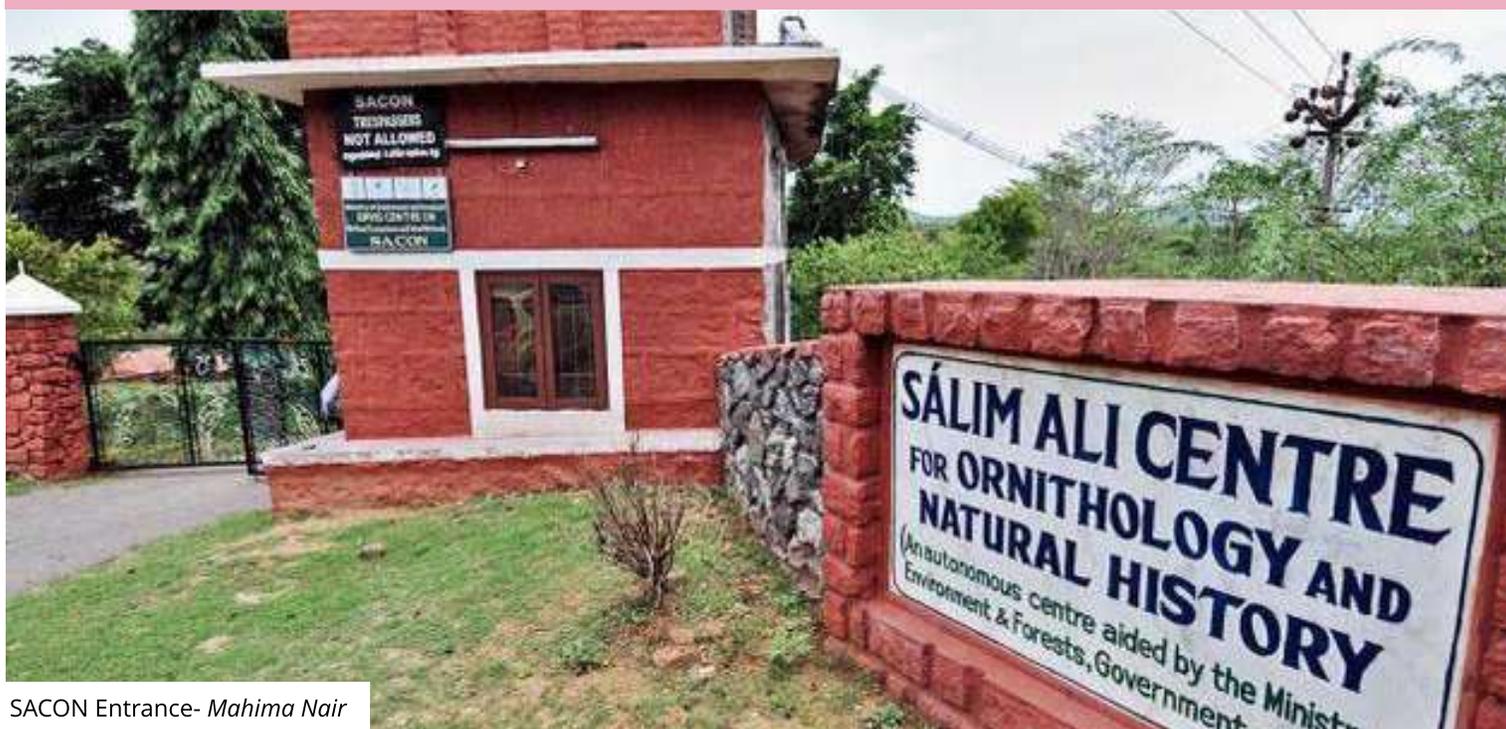
*Nanditha Ram is a 3rd year Chemical Engineering student at SSN-CE and Mahathi Narayanaswamy is a 1st year student at Azim Premji University.*

### **Frogs belonging to the monotypic genus *Astrobatrachus* described by Kartik, his student, Vijayakumar and their collaborators**



*(Astrobatrachus kurichiana) - S. P. Vijayakumar*

# SALIM ALI CENTER FOR ORNITHOLOGY AND NATURAL HISTORY (SACON)



SACON Entrance- Mahima Nair

Mahima Nair briefly introduces us to SACON, its scope of research, eligibility criteria and how to apply for admission.

