



EVOLVE

THE ZOOLOGY
SOCIETY

MIRANDA HOUSE

2019-2020

This is an Oriental garden lizard (Calotes). The male garden lizard does push ups to impress females or scare other males in the vicinity. When these terrifying push ups do not do the trick, the male will have to physically fight with his rival. Interestingly, like the chameleon, the garden lizard can move each of its eyes in different directions.

Photograph by- Tanya Bhardwaj, B.Sc. (H) Zoology, I Year

Cover design by- Sumedha Dahiya, B.Sc. (H) Zoology, III Year



The Circle of Life

Nature works in mysterious ways; the hunter becomes the hunted and the predator becomes prey. The deer in the picture eats the leaves of the tree; after its death, its nutrients are utilized by the same tree for growth. The picture symbolizes that nature does not allow anything to go to waste. The waste of one organism is a feast for another. The fallen leaves of the trees are converted to nutrients by the earthworms. These nutrients are then assimilated by the tree for its growth and thus the circle of life is completed. Life rises once again like the sun.

Artwork by- Dr. Yasha Yadav

Assistant Professor

Department of Zoology

FACULTY



Dr. Nisha Vashishta
Associate Professor



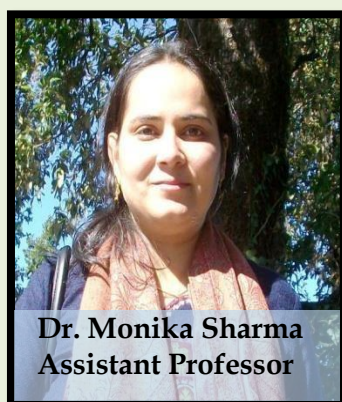
Dr. Rekha Kumari
Assistant Professor



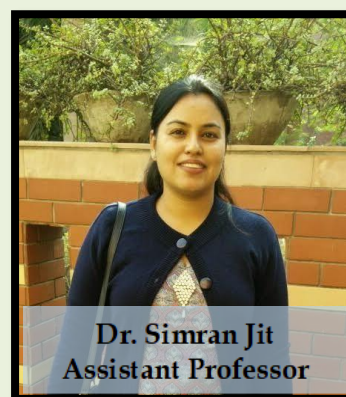
Dr. Jyoti Arora
Assistant Professor



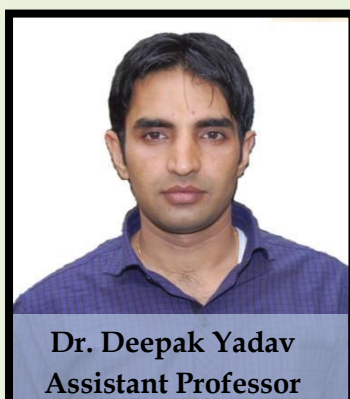
Dr. Sadhna Sharma
Assistant Professor



Dr. Monika Sharma
Assistant Professor



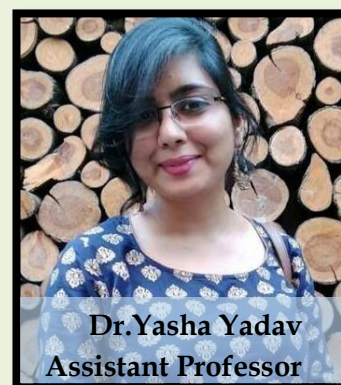
Dr. Simran Jit
Assistant Professor



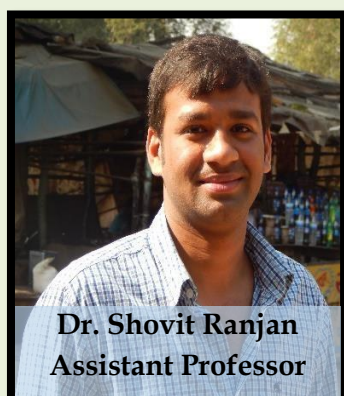
Dr. Deepak Yadav
Assistant Professor



Dr. Pooja Suman
Assistant Professor



Dr. Yasha Yadav
Assistant Professor



Dr. Shovit Ranjan
Assistant Professor



Ms. Saba Zulfiquar
Assistant Professor

LABORATORY STAFF



**RAKESH KUMAR
RAMESH SHARMA
SANJAY DUTT**

**UDAY CHAUDHARY
MUKESH MANIK
DAAN SINGH**

**SURESH PRAJAPATI
PUNEET RANGA
KULDEEP SINGH**

FIRST YEAR



SECOND YEAR



THIRD YEAR



STUDENT COUNCIL



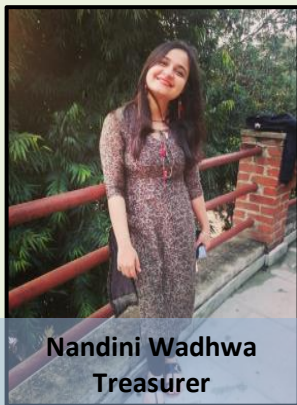
Apoorva Atri
President



Srijan Singh
Vice President



Ayushi Das
General Secretary



Nandini Wadhwa
Treasurer



Devanshee Prakash
Editor



Era Stuti Sharma
Editor



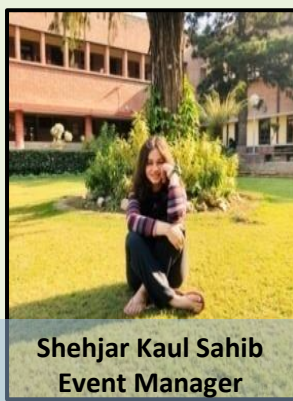
Haripriya Malviya
Co- Editor



Khushi Srivastava
Co-Editor



Muskan Yadav
Event Manager



Shehjar Kaul Sahib
Event Manager

CONTENTS

S.No.	CONTENTS	Page No.
1.	MESSAGE FROM STAFF ADVISORS	1
2.	PRESIDENT'S NOTE	2
3.	EDITORS' NOTE	3
4.	STEREOPSIS- BRINGING SCIENCE INTO PERSPECTIVE	4
	• Thawing Permafrost in the Arctic: A Time Bomb waiting to explode	5
	The Butterflies of my Backyard	6
	• Mitochondria: Self Cannibalizing Mitochondria act as a trigger for ALS	9
	• Psilocybin: Old Magic in New Hands	11
	• Human nature versus nature	12
	• Space Colonisation: a pipe dream?	13
	• Sisterhood is powerful	15
	• Living with the Human Microbiota	16
	• How cells sense and adapt to oxygen availability	16
	• Insect Conservation psychology in the 21 st century	19
	• COVID- 19: The 2020 Pandemic	20
	• Climate Trauma is real	22
	• The Nobel Prize in Physiology or Medicine 2019	24
5.	LA GALLERIA: GLIMPSES OF EVENTS, 2019-20	27
6.	INTERNSHIP EXPERIENCES	33
	• A Battle of Wits and Tech	34
	• Understanding Microbial diversity at Jakrem Hot Water Spring, Meghalaya	36
	• Drosophila in Classroom	37
	• My Experiences in Cell Culture Add-on Course	39

7.	BACHELORS AND BEYOND	41
	• The Journey That I Never Planned	42
	• Stop! Wait a minute: Words from a gap year student	43
	• Living out there: From the diary of a Wildlife biology student	44
	• Biotechnology: A career	45
	• A Note from the Heart	46
	• Stepping into the Wild	46
	• The Wild trails of Uttarakhand	47
8.	TRIVIA AND FUN FACTS	49
	• Some facts about Tigers	50
	• Did You Know?	51
	• International Scientific Discoveries and Inventions of 2019-20	53
9.	BOOK REVIEW	54
	• Vital Signs: Where terror begins	55
10.	FROM THE QUILL	56
	• Musings	57
	• Second Wind	59
	• The Essence of Prayanam	61
	• Speak Up! Why don't You?	61
	• Economic Slowdown in India	64
	• I will rise	64
	• Music or Love	65
	• गांव की कहानी	65
	• मतदान – युवा पीढ़ी के लिए अभय दान	66
	• अधूरी कहानी	67
11.	STUDENTS ACHIEVEMENTS	68
12.	INTO THE WILD	72
13.	TO THE CREATORS	77

MESSAGE FROM STAFF ADVISORS

Greetings to all our readers!

We present to you the 11th edition of *Evolvere*, The Annual Magazine of Department of Zoology, Miranda House. We are delighted with the successful completion of the academic year 2019-20, which was very fulfilling with many activities organized by *Synapse*, our society. The latter part of the academic session was indeed challenging due to the ongoing pandemic. However, effective teaching and learning continued throughout the session. The resilience shown by our students and staff during this time has been commendable.

We congratulate our dedicated editorial team for bringing out this riveting issue of the magazine, which will enthrall everyone. This issue contains contemporary science articles, book reviews, poems, and musings written by our students, faculty, and laboratory staff. The issue also includes glimpses of various events organized throughout the session. The magazine includes a special section, for the students to share their internship experiences. In 'Bachelor's and Beyond,' section the alumni of the Zoology Department have contributed articles narrating their journey since they graduated from Miranda House.

We hope that this edition inspires everyone to continue the quest for science communication and writing. Best wishes to our dear outgoing batch 2017-2020. We wish you success in all your future endeavors.

Staff Advisors

Dr. Simran Jit

Dr. Yasha Yadav

PRESIDENT'S NOTE

Miranda House, one of the best colleges in India, is known to create leaders and as I'm walking out of this college, I can vouch for it without a hint of doubt. Not only has this college made me a better person but being with such wonderful women has made me a more confident and opinionated individual.

Synapse, The Zoology Society of Miranda House believes in bringing out the best in every student and Evolvere, the annual magazine of Department of Zoology is one such platform, where we try to showcase the talents of our students be it writing, drawing or clicking.

With immense pleasure and gratitude, I would like to present you all the 11th edition of Evolvere, hoping that it will successfully communicate all the hard work that was put into its making.

I also take the opportunity to extend my gratitude to Dr. Simran Jit and Dr. Yasha Yadav, the Staff Advisors, for guiding us throughout this year and providing the essential support. Cheers to the editorial team for bringing out this beautiful piece of work and a heartfelt thanks to all the students who contributed in its making.

Lastly, I would like to thank all the readers.

Wishing you all good health.

Apoorva Atri

President

Department of Zoology

EDITORS' NOTE

"Imagination is more important than knowledge. Knowledge is limited. Imagination encircles the world." –Albert Einstein

It gives us immense pleasure to present the 11th edition of Evolvere, the Annual magazine of Synapse, the Zoology Society of Miranda House. Evolvere means to undergo gradual change. This magazine, by its very disposition, stands true to the ever evolving and advancing temperament of science. The current edition of Evolvere brings forth an amalgamation of science and creativity, with a special emphasis on biodiversity. This issue also features articles from Miranda House alumnae, detailing their experiences as determined women making their way in the world.

The current COVID-19 pandemic highlights the staggering but oft ignored impact science in general, and zoology in particular, has on our lives. Evolvere endeavours to offer our readers an insight into the wonderfully breath taking world of animals.

We would like to extend our gratitude to our Staff Advisors, Dr. Simran Jit and Dr. Yasha Yadav and all the other staff members for being our guiding light, inspiring and supporting us through all our endeavours. We congratulate the Editorial board, the Students' Union and the entire Zoology department for the successful completion of this year's edition of our magazine.

The many members of the Synapse community have responded to the Coronavirus crisis in innumerable altruistic, heroic and inspiring ways. Although this issue of Evolvere was largely composed before the pandemic, we hope it reflects our resilience and finds you in good health.

Devanshee Prakash

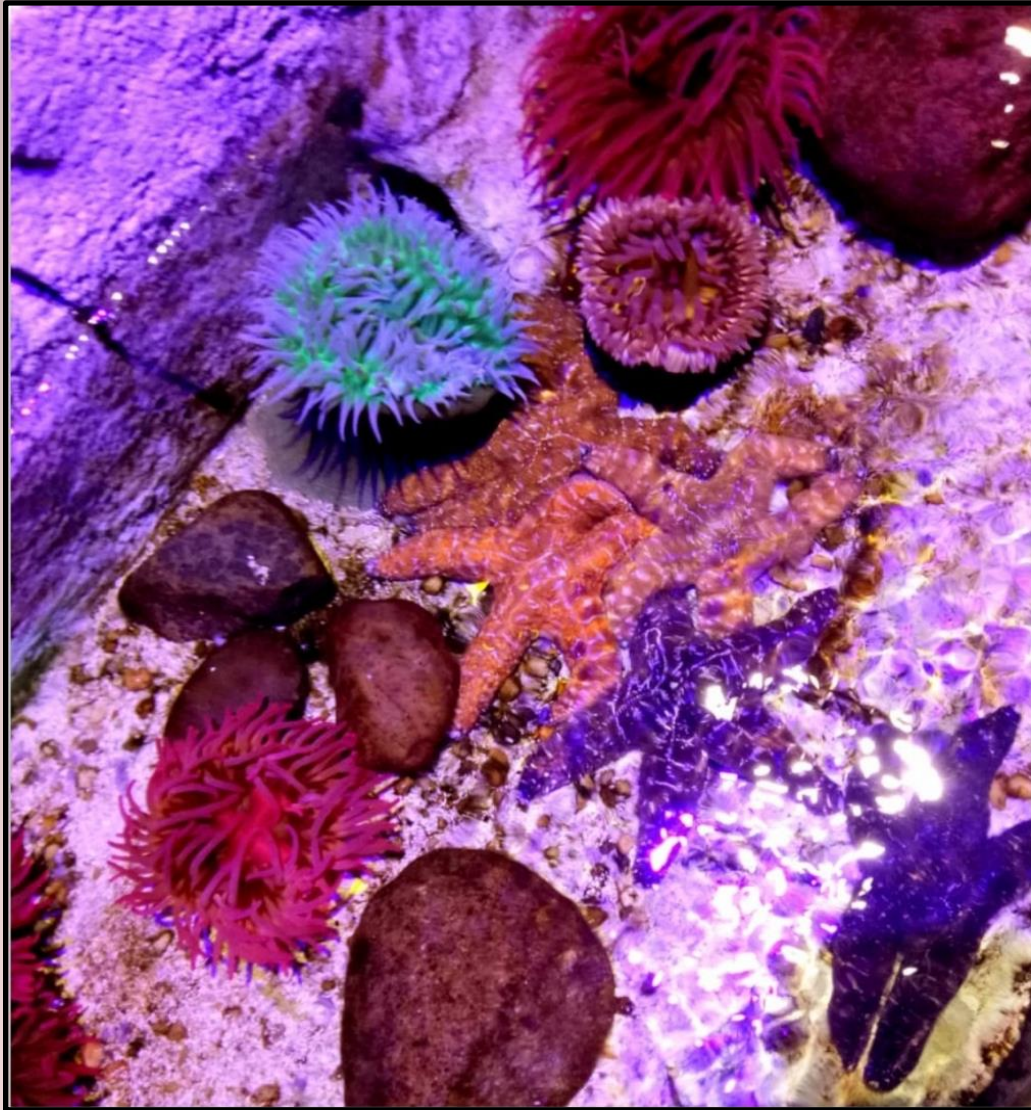
Era Stuti Sharma

Editors

Evolvere (2019-20)

Stereopsis

Bringing science into perspective



Photograph by: Tejaswini Pattnaik, B.Sc. (H) Zoology, 1 year

THAWING PERMAFROST IN THE ARCTIC: A TIME BOMB WAITING TO EXPLODE!

Arctic is warming twice as fast as the rest of the world. Rising air and water temperatures have resulted in a drastic decline in the Arctic sea ice area, extent and volume. Melting ice speeds up the process of climate change as ice reflects sunlight while oceans absorb more sunlight and heat up.

But something even more threatening is happening below the surface in the arctic on land, in the Permafrost. Permafrost is a layer of permanently frozen soil that covers 25% of the Northern Hemisphere. Climate change has been responsible for thawing of permafrost layer. According to an estimate, 2.5 million square miles of permafrost that accounts for 40% of the world's total permafrost could disappear by the end of the century. These changes to permafrost are expected to be irreversible. The situation is really alarming as permafrost keeps the microbes, carbon, poisonous mercury and soil firmly bound and locked at one place, working like a giant freezer.

The upper few inches of the permafrost comprise the active layer that thaws during the summer and again freezes in autumn. Plants grow largely in the active layer of the permafrost as roots cannot penetrate the frozen ground beneath. The global warming is making the active layer thicker and warmer over the years. As the active layer is deepening, the ground is becoming more unstable.

Thawing of the permafrost is expected to release huge amount of greenhouse gases like methane, carbon dioxide and nitrous oxide that will contribute even more to the global warming. Also, it is transforming the Arctic landscape with the ground distorting, folding and caving in at number of spots. The entire arctic region is speckled with thaw slumps, craters, sinkholes or landslides largely due to thawing of permafrost. A crater formed in Siberia is so huge that it has been named as 'the doorway to underworld'. The roads built on top of permafrost are turning into wavy roller coasters throughout the region. After thawing, soil will be exposed to air and get dried up that will increase the incidence of wildfire in the arctic regions.

Microbes lying dormant in the ice for millions of years are beginning to wake up with the thawing of permafrost. These microbes still bear great potential to infect humans with deadly diseases. This is exemplified by an incident that took place in the summer of 2016 when some reindeer herders fell sick due to a mysterious disease. Some suspected it to be "Siberian plague", last seen in the region in 1941. But later, the disease was identified as anthrax that originated from a defrosting reindeer carcass died during an anthrax outbreak that occurred 75 years ago. In fact, it is speculated that diseases like the Spanish flu, smallpox or the plague that have been wiped out from the world might be frozen in the permafrost waiting for them to be unearthed. A recent study demonstrated the revival in the laboratory conditions of a 30,000-year-old virus that was lying frozen within permafrost for 300 centuries. Scientists are worried that as more permafrost thaws disease causing microbes can get into the groundwater that people used. It is not a remote possibility that once long-lost diseases like small pox against which most humans have lost immune defence could revive again. The problem will increase further when warming

will make these areas more accessible to human for doing excavation and mining. These activities will expose humans to variety of microbes hidden there for ages. It is surprising to know that we can catch a disease prevalent among Neanderthal man!

Permafrost also preserves the remains of ancient animals and human history. Thawing will expose these treasures to be degraded by bacteria. It has been observed that after a specimen is unearthed and thawed, researchers have a year to recover it before it is completely degraded by bacteria.

The retreating ice is also exposing frozen plants that were buried in ice since last 45,000 years as suggested by radiocarbon dating. For past thousands of years, the plant matter carbon amounting to 1400 to 1600 gigatons (billion tons) was trapped in permafrost. This is almost equivalent to more than double the amount of carbon present currently in the atmosphere. Thawing of permafrost would expose this plant matter that starts decomposing releasing the potential greenhouse gases, carbon dioxide and methane into the atmosphere. Greater the concentration of these greenhouse gases more will be the magnitude of global warming. According to a recent study, every additional 1°C rise in temperature would disappear 1.5 million square miles of permafrost.

Thawing would release heavy metals, especially mercury and other contaminants that are at present locked in permafrost. Scientists believe that there is around 15 million gallons mercury frozen in permafrost soils which is almost double the amount found in all other soil, the ocean, and atmosphere combined. These contaminants will impact the water quality in both freshwater and marine ecosystems and these contaminants also tend to accumulate and magnify along the food chain.

The only one advantage of the thawing permafrost is that farming is now possible in parts of arctic. But the negatives associated with the thawing permafrost outweigh the benefits. The fate of arctic is dependent on the level of carbon emissions. If we don't put a check on global warming then the arctic will be releasing more carbon to the atmosphere enhancing the positive feedback loop!

Dr. Jyoti Arora

Assistant Professor

Department of Zoology

THE BUTTERFLIES OF MY BACKYARD

A butterfly may be just another insect for most of the people but for me, it's my passion. It's been a year observing these creatures in my backyard. These insects belong to Lepidoptera order. They have 2 pairs of membranous wings covered with flat, minute overlapping scales. These scales give a distinct colour and pattern to the wings. These are holometabolous insects whose life cycle consists of egg, larva, pupa and adult. Larvae and adults are completely different biological entities with different structure, feeding habits and host plants. Larvae for instance, generally

feed on leaves of its host plant while the adults generally feed on nectar of flowers. Most of the butterflies are said to have coevolved with angiosperms.

Butterflies are indicators of ecosystem health and wealth. Any change in the environment will directly affect species composition of butterflies. They are effective pollinators and help in pest control. They produce chemicals which may be economically important. They are used as model organisms to expand our knowledge in various fields of biology. They are aesthetically important. Their mention can be found in ancient art and literature. Because of their aesthetic appeal, they are considered flagship species for conservation.

