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# NATURA ZOOLOGIA

THE OFFICIAL NEWSLETTER OF NATURAL  
SCIENCE ASSOCIATION  
ST. JOSEPH'S COLLEGE (AUTONOMOUS)  
BENGALURU



Photo by Rakesh Prasad  
North Bengal





# CONTENTS

3

## ***Editorial***

Manjari Prasad

4

## ***Alumni Corner***

Manidip Mandal

5

## ***Species of the Month***

Elephants

6

## ***Expert Corner***

Noel Foning

8

## ***Events of the Month***

Zoophite 2021

11

## ***Scientific Article***

Alternate Cropping Strategies to minimize HEC

14

## ***Inputs from Josephites***

Dissertation, Creative corner, Insect photography, Drawing corner

23

## ***Student***

***Achievement***

24

## ***What's new in***

***Zoology?***

26

## ***Fun with***

***Crossword***

# Editorial



*Fasten your seat belts! We are going on a tour of all the activities NSA held in the month of April. 3... 2... 1... go!*

*All the readers are heartily welcomed to look back at the journey of the Natural Science Association. I, Manjari Prasad (20CBZ71), will be your tour guide through this excursion.*

*Firstly, I would like to take this opportunity to thank Dr. M Jayashankar sir for his guidance, for providing a platform that enabled us to expand and share our knowledge about anything related to zoology.*

*Natural Science Association has been one of the oldest associations of St. Joseph's College (Autonomous), Bengaluru. Despite the pandemic, NSA never let down its charm, we were able to conduct several Webinars, Student- Alumni talks and competitions that kept our peers engaged and entertained making NSA one of the most prestigious and active associations of the college.*

*One of the most important things I learnt from this esteemed association is to make the best of what I have. The pandemic had taken a toll on all of us. Yet, everyone in the team organized events, webinars and competitions that kept the students connected and provided a platform to learn more than just academics.*

*A lot of resource persons were invited who gave us an insight into their work. It was an eye-opener for all of us. I personally made a lot of friends and connections through these activities. It was a incredible experience for all the members of NSA, an experience we will cherish.*



# Chief Editor



**Dr. M Jayashankar**  
**Associate Editor**



**Kishan Nag M P**



# Alumni Corner



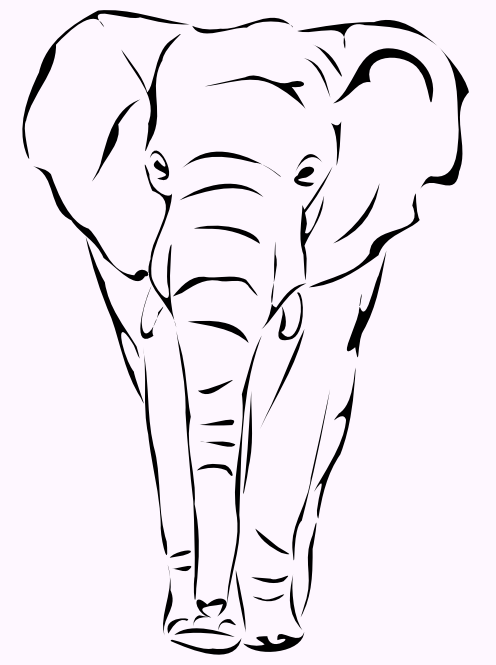
Manidip Mandal  
13CBZ3014 (2013-16)

When I joined St. Joseph's College in 2013, I was aspiring to become a biologist. However, I was still clueless about what I actually wanted to do in the field of biology. This is when I came across the Natural Science Association led by the Dept. of Zoology. During my first year, we used to discuss research papers on ecology and went on several field trips like birding at Lalbagh and watching blackbucks at Jayamangali which was fun and engaging. There was so much to learn by interacting with my teachers from the Zoology Dept. and friends in the association. NSA helped me figure out where my interests lied, to follow them and always played a crucial role in driving me towards research in natural sciences. During my first year, I developed an interest towards insects and particularly butterflies. My senior Nitin Achari who was also an NSA member, helped me understand various interesting aspects of butterfly biology.

NSA also provided me with a platform to share my knowledge and an opportunity to lead the association. I had the wonderful opportunity to be the vice president and president of NSA during my 2nd and 3rd year of college. We had conducted several competitions in college fests and organized a fest ourselves. NSA also actively engaged students from different backgrounds to develop interest in natural sciences and conservation of flora and fauna. NSA has always been open-minded and scientifically engaging. I believe it's these qualities that have inspired a lot of my seniors, batchmates and juniors from NSA to pursue successful careers in natural sciences.

I am presently pursuing a career in academia, studying the evolution of butterfly-plant interactions. Lastly, I owe a great deal to everyone at NSA for inspiring me to pursue my passion in natural sciences. I'm really privileged to have lead and been a part of one of the oldest associations in St. Joseph's college.

# Species of the Month: ELEPHANTS

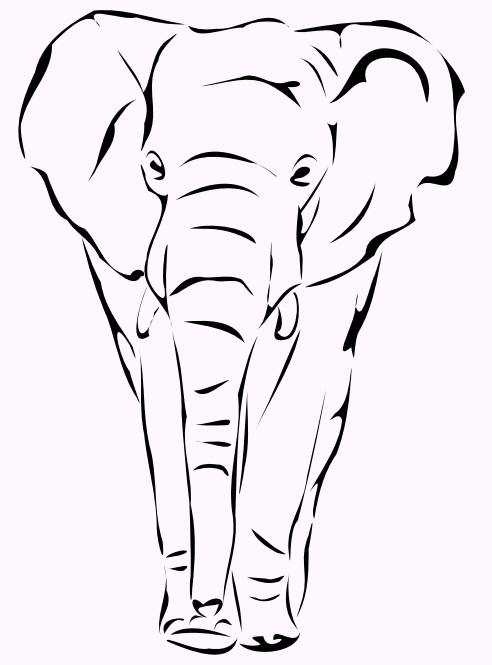


Photos by Rakesh Prasad  
North Bengal



# Species of the Month:

# ELEPHANTS



Elephants are the largest land animals on Earth, and they're one of the most unique animals, too. Their trunk, long legs and huge body are the most characteristic features. Not only the structure but their behavior is also very unique. They are social animals and hence they live in herds. They follow a matriarchal society, communicate with each other and have the ability of recognition. They are very intelligent and show traits of problem solving and empathy towards others.

India is home to the largest population of Asian elephants. They are majorly found in the North-East corridor and parts of South India. They prefer to stay in grassland areas and forage on grass or tree leaves. More than two-thirds of an elephant's day may be spent feeding on grasses, but it also eats large amounts of tree bark, roots, leaves and small stems. Cultivated crops such as bananas, rice and sugarcane are their favorites.

Elephants are always close to a source of fresh water because they need to drink at least once a day.

In India, people have a very close relationship with elephants. Lord Ganesha in Hindu mythology has a very important religious importance. Not just texts but also in old wars, the elephant cavalry was very popular. A lot of people used to keep elephants as pets for travelling and entertainment. Many also used them for agriculture and construction related work.

In these modern days humans have started to invade the forests which is the home to these innocent beings, who just want to live their lives peacefully. Humans have cut down the jungles, converted them to agricultural land, spread civilization, fragmented forests, dried up the rivers and so much more. The once lush green forests have turned to concrete jungles. Unfortunately, this has had an adverse effect on the elephant population. However, drastic measures have been made to reduce the impact of anthropocentric activities. Many Human Elephant Conflict counter steps have been followed. Fodder plantation, keeping the elephant corridors undisturbed for their migration, teaching and inculcating the feelings of harmony among the people are some such activities. These conflict mitigation steps have been religiously followed and huge funding have been made to keep up the good work. The people of India dream to live in the blissful utopia where humans and elephants can co-exist in harmony.

# Expert Corner

## Noel Foning

Our next stop is to meet an excellent bird watcher. Mr. Noel Foning, a resident of North Bengal has been an avid bird watcher and photographer for the last 10 years. I must say, he is an inspiration for all of us that he went on to pursue his passion and interest and had not given up to the daily mundane life.



Manjari: Hello sir. It is such a pleasure to have you with us and we are very eager to hear about your story. Could you please start by telling us about your profession and how you started bird watching and photography?

Mr. Noel: Lovely to meet you. I started my profession as a school teacher. I always had a thing for photography since my school days. My first camera was Kodak KB10, a roll camera and later I got a Sony cyber shot small digital camera. Sometime after, I bought a DSLR camera and thereafter started my journey of Birdwatching and Bird photography by going on bike rides to nearby hills. One fine day, I saw the Great Hornbills, that sparked the interest in me and gradually started observing and photographing the birds found in and around the area.

Manjari: Amazing! Well, never late to run after what catches your interest. What is the process? How long do you have to wait for the birds that you are looking for? How do you choose the location and season?

Mr. Noel: Birding is all about patience, hard work and exploration. You need to spend a lot of time in the field. You have to spent hours and hours for a particular bird that you want to study. You need to be observant and notice their behavior. I have sat for hours in the same position, camouflaged with just my camera. Theory knowledge is easy to find in the books but the field work really tests your skills. And it took me years to master this skill. Once you get to know the habitat and vegetation of the bird, rest is a piece of cake.

Yes, its true that different seasons have different birds' availability. summer birds are different and so are winter birds. In winters we get to see small colorful birds, mostly many species of sunbirds. They fly down to mid or low altitudes. During summer seasons, we get birds that migrate to Southern places.

North Bengal has a rich flora and fauna which attracts even the migratory birds. The diverse terrain is an additional positive factor as well that allows me to study a wider range of birds.