## **SALIM ALI CENTER FOR ORNITHOLOGY AND NATURAL HISTORY (SACON)**

**Location-** Coimbatore, Tamil Nadu

**Established in-** 1990

*SACON is an institute whose area of research revolves around the field of Ornithology.*

**Courses they offer-**  
Various Masters, PhD and Postdoctoral courses in Ornithology.

**Website-** [www.sacon.in](http://www.sacon.in)

### **What do they do?**

SACON is a national institution established in 1990. It has been engaged in extensive research in various fields such as conservation ecology, eco-toxicology, environmental impact assessment, landscape ecology and restoration ecology. The institution houses an education centre offering postgraduate and doctorate degrees taught by reputed faculties who guide students throughout their dissertations. Short term orientation programmes such as the activity-based science education program called Exploring Nature Through Birds, arranged along with the National Council for Science and Technology Communication (NCSTC), are also available. Lastly, they recognise and grant honorary awards and distinctions to individuals with outstanding contributions to the aforementioned fields.

### **Organisations and Associations**

It is an autonomous organisation established as a partnership between the Ministry of Environment and Forests (MoEF) and Bombay Natural History Society (BNHS) to pay tribute to Dr. Salim Ali's dream of having a body devoted to conducting research in ornithology and natural history. As an educational institution, SACON is affiliated to Bharathiar University in Tamil Nadu, Saurashtra University in Gujarat and Manipal Academy of Higher Education in Karnataka. It is also associated with the Centre for Ecological Sciences (CES) of the Indian Institute of Science, Bengaluru.

## How to get in?

The admissions for PhD, M.Phil and M.Sc courses are granted by the Director of the institution. The Institute also provides 6 month internship programmes.

For the 1 year on-campus M.Phil course and the 3 years on-campus PhD course, the aspirant requires a Master's certification in any discipline from a recognised university or should have cleared the Common Eligibility Test if he/ she is not a degree holder.

The institute's faculties assess the theses of the external candidates. Candidates who wish to pursue their dissertation with the centre are required to produce a letter of recommendation from the head of their parent institution and will be charged an admission fee of INR 500.

Individuals who want to join the internship programme should be studying in recognised universities and the application for the internship programme should be sent by the dean or higher authority from said institution. Hostel facilities are also provided for students who require them.

For PhD programmes:

For Bharathiar University, the individual has to clear the Common Eligibility Test (CET).

For Saurashtra University, one has to clear a national level entrance exam which is conducted by SACON. For Manipal University, the application should be forwarded to the academy through the faculty of SACON.

Visit [sacon.in](http://sacon.in) for further details on the institution.

*Mahima Nair is a physiotherapy intern at Kovai medical hospital, Coimbatore.*

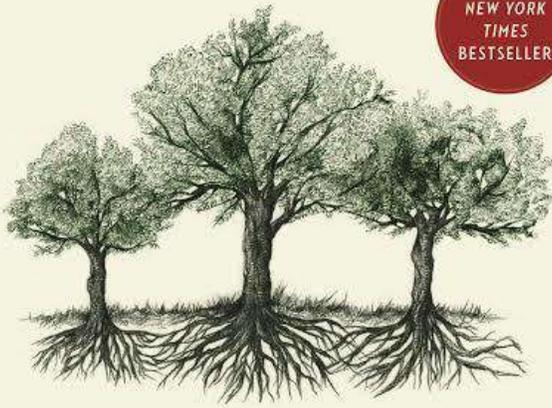
Photo sourced from Priyanka Das



foreword by TIM FLANNERY  
PETER WOHLLEBEN

# The Hidden Life of TREES

A  
NEW YORK  
TIMES  
BESTSELLER



What They Feel,  
How They Communicate

Discoveries from a Secret World

BOOK REVIEW

The book "The Hidden Life of Trees" is a fantastic compilation of Peter Wohlleben's observations of trees. Here's a book review by Rohith Srinivasan consisting of his thoughts and interpretations of the book.

