NATURE TRAIL

Chennai Young Naturalists' Network
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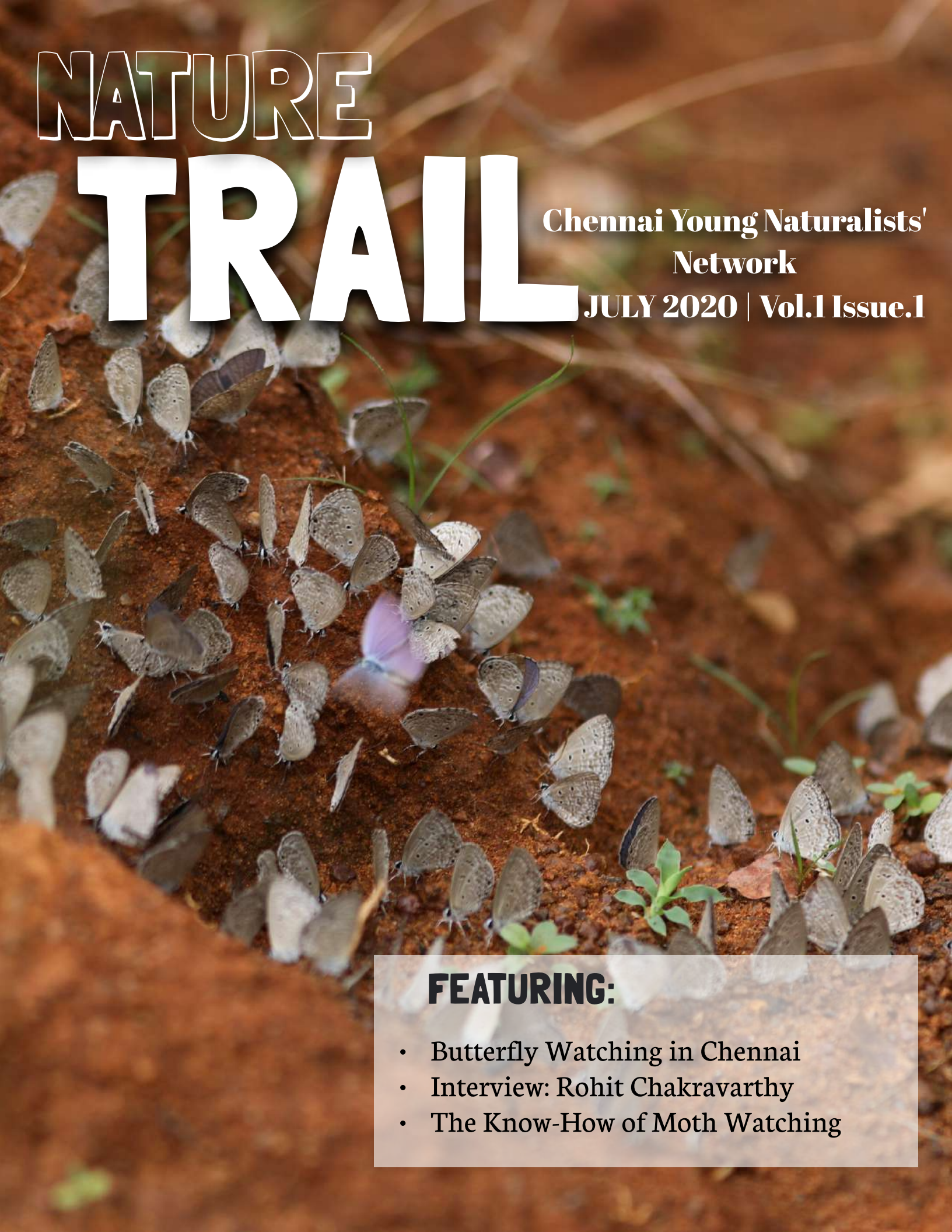

FEATURING:

- Butterfly Watching in Chennai
- Interview: Rohit Chakravarthy
- The Know-How of Moth Watching

Nature Trail

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Editorial Team

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.

Cover Image- Lime Blues mud-puddling at Guindy National Park- *Vikas Madhav*

Back Cover- Guindy National Park- *Mahathi Narayanaswamy*

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,

Hope you are all safe and well in these difficult times. Welcome to the first edition of Nature Trail, a YNN initiative. We have tried to make this issue as diverse as possible, from articles on birds and butterflies to less featured groups such as planthoppers, dragonflies and spiders. We hope that this motivates more people, especially youngsters to start documenting the biodiversity around them. Though many of us are under lockdown, there is a lot happening around us. From butterfly migration to the National Moth week, a lot is awaiting us this July-September. I hope you enjoy reading about nature's gems and that you go out and try to document them while also stepping up to protect them.

--*Vikas Madhav Nagarajan, Editoral Director*

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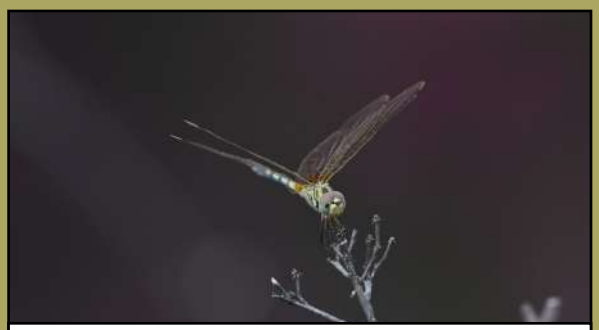
TAXONOMIC UPDATES AND NEWS

2020 has taken the world by surprise with the pandemic draping a lockdown across the globe, restricting us to our homes. However, during this period a lot of new discoveries and interesting observations have been recorded from across the country. We have tried to summarise and cover all those that have been published this year till date.

1. New species of carnivorous aquatic plant- (*Utricularia sainthomia*) from Northern Kerala.
2. New species of carnivorous aquatic plant- (*Utricularia kamarudeen)* from Kottayam, Kerala.
3. New species of Melastomataceae- (*Memecylon nervosum)* from South India.
4. New species of Annonaceae- (*Goniothalamus sericeus*) from Southern Western Ghats.
5. New species of Myrtaceae- (*Eugenia sphaerocarpa)* from Kerala.
6. New species of Acanthaceae- (*Barleria sahyadrica)* from Maharashtra.
7. Two new species of butterfly- Striped Hairstreak (*Yamamotozephyrus kwangtugenesis*) and Elusive Prince (*Rohana tonkiniana*) from Arunachal Pradesh.
8. New moth subspecies - (*Olepa schleini chandrai*) from Nandurba, Maharashtra.
9. New species of dragonfly- (*Bradinopyga konkanensis)* endemic to the lowland region of Konkan, Maharashtra.
10. Sighting of a Gynandromorphic Scarlet Skimmer (*Crocothemis servilia*) from Kole wetlands, Kerala.
11. Description of eleven new species of *Oedothorax* spiders from India, including *Oedothorax uncus* from the region earlier known as Madras, Tamil Nadu.
12. New species of insect- The Woolly Whitefly (*Aleurothrixus floccosus*) from Tamil Nadu.
13. Three new species of water mites- (*Torrenticola kumarisp*, *Torrenticola muranyiisp* and *Monatractides kontschanisp*) from the state of Uttarakhand, India.
14. New species of scorpion- (*Janalychas granulatus*) found distributed across southern Maharashtra, Goa, Karnataka and another species (*Janalychas keralaensis*) from Northern Kerala.
15. Description of (*Scorpiops furai)*, (*Scorpiops kejvali)* and (*Scorpiops tryznai)* from India and the elevation of (*Scorpiops vonwick*) to species rank.
16. New species of ribbon worm- (*Tetrastemma freyae*) from Kovalam beach in Chennai.
17. New species of catfish- (*Glyptothorax kailashi)* from Mizoram.
18. New species of freshwater fish- (*Waikhomia hira*) found in Maharashtra and Kerala.
19. New species of snake eel fish- (*Ophichthus kailashchandrai)* from Odisha.
20. Three new species of frog- (*Liurana indica), (Liurana himalayana)* and *(Liurana minuta)* from Arunachal Pradesh.
21. New species of frog- *(Walkerana muduga)* endemic to the Western Ghats.
22. New wood snake- Anamalai Wood Snake (*Xylophis mosaicus*) from Tamil Nadu.
23. New species of snake- Salazar Pit Viper (*Trimeresurus salazar)* from Arunachal Pradesh.
24. Sighting of the Assam Keelback (*Amphiesma pealii*) after 129 years and discovery of the first female specimen from a reserve forest on the Assam-Arunachal Pradesh border.
25. New species of gecko - (*Cnemaspis bengara*), (*Cnemaspis graniticola*) and (*Cnemaspis yelagiriensis*) from the Mysore Plateau.
26. New species of gecko- (*Cnemaspis magnifica*) from the Western Ghats in Hassan District, Karnataka.
27. New species of gecko (*Cnemaspis avasabinae*) from Velikonda Range, Andhra Pradesh.
28. New species of Fan-throated Lizard- (*Sitana dharwarensis*) from Balagot in North Karnataka.
29. New species of lizard- *(Cyrtodactylus urbanus*) from Assam.
30. Sighting of the Red-billed Starling- (*Spodiopsar sericeus*) from Manipur, possibly the first report from India.
31. Sighting of the Rustic Bunting- (*Emberiza rustica*) from Arunachal Pradesh, the first report from India.
32. Sighting of a pair of melanistic Bengal Tigers (*Panthera tigris*) from Odisha.
33. Sighting of the Brown Mongoose (*Herpestes fuscus*) from Tadoba Andhari Tiger Reserve, Maharashtra- A possible range extension.



Dancing Dropwing (*Trithemis pallidinervis*) from Mylapore- *Smriti Mahesh*

Eupterote sp. from IIT Madras- *Mahathi Narayanaswamy*

Red-vented Bulbul (*Pycnonotus cafer*) from Thiruvallur- *Claudia Pinheiro*

Plains Cupid (*Luthrodes pandava*) from Mylapore- *Smriti Mahesh*

Western Golden Dartlet (*Ischnura rubilio*) from Mylapore- *Smriti Mahesh*

LOCKDOWN NATURE-WATCH

The spread of the novel coronavirus in India has forced the country into lockdown. While many have turned to binge-watching sitcoms and taking up new hobbies, YNN members started recording the biodiversity around them. They shared their findings on our project, “Chennai Young Naturalists' Network” on iNaturalist. A total of 137 observations were made by 9 of our contributors and the total number of species recorded from this time period was noted to be 95 from Chennai. Furthermore, including the observations of those who had returned to their hometowns during this period, a total of 385 observations of 238 species were recorded by 17 members from 6 locations across 4 states. The most frequently observed species during the lockdown were noted to be the Garden Lizard (*Calotes versicolor*), followed by Giant Huntsman Spiders *(Heteropoda spp)* and the Chunam Tree Frog *(Polypedates maculatus)*.

OBSERVATIONAL NOTES

Shivani Manivannan has summarised her observations of a Cluster Fig tree in early July.

We have a 12-15 m high *Ficus racemosa* tree in our backyard. It is a lactiferous tree as it secretes a milky juice when a leaf or fruit is broken off. The tree is covered with leaves that are neither new nor too old to start shedding. The tree bears a lot of fruits that started growing a while ago, most of which are still raw and yet to ripen.

The leaves are simple, have reticulate venation, are arranged alternately on twigs and are elliptic-oblong in shape.

The fig fruits grow directly on the trunks or main branches in clusters and thus the common name of the tree, Cluster Fig.

Many fruits had a dark spot which seemed to be the tunnel dug by the male fig wasps for the females to escape. When opened, around 50 wasps were found within a fruit. I was not able to determine the life stage and the sex of the wasps.

In addition to the wasps in the fruits, I noticed a plethora of other species supported by the tree- Three-striped Squirrels, Greater Indian Fruit Bats (also known as the Indian Flying Fox), Bonnet Macaques, Asian Koels, Coppersmith Barbets, Rufous Treepies and Bark Geckos to name a few along with several other species of insects.

On reading up further, I found that the fig wasp and the fig tree have a special relationship called mutualism. There are more than 800 types of figs and each species has its own specific type of fig wasp. The female fig wasp lays its eggs in the fig while helping disperse the pollen of the plant. Sadly, it loses its wings and antennae in the process. In return, the fig provides shelter and food for the larvae that hatch out of the eggs. The larvae hatch and mate once they are adults. The males do not have wings and they die after digging a tunnel for the females to escape. The female wasps then collect the figs' pollen as they come out of the fig. The females fly to another fig and the cycle repeats.

Thanks to this partnership, figs are available year-round and have been called a keystone species not only for wasps but also for other animals like squirrels, bats and many species of birds.

All photos attached in the article were taken by Shivani Manivannan and she holds the copyright to them.

Shivani Manivannan is an 8th standard student at P S Senior Secondary School.