Manjari: How do you identify the birds?

Mr. Noel: Birds have different sizes, color, different posture and movement. They have different flying patterns and the most important is their calling. All birds have different vocalization. For example, some birds like the skulkers or the deep dense bush dwellers don't come out easily in the open but you can hear them call. And again, you have to wait for a long time to let these shy birds out and photograph them.





Manjari: That does sound like a lot of hard work. But the most important thing is that you enjoy doing it which is really inspiring.

My next question to you is, are birds going extinct in North Bengal? The once rich in biodiversity area is a home to many endangered birds now. What can be done?

Mr. Noel: It pains my heart to say that its true. Endangered to nearly extinct birds are Bengal florican, Pallas's fishing eagle and vultures like slender billed, long billed and white-rumped. The high-altitude birds like Satyr Tragopan are also threatened and their population is declining sharply. In a broad sense, we need to create more awareness among the masses. The local community must be guided properly. They need to identify the habitat of such endangered species, protect and conserve it.

Manjari: What is the biggest threat to birds these days and how can endangered species be preserved? How can we increase awareness to take care of birds?

Mr. Noel: The biggest threat to birds is the loss of habitat and vegetation. Also, the imbalance in the number of predators. The eggs of the endangered birds go unprotected from the predators like civet cat, yellow-throated marten, some snakes, etc. Although most of the direct or indirect damage is done by humans, people are slowly getting aware of the dangerous consequences of rapid extinction of wildlife. Hence, active participation of locals and forest department have successfully provided a relatively safer environment to the birds.

Locals have been educated about different birds and their habits. How to carry on their activities in such a way that does not disturb the birds. This will create a holistic environment where both can live in harmony. It is easier to reach to the ground level to solve the problem rather than holding only the authorities and bird watchers accountable to take the initiatives.

Many government centers have these breeding departments where endangered birds are allowed to breed in a safe environment. Bengal also has some breeding centers which are necessary to conserve the beautiful fauna.

Manjari: How do birds play a major role in environmental statistics?

Mr. Noel: It is well known that Birds are indicators of healthy vegetation. The more the number of birds, the healthier the forest is, they are called the bio armers. Their wastes are important to the plants and they are an important carrier of seeds. This helps in sustaining the biosphere. They feed on insects that could be harmful for trees and ensure healthy growth.

Manjari: What message would you like to give to young birding enthusiasts?

Mr. Noel: Photography is an art and a powerful weapon as well. If used carefully, one can do wonders. Awareness can be spread through this medium. It must be our responsibility to not disturb the bird in its natural habitat just for the sake of watching them or photographing them. Be patient and cherish the beautiful nature we are gifted with.

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# Events of the month

Here is our next stop of this journey. Let's read a little about the events that were held in the month of April 2021.

## ZOOPHITE 2021!

Zoophite is an annual intercollegiate carnival. The Josephites celebrate the world of Zoology by conducting various events aiming to spread awareness and to have fun with the subject. The great insight into this world is possible due to the various informative webinars held.

NSA fest is the event where various activities like poster making, treasure hunt, photography contest, etc. take place. Students from all the courses with a zeal to learn zoology are welcomed. Scientific awareness and fun activities make the event more attractive.

**ST. JOSEPH'S COLLEGE (AUTONOMOUS) BENGALURU - 27**  
 NATURAL SCIENCE ASSOCIATION  
 DEPARTMENT OF ZOOLOGY  
 PRESENTS  
**'ZOOPHITE-21'**  
 Annual intercollegiate carnival

DATE	EVENT
26/04	PHOTOGRAPHY AND SKETCHING
27/04	MIMICRY
28/04	PET TALENT
29/04	CREATIVE WRITING
30/04	WEBINAR ON 'CAREER GUIDANCE'
1/05	NATIONAL LEVEL VIRTUAL CONFERENCE ON 'DIVERSITY AND DISTRIBUTION OF INDIAN BIRDS'

Participate and win cash prizes!

**ST. JOSEPH'S COLLEGE (AUTONOMOUS) Bengaluru 560027**  
 Natural Science Association,  
 Department of Zoology

**EVENT: Photography**  
**DATE: 26TH OF APRIL 2021**

**THEME: 'Abuse and neglect of animals during the pandemic.'**

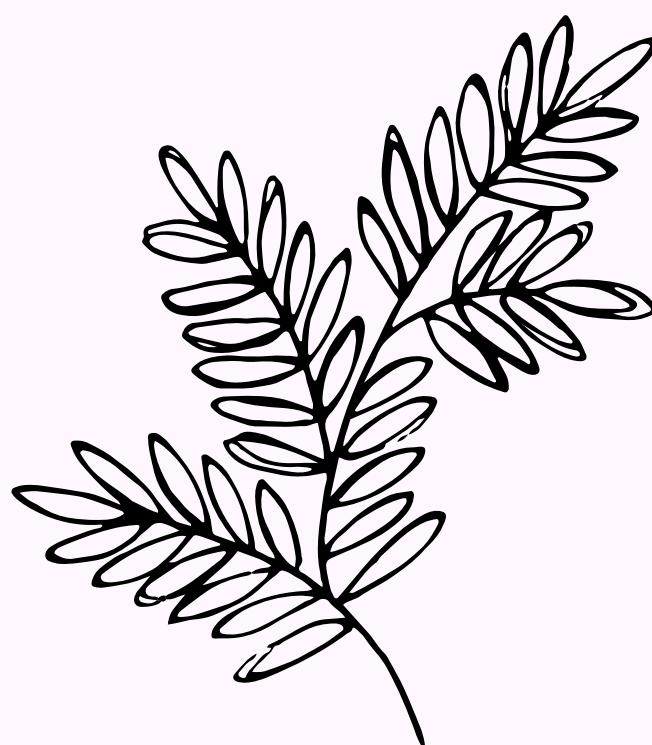
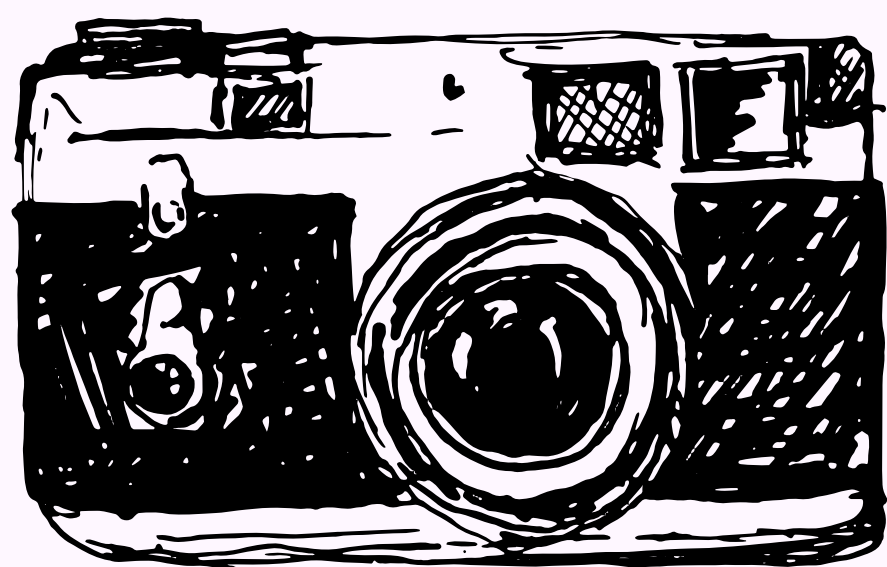
- Registration fee ₹ 100
- Individual event with maximum of 2 participants from each college
- A single photo to be submitted depicting the theme
- Editing is not allowed
- Kindly Submit the soft copy to the given mail ID (sjcnsa.zoology@gmail.com)
- Plagiarism is strictly prohibited.
- Kindly mention your name, contact number and college name while drafting the mail

Event heads: Anupama(8119040054)  
 Maria(9741891658)

Click here to register  
 SCAN THE CODE TO MAKE PAYMENT

### a) Photography- 26/04/2021

On 26th April, 2021 a photography contest was held. The theme being "Abuse and Neglect of Animals during the Pandemic." Contenders from four colleges namely DVS Arts and Science College (Shimoga), St. Aloysius College (Jabalpur), St. Josephs College (Bengaluru), Loyola Degree College (Manvi) around India participated in the contest. There were in total, 4 participants. The contenders mailed their works to NSA. Ganesh Jaju and M D Amer Hussain won the contest and were awarded with cash prize and certificates. Certificates were also distributed to all the participants.



### b) Sketching- 26/04/2021

Sketching contest was held on the 26th of April, 2021. The theme for the event was 'wet market'. Two participants from two different colleges showcased their talent and received consolation prizes. Certificates were also given. The participants had to mail their creation to the respective event heads. The event platform was Google meet.