Currently, we are witnessing a decline in butterfly populations around the world. There is direct and indirect evidence suggesting that habitat fragmentation and degradation, introduction of alien species, application of pesticides and many such factors are responsible for the decline in butterfly populations. The first step to conservation is awareness. The purpose of this article is to spread awareness about the butterfly species which I could observe and document this year in my backyard.

***Spindasis vulcanus vulcanus*- Indian Common Silverline**



October 2018: I came back home after class and saw this Common Silverline butterfly resting on one plant. I kept my bag aside, took out my phone and captured the picture of this butterfly. These are small sized butterflies. The underside of the wings is light yellow with reddish brown bands bordered with brown or black colour. These bands have a silver line in the centre. The upper side of wings have brown and orange markings. The hind wings have an orange mark at the base with white tipped antennae like tails. These give a head like appearance to the base of hind wings which is used to deceive predators. The larval host plants include *Carissa carandas*, *Cadaba fruticosa*, *Dioscorea wallichii*, *Diospyros montana*, *Cassia fistula*, *Clerodendrum inerme*, and many more.

***Papilio polytes romulus*- Indian Common Moth**

January 2019- March 2019: While brushing my teeth in the morning, I saw its larva on a lemon plant. Later, I clicked its picture and showed it to my teachers who helped me to identify this butterfly. I started observing it on a daily basis. The collage shown here shows the journey larva into its adult form. In February, I could observe eggs and different larval stages. The larval host plant includes citrus plants. The eggs are pale yellow in colour and globular in shape. As the larva develops, the egg colour fades and the head of the larva could be seen in the egg. The first instar after hatching from the egg, eats the egg shell. It is light brown in colour. On day 1, it is sluggish. As it develops, white coloured bands appear on the 1st and last abdominal band. It becomes active on day 2 and feeds on small, young leaves at the apex of branches. This stage lasts for 2-3 days. The larva undergoes ecdysis and moults into the 2nd instar. It is similar to 1st instar but the white bands widen. This stage also lasts for 2-3 days. It undergoes ecdysis and moults into 3rd instar. The white bands extend to lateral sides of the body. The body colour is greyish green. It

undergoes ecdysis and moult into the 4th instar. This is similar to 3rd instar but it is more voracious feeder. The 1st to 4th instar larvae appear like bird dropping and thus help in deceiving the predator. The 5th instar larva appears green in colour and has a spongy body. The head appears similar to viper snake head and thus offers protection from predators. The body has white stripes with brown spots in it. The larva at this stage is highly voracious. As it matures, it searches for a suitable place for Cocoonation. Once it finds a suitable place, it becomes inactive and its cuticle dries up. After 6-7 hours, it undergoes 4th moulting and cocoon formation. The pupa undergoes metamorphosis. The cocoon dries up and the butterfly could be seen in it. Soon, the butterfly emerges from the cocoon. For some time, it remains inactive as its wings are wet. The males are monomorphic and females are polymorphic. The males have white streaks between veins. The females have red eyespots in addition to white streaks.

Chilades pandava pandava- Oriental Plains Cupid



May 2019- present: My semester 4 exams were going on. It was Sunday. Around 7 pm, I took a break. I went for a walk in my backyard and saw these butterflies mating. I brought my camera and captured this behaviour. With the help of my teacher and Butterflies of India website, I identified this butterfly. After a few days, I saw one female butterfly laying eggs (shown in first picture). These butterflies are small and are generally called blues or cycad blues or plains cupid. Their host plants include *Cycas* sp., *Bauhinia* sp., *Saraca asoca*, *Canavalia gladiata*, and *Holoptelea integrifolia*. Their eggs are turban shaped and laid at the underside or edge of leaves. The larvae are elongated and flattened. They can be green or reddish-purple in colour. The head capsule is black in colour. Longitudinal lines extend throughout the body. They show positive association with ants (Myrmecophily). The ants feed on sugary fluid secreted from gland located at the dorsum of 7th abdominal segment. The ants guide the larvae to pupation sites. The larvae under pupation in rolled leaves or create tunnels in leaves. There the pupa undergoes metamorphosis to form the adult. The adult forms show seasonal polyphenism that is they have wet and dry season form. The upper side of wings is brown with scanty blue colour at base of the wings in females and pale-violet blue in males. The underside of the wings is grey- brown. Outerside has a thin line composed of light brown spots. There are cell end bars. Near the base of hind wings, 4 spots are present. The torus has 2 black and blue centered orange spots. These orange crowned black spots are absent or greatly reduced or without orange colour in dry season form.

Pseudozizeeria maha maha- Himalayan Pale Grass Blue

August 2019: I first observed this butterfly on 11th May around 3pm. After having lunch, I went for a walk in my backyard. I saw this butterfly resting on one plant and clicked its picture. Using Butterflies of India website, I identified this butterfly. Its host plant is *Oxalis corniculata*. A fully grown larva is green in colour with dark green dorsal line. Larger caterpillars are sometimes

attended by ants. Pupal stage lasts for 7 days. Adult forms have distinct wet and dry season forms. The upper side of wings is pale blue with broad dark borders. The underside of wings is greyish brown with small rounded black spots.

***Saustus gremius gremius*- Indian Palm Bob**

May 2019: While walking in my backyard, I saw this butterfly and captured its picture from all angles. I found it resting on *Oxalis* sp. These butterflies are called skippers. The wings are pale brown. They are sharply defined small black spots- 3 in 1 line and 2 opposite to the 3 spots. They have semi-transparent spots.



Sakshi Saini

B.Sc. (H) Zoology, III year

MITOAUTOPHAGY: SELF CANNIBALISING MITOCHONDRIA ACT AS A TRIGGER FOR ALS

Amyotrophic Lateral Sclerosis is a progressive neurodegenerative disease that affects nerve cells in the brain and spinal cord, causing loss of muscle control. Scientists have discovered a new occurrence in the brain that could explain the development of early stages of neurodegeneration seen in ALS. This phenomenon is called Mitoautophagy, the mechanism of self-destruction of mitochondria in diseased upper motor neurons of the brain that begin to disintegrate at a very early stage of disease.



“Amyotrophic” translates to “no muscle nourishment”. In ALS, progressive degeneration and eventual demise of motor neurons occurs. Motor neurons reach from the brain to the spinal cord and from the spinal cord to muscles throughout the body. Their degeneration leads to loss of the brain’s ability to initiate and control muscle movement. The motor neurons affected in ALS are the ones that control voluntary muscle movement. To put it in simple words, ALS “kills” motor neurons, causing muscles to weaken and eventually paralyse. As a result, patients lose the ability to speak, eat, move and breathe.

Mitoautophagy explains how neurons become primed for future degeneration and eventually lead to the development of ALS in patients. This phenomenon is exhibited by mitochondria of upper motor neurons, which are located in the brain and send messages to the spinal cord. Mitochondria are powerhouses of the cell that create and maintain energy in the cell. In the diseased upper motor neurons, mitochondria self-destruct by first elongating, then forming a ring like structure until they finally disintegrate from the inside out. These suicidal mitochondria eat themselves up very early in the disease. This occurs selectively in neurons that will soon disintegrate in the patient’s brain.

Mitoautophagy may be one of the first deficits leading to motor neuron degeneration associated with TDP-43 clumps. Accumulation of toxic TDP-43 aggregates inside diseased nerve cells is a distinctive trait of ALS. TDP-43 is a protein that regulates RNA. These clumps have been found in 90% of patients with sporadic ALS and in patients with mutations in several ALS-associated genes, including TARDBP (which has the instructions to produce the TDP-43 protein) and PFN1.

In order to overcome neurodegeneration, it is imperative to improve the health and stability of mitochondria. If the health of mitochondria is improved early, it may also be possible to eliminate protein aggregate formation. This indicates that available therapies against mitochondrial degeneration might be repurposed to treat neurodegenerative diseases like ALS. It may not be necessary to reinvent the wheel to cure ALS and other neurodegenerative diseases.



Image Source: 1. Karlos-Stock.adobe.com,
2.Science Photo Library

Devanshee Prakash

B.Sc. (H) Zoology, III year

PSILOCYBIN: OLD MAGIC IN NEW HANDS

Psilocybin or 4- phosphoryloxy- N, N- dimethyltryptamine is a psychoactive hallucinogenic chemical found naturally in 'magic mushrooms. The genus *Psilocybe* contains the majority of species of the psilocybin mushroom; *Pluteus*, *Gymnopilus*, *Paneolus* are some of the genera containing these mushrooms. Hallucinogenic species of mushrooms have a long history of usage for ritualistic and religious purposes in many native populations. Prehistoric art and culture reveal the deep-rooted association of these fungi with mysticism and spirituality.

Psilocybin acts as an agonist and activates the 5-HT_{2A} serotonin receptors in the brain producing dream-like effects with enhanced awareness being the basis of the hallucinatory experience. When ingested, the compound is broken down into Psilocin, which is responsible for the psychedelic effects. Euphoria, visual and auditory hallucinations, altered perception of time and space, a feeling of oneness with the surroundings and occasional synesthesia are the chief effects of psilocybin consumption. Although the experience is highly subjective and personal, described differently by all users.

With the surge in consumption of psychedelic drugs during the counterculture movement of the 1960s psilocybin usage gained momentum for recreational and spiritual purposes, making the drug widely popular along with LSD. This period also witnessed some efforts being made to study the psychiatric and clinical effects of the chemical. However, before any significant discoveries could be made regarding the long-term cognitive effects of the drug it was classified as a Schedule I drug in the United States, effectively banning it from being used in research. Other countries followed suit and subsequently the drug was vastly illegalized, impeding any progress in the discovery of its medicinal and therapeutic benefits.

Over the last decade, with increasing support for relaxed drug policies, various trials and studies of the chemical have found it to cause long-term positive effects against anxiety and depression, even in cases where conventional methods were not helpful. Unlike conventional antidepressants it does not create physical or psychological dependency and there is no evidence of negative impact on cognitive functions. Anecdotal evidence suggests that the drug helps overcome alcohol and nicotine addiction. Majority of participants report their experience of the drug as a highly positive one.

Psilocybin has passed its first safety clinical trial in 2019 and is on its way to soon becoming a licensed treatment for depression. The ever-increasing efforts for legalisation and decriminalisation of magic mushrooms and the widespread support in the medical community for psilocybin usage paves a way for the many benefits of the drug to be accessible to all.

Era Stuti Sharma

B.Sc. (H) Zoology, III year

HUMAN NATURE VERSUS NATURE

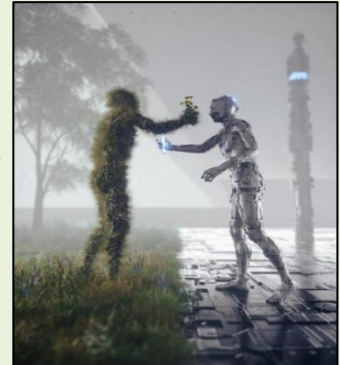
"Cherish the natural world because you're part of it and depend on it."

-Sir David Attenborough

Blessed by the serene ingenious design of god is the jewel of this planet-"Nature". Life on this planet is supported and sustained in the lap of nature.

However, the nature of this planet is contrary to human nature. One of the truths is that earth's resources are limited and will fade away very soon, with an ever-increasing human population, resource exploitation, and urban expansion. Humans would be left with towering iron pillar buildings, no clean air to breathe, no clean water to drink and often to face the enmity of the environment.

Human activity is completely altering the environment, from massive deforestation to the release of harmful gases into the atmosphere.



I don't call human expansion and urbanization a boon for us if it leads to so much damage at the cost of nature. Is this the development we keep referring to?

It is well said, "Humanity is doomed to destroy itself". Population expansion and resource depletion will soon become a limitation of the planet and result in a collapse of civilization. I believe that this kind of development is no longer sustainable as it is more degradation than conservation.

Humans are putting the lives of millions of people, animals, and innocent birds at stake. Human beings are not able to understand the need of the hour, leading to continuous self-destruction. The human population is about to plunge into a time of great darkness. If the felling of trees, soil erosion, failed crops and flooding continues uninterrupted, the entire civilization will fail to sustain.

"Do not offend Mother Nature or she will hurt you." She shows her anger in the form of disastrous storms, hurricanes, floods, earthquakes that take away the lives of many, not only of individuals who are responsible but also of many innocent animals and birds.

I feel that the power of nature is stronger as compared to human's power of converting a green land into ruin. Nature can wipe away whole civilizations at a time. It is very disappointing that we are unable to preserve the beauty rendered to us. We often get awestruck and mesmerized by just looking at the ice-capped mountains, hot springs, lush green beauty, but we often fail to preserve the same.

A recent report released on September 12, 2019, stated that a total of 7 million people have been displaced globally due to natural disasters including storms and floods. The number is estimated to more than triple by the end of the year to around 22 million.

Therefore, humans should channelize their energy for the good of all, for promoting a healthy and functional ecosystem, protecting wildlife, doing every bit to conserve and save “Mother Nature.”

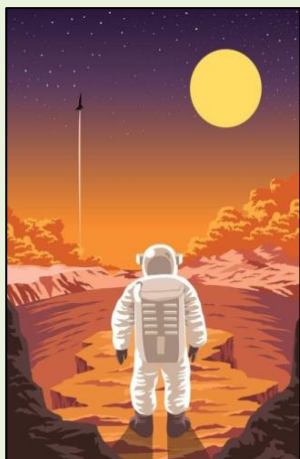
Teeksha Wadhwa

B.Sc. (H) Zoology, III year

SPACE COLONISATION: A PIPE DREAM?

“Across the sea of space, the stars are other suns.”

- Carl Sagan



With Stephen Hawking saying that earth may end in the next hundred years to Elon Musk inventing cheaper spaceships, the question arises: Is it really possible to colonize space?

When we look back a few years ago, even communicating with mobile phones was a mirage, but now it has become the lifeline of the entire population. Similarly, if we reject the idea of space colonization, we eliminate the very basics of science thinking that it is beyond imagination. Also, the situation doesn't seem that difficult. Before looking at the possibilities of space colonization we must reflect upon the need for Space Colonization. Firstly, it is the duty of the human race to sustain life, for nature has already taken billions of years to start life

and hence humans bear the responsibility that nature should not undergo the complete process again. Secondly, space colonization is important to mitigate the negative effects of overpopulation. If the resources of space were opened to use and viable life-supporting habitats were built, Earth would no longer define the limitations of growth. Many of Earth's resources are non-renewable so off-planet colonies could satisfy the majority of the planet's resource requirements. With the availability of extra-terrestrial resources, demand on terrestrial ones would decline. We are not even lacking in terms of technology.

1. Technologies like test tube babies, lab cultures and many more are enough to tell that humans can create as well as live in artificial environments. Changing the environment to become a life-friendly habitat is called TERRAFORMING. It is thought that Mars had a more Earth-like environment early in its history, with a thicker atmosphere and abundant water that was lost. Given the foundations of similarity and proximity, Mars would make one of the most plausible terraforming targets in the Solar System.

2. Changing organisms to become more compatible with the environment with help of technologies like genetic engineering, transhumanism, cyborg can also be done.

3. The climate change induced in the near term is likely to be driven by greenhouse warming due to an increase in atmospheric carbon dioxide (CO₂) and a consequent increase in atmospheric water vapour. These two gases are the only likely sources of greenhouse warming that are available in large quantities in the Mars environment. Large amounts of ice exist below the Martian surface, as well as on the surface at the poles, where it is mixed with dry ice. Electrolysis could be employed to separate water on Mars into oxygen and hydrogen if sufficient liquid water and electricity were available.

These examples prove that we are very much technologically advanced to think about space colonization. Though there are many things which provide a very strong foundation for us to work on this dream, there are many other factors which make this dream mere imagination.

To begin with, let's talk about the rockets we send into space. It takes millions of dollars and many years to send one single rocket. So, the first problem that arises is transportation of such a large population to another planet. Human beings cannot survive alone. They need a complete ecosystem to survive. Even if we develop the cheapest of spaceships and spacesuits, it won't be possible to take along all the bacteria, fungi, algae, plants and other organisms with us. If we decide to take only a few human beings to space, what will the criteria to select these people be? Even if we reach a selection procedure, won't it just add to social disparities we are facing now between rich and poor, literate and illiterate, developed and developing, to name a few.

Our Earth has the optimum temperature, distance from the Sun and atmosphere to sustain life. And one of the important key factors is availability of ozone which protects us from harmful radiations of the Sun. Residing on some other planet will simply expose us to injurious radiations which are capable of causing cancers and skin diseases. Despite all the odds, even if we are able to develop an 'earth-like environment' on another planet, will it ever become possible to properly colonise some other planet when we have not been able to colonise Earth even after these million years. Yes! What type of colonization is this in which there are so many poor who can't even fill their stomach once in a day? What type of colonization is this where a major part of the economy is shared only by 5% rich people? What type of colonization is this when one third of the population doesn't even have a home to live? So, let's colonise Earth first.

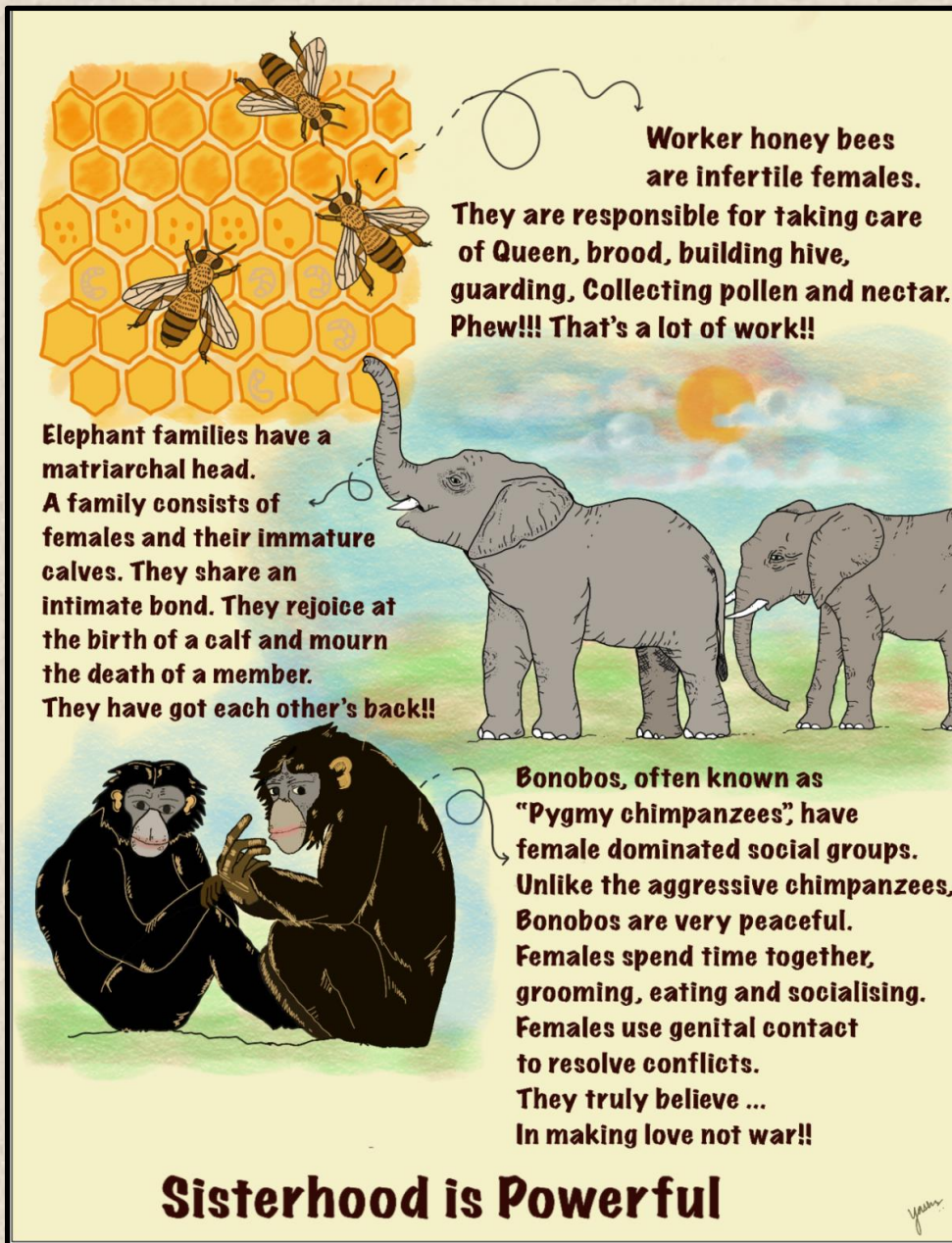
Space Colonization may be possible but sustainable development is a much easier and effective way to make this civilization work. After all, it is rightly said:

"LET'S NOT GO BOLDLY

LET'S STAY BOLDLY"

Geetika Verma

B.Sc. (H) Zoology, 1 year



Artwork by - Dr. Yasha Yadav

Assistant Professor

Department of Zoology

LIVING WITH THE HUMAN MICROBIOTA

Our bodies harbour a wide variety of microorganisms, both inside and out, which are collectively known as the human microbiota or the human microbiome. Surprisingly, these microorganisms outnumber human cells by a factor of 10 to 1 and make up about 1 to 3 percent of the body's mass. Does this mean that we are not human? Nowadays, the concept of superorganisms or holobionts, with interacting microbial and human cellular and genetic components, is being popularized.



