SHRI MATHURADAS MOHOTA COLLEGE OF SCIENCE

2025 ISSUE

# SHEKRU

E-MAGAZINE PUBLISHED BY SMMCS ZOOLOGICAL SOCIETY

Nagpur Shikshan Mandal's

# Shri Mathuradas Mohota College of Science, Nagpur

## PATRONS

Er. Mohit S. Shah

President, Nagpur Shikshan Mandal

Adv. Rajeev S. Deo

Secretary, Nagpur Shikshan Mandal

## PRINCIPAL

Dr. J. R. Dontulwar

# *SHEKRU*

## EDITOR-IN-CHIEF

Dr. Pawan U. Gajbe (Professor)

## EDITORIAL SUPPORT

### TEACHERS

Dr. Vaishali H. Badiye (Assistant Professor)

### STUDENTS

Shreyash Mishra (BSc Sem-VI)

Shruti K. Moglewar (BSc Sem-IV)

# EDITORIAL

Dear Readers,

On the occasion of National Science Day 2025, we are thrilled to present to you the inaugural issue of '*SHEKRU*', an e-magazine created by our UG/PG Zoology students under the aegis of the college Zoological Society. It is dedicated to exploring the wondrous world of science. Our e-magazine is named after Maharashtra's state animal, the giant squirrel, which is known as *shekru* in Marathi. In a time where science and technology are advancing at an unprecedented pace, it is our mission to offer you interesting articles that shape our understanding of science.

Our goal is to provide a platform for our student authors to display their creativeness by producing articles on diverse topics that not only inform, but also inspire curiosity and a deeper appreciation for science. Whether you are a student, a teacher, or simply someone with a passion for learning, we aim to make the complexities of science interesting and engaging for all.

Our magazine is more than just a collection of articles. It is a community. We invite you to join us on this journey of exploration and discovery. Share your thoughts and ideas with us, and let us create an interaction that fosters growth and innovation. As we embark on this exciting adventure, we promise to bring you content that is well-researched, thought-provoking, and relevant. Thank you for being a part of *Shekru*.

Sincerely,

28/02/2025

Editor-in-Chief

*'SHEKRU'*

# CONTENTS

# GIANT SQUIRREL – STATE ANIMAL OF MAHARASHTRA

Akansha V. Manwatkar (BSc Sem-II)

The Indian Giant Squirrel (*Ratufa indica*), is the state animal of Maharashtra. It is known as "*Shekru*" in Marathi. This species is native to the forests of the Western Ghats and central Indian forests. Measuring up to 3 feet in length from head to tail, the Indian Giant Squirrel is characterized by its vibrant fur, which varies from deep maroon, rust, and tan to cream, blending beautifully into its forest habitat.

The Indian Giant squirrel is arboreal, spending most of its time in the treetops, rarely descending to the ground. Its long tail, often as long as its body, aids in maintaining balance while leaping between branches. It is diurnal, feeding on a diverse diet of fruits, nuts, flowers, and tree bark. It plays a crucial role in its ecosystem as a seed disperser, aiding in forest regeneration. In Maharashtra, the Indian Giant Squirrel symbolizes the rich biodiversity of the region and highlights the importance of conserving the Western Ghats.

Beyond its ecological significance, the Indian giant squirrel is an emblem of the natural beauty that Maharashtra has to offer. Its striking appearance and graceful movements through the treetops capture the imagination of wildlife enthusiasts and nature lovers alike. By focusing on the protection of such species, Maharashtra not only preserves a part of its natural heritage but also emphasizes the broader need to safeguard the Western Ghats and India's diverse ecosystems for future generations.

# YELLOW-FOOTED GREEN PIGEON: THE STATE BIRD

Manoj A. Kshetrafal (BSc Sem-II)

The yellow-footed green pigeon (*Treron phoenicoptera*), is a beautiful bird found across parts of South Asia. It is the state bird of Maharashtra, and is called "*Haroli*" or "*Hariyal*" in Marathi. It is known for its striking colour, with an olive-green body, purple breast, and distinct yellow legs. It is a medium-sized bird and typically inhabits forests, wooded areas, and groves where it can find fruits and berries, its primary diet. It is a social bird and often seen in flocks.