**St. Joseph's College (Autonomous) Bengaluru 560027**  
 Natural Science Association,  
 Department of Zoology

**EVENT: Sketching**  
**DATE: 26TH OF APRIL 2021**  
**TIME: 4:00PM-5:00PM**

- Topic will be given on spot
- A maximum of 2 participants per college. Only A4 size sheet can be used.
- Plagiarism will lead to disqualification.
- The event will be online on zoom call or Google meet.
- Time limit of 45 mins will be given to the participants
- (Other instructions will be given on the day of the event)
- Time: 4 to 5 pm

REGISTRATION FEE - 100  
 Click here for registration  
 SCAN THE CODE TO MAKE PAYMENT

Event Heads: Kishan Nag (7406253707)  
 Himesh (9742776919)



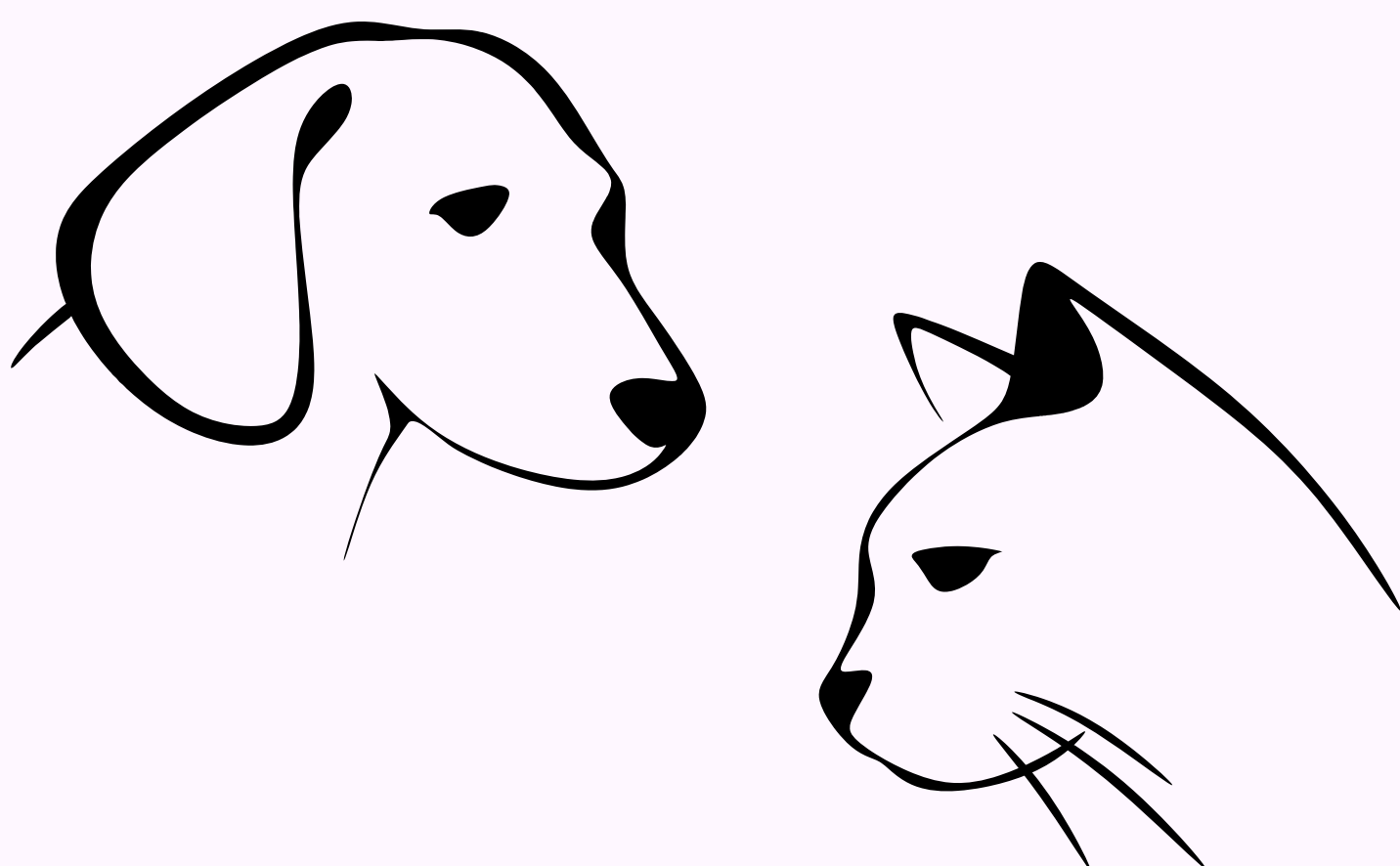
c) Mimicry- 27/04/2021

The mimicry event (also called Voice Box) competition was held on 27th April, 2021. It was an individual event. The participants sent their video entries through the google drive link. The participants could mimic any animal, bird or insect. There were two participants in total. Certificates and consolation prizes were given for participation.



d) Pet talent- 28/04/2021

On 28th of April, 2021 pets' talent (talent showcase) competition was held. It was an individual event. The participants sent their video entries through the google drive link provided. There were two participants in total. Certificates and consolation prizes were given for participation from St. Joseph's College and Jothis Nivas College.







**St. Joseph's College (Autonomous)**  
Bengaluru 560027  
RECOGNISED AS COLLEGE OF EXCELLENCE BY UGC  
B+ ACCREDITED WITH A++ AND 17th CCR BY NAAC  
AWARDED DST STAR STATUS AND DST FIRST GRANT  
BY MINISTRY OF SCIENCE AND TECHNOLOGY, GOI

Natural Science Association,  
Department Of Zoology  
**EVENT: CREATIVE WRITING**

DATE : 29th April, 2021  
TIME : 6pm-6:45pm

1. Topic will be given on spot.
2. Individual event with maximum 2 participants from each college.
3. The competition will be held on zoom.
4. Time limit is 40 minutes.
5. It can be an essay, short story, poem depending on your creativity.
6. Kindly submit the soft copy to the given email ID.  
sjnasa.zoology@gmail.com
7. Plagiarism is strictly prohibited.
8. Kindly mention your name, contact number and college name while drafting the email.

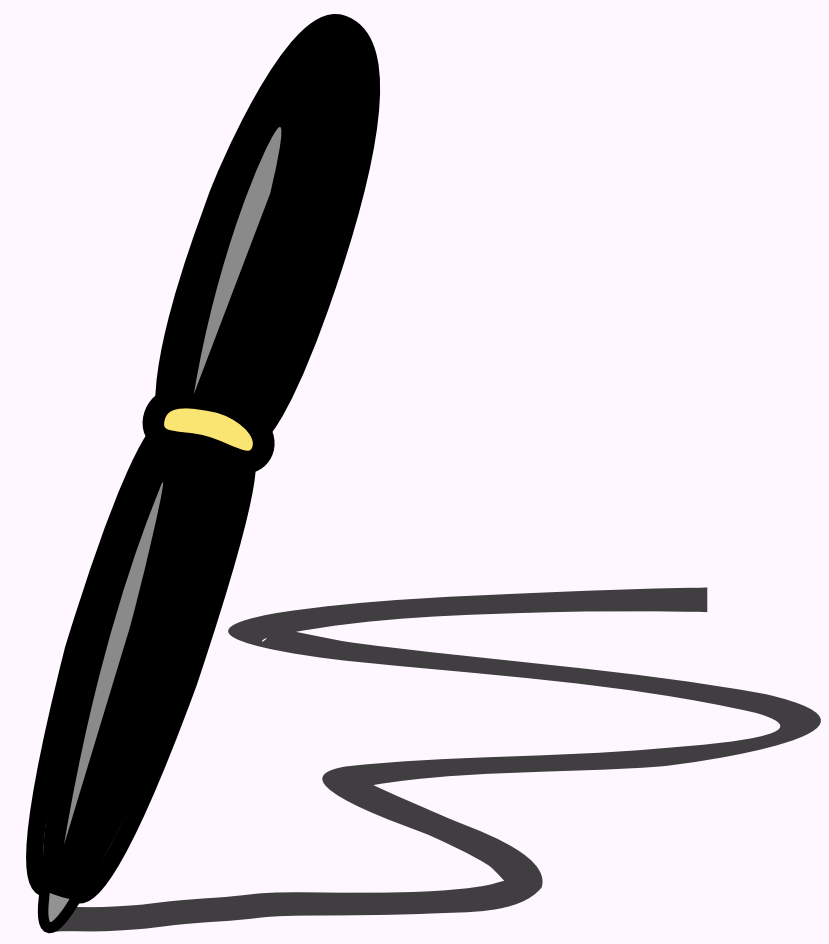
**Register here**  
**Registration Fee- ₹100**