## **The Hidden Life of Trees: What they feel, How they communicate- Discoveries from a Secret World**

**Author-** Peter Wohlleben

*Peter Wohlleben is a German forester and author. His books, which are written in German and several of which have been translated to English, feature a range of themes from ecology. The documentary "Intelligent Trees" also features many of his observations.*

**Release-** May 2015

**Genre-** Non-fiction, Nature

**Pages-** 288

**Summary-** The Hidden Life of Trees entices us with stories of wonder. The book is a rambling journey through various aspects of the lives of trees in the deciduous and coniferous forests of the Eifel Mountains in Germany. Peter Wohlleben uses several anecdotes and observations from his experience as a German forester turned conservationist who has been observing trees for more than 20 years.

The author compares trees with human families, in the sense that the forest's trees are social beings- communicating through their roots using the fungal "wood wide web" network. The parent trees nurture their young by sharing nutrients with their children and agreeing to bloom at the same time as them. Tree families balance out harsh weather conditions by creating microclimates and even protect one another by sending warning signals to each other. Trees in a family protect and communicate with each other and can live to be very old while solitary trees in concrete cities tend to die sooner. The book asks the readers to re-evaluate their understanding of these woody sentinels and offers a deep insight into the behaviour of trees in the forest and the complicated web of relationships and kinship networks.

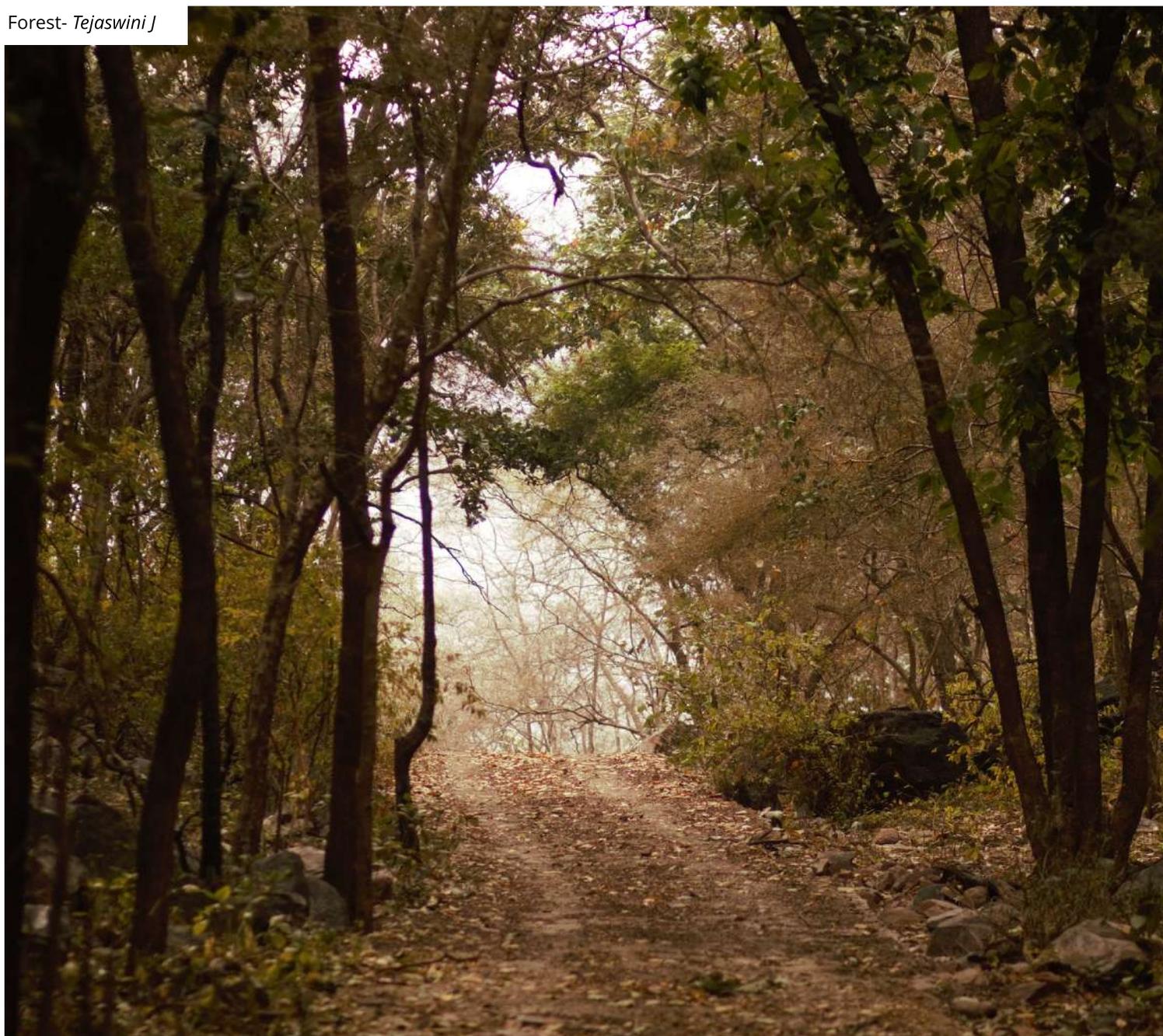
**Evaluation of Content-** The book is well written and informative, as the author unfolds the activities that lie beyond the naked eye, underpinned with strong scientifically researched evidence. In every chapter, the author describes elaborately the complex biology within trees through simple, understandable and evocative language. The author creates analogies between trees and animals and these analogies shed deep insight into the ancient lives of trees.