These pigeons play a vital role in their ecosystem by aiding in seed dispersal as they consume various fruits and spread the seeds through their droppings. Their call is soft and repetitive, adding a soothing melody to their surroundings. They are facing threats from habitat loss and deforestation, which impact their natural habitat. Their vibrant colours and peaceful nature make them a favourite among bird watchers and nature enthusiasts.

Their role in maintaining the ecological balance by helping in seed distribution highlights the importance of preserving their habitat.

In conclusion, the yellow-footed green pigeon is more than just a beautiful bird. Its role in forest ecosystem highlights the importance of conservation efforts that protect entire habitats. By understanding and appreciating the interconnected nature of ecosystems, we can work towards preserving species like the yellow-footed green pigeon, and ensuring the health of our planet's diverse ecosystems for future generations.

# *LAGERSTROEMIA SPECIOSA* – MAHARASHTRA'S STATE FLOWER

Honam R. Nilaskar (BSc Sem-II)

***L**agerstroemia* is a genus of around 50 species of deciduous and evergreen trees and shrubs native to the Indian subcontinent, southeast Asia, northern Australia, and other parts of Oceania, cultivated in warmer climates around the world. *Lagerstroemia speciosa* (giant crepe-myrtle, banabá plant, or pride of India, is a species of *Lagerstroemia* native to tropical southern Asia. It is a deciduous tree with bright pink to light purple flowers. It is the state flower of Maharashtra and is known as "*Tamhan*" or "*Jarul*" or "*Motha Bondara*" in Marathi. It is a member of the family Lythraceae, which is also known as the loosestrife family. These flowering trees are often planted both privately and commercially as ornamentals.

In Nagpur, it flowers during the summer season, from April to June. It has been planted along many avenues in Nagpur, and its flowers are a sight to behold during the warmer months.

The name "Queen's Flower" is derived from the specific epithet 'reginae' or 'flosreginae', which means "imperial or flower of the queen". The tree bears beautiful attractive flowers in profusion in purple, lilac or pinkish-violet colours. It is called Queen's crepe-myrtle, as its flowers look like delicate crêpe paper. In Vietnam, the plant's young leaves are consumed as vegetable, and its old leaves and mature fruit are used in traditional medicine for reducing glucose in blood.

# BLUE MORMON – STATE BUTTERFLY OF MAHARASHTRA

Hemansh Parate (BSc Sem-II)

The Blue Mormon (*Papilio polymnestor*), is known for its striking beauty and ecological significance. It is one of the largest butterflies in India, with a wingspan that can reach up to 120-150 mm. Its vivid black wings are adorned with bright blue patches, making it a stunning sight in the Western Ghats, where it is commonly found.

The Blue Mormon thrives in tropical and subtropical forests, gardens, and plantations, favouring areas with abundant flowering plants. The butterfly plays a key role in pollination, helping to maintain biodiversity by aiding the reproduction of various plant species. Its larval host plants include those from the citrus family such as lemon, which makes it a familiar visitor to home gardens.

Beyond its ecological role, the Blue Mormon holds cultural significance in Maharashtra, symbolizing the rich biodiversity of the region. It was declared as the state butterfly in 2015, reflecting the state's commitment to environmental awareness and conservation efforts. The butterfly's presence is often seen as an indicator of a healthy ecosystem. However, habitat loss and climate change pose threat to its survival. Conservation efforts aimed at preserving forested areas and promoting awareness about local biodiversity are essential for the continued protection of the Blue Mormon. In urban areas, the Blue Mormon is attracted to gardens with flowering plants, where it can be seen feeding on nectar from plants like *Lantana*, *Ixora*, and *Hibiscus*.