Event heads: Rebecca - 8951773169  
Ruth - 9008050410



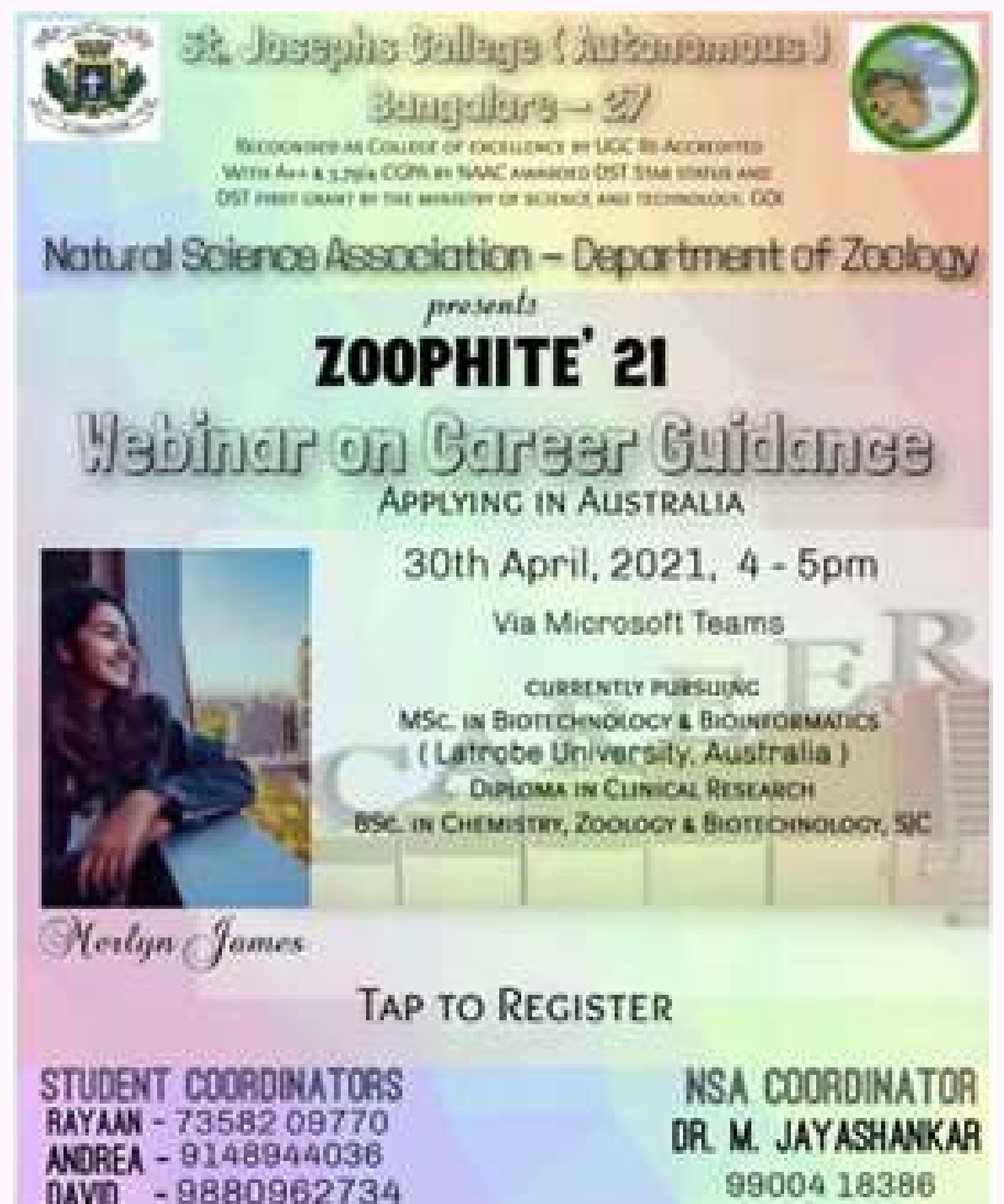
e) Creative writing- 29/04/2021

The creative writing contest was held on 29th April, 2021. The competition was held on google meet. Participants from various colleges from within India showcased their flair of writing on the topic "Wildlife and Pandemic." All the 8 participants showcased their wonderful talent through this platform. The winners were awarded a cash prize.



f) Webinar on Career guidance (applying in Australia)- 30/04/2021

Ms. Merlyn James, a master's student at Latrobe University of Australia, gave students an idea of what a future in Australia might look like. The various requirements, steps and processes involved in shifting, studying and living in Australia were discussed, and in the end various queries and doubts were also clarified. The number of participants who attended the webinar was 50.




**St. Joseph's College (Autonomous)**  
Bengaluru - 27  
RECOGNISED AS COLLEGE OF EXCELLENCE BY UGC B+ ACCREDITED  
WITH A++ & 17th CCR BY NAAC AWARDED DST STAR STATUS AND  
DST FIRST GRANT BY THE MINISTRY OF SCIENCE AND TECHNOLOGY, GOI

Natural Science Association - Department of Zoology  
presents  
**ZOOPHITE' 21**  
**Webinar on Career Guidance**  
APPLYING IN AUSTRALIA

30th April, 2021, 4 - 5pm  
Via Microsoft Teams

CURRENTLY PURSUING  
MSc. IN BIOTECHNOLOGY & BIOINFORMATICS  
( Latrobe University, Australia )  
DIPLOMA IN CLINICAL RESEARCH  
BSc. IN CHEMISTRY, ZOOLOGY & BIOTECHNOLOGY, SIC



*Merlyn James*

**TAP TO REGISTER**

**STUDENT COORDINATORS**  
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ANDREA - 9148944036  
DAVID - 9880962734

**NSA COORDINATOR**  
DR. M. JAYASHANKAR  
99004 18386



# Scientific Article



By M JAYASHANKAR and MANJARI PRASAD

## Alternate cropping strategies to minimize Human-Elephant Conflict (HEC) in India

" The wildlife and the habitat cannot speak, so we must and we will"

-Theodore Roosevelt

India is home to the largest population of Asian elephants (*Elephas maximus*). They have been depicted in many cultural and religious scriptures as lord Ganesha, the very reason for worshipping elephants. Elephants are an important umbrella species as their conservation helps in biodiversity enrichment. They help in seed dispersal, dig waterholes and modify their surroundings which benefit other animals as well. The Indian elephants are distributed from the Eastern border of Nepal to Assam, some parts of Orissa and in the Southern states of Karnataka, Kerala and Tamil Nadu. The country's estimated wild population strength of these flagship species stands at 27,000-31,000.

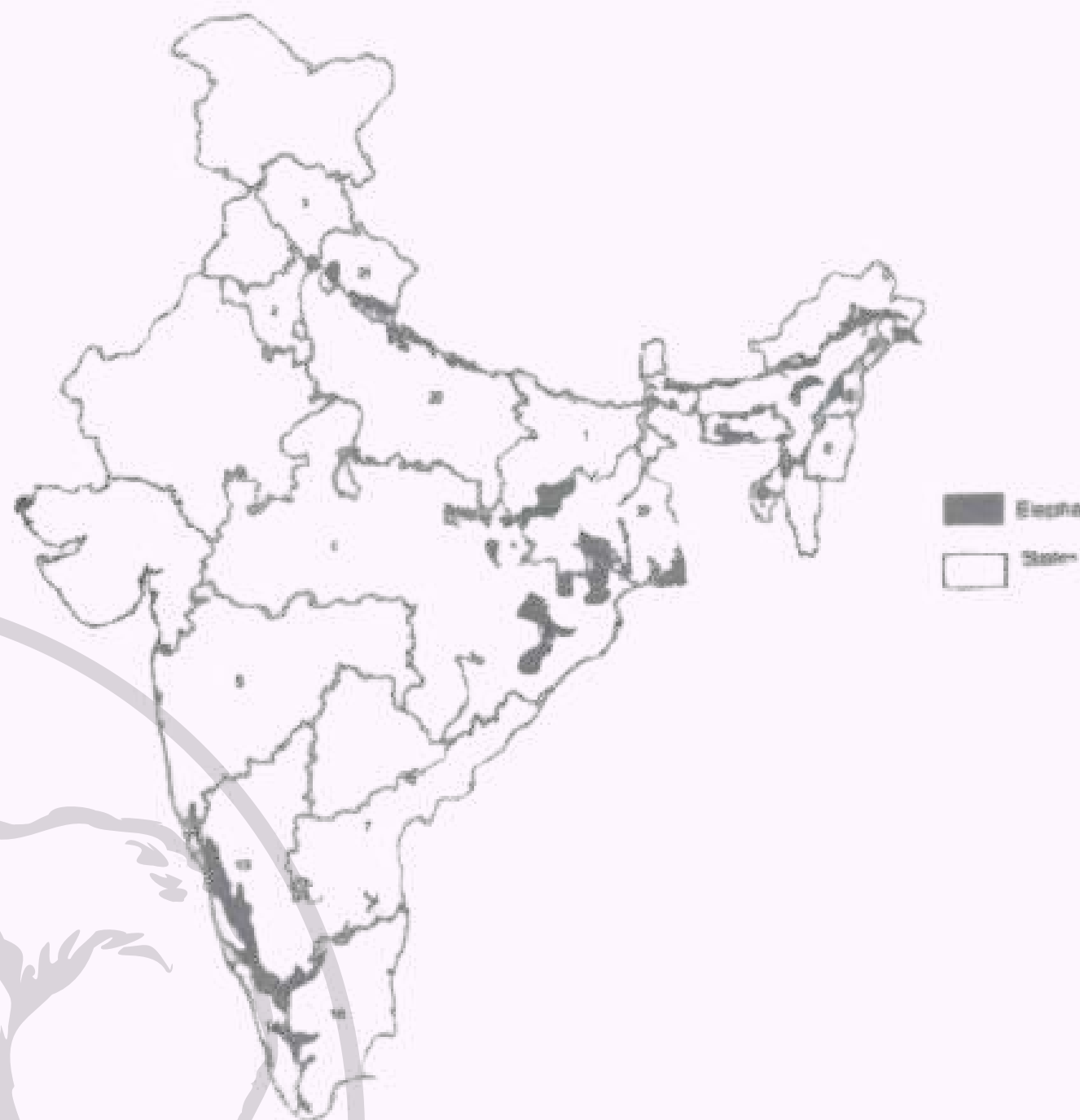


Fig.1. Elephant distribution in India according to 2017 census (Source: <http://www.indiaenvironmentportal.org.in/files/file/Synchronized%20Elephant%20Population%20Estimation%20India%202017.pdf>)

We do take pride in them, but ignorantly continue to harm them. Human-elephant interaction hasn't always been very pleasant. The boom in human population in the recent decades has facilitated the loss of habitat of many species. Where the wildlife is struggling for its existence, exploitation of limited resources continues which is manifesting with detrimental consequences. According to the Endangered Species Act of 1976, Asian elephants have been declared as an endangered species. Human-elephant conflict (HEC) is the adverse impact people and elephants have on each other, it's a major conservation concern in elephant range countries including India. HEC is largely due to land fragmentation and atomization of habitat area of elephants. Human settlements have a dual impact on elephant habitat viz., habitat loss and area denial (Desai and Baskaran, 1996). The decrease in forest stretches has made it difficult for the gentle giants to undertake their rhythmic migratory activities safely and peacefully. Their sources of food and water have become limited propelling them to foray into human used areas to feed on agricultural and plantation crops causing obligate or opportunistic crop-raiding.