These organisms are first acquired at the time of birth and then subsequently from our surrounding environment. Different communities, too, have different types of microorganisms. The kind of microorganisms present on/in our body also depends on the food we eat. For example, a North-Indian family and a South-Indian family with contrasting food habits also have strikingly different kinds of microorganisms in their body.

Our microbiome has a huge impact not only on our health but our thoughts and behaviour too. People with obesity have microbes different from those present in the gut of a lean person. The microorganisms present on our skin are supposed to affect our BMI. The gut microbiome has a measurable impact on the brain, influencing stress, anxiety, depressive symptoms and social behaviour. People with large social networks tend to have a more diverse microbiome. In contrast, anxiety and stress are linked to reduced diversity and an altered microbiome composition.

Today, scientists are making tailored probiotics, nutritional and faecal transplants to match the individual's need. The time is not far when we will get our own personalized probiotics to lift our mood.

Kritika Arora

B.Sc. (H) Zoology, 1 year

HOW CELLS SENSE AND ADAPT TO OXYGEN AVAILABILITY



"People take oxygen for granted because it's just there and we use it all the time"

-Dr. Donald E. Canfield

Oxygen makes up about one fifth of the volume of Earth's atmosphere and is vital for sustenance of life on Earth. In mitochondria oxygen is used for oxidation of food to generate energy that is required for the body to function.

In our body oxygen levels can vary in different parts, at different times, for instance during exercise, at high altitudes or after a wound that disrupts the blood supply and when the oxygen level drops cells have to rapidly adapt their metabolism. Both environmental and physiological status of the body determines the oxygen availability to cells. For example, at higher altitudes the availability of oxygen decreases. This is especially important to mountain climbers for adapting their bodies to high altitude in order to increase the oxygen carrying capacity in blood. This is essential for avoiding altitude sickness and other altitude related health issues such as pulmonary and cerebral diseases.

One way of adjusting the body's oxygen supply in general is by adjusting the breathing rate. Carotid arteries are the major blood vessels present in the neck which contains carotid bodies that check the oxygen level in passing blood. When the oxygen levels are low these carotid bodies send signals through nerves to increase the breathing rate. Similarly, when the oxygen levels are too high, they send signals to slow the breathing rate. They help in the overall amount of oxygen getting into the lungs and blood circulation but they alone can't monitor and adjust the oxygen that is getting to more local levels in the body.

Oxygen is important for cells to survive, but they don't always have the steady oxygen supply. So how does the human body cope with these constant and rapid fluctuations? This question is answered by three physician scientists, Dr. William G. Kaelin, Sir Peter J. Ratcliffe and Dr. Gregg L. Semenza.

They worked independently to explain how cells sense and adapt to changing levels of oxygen in the atmosphere or their surroundings. They discovered the molecular machinery that regulates the activity of genes in response to varying levels of oxygen. In 2019 they received the Nobel Prize in Physiology or Medicine for this ground-breaking discovery.

Erythropoietin (EPO) is a hormone that is produced by kidney cells. Earlier research has already shown that it is secreted in response to low oxygen concentration. However, it was still a mystery how the oxygen level regulates the EPO level in the body.

Semenza and Ratcliffe studied the regulation of EPO. Both the research teams found that it is not just kidney cells but all the tissues have the ability to sense oxygen levels. Semenza, along with his team, worked on the DNA sequences near the genes that code for EPO and continued his research to understand how EPO is regulated. The hooray moment came to him when he found the protein sequence that binds to the identified DNA segment in oxygen manner. He called it HIF - hypoxia inducible factor. The team eventually realized that HIF consists of two different proteins, HIF-1 α and ARNT that can bind DNA. A series of experiments showed that this protein

complex is responsible to turn on certain genes and boost the EPO production in response to hypoxia.

Meanwhile, Kaelin and team were researching something seemingly unrelated, von Hippel-Lindau's disease (VHL disease). In normal conditions the VHL gene prevents certain cancers from developing. However, during this hereditary condition there is a mutation in the VHL gene which increases the risk of different cancers. Kaelin's work is an example of how the magic of science has the propensity to change the way we want to conclude things and in a better way in most cases. He and his team ultimately found that the VHL gene also plays a role in regulating the response to low oxygen levels.

It was Ratcliffe and his group who found the link between the VHL gene and HIF. He discovered that the protein expressed by the VHL gene interacts with the HIF-1 α , turning off responses to low-oxygen conditions by marking the HIF component for destruction once oxygen levels rise. Now the question was how oxygen levels influence this interaction and subsequent HIF-1 α degradation.

The answer to this mystery puzzle was prolyl hydroxylation. In 2001, both Kaelin and Radcliffe published a paper explaining this. During prolyl hydroxylation hydroxyl groups are at two specific positions in HIF-1 α . This protein modification is responsible for the binding of the VHL gene with HIF-1 α , which leads to its degradation. This process takes place under normal oxygen level. In the absence of oxygen, this modification is blocked, kick-starting the activity of HIF.

The work of these Nobel laureates has laid the foundation for researchers to develop drugs for the treatment of various diseases by targeting oxygen sensing processes like anemia, which results in low oxygen levels, coronary artery disease and cancer. While clinical trials of various drugs are going on with the aim to help heart disease and lung cancer patients who struggle to get enough oxygen into their bloodstream.

According to Kaelin, "The most dangerous result in science is the one you were hoping for, because you declare victory and get lazy." Being a cancer researcher he, especially, has taken his field to task for pursuing possible cancer treatments that are not secured by strong evidence.

Priyanka Shankar

B.Sc. (H) Zoology, 1 year

INSECT CONSERVATION PSYCHOLOGY IN THE 21ST CENTURY

In a rapidly changing world, insects have been immensely successful as an animal group but remained ignored for long in academic pursuits and policies for conservation and proliferation. It may be due to our psychological bend towards vertebrates and the vastness of insects, as the largest animal group, constituting more than half of all known living species and more than three fourth of animal species on earth.

With indications of rapidly changing climate, time has come to aggressively develop insect conservation psychology and research in the 21st century to protect this successful animal group from possible threats of climate change.



Characteristically, insects have jointed body parts and are generally six legged for which they are classified under Phylum *Arthropoda* and Subphylum *Hexapoda*. These small terrestrial invertebrates are armoured with a hard exoskeleton made of chitin, which is internally connected to muscles for mobility. Presence of compound eyes, a pair of antennae, wings and presence of stinger in some cases are other noticeable features.

Internal system has stomach, heart, excretory and respiratory organs. A pair of silk glands is the unique organ feature seen only in *sericigenous* insects such as *Antheraea mylitta* & *Antheraea paphia* (the Indian Tussar Moth), *Philosamia ricini* (Eri Silk Worm), *Antheraea assamensis* (The Indian Muga Moth), *Bombyx mori* (The Chinese Mulberry Silk Worm).

Insects are cold blooded animals, devoid of lungs. *Diapause* is an adaptive phenomenon seen in many insects during winter, with the shedding of leaves of their food plants in the natural habitat. The pupae of Indian Tussar Moth, *Antheraea mylitta* undergo diapause for a period stretching up to six months or more. The Chinese Mulberry Silk Worm, *Bombyx mori* exhibits egg diapause.

The class *Insecta* has many orders of which *Lepidoptera* (Moths and Butterflies) is the most widespread and widely recognised insect order constituting 10% of the known species of living beings. The other *speciose* orders are *Coleoptera* (Beetles), *Diptera* (Flies), *Hymenoptera* (ants, bees & wasps) and *Hemiptera* (Bugs).

Spiders, scorpions and similar type creatures including centipedes are generally confused as insects. They are not insects but *Arachnids* in the subphylum Myriapoda under the phylum *Arthropoda*.

Thus, insects have become the most successful animal group by developing habitation-based adaptability, evolution of wings and winglets and the lack of flying vertebrates which could have posed a possible survival threat.

However, harmonious coexistence is gradually being threatened across hemispheres due to various extraneous factors, including over exploitation of natural resources and likely vulnerability to rapid climate changes. The recent incident of catastrophic bushfires in Australia has wiped out more than two billion animals including insect fauna and its natural habitat. Threat of blaze is still imminent. The Amazon forest, which stands as a bulwark against climate change, was burning six months ago, brutally destroying wildlife.

Therefore, the time has come for the international bodies like the International Union for Conservation of Nature-Species Survival Commission (IUCN/SSC) and associated agencies to aggressively engage in inculcating insect conservation psychology and research in the 21st century world. Realising that the most successful animal group does not fall victim to *speciositic* apartheid and is rightfully protected from such harrowing and apocalyptic incidents for the benefit of a harmonious nature is very important.

Tejaswini Pattnaik

B.Sc. (H) Zoology, 1 year

COVID-19: THE 2020 PANDEMIC

After a very long semester of assignments, tests and cancelled fests; the mid semester break came as a breath of fresh air. Little did we know that it would bring with itself a global pandemic.

In December 2019, a cluster of pneumonia cases was reported from Wuhan, in the Chinese province of Hubei. The outbreak of a new, highly contagious and fast- spreading virus was eventually reported. In the midst of all other seemingly important economic, political and social crises; the world was suddenly faced with a public health crisis that overshadowed the rest.

The SARS-CoV-2 (Severe acute respiratory syndrome-Coronavirus-2), also known as the Novel Coronavirus is a member of the beta- coronavirus family of single stranded RNA viruses. These viruses are named so because of the crown-like morphology that the spike glycoproteins on their surfaces impart to them. It causes Covid-19 (Coronavirus Disease 19) that has infected more than 2,878,196 people worldwide (as of April 27, 2020). The primary disease symptoms are fever, tiredness and dry cough. Some other symptoms include a runny nose, nasal congestion and body ache. SARS-CoV-2 is a zoonotic virus. Most evidence suggests that bats are the reservoirs of the virus. However, it is not yet known whether there is an intermediate host to carry the virus from bats to humans.

Countries such as USA, Spain, Italy, France and Germany are currently the worst hit by the virus (based on infection rates and mortality rates). Individuals above 60 years of age and having co-morbidities such as hypertension, diabetes, cardiovascular disease and chronic respiratory disease are at maximum risk of developing severe disease. Children and those below 19 years of age have the lowest risk of developing severe disease.

The virus has an incubation period of 7-12 days. It targets the goblet cells and the ciliated cells of the lungs. The mucus secreting goblet cells release sticky mucus that ensures that the lungs do

not dry out and also traps pathogens such as viruses and other foreign particles like dust and pollen. The ciliated cells then mechanically help in clearing out these substances. The virus, via the spike glycoproteins on its surface, binds to the ACE2 receptor of these cells and enters them. Once inside, the virus kills the cells that then slough off and accumulate in the respiratory passages along with other fluids released consequently. This results in respiratory discomfort. This situation triggers the immune response which tries to fight off the virus. At this stage the patient develops a fever and a runny nose with dry cough. In some older patients, this immune response overrides and results in other opportunistic infections and even organ failure.

The virus transmits from person to person via droplet infection and through fomites. When an infected person coughs, sneezes, or talks; his/her respiratory droplets get sprayed into the air. These droplets carry the virus, and when inhaled by others in close proximity, it causes infection in them. Fomites refer to the surfaces such as clothes, utensils and furniture, on which these infectious respiratory droplets rest. The virus particles can survive on these surfaces for up to or more than 24 hours. There are no reports to confirm the airborne spread of the virus.

One of the major reasons why this particular virus is spreading so fast is because of the possibility of asymptomatic transmission. The flu-like Covid-19 symptoms do not appear as soon as an individual is infected. However, even at this point when the symptoms have not yet manifested, the individual can spread the virus.

Testing for Covid-19 is done in two ways. There are diagnostic tests and antibody/serologic tests. A body fluid sample such as a blood sample, a sputum sample or a nasal aspirate is collected first. These are then subjected to testing. Diagnostic tests function by detecting the virus. RT-PCR (Real time polymerase chain reaction) is being mainly used for the diagnostic tests. On the other hand, antibody tests detect the antibodies that our body produces in response to the virus. Recently some paper-based testing kits have been developed by scientists at the CSIR-IGIB. These kits use Crispr-Cas9 technology to detect antibodies. Similar, to pregnancy test kits, these kits also give instantaneous results and cost below Rs.500.

Several vaccine development and trials are underway. The USA based biotechnology company- Moderna has developed an mRNA vaccine called mRNA-1273 that is now in the Phase-1 of human vaccine trials. When introduced in the human body, the mRNA present in this vaccine produces viral proteins similar to those that the SARS-CoV-2 produces upon infection. This helps the immune system to establish memory regarding how to fight the pathogen if it ever comes across it in the future. Other companies such as China based CanSino Biologics Inc. have created a vaccine that has reportedly completed Phase-1 trials. In a disclosure to the Hong Kong Stock Exchange, the company says, "Ad5-nCoV is a genetic engineered vaccine candidate with the replication-defective adenovirus type 5 as the vector to express SARS-CoV-2 spike protein, which intends to be used to prevent the disease caused by the novel coronavirus infection." Among numerous other vaccine candidates, some other current forerunners are Inovio and Schenzen Geno-Immune Medical Institute.

There are no drugs with proven efficacy against Covid-19 as of now. Symptomatic treatment until the body is itself immune to the virus is being practiced. Certain drugs and their combinations

are thought to be effective for Covid-19 treatment, however, there is no solid scientific evidence to support their safe and universal use, yet. These include, chloroquine, hydroxychloroquine, azithromycin, remdesivir, ritonavir and some interferon-based drugs.

Laboratories and pharmaceutical companies all over the world are in search of a suitable drug. In-silico (computer based) models and libraries of compounds are being scanned to find those that can destroy this virus. Many of the approaches to finding a proper drug are aimed at finding a compound that can interfere with the activity of the S spike glycoprotein of the virus.

Considering, the absence of a viable vaccine or drug, coupled with the lack of testing in many countries, prevention of disease transmission is of utmost importance. By following general health and personal hygiene guidelines issued by the WHO, NIHs and CDCs; and by practicing physical distancing, one can save oneself and their close ones from this disease.

Ritika Mukherji

B.Sc. (H) Zoology, 1 year

“CLIMATE TRAUMA IS REAL”

Last summer in Chennai, locals were praying for a few rains; in Mumbai, people were reeling under a deluge. Long ago, these extreme disparities may be solely blamed on nature's vagaries, but now science has established that human-induced temperature change is playing a serious role. Temperature change, caused by emissions from industries and other human activities, is making the earth warmer, disrupting rainfall patterns, and increasing the frequency of maximum weather events. No country is resistant to these forces, but India is especially vulnerable.



There is no denying the actual fact that our surroundings are changing and none of us is unaware that through our actions, we are destroying habitats and endangering the lives of future generations. In 2018-19, as many as 2,400 Indians lost their lives to extreme weather events like floods and cyclones, according to the environment ministry. The India Meteorological Department (IMD) says these events are increasing in both frequency and

intensity. Extreme events could also be the most tangible and immediate impact of climate change, but another more long-term and equally dangerous effect is rising temperatures. In India, according to IMD data released by the statistics ministry, average temperatures have increased by 0.6 ° C between 1901-10 and 2009-18. At an annual level, this could seem trivial, but projections deeper into the future paint a more alarming picture. For example, the World Bank estimates that, if climate change continues unchanged, then average temperatures in India could reach as high as 29.1° C by the tip of the century (up from 25.1° C currently). A primary channel for the autumn in incomes comes from climate change's effects on farmers. The monsoon and suitable temperatures are crucial factors for farmers. Hotter weather and disrupted rainfall destroy crop yields and, consequently, their incomes. In line with the 2017-18

Economic Survey, extreme temperatures and droughts shrink farmer incomes to the tune of 4-14% for key crops. This is successively affecting the Indian Economy.

India made several commitments under its Nationally Determined Contributions (NDC) in the 21st session of the conference of the parties (COP 21) of the United Nation Framework Convention on Climate Change held in Paris in November and December 2015. The country had set a goal to scale back greenhouse gas emission intensity of its GDP by 33-35 per cent below 2005 levels by 2030 and to higher adapt to climate change by enhancing investments in development programmes in sectors susceptible to climate change. It was pledged that 40 per cent of India's power capacity would be supported on non-fossil fuel sources and therefore the country will create a further 'carbon sink' of 2.5 to 3 billion tonnes of CO₂ equivalent through additional forest and tree cover by 2030.

Over the last decade, our country has pursued policies and publicly funded programs focused on energy conservation and deployment of renewable energy technologies. A number of these are:

- a) Reforming Energy Markets (Electricity Act 2005, Tariff Policy 2003, Petroleum & Natural Gas Regulatory Board Act, 2006, etc.)
- b) New and Renewable Energy Policy, 2005: The policy promotes adoption of sustainable and renewable energy sources. It facilitates speedy deployment of renewable technology through indigenous design, development and manufacturing.
- c) Rural Electrification Policy, 2006: The policy promotes renewable energy technologies where grid connectivity is not possible or cost-effective.
- d) Biodiesel Purchase Policy: It mandates biodiesel procurement by petroleum companies.
- e) Ethanol Blending of Gasoline: The regulation mandates five percent blending of ethanol with gasoline from 1 January 2003 in nine states and four Union Territories.
- f) Energy Conservation Act, 2001: The legislation aims to scale back specific energy consumption in different sectors. It set up the specialized Bureau of Energy Efficiency (BEE).

With all these facts stated, the good news lies in the fact that the problem of Climate Change in India could still be controlled if the right steps are taken at the right time. A little awareness among people and a small initiative from their side could do a lot. Turning towards solar-powered lighting, installing household and community biogas units to power clean-burning methane stoves, replacing conventional wood-burning stoves with more efficient ones could go a long way in halting climate change. On a larger scale, implementation of low carbon farming programs in the country, appreciating methodically and economically sound climate-smart farming techniques through use of information technology (IT) platforms like smart-phone apps could make a great difference to the situation.

Anamika Yadav

B.Sc. (H) Zoology, 1 year

THE NOBEL PRIZE IN PHYSIOLOGY OR MEDICINE 2019

- The Nobel Prize in Physiology or Medicine 2019 was awarded jointly to William G. Kaelin Jr, Sir Peter J. Ratcliffe and Gregg L. Semenza "for their discoveries of how cells sense and adapt to oxygen availability."



William G. Kaelin Jr



Sir Peter J. Ratcliffe



Gregg L. Semenza

William G. Kaelin Jr.,

American Nobel Laureate physician-scientist is a professor of medicine at Harvard University and the Dana-Farber Cancer Institute. His laboratory studies tumour suppressor proteins.

Born : November 23, 1957
New York City, New York, U.S
Education : Duke University (BS, MD)
Fields : Oncology

Sir Peter John Ratcliffe, FRS, FMedSci is a British Nobel Laureate physician-scientist, trained as a nephrologist. He was a practising clinician at the John Radcliffe Hospital, Oxford and Nuffield Professor of Clinical Medicine and head of the Nuffield Department of Clinical Medicine at the University of Oxford from 2004 to 2016. In 2016 he became Clinical Research Director at the Francis Crick Institute, retaining a position at Oxford as member of the Ludwig Institute of Cancer Research and Director of the Target Discovery Institute, University of Oxford.

Born : 14 May 1954
Morecambe, England, UK
Education : Lancaster Royal Grammar School,
Gonville and Caius College, Cambridge (MB BChir, MD)
St Bartholomew's Hospital Medical College

Gregg Leonard Semenza, an American Nobel Laureate, is the professor of paediatrics, radiation oncology, biological chemistry, medicine, and oncology at the Johns Hopkins University School of Medicine. He serves as the director of the vascular program at the Institute for Cell Engineering.