# RED WEAVER ANTS – A TRADITIONAL FOOD OF TRIBALS

Dhruv M. Dhanvijay (BSc Sem-II)

**R**ed weaver ants, scientifically known as *Oecophylla smaragdina*, are known for their ferocious nature, painful sting, and for constructing leaf nests on trees, especially mango trees. They are among the several species of edible insects consumed by humans. They are a traditional food source for many tribal communities in various parts of the world, particularly in Asia and Africa. In many tribal cultures, red weaver ants are considered a delicacy. They are a vital source of nutrition, especially when there is scarcity of food. Ant-based dishes are integral to tribal ceremonies and celebrations. Red weaver ants have a high protein content and are rich in fibre, micronutrients (iron, zinc, potassium) and antioxidants.

Tribals collect these ants by removing their nests from the host trees. The ants are sorted, cleaned, and either dried or cooked. They are generally roasted or fried before consuming. They are also used in traditional medicine for curing various health issues such as stomach pain, dysentery, cold and fever. It is believed that consuming these ants boosts the immune system.

In India, these ants are eaten in various states such as Odisha, Madhya Pradesh, Chhattisgarh, and Maharashtra. Madia tribals residing in the forested areas of Gadchiroli district of Maharashtra, are well known for consuming red weaver ants and making a nutritious chutney out of them.

# LEAVE NO TRACE – ETHICAL TOURISM

Vaishnavi Mahakalkar (MSc Zoology Sem-II)

Whenever we are exploring nature, our acts can upset the balance of ecosystems. This can happen when we unintentionally bring in non-native species, damage trails, scare animals, or leave garbage behind. Essentially, our actions can have significant and long term consequences. Hence, when going outdoors, we need to follow the principal of 'Leave No Trace,' a set of guidelines on how to minimize the impact of people on the natural world. The goal of LNT is to leave the environment as close to its original state as possible, so that in the future, others may continue to enjoy natural spaces. The idea of LNT is to sustain the environment for generations to come. We can do this by being aware of how we are interacting with the environment and making conscious decision that serve to reduce our impact on nature.

The LNT movement is a set of guidelines created in the 1960s to raise awareness about how human activities affect the environment.

The seven principles of LNT are as follows:

1. Plan ahead and prepare
2. Travel and camp on durable surfaces
3. Properly dispose the waste
4. Leave everything in the same state as you find them
5. Minimize campfire impact
6. Respect wildlife
7. Be considerate of other visitors

# ROOFTOP FARMING – GROWING FOOD IN THE CITIES

Asmita R. Dere (MSc Zoology Sem-II)

Urban areas are densely packed and have no space for farming. Rooftop farming is an innovative approach to urban agriculture where crops are grown on the rooftops of buildings.

This method offers numerous benefits, including:

1. Food Security: It provides fresh produce to urban residents, reducing the need for food transportation and lowering carbon footprint.

2. Temperature Control: Rooftop farms can help cool buildings and mitigate the urban heat island effect, making cities more comfortable during hot weather.

3. Social Interaction: These green spaces can foster community engagement and provide recreational opportunities.

4. Biodiversity: They create habitats for pollinators like bees and butterflies, enhancing urban biodiversity.

Rooftop gardens, balcony gardens, wall gardens are an important part of urban agriculture, which provide fresh organic vegetables to urban kitchens. Various types of containers used in rooftop farming include clay pots, poly bags, and plastic containers. Rooftop gardens require less water and soil. Rain water, or storm water can be collected and used for irrigating rooftop farms. Even fruit trees can be cultivated on rooftops. In big cities like Nagpur, rooftops provide gardening enthusiasts a great opportunity to grow organic produce and to indulge in a beneficial hobby.

# HUMAN-WILDLIFE CONFLICT: CAUSES AND PREVENTION

Roshni Katariya (MSc Zoology Sem-II)

**H**uman-wildlife conflict refers to the negative interaction between humans and wildlife that results in injuries and loss of life of humans and wild animals, crop damage, livestock depredation, damage to human property and collapse of wildlife populations. Wildlife can threaten people's safety and livelihoods, which can lead to conflicts between group of people over how to resolve the situation.