With damage to property and human life arising as incidental damage, as a result of feeding on crops and trampling, people in the conflict prone zones resort to violent measures like pelting stones at the pachyderms resulting in injuries or even leading to retaliatory or accidental killing of



elephants. The conflict zones of India are spread across North Bengal, Karnataka, Assam, Tamil Nadu and Kerala. HEC intensity is highly variable, ranging from very occasional to chronic. Various mitigation measures have been taken up to minimize conflict and its deleterious impacts on both sides. Mitigatory measures are designed to reduce the level of impact upon elephants and people, and lessen the perceived problem by humans. The continuous stretch of forests has been punctuated by many barren spots. In these forest areas, grass seeds are grown in small patches of land and tended to for about three to four years. These serve as an alternative diet for the elephants. These grasses can be consumed by the elephants without the villagers' crops being compromised. *Imperata cylindrica* and *Leersia hexandra* are examples of grasses grown in the forest so that the villagers can grow their crops safely. We are aware about the alarming rate at which these tusked farmers are losing their home. Hence, the concept of Vayals has been extremely successful as a mitigation measure. Vayals are swampy areas in the forest or a patch of land. These serve as microhabitats for elephants. They come here to rest, bathe and drink water. The water suffices their thirst and they don't have to wander in the scorching heat of summer to quench their thirst. This is widely practiced in Kerala along with new bamboo plantations or restocking of existing degraded bamboo in lantana removed areas. One of them is the alternate cropping which suits both the local villagers as well as the elephants.

The fodder plantation practice is a strategy introduced in many areas. Fodder crops for elephants are cultivated on the edges of forests to prevent the elephants from venturing out into human settlements. Sorghum, Naanal grass, Coconut trees, Vaagai and Alanthalai are some of the fodder crops besides seasonal fruits. The forest department along with the elephant squads play a major role.

The local villagers are encouraged to grow crops like maize that are nutritious for elephants. These heavy weights obtain a rich diet when they visit the farms. The villagers are compensated by the forest department if the elephants raid these crops. This is beneficial for the farmers and to befriend their estranged pachyderms frequenting their fields. Sustenance farming is a common phenomenon observed in many parts of India. Villagers rely upon the extra crops they grow. These may be edible or commercial.

Elephants are kept away from the farms by planting chillies, ginger, citrus fruits and onions. They act as elephant repellent crops and this way the elephant raids are prevented, saving the farmer's crops and also keeping the elephants confined to the forests. Lemongrass is one of the plants used for biofencing. The smell repels the elephants. This way they stay away from the farms. Another biofencing crop is Agave which is used to impede elephants. Farmers are able to harvest a crop that is commercially viable, resistant to elephants, and useful in the defence of their fields.

Farmers need to grow crops that are economically beneficial and at the same time are deterrents for elephants. Tobacco is one such growth that suits both their needs. A good example to explain this is the case study observed in Nagarhole National Park. It is a conflict prone area. The villagers started to grow tobacco in place of Ragi. The alternate crop did not attract the colossal mammals.

In Africa and some parts of Sri Lanka and India, bee hive fences have been found to effective in deterring elephants. Farmers get additional benefit of income from honey and better pollination.



Barnes et al. (2003) suggested a zonation system whereby farmers with land within 1km of park boundary would be discouraged from growing food crops over time, and would be encouraged to cultivate crops that are unpalatable to elephants. They would also seek alternative sources of income. This would reduce the attractiveness of the land immediately adjacent to Park boundary to elephants. In the second zone, more than 2 km from the park boundary, farmers could cultivate subsistence food crops.

Experts opine that if cropping pattern including alternate crops to effectively reduce HEC (Human Elephant Conflict), it must involve the entire community and that on a sustained basis lower damage rate by elephants and increased income to farmers needs to be ensured. The Project Elephant was started in 1992 by the Government of India aiming at preserving the endangered Asian elephants.

Its main objectives are as follows:

- To protect elephants, their habitat & corridors
- To address issues of man-animal conflict
- Welfare of captive elephants

This project was initiated with the hope to strengthen the declining population of the tusked farmers. Many research activities like alternate fodder crops and their behaviour, health and disease and anatomical studies have been put into effect. The areas under elephant reserves have been increased. There has been strict supervision and check on poaching, ivory stealing and inhuman dealing with elephants in the conflict areas. Elephant census is conducted once in 5 years under the aegis of Project Elephant. India has 27,312 elephants according to the 2017 census. Overall, this project has been a huge success and is meeting with its objectives efficiently. Conflict mitigation also requires an increase in local people's tolerance to damage.

The jungles we have taken over, the streams we have reduced to trickles, the lands we have soiled and the air we have tainted; all of it belonged to these tusked giants first. The devastating blow that we have dealt to this species is something that cannot be undone. It's to be remembered that WE, the humans have encroached upon the lands of the elephants. Their protection and conservation should be our rightful duty. They have as much right to live as we humans do. Thus, it's our duty to provide them the safe migratory passages (the corridors) and take care of their nutritious diet and water. What's left to do is to support the conservational methods aggressively and work unitedly to make Mother Earth a blissful utopia to live in.

## References

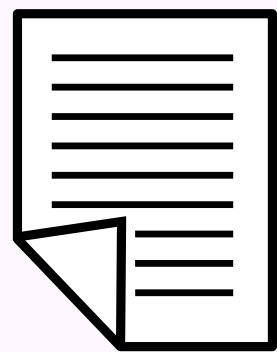
1. Barnes, R.F.W. Boafo, Y. Nandjui, A. Umaru-Farouk, D. Hema, E.M. Danquah, E. & Manford, M. 2003. An Overview of Crop-Raiding by Elephants Around Kakum Conservation Area. Elephant Biology and Management Project, Africa Program, Conservation International.
2. Desai, A.A., and Baskaran, N. (1996). Impact of human activities on the ranging behavior of elephants in the Nilgiri Biosphere Reserve, South India., Journal Bombay Natural History Society

## Websites

- <https://static.pib.gov.in/WriteReadData/userfiles/HEC-Brochure-%20Version%208-min.pdf>
- <https://mahaforest.gov.in/fckimagefileuideline%20for%20Human%20Elephant%20Conflict.pdf>
- <http://www.indiaenvironmentportal.org.in/files/filesynchronized%20Elephant%20Population%20Estimation%20India%202017.pdf>



# Inputs From Josephites



## Dissertation

By KISHAN NAG (20CBZ24)

## Prospectus and problems of biological control

Biological control or biocontrol is a method for eliminating pests, disease causing organisms and other harmful organisms by the use of other organisms against them. It usually involves the introduction of a new species in a particular habitat or the promotion of a weakened species of a habitat. This method inevitably requires anthropological interference.

Biocontrol can be classified into three types: Importation, Augmentation and Conservation.

**Importation** is a method where a new species is introduced into the habitat to bring control over the pests. It's the most classical form of biocontrol and has been practiced unofficially since ages. The key points to note about the species being introduced are:

Colonizing ability- It's ability to form a colony and withstand the changes in temperature, climate and other factors influencing its life in the new habitat.

Temporal persistence- The ability to persist although the target species is absent for a period.

These two points are very important. If the introduced species is unable to colonize, there won't be any result as they will eventually be eliminated and won't be able to reduce the pest.

Temporal resistance is also a very important aspect because if the introduced species is successful in colonization and completely eliminates the target pests and is unable to persist, it will perish and the pests return recreating the original scenario.

Certain introduced species rapidly exploit the target pest population and eliminate them completely. They are called opportunistic foragers and they can bring an immediate effect.

Examples for Importation:

1. The cottony cushion scale is a scale insect that feeds on woody plants. It was a major pest in California and was brought under control by importing the Vedalia beetle, a predator that feeds on Cottony cushion scale.

2. Aphids are a major pest for flowering plants and crops. They can be brought under control by importing Lady Bird beetles which feed on them or other such predatory species.

**Augmentation** is a method of promoting the biocontrol agents present in the habitat by introducing some more members of the species in small intervals and small numbers. This way, the species gains the boost needed to develop and grow stronger.

Augmentation is a very effective method but it is not guaranteed to work all the time. Although it seems as a simple concept of introducing more members in intervals to boost the species, it has many factors to be considered and is also dependent mainly on pest-control agent interaction.



### Examples of Augmentation:

1. Augmentation is practiced in Greenhouses against a pest called the greenhouse white fly. Parasitoidal wasps are periodically released in greenhouses to bring the pest under control.
2. Trichogramma is an egg parasite that is periodically released to bring many harmful moth species under control.

Conservation is a method where the existing biocontrol agents of the habitat are promoted via various practices and techniques. Methods which are beneficial to the biocontrol agent are practiced and they help in reducing the pest population. This is done by growing crops or plants beneficial to the biocontrol agent. The crops being grown should be chosen carefully as they can sometimes also promote the growth of the pest. Another type of technique in conservation is to provide a beneficial habitat for the biocontrol agent. Shelterbelt and Hedgegrow are two practices where the area affected is lined with shrubs and trees. This way, the impact of wind is reduced and it provides shelter to the biocontrol agents. These techniques also help in reducing soil erosion. Beetle bank is a technique where a strip of land is left to be dominated with various grasses. This strip of land serves as a beneficial area for the biocontrol agents.