## Opinions and Recommendation-

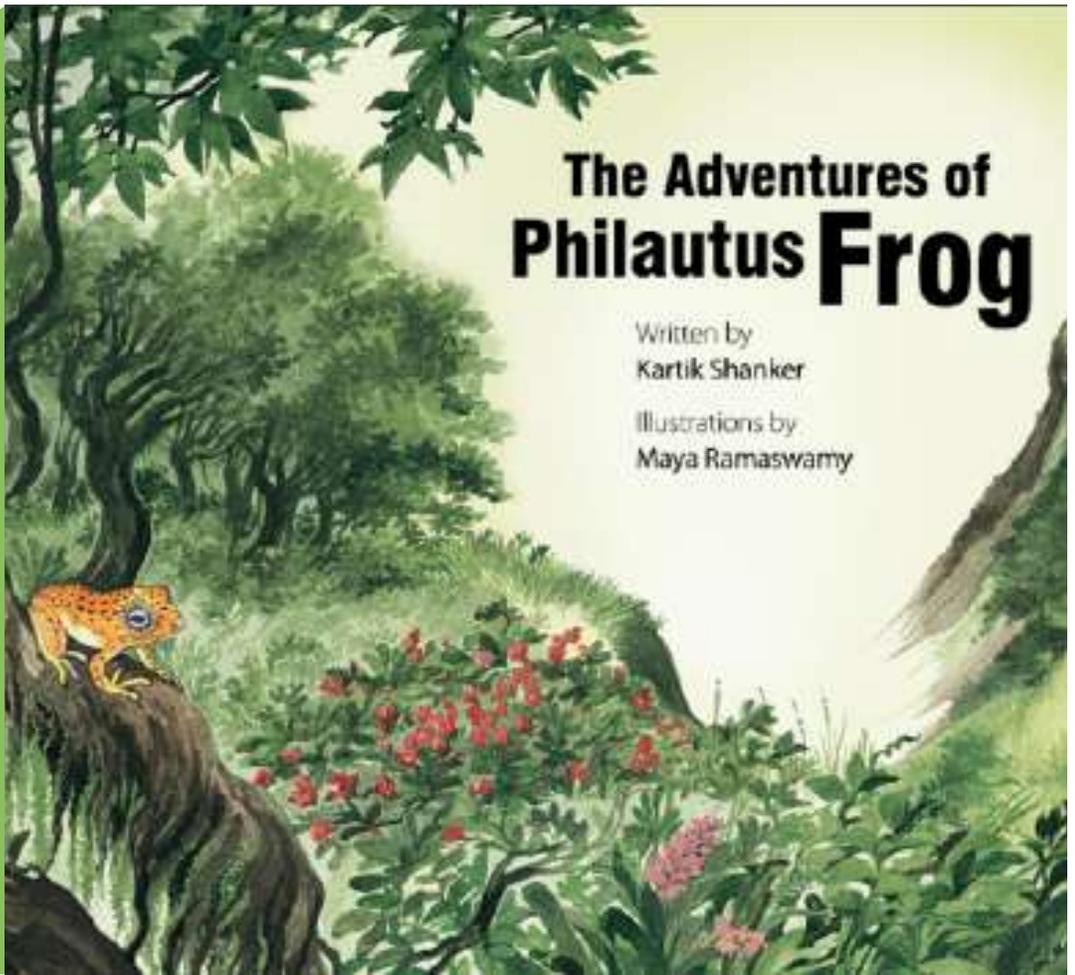
Peter Wohlleben devoted his life to the study and care of trees and has this rare understanding of the deep inner lives of trees. I truly loved reading this book, it changed my perception of trees and took me to a whole new, mysterious and magical world. I would recommend that this book be read by secondary high school students and above, as it contains a lot of knowledge backed up by scientific research. Walking through a quiet forest or observing trees in your backyard will no longer be the same once you read this book. Pick the book up, sit under a tree and look up into a magical world.