Bengal Monitor (*Varanus bengalensis*) from IIT Madras- *Mahathi Narayanaswamy*

THE CASTLE CLIMBER: BENGAL MONITOR

Being one of the most widely spread Varanids or Monitor Lizards, the Bengal Monitor is known by various names from language to language and place to place. There are also several beliefs and stories associated with it. ***Ekadh Ranganathan*** *has compiled information about it ranging from its connections with humans to its lifestyle.*

Bengal Monitor
(*Varanus bengalensis*)
Weight: 7-16 kg
Length: 61-175 cm

TAXONOMY

Kingdom: Animalia
Phylum: Chordata
Class: Reptilia
Family: Varanidae
Genus: Varanus

Interesting origins: The Bengal monitor is known by a variety of names across different places! In Sri Lanka, it is known as *Thalagoya*, while in the western parts of the Indian subcontinent, the term associated with it is *Bis-cobra*. In total, this Varanid goes by at least 7 regional names! By far, the most interesting facets of their influence on culture are the traditional beliefs. In Rajasthan, it is believed to become venomous with the onset of the monsoon. Even more bizarre, the *Ghorpade* people native to Maharashtra believe that their family name is derived from their leader, who scaled a fort using a monitor lizard and a rope! Many natives have very similar stories of Bengal monitors climbing castles.

Range: Occupies a huge expanse of the Indian subcontinent as well as most of Southeast Asia. Some have even been discovered in arid climates, going as far west as Iran!

Habitat: Wide-ranging. Since they can occupy a range of habitats, they're copiously populated. Their presence ranges from deserts to rainforests, even though they usually prefer deciduous forests with adequate rainfall.

Diet: This reptile is an opportunistic carnivore that can scavenge just as well as it can hunt. It usually feeds on insects and worms, while occasionally preying on birds' eggs and hatchlings. In fact, they can go as far as to resort to eating eggs and hatchlings of their own kind!

Lifestyle: Like a lot of other Varanids, the Bengal monitor is solitary and terrestrial, with only the young being semi-arboreal to reduce the risk of predation. Like most of its relatives, this reptile is diurnal, preferring to be out and about during the day to hunt and scavenge, while regulating their body temperature by basking in the sun. In colder reaches some individuals enter a state of semi-hibernation.

Bengal Monitor (*Varanus bengalensis*) from Bandipur National Park- *Melvin Jaison*

Threats: In the wild, they don't have many predators; the only main predators being pythons or large birds of prey. In terms of human threats, while habitat destruction isn't a major issue currently due to their wide distribution in Asia, bioaccumulation of artificial fertilisers and pesticides in the insects they feed on pose a serious threat. Even more concerning, these monitors are hunted for their skin, which is used in leather products, while the rest of the body is used for consumption and for the preparation of local medicine.

ID parameters: They usually appear dull grey in colour, with males generally being larger than females. Juveniles have much more vivid colourations, with segmented black and yellow dotted bands running across the dorsal side of the individual. In addition, there is another monitor that it does share its range with, namely the Asian water monitor (present in the Sundarbans and some other remote parts of India). The water monitor is generally the bigger of the two and spends most of its time near water. While the Bengal monitor can do the same, its nostrils are lower than that of the water monitor, making its head poke out of the water. It also usually has a stubbier snout compared to the water monitor, whose nose is quite pointed. Lastly, the Bengal monitor generally has a grey colouration as an adult, while the water monitor retains yellow spots on its dorsal side while attaining a blacker/darker shade overall.

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Ekadh Ranganathan is a 1st year student at Hong Kong University of Science and Technology.

Oriental Magpie-Robin (*Copsychus saularis*) female from Mysore- *Melvin Jaison*

A MELODIOUS SONGBIRD: ORIENTAL MAGPIE-ROBIN

Well-known for their melodious singing, Magpie-Robins used to be popular cage birds. They exhibit a wide range of songs and calls and are also skilled at mimicry. ***Claudia Pinheiro*** *has compiled information about this common yet fascinating bird, which is the National Bird of Bangladesh and is even printed on their currency.*

Oriental Magpie-Robin
(*Copsychus saularis*)
Weight: 29-51 g
Length: 19-21 cm

TAXONOMY

Kingdom: Animalia
Phylum: Chordata
Class: Aves
Order: Passeriformes
Family: Muscicapidae

Range: The Oriental Magpie-Robin is found in south and south-east Asian countries like Nepal, Bangladesh, India, Sri Lanka, Pakistan, Indonesia, Thailand, South China, Malaysia and Singapore. It is a resident breeder throughout its range.

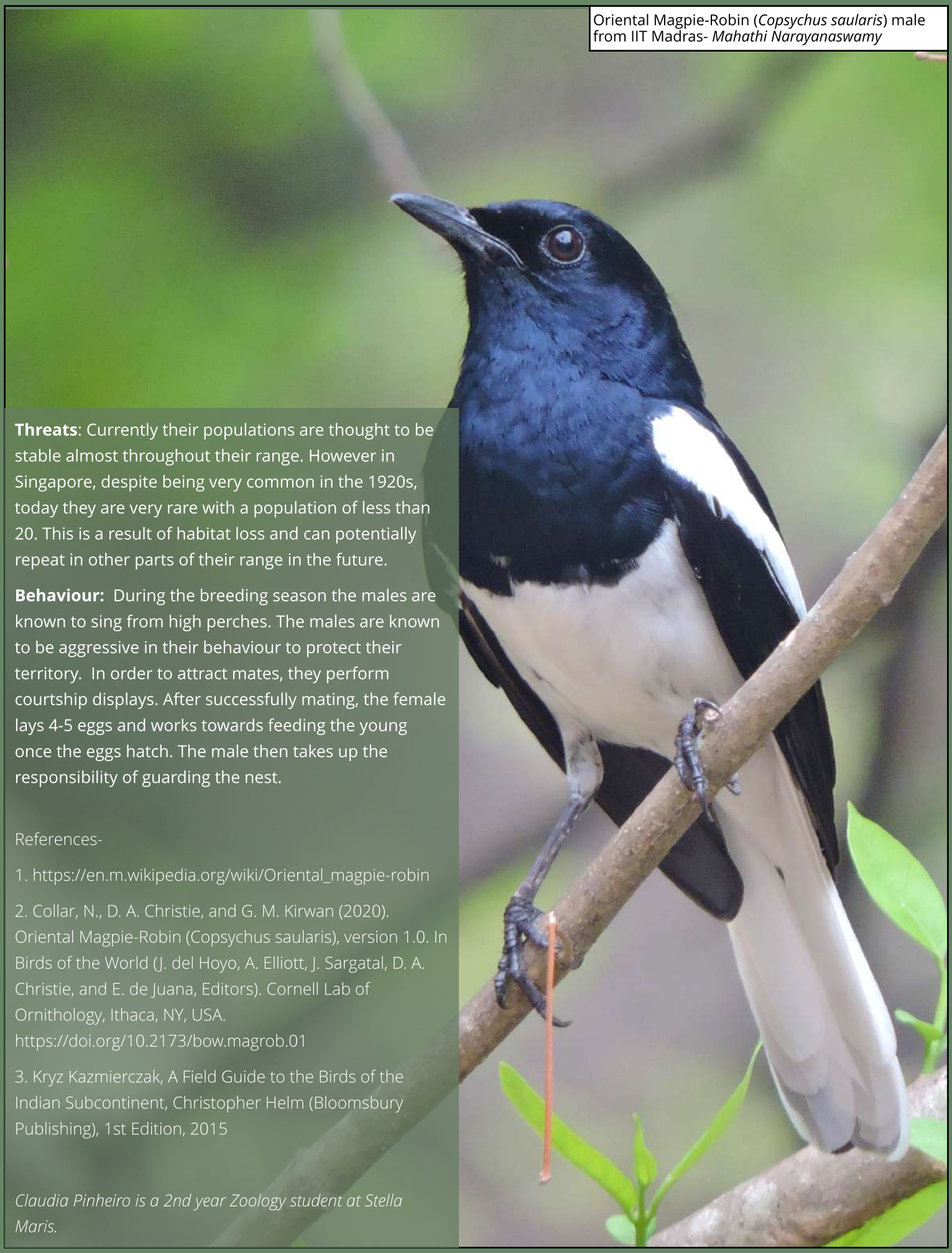
Habitat: Places like gardens, forests, shrubs, open woodlands and spots near human habitations are commonly chosen as their preferred dwellings sites.

Diet: Being omnivorous, their diet preferences include insects such as dragonflies, mantises, weevils, locusts, ants and other invertebrates such as earthworms, leeches, molluscs and spiders. They also consume small vertebrates like geckos and fish.

Vocalisations: Apart from their melodious singing, they exhibit a variety of calls for different reasons like roosting calls, territorial calls, threat calls, etc. Till date, 7 basic vocalisations have been identified. They are also good at imitating other bird-calls.

Breeding Season: Usually from January to June.

Description: Magpie-robins are medium-sized birds of about 20cm. They have a broad wing bar which runs from the shoulder to the end of the wing-tip. The tail feathers have white borders on either side and are held upright like a 'tick mark' most of the time. The species is sexually dimorphic. Males have black and white plumage while females show grey and white plumage with slight shades of brown. The juveniles are browner than the females and have scaly heads and upper bodies.



Oriental Magpie-Robin (*Copsychus saularis*) male from IIT Madras- *Mahathi Narayanaswamy*

Threats: Currently their populations are thought to be stable almost throughout their range. However in Singapore, despite being very common in the 1920s, today they are very rare with a population of less than 20. This is a result of habitat loss and can potentially repeat in other parts of their range in the future.

Behaviour: During the breeding season the males are known to sing from high perches. The males are known to be aggressive in their behaviour to protect their territory. In order to attract mates, they perform courtship displays. After successfully mating, the female lays 4-5 eggs and works towards feeding the young once the eggs hatch. The male then takes up the responsibility of guarding the nest.

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Claudia Pinheiro is a 2nd year Zoology student at Stella Maris.

(Eurybrachys cf. tomentosa) from IIT Madras- *Mahathi Narayanaswamy*

CRYPTIC MIMICS: PLANTHOPPERS

Planthoppers are undoubtedly some of the most fascinating insects, in particular, due to their resemblance to various plant parts like leaves, stems and thorns. ***Mahima Nair*** *has compiled information about these Cryptic Mimics that are present around us.*

Planthopper

TAXONOMY

Kingdom: Animalia
Phylum: Arthropoda
Class: Insecta
Order: Hemiptera
Suborder: Auchenorrhyncha
Infraorder: Fulgoromorpha

Planthopper nymph possibly belonging to the Genus *Eurybrachys* from IIT Madras- *Mahathi Narayanaswamy*

Behaviour: Planthoppers walk very slowly in order to avoid attracting the attention of their predators. Often, they may even hop to move quickly. Their camouflage and behaviour often result in them going unnoticed, so much so that ants and other insects even walk over them.

Life Cycle: Planthopper eggs are white in colour, elongated and typically hatch within 8-10 days giving rise to a nymph. These eggs are protected by a hydrophobic wax that the adult produces from special glands.

The nymphs undergo 5 instars within a period of 15-20 days before emerging as adults. Typically it takes a total of 20-25 days from the moment the egg is laid for the planthopper to reach its adult stage.

Life Span: Adult males typically have a life span of 15-20 days while females have a life span of 15-30 days.

Diet: All planthoppers feed on plants by sucking out their juices. On digestion they excrete honeydew, a sweet by-product.

Predators: Spiders, especially those belonging to Lycosidae, Linyphiidae and Tetragnathidae, are amongst the most important predators of planthoppers and significantly help keep their populations in check.

Agricultural Significance: Planthoppers act as vectors in the transmission of phytoplasma-associated diseases by transmitting the pathogen from the infected plant's phloem to another plant. The Brown Planthopper and White-backed Planthopper are considered major agricultural pests in India.

Planthopper belonging to the Family Flatidae from IIT Madras- *Mahathi Narayanaswamy*

Planthopper belonging to the Family Ricaniidae from Erode- *Supraja Narasimhan*

Common taxa: Some of the commonly seen planthopper families are Eurybrachidae, Flatidae, Derbidae, Fulgoridae, Meenoplidae and Ricaniidae.

Planthoppers are often quite challenging to identify below the family level taxon.

According to iNaturalist there are 38 species recorded from India. Some of these which occur in Chennai are *Dichoptera hyalinata*, *Eurybrachys cf. tomentosa* and *Nisia carolinensis*.

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Mahima Nair is a physiotherapy intern at Kovai Medical Center and Hospital.

(Dichoptera hyalinata) from IIT Madras- *Mahathi Narayanaswamy*

Planthopper belonging to the Family Derbidae from IIT Madras- *Mahathi Narayanaswamy*

(*Phanuelus gladstone*) male- sourced from *Anubhav Agarwal*

AN ELUSIVE JUMPER: (PHANUELUS GLADSTONE)

Kavya G. V. has compiled information about a spider that is endemic to Tamil Nadu which was discovered as recently as 2014.