### **Biocontrol agents:**

There are many types of biocontrol agents classified on the basis of their interaction with the pests. The classifications are:

a) **Predators:** These organisms directly consume the pests as prey. They are the most commonly known and used biocontrol agents.

Examples: Ape-fly larvae which feed on mealy bugs.

b) **Parasitoids:** These organisms lay eggs on or inside a target insect. The developing larvae feed on the insect host and eventually kill it. The ones which lay the eggs on the insect host are called ectoparasitoids and the ones laying it inside are called endoparasitoids.

Examples: Many wasps are parasitoidal in nature and are used to bring certain caterpillars and aphids under control. Some parasitoidal flies are also known to target beetles (coleopterans) and true bugs (hemipterans).

Parasitoids are grown and nurtured in units called rearing units. Parasitoids can be very effective but they have many factors to be taken under consideration as well. The rearing units can't be too far from the habitat as the transportation of the parasitoids via vehicles can affect the parasitoids. There are two methods in introduction of parasitoids. One being long term with low production and the other being short term with high production. The use of the method depends upon the pest, parasitoid, need and other factors of the habitat.

c) **Pathogens:** Pathogens like bacteria, fungi, viruses and oomycota are used to bring many insect pests under control. These are usually host specific and are known to cause diseases which can control and reduce the pest population.

The most common example for bacterial pathogen is *Bacillus thuringiensis* which can bring butterflies and moths (lepidopterans), beetles (coleopterans), flies (dipterans) under control.

Fungi are used to control pests like grasshoppers, aphids, spider mites and weevils by spreading insect diseases.



Baculoviruses are specific to individual insect host species and have shown to be useful in biological pest control. For example, the *Lymantria dispar* multicapsid nuclear polyhedrosis virus has been used to spray large areas of forest in North America where larvae of the gypsy moth are causing serious defoliation. The moth larvae are killed by the virus they have eaten and die, the disintegrating cadavers leaving virus particles on the foliage to infect other larvae.

*Lagenidium giganteum* is water-borne mould that parasitizes the mosquitoes' larval stage. It's very effective as it releases its spores in water and mosquitoes also lay their eggs in stagnant water.

**d) Competitors:**

The Biocontrol agent is introduced and promoted thus, out-competing the pest. This way, the pest is brought under control.

Example, Australian bush fly breeds on cow dung and was a major pest. It was brought under control by introducing dung beetles into the place.

**e) Parasitoids and pathogens:**

The combined use is made when an immediate effect is required or when the pest is at large.

Example: emerald ash borer, invasive beetle destroying ash trees in north america.

Hence, *Oobius agrilli*, larval endoparasitoid, *Spethius agrilli*, larval ectoparasitoid, *Beauveria bassiana*, a fungal pathogen was introduced to bring it under control.

Biocontrol also has some cons. It's not a controlled method as the agent-pest interaction can only be assumed and not accurately predicted. Sometimes it ends up doing more harm than good if the process is not scrutinized and planned well enough.

Provided that Biocontrol is employed in a carefully planned manner, it faces many problems for large scale implementation. Compared to pesticides and insecticides, Biocontrol is a much slower method and takes some time to show impact. And it is cheaper in the long run but can be quite expensive to set up. There is a lack of awareness among growers about the advantages and stability of biocontrol.

**Sites referred:**

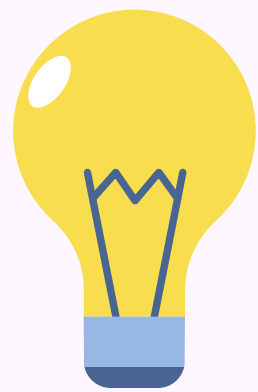
1) <https://extension.missouri.edu/publications/ipm1034>

2) <https://www.wur.nl/en/show/Biological-pest-control.htm>

3) [https://en.wikipedia.org/wiki/Biological\\_pest\\_control](https://en.wikipedia.org/wiki/Biological_pest_control)

<https://owlcation.com/stem/Advantages-Disadvantages-of-Biological-Control>





## Creative Corner

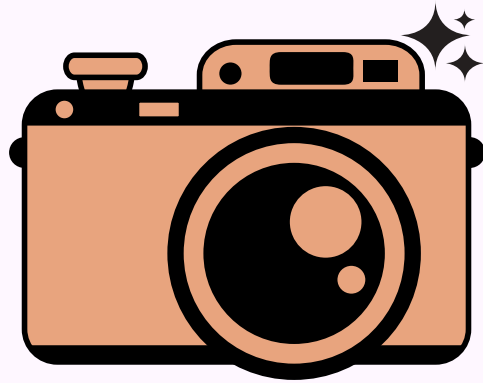
BY APOORV SHARMA, SHIKSHA DOKANIYA, SIMRAN KUMARI AND SNEHA NAIR

# STUDY OF EMOTIONAL INTELLIGENCE IN ELEPHANTS



Elephants, the world's largest land animals, are among the most exuberantly expressive species on the planet. Elephants, like people express their emotions through visual clues, noises, and body language. They engage in rituals, problem-solving, and collaborative efforts. Elephants are also capable of deep feelings and intellectual thought. Joy is a positive feeling that elephants frequently express in the wild by bellowing and blaring. This is frequently demonstrated when they gather with friends and relatives to play games and welcome the new born. The bond between an elephant mother and her calf is the most common expression of love and affection. Whenever a calf squeals in pain, the mother rushes to their rescue. Elephants have shown perception to the notion of death. When an elephant comes across the remains of a deceased member of their pack, they pause and place their hands on the bones as an expression of sadness. They are also prone to stress and rage, especially when their calves are in danger. In elephant society, compassion is not limited to offsprings. Elephants appear to make sacrifices for other elephants in their herd as well as other living creatures. Empathy and jealousy are also expressed by them. Elephants use touch, sight, smell, and sound to communicate. They communicate across large distances via infrasound and seismic transmission. The intellect of elephants has been compared to that of primates and cetaceans. They are always conscious of themselves. Elephants' ability to express a wide range of emotions demonstrates their emotional intelligence, wit and self-awareness.





# Insect Photography



BY VIKRAMADITYA DAS  
(20CEZ31)