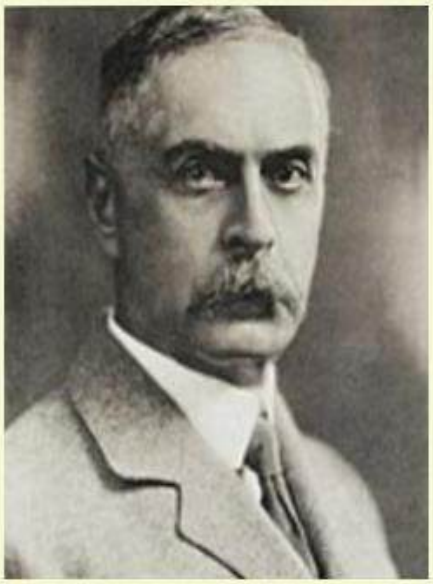
Human-wildlife conflict can occur wherever wildlife and human populations overlap, so any factor that forces wildlife and people into closer contact makes conflicts more likely. The main causes of human-wildlife conflict are population growth, deforestation, agricultural expansion, and illegal activities such as poaching. As the population increases, so does the demand for resources which leads to more encroachment of wildlife habitat. Deforestation causes wild animals to migrate from forests to human areas in search of food. When agriculture expands to areas that were previously wildlife habitats, it can lead to crop raiding and other conflicts. As the climate change takes effect world wide, it can alter the climate of specific regions causing wildlife to migrate to other areas.

Human-Wildlife conflict can be prevented by educating people about wildlife and conservation, by being aware, patient and respectful of wildlife, by creating barriers and buffer zones, by balancing the needs of humans, and recognizing the value of biodiversity.

# THE MAN WHO SAVED A BILLION LIVES

Anjali Thakur (MSc Zoology Sem-II)

**K**arl Landsteiner, an Austrian-American biologist and physician, made groundbreaking contributions to the fields of immunology, serology, and blood transfusion. Born on 14 June 1868, in Baden, near Vienna, Austria, Landsteiner's work laid the foundation for modern transfusion medicine. He studied medicine at the University of Vienna, graduating in 1891. He then worked under renowned pathologist Anton Weichselbaum, developing his interest in immunology and serology. In 1896, Landsteiner moved to Zurich, where he conducted research on immunology and bacteriology.



Landsteiner's most significant discovery came in 1900 when he identified the ABO blood group system. By experimenting with blood samples, he found that some blood samples clumped together, while others did not, leading him to classify blood into three groups: A, B, and C (later renamed O). This pioneering work earned him the 1930 Nobel Prize in Physiology or Medicine.

Landsteiner's notable contributions include:

1. Development of blood typing (1907): It enabled the safe transfusion of blood, revolutionizing medical practice.

2. Identification of the Rh factor (1940): It was crucial for preventing haemolytic disease of the newborn.

3. Research on poliomyelitis and syphilis: Landsteiner investigated the causes and mechanisms of these diseases.

Landsteiner's discoveries transformed the field of transfusion medicine, ensuring safe and compatible blood transfusions. His work has saved countless lives and paved the way for further research in immunohematology.

# PROBIOTICS – WHEN FOOD IS ALSO MEDICINE

Akansha Jangle (MSc Zoology Sem-II)

**P**robiotics are live microorganisms, often referred to as 'good' or 'friendly' bacteria, that provide health benefits when consumed in adequate amounts. They are similar to the beneficial microorganisms naturally found in human body, particularly in the digestive system.

***Types***: Probiotics can be bacteria or yeasts. Common probiotic bacteria include strains from the *Lactobacillus* and *Bifidobacterium* genera. Yeasts like *Saccharomyces boulardii* are also used as probiotics.

***Sources***: Probiotics are found in fermented foods such as yogurt, kefir, sauerkraut, kimchi, miso, tempeh, kombucha, pickles, buttermilk, cheese, and paanta bhaat. They are also available in the market as dietary supplements.

***Functions***: Probiotics help maintain a healthy balance of gut bacteria, which is crucial for digestion, nutrient absorption, and immune function.

**Benefits**: Probiotics can aid in preventing and treating diarrhoea, improving mental health, boosting heart function, enhancing immune function, reducing allergies, and supporting weight management, among other benefits. Including probiotics in the diet can help support a person's digestive health and overall well-being.