(*Phanuelus gladstone*)
Length: 3-4 mm

TAXONOMY

Kingdom: Animalia
Phylum: Arthropoda
Class: Arachnida
Family: Salticidae
Genus: Phanuelus

(*Phanuelus gladstone*) female- sourced from *Anubhav Agarwal*

Etymology: The Monotypic genus *Phanuelus* is named after G.J Phanuel, a professor from Madras Christian College who worked on the spiders of Chennai in the early 1960s.

Range: Endemic to Tamil Nadu. So far it has been reported only from Greater Chennai.

Habitat: Mostly found dwelling in low vegetation of scrub jungle remnants of tropical dry evergreen forests.

Diet: Like most other spiders it is a hunter, preying mainly on small insects.

Adaptations: Their small size and colouration camouflage them well in their habitats.

Threats: These spiders, having been discovered very recently, are currently known to have a very small range and possibly a small population as well. As a result, habitat loss could potentially drive the species into extinction in the coming years.

ID parameters: This sexually dimorphic species can be recognised in the field by its general body colour, size and abdominal pattern. Males of the species are smaller than the females.

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4. Mr. Anubhav Agarwal

Kavya G. V. is a 1st year student at Easwari Engineering College.

Spot Swordtail (*Graphium nomius*) from IIT Madras- *Vikas Madhav*

BUTTERFLY WATCHING IN CHENNAI DISTRICT

Chennai is a metropolitan city in South India, situated on the Coromandel Coast, spread over 490 sq.km. It is located in northern Tamil Nadu, with hills of the Eastern Ghats about 100 km away from the city. Chennai has Tropical Dry Evergreen Forests (TDEF), grasslands, scrublands, wetlands and community park habitats, some of which are protected areas. The average rainfall received during the north-east monsoon and the mean temperature of the city are 140 cm and 28.6 °C respectively. These conditions make Chennai a suitable location for butterflies, 150 species of which have been recorded by various butterfly enthusiasts

***Vikas Madhav** has selected 6 butterfly hotspots from Chennai district, to showcase its butterfly diversity and to guide visitors on where to see butterflies within these locations.*

1. Adyar Poonga

A restored habitat, situated on the banks of the Adyar river, Adyar Poonga has estuarine and tropical dry evergreen forests interspersed with grassy patches. It is open to the public on Tuesdays and Thursdays from 2:30 p.m. to 4 p.m., on Saturdays from 10:30 a.m. to 12 p.m. and again from 2:30 p.m. to 4 p.m. The most notable species found in the park are the Small Salmon Arab, Tawny Coster and Plain Tiger. In fact, in Chennai, the Small Salmon Arab is best seen at the Adyar Poonga, where its lifecycle has also been observed. It is also home to several uncommon butterflies including the Asian Marbled Skipper, Black Rajah and Common Albatross. Some rare butterflies observed from here are the Tri-coloured Flat, Apefly and Indian Red Flash. It is recommended that you try to walk along the route near the park office to maximize your chances of spotting the Asian Marbled skipper. Do check the Tridax patches outside the entrance of the park, where species like the Small Cupid, Painted Lady and Common Grass Dart are found.

2. Guindy National Park (GNP)

Situated in the centre of the city, it is one of India's smallest National Parks. Several forest species such as the Blue Mormon, Round Pierrot and Yellow Orange Tip have been observed in this dry, evergreen forest. With 118 species recorded here till date, it is a treasure trove for butterfly enthusiasts across north Tamil Nadu. Some species like the Spot Swordtail, One-spot Grass Yellow, White-banded Awl, Large Oakblue and Indian Red Flash can be observed here during the Butterfly Migration in July-September. Polo Ground, its only large grassland, hosts large populations of several blues like Grass blues and Grass Jewels. Taramani road, Grizzled Grove Road and

Small Salmon Arab (*Colotis amata*) from Adyar poonga- *Mahathi Narayanaswamy*

Large Oakblue (*Arhopala amantes*) from Indira Nagar- *Vikas Madhav*

Pale Palm Dart (*Telicota colon*) from Chengalpattu- *Rohith Srinivasan*

Velachery Main Road are amazing trails to spot butterflies like the Indian Wanderer, Yellow Orange Tip, African Babul Blue, Pointed Ciliate Blue and Common-banded Peacock at close proximity. The Doctor's Road is an excellent trail to look for caterpillars of the Common Crow, Blue Tiger, Plain Tiger, Common Mormon, Common Lime and Common Evening Brown. Permission to enter the park can be obtained by submitting a request in person to the Wildlife Warden's office a few days before the planned visit. As of now, only students with a teacher/guide are given permission to enter. However, the neighbouring Children's Park is also a butterfly hotspot. Several species can be seen there during the butterfly migration in July. Additionally the Baronet, Striped Albatross, Pale Palm Dart, Tamil Bushbrown and the Dark Cerulean have been recorded from there in Winter.

3. Indian Institute of Technology Madras

The IIT-M campus is situated adjacent to GNP. Unfortunately it has been urbanized, and thus a lot of its originally dense vegetation has been lost. The Common Mime, a normally wet forest species, was seen for the first time in Chennai in July of 2015 here. The rare Dark Palm Dart was also seen in this area in 2015. The Little Tiger Pierrot was recorded on campus in 2019 and was the 150th species of butterfly to be seen in Chennai. The stadium is a well known mud-puddling hotspot between the months of June and September, when thousands of Common Emigrants and Common Limes are seen congregating, along with Spot Swordtails, Lime Blues, Striped Albatrosses and Common Leopards. The Student Activity Centre (SAC) is an excellent area to find pansies, ceruleans and swifts. Madras Avenue is yet another ideal location, with species such as the Painted Lady, African Babul Blue and Peacock Pansy being reported during the month of September.

4. Indiranagar

This is a green, humid, residential area located in Adyar. It had a lot of tree cover and old gardens as it was an IAS residential colony, and it still manages to retain a fair amount of the same. The two best places to see butterflies in Indiranagar are the 1st Cross Street and the Indiranagar Park on 5th Cross Street. Many rarities from Chennai have been recorded from here, few of which are the Complete Paintbrush Swift, Tri-coloured Flat (seen occasionally in winters) and Dark Cerulean. Despite being a residential colony, it hosts about 99 species of butterflies. On average, it would not be tough to spot about 25 species of butterflies in an hour, with one being able to spot upto 53 species in a day. Few regularly reported butterflies that are tough to see in other parts of Chennai are

Little Tiger Pierrot (*Tarucus balcanicus*) from IIT Madras- *Mahathi Narayanaswamy*

Tawny Coster (*Acraea terpsicore*) from Stella Maris College- *Aswathi Asokan*

Grass Demon (*Udaspes folus*) from IIT Madras- *Mahathi Narayanaswamy*

Indian Sunbeam (*Curetis thetis*) female from Indira Nagar- *Vikas Madhav*

the Indian Sunbeam, Apefly (in winter) and Grass Demon. The Red-spot Jezebel, a species normally seen in Southeastern Asia and Northeastern India, was reported from here and was the first record of the species from South India. You can try looking out for these species at the Indiranagar Park.

5. Kalakshetra Foundation

This is a 99-acre property which has mixed vegetation – some amount of forest, grassland and quite a bit of arid area. The specialities of this location include the chance of spotting the rare Painted Lady, Spot Swordtail, Blue Mormon and very rarely, the Bush Hopper. Other butterflies seen here are the Indian Sunbeam, Dark Cerulean, Rice Swift and Common Lineblue. Prior permission to enter the property is required, which can be obtained by applying for a walking pass. Another close-by location that can be visited is the Thiruvanmiyur area, dotted with corporation parks and coastal grasslands.

6. Theosphical Society

This is a forested area with fringes of estuarine habitat. It is situated on the banks of the Adyar River. It is open to the public from 8 am to 10 am on weekends. However photography is restricted. Some of the highlight species include the Monkey Puzzle, Blue Mormon, Joker, Common Palmfly, Common baron and Great Orange-tip. The grassland patches in this setup offer extremely fruitful butterfly watching. The rare African Grass Jewel was also reported from this area in 2017.

Vikas Madhav Nagarajan is a 3rd year Chemical Engineering student at SSN.

If you observe butterflies in Chennai between June and September, please do report your sightings to ***madhavvikas@gmail.com****.*

Your observations will help us understand the behaviour and density of migratory butterflies passing through the region.

Kindly send these as a single document with the date, species, location, number of individuals, direction of movement and behavioural notes, if any, for each observation.

Tip: *use iNaturalist to identify if you have difficulty.*

PAPER ABSTRACT 1

Title: Resonating Feathers produce Courtship Song

Author: Kimberly Bostwick, Damian Elias, Andrew Mason, Fernando Montealegre- Z

Published in the Proceedings of the Royal Society, Biological Sciences in 2009, 277, p 835-841

DOI: 10.1098/rspb.2009.1576

ResearchGate:

https://www.researchgate.net/publication/38083192_Resonating_feathers_produce_courtship_song

*Deep in the Andes, in the subtropical forests of Ecuador and Columbia, lives a bird that attracts its mate using resonance! The Club-winged Manikin is a small passerine species that is known to use its wings to cause raking movement that produces sound in order to attract a mate. This abstract written by **Mahathi Narayanaswamy** summaries a research article on this spectacular behaviour.*

GLOSSARY

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

1. Sonation: The process of intentionally producing sounds non-vocally. For example, this may be achieved by using feet, legs, wings or tools collected from nature.

2. Resonance Stridulation: The process of producing sounds by setting part(s) of the body into resonance by rubbing them together.

3. Secondary Feathers: The feathers on the wing inserted on the *Ulna* (forearm)

4. Courtship Display: A means of communicating willingness to mate, allowing individuals to choose their partners.

5. Cranio-dorsal: A cranial (towards the head) and dorsal (towards the back) position.

6. Laser- Doppler Vibrometer: An instrument used to make vibration measurements of a surface without any contact with it.

The Target Taxon- Like several other Manakin species, the target taxon, male Club-winged Manakins (*Machaeropterus deliciosus*) produce a mechanical sound, otherwise known as sonation (the process of intentionally producing sound non vocally- this may be, for example, achieved by using feet, legs, wings or tools collected from nature). The process of sonation that the male Club-winged Manakin uses to produce its courtship song is known as Resonance Stridulation (producing sound by setting part(s) of its body into resonance by rubbing them together), a process that is unique to Vertebrates. The modified secondary feathers of the Club-tailed Manakins aid in exhibiting resonance stridulation.

To observe this spectacular behaviour exhibited watch:
https://www.youtube.com/watch?v=tSHjhCN6NC0

What is unique about this?- The courtship song that these males produce has a frequency of approximately 1500Hz, which they achieve by knocking their feathers together at 107 cycles per second (this is an incredibly fast rate for any vertebrate to be moving its body).

For reference- a Rattlesnake rattles its tail at 90 cycles per second and an Amethyst Wood-star Hummingbird typically beats its wings at around 80 cycles per second.

What adaptations support this?- *(with reference to image in the next page)* The nine secondary feathers (the feathers on the wing, inserted on the Ulna or forearm) of the Club-tailed Manakin include typical avian secondaries having a long, slender evenly tapering rachis (central shaft of a feather) while others severely deviate from typical avian secondaries.

The secondaries 1-5 deviate from typical secondary feathers as the rachides become increasingly wider and secondaries 3-5 continuously taper from the normal position to exhibit a rather abrupt taper. The 6th and 7th secondaries are the most obviously modified ones, with their rachides having thick bases while width increases drastically along the length of the feather. The rachis also twists so that the dorsal feather's surface is aligned medially.

What exactly happens?-

When the manakin flips its wings cranio-dorsally, the wings knock into each other 107 times a second. The "beep" sound you hear is actually the sound of the two wings knocking into each other with remarkable frequency. In fact, the sound that we hear has a frequency 14 times that of the frequency at which the wings knock into each other, which is precisely 1498 Hz.

So why is the air vibrating 14 times faster???

One can note that the 6th and the 7th feathers are like clubs while the 5th feather abruptly tapers. It can also be noted that the 6th feather has 7 ridges. The 5th feather, due to its bent nature can easily slide over the rachis of the 6th feather, and as a result acts as though it were a pick with the ridged edge of the 6th feather acting like a comb when the two feathers knock into each other, resulting in the ridged edge setting the 5th feather into resonance. Due to the 7 ridges on the 6th feather, the 5th feather is stridulated 14 times after every knock of the wings- 7 times up and 7 times down. This produces the sound that you hear.

How was the study done?- Slowing down a video recording of the courtship display revealed that once the wings were flipped cranio-dorsally, they knocked into each other at a rate of 107 cycles per second.