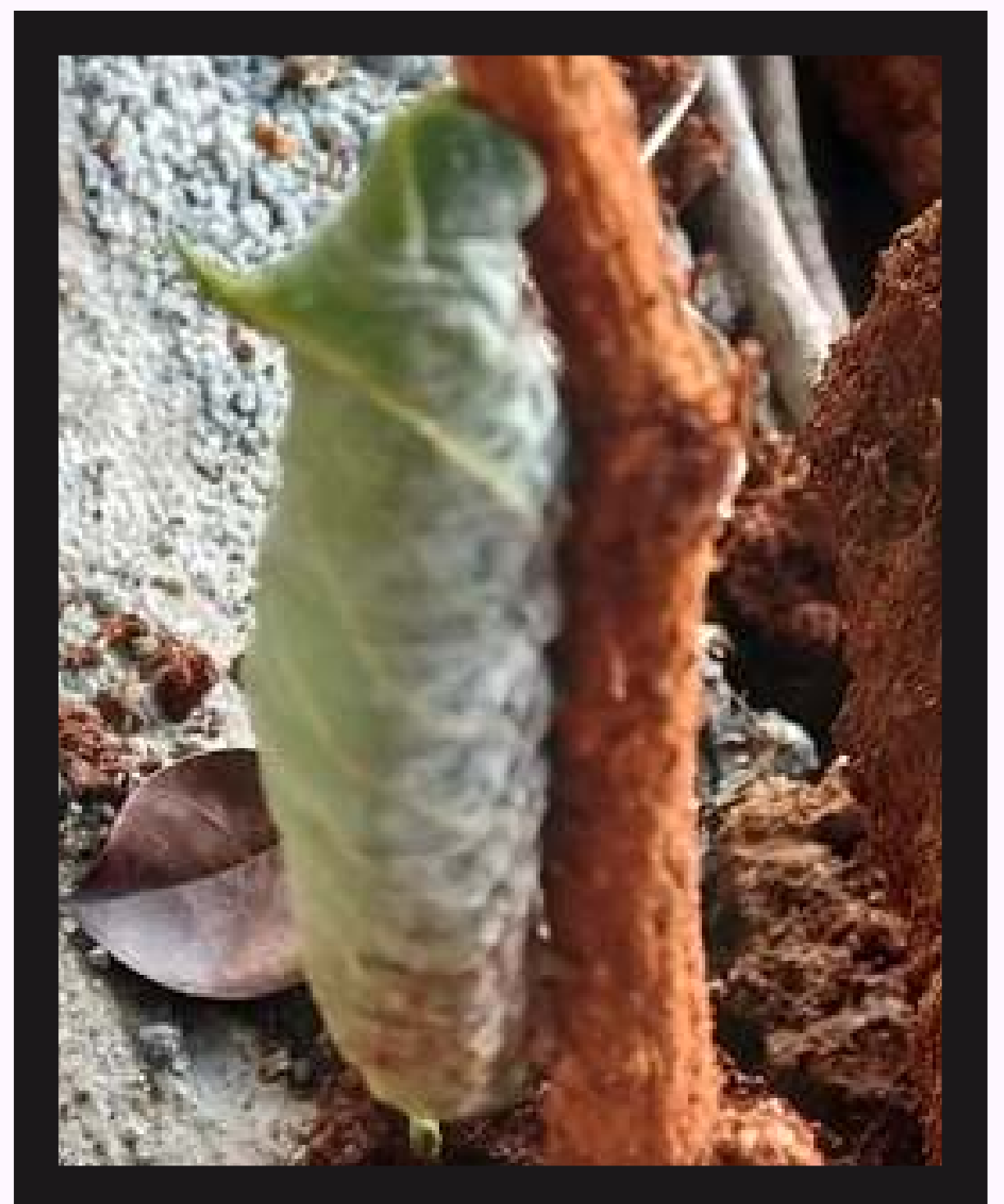
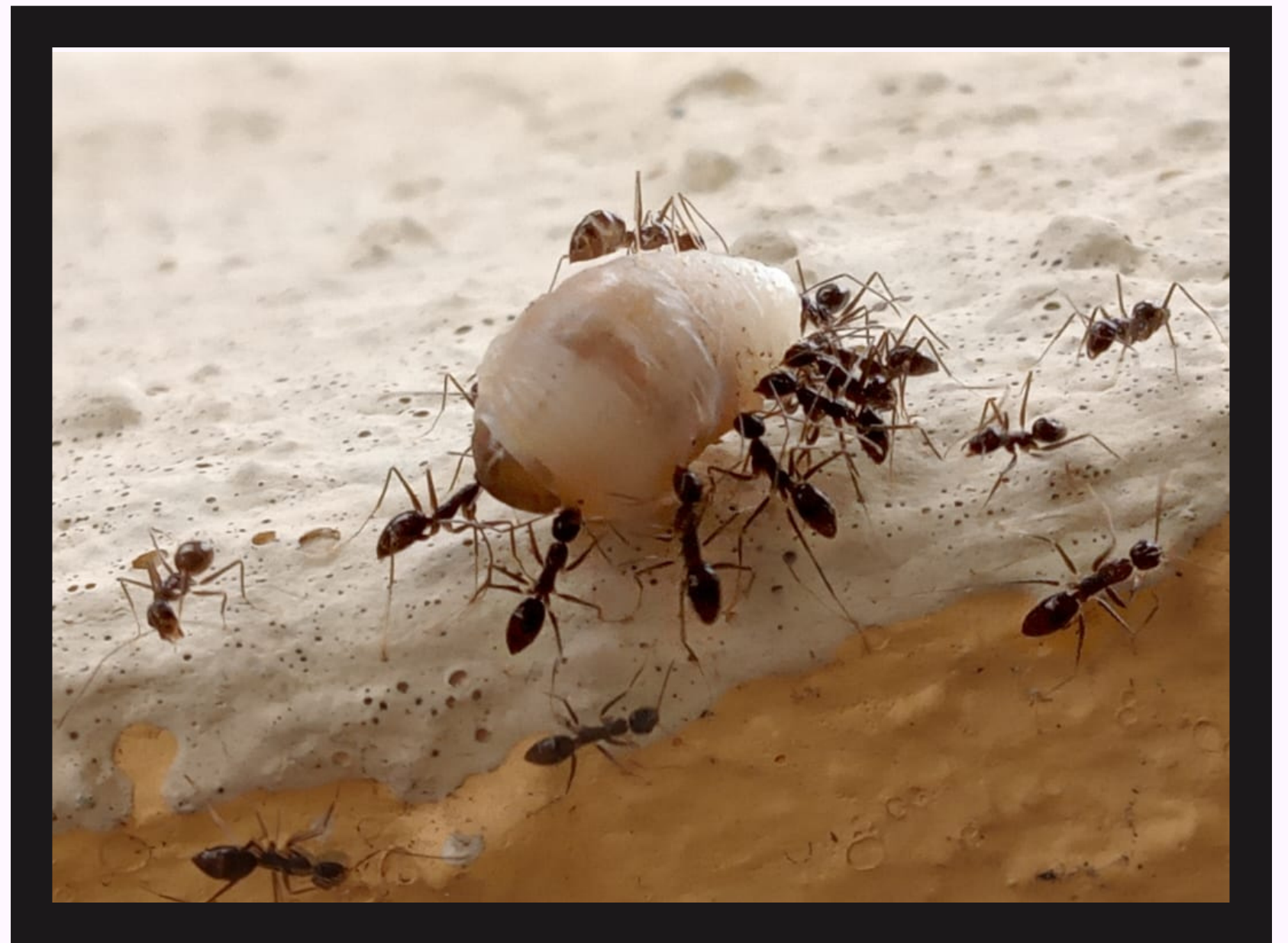
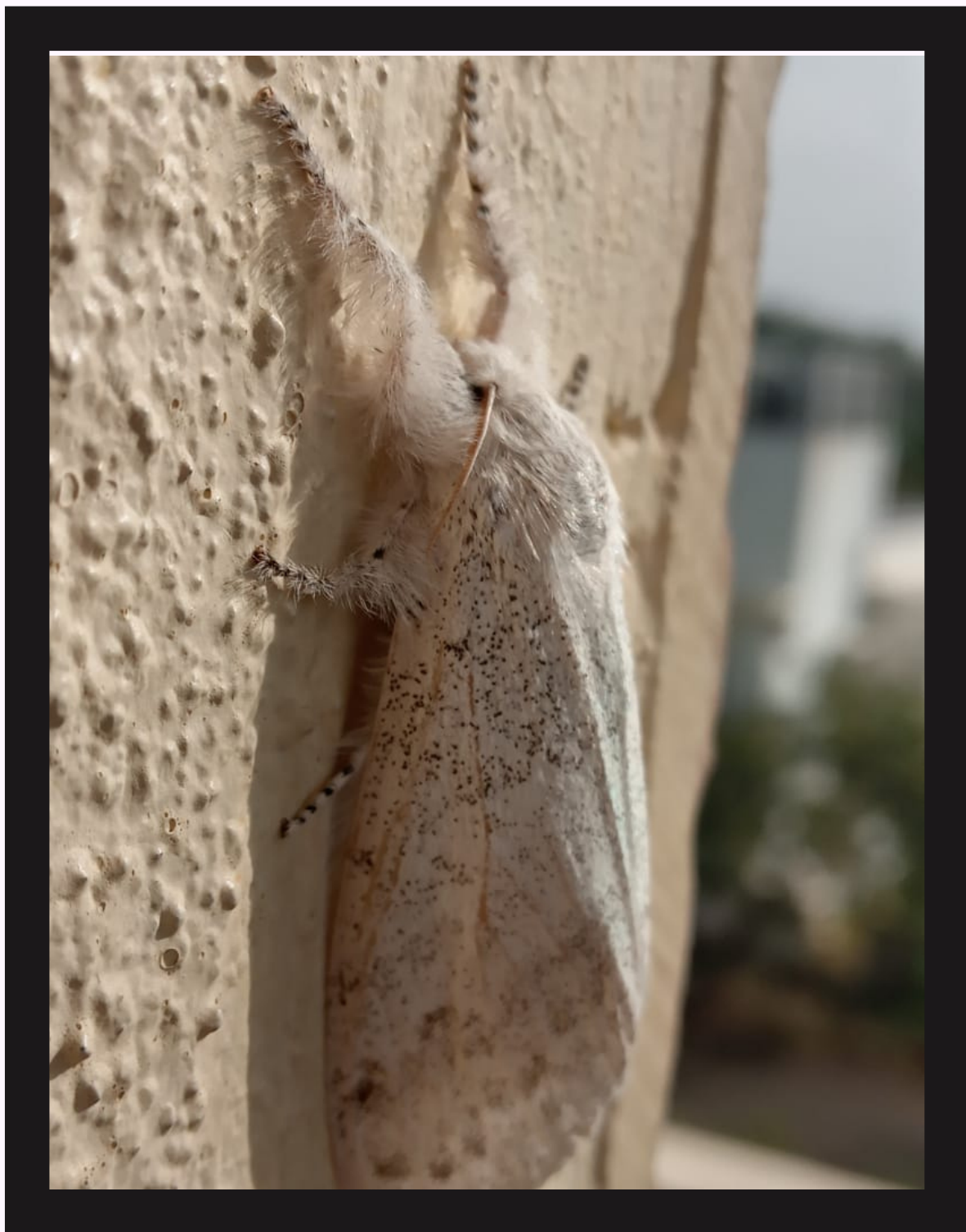
BY ABHISHEK MISHRA  
(20CBZ17)







BY SIRIVANTH S  
(20CBZ74)