# URBAN BIODIVERSITY – NATURE IN THE CITY

Prachika S. Bokde (BSc Sem-II)

Urban biodiversity is a key component of human well-being and natural conservation, and can be enhanced in cities through planning and design. Urban biodiversity can benefit people in many ways including improving air quality, reducing urban heat island effect, providing recreational and educational opportunities. However, urbanization can create barriers that limit the movement of species, making it difficult for them to find food, shelter and mating partners.

Cities can promote biodiversity by incorporating nature based solution (NbS) into urban design and planning. This can include provision for green spaces such as parks, urban forests, and roadside and lakeside plantations. Some steps that can be taken to conserve urban biodiversity include environment education, public and private partnership, special protection areas, environmental forestry, and landscape cover planning.

Nagpur has the distinction of being one of the greenest cities in India. It is rich in urban biodiversity, having a multitude of flora and fauna. Nagpur is home to many bird species including winter migrants and resident birds that flock to the city's reservoirs. The city has many public gardens, including important ones such as Ambazari garden, Japanese garden, and Botanical garden. Nagpur is known as the "Tiger capital" because it is close to many Tiger reserves of Maharashtra. We all need to work together diligently to protect and enhance the floral and faunal diversity of Nagpur.

# REDUCE, REUSE, RECYCLE – LIVING SUSTAINABLY

Neha Johar (MSc Zoology Sem-II)

In today's world, where environmental issues have become a global concern, sustainable living is not just a trend but a necessity. The concept of "reduce, reuse, recycle" serves as a simple yet powerful mantra for minimizing our impact on the planet. These three actions form the foundation of sustainable living by cutting down waste, conserving natural resources, and reducing pollution. Understanding how each contributes to sustainability can help us make better choices for a healthier planet.

1. Reduce: Lowering Consumption - Reducing begins with thoughtful decision-making—choosing to buy only what is necessary and opting for products that have a lower environmental impact. This can include selecting energy-efficient appliances, choosing products with minimal packaging, and avoiding single-use items like plastic bottles and bags.

2. Reuse: Extending Product Lifespan - Reusing is the practice of finding new ways to use items instead of discarding them. It encourages creativity and resourcefulness. From reusing glass jars as containers to repairing clothing and electronics, this practice ensures that fewer products are sent to landfills.

3. Recycle: Transforming Waste into Resources - Recycling is the process of converting waste materials into new products. By recycling, we divert waste from landfills and reduce the need for raw materials. Commonly recycled materials include paper, glass, plastic, and metals, which can be processed and made into new products like packaging, containers, or even building materials.

# PEACOCK SPIDER – THE GREATEST DANCER

Kalyani Gawande (MSc Zoology Sem-II)

**P**eacock spider (*Maratus volans*), is a fascinating species of jumping spider native to Australia. These spiders are renowned for their vibrant and colourful courtship displays, which are reminiscent of a peacock's tail, hence the name.

Size: Both males and females are about 5 mm in length.

Appearance: Males are particularly striking with their colourful abdomen flaps, which they use to attract females during courtship. Females and immature spiders are generally brown but have distinct patterns.

Habitat: They occupy a wide range of habitats across Australia, from sand dunes to grasslands.

Courtship Dance: Males perform a unique dance involving the raising and waving of their colourful flaps and legs to attract females. The male begins by approaching the female cautiously. Once he has her attention, the male raises his colourful abdomen flaps, which are usually folded down. The male then raises his third pair of legs and waves them rhythmically. In addition to visual displays, the male also produces vibrations and sounds by tapping and scraping his legs on the ground.

The male performs a series of dance movements, including side-to-side shuffling, leg waving, and abdomen shaking. The dance is both a visual and vibrational performance aimed at impressing the female. If the female is impressed by the display, she will allow the male to mate with her. If not, she may ignore him or even become aggressive.