Born : July 12, 1956
New York City. New York, U.S.
Education : Harvard University (BA), University of Pennsylvania (MD, PhD)

- Work by the prize-winning scientists has shown that in animal cells, oxygen availability affects gene expression through oxygen-sensitive post-translational modification and the subsequent proteasomal degradation of Hypoxia Inducible Factors (HIF).
- This research laid the foundation for understanding the mechanistic basis for the cellular response to hypoxia and paved the way for the therapeutic targeting of the response pathway to treat conditions including cancer, anaemia and other diseases.

Oxygen at center stage

Oxygen is used by the mitochondria present in virtually all animal cells in order to convert food into useful energy. During evolution, mechanisms developed to ensure a sufficient supply of oxygen to tissues and cells. The carotid body, adjacent to large blood vessels on both sides of the neck, contains specialized cells that sense the blood's oxygen levels.

HIF enters the scene

A key physiological response to hypoxia is the rise in levels of the hormone erythropoietin (EPO), which leads to increased erythropoiesis. Semenza studied the EPO gene and how it is regulated by varying oxygen levels. By using gene-modified mice, specific DNA segments located next to the EPO gene were shown to mediate the response to hypoxia. Ratcliffe also studied oxygen-dependent regulation of the EPO gene. Both found that the oxygen sensing mechanism was present in virtually all tissues, not only in the kidney cells. In cultured liver cells, Semenza discovered a protein complex (called the hypoxia-inducible factor, HIF) that binds to the identified DNA segment in an oxygen-dependent manner. HIF was found to consist of two different DNA-binding proteins (transcription factors) - HIF-1 α and ARNT.

VHL: an unexpected partner

When oxygen levels are high, cells contain very little HIF-1 α . However, when oxygen levels are low, the amount of HIF-1 α increases so that it can bind to and thus regulate the EPO gene and other genes with HIF-binding DNA segments. Several research groups showed that HIF-1 α , which is normally rapidly degraded, is protected from degradation in hypoxia. At normal oxygen levels, a cellular machine called the proteasome degrades HIF-1 α . Under such conditions, a small peptide, ubiquitin, is added to the HIF-1 α protein. Ubiquitin functions as a tag for proteins destined for degradation in the proteasome.

How ubiquitin binds to HIF-1 α in an oxygen-dependent manner?

William Kaelin Jr. was researching von Hippel-Lindau's disease (VHL disease). This genetic disease leads to dramatically increased risk of certain cancers in families with inherited VHL mutations. Kaelin showed that the VHL gene encodes a protein that prevents the onset of cancer and cancer cells lacking a functional VHL gene express abnormally high levels of hypoxia-regulated genes; but that when the VHL gene was reintroduced into cancer cells, normal levels were restored. This was an important clue showing that VHL was somehow involved in controlling responses to hypoxia. Ratcliffe and his research group then made a key discovery: demonstrating that VHL can physically interact with HIF-1 α and is required for its degradation at normal oxygen levels. This conclusively linked VHL to HIF-1 α .

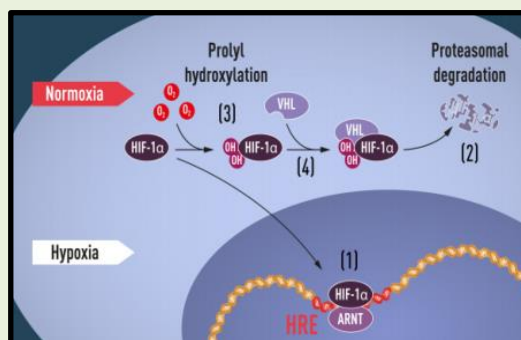
Oxygen shifts the balance

Both Kaelin and Ratcliffe suspected that the key to oxygen-sensing resided somewhere in a specific portion of the HIF-1 α protein known to be important for VHL-dependent degradation. In 2001, they showed that under normal oxygen levels, hydroxyl groups are added at two specific positions in HIF-1 α . This protein modification, called prolyl hydroxylation, allows VHL to recognize

and bind to HIF-1 α , and thus explains how normal oxygen levels control rapid HIF-1 α degradation with the help of oxygen-sensitive enzymes (prolyl hydroxylases). It was also shown that the gene activating function of HIF-1 α was regulated by oxygen-dependent hydroxylation. When oxygen levels are low (hypoxia), HIF-1 α is protected from degradation and accumulates in the nucleus, where it associates with ARNT and binds to specific DNA sequences (HRE) in hypoxia-regulated genes (1). At normal oxygen levels, HIF-1 α is rapidly degraded by the proteasome (2). Oxygen regulates the degradation process by the addition of hydroxyl groups (OH) to HIF-1 α (3). The VHL protein can then recognize and form a complex with HIF-1 α leading to its degradation in an oxygen-dependent manner (4).

Oxygen shapes physiology and pathology

Oxygen sensing allows cells to adapt their metabolism to low oxygen levels: for example, in our muscles during intense exercise. Other examples of adaptive processes controlled by oxygen sensing include the generation of new blood vessels and the production of red blood cells. Our immune system and many other physiological functions are also fine-tuned by the oxygen-sensing machinery. Oxygen sensing is essential during foetal



development for controlling normal blood vessel formation and placenta development. Oxygen sensing is central to a large number of diseases. For example, patients with chronic renal failure often suffer from severe anaemia due to decreased EPO expression. In tumours, the oxygen-regulated machinery is utilized to stimulate blood vessel formation and reshape metabolism for effective proliferation of cancer cells. Intense ongoing efforts in academic laboratories and pharmaceutical companies are now focused on developing drugs that can interfere with different diseases by activating or blocking the oxygen-sensing machinery.

Shatakshi Sharma

B.Sc. (H) Zoology, III year

La Galleria

Glimpses of Events: 2019-2020





SCIENCE COMMUNICATION WORKSHOP

The scientific writing and communication workshop broadened the perspective of students about technicalities of writing a scientific article and gave them an opportunity to explore prospects for unconventional careers in Science.



FRESHERS': ReDiscover, Paint It Red

Add a dash of camaraderie to all the fun and frolic, throw in a hint of style and chic and zest of warmth, and here you have the recipe for the perfect freshers' party. The fond memories of the event leave a subtle aftertaste of lasting friendships and hold a special place in our hearts.



TEACHERS' DAY

Celebrating the driving force behind our excellence; for behind every successful student, there is a great teacher.



INAUGURAL LECTURE: Wild India- Camouflage, Photography, Documentation

Get acquainted with the nature around and learn to appreciate the smallest things of nature instead of just looking for the obvious, was the master plan behind this talk by Dr. Asani Bhadhuri from Cluster Innovation Centre, University of Delhi. It made us appreciate the beauty of mystery and life that lies hidden in plain sight.



DRAGONFLY FESTIVAL

Ranging from ditch jewel to granite ghost, dragonflies continue to astonish us with their glory. WWF via this festival helped us peek into their world. Now, we spot these often-forgotten insects, everywhere in our college and beyond.



FIELD TRIP: YAMUNA BIODIVERSITY PARK

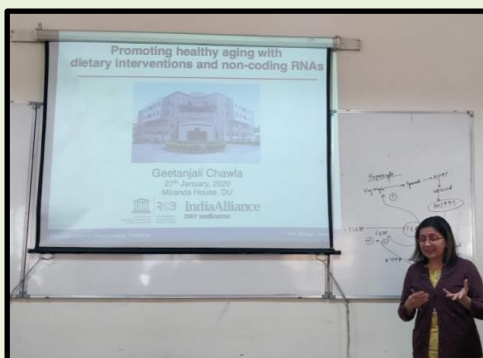
Students of I and III year were taken for this field trip as a part of their course in Ecology and Animal Behaviour respectively. Spotting peacocks and butterflies, learning about various plants and pollinators, walking in the thickets with the anticipation of encountering the unknown, this field visit had it all. It was a display of natural elements coming together harmoniously for sustenance of life.



FIELD TRIP

INDIAN AGRICULTURAL RESEARCH INSTITUTE

Students of II year were taken on this field trip as a part of their course in Apiculture. Spotting the tiny master-pieces of nature at work, the honey bees as pollinators for countless vibrant flowers was a truly enthralling experience. From learning about various types of hives and procedures for honey production to uncovering numerous other bee products, the trip had it all.



DEPARTMENTAL COLLOQUIUM

Be it scientific or an issue of social interest, Colloquiums covered it all. These series of lectures organized for II- and III-year students, aimed to broaden their horizon. They covered a wide range of topics like “Menstrual Hygiene”, “Molecular Mechanisms that aid Metabolic Flexibility in Migratory Buntings” and “Promoting Healthy Aging with Dietary Interventions”.



HANDS-ON WORKSHOP: ZEBRAFISH DEVELOPMENT

A two-day Workshop on Zebrafish development was conducted for III-year students. It was highly interactive. Everyone was enthused to learn about the developmental intricacies of Zebrafish. The site of embryonic Zebrafish heart pumping blood mesmerised all.



ANNUAL CAMPUS BIRD COUNT

The much-awaited annual campus bird count was held in February. With birding binoculars in hand and unbridled excitement we walked around the college campus in the pleasant morning hours looking for birds. Under the expert guidance of Mr. Kaustabh, we identified and learned about the habits of various birds like the beautiful rose ringed parakeet and the tiny brown headed barbet. The count turned out to be remarkably informative.

Internship Experiences



A BATTLE OF WITS AND TECH

It seems like it was only yesterday.

It was an unusually bright morning, even more so brightened by our positive spirits as we headed for a battle of wits and tech, of course.

We were going to participate in the New Delhi Zoohackathon held on 16th and 17th November, 2019.

A team of four first year students from the Zoology department, Miranda House entered the gates of WWF with little apprehension but resolute determination.

As soon as we entered on the first day of the event, we were greeted by members from TRAFFIC -INDIA and US EMBASSY who, after an initial ice breaking session, introduced us to our problem statements, related to wildlife crime. We were also enlightened on the subject of wildlife trafficking by bureaucrats working to put an end to it.

The tension in the air could be cut with a knife. The aura of competition was engulfing everybody. We had competitors like Computer Science students and graduates, Computer engineers and even working professionals. Initially, we were intimidated by their level of expertise but on hearing 'Team Miranda', we knew we had to live up to the name. Cowardice was not an option, so with our heads held high, we plunged right away into our plan of action.

We chose the problem statement: Avoiding compromise in counter wildlife trafficking investigations. We were explained before that miscommunication between various NGOs has hampered the progress of such investigations and even research productivity. Often, many researches are conducted in the same areas and later, it results in clash of interests between organizations. Organizations are also reluctant to share their nature of work due to the fear of potential corruption. We decided on creating an app tackling the issue and so Trackpeer came into existence.

Our plan of action was a three-step process - devise a plan, execute the plan, come hell or high water and to hope for the best.

We had to fulfil the requirements in the problem statement, of which the most important one was to provide a highly secure app to allow NGOs or other partner organizations to mark their area of interest using flags.

Our app was based on three pillars – keyword usage, flagship operation and interactive chat box.

We tried to secure the app by providing an OTP window in our login credentials. Since the NGOs are pretty reluctant to share their research, we gave the registered NGOs autonomy to associate keywords to their flagged areas according to their nature of research. This would make others aware about the type of research and would increase productivity. We designed it to accept only the registered NGOs to avoid plagiarism or any unfounded claims on the work.

The highlights of our app were – Flagged areas, My flags and Recent findings.

On entering keywords about the nature of research, one would find the organizations already working on related issues and their flagged areas. The 'My flags' option displayed the areas flagged by the user. We had also introduced a chat box for users interested in communicating with certain organizations which was based on mutual consent. Our recent findings displayed some information displayed by the organizations about their research as per their discretion.

The first day almost whizzed past us, leaving us to question the clock, and working almost mechanically on our set of work. Between the jumble of work and the time limitation, there were certainly a few light moments where we enjoyed multiple rounds of quizzes. They were quite the welcome breaks.

We ended the day one on a busy yet promising note.

Day two started with us arriving early and vowing to finish the work by noon. We also had to prepare a presentation explaining our app's objective and efficiency.

Again, we pulled up our socks and set to work. We were also given a seminar on the art of presentation, which helped us hone our skills.

Initially day two felt even more stressful, with all hell breaking loose, but later we regained our composure. Our confidence soared as we assembled the app by and by. After a lot of patience and dedication - Trackpeer was ready to be presented.

However, it was not the end of our troubles – we were running way behind our scheduled time for the presentation and right about this time we got to know that the presentation was the most crucial thing, the situation was EITHER DO OR DIE.

So, we took the former plunge...We made the presentation just in time and finally, bucked ourselves for the show time...

As terrifying as it was, nonetheless it was empowering to stand in front of a panel of experts from not only TRAFFIC -WWF INDIA but even from THE US EMBASSY to present a creation we could rightfully call our own.

It was indeed, a tough act to follow up. None of the participants had tried to leave any stone unturned but neither had we. And we were ready to face the consequences.

We presented our app in front of the jury and answered their questions. Their positive reviews thrilled us. It was now time for the last leg of our agenda- to hope for the best.

The moment of truth came and it shattered us.

We could not make it to the top. We began to question our diligent efforts, only to realise that even if there was only one victor, we were not vanquished.

We had created an app successfully and presented it to the best of our efforts. Experience is a great teacher. The event proved to be quite a learning experience and exposed us to a highly

competitive environment which made us believe team work makes the dream work. We also learned to improvise our decisions based on situations and think on our feet.

Special thanks to the Zoology department, MH for providing us with this golden opportunity which greatly helped us in developing our potential. We look forward to more brilliant opportunities like these and we hope to make you proud, whenever we are in the capacity of "Team Miranda".

Samridhi

B.Sc. (H) Zoology, 1 year

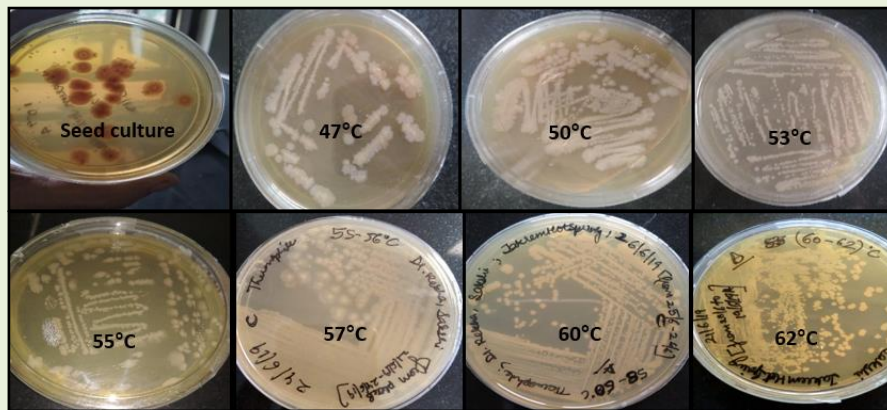
UNDERSTANDING MICROBIAL DIVERSITY AT JAKREM HOT WATER SPRING, MEGHALAYA

The geothermal hot springs and other extreme environments are hotspots for exploring biodiversity. They are the rich source of extremophiles- the organisms which can adjust, survive and thrive in extreme environmental conditions. Understanding extremophiles and the extreme environmental conditions will help us understand and hypothesise the conditions required for the origin and evolution of life elsewhere in the universe. They harbour genes and enzymes which can be exploited for commercial purposes.

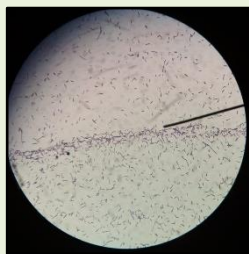
The soil samples were collected from Jakrem Hot water spring which is located at Western Khasi hills, Meghalaya. The water is sulphur rich which has curative medicinal properties. At the time of sample collection, the temperature and pH of the hot spring was 47°C and 9 respectively. These samples were used to assess microbial diversity at the hot spring using culture based and non-culture-based approach. In culture dependent approach, the soil sample was added in thermus broth which was incubated at 47°C. After serial dilution and spreading, the individual colonies were obtained. The colonies were purified by repeated streaking to obtain pure bacterial strain. This bacterial strain was assessed for morphological and physiological properties. It is gram positive strain which can form biofilm and tolerate temperature up to 62°C. The genomic DNA was isolated and 16S r RNA gene analysis was done. The bacterial isolate was found similar to *Bacillus smithi* and *Bacillus manusensis*. The biochemical characterisation tests will be done and bacteria will be screened for industrially important enzymes. We will look into molecular phylogeny of the strain.

Since only 1% of bacteria can be cultured under laboratory conditions and rest 99% diversity go untapped, we used non culture-based approach along with culture-based approach. In culture independent approach, we isolated metagenomics DNA from soil samples using CTAB method. This DNA will be used to know the community composition of the hot spring.

Apart from this, soil samples were subjected to soil chemical analysis to correlate the microbial diversity with soil chemical composition.



Bacterial colonies on thermus agar plates grown at different temperature.



Gram Staining:
The isolate gave gram +ve result as expected for thermophile.



Form : Irregular, smooth, Creamish
Elevation : Raised
Margins : Erose



Biofilm formation
at Day 3

Sakshi Saini

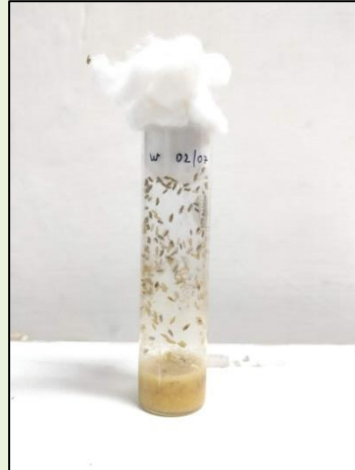
B.Sc. (H) Zoology, III year

***DROSOPHILA* IN CLASSROOM: SIMPLE EXPERIMENTS TO UNDERSTAND DEVELOPMENT, BEHAVIOUR AND GENETICS**

The common fruit fly gets its scientific name from the Latin word *Drosophila* meaning 'dew loving'. *Drosophila* is one of the most widely used model organisms. Research on *Drosophila* has won eight Nobel prizes. What makes it such a good model organism is its short life cycle, ease of maintaining & culturing and small genome size. It also shares 60% genetic homology with humans and thus is used as human disease models and to develop therapeutic strategies.

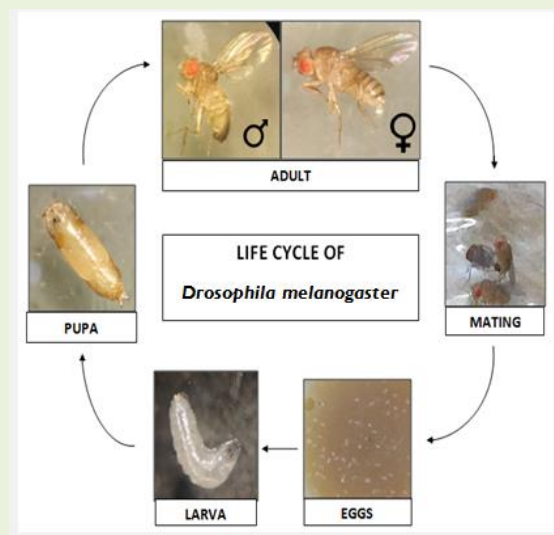
The project aimed at studying the life cycle of *Drosophila*, culturing of flies and effect of different types of diet on larvae, fecundity & motor functions (climbing assay).

Culture of *Drosophila*



Maintaining and culturing of *Drosophila* is very easy and inexpensive. It is fed on a simple diet prepared with yeast (protein source), sugar, corn flour (source of nutrition) and agar (solidifying agent) and can be cultured in vials. Propionic acid (to suppress bacterial growth) and anti-fungal (nipagin) are also added to prolong shelf life of the medium.

Life cycle

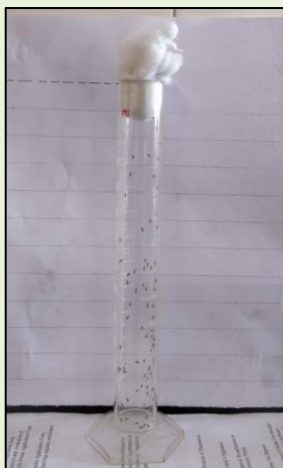


Drosophila is a holometabolous insect (undergoes complete metamorphosis) with egg, larva, pupa and adult. Its life cycle gets completed in 12-14 days. Egg takes 1 day to hatch, larvae transforms into pupa in 4-5 days through 3 instar stages and it takes 3-4 days for new flies to emerge out of the puparium. The adults show sexual dimorphism: Males are smaller, have rounded darkened abdomen and sex combs on foreleg whereas females are larger, have elongated abdomen and do not bear sex combs.