Specimens were procured for destructive use in order to analyse the feather structures and modifications. From these specimens, the feathers were removed along with a ligament holding them in place, like the original structure. The behaviour of the feather, in particular the rachis, was measured using a Laser Doppler Vibrometer while being stimulated by the mini-shaker on a vibration isolated table. These responses were recorded in the form of a transfer function with input being the measured response of holders and output being the vibration of feathers at each measurement point.

Additionally, the Quality factor (Q-factor) was calculated using a spectral method (I believe this is by using optics to determine the Q-factor of a cavity by a means known as Q-switching) to understand the dampening of the resonance system. The data gathered by these means were used to further analyse the resonance properties of the feathers.

Observation of similar behaviour- The mechanism displayed by Club-winged Manakins is commonly seen in arthropods and rarely in birds and other vertebrates. The closest connection to this mechanism of sound production is exhibited by the diurnal Australian Whistling Moth, also known as the Castanet Moth (*Hecatesia exultans*), whose acoustic communication, a brief tonal sound pulse is achieved by percussive contact between castanet shaped structures on its wings.

Reference:

1. Bostwick, Kimberly & Elias, Damian & Mason, Andrew & Montealegre-Z, Fernando. (2009). Resonating feathers produce courtship song. Proceedings. Biological sciences / The Royal Society. 277. 835-41. 10.1098/rspb.2009.1576.
2. Additional Reference: https://www.youtube.com/watch?v=gQ1F1ITa7I0&feature=youtu.be

Mahathi Narayanaswamy is completing her 12th standard at NIOS

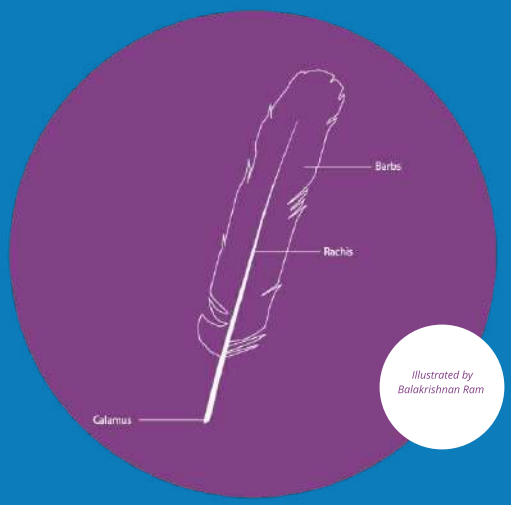
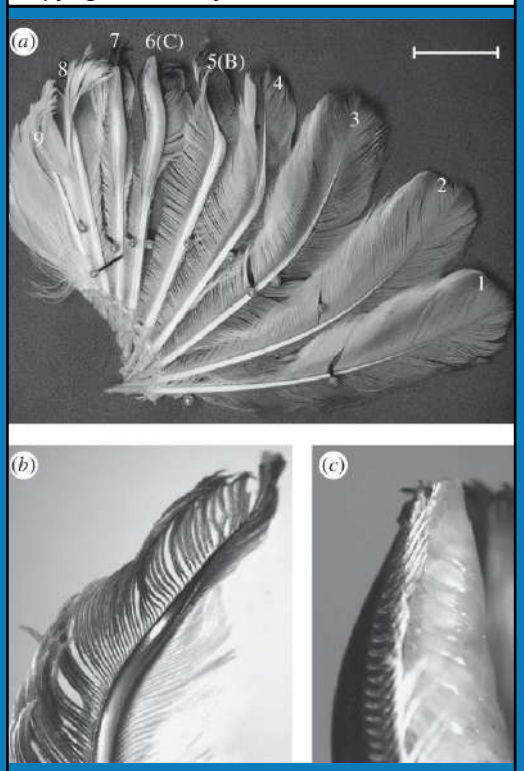


Image- sourced from original publication (references)
Copyright- *Kimberly Bostwick*



Wandering Glider/ Globe Skimmer (*Pantala flavescens*) from Indira Nagar- *Vikas Madhav*

PAPER ABSTRACT 2

Title: Migration of Dragonflies from India to African Grounds Across the Western Indian Ocean

Author: R. Charles Anderson

Published in the Journal of Tropical Ecology in 2009, Vol 25, Issue 04, p 347-358

DOI: https://doi.org/10.1017/S0266467409006087

Cambridge Core: https://www.cambridge.org/core/journals/journal-of-tropical-ecology/article/do-dragonflies-migrate-across-the-western-indian-ocean/227EEFD644DB0E5220AF176D6958192

The Wandering glider/ Globe skimmer (Pantala flavescens) is one of the most common dragonflies that can be encountered in Chennai. It is undoubtedly one of the best studied dragonfly species and is best known for its annual migration. This paper abstract by ***Supraja Narasimhan*** *deals with the migratory pattern of these winged insects through peninsular India.*

GLOSSARY

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

1. **Migration-** The seasonal movement of an entire population of organisms from one place to another for food, breeding, sunlight, temperature or any other factors.

2. **Intertropical Convergence Zone (ITCZ)-** ITCZ is a zone circling the earth near the equator where the Northern and Southern Hemisphere's trade winds join together.

3. **Fugitive rainfall-** Dispersed, erratic rainfall.

4. **Taxon-** The basic unit of classification of an organism arranged in a hierarchy that consists of a population of organisms.

Target Taxon:

Wandering glider (in India) or Globe skimmer *(Pantala flavescens).*

The unique behaviour of the Target Taxon:

Migration of the target taxon across the Indian ocean from India to African grounds.

Migratory observations: Discussions/ Hypothesis:

In the tropical Indian Ocean, the Maldives lack freshwater that actually favours dragonfly reproduction. Despite this, Wandering gliders appear in millions all of a sudden during the month of October. The arrival dates of these dragonflies, which coincide with the southward passage of the Intertropical Convergence Zone (ITCZ), have been noticed in the Maldives and India. According to specific pieces of evidence, these dragonflies fly with Northeastern winds within and behind the ITCZ over a 1000 m altitude. This massive movement of dragonflies is a part of the animal migration across the Western Indian Ocean from India to Africa. The date of appearance of dragonflies also supports this hypothesis.

Significant numbers of Globe Skimmers are noted to appear in the Maldives with the onset of the Southwest monsoon during the month of May. This suggests that the dragonflies might possibly return to Africa.

These migrants make use of fugitive rainfall for breeding. The monsoon and the ITCZ facilitate and bring appropriate wind for dragonflies to follow the rains.

Same Notable behaviour in other Taxa/Phyla:

It is known that several bird species that migrate from India across the Western Indian ocean to African winter grounds, take advantage of the same seasonal winds that the dragonflies do.

Map : *(with reference to attached map)*

Map of the region including India, the Indian Ocean, East Africa and the Arabian Peninsula, across which *Pantala flavescens* is thought to migrate. Normal months of arrival at different island groups in the western Indian Ocean are given in parentheses. **Symbols** are the locations of the weather stations from which monsoon movement and rainfall data were obtained. The **Arrow** indicates the schematic track of crossing of *P. flavescens* that pass over Male and the Maldives during migration from India to Africa.

References-

1. Anderson, Charles, 2009, Do Dragonflies migrate across the Western Indian ocean?, Journal of tropical ecology, Vol.25, Issue 04, p. 347-358

2. https://www.ted.com/talks/charles_anderson_dragonfli es_that_fly_across_oceans/transcri pt?language=en

Supraja Narasimhan is starting as a Student Teacher at Lady Willingdon College.

Map made by *Rohith Srinivasan* to replicate Map attached in the paper

CHIROPTEROLOGY AS A CAREER

FEATURING ROHIT CHAKRAVARTHY

Chiropterology is the scientific study of the order Chiroptera, whose members are commonly known as bats. Through this interview with Rohit Chakravarthy, learn more about one of India's few Chiropterologists and his work. The questions for the interview were framed by ***Vikas Madhav*** *and* ***Mahathi Narayanaswamy*** *and the interview was coordinated by* ***Vikas Madhav****. Responses sent back by Rohit Chakravarthy have been retained as such with no editing.*

1. Tell us a bit about yourself.

I'm currently pursuing a PhD at the Leibniz Institute for Zoo and Wildlife Research, Berlin, Germany, studying how the bat communities change and how bats get by their lives in the Himalayas of Uttarakhand. This means that I spend a lovely summer catching bats and collecting data in the Himalayas, and crib through the grey European winter where I wrack my head trying to make sense of what my bats do!

2. How long have you been working with bats for and how did you get the interest?

My first formal project on bats was in 2013. That was my Master's dissertation where I studied gene flow in bats in the Andaman Islands. But I got interested in bats in 2007 when my brother and I rescued a Fulvous Fruit Bat at home in Nagpur. Later that year, our pet dog found a Short-nosed Fruit Bat trapped in our dustbin. The bat had flown into the dustbin smelling rotten bananas! However, that interest remained dormant until 2011 because bats were not easy animals to find and observe. In 2011, during the final year of my bachelor's in Mumbai, I started exploring caves and forts in search of bats. That was also the time when I was looking for an "empty niche" where I could create some sort of identity and that's how bats took me from the Andaman Islands to the Himalayas and from India to Germany.

3. What inspired you to take up your field?

Ever since one of my aunts gifted me my first field guide, The Book of Indian Animals by S.H. Prater in 2005, I was intrigued by the smaller mammals and found the charismatic large mammals too mainstream. Mongooses (which I have been watching from my house since childhood), civets and bats caught my attention the most. But, I'll be honest; more than the interest it was the desire for an empty niche that prompted me to take up bat research. Even seven years earlier when I did my first project, there were very few people studying bats in India; more so from my generation. I recently attended a regional bat conference in Germany and there were more than 100 participants. Whereas, in India, we recently did a press release on why bats should not be villainized for COVID-19 and we managed to scrape 64 researchers from all over South Asia! Luckily, my decision to study bats was not only important from an academic standpoint (because bats are such super-heroic animals!), but also because there was more sense of adventure than studying any

other animal; for example, working in stunningly beautiful caves filled to the brim with bats and spending calm nights in coniferous forests.

4. What would you recommend as the best places to pursue this study? How does one get into studying bats?

I'll answer the second part of the question first. I'd suggest reading a bit and then getting ready for a round of practical experience. Book of Indian Animals by S.H. Prater, Field Guide to the Mammals of India by Vivek Menon and the chapter on Bats in Mammals of South Asia by Dr AJT Johnsingh and Dr Nima Manjrekar cover a nice overview of bat biology and the species that one can see in India. Once you're done reading up the basics, you're ready to put that knowledge to test. The best places to start observing bats are colonies of flying foxes roosting on trees (there's definitely one in every city, town, village!), and large colonies of different species of bats in caves and forts. Once you have some basic understanding of bats, I strongly recommend that you look for volunteering opportunities and workshops. These are absolutely crucial in developing the skills necessary to scientifically study bats (for example, mist-netting, bat handling, taking measurements etc.) I have a detailed blog post called 'The Beginner's Guide to Bat-watching' (hosted on Conservation India) to help people get started with watching or studying bats.

To answer the first part of the question: anywhere in India! There is so little known about Indian bats that every place and every species is under studied. The flying foxes that fly over our houses every dusk? Why do they choose certain trees for roosting? Do they fly in the same direction in every season? What insectivorous bats are found in our own neighbourhoods? We don't have answers to all of these basic questions.

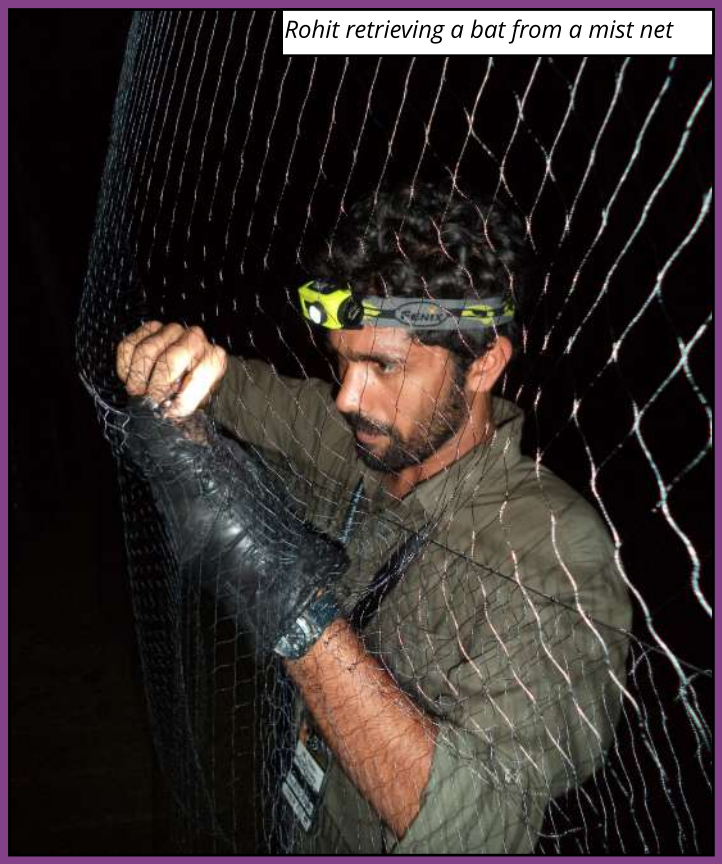
5. Can you describe the work that you do as a chiropterologist and what it involves?