# URBAN HEAT ISLAND EFFECT – CAUSES AND MITIGATION

Albira Khan (MSc Zoology Sem-II)

Urban heat island effect is a phenomenon in which urban areas experience significantly higher temperatures compared to their rural surroundings. This temperature disparity arises from human activities and the distinctive physical characteristics of urban areas, such as building materials, reduced vegetation, and energy consumption. The effect poses serious implications for urban climates, energy consumption, public health, and environmental sustainability, making it a critical issue for cities worldwide.

**Causes**

1. Land Use and Material Properties: Urbanization involves replacing natural vegetation with buildings, roads, and other impervious surfaces, which absorb more solar radiation than natural landscapes.

2. Reduced Evapotranspiration: Urban areas, with fewer trees and green spaces, experience a reduction in this natural cooling process, exacerbating the UHI effect.

3. Waste Heat from Human Activities: Urban areas generate significant waste heat from transportation, industrial activities, and buildings, which further contributes to the heat island effect.

4. Urban Geometry and Canyon Effect: The layout of urban areas, with densely packed buildings and narrow streets, can trap heat. This is known as the "urban canyon effect."

5. Air Pollution: Urban areas typically have higher levels of air pollution, which can trap heat by increasing the concentration of greenhouse gases and particulates in the atmosphere.

**Mitigation Strategies**

1. Increasing green spaces and promoting urban forestry.

2. Using cool and reflective materials.

3. Designing cities with open spaces, wider streets, and better ventilation.

4. Reducing energy consumption and use of renewable energy.

5. Government policies and public awareness.

# MANAGING LANTANA – THE INVASIVE PLANT

Ruchika J. Gahukar (MSc Zoology Sem-II)

*Lantana camara*, a tropical shrub native to Central and South America, has become a highly invasive weed globally including India. This plant can tolerate a wide range of environmental conditions, including high temperatures and varying moisture levels. Its spread has severe ecological, economic, and social impacts. Lantana outcompetes native vegetation by forming dense thickets, thereby reducing biodiversity and altering ecosystem processes. It alters habitats, making them less suitable for native wildlife. In India, it threatens about 40% of the tiger habitat.

Effective management of Lantana requires a multi-faceted approach:

Physical control: manual removal along with the roots and replacement with native plants.

Biological control: using natural enemies like insects and pathogens.

Chemical control: targeted herbicides.

Integrated management: combining physical, biological, and chemical methods.

Lantana has also found some economic uses, particularly in rural and developing areas. Here are a few ways it can be managed, while contributing to the economy:

Handicrafts: Lantana stem is used to make furniture, baskets, and other handicrafts. This provides a source of income for local artisans.

Biofuel: Lantana can be used to make charcoal. Its biomass can be converted into energy.

Medicinal Uses: Some traditional medicine practices use Lantana.

However, the economic benefits are often outweighed by the environmental and agricultural damage Lantana causes. Managing its spread is crucial to protect native ecosystems and agricultural lands.

# INDIAN SNAKES – MYTHS VS FACTS

Pooja S. Nehare (BSc Sem-II)

India is home to over 300 species of snakes, who play a crucial role in maintaining ecological balance. Snakes are often feared and misunderstood due to widespread myths and superstitions. One myth is that all snakes are venomous. However, most Indian snakes like rat snakes and pythons are non-venomous and help control rodent populations. Among the few deadly Indian snakes are the spectacled cobra, Russell's viper, saw-scaled viper, and the common krait. These four snakes are responsible for most snakebite cases in India.

A common myth is that cobras seek revenge if their mate is killed. The fact is, snakes lack the cognitive ability for such behaviour. There are other beliefs such as, cobras can hypnotize humans, they can change into humans and back (*icchhadhari naag*), and they are associated with a rare pearl (*naagmani*). All these beliefs are totally false.

Myths and superstitions often lead to the mistreatment of snakes. Promoting awareness of snake behaviour and dispelling myths can reduce fear and foster a better understanding, ensuring the safety of both humans and these valuable reptiles. Snakes are a vital part of India's natural heritage, and their role in ecosystems extends far beyond the fear and fascination they inspire. By separating facts from myths and superstitions, we can work towards a society where both snakes and humans can co-exist safely. Education, awareness, and respect for snakes are key to ensuring their conservation.