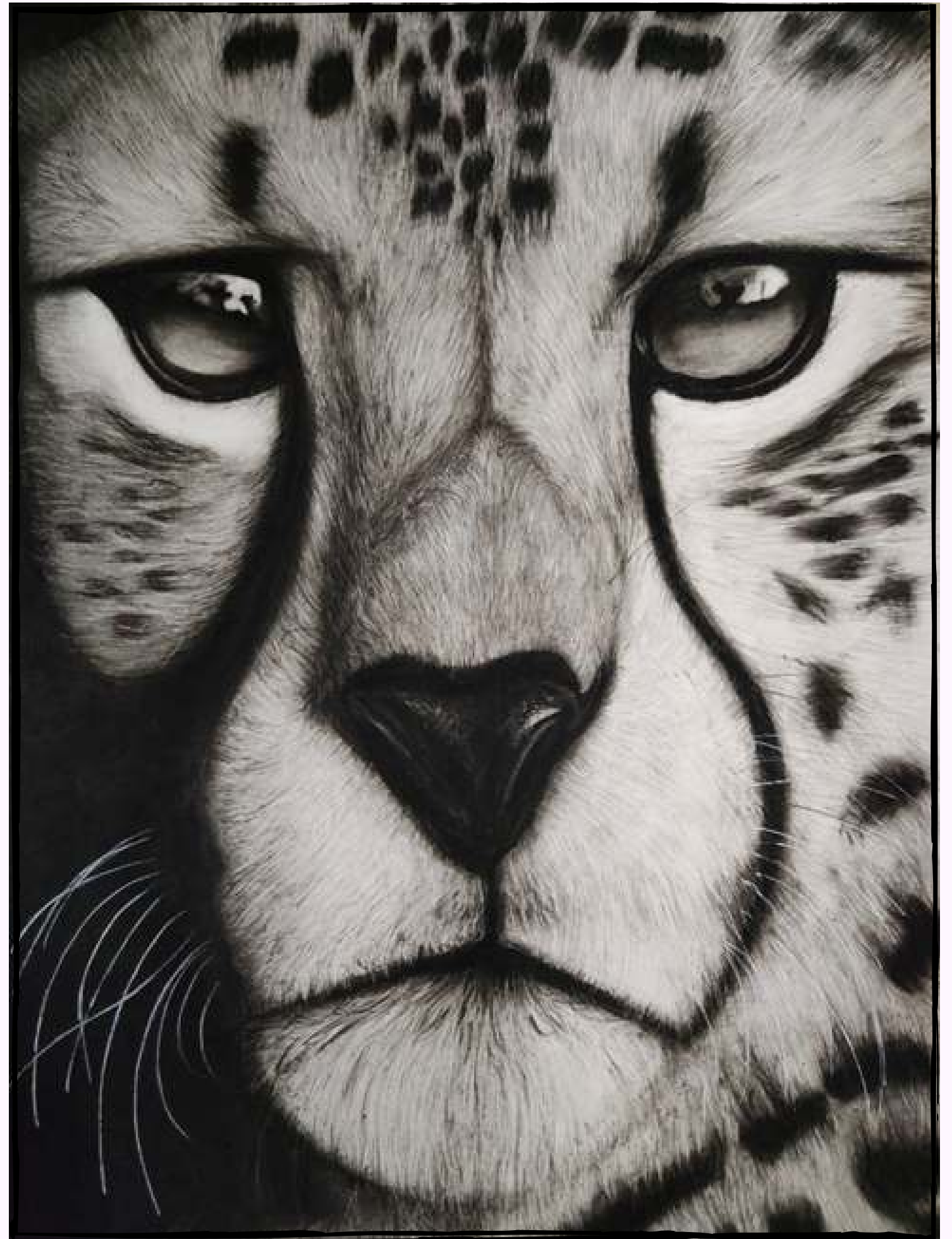




# Drawing Corner



BY SRUSHTI RAGHAVENDRA  
(20BBZ06)





BY MANJARI PRASAD  
(20CBZ71)





# Student Achievement



On 9th of April, Microcosm had held an event-treasure hunt.

It was held online.

Amritha M S, 20MCZ14 had won this event! Heartiest congratulations to her!



# What's new in Zoology?

FROM SCIENCE DAILY

1. Neurobiologists identify a new gene important for healthy daily rhythms. A team of neurobiologists has identified a new gene, called Tango10, that is critical for daily behavioural rhythms. This gene is involved in a molecular pathway by which the core circadian clock (the 'gears') controls the cellular output of the clock (the 'hands') to control daily sleep-wake cycles.



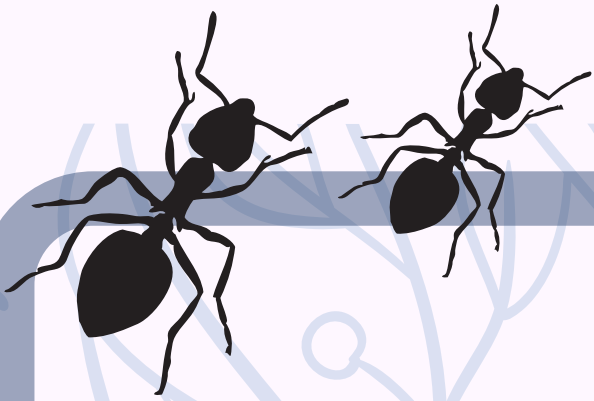
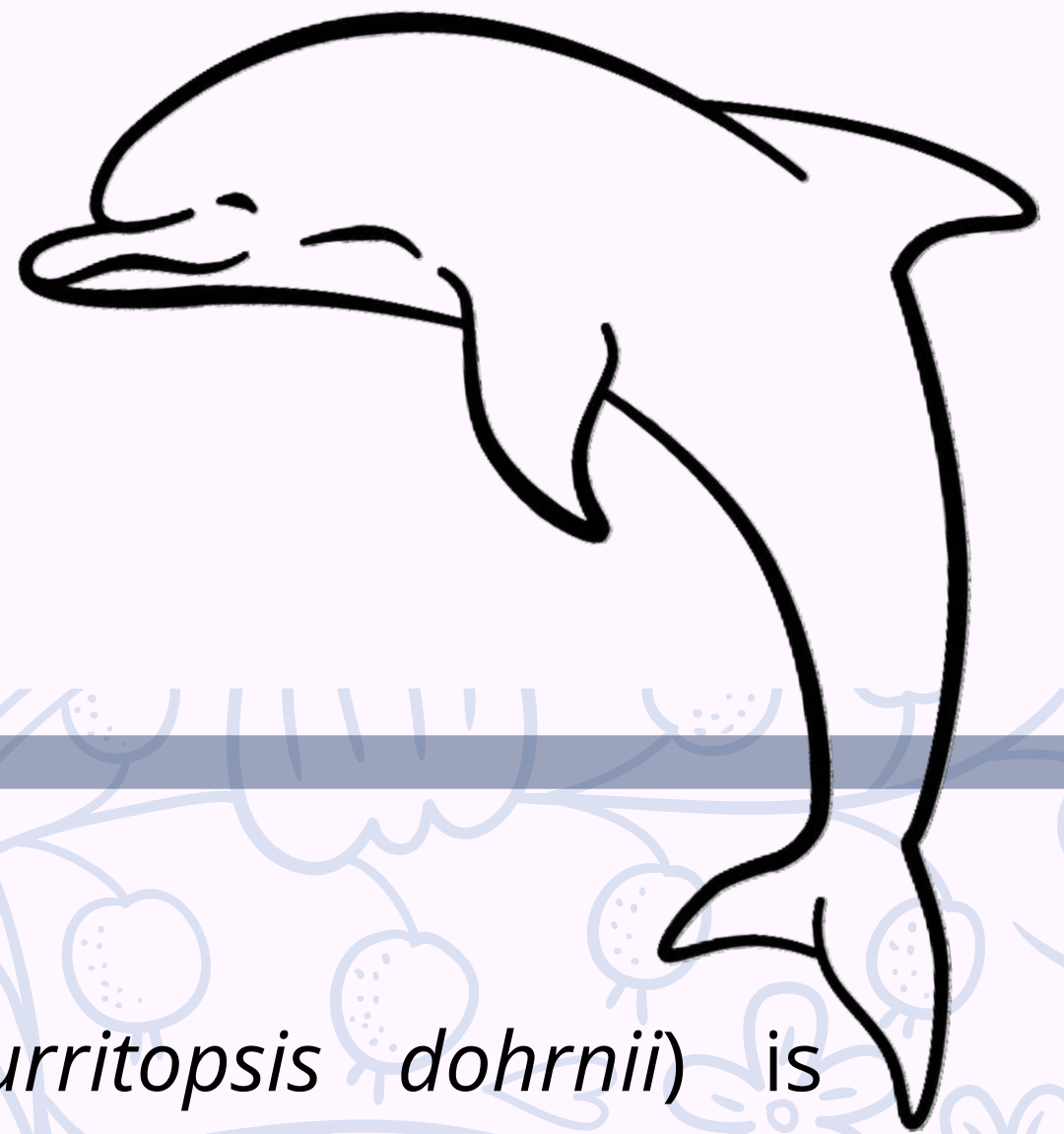
2. Young honeybees show learned preferences after experiencing adulterated pollen. Many plants contain different kinds of chemicals that are not always suitable for the honeybees to extract nectar from. After the advent of man-made chemicals, the pollen chemical contents have also been altered. The honeybees have equally adapted themselves to select the desirable pollen.

3. Microscopic world of plankton in stunning detail. Scoop up a cup of water anywhere on Earth, and you will find strange, entrancing life-forms called plankton. From brilliantly coloured blobs to miniature monsters adorned with tentacles and gigantic eyes. Every drop of water, be it freshwater or seawater, hums with microscopic life most of us have never seen.





# Fun Facts



1. One species of jellyfish (*Turritopsis dohrnii*) is immortal. It can revert back to its child state after having become sexually mature, and therefore never dies.
2. A snail can sleep for three years at a time.
3. There are 1 million ants for every human in the world.
4. Kākāpō is the only flightless parrot. They are massive birds and are critically endangered.
5. Woodpecker's tongue is wrapped round its brain. It not only protects the brain but this also helps to store the long appendage.
6. A sea lion is the first nonhuman mammal with a proven ability to keep a beat.
7. The flamingo's actual colour is not pink. Their pink colour comes from algae, larvae and shrimp that they consume.
8. The leg bones of a bat are so thin that no bat can walk.
9. Only half a Dolphin's brain sleeps at a time.
10. Frogs have a 360° visual range.





# Crossword

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

Find these words!

EXOSKELETON, DARWIN, WING, CETACEAN,  
AMPHIBIANS, BEETLE, ANATOMY, ANT,  
HOMEOSTASIS, PARASITE, MARINE





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