Like I said earlier, I spend a pleasant summer catching and studying bats in the field in Uttarakhand. The rest of the year I sit in front of my laptop screen looking at my data and crib about numbers, statistics and the grey winter (doesn't help that bats also hibernate for four months in Berlin)! We all have a romantic idea about wildlife research from TV shows and documentaries but the unfortunate reality is that ecological research is as much about statistics as it is about biology and natural history. Spending most of the year in front of the computer is the norm for most of us.

However, I like to break the monotony of data analysis by engaging in public outreach. I like delivering presentations to the general public on bats. This lockdown and the false demonization of bats in the wake of COVID-19 have been very useful in helping me think of avenues and media for public education.

6. Why, in your opinion, is it important that more people take up careers in wildlife?

This is a great time to answer this question because we're in the middle of a pandemic of zoonotic origin. How did the pandemic start? Who can tell the answer? Politicians are busy passing around conspiracy theories about a certain country (that everyone likes to hate) or withdrawing funding to the global health



Rohit retrieving a bat from a mist net


(Chaerephon plicatus)


(Barbastella darjelingensis)

organization to push their political agenda. Doctors are busy saving lives. Engineers can't go on a vacation and fill up Instagram servers. This pandemic is an example that the world cannot be run solely by engineers, doctors, lawyers and politicians. Wildlife researchers are the ones capable of answering where the virus may have come from and how it may have got transmitted to humans. The information gathered by researchers can guide wildlife conservationists to help us prevent another such pandemic that has a footprint on every aspect of our lives.

7. Do you think it is easier to make a career in wildlife today than it was earlier? How do you think it can be enhanced even more in the future?

I do sound preachy at times but I'm very much from this generation. I haven't had the privilege of seeing the previous generation, so I'll answer your question based on what I've heard from my professors and colleagues. There certainly are more ways in which one can make a career in wildlife today. There are now many NGOs, institutes, government bodies and Corporate Social Responsibility (CSR) initiatives than earlier. However, competition has also proportionately increased.

The most important step that is needed to enhance career options in wildlife is that we need to assign a fair value to time. A lot of people (some of whom I have had the displeasure of interacting with) believe that one should do public outreach activities for free because it is for a 'noble cause'. Do you expect the same of a doctor, a lawyer or a politician? No, we pay them for what they do. Then why do we want wildlife conservationists or educators to work for free? If this attitude continues we will end up creating a society where everyone works as an engineer or a doctor and does voluntary service for nature conservation – a setup that hugely compromises on quality. Nature education is a field that is in dire need of employment opportunities. We need to employ full-time nature educators because more nature awareness can really change how the public perceives environmental problems, and more importantly, help people vote for politicians who prioritise nature conservation.

8. For those students who may be interested in going into the same line of study do you have any suggestions or advice?

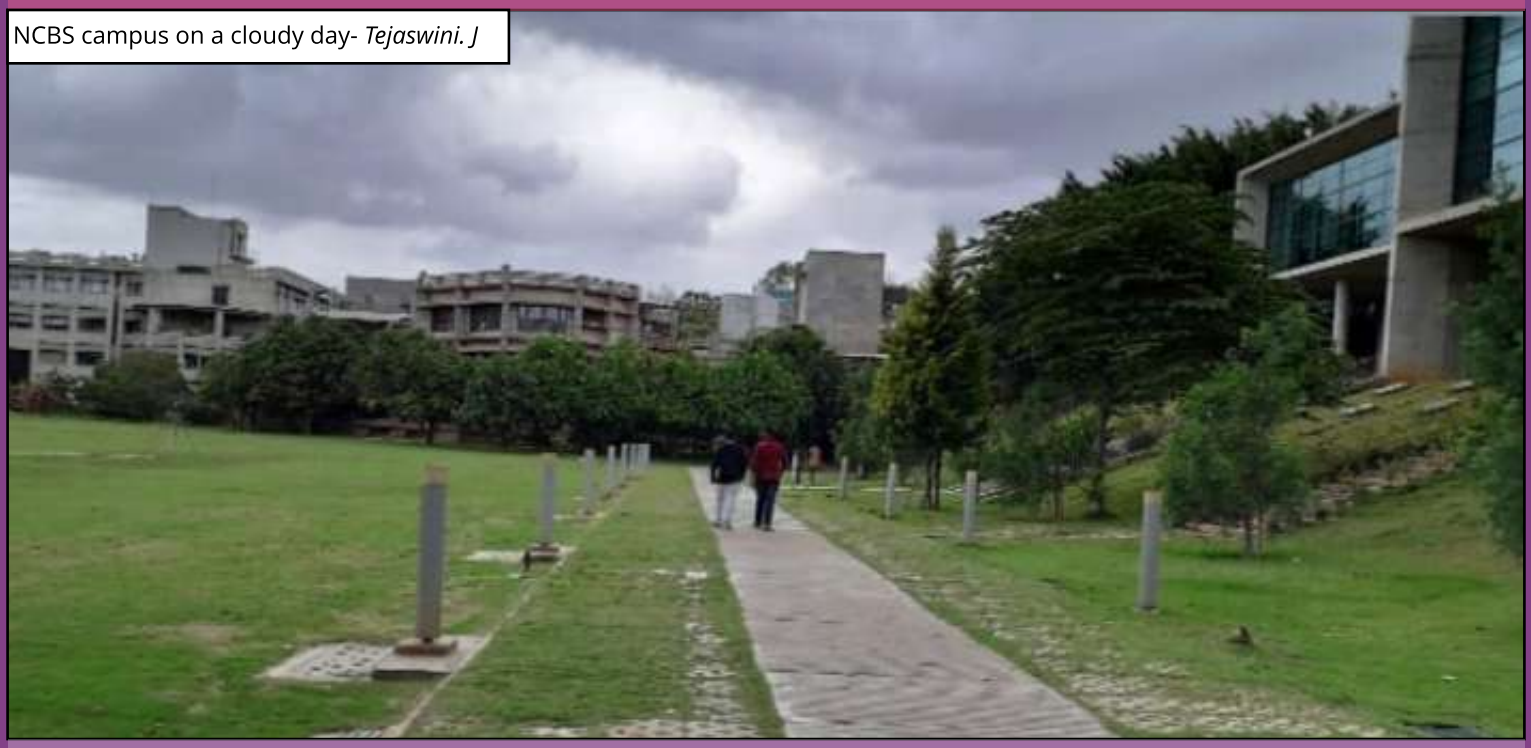
There is absolutely no substitute for good natural history skills if you want to study wildlife. Natural history is a dying skill in today's world. I see a lot of people overusing statistics to understand biology. In the scientific framework, this may be perfectly acceptable, but often, the interpretations of their data make no sense considering the natural history of their study species. You have to spend adequate time observing and understanding the basic behaviour of your study species. You cannot just wake up one day saying that you want to study how electricity transmission lines affect flying foxes without ever having watched flying foxes.

9. What do you think is required for a person, apart from passion, to pursue a career in wildlife?

There are multiple ways to make a career in wildlife. You can work in conservation, in outreach and education or in research. Irrespective of the path you take, you need a vast skill set. Language skills, writing skills (in multiple languages), talent in music or acting, graphic designing or just a lot of practical knowledge on particular groups of animals or plants – these are all skills that you can use to make a fruitful career in wildlife research or conservation. Language skills allow you to interact with local communities. Writing skills help you write effective conservation stories to mobilise public attitude towards nature conservation. All your other talents can come in handy in the least imaginable ways: you can help compose a song on wildlife conservation as a musician, you can help design attractive and informative outreach material as a graphic designer, and you can make awareness videos if you know video editing! There is another thing that you need; it's the bitter truth. Sufficient bank balance. Being employed is a constant struggle in all careers in wildlife and one must be able to sustain themselves through brief or prolonged periods of unemployment. I don't mean to discourage you, but I just want to help you plan your lives in such a way that your passion allows for smooth sailing.

All photos in this article were obtained from Rohit Chakravarthy and all copyrights remain with him.

NATIONAL CENTRE FOR BIOLOGICAL SCIENCES (NCBS)



NCBS campus on a cloudy day- *Tejaswini. J*

NCBS is a beautiful campus and is also among the best places to pursue a career in wildlife research. ***Nanditha Ram*** *briefly introduces us to the institution, its scope of research, eligibility criteria and how to apply for admission.*

NATIONAL CENTRE FOR BIOLOGICAL SCIENCES (NCBS)

Location- Bangalore, Karnataka

Established in- 1992

NCBS is a research institute whose area of research revolves around the field of biology - from molecular biology, to systems biology. The centre is a component of the Tata Institute of Fundamental Research (TIFR), which falls under the Government of India's Department of Atomic Energy.

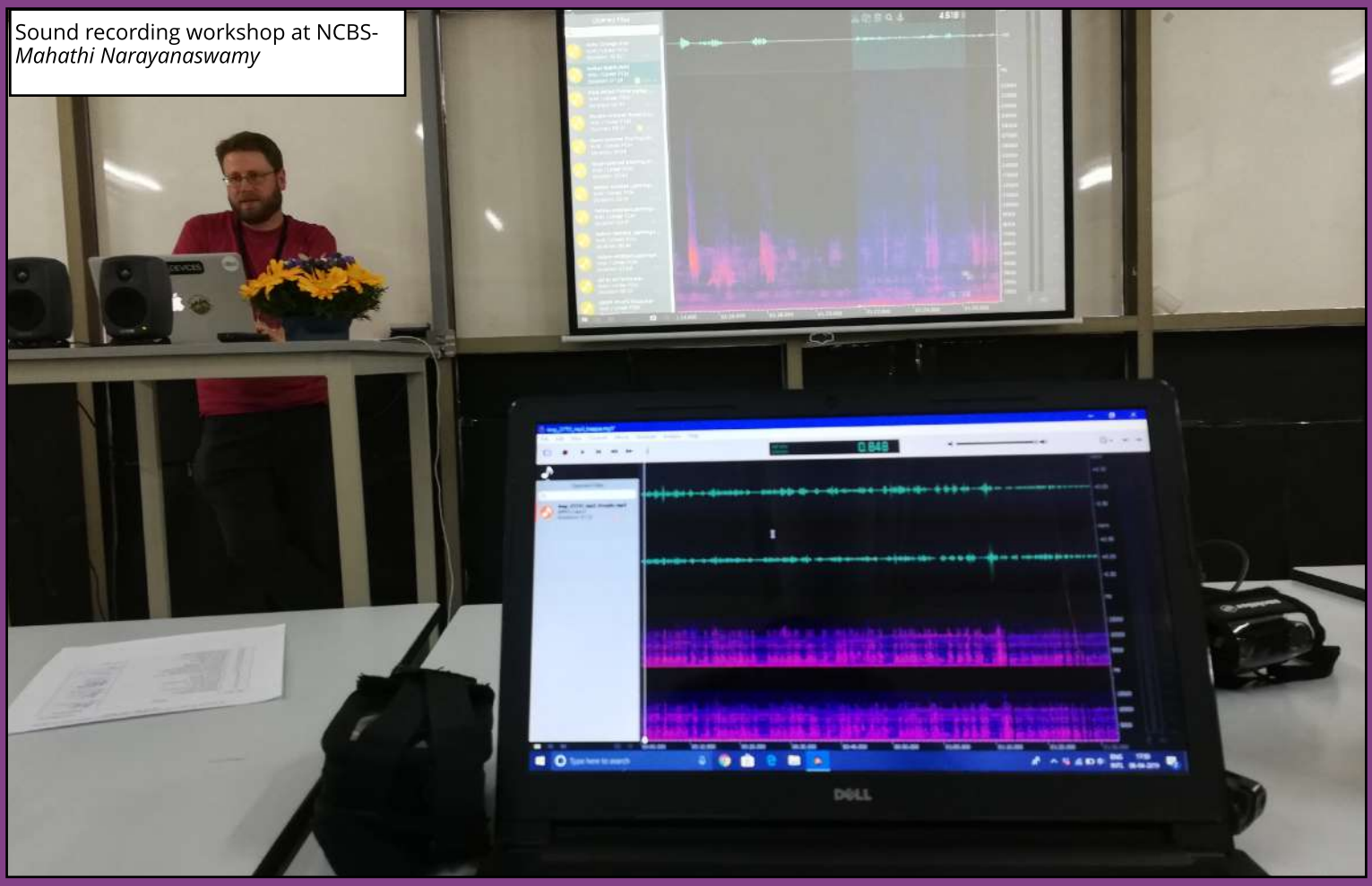
Courses they offer- Masters, PhD and Postdoctoral courses revolving around the field of Biology

What do they do?