# WILD VEGETABLES

Aarya S. Chillure (BSc Sem-II)

Wild vegetables, also known as foraged vegetables or edible wild plants, are plants that grow naturally without human cultivation. Hundreds of species of edible wild plants occur in India. Many of these plants are considered weeds or useless, but in reality, they are edible and have many benefits for humans. Such plants are known as '*raan bhaajya*' in Marathi. Some wild vegetables found in Maharashtra include Charota, Shevli, Ambadi, Kadu Kand, Bhokar, Kartuli, Kavadar, Kakad, Kharsing, Mahua, etc.

Common Wild Vegetables of Maharashtra

Charota (*Senna tora*): Young leaves can be cooked as a vegetables, and the roasted seeds can be used as a coffee substitute.

Chival (*Portulaca oleracea*): This plant is eaten as a leafy vegetable.

Mahua (*Madhuca longifolia*): The flowers are ebile and are used to make chutney, as well as wine.

Ambadi (*Hibiscus sabdariffa* var. *rubra*): It is used as a leafy vegetable.

Benefits of Wild Vegetables

1. Nutrient-rich: Wild edible plants are one of the most potent sources of nutraceuticals and bioactive compounds such as antioxidants, vitamins, proteins, carbohydrates, and fibre.

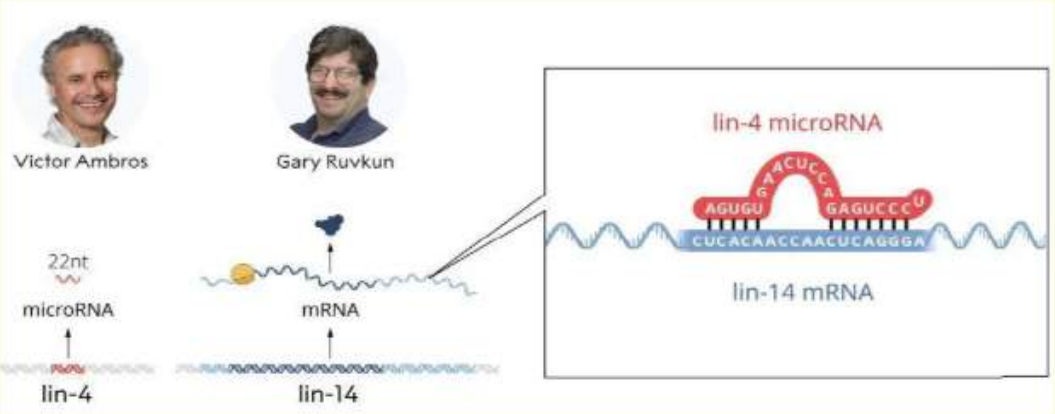
2. Food security: Wild vegetables can help reduce food insecurity and malnutrition.

3. Diversity: Wild vegetables can help diversify diets and reduce vulnerability to disease.

4. Unique flavours: They offer unique flavors that are not commonly found in cultivated vegetables.

# 2024 NOBEL FOR THE DISCOVERY OF MICRO-RNA

Ruchika P. Binekar (BSc Sem-II)




The 2024 Nobel Prize in Physiology or Medicine was awarded to Victor Ambros and Gary Ruvkun for the discovery of micro-RNA and its role in gene regulation. Micro-RNA are a class of tiny RNA molecules in plants and animals including humans. Ambros and Ruvkun first discovered micro-RNA in the roundworm *Caenorhabditis elegans*. They published their findings in 1993, but it was not until seven years later that Ruvkun found a similar mechanism in almost all animals.

Every cell in the human body contains the same DNA instructions but during embryonic development, different cells develop into specialized types. Some become brain cells, some turn into blood cells, while others transform into muscle cells. The process by which cells decide their specific roles is guided by gene regulation, which directs what parts of the DNA are active. Micro-RNAs are essential for gene regulation in multicellular organisms, including humans, and have far-reaching implications for biology, medicine, and human health. They are powerful regulators of various cellular activities including cell growth, differentiation, development, and apoptosis. They are involved in many tasks including embryonic development, cell physiology, and the evolution of complex organisms. In the future, we may be able to use micro-RNAs for the treatment of cancer and other serious diseases.