Effect of diet

Study was based on three types of diet: High sugar diet, low sugar diet and normal diet. High sugar diet was observed to cause obesity in larvae and decrease fecundity (decreased egg count). Low sugar diet did not cause any significant change in larvae but it did lead to reduction in fecundity. Effect of diet on motor functions was also studied through climbing assay.

Climbing assay



Climbing assay is used to study motor functions in *Drosophila* and helps in detection of locomotive defects and thus neurodegenerative disorders. It was observed that diet does not affect motor functions significantly. It can also be used to compare motor functions in old and new flies.

Drosophila is a versatile model organism that has been used in study of diverse range of biological processes including genetics and inheritance, embryonic development, learning behaviour and aging. Although humans and fruit fly may not look similar it has been well established that most of fundamental biological mechanism and pathway that control development and survival are conserved across evolution between the species.

In biomedical research small organisms like the fruit fly are important pillars in the process of scientific discovery. It is an essential discovery tool to study fundamental processes. There is enormous potential that *Drosophila* has beyond research for biology teaching. The study of life cycle and its culture at high school and undergraduate level will provide students access to an informative, inspiring and memorable experiences.

Srijan Singh, B.Sc. (H) Zoology, III year

Khushi Srivastava, B.Sc. (H) Zoology, II year

MY EXPERIENCE IN CELL CULTURE ADD ON COURSE

It has been a great experience attending the cell culture course in Miranda House this December. Personally, I think this course was very well organized and successful. I fully enjoyed the one-week course with so many lectures and discussions on various topics. Several of the lectures, delivered by different speakers were very informative and insightful on their particular topics. I would like to take this chance to reflect upon my enriching experiences in Miranda House and summarize in what ways this add-on course helps me understand the importance and applications of cell culture.

On the first day of course, 17th December, Dr. Sadhna Sharma (Department of Zoology, Miranda House) gave an introductory lecture on basics of cell culture and its application in various fields. Also, a practical session took place in which maintenance of aseptic conditions, basic requirements for cell culture (equipment, culture vessels, pipettes, culture media etc.) and preparation of media was taught. The practical session was followed by a lecture by Dr. Monika Sharma (Department of Zoology, Miranda House) on Cell Viability Assays.

On the second day of the course, 18th December, Prof. Pankaj Seth (National Brain Research Institute) gave a lecture on application of cell culture in neuronal science research explaining the neural stem cells as a right model system for neural research. In the practical session, we did THP1 cell lines treatment with PMA for differentiation and PBMC isolation and culturing of cells for macrophage maturation.

On the third day of the course, 19th December, Dr. Sujata Mohanty (AIIMS, New Delhi) introduced us to stem cell research and its success in treating vitiligo and bone marrow transplant. In the practical session, we determined cell viability by MTT and cell titer glow assay.

On 20th December, Dr. Kaustav Nayak (ICGEB, Delhi) threw light on the application of cell culture in vaccine research. In practical sessions, we differentiated live and dead cells through fluorescence microscopy (Acridine orange/ EtBr staining of cells).

The next day, a practical session took place in which stimulation of cells and determination of release of reactive oxygen species (ROS) and nitric oxide was done.

On 23rd December, Dr. Vinay Gupta (BD Bioscience) explained the basics of flow cytometry and principles on which it works, followed by an impressive lecture on production of antibodies in cell culture by Dr. Satish Kumar (National institute of Immunology).

The course ended with a lecture on application of cell culture in Assisted Reproductive technology by Dr. Aastha Gupta (Delhi IVF). Also, in the practical session we performed ELISA.

Inspired by what I learned from this course; I have been given a chance to work on a research project under the aegis of DBT Star College Scheme. The main objective of this project is to study the role of MTB cell wall fraction/ cell membrane associated protein in scavenging/ inhibiting the ROS in host macrophages. This course made us aware of various career options available in this field.

In conclusion, I would like to express my heartfelt gratitude to people who made this course possible and those who have shared their experiences during that one-week course. I have benefited very much from this fantastic course.

Monika Devi

B.Sc. (H) Zoology, II year

Bachelor's and Beyond



THE JOURNEY THAT I NEVER PLANNED

I come from a humble town called Bargarh in Odisha, where the only career options that we are 'allowed to pursue' were medicine or engineering. I think these conventional career aspirations for children have loomed large in the minds of the parents of our generation. I was no different and I literally slogged my days in studying hard, but with the motive of going to any college I get in the coveted University of Delhi. I did not score enough in the Class 12th board examinations, and was very disappointed for not getting the Microbiology course I wanted to pursue. But then, in the 4th cut-off, I had scored just enough to get admission in Zoology at Miranda House. Miranda was out of my league to be honest. But this opportunity was enough to convince my reluctant parents to send me to Delhi.

The Department of Zoology at Miranda opened vast avenues for me to explore. All our amazing teachers interacted with us personally, cleared doubts even if one asked them umpteen numbers of times and the laboratory exercises were long and cumbersome, yet interesting. I worked on a smallscale project with two of my batch mates, Kanika and Garvita under the guidance of Dr. Vimal Thareja in the first year itself. Dr. Thareja kindled our interest in research and guided us on academic writing. In the following years, I also had an opportunity to work in innovation projects which were initiated in the college in collaboration with the Chemistry and Botany departments.

The beginning of third year during graduation fills everyone with lots of anticipation about further career choices, and I was certainly not an exception. I always wanted to do something out of the box, something that will make me part of a process that can bring about change, however small it may be. And this desire was fuelled because of the multidisciplinary exposures that I got to explore while studying at Miranda. When it was time to appear for the entrance examinations for post-graduation, I appeared just for one, the entrance exam for the Tata Institute of Social Sciences, Mumbai. Studying for this entrance was a little difficult for me, as I had semester exams going on, and I had to juggle among subjects- from molecular biology to going through public policies, social protection programmes and current affairs. Nevertheless, I cleared the entrance exam. But I landed myself in a dilemma, as this course required me to change my stream. Considering that I had no other option left and for the adventure that I had chosen for not appearing for any other entrance, I decided to join TISS.

I will not be exaggerating if I say, my journey at TISS has been a life-changing experience. I am pursuing an M.A in Social Work, with a specialisation in Public Health. This course catered to my multi-disciplinary interests and helped me develop perspectives regarding multifaceted dimensions of public health. As part of my field engagements in this course, I have worked in three organizations, both in the urban as well as rural landscapes. Working in the field, meeting different people, from different socio-cultural contexts, listening to their stories and struggles, engaging with government and non-government stakeholders are some of the many firsts that I experienced during the entire course period. These engagements have helped me understand the unanticipated consequences that beautifully framed policies and programs might have on people at the ground level. The course is very extensive in terms of what it teaches you- research

methods in social sciences, management, planning, implementation and analysis of social policies and programmes along with reality checks through fieldwork.

This was a journey that I never planned. At every step, I encountered an adventure and I tried to make the best out of it. Most importantly, I am happy, that is something we all should keep in mind while making a career choice. As Albert Einstein has famously said- "If you judge a fish by its ability to climb a tree, it will live its whole life believing that it is stupid." So, never compare yourself with others and always aspire for what you think works for you. If you invest sincere efforts and time in what makes you happy, no one can stop you in excelling in what you are doing.

Shruti Acharya

Batch-2015-18

Currently pursuing M.A.in Social Work in Public Health, Centre for Health and Mental health, School of Social Work, Tata Institute of Social Sciences, Mumbai.

STOP! WAIT A MINUTE

WORDS FROM A GAP YEAR STUDENT

After 15 years of formal education set by a system otherwise unknown to me, I decided to educate myself under the tutelage of a person who I needed to know more about i.e. me. If you firmly believe that taking a gap is equivalent to waste of time and getting behind then you may as well stop reading right now, because to be blunt it is definitely not. After I graduated from Miranda House, I didn't give in to the pressure of scoring admission right away to a course that I would probably regret after. I wanted to explore my options and know better; I didn't want to continue with a career in research in science. However, I discovered a field that I didn't consider before that could be my forte, the amazing universe of narratives and communication aka Journalism. Having worked for the very magazine that you are reading right now as an Editor in my senior year, that experience was enough to enforce my decision to lead in the direction of journalism as a career.

As I mentioned earlier, I took a gap to find myself and in order to do that I did something I wouldn't normally do. I applied myself for an international MUN. When I received my invitation, I was baffled at first and the prospect of travelling to another country all alone to debate with total strangers scared me. But somehow my well-wishers wore me down and I took the one chance that was about to change me for better. I participated in the GLOBAL GOALS MUN, organised by International Global Network, a four-day event in Thailand. Apart from participating in mind-grilling debates with brilliant people from across the globe, I got to experience a completely different culture, and being culturally woke is quite a necessity today. Ten days in another country felt like a giant leap in life and it changed my general outlook towards everything. I sincerely encourage anyone who gets the same opportunity to go ahead with it, make life about collecting knowledge and experiences and not degrees. Your education and career are a part of your life, an important part I must say (what's more liberating than financial

independence) but still just a part of it, life as a whole is bigger than what you know, don't lose on it.

I have applied to a few graduate schools for Journalism and now I feel ready, more than ever, to start another journey. So, if you are a person like me who is not ready just yet or confused about the 'Next Step', it is absolutely fine to take a minute, a month or a whole year. People still tell me that it was a mistake, that I derailed my train to success and now everyone's ahead of me. Even if it was a mistake it was mine to make and I must make any number of them because I have still got the time.

As rightly said by the late *Robin Williams* in *Dead Poet Society* (1989), '*You must trust that your beliefs are unique, your own even though others may think them odd or unpopular.*' Go on now, seize the day and if you didn't get me, watch the movie.

Noor Chikara

Batch of 2019, Aspiring Writer and Journalist (As of now)

LIVING OUT THERE

From the Diary of a Wildlife Biology Student

Set foot into final year territory and the prospect of having to make a career decision, and make it quick, becomes very real. It can be very daunting at times especially if you are one of the last few people in the batch to reach a decision. Nonetheless, sometimes it's not that bad a place to be in not knowing what you want to do – it broadens perspective and enables you to take more things into your stride. Not very different to where I was at at that stage.

My journey of deciding to do Wildlife Science was a rather brisk one with an unexpected start. Though it was a field I had always been fascinated by, it had never really struck me as something I could do full time. This was until I visited the Wildlife Institute of India at Dehradun as part of the Department trip in March 2019. It was pretty much the wake-up call I needed. I suddenly realised that the path I had been seeking was staring right at me. It was like love at first sight and the course aligned perfectly with my love for animals and my yearning to be out amongst nature. I was fortunate enough to make it through the selection process and the next thing I knew I was packing my bags for Dehradun.

I joined the program in July 2019 and the time I have spent at the Institute (from where I write to you) over the past 8 months has been quite the ride. The course itself is a perfect blend of classroom teaching coupled with hands-on experience out on the field with faculty bringing in expertise from varied fields including taxonomy, genetics, ecology, biostatistics and geoinformatics to name a few. Excursions to diverse natural systems including protected areas such as Rajaji National Park, Uttarakhand, Bhitarkanika National Park, Odisha and National Chambal Sanctuary, Madhya Pradesh have added to my knowledge base in ways I could not have envisaged. One of the biggest shifts over the past few months has been the realisation that plants are as much a part of wildlife as we imagine only animals to be and the sooner we realise this the better. It has resulted in a paradigm shift in the way I view my surroundings.

In addition to changing my world view the course has taken me on a journey to new landscapes and habitats, made me marvel at the diversity of life forms that exist in these

strikingly different locales, helped me explore novel ideas and interact with a diverse group of people from all over the country while allowing me the opportunity to discover my own self. All good things, however, come with their own hardships. This is no different – travelling options especially to remote parts of the country aren't always the most luxurious, the on-field working hours aren't always the most comfortable and the conditions aren't always the most favourable but what is fun without hardships. It is what makes the hard work worth it. There is nothing more enabling than being able to learn and contribute to a cause that is close to your heart. This course gave me just that.

What's more, the prospects post this course are limited only by one's imagination. It provides an opening into several arenas. One can pursue an academic path involving research or teaching or both. Administration is another route forward be it enforcement through the civil services or policy formulation. Wildlife law is another prospective field post the Master's program. Being involved in advisory boards and panels for conservation and management interventions in consulting capacity is also a potential option. Documentary and film making and wildlife photography are also very much in the picture. The options are endless.

Be it the road less taken or the beaten track, always follow the path that leads to your passion for only when you find joy in your work can you do it justice.

As has been wisely said "Do what you love and love what you do".

Anubhuti Krishna

Editor, Evolvere'19

M.Sc. Wildlife Science Student, Wildlife Institute of India, Dehradun, Uttarakhand

BIOTECHNOLOGY: A CAREER

Biotechnology is a field of science that integrates basics of biology to technology and how that technology can be used for human welfare. It is a fast-growing field with ample opportunities. As we are advancing in life, we are becoming more dependent on technology to make our life more comfortable and better. After completing masters in biotechnology, you have the option to appear for placements and join any of the industries which hire biotechnologists and get to learn and work there (which itself is a very big topic 'Industrial Biotechnology'). Another option you always have is PhD but that requires a whole lot of patience, perseverance and hard work. You will get the chance to work in labs dealing with neurological science, immunology, cell biology, proteomics, computational biology and other aspects of biology in real world and trust me if you are a science lover, it will fascinate you to the core (if you are ready to spend your life in a 2X2 room!!). Life is pretty amazing in the research field if at some point you learn to manage your time and live happily ever after!!

And for all the juniors who are going to appear for any competitive examinations it is important to focus on the basics and be confident because it is this that will matter in the long run.

Neelima Sharma

Batch of 2019, Pursuing M.Sc. in biotechnology

A NOTE FROM THE HEART

When I first took admission in Miranda, I was scared to be a part of an all women college after spending my whole school life in co-ed. The fact that people there would be stricter and my life would become a third series of Mean Girls scared me, but taking admission here was the best part of my life. Miranda nurtured me and turned me into this independent person capable of taking her own decisions. Deciding the future for our career, at this stage, is a bit difficult for almost all of us because we are still not sure what we want in life, what are the things that we are passionate about or do we really want it?? These are some of the questions that haunted me for the three years of my graduation and it is okay to be unsure for a while as it gives you some time and opportunity to explore and realise the ample career prospects you can have in a particular field. It is okay to be different from others, as the great legend Darwin had said that variation brings evolution of a population, it is what gives you a unique personality. Do what your heart wants to do because if it doesn't go well, you don't have anyone else to blame and your heart will always be at peace with your mind (this is my theory of success, yours can be different!!). In this fast-paced life we have forgotten to live in the moment, we have forgotten to make memories and to make friends. This might not be a major issue right now but as you will go higher and become more involved you will realise its importance. When nothing goes right it is these memories which become your happy spot, it is these people who become your strength. It is important to share with your friend(s), parent(s), sibling(s) or anyone as it makes you less anxious. It does not matter what you choose to become, what matters is if you are happy with what you are choosing to become?

Neelima Sharma

Batch of 2019, Pursuing M.Sc. in Biotechnology

STEPPING INTO THE WILD

I concluded my bachelor's degree at Miranda House in the year 2018. I guess I took "Zoology" literally when I opted for a program like Wildlife Science for my Masters. I planned to pursue my postgraduate degree from a budding institute of Amity University, Noida.

Wildlife Science has allowed me to explore more rather than extracting from text-imprinted books. Within a span of less than two years, I have managed to visit multiple protected areas ranging from the hottest and driest areas to the highest and coldest regions of the country. Field visits to Sariska Tiger Reserve, Rajasthan and Great Himalayan National Park, Himachal Pradesh have let me practice numerous field-based techniques like radio collar tracking, line transect, camera trapping, scat analysis, and so on. Barring the field techniques, trekking for more than 25 kilometres just to spot a single individual of the Himalayan treasure, Western Tragopan, is a nonpareil thrill. At the institute, we have faculty from all around the country, excelling in varied fields – from butterflies to tigers, from genetics to behaviour studies, from vegetation to flying squirrels, from capturing & handling to GIS.

My zeal for psychology led me to go for a behaviour-based research work for my dissertation. As a reconnaissance study, I carried out a two months internship study during

summer months on captive felid species. My thesis research involves an observational study on tigers and leopards for four months at two prominent zoological parks of India – National Zoological Park, Delhi and M.C. Zoological Park, Chandigarh. I aim to understand the factors impeding optimal welfare of animal species in captivity and provide better management strategies for upkeep.

Masters in such a program has urged me to read literature, explore the field, test hypotheses, perform experiments, and statistically analyse data. For someone with keen interest to pursue research in the future, we have been constantly encouraged to read through published papers. This has motivated me to carry out dedicated research work and publish paper(s) of my own!

Wildlife is much more than passion for photography and farming/petting animals; it is a research-based science which involves hard-core field work. With numerous meetings and events being organized by different institutions and organizations, awareness amongst citizens is inflating day by day. Following Masters, I wish to pursue MPhil and PhD in the same course to carry out my research work, and ultimately make a valuable contribution to the community of Wildlife Science.

Avni Gupta

M.Sc. Wildlife Science (2018-2020)

THE WILD TRAILS OF UTTRAKHAND

So, it's been a semester and a half at the Department of Environmental studies, University of Delhi, from where I am pursuing my M.Sc. Environmental studies. Since the beginning of my bachelors at Miranda House, I was fond of studying about animals, their development, physiology and behaviour, as well as how the species evolved into the existing forms and their origin.

During my three years at Miranda, studying Zoology deepened my interests with respect to my consciousness towards my surrounding environment, the ecosystem and the wildlife it supports. So, my search for universities began and luckily, I got admission in Delhi University again; now as a master's student of environmental studies. While studying here, I interned for two weeks in a state government project under NMHS (NATIONAL MISSION ON HIMALAYAN STUDIES), titled: Dispersal, communication and conservation strategies for Tiger in Kumaon Himalayas of Uttarakhand, India.

My work included handling the camera traps and setting them up for collecting data samples of tigers for population survey, and basic vegetation sampling survey in the western circle, Surai forest range, Haldwani, Uttarakhand.

The entire 2 weeks field experience was an eye opener for me because until then I wasn't familiar with what exactly it feels to trail and work inside such a vast and dense forest. The experience of Delhi jungles felt vague in front of it. It was a journey that made me realize how

necessary it is to be passionate about your work and at the same time to be determined and focused even in difficult situations that may fall upon you on the field.

One cannot stand a complete day in the field, if one is not compassionate about nature and all the little things that our nature provides to us! It's not easy to walk more than 6kms everyday deep into the jungle to set up camera traps. Walking 6 kilometers in a forest is not the same as walking on the streets of Delhi. You need to have the stamina, will power and zeal to rigorously work on the field, taking the whole team along. One should always wear proper clothing and be equipped with the necessary things that are handy and helpful while working.