The research institution established in 1992, has been involved in research in the domains of biochemistry, biophysics, bioinformatics, neurobiology, genetics and development, ecology, and evolution. The institute has been a centre for education, offering a Master's degree in Wildlife Biology and Conservation every alternate year for students all over the globe. A multitude of PhD, integrated PhD and Postdoctoral programmes, taught and guided by award-winning and reputed faculty, are available for further studies in specific areas of research. Various workshops and internships are hosted for students and individuals who are passionate about and are interested in biological sciences.

Organisations and Associations

NCBS runs a science society by the name of IndiaBioScience, which aims to highlight the life sciences sector in India and evolves to keep pace with a growing world and an ever-changing society. This non-profit organisation is a meeting-ground for educators, researchers and policy-makers who come together and hold mentorship programmes, career development programmes



Sound recording workshop at NCBS- *Mahathi Narayanaswamy*

various other activities that entice the youth to dive into the limitless world of science.

Collaborating with the Simons Foundation, NCBS is home to the Simons Centre for the Study of Living Machines. Working at all levels- molecular, cellular, and organismal, the foundation fosters research and development by viewing each of the aforementioned levels as living machines.

How to get in?

The eligibility criteria for admission into postgraduate or PhD courses are quite flexible and they do not require the applicant to have a background in the concerned field.

The applicants have to write the TIFR Nationwide Entrance Exam, also known as the Joint Graduate Entrance Examination for Biology and Interdisciplinary Life Sciences (JGEEBILS). The admission procedure calls for the JGEEBILS exam score followed by the submission of the applicant's CV, recommendation letters and scientific articles or write-ups. Shortlisted applicants will then be called for an on-campus interview.

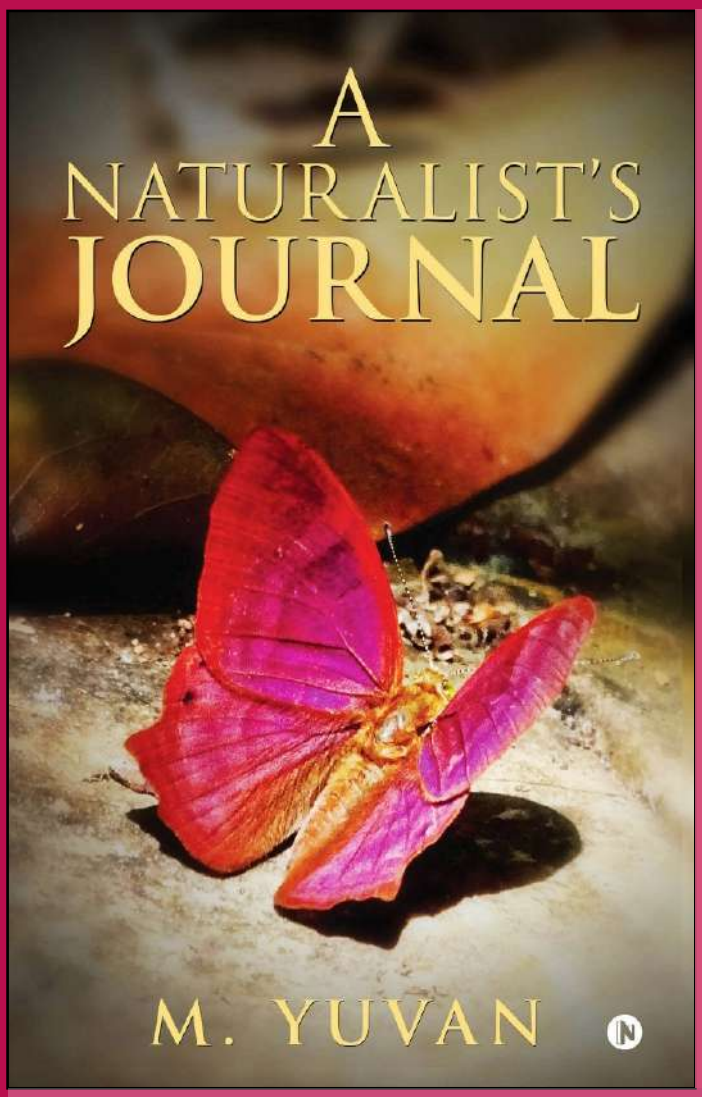
The M.Sc. Wildlife Biology and Conservation course requires a separate written exam that tests the applicants based on General Knowledge, Aptitude, English Language and Communication Skills, knowledge on basic biology, ecology and conservation issues.

NCBS and Wildlife Sciences

The institution is involved in and is a vital part of many portals and citizen science databases. The widely used India Biodiversity Atlas, is supported and run in the interest of bringing together all nature lovers ranging from scientists and naturalists to citizens and photographers who love wildlife. They organise Biodiversity Marathons where people who are passionate about the environment can meet and be led by specialists on nature walks. In India, a major portion of the taxonomy based groundwork and examination is conducted here, rendering them one of the pioneers in the field.

Visit ncbs.res.in for further details on the institution.

Nanditha Ram is a 2nd year Chemical Engineering student at SSN.



BOOK REVIEW:

A NATURALIST'S JOURNAL

A Naturalist's Journal

Author- M. Yuvan

M. Yuvan is a passionate naturalist and nature writer. He was awarded the M. Krishnan Nature Writing Award by the Madras Naturalists' Society for his essay 'Bel Plants and Lime Caterpillars'. His instagram account is a great source of information for several naturalists. He is also a skilled record player who has won accolades for his performances from the Trinity College of Music, London.

Release- November 2017

Genre- Non-fiction, Nature

Age Group- 12+

Pages- 221

The book "A Naturalist's Journal" is a fantastic compilation of anecdotes by the author on his observations of wildlife. Here's a book review by ***Sathya Priya*** *on the book, consisting of her thoughts and interpretations of the book.*

Summary-

A Naturalist's Journal is a refreshing assortment of anecdotes of the author's experiences which embrace the invigorating beauty of nature. The book drives the reader to ponder over essential questions, like what it means to co-exist in such a vast world.

The author talks about his experience with tabooed animals like snakes, and it definitely is an exhilarating read. He also covers the metaphysical aspect of nature in one of the chapters. The peep into the subtle behaviour of birds that he gives us is narrated brilliantly in some of the chapters.

The book emphasises on the need to look at all life, as people of their own- as beings in a process of learning as life slips by. The politics behind habitat destruction in the name of development is also highlighted in a chapter.

Evaluation of Content- The book is a mesmerizing read and provides excellent visual imagery. Without making readers guilty for not noticing the intricate lives around them, it softly nudges us humans to think beyond the confines of human-centric consciousness into realizing and exploring the vast forms of life that surround us.

The entire book is ethereally beautiful and the way the words are played with, produce a perceptive temporality in the chapters. The poetry in the book is impressive.

Opinions and Recommendation-

“Believing without belonging” is a seemingly simple yet apt phrase that expresses the psyche of most people in our times. It has become quite normal to believe in particular stances often along or against the direction of mainstream viewpoints, in various degrees and yet not get a sense of belonging to them. A possible consequence of late modernity. From the very beginning, as early as the author’s note on walking, the reading experience is intense.

For relatively fresh and flexible minds it can bring about a change in perspective in internalizing the natural world- a process that even public policies cannot bring about. While nature writing has become a doleful act of archiving amidst the mass extinctions we are living through, this book is about hope as an act of defiance.

Furthermore, the experiences compiled by the author help the reader create an unbiased viewpoint. The author's role as an educator makes these experiences more significant, as knowledge produced is disseminated then and there to learners who further propagate knowledge. The author makes the learning process stronger by integrating nature as a primary educator. This book is for every inquisitive soul that wants to enhance their knowledge about nature. The vast worlds that live, co-exist, predate and yet, don’t exploit the spaces that we inhabit can possibly reshape us with a sense of responsibility and ethical accountability. Most readers would feel similar deep-seated impressions upon reading this book.

Sathya Priya is a 3rd year Masters student in Humanities at IIT Madras.

Kurunji flowers- *Vikas Madhav Nagarajan*

BOOK REVIEW:

THE RACE TO SAVE THE LORD GOD BIRD

The Race to Save the Lord God Bird

Author- Phillip Hoose

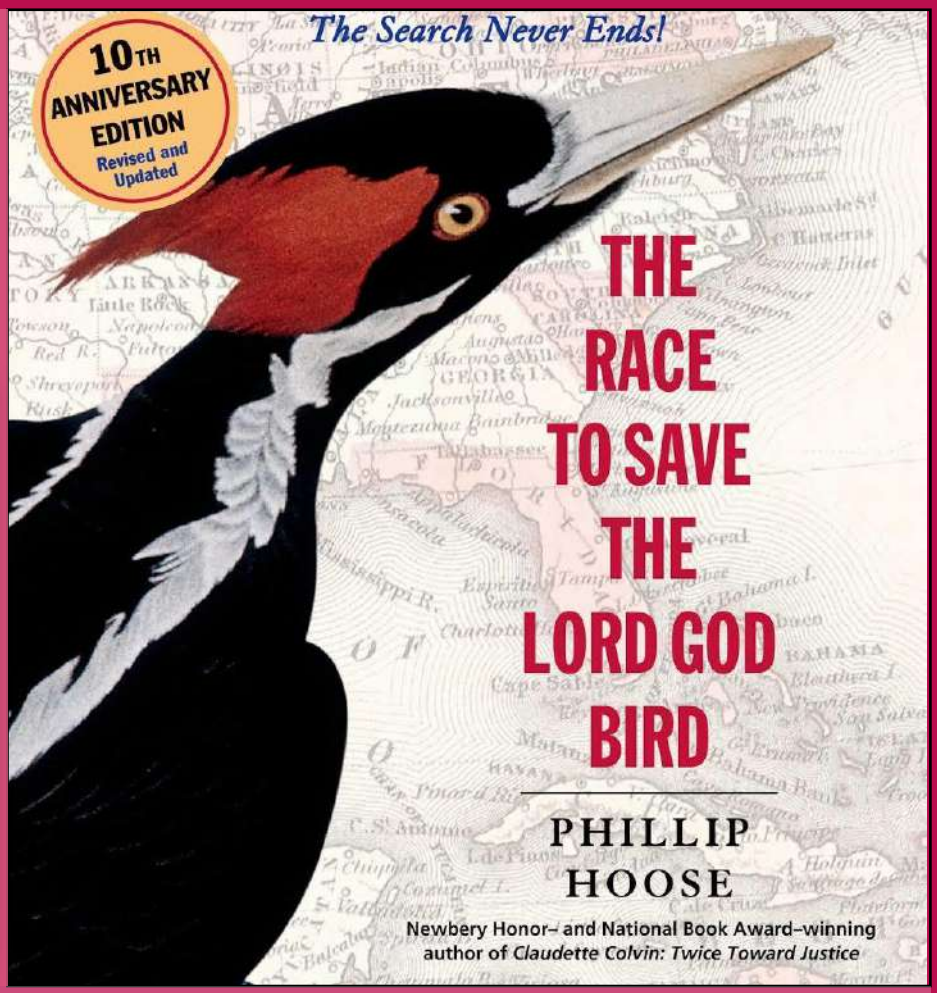
Phillip M. Hoose is an American writer with 11 published works to date. Five of his works have received several notable awards and this particular book has won 15 awards including the Boston Globe.

Release- January 2004

Genre- Non-fiction, Children

Age Group- 12 to 18

Pages- 223



*Today, we are driving an era of the fastest mass extinctions and there are several conservationists and environmentalists trying to prevent these from happening. Here's a book review by **Shivani Manivannan** on the book "The Race to Save the Lord God Bird", that talks about the extinction of the Ivory-billed Woodpecker and the efforts that were taken in an attempt to save the bird.*

Summary: The book "The Race to Save the Lord God Bird" revolves around the story of the Ivory-billed Woodpecker (*Campephilus principalis*), which was the largest woodpecker in North America until it went extinct in the 1950s. It was said to have been such a magnificent bird, that people called it the Lord God Bird in awe.

The book gives an insight into how habitat destruction, driven by the Plume Wars and World War II led to the woodpecker's extinction. It also highlights the exhaustive actions taken by various conservation groups to prevent its extinction, which was possibly the very first such effort made to protect the species. It also talks about the birth of the Audubon Society during this period and briefly touches upon the history of Ornithology and Conservation in the United States.

The book talks about the ornithologist James Tanner and his efforts as a graduate student at the Cornell Lab of Ornithology to track, tag, record and photograph these birds for the first time. Today, the only known photographs of the species are those taken by Tanner.

Evaluation of Content: The book has been written in a way that is easy to read and understand, which despite the sad extinction of the woodpecker, makes the book very enjoyable. It also subtly emphasises that the urgency does not end with the Ivory-billed Woodpecker and that hopefully, the readers will step up to try and save what remains of our biological heritage today.