# THE DEADLIEST ANIMAL IN THE WORLD

Rutuja M. Nannaware (BSc Sem-II)

When we think of deadly animals, we conjure up images of tigers, sharks or venomous snakes. But the deadliest animal in the world, in terms of how many people it kills every year, is by far the tiny mosquito. There are more than 2500 species of mosquito, and they are found in every region of the world except Antarctica. Mosquitoes love warm weather, and with the advent of global warming and climate change, they may spread to cooler parts of the world, where they were not naturally found.

Malaria is just one of the deadly diseases that mosquitoes are known to transmit. With other illnesses such as dengue, chikungunya, lymphatic filariasis, yellow fever, Zika fever, and Japanese encephalitis hitting a bit closer to home, it is more important than ever to be vigilant about mosquitoes. When mosquitoes bite, they can leave behind much more than just itchy red bumps as a reminder of their visit. Mosquitoes carry viruses, bacteria, parasites, and more, which they can easily transfer to humans through their bites. Every year, about a million lives are taken by mosquito-transmitted diseases.

It is not possible or ecologically feasible to eradicate mosquitoes completely. However, we can reduce mosquito breeding sites by eliminating standing water and improving sanitation. Biological control, chemical control, and genetic modification are some of the ways we can reduce mosquito populations.

# ROHAN CHAKRAVARTY – THE GREEN HUMORIST

Sakshi B. Sawsakade (BSc Sem-II)

**R**ohan Chakravarty is an Indian artist, cartoonist, illustrator, and naturalist known for his work on wildlife and environmental issues. He is the creator of the popular cartoon series "Green Humour", which features cartoons and comics on nature conservation, sustainability, and environmental awareness. Rohan's work has been widely recognized and published in various platforms, including national newspapers, magazines like Tinkle, and even by government departments. He has also authored books such as "Green Humour for a Greying Planet" (2021) and "Naturalist Ruddy: Adventurer. Sleuth. Mongoose" (2021).


Rohan's journey into the world of wildlife and conservation began in Nagpur, where he grew up and studied. His passion for nature was ignited by a nature outreach program and a memorable trip to Nagzira Wildlife Sanctuary. If you are interested in his work, you can explore more on his blog, Green Humour.

# ALOE VERA – MEDICINAL PLANT PAR EXCELLENCE

Trupti R. Balbudhe (BSc Sem-II)

Aloe vera is a succulent plant known for its numerous health benefits and uses.

Health Benefits

Skin Care: Aloe vera gel is widely used to treat skin conditions such as burns, sunburn, acne, and psoriasis. Its soothing and moisturizing properties help in healing and reducing inflammation.

Digestive Health: Aloe vera juice is sometimes used to aid digestion and relieve conditions like constipation and heartburn. It may also help with irritable bowel syndrome (IBS).

Immune Support: The plant contains vitamins, enzymes, and amino acids that can boost the immune system.

Anti-inflammatory: Aloe vera has anti-inflammatory properties that can help reduce swelling and pain.

Common Uses

Topical Application: Aloe vera gel is applied directly to the skin for its healing and soothing effects.

Oral Consumption: Aloe vera juice is consumed for its potential digestive and immune benefits. However, it is important to use it in moderation and consult a healthcare provider, as excessive consumption can lead to side effects.

Growing aloe vera is relatively easy and rewarding. It can be grown in a plastic or clay pot filled with regular potting soil. The pot should be placed in an area where the plant will receive bright, indirect light, as direct sunlight can scorch the leaves. The plant should be watered deeply but infrequently, as overwatering can lead to root rot.

# RAMSAR SITES OF MAHARASHTRA

Dhanshri K. Dhone (BSc Sem-II)

**R**amsar sites are wetlands that are designated as being of international importance under the Ramsar Convention. As of August 2024, India has 85 Ramsar sites. Ramsar sites are important for environmental conservation and the sustainability of human life. They are wetlands that are protected under strict guidelines to help conserve global