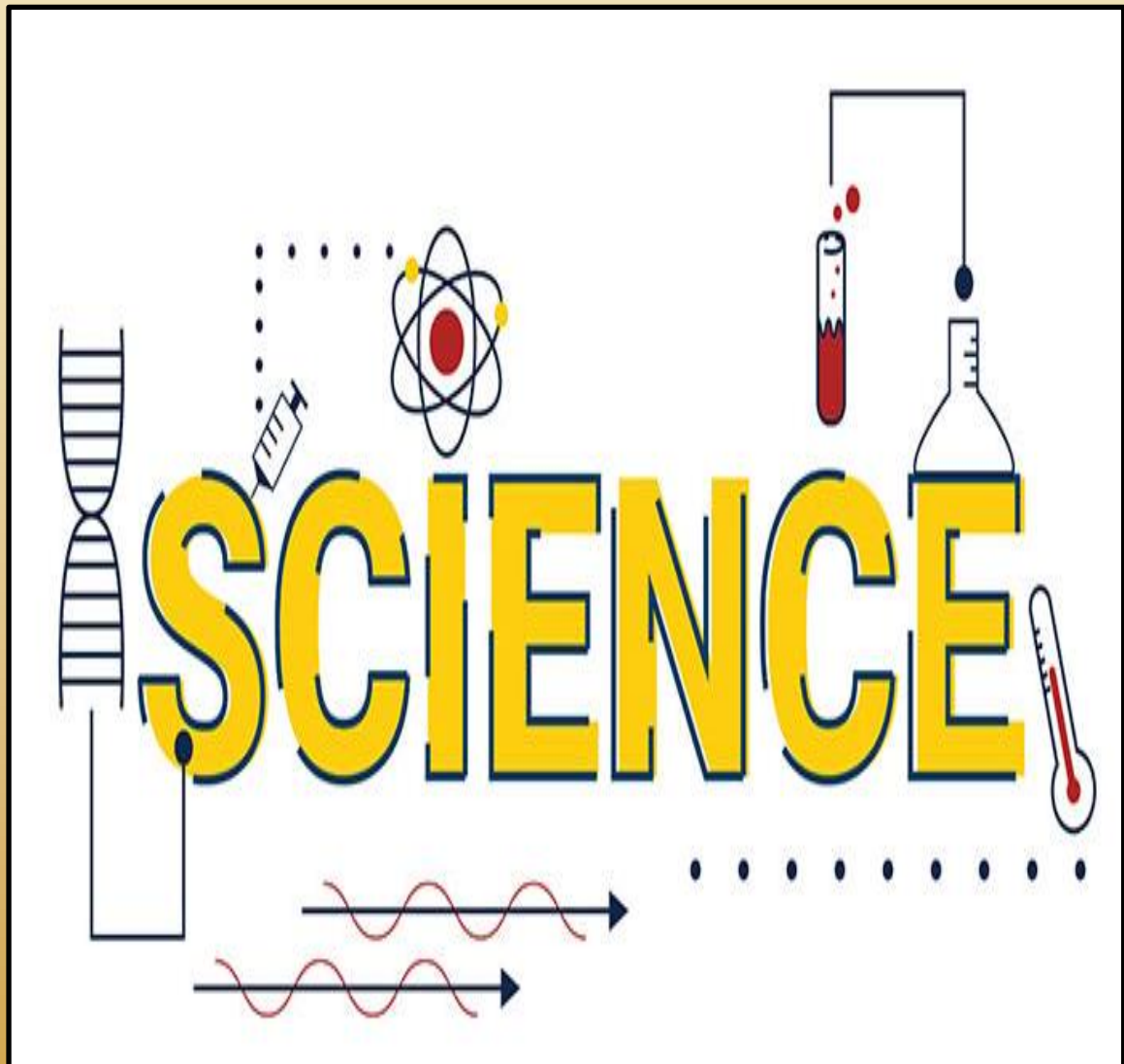
The next crucial thing the field taught me was the lesson of teamwork. An essential part of working in a jungle is that you should have good communication with your teammates as well as the helping staff and the mentor under whom you are working. They can be of great help to you if you get into some dangerous circumstances or situations, for example an encounter with a tiger. Until and unless you know how to understand the behaviour of large carnivores in the wild, avoid being alone on trails, always move in groups. The field guides are much more experienced than you, so follow their instructions if they tell you something. Another important lesson was to learn how to adjust and compromise. It is not necessary that you will get a good stay or regular food. So, stay mentally prepared for the odds. We used to have lunch at 10 am in the mornings. Our mentor used to tell us to eat as much as could be eaten because on field one never knows where the next meal will come from.

These were some basic necessities of field work that I experienced and felt worth sharing with my juniors who want to pursue the field of wildlife conservation, including, of course, the basic knowledge of the work you are doing. Being new to this field I can't really say much about it. This, I know for sure: if you are willing to be a conservationist, be confident, spend time in fields, and if you think you are really passionate and willing to take the challenges, then go for it; it's a beautiful experience!

Vibhuti Bhat

Batch of 2019, Pursuing M.Sc. in Environmental Studies

Trivia and Fun Facts



SOME FACTS ABOUT TIGERS

❖ Tigers have striped skin, not just striped fur. The stripes are like fingerprints and no two tigers have the same pattern.



❖ A tiger's tongue is so coarse, it can lick flesh down to the bone. A tiger's tongue has small, sharp, thorn-like protuberances called "papillae". Papillae are small, hard, hooked bumps that cover the entire tongue of the tiger. These papillae make the tongue so rugged and rough, if a tiger licks you a couple of times, it may scrape off your skin and lead to bleeding. It also helps tigers to tear the flesh and feathers off their prey's body. Also, the more a tiger rolls up its tongue, the sharper is the lick



❖ Even though tigers and lions look to be the same size, tigers weigh up to 300-lbs/136-kgs more than lions due to their muscle density.

❖ A tiger's night vision is six times stronger than humans. Also, their eyes are the brightest of any animal in the world. Tigers' eyes have a special membrane that reflects light with tremendous intensity through the retina. Unlike many other animals, tiger's eyes are located on the front of the head which enables a three-dimensional vision and gives an edge while hunting.

❖ Tigers are solitary creatures. They like to spend most of their time alone.

❖ There exist "tigons". They are a cross between female lions and male tigers. Tigons are smaller in size and weigh around 400 pounds. They are very aggressive in nature and show quite conflicting characteristics since lions are social and tigers are not. They are prone to many diseases and have a shorter life span.



Ms. Saba Zulfiquar

Assistant Professor

Department of Zoology

DID YOU KNOW?



1. The English word “Zoology” comes from _____ word for “animal”.

- a) Greek b) French
- c) Chinese d) Saxon

Answer: Greek

2. Which philosopher was interested in the study and classification of animals?

- a) Aristotle b) Epicurus
- c) Marcus Aurelius d) Spinoza

Answer: Aristotle

3. Who wrote on the “Origin of Species”?

- a) Darwin b) Linnaeus
- c) Mendel d) Vesalius

Answer: Darwin

4. A diurnal animal is one that is active in:

- a) Daytime b) Night time
- c) Mating d) Short bursts

Answer: Daytime

5. A crepuscular animal is most active at:

- a) Noon b) Twilight
- c) The height of summer d) Midwinter

Answer: Twilight

6. If you specialize in arachnology, you study animals like:

- a) Ants b) Birds
- c) Pandas d) Spiders

Answer: Spiders

7. Which of these is called Arachnid?

- a) Ant b) Cricket
- c) Moth d) Tick

Answer: Tick

8. _____ is the term for the animals (and other living things) are classified and named.

- a) Natural philosophy b) Zoonotics
- c) Nominative determinism d) Taxonomy

Answer: Taxonomy

9. The most morphologically diverse species in the world is the:

- a) Eagle b) Dog
- c) Human d) Lion

Answer: Dog

10. "Felidae" is the zoological family that contains:

- a) Ants b) Eagles
- c) Cats d) Horses

Answer: Cats

11. Retina contains the sensitive cells called:

- a) Rods and cones b) Cones and cortex
- c) Rods and pelvis d) Cortex and fovea

Answer: Rods and cones

12. Birds excrete nitrogenous waste in the form of:

- a) Urea b) Ammonia
- c) Fatty acids d) Uric acid

Answer: Uric acid

Sakshi Krishna

B.Sc. (H) Zoology, II year

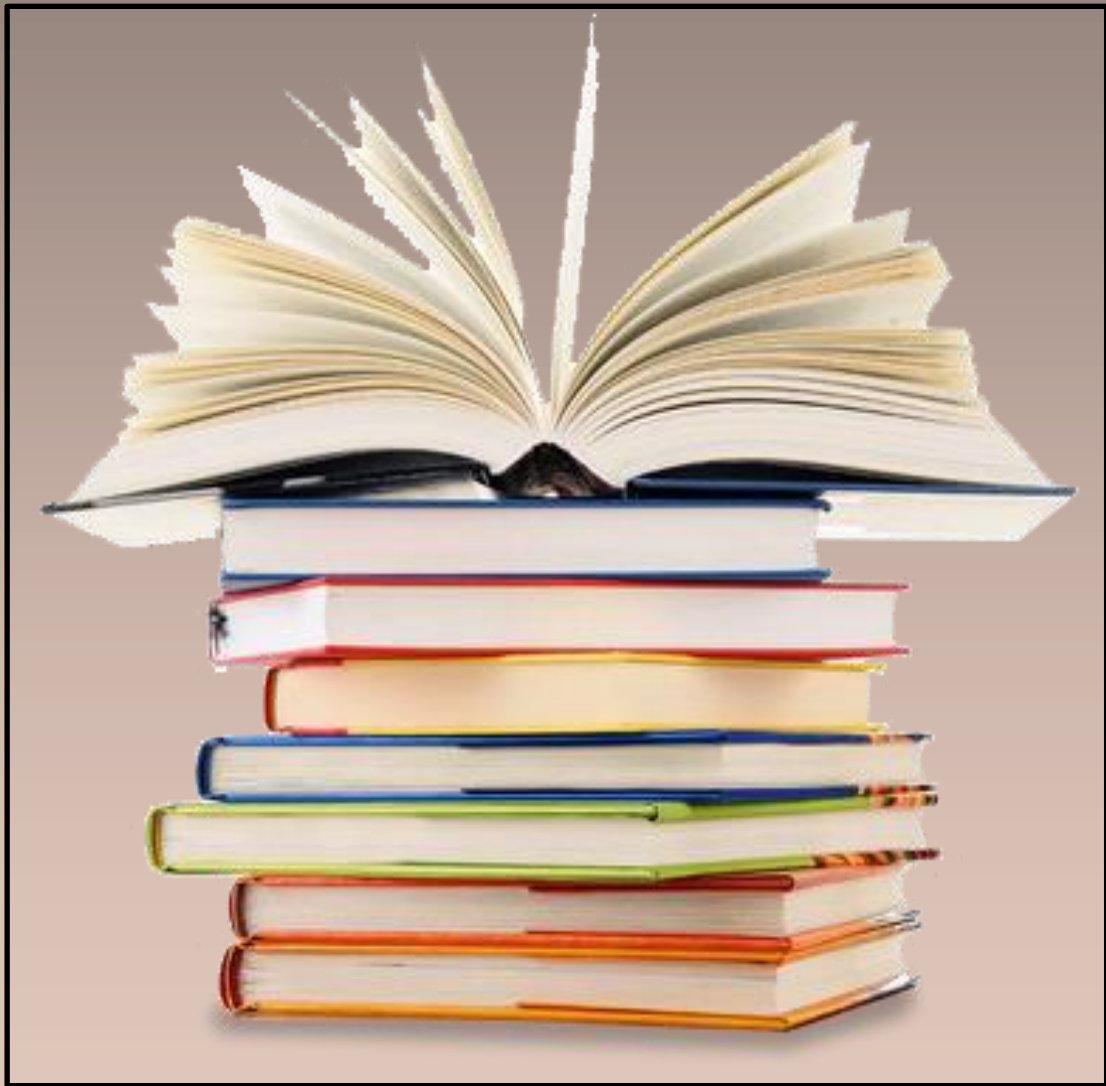
INTERNATIONAL SCIENTIFIC DISCOVERIES AND INVENTIONS OF 2019-20

1. **Nobel Prize in Physics** - James Peebles was awarded the Nobel prize in physics for theoretical discoveries in physical cosmology. He shared one half of the award with Michel Mayor and Didier Queloz. Michel Mayor and Didier Queloz were awarded the prize for their discovery of an exoplanet orbiting a solar-type star.
2. **Nobel Prize in Chemistry** - It was shared among three scientists: John B. Goodenough, M. Stanley Whittingham, and Akira Yoshino. They were awarded the prize for the development of lithium-ion batteries.
3. **New eels discovered in the Amazon** - Two new species of electric eel were discovered in the Amazon basin by C. David de Santana. One of the eels, *Electrophorous voltai*, was found to generate an electric current of 860 volts, which makes it the strongest known bioelectric generator. The other species discovered was named *Electrophorous varii*. These discoveries give us hope that more species are present which need to be uncovered.
4. **First-ever image of a Blackhole** - Dr. Katie Bouman, a 29-year old computer scientist played a pivotal role in making the algorithm which allowed the team of MIT's Computer Science and Artificial Intelligence Laboratory, the Harvard-Smithsonian Center for Astrophysics and the MIT Haystack Observatory to capture the image of the black hole. It was captured by the Event Horizon Telescope (EHT) which is a combination of 8 telescopes.
5. **Human ancestor traced to modern-day Botswana** - Anthropologist Vanessa Hayes suggests that "everyone walking around today" can trace their mitochondrial DNA back to this "human homeland". The anthropologists determined that anatomically modern humans emerged in what was once a lush wetland in Botswana, south of the Zambezi River.
6. **Virtual Surgery** - A virtual reality experience allows surgeons to practice new techniques and prevent any mishaps. Osso VR is a new way of learning and practicing surgeries. This was developed by Dr. Justin Barad in the USA.
7. **Genetically modified monkeys** - Scientists in China report the creation of five identical cloned gene-edited monkey using somatic cell nuclear transfer technique and gene-editing CRISPR-Cas9 technique. The genetically modified monkey clones were made to study several medical diseases.
8. **Hachimoji DNA** - Several different teams of scientists created a new form of DNA, named Hachimoji DNA, composed of four natural, and four unnatural nucleobases. The benefits of such an eight-base DNA system may include an enhanced ability to store digital data, as well as insights into what may be possible in the search for extra-terrestrial life.
9. **Massive neutron star discovered** - Astronomers using the Green Bank Telescope, Virginia, US, identify a rapidly rotating millisecond pulsar, called J0740+6620, as the most massive neutron star ever observed, with 2.17 solar masses in a sphere only 30 kilometres across.
10. **Human cartilage repair system** - Researchers at Duke University Health System identify a mechanism for cartilage repair in humans, which could allow joints and possibly entire limbs to regenerate. This mechanism would allow patients with osteoarthritis to recover.

Haripriya Malviya

B.Sc. (H) Zoology, II year

Book Review



VITAL SIGNS: WHERE TERROR BEGINS...

A book by Robin Cook

Vital Signs is a book dedicated to the numerous couples who have to face the emotional and physical trials and tribulations of infertility and its new-age treatments. Dr. Robin Cook, who is famous for his medical thrillers, delivers yet another intriguing book on the infamous topic of sterile couples and the hardships they endure.

The book, written in the third person narrative, revolves around the new assisted reproductive technologies and the business that they create. The protagonist of the book is Dr. Marissa Blumenthal whose life turns upside down when she is caught up in the chilling conspiracy of in-vitro fertilization. She wishes to have a baby with her husband; however, being a barren woman, she slowly realizes the immoral scheme of the Women's clinic of making dollars, not babies. The book narrates her journey of uncovering the reality of the Women's clinic and Female Care Australia (FCA). She is aided by Dr. Tristan Williams in her pursuit of the truth. As the story unfolds, she has to undergo many hardships as her best friend as well as her husband is killed by the people of the Women's clinic. The book ends with her uncovering the secret of the FCA (to know the secret, you must read the book).

The book is a good read for anyone looking for some thrill and adventure. The character of Dr. Blumenthal inspires you to never give up even when situations are not in your favour and to always listen to your heart. She is portrayed as a strong-willed woman who strives for truth and nothing can hamper her determination. Dr. Williams also plays a major role by supporting Marissa and accompanying her across the world.

I enjoyed the second half of the book as it picked up the pace and ended in a promising climax. In the beginning the book is a bit slow-paced which made me put it down a little too much. The beginning includes more character building and less adventure, but the climax is worth the wait and it covers up for the bland first half.

I would surely recommend this book to a person who enjoys thrillers and mystery novels. A person from the medical background would surely appreciate this book to a greater degree. The medical terminologies are kept to a necessary minimum and explained well, wherever included. Thus, anyone with a little knowledge of science can also enjoy this good read.

Haripriya Malviya

B.Sc. (H) Zoology, II year

From the Quill



Photograph by- Sakshi Saini, B.Sc. (H) Zoology, III year

MUSINGS

"Excuse me, please. Sorry, sir. Please move aside, madam. Sorry, sir, I think you've been mistaken, this happens to be my seat. Thank you."

The train compartment was full of hustle and bustle, with people elbowing each other to make way to reach their respective seats. The energy was palpable, even though the sky had turned purple. Sighing and taking a deep breath on finally locating my seat, I sat down and looked out of the window.

I was travelling on very short notice from Varanasi to Delhi to secure my admission. The multitude continued to pool inside making the July heat even more unbearable. Never had I experienced a journey in a sleeper class compartment-it was the first time. Sighing at my misfortune on my inability to procure better tickets, I was blaming it all on ill-luck. Little did I know the fates had something else planned for me. The sky had changed its hue to pitch black. Winds started slapping my face in no time. It was a clear starry night in mid-July. Soon I forgot all about people standing left right and centre on the overly crowded train.

You must've guessed by now that on that atrocious journey, I met someone special. No, it wasn't some tall, dark knight in shining armour but it was someone I knew better. At the end of this journey, I met myself-a new metamorphosed person.

Metamorphosis of a *caterpillar* into a *butterfly* occurs when it understands the beauty of obstacles faced in the making of a butterfly and endures them with a burning passion for a miraculous transformation into a butterfly-full of colour and full of vigour.

They say, "Life is a journey, hope is the ticket". The nuances of living which we often ignore make our personality better. The life we wish to live and the one we are currently living, there is no fine line between the two but a huge divide -a divide which can be abridged by sheer and accurate analysis of the situation and our shortcomings but a desire and will to incessantly strive for the goal with the right effort, at the right time in the right direction.



The train is speeding up and I feel time flying transiently in front of my eyes; limited time, limited resources, limited opportunities can surely be battled by limitless hard work in limitless endeavours. It's quite ironic how many people in adjacent compartments are sitting back and are busy in the digital world while sitting there amidst the less privileged people without even basic luxuries; I was watching life unfold before me. Contentment was in the air. The kindness shown by absolute strangers on that journey also holds high reverence in my heart.

Experience is the greatest teacher. Things would not be the same without the jerks in the path, the sound of the whistle, the winds blowing, the time flying and the moon amidst the stars.

Whosoever had thought a journey can change your perspective and teach you lessons for life? It did.

Jerks taught me the importance of balance.

The whistle taught me to be alert and be mindful of the surroundings.

The time in its ever so fleeting nature dared me to catch if I could.

The beautiful moon and the stars reminded of the elixir of life.

And the train which was frisking me away from my comfort zone into unfathomable darkness taught me to believe in myself and to believe that there would be light soon.

Life by now had become my favourite novel-so unpredictable, so realistic, so exciting (I had changed two cities on the same day and was heading towards the third without any prior planning). It takes you places. Like characters in a play, people-good and bad enter and then exit. *Shakespeare* had said, “*All the world's a stage*” and one must play his part but as they say “The show must go on” and so does life.

Often, we mistake surviving. Surviving does not bring you happiness but living in the moment does. The past is dead and the future unknown, yet we have a gift- present.

Utilizing the present wisely can be the answer to many worries. Living life on your terms, your ideologies without compromising on your values and integrity, using your independence responsibly and your right attitude towards achievement of personal goals and proper scrutiny of failures- can make you the person you wish to become from the person you see in the mirror every day.

"Excuse me, Ma'am, ticket please," the ticket checker enquired.

This interruption in my contemplation of life broke me out of my reverie and soon the real world came into existence. Recovering, I showed him my ticket.

My bubble had been broken but as the real world materialized in front of my eyes, I felt enlightened. The caterpillar inside me had realized the value of my wondrous transformation into a butterfly which spreads happiness through its colour and its vigour.

I thanked the fates for this epiphany.

Soon, the comforting winds lulled me into a deep slumber.

Samridhi

B.Sc. (H) Zoology, 1 year

SECOND WIND

26.2 miles- bustling with energy

15 miles- feeling a little breathless

8 miles- acute breathlessness

5 miles- the world is fading

4.5 miles – on the verge of blackout

0 miles- WINNER

The athlete knows no bounds of joy at his victory.

“Wait, how did he win? He was just about to faint!” you would ask.



This is not a sequence from some Bollywood movie where our hero, the protagonist fights on till his last breath. What my athlete and I are trying to communicate is the power of the second wind.

Scientifically speaking, it is a phenomenon experienced during marathons, wherein the athletes who are too tired to continue suddenly find the energy to exhibit the peak of their performance, feeling the least exertion. The proper balance of oxygen in their blood counteracts the lactic acid formed in the muscles during running. It is often referred to as the “runner’s high”. This is what has made our athlete victorious.

The second wind is like a sudden jolt of energy when the person is truly exhausted but has the will to win. However, the second wind has more widespread effects than just on the field.

Have you ever felt that you’ve hit rock bottom and that all your efforts are in vain?

Have you ever wanted to flee the battleground because you feel that you can survive no longer?
Have you taken risks and failed?

Have you failed and failed again repeatedly?

Do you feel the universe is against you and no matter what you do, the outcomes are never up to the mark?

Now, ask yourself the most important question- DO YOU WISH TO WIN? Do you wish to carve a niche for yourself?

Do you now relate to the athlete on the verge of fainting? If you do, then like the athlete – don’t quit.

You don’t know when you will be hit by the sudden jolt of positivity and immense mental strength to lead you to your destination.

When you feel like everything is crumbling around you, push yourself beyond the limits of pain and exhaustion and fight through. These are the necessary conditions for achieving the second wind.

The second wind is like your re-birth in the competition. It reassures your faith in you and shows your opponents that you're not an underdog but are here to stay and the game still belongs to you.

Life offers second chances which can be also accounted for as second winds. When one endeavour goes badly, we are always blessed with new opportunities. We can decide if we let ourselves be sad and miserable due to one failure or pull ourselves out of the rut and grab many opportunities and turn them into successes.

And if at all, we fail again, never mind life gives us a third wind, fourth wind and so on.

"Where there is a will, there is a way." The will to succeed, despite all odds, matters the most. The fire within to achieve is what is required to stay true to your purpose in life.

Remember, most people give up before they reach their second wind because that is easy, but the question which arises is: Is that right?

Second wind helps you to go that extra mile.

The extra mile is never crowded and it is for those who dare to persevere until their last breath and fight through with the last shred of hope and strength left.

They are achievers and they are survivors. They believed in themselves when the conditions were adverse and they have experienced multiple failures and second winds in the pursuit of their goal. They cherish their pursuit of the reward more than the actual reward.

They were not afraid to get exhausted and shattered in their endeavours. On their failures, they stopped and regained their breath but kept going on and on.

People who give up in their first wind never win races and often end up blaming circumstances for their poor decisions and regretting their lack of willpower.

On the road to success, falling is natural but in the face of adversity, what matters is thick resilience to spring back up, hale and hearty, to complete the journey.

So, I leave the decision to you: Would you like to give up in your first wind or wait for your second wind?

Samridhi

B.Sc. (H) Zoology, 1 year

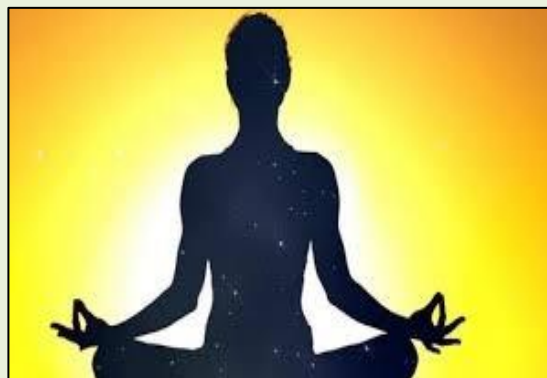
THE ESSENCE OF PRANAYAM

Our body is a bundle of different types of cells. The requirement of each cell in our body is oxygen. Oxygen doesn't mean just air. It means a vital life force.

Our body is made up of five elements and each cell has fire, air, water, earth, and ether. Pranayam sacrifices each element and our cells become energetic and healthy.

There are 8 steps to yoga. They are:

1. Yama- social discipline
2. Niyam - self-discipline
3. Asana - body postures
4. Pranayama - breathing techniques
5. Pratyahara - detachment of senses
6. Dharana – concentration
7. Dhyana – meditation
8. Samadhi - superconscious



When you do Pranayam you automatically follow your niyam and asana. When you continue to do Pranayam with total devotion, dedication and discipline, pratyahara, dharna, dhyana, and samadhi will be experienced.

Deepa

B.Sc. (H) Zoology, II year

SPEAK UP! WHY DON'T YOU?

"Congratulations! You are a victim!"

"What?"

I hate to break it to you but sadly we are all victims of a common perpetrator - our Silence!

Often, we hear in movies "You have the right to remain silent. Anything you say can and will be used against you in the court of law!"

That is how we like it, don't we?

Profound, unwavering, unflinching and brutal, like the consequences it leads to.

Often, this divide between silence and consent is aggravated – a situation where consent agonizes, but still its cries go unheard over the noise that silence makes.

Our society often mistakes our silence. It is taken as a green signal for their misdoings.

However, please remember:

“He who fails to understand thy silence will also fail to understand your words.”

I would like to ask you some questions:

Why remain silent when you feel that the treatment meted out to you is ill-intentioned and unfair?

Why remain silent when you think your decision to accomplish a task is correct?

Why remain silent when you see the wrong things around you?

Why turn away your gaze when you know something wrong is happening in front of your eyes and you, in your way, are capable of doing at least something, if not much to prevent the wrongdoing?

Why think it is okay to discriminate on any grounds?

Why censor our speech, our clothes and our body posture to suit others?

Why succumb to the ordinary when you know you deserve the extraordinary?

Why limit our horizons when we know we can reach the skies and beyond, just because others want us to?

Why should the women in our country be on a constant vigil, like a country under a terrorist attack?

Why?

The answer lies deep within all of us, at the bottom of our hearts, secure, as we purse our lips pondering these questions and share a singular emotion – fear.

We are afraid to break the shackles, lest they should break us.

Fear has way too many shades, not just fifty. It exists in all degrees – fear of rejection, fear of being shunned by society, fear of losing the trust of your kith and kin or just the fear of the unknown.

It isn't incomprehensible that fear leads to silence. Silence in the wrong situation leads to oppression and ultimately, the situation goes out of hand and gets worse and worse.

It is said that silence speaks louder than words.

But in cases where it does not, try words, full of love and rage and speak up!

SPEAK UP – for all the wrongs meted out to you and against all wrong which you can prevent in your way.

SPEAK UP- for your credits and your credibility.



SPEAK UP – against wage disparity, against any form of discrimination you come across.

SPEAK UP- for your rights, for your decisions, dreams, and for all other things, you deem right

SPEAK UP-to safeguard your future and the future of those around you, even the unborn.

SPEAK UP- if you want all the whys asked to you by society to change into why nots.

Speak up and spread awareness against child labour for young children like Bholu, who are forced to be the sole breadwinners of their families.

Please speak up against malpractices like child marriage for Sarita, who wants to go to school for higher education.

Speak up for Ganga Devi, residing in a village near the arid regions, to save women like her, from traversing miles just to fetch a few pots of water.

Speak up against domestic violence or any form of violence to save precious lives. Speak words of peace and harmony, because that's what the world needs in times like these.

Feel free to speak your mind as long as it does not hurt others' sentiments because you have the right to exercise your freedom of expression.

*"Where the mind is without fear and the head is held high...
Into that heaven of freedom, my Father, let my country awake"*

No democracy is a democracy where people live under constant fear. Silence is a great source of strength; however, nothing strengthens authority so much as silence. It facilitates oppressors.

The decision lies with us, whether we want to emerge as victors or be vanquished at the hands of the fear of social stigmatization?

Victors are not afraid to voice their beliefs and stand up for what they believe to be true and just.

Shun the fear, break the silence and let the world hear your opinions and perceptions.

Our perceptions and opinions do matter because we form this democracy. Perceptions decide what we like, who comes in power and what changes we can make together to maintain harmony in our nation. *Mark Twain* has rightly said, *"The public is the only critic whose opinion is worth anything at all".*

Samridhi

B.Sc. (H) Zoology, 1 year

ECONOMIC SLOWDOWN IN INDIA

"Have you ever taken cognizance of how I run this house?" said the infuriated wife to her husband who is stuck amid the debate on television.

With the prices of essentials soaring high and her young sons sitting idle for about three years now, the poor lady is bound to see their daunting future. This thought makes her heart skip a beat.

With none paying heed to her wail, she started playing with utensils in reach for a wider audience. Her husband, a silent spectator, switched off the T.V and assured her "Don't worry; they say it's all cyclical".

Samiksha Uniyal

Bsc (H) Zoology, III year

I WILL RISE

The world will provide largesse,

But in factual, that will be alms.

Blithely welcoming those dupe advances,

I will rise...

They will lambaste my words,

Whenever I will speak truth,

Disregarding those mental besmirch,

I will rise...

Every moment, I will give performance of considerable virtuosity,

But still, they will not be contented,

Making that exasperation, my durable strength,

I will rise...

They will always preach of love and that will definitely be imitation,

But this time, I will not take those shams in consideration,

Disdaining those fallacious teachings,

I will rise...

Unequivocally, they will approach in my life,

Will manifest of love and then shatter my heart,

Tenderly joining those delicate fragments,

I will rise...

They will never admire me,

For my high aptitude and benevolence,

They will mentally mutilate me,

By their criticising words,

Haughtily accepting those cacophonous sounds and

Turning them into motivating words,

I will rise...

To that extent, where they can never rise...

Forever I will rise...

Vanshika Bhat

B.Sc. (H) Zoology, I year

MUSIC OR LOVE

A string of guitar shimmers us away in the world of love,
A quiet place in the night where a firefly reaches its ecstasy of glow.
The clinking of the key of piano embracing each step of your harmonious motion
In response to it,
The heart sinking piece of flute leading us to the melody of
Unrequited or incomplete romances,
Which deserves to be won but harbours away due to
Symphony of its drawl.
A piece of music installed in every living smaller piece,
Making the stage of the world an orchestra of love, devotion,
happiness, compassion,
While projecting the passion to God who sit up in the seat
as an audience,
For the embodiment of eternal dance to take place.

Sakshi Krishna

B.Sc. (H) Zoology, II year

गांव की कहानी

कच्ची सड़के बारिश का पानी
मेरे गांव की पुरानी कहानी
अच्छा होता फिर से आ जाता बचपन
दूर-दूर तक फैले है बचपन के साथी
आता बचपन वो भी आ जाते
खेल-खेल में उम्र भुल जाते
फिर जाते हम नहीं किनारे
और तरबूज खीरा खाते
शाम को अन्धेरा होने से पहले
सभी अपने-अपने घर को चले जाते
दादा को दवाई दादी का लालटेन जलाते
बचपन के समय गांव की यही थी कहानी
कच्ची सड़के सर्दी-गर्मी बारिश का पानी ।

Mr.Suresh Prajapati

मतदान – युवा पीढ़ी के लिए अभय दान

यूँ ही, आज सुबह मेज पर पड़े अखबार की तरफ़ मेरी नज़रें आकर्षित हो गईं। वैसे तो, कभी धैर्य से पूरा, उसे पढ़ने की मशक्कत न की थी, पर वक्त-बे वक्त नज़रों के सामने एक-आधी सुखियाँ आ ही जाती हैं। माँ नाश्ता तैयार कर रहीं थीं और मैं उसका इंतज़ार और इसी बीच मैंने वह समाचार पत्र उठा लिया और खबरों पर सरसरी परंतु पैनी नज़र डालने लगी- अर्थव्यवस्था की कमर टूट रही थी, प्याज़ के दाम बढ़ रहे थे और सोने ने भी छलांग लगाई थी। पारा गिर रहा था और इस बात की मैं स्वयं ही साक्षी थी। पन्ने पलटने पर यह जरूर आभास हुआ कि, राजनीति काफी गर्म चल रही है और इसका कारण था - चुनाव।

कुछ दिनों में चुनाव आने वाले थे।

चुनाव का ख्याल आते ही मेरे मस्तिष्क में इस बात ने घर कर लिया कि इस बार मैं भी मतदान कर सकती हूँ और इसके साथ आए कई सवाल:

क्या मेरे मतदान का कोई फायदा होगा?

चुनाव तो बहुमत से जीता जाता है।

क्या इस चुनाव में युवा अपनी शक्ति प्रदर्शित कर पाएंगे?

क्या कोई युवाओं की आवाज़ सुनेगा?

खैर, मैं घर से महाविद्यालय के सफ़र पर निकल पड़ी।

परंतु, बस क्या चली, मेरे ख्यालों का काफ़िला ही चल पड़ा और उनमें मदमस्त मैं महाविद्यालय की ओर रूख कर रही थी।

कशमकश तो अभी भी थी।

हमारे देश की प्रमुख शक्ति, आज की तारीख में युवा शक्ति को माना गया है। वो युवा जो अपनी कलम से देश का भविष्य लिखता है और जो अपने कर्मों से देश की किस्मत बदलने की ताकत रखता है। आज हमारे देश में अधिकतम मात्रा युवाओं की है और इसी कारण भारत “युवा राष्ट्र” है।

आज का युवा सक्षम है, स्वच्छन्द है, निडर है। वह जुगाड़ में नहीं, अपितु जागरूकता एवं जानकारी में विश्वास रखता है। और यदि, बात अपना मत रखने की हो, तो वह हटाए नहीं हटेगा।

मतदान एक विवशता नहीं, अपितु शक्ति है। अपनी आवाज़ और अपना समर्थन प्रदर्शित करने की शक्ति। यह शक्ति है एक बेहतर कल के लिए और संपूर्ण आज के लिए। यह शक्ति है, हमारे लोकतंत्र के की- हमारे संविधान का उपयोग जनहित में किया जाए और जन प्रतिनिधित्व के आधार पर किया जाए, ताकि देश प्रगतिपथ पर अग्रसर हो। इस ताकत का मूल्य आज का युवा भलि-भांति पहचानता है। वह समझता है कि अपने संविधान के संरक्षण का कार्यभार उसके कंधों पर है।

राजनेता, अमूमन, बेहतर उच्च शिक्षा, नौकरी और आर्थिक उन्नति के वायदें, युवा को आकर्षित करने हेतु करते हैं, क्योंकि युवा चुनाव की नियति के कर्णधार होते हैं। आंकड़ों के अनुसार, तो अधिकतम युवा, मतदान से पूर्व अपने क्षेत्र के उम्मीदवार के बारे में जानकारी एकत्रित करते हैं और अपने मतदान के मौलिक अधिकार को नज़र अंदाज़ नहीं करते।

परंतु, क्या सारे युवा मतदान कर पाते हैं?

जी नहीं, कतई नहीं, क्योंकि वह अक्सर अपने घरों से दूर होते हैं और मत नहीं रख पाते। चुनाव की नियति का निर्धारण उन लोगों के बहुमत से होता है, जो उसमें मतदान कर पाते हैं। क्या लुप्त वोटों का कोई मूल्य नहीं? जो मतदान करने में असमर्थ हैं, उनकी आवाज़ अनसुनी क्यों रहे भला? मत न रखना कोई विरोध नहीं, वह तो आत्मसमर्पण है। अक्सर, निःकुशल लोगों का चुनाव, अच्छे लोगों की चुप्पी का नतीज़ा होता है और प्रायः यह अनैच्छिक होता है।

आज हमें जरूरत है, एक ऐसे माध्यम की, जो समान रूप से सभी को मतदान करने का अवसर दे। जरूरत है, संपूर्ण जनता का मत जानने की, झूठे आडंबरों और झूठे वायदों से, क्योंकि जनता सब जानती है। आजकल की दुनिया ऑनलाइन तथा सोशल मीडिया के सहारे चलती है, तो चुनाव इनसे अछूते क्यों रहें? एक सुरक्षित डिजिटल सेवा के तहत, हम अपने प्रजातंत्र की गरिमा बनाये रख सकते हैं। ज्यादातर युवा ईवीएम की गुणवत्ता को शशंकित रहते हैं, अतः यह एक उज्ज्वल अवसर की तरह उभर सकता है। लोकतंत्र मतदान से चलता है, और अपने लोकतांत्रिक अधिकारों के प्रयोग का समय आ चुका है। इसी हक के लिए कई लोगों ने आवाज़ उठाई थी, इसे जाया न करें। युवा को समझना होगा कि घर बैठे, दोषारोपण से प्रगति नहीं होती, न ही अर्थव्यवस्था में सुधार होता है। सुधार की शुरुआत मतदान के नीले निशान से होती है। आज युवा के पास ताकत है, इसे व्यर्थ किया, तो कल सिर्फ़ अफ़सोस बचेगा। 'नोटा' का वोट भी राजनीतिक पार्टियों को कार्य कुशलता लाने पर विवश करता है।

दुनिया के समक्ष अपने युवा राष्ट्र के 'हाई जोश' का प्रदर्शन, हम चुनाव प्रक्रिया में सक्रिय भूमिका निभा कर सकते हैं। हम सभी में बदलाव लाने की क्षमता है और बदलाव लाने हेतु, हमें स्वयं बदलने पड़ेगा। जनता – जनार्दन के पास क्षमता है राजनीतिज्ञ महारथियों के समक्ष यह प्रकट करने की, कि जो जैसा बोता है, वह वैसा ही काटेगा। बैलेट की ताकत, बुलेट से अधिक है।

मेरे विचारों की श्रृंखला में भंग बस की घंटी ने डाल दिया। मैं उतर गई और महाविद्यालय की ओर रूख करने लगी।

जब तक, मैं महाविद्यालय पहुँची, तब तक मेरे मन में एक संकल्प का बीज अंकुरित हो चुका था:

“सारे युवा मिल कर लें, यह शपथ, नहीं डरेंगे, नहीं चूकेंगे, हम रखने से अपना मत”

Samridhi

B.Sc. (H) Zoology, 1 year

अधूरी कहानी

इच्छाओं के जंगल में
पतझड़ सी रहती हैं अधूरी कामनायें
अजगर सी चाहत है
सब कुछ पा जाने की
पिन्टू गिरगिट की तरह
हर पल है रंग बदलता
किसको छोड़ किसको पा जायें
कहां जायें इस कमजोर कामनाओं
के जंगल से
जहां ओर तो दिखे पर छोर नहीं दिखता
बदन पर मांस कमए अब हड्डियां हैं ज्यादा
लालच की रानी है बड़ी सयानी
इस उम्र में सब कुछ पाकर भीए
कहती है अधूरी है कहानी।

Mr. Suresh Prajapati

STUDENTS' ACHIEVEMENTS

ACADEMIC

- Ritika Mukherjee, Samriddhi, Bathula Sreeja and Kamakshi Singh, B.Sc Hons. I year represented Miranda House at Zoonhackathon, New Delhi 2019.
- Kamakshi Singh and Ritika Mukherjee, B.Sc. Hons. I year participated in a talk on Citizen Initiatives against Vector Borne Disease organized by the US Embassy and WHO.
- Kamakshi Singh and Ritika Mukherjee, B.Sc. Hons. I Year participated in the Mimamsa Quiz organized by IISER, Pune for North Delhi Centre Toppers.
- Geetika, B.Sc. Hons. I year secured 2nd position in CMS VATAVARAN Quiz organised by MH VATAVARAN
- Kamakshi Singh, B.Sc. Hons. I year participated in the Infinity Asylum Quiz, Overclock Technology Quiz and Trident Mythology quiz organized by SRCC.
- Kamakshi Singh, B.Sc. Hons. I year participated in the Psoask Majors Quiz organized by AIIMS along with the Rites General Quiz organized by Hindu College.
- Kamakshi Singh, B.Sc. Hons. I year participated in the International Conference on Women in STEM.
- Ayushi Das, B.Sc. Hons. II year has been a Summer Research Intern at Tata Memorial Centre Advanced Centre for Treatment, Research and Education in Cancer, Navi Mumbai from 1st June-20th July, 2019
- Yamini Gupta, B.Sc. Hons. III Year has a research paper under submission, titled "Architected SPIONs for Cancer Theranostics: Integrating Particle Characteristics, Facilitated Diagnosis and Therapy" in the prestigious Nanotoday journal.

- Yamini Gupta, B.Sc. Hons. III year won the Best Poster Presentation Award in the 6th World Congress on Nanomedical Sciences (ISNSCON) from 7th to 10th January, 2019.
- Yamini Gupta, B.Sc. Hons. III year has been a Summer Research Intern at the Indian Academy of Sciences 1st June to 26th July.
- Yamini Gupta, B.Sc. Hons. III year has been a Summer Research Fellow at the D.S.K.C. Lab, Miranda House from 6th June to 10th July.
- Yamini Gupta, B.Sc. Hons. III year won the Best Poster Presentation Award in DBT Science Conclave at Miranda House from 16th to 18th January, 2019.

SPORTS

- Parul, B.Sc. Hons. II year stood 1st in Delhi State Taekwondo Competition in September, 2019.
- Parul, B.Sc. Hons. II year participated in Delhi University Inter-college Taekwondo Competition from 4th-6th January, 2020 and secured 1st position.
- Parul, B.Sc. Hons. II year secured 1st position in Erobern, the MH Sports Fest, held from 11th-13th January, 2020
- Sumedha Dahiya, B.Sc. Hons. III year won a silver medal in the Inter-college Shooting Championship held in Hansraj College from 15th-18th October, 2019
- Sumedha Dahiya, BSc. Hons. III year got selected in International Trials of 63rd National Shooting Championship held at Bhopal by the National Rifle Association of India.

OTHERS

- Arukshita Tyagi, B.Sc. Hons. II year from MH NCC was a part of the Marching Contingent of the Republic Day Parade on January 26, 2020 at Rajpath.

- Arukshita Tyagi, B.Sc. Hons. II year from MH NCC participated in the Combined Annual Training Camp from 11th-20th July, 2019 and secured 2nd position in the Squad Drill Competition.
- Samriddhi, B.Sc. Hons. I year secured 1st position in the Slogan Writing Competition organised by NSS MH in association with Systematic Voters Education and Electoral Programme (SVEEP) on 23rd January,2020.
- Samriddhi, B.Sc. Hons. I year secured 2nd position in Creative Writing Competition organised by NSS MH in association with Systematic Voters Education and Electoral Programme (SVEEP) on 22nd January,2020.
- Geetika, B.Sc. Hons. I year secured 1st position in Dyal Singh Intercollegiate Parliamentary Debate held on 20th and 21st October,2019
- Geetika, B.Sc. Hons. I year participated in The Lady Irwin Conventional Debate on Science and Technology, The Zakir Hussain College Senior Parliamentary debate as well as the KMC UDBHAV Parliamentary debate.
- Yuktika Pandya, B.Sc. Hons. I year won the 2nd prize in Speech Competition organised by Vigilance Awareness Camp.
- Yuktika Pandya, B.Sc. Hons. I Year, participated in the Slogan Writing Competition organized by NSS MH in association with Systematic Voters Education and Electoral Programme (SVEEP) on 23rd January,2020.
- Vanshika Bhat, B.Sc. Hons I year, as a member of Geetanjali, the Indian Music Society of MH, secured 3rd position in Sangam- the choir singing competition in Antaragni- The Annual Fest of IIT Kanpur.
- Vanshika Bhat, B.Sc. Hons. I year, as a member of Geetanjali, the Indian Music Society of MH, participated in Rendezvous- The Annual Fest of IIT Delhi.
- Ritika Mukherjee, B.Sc. Hons. I year, as a member of Orpheus, the Western Music Society of MH received 2nd prize in Pitch Perfect at Oasis, BITS.
- Ritika Mukherjee, B.Sc. Hons. I year participated in Acappela Competitions at Gargi College, Shiv Nadar University and Delhi Technological University.

- Ritika Mukherjee, B.Sc. Hons. I year is the Zoology Course Coordinator, Placement Cell, MH.
- Kamakshi Singh, B.Sc. Hons. I year is a member of The Quiz Society MH and Bluequill-The English Creative Writing Club, MH.
- Yamini Gupta, B.Sc. Hons. III year participated in the Debate Competition on open day at Regional Centre for Biotechnology, Faridabad.
- Samiksha Uniyal, B.Sc. Hons. III year won first prize in a micro tale competition titled Economic slowdown in India organized by Arthashastra, the Economics Society of Miranda House, as a part of their annual fest -Zenith 2020.

Into the Wild



Photograph by- Sakshi Saini, B.Sc. (H) Zoology, III Year

Here you can see bee on a mustard and water Lilly, the most important thing that bees do is pollinate. Pollination is needed for plants to reproduce, and so many plants depends on bees' pollinators. When a bee collects nectar and pollen from the flower of the plant, some pollens from the stamens (the male reproductive part of the flower) sticks to the hair of bees body , when she visits next flower some pollens is rubbed off on to the stigma or tip of the pistil (the female reproductive part of the flower) and after all this fertilization is possible, and a fruit, carrying seeds , can develop.



In the picture we can see ladybugs mating. The ladybugs species releases special pheromones specific to its species. They copulate for 2 hours in a single go. And female stores the sperms for a long time of 2-3 months and they lay their eggs where there is abundance of food.

Kumari Aruna Singh

B.Sc. (H) Zoology, II Year



Rose ringed parakeet (*Psittacula krameri*)

Male Rose-Ringed Parakeet sitting on a branch. The bird is named so because of the red coloured ring on the neck of the males.



Common Myna (*Acridotheres tristis*)

Common myna basking in the sun. The bird has a dark brown body, bright yellow coloured beak and eyes encircle with bare yellow skin.



Dragonfly (*Anisogomphus caudalis*)

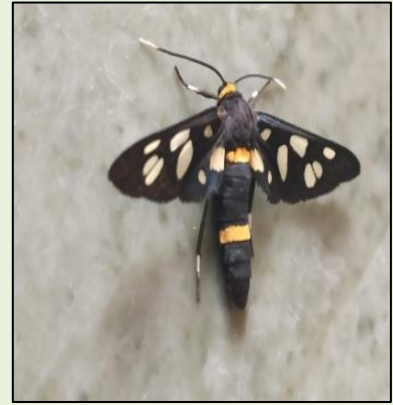
Female *Anisogomphus* resting. The narrow abdominal segments and transparent wings held horizontally are some of the distinctive features which are seen in this picture

Srijan Singh

B.Sc. (H) Zoology, III Year

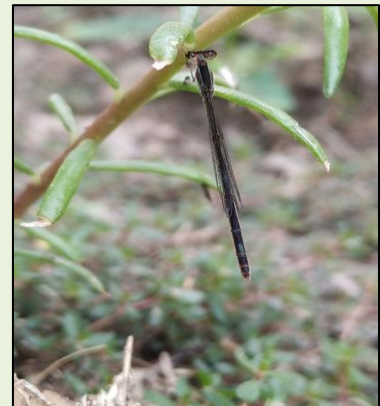
***Amata Cyssea*- Handmaiden moth**

It mimics wasp in its body colour and markings. Bright Body colour usually suggest bad taste.



***Brachythemis contaminata*-
Ditch jewel dragonfly**

During resting, they keep their wings extended. Their legs are more extended, the body is kept away from plant support with abdomen forming an angle of 90 degrees.



***Ischnura rubilio*- Western Golden Dartlet**

During resting, the legs of the damselfly are more extended so that the body is kept away from plant support with abdomen forming an angle of 90 degrees. They fold their wings up and hold them together across the top of their backs.



***Tettigoniidae* sp. - Bush cricket**

The green body colour, resting posture and green colour of environment makes katydid inconspicuous in the environment. This offers survival benefit to the individual.

***Papilio polytes romulus*- Common Mormon- larva stage**

This is fifth instar larva. The body is green coloured and has spongy appearance. There are white stripes on body with brown spots. The head appears similar to that viper snake, thus, providing protection from predator.



***Achatina fulica* - Giant African Snail**

It is considered invasive species. It belongs to native of Eastern Africa. The shell colour and pattern varies and depend on diet. Usually, there are brown bands which run spirally across the shell.

***Dysdercus cingulatus*- Red Cotton Stainer**

It is a serious pest for cotton plants. The adult are reddish with white bands on the abdomen and black markings on forewing.



Sakshi Saini

B.Sc. (H) Zoology, III Year

Panulirus argus, the Caribbean Spiny Lobster, is a species of spiny lobster that lives in reefs and mangrove swamps in western Atlantic Ocean. It has a long cylindrical body covered with spines. It is a nocturnal species, taking to cover during the day.

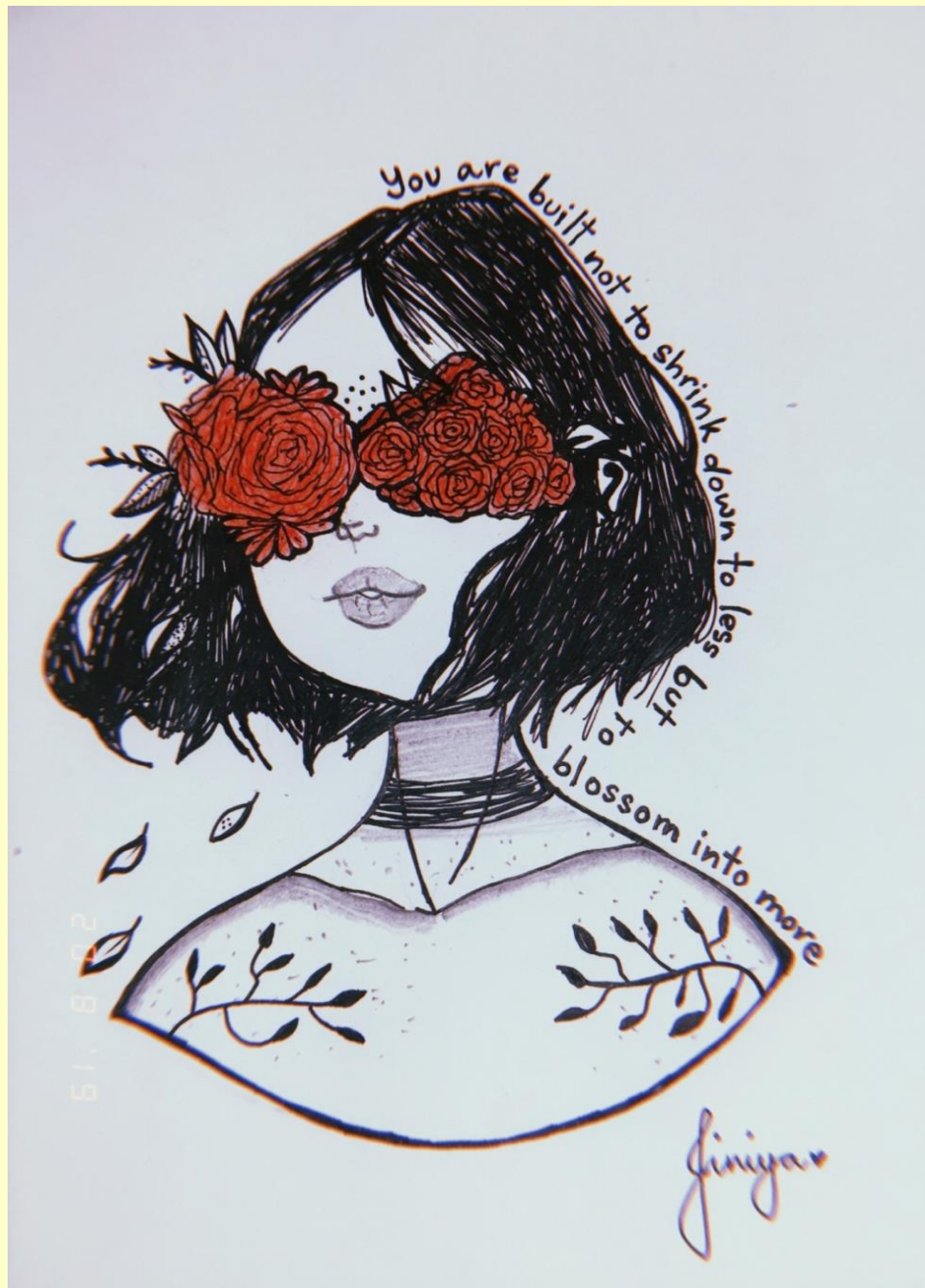


The Blackbelly Triggerfish ***Rhinecanthus vercusus*** is a ray finned fish in family Balistidae found in Indopacific. It has a laterally compressed deep body and a long snout. Blackbelly triggerfish is a territorial species and defends its territory against other triggerfish. Its habitat is lagoons and reef flats where it favours areas with seaweed, corals, seagrasses and stony places.

Tejaswini Pattnaik

B.Sc. (H) Zoology, I Year

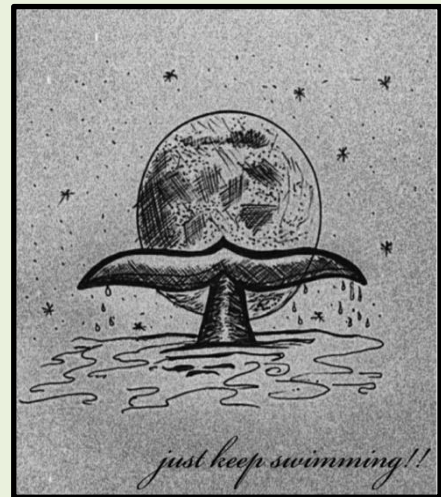
To the Creators



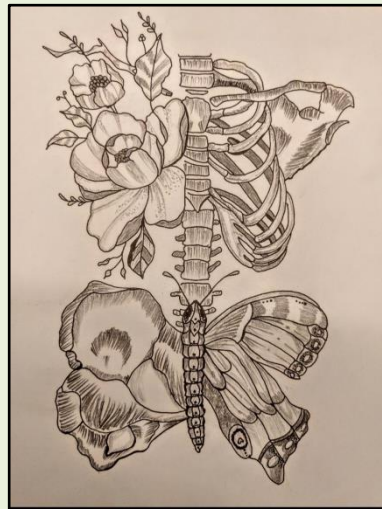
Artwork by: Jiniya Chatterjee, B.Sc. (H) Zoology III year



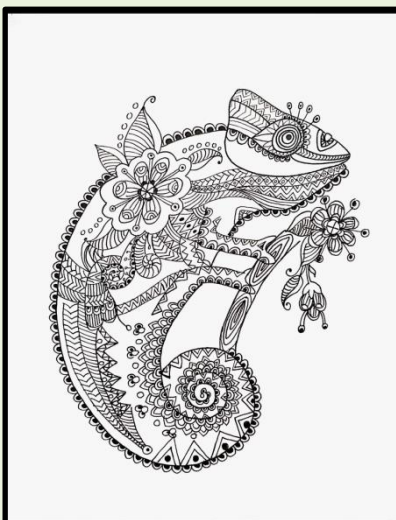
Kumari Aruna Singh, 11 year



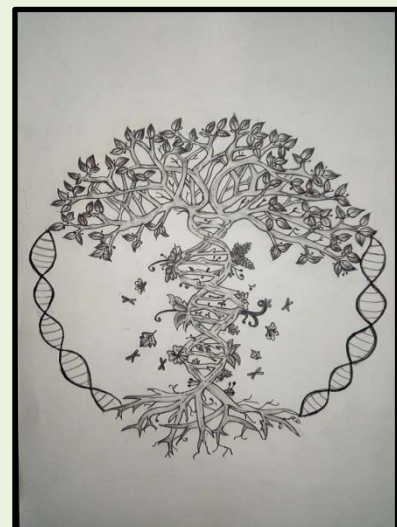
Kumari Aruna Singh, 11 year



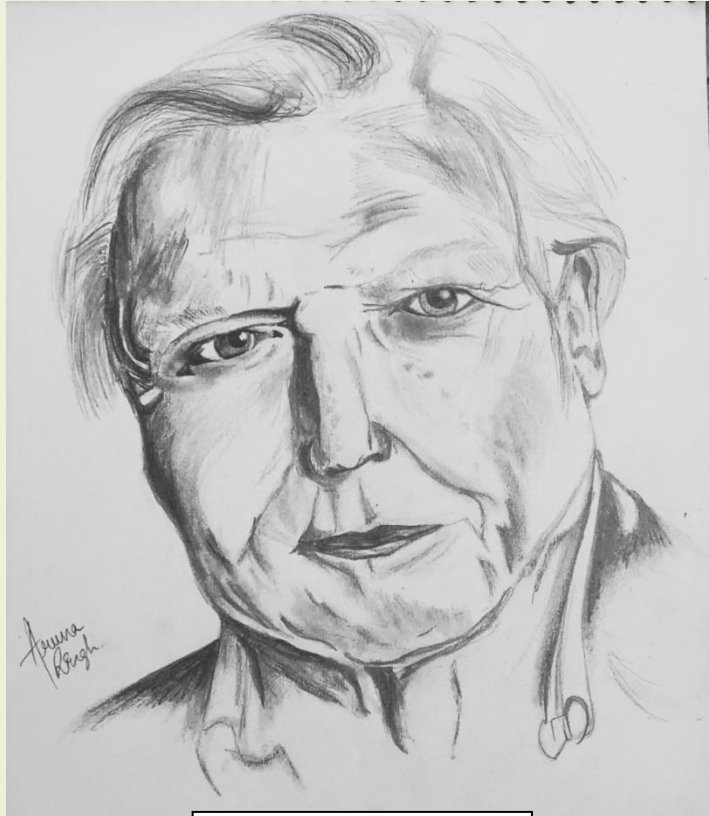
Tanya Bharadwaj, 1 year



Vidhi Singh, 1 year

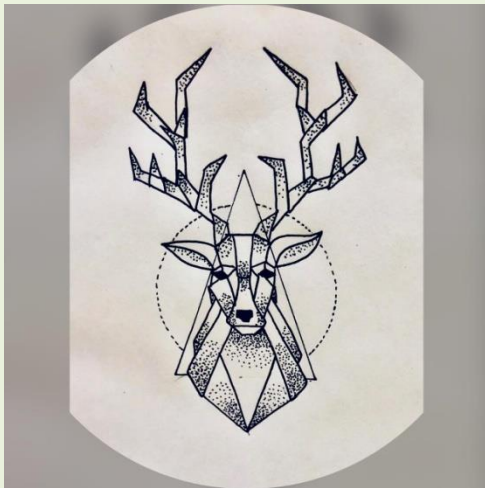


Priyanka Shankar, 1 year



Sir David Attenborough

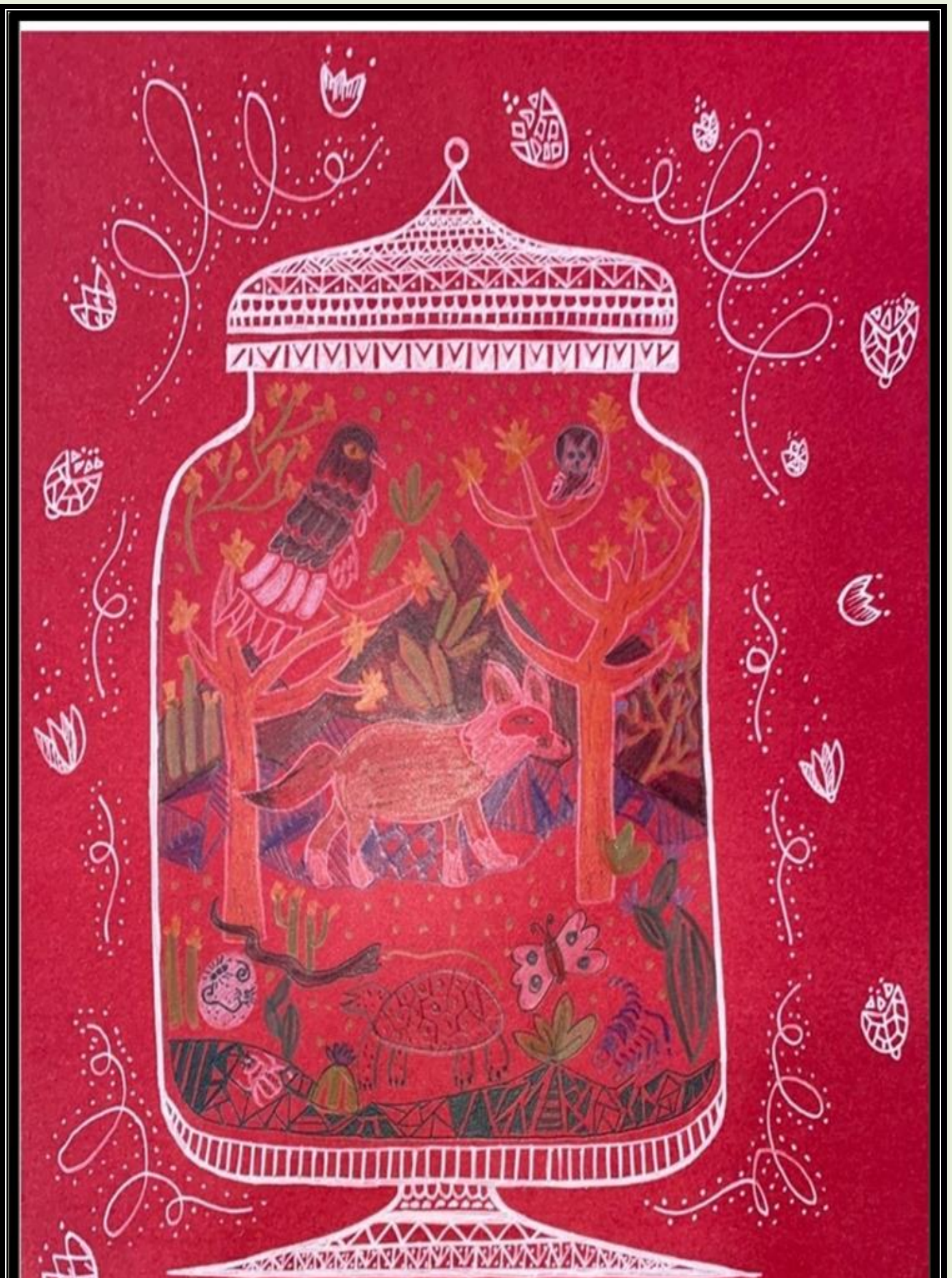
Kumari Aruna Singh, 11 year



Tejaswini Pattnaik, 1 year



Tejaswini Pattnaik, 1 year



Artwork by: Jiniya Chatterjee, B.Sc. (H) Zoology III year