Opinions and Recommendation: I personally would recommend secondary school students like me to read the book and appreciate it as a story, while also recognising the importance of preventing this from repeating in the future. It definitely is a book that they will be able to understand and enjoy.

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

THE KNOW-HOW OF MOTH WATCHING

A white cloth (Veshti) being used as a moth screen, with quite a few moths on it- sourced from *M. Yuvan*

Moths play very important roles in the economy- they are very important pollinators, despite many of them being major agricultural pests. Sericulture, one of Asia's fastest growing Agro-based industries, is done by rearing silkworms (moth caterpillars) to obtain the silk that they weave to produce their cocoons. Apart from their economic significance, they also play a vital role in the ecosystem. Their colours, markings and behaviour are fascinating to observe. They are also the amongst the few creatures that require limited amount of effort to observe, as you can bring them to your houses instead of having to have to go out and search for them in their habitats. ***Rohith Srinivasan*** *introduces us to how one can watch moths.*

WHY ARE MOTHS ATTRACTED TO LIGHT??

The "Transverse Orientation" theory attempts to explain why moths are attracted to light.

Theory of Transverse Orientation

Moths navigate the world by traveling towards a distant light source such as a star or the moon. Bulbs act as artificial stars and moons, confusing moths. As moths orient themselves towards a distant source, closer ones can disorient and dazzle them for a while.

What are Moths?

Moths and butterflies are insects that form the Order Lepidoptera (scaly winged). Moths are elusive insects which are extremely diverse, and very little is known about their habitat and ecology. They're known as the 'Butterflies of the Night' and yet live in the shadows of their diurnal cousins. Their colours and patterns are either dazzling or cryptic, to aid in camouflage. They vary in size, from being as small as a pinhead, to as large as an adult human's face.

Are Moths only Nocturnal?

Most moths are nocturnal, but some, like butterflies, fly during the day. If you look very carefully, you may be able to spot nocturnal moths camouflaged on trees, amongst leaves and in other locations.

Where can one find Moths?

Moths are numerous and widespread, depending on the distribution of their host plants. The Western Ghats and Northeastern hills of India are some of the best moth watching sites in India, due to the vast diversity of plants present there. However, moths are not exclusive to forests and occur in gardens, agricultural lands, urban parks and even in the busiest cities.

Are Moths dangerous?

Adult moths are harmless to touch as they do not sting/bite, nor are they known to be vectors for any diseases.

(*Hippotion cf. boerhaviae*) from Adyar Poonga- *Vikas Madhav*

(Spirama cf. retorta) from Adyar Poonga- *Rohith Srinivasan*

How can one observe Moths?

There are several ways of indulging in moth watching. One, quite obviously would be to go and look for moths in the field. However, this is not effective due to moths being predominantly nocturnal and very well camouflaged.

The two most effective means of observing them are: Light baiting and sugaring.

How is light baiting done?

A light sheet or a white cloth is hung with a light source. Mercury Vapour (MV) bulbs or black light bulbs are the most effective, as they produce ultraviolet radiation, which moths are attracted to. However, any light source works. Ideally the set up should face some vegetation.

How is Sugaring done?

Fruit, sugar and alcohol baits can also be used for attracting moths, especially those like the Fruit Piercing moth. These baits can be prepared by mixing fermented fruit with sugar or alcohol and brushing it on any surface.

What is the best time for moths?

Moths typically begin to appear at dusk, and will keep coming to the light sheet or bait till dawn. The best nights for moth watching appear to be new moon nights due to lower light pollution. Moths are seasonal, with different species occurring in different seasons, however a warm climate is required and typically most moths go into diapause during winter months. In most parts of India, the period from the start of July until January is ideal for moths. Clear nights with medium temperatures are most ideal.

What are the precautions that should be taken during moth watching?

There are couple of things that one should be aware of and take precautions against before baiting moths:

- For light baiting, read up to find out what bulbs are most effective for attracting moths and check that the amount of UV radiation emitted by the bulb is safe for your eyes and skin.
- While setting up light baits (especially with MV bulbs) ensure that the bulb is not in contact with the sheet.
- Baiting moths will surely attract a variety of other insects such as bees, dragonflies and beetles too, so it is important for you to be aware of this before you start. Ensure that the screen is at a fair distance (at least 4-5 metres) from anywhere people are sleeping.

Cyana sp. from Sathyamangalam- *Vikas Madhav*

Utetheisa sp. from IIT Madras- *Vikas Madhav*

(*Eudocima materna*) from IIT Madras- *Mahathi Narayanaswamy*

How does one identify Moths?

Identification is the most challenging part of moth studies. The families of most moths can easily be identified based on size. Large moths mostly belong to the families Brahmaeidae, Saturniidae and Eupterotidae. Medium-sized moths belong to the families Sphingidae, Geometridae, Erebidae, Noctuidae, and Uraniidae. Small moths belong to the families Nollidae, Crambidae and Pyralidae. Patterns and colours on the upper side and underside of both wings are important identification characters. Eupterotidae, Lasiocampidae and Uraniidae families are brightly coloured. Sphingidae, Geometridae, Noctuidae and Erebidae families are cryptically coloured. Crambids are distinctively shiny and intricately patterned. These are a few tips to identify moths. It is important to photograph key features of the head, wings, body and posture to further help in identification. However, these markers often tend to be insufficient to identify moths, resulting in the need to carefully analyze their genitalia. Additionally, there seems to be a shortage of data on several moth groups.

Some resources that one can use to identify moths are Afro Moths, Bold Systems, Moths of India, Moths of Borneo and the citizen science databases, iNaturalist and India Biodiversity Portal.

Rohith Srinivasan is completing his 12th standard at Abacus Montessori School.

National Moth Week 2020

Dates: 18th-26th July 2020

*Participate in **NMW 2020** by contributing your observations of moths to Citizen Science Portals like: **Moths of India, India Biodiversity Portal and iNaturalist.***

*To know more visit **nationalmothweek.org***

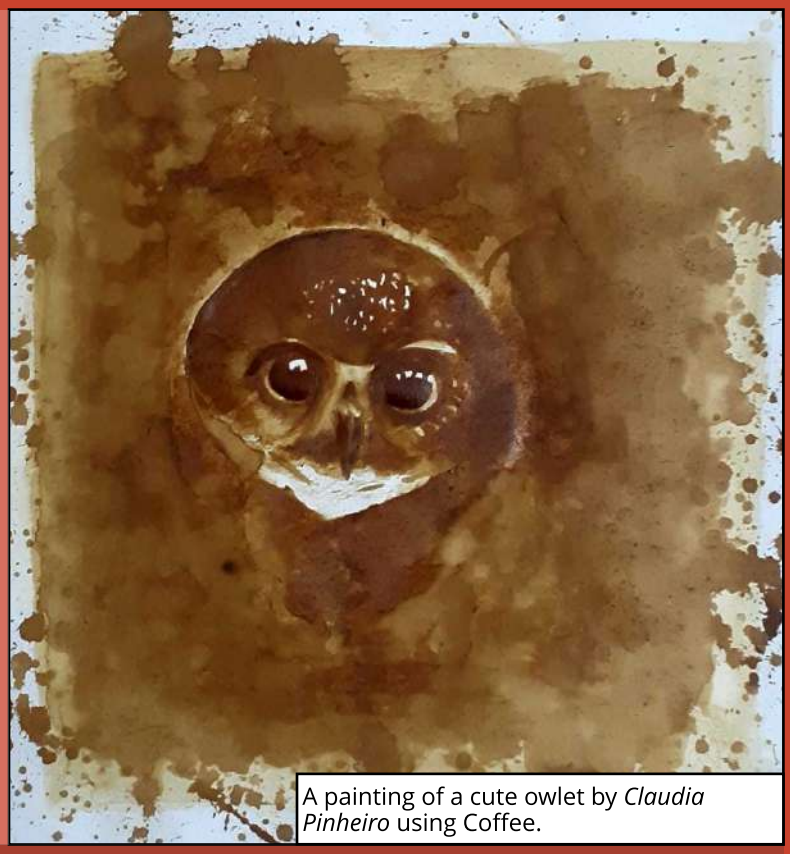
*Arctonis sp.*from Tinsukia- *Vikas Madhav*

(Enispa elataria) from IIT Madras- *Mahathi Narayanaswamy*

(Dichromia sagitta) from Adyar Poonga- *Vikas Madhav*

Circula sp. from Nagercoil- *Rohith Srinivasan*

COFFEE PAINTING



A painting of a cute owlet by *Claudia Pinheiro* using Coffee.

Most materials used in creating art that we are familiar with today, extensively use highly polluting materials such as paints made of various chemicals or materials made of plastic. Art however, is not limited to such forms. ***Nikkitha Terasa*** *introduces us to a new form of paints, using coffee- environmentally friendly, aromatic and beautiful.*

MATERIALS REQUIRED

1. *Coffee powder*
2. *Water*
3. *Paintbrushes*
4. *Palette*
5. *Drawing sheets*

A painting of a bird by *Kavya. G. V.* using Coffee

Method:

1. Before painting, ensure that you pencil-sketch the drawing of your choice subtly on the drawing sheet.
2. For the main ingredient, mix the coffee powder with water. I suggest you make two shades- a light and a dark shade.
3. To make the light shade, add a smidge of coffee and double the amount of water, in a 1:2 ratio. For the dark shade, add coffee powder and water in a 2:1 ratio. You can blend the two shades to get an intermediate colour. (Experiment with different amounts of coffee and water to try and see what different hues you can make)
4. Apply the lighter shade such that it covers the entire drawing sheet.
5. Now start painting with the darker shade to give your drawing an outline, and accentuate the details.
6. Using a thin brush while painting with the darker shade helps achieve precision.
7. Let your creativity run wild, try experimenting with different shades and patterns. You can use coffee powder to produce a wide range of colours, from a light ochre to a very dark brown.

You are now good to go! These monochromatic paintings splendidly complement your wall, giving it an antique touch. Not only does it look beautiful, the painting gives off a strong aroma of coffee too!