*Rohith Srinivasan is a 1st year student at Ahmedabad University.*

Forest- Tejaswini J



## BOOK REVIEW



*The Western Ghats of India are considered to house some of the most biodiverse tracts of forest in the subcontinent, home to a multitude of flora and fauna including many endemic species. Here's a book review by Samrudh Nandagopal on "The Adventures of Philautus Frog", which reflects on the region's unique inhabitants while following the adventures of a curious frog.*

**Summary:** This book is about the adventure of a little tree frog named Philautus who wants to visit the sea. On his way, he teams up with other creatures found in the Western Ghats including a snake, a frog that lives underground and a widely distributed toad.

**Evaluation of Content:** This book highlights the biodiversity of the Western Ghats and is written in a manner that's easily understandable and that gives an enjoyable feeling to readers irrespective of their age.

**Opinions and Recommendation:** This book is a short story which can be understood and enjoyed by primary and middle school students. I hope that by recommending this book to my classmates and other children, I will encourage them to learn about and appreciate the biodiversity of the Western Ghats and the importance of conserving it because as we speak, the forests are disappearing part by part.

*Samrudh Nandagopal is a class 6 student at Maharishi Vidya Mandir.*

### **The Adventures of the Philatus Frog**

**Author-** Kartik Shanker

*Kartik Shanker is an evolutionary biologist and a professor at IISc Bengaluru. He works on environmental awareness and education and has written 8 books till date of which 4 are children's books.*

**Release-** January 2004

**Genre-** Fiction, Children

**Age Group-** 13 to 16

**Pages-** 36



# ECO-BRICKS



An eco-brick made by Nikkitha-  
Photo- Nikkitha Terasa



A statue in Phoenix Market City made of  
Eco-Bricks- Photo by- Aravind Subramaniam

Today, plastic bottles and covers seem to be an unavoidable part of our lives. Rather than disposing them in ways that could harm the environment, we can recycle them by using them to make Eco-bricks! **Nikkitha Terasa** introduces us to this innovative means of reusing plastics.

## MATERIALS REQUIRED

1. Clean and dry Plastic Bottles
2. Clean and dry Plastics
3. A stick

**What?** Eco-bricks are clean, dry plastics compactly packed in a plastic bottle, to a set density. They can be used to build furniture, a wall and even a house!

**Why?** It helps reduce one's plastic footprint by effectively reusing plastics. You are taking products that are otherwise useless and forming something long-lasting.

### **How to make an Eco-brick?**

- The first step is to find a plastic bottle with a cap that is not damaged. While building with eco-bricks, it's better to use bottles of the same size and shape. Similar bricks make the structure stronger. Start with smaller bottles to get the hang of it.

- The next step is to collect all the plastics from your house. Make sure they are clean and dry. Anything which is unclean or wet will encourage microbial growth. Paper, glass, metal and any biodegradable wastes are a strict no-no!
- The final step is to pack all the collected plastics. This is when a stick comes in handy! You can use any blunt material to insert the plastics, for example; a wooden stick, a used paintbrush, a pen etc.
- When you pack, start with soft plastics so that the bottom is filled completely. You can cut hard plastics into smaller bits to make the eco-brick denser. Repeat this layer by layer and voila! You've made your very own eco-brick!

**Pro tip:** Once you are done, check the weight of your brick. It must be equal to 1/3rd of the bottle's volume (for example: 110 g for a 330 L bottle). Anything below is not ideal for building.

Remember, you always have to keep an eye on the plastics you use. The only solution to plastic pollution is to avoid buying them in the first place. Eco-bricks are only an alternative. Let's refuse and reuse, not purchase and waste!

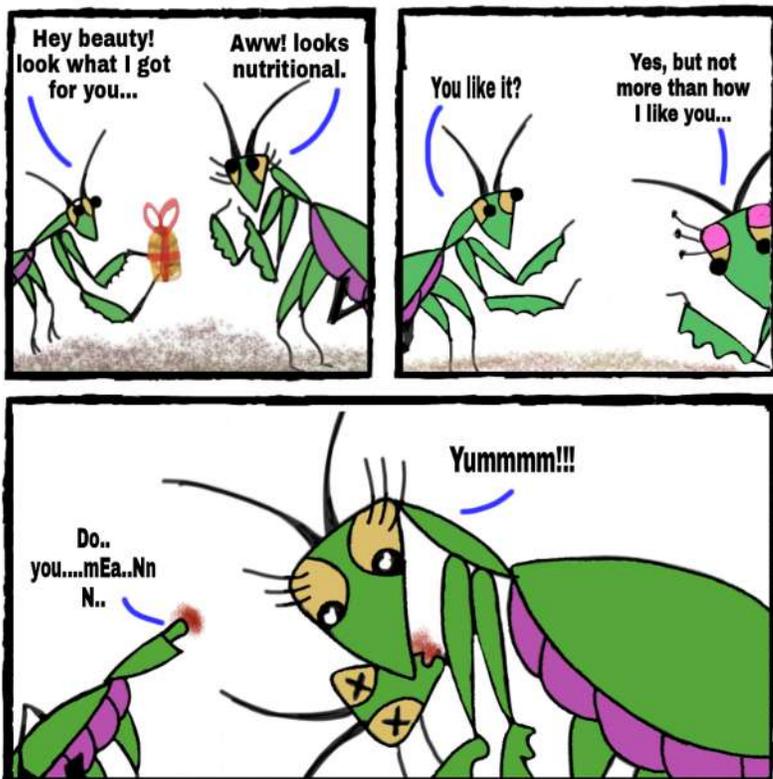
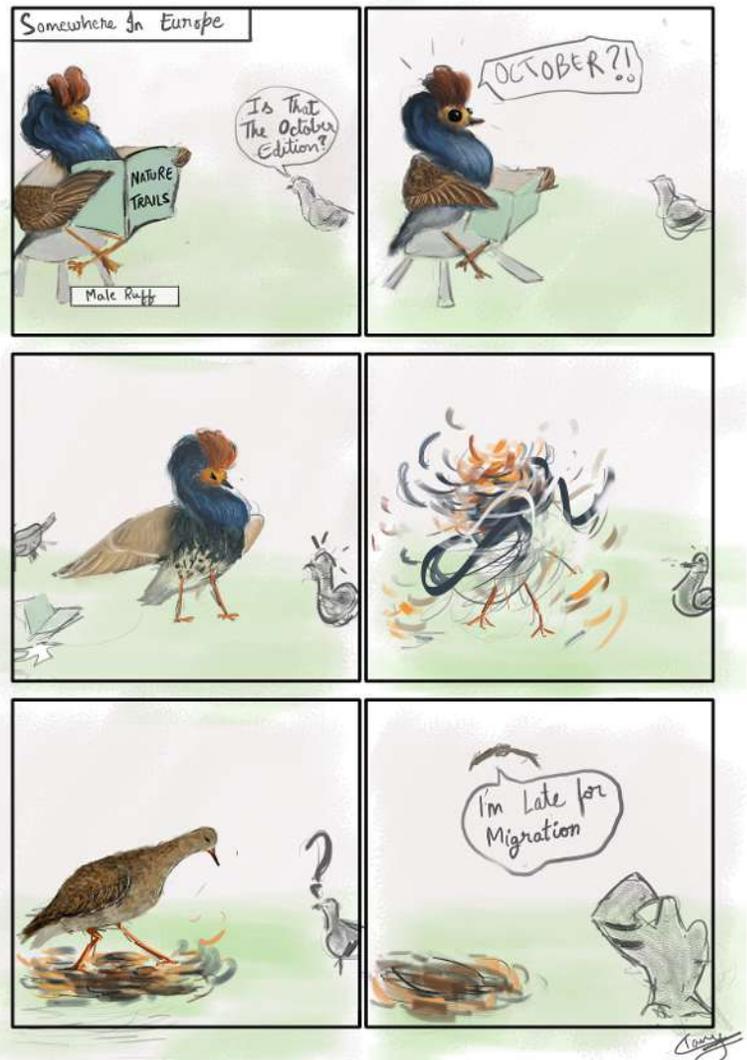
*Nikkitha Terasa is a 2nd year Zoology student at Stella Maris College.*

# COMIC STRIP



The Ruff is a winter migrant to several parts of India from Europe and some parts of North America. It breeds in Europe and North America during which its appearance is entirely different from what we observe during its non-breeding season in India. Here is a comic strip by **Tanmay Jain** which brings out the aspect of its two entirely different plumages.

Tanmay Jain is a 1st year student at NID, Jorhat.



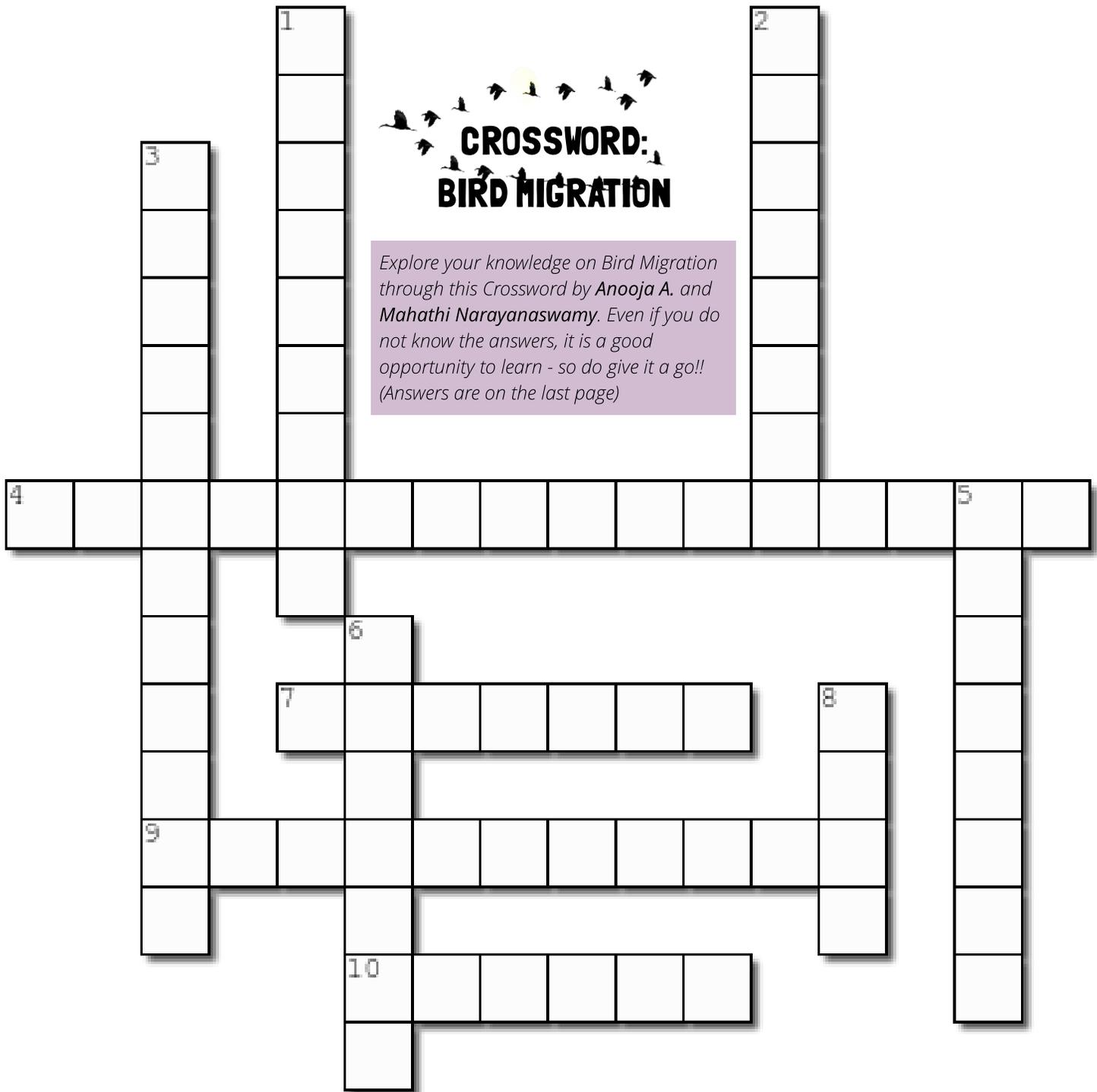
The females of several species of praying mantis are known to eat the heads of the males for nutrition after or while mating. Here is a comic strip by **Claudia Pinheiro** which highlights this behaviour.

Claudia Pinheiro is a 3rd year student at Stella Maris College.



## CROSSWORD: BIRD MIGRATION

Explore your knowledge on Bird Migration through this Crossword by *Anooja A.* and *Mahathi Narayanaswamy*. Even if you do not know the answers, it is a good opportunity to learn - so do give it a go!! (Answers are on the last page)



**Across- 4.** A bird which flies over 7000m above sea level during its migration.

7. A bird that stops at a place during its migration is known as a \_\_\_\_ migrant to that place.

9. A small pan-tropical migratory raptor flocks of which while passing through Nagaland, have several lakhs of individuals.

10. Radar technology that is used to track bird migration. As of now, this is mainly used in North America.

**Down- 1.** Restlessness/ Anxious behaviour observed in many migratory species, especially birds: the word originates from German.

2. When species breed further North and then migrate to more southerly locations when compared to closely related species that breed further south it is known as \_\_\_\_ migration.

3. When different groups (males, females, age groups. etc) of a population migrate different distances it is known as \_\_\_\_ migration.

5. Feeding/resting stops during migration are known as \_\_\_\_ locations.

6. A bird that is found outside its usual range is known as a \_\_\_\_.

8. The number of Major Migratory Flyways is \_\_\_\_.

## **NATAL PHILOPATRY**

To return to one's place of birth. The strong instinct to journey back to where one hatched, emerged, was born, to have one's own offspring.

Turtles, fish, butterflies, birds, frogs, bats and many other creatures travel great distances, and against odds to nest or rear their young at specific nursery-habitats - stretch of coast, ledge of mountain, course of river, islet, pond, tree, rock - which held their first footsteps, wing flaps, fin beats.



Photo- Yuvan. M

*Yuvan M. is a teacher at Abacus Montessori School.*

## **I SPY**

*Try to Spot this creature hiding on this wall!!!! This photo was taken by Mahathi Narayanaswamy.*



*Mahathi Narayanaswamy is a 1st year student at Azim Premji University.*

# ANSWERS

- **Crossword: Bird Migration**
- (Hyphens and spaces not included in crossword)
- 1. Zugunruhe
- 2. Leapfrog
- 3. Differential
- 4. Bar-headed Goose
- 5. Stopover
- 6. Vagrant
- 7. Passage
- 8. Nine
- 9. Amur Falcon
- 10. NEXRAD

- **I Spy**

Triangular-striped Moth (*Chalciope mygdon*)- below picture shows its location.



*We welcome letters and feedback from our Readers:*

*Please email us at [ynn.chennai@gmail.com](mailto:ynn.chennai@gmail.com) with your thoughts and feedback*