A painting of Mangaljodi Wetlands by *Tanmay Jain* using Coffee

COMIC STRIP

Enjoy this Comic Strip by ***Mahathi Narayanaswamy***

Mahathi Narayanaswamy is completing her 12th grade at NIOS

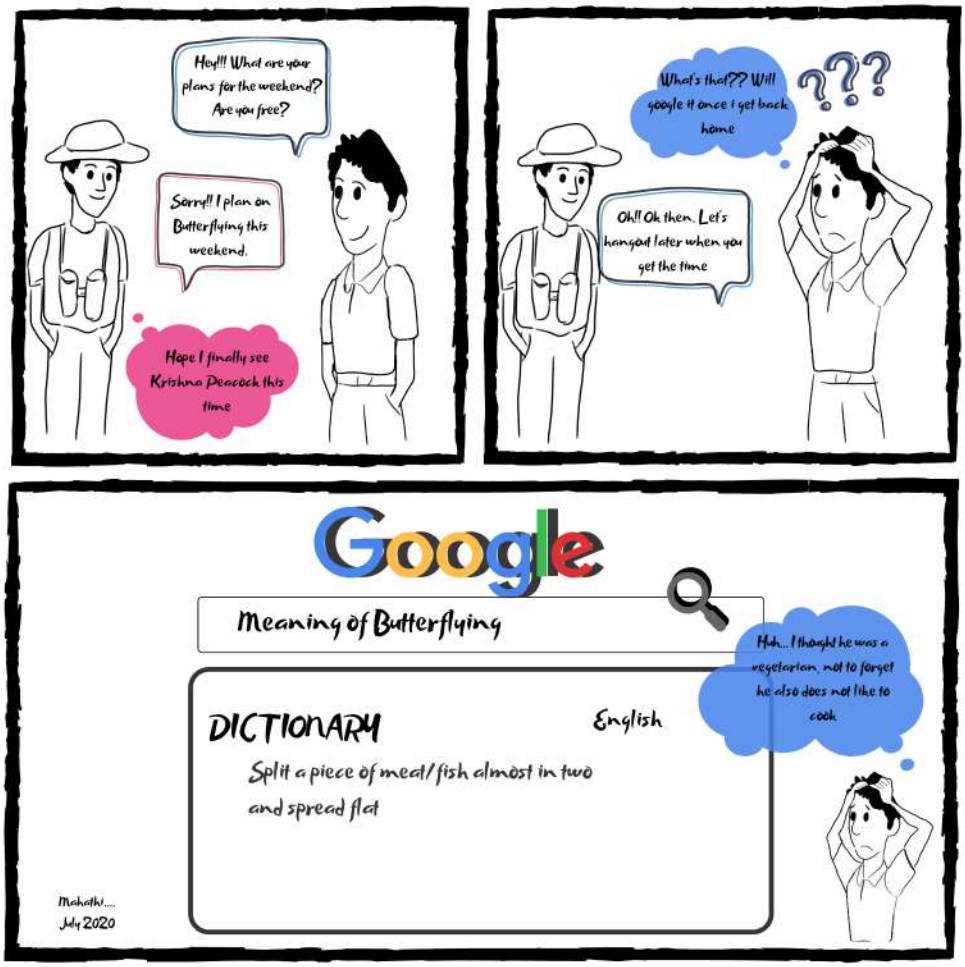


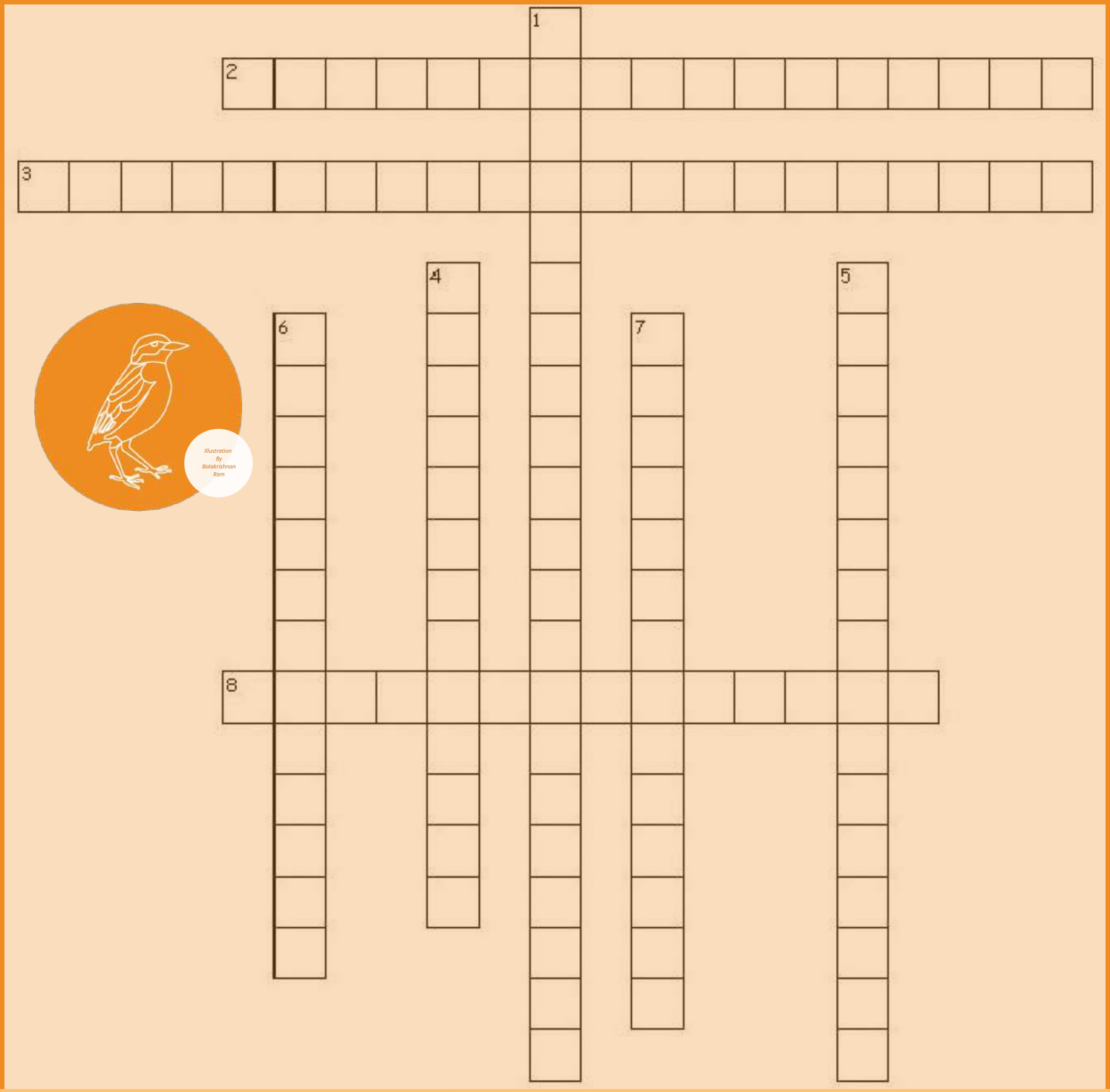
Photo- *Melvin Jaison*

WHO AM I???

Identify this species using the clues given by ***Shivani Manivannan****. (Answer in last page)*

1. I have a brown body, white throat, red bill, and bright blue wings and tail.
2. My nest is a tunnel in a mud wall.
3. The front of the Japanese Bullet train is designed to mimic the structure of my beak which is aerodynamically very efficient, allowing me to dive fast, while producing minimum splash.
4. I close my eyes when I dive into the water, so I have to accurately judge the depth of the fish before I dive.
5. Apart from fish, I also eat lizards, snakes, small birds and insects.
6. I am not only seen near waterbodies, but also on wires and poles along roads and railway tracks.

Shivani Manivannan is an 8th grade student at P S Senior Secondary School.



CROSSWORD ON BIRDS OF INDIA

Explore your knowledge on Indian Birds through this Crossword by ***Melvin Jaison****. 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- 2. The newest addition to India's shorebirds. It was first seen in Pulicat in 2017.

3. My death ignited a fire in the heart of the boy who became the "Birdman of India".

8. An endemic nocturnal bird last seen in 2009.

Down- 1. Most recently discovered Indian bird, named after Salim

4. India's largest cuckoo, that builds its own nest.

5. A rare winter visitor which is mistaken for a feral pigeon.

6. Lives in coastal forests that grow in saline water and is closely related to Navrang.

7. An endemic bird named after a tribe in NE India.

Melvin Jaison is a 1st year MBBS student at Chengalpattu Medical College

Photo- *Mahathi Narayanaswamy*

I SPY

Most forms of wildlife utilise defence techniques against their predators. One such defense technique is camouflage, which makes it harder for predators to spot them. Can you spot the creature in the adjacent image? Easy to find, assuming you know what you are looking for!! Nevertheless, give it a go!!! (Answers on last page)

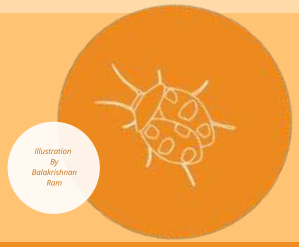


Illustration By Balakrishnan Ram

WILDLIFE WORD SEARCH

*Have fun with this word search on wildlife by **Kavya G. V**. 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)*

INDIRECT CLUES

1. Kaziranga National Park is famous for the ____
2. The largest coral reef is _____
3. _____ is also called Sea Cow.
4. The scientific name of Mango is ____
5. Birdman of India is _____
6. Common name of *Electrophorus electricus.*
7. The Giant Pacific _____ has three hearts, and nine brains.
8. The famous islands extensively studied by Charles Darwin are the ____
9. The collective noun for a group of crows is ____
10. The turtle majorly found in Gahirmatha in Odisha is the _____
11. The native continent of Giraffes
12. Baby swans are called _____
13. The only type of bird that can fly backwards is ____
14. The mammal with the best memory is the _____
15. The bird that migrates from the North Pole to the South Pole and back is ____
16. The Bhindawas Bird Sanctuary (BBS) is located in _____
17. The Dibang Valley is famous for being the highest place in India to spot ____
18. A bird which lays only one egg every two years is the _____
19. A fish that can taste with its whole body
20. The bird that can turn its head 180° around to look backwards is the ____
21. _____ flies are known to feed on blood and the females can bite.
22. Niko Tinbergen's studies on the early development of ethology as an example of a fixed action pattern were conducted on this fish
23. Asiatic ____ are the specialty of Gir.
24. _____ are among a few reptiles to have the longest lifespans

DIRECT CLUES

1. Eagle
2. Sparrow
3. Jellyfish
4. Lizard
5. Pelican
6. Elephant
7. Lizard
8. Wasp
9. Crotalaria
10. Cheetah
11. Environment
12. Dodo
13. Earthworm
14. Blue Whale
15. Emperor penguin
16. Giraffe

Kavya. G. V. is a 1st year Mechanical Engineering student in SRM EEC

O	L	I	V	E	R	I	D	L	E	Y	D	G	S	T	I	C	K	L	E	B	A	C	K	H
S	A	Q	F	L	I	Z	A	R	D	J	G	L	Y	J	I	K	B	G	H	E	D	F	G	G
S	D	F	H	J	K	A	R	T	I	C	T	E	R	N	U	J	S	D	B	M	S	C	F	A
P	S	D	F	L	A	X	G	C	R	O	T	A	L	A	R	I	A	D	F	P	C	A	J	L
A	E	N	V	I	R	O	N	M	E	N	T	F	G	H	J	M	U	R	D	E	R	T	K	A
R	G	S	I	O	H	D	C	Y	G	N	E	T	S	A	S	A	N	B	M	R	G	F	S	P
R	H	W	O	N	I	N	G	T	H	K	J	L	F	G	D	N	D	F	B	O	H	I	C	A
O	J	E	P	S	N	J	H	F	O	F	H	E	F	G	H	G	G	H	N	R	N	S	X	G
W	K	U	D	D	O	D	O	G	S	P	L	S	D	S	J	I	F	B	W	P	N	H	W	O
A	L	T	S	S	C	G	N	S	G	E	U	G	I	R	A	F	F	E	D	E	H	F	Q	S
B	Z	H	E	C	E	A	A	S	C	D	F	S	G	E	R	E	F	G	S	N	U	S	Y	I
C	T	H	E	G	R	E	A	T	B	A	R	R	I	E	R	R	E	E	F	G	M	D	T	S
D	F	C	V	B	O	R	R	D	G	H	D	T	K	D	V	A	H	A	S	U	M	O	H	L
E	R	T	Y	U	S	I	G	H	T	I	G	E	R	G	H	I	J	R	D	I	I	L	K	A
F	G	H	J	K	C	S	D	F	G	H	D	G	D	L	F	N	B	T	X	N	N	P	O	N
D	V	F	J	E	L	L	Y	F	I	S	H	H	N	I	B	D	E	H	Z	H	G	H	P	D
U	C	V	E	F	V	B	D	F	A	F	G	H	S	Z	D	I	X	W	M	J	B	I	S	G
G	G	L	F	V	P	E	L	I	C	A	N	B	N	A	A	C	N	O	H	G	I	N	A	H
O	J	F	V	B	B	S	G	S	I	V	B	B	M	R	C	A	L	R	I	D	R	D	Z	N
N	D	V	B	X	V	B	H	O	R	S	E	S	D	D	F	H	J	M	D	U	D	D	V	S
G	H	X	W	A	S	P	F	B	F	R	H	G	H	V	M	H	J	T	H	F	G	H	B	S
S	D	F	G	H	D	G	X	S	A	L	I	M	A	L	I	B	K	G	D	E	A	G	L	E
H	J	D	T	W	Y	D	E	J	H	D	A	N	A	Y	R	A	H	G	S	R	S	G	R	W
T	O	R	T	O	I	S	E	H	N	J	D	G	E	H	C	H	E	E	T	A	H	H	J	K
B	H	D	B	L	U	E	W	H	A	L	E	B	C	D	X	T	N	A	H	P	E	L	E	H

ANSWERS

- **Who am I???**

White-throated Kingfisher *(Halcyon smyrenensis)*

- **Crossword on Birds of India**
- (Hyphens and spaces not include in crossword)

1. Himalayan Forest Thrush *(Zoothera salimalii)*
2. Grey-tailed Tattler *(Tringa brevipes)*
3. Yellow-throated Sparrow *(Gymnoris xanthocollis)*
4. Greater Coucal *(Centropus sinensis)*
5. Yellow-eyed Pigeon *(Columba eversmanni)*
6. Mangrove Pitta *(Pitta megarhyncha)*
7. Bugun Liocichla *(Liocichla bugunorum)*
8. Jerdon's Courser *(Rhinoptilus bitorquatus)*

- **I Spy**

Stick Insect- adjacent picture shows its location.

- **Wildlife Word Search** (only the answers to the Unseen Clues -find the words yourself)

1. Rhinoceros
2. The Great Barrier Reef
3. Dugong
4. *Mangifera indica*
5. Salim Ali
6. Electric Eel
7. Octopus
8. Galapagos Islands
9. Murder
10. Olive Ridley
11. Africa
12. Cygnets
13. Hummingbird
14. Dolphin
15. Arctic tern
16. Haryana
17. Tiger
18. Albatross
19. Catfish
20. Owl
21. Horse
22. Stickleback
23. Lions
24. Tortoise

Readers Forum

We would love to hear your thoughts, suggestions and feedback on ***Nature Trail****.*

Please send us your thoughts/ suggestions/ feedback to ***ynn.chennai@gmail.com***

Alternatively, you can use the forms on our website, ***ynnchennai.weebly.com*** *to submit the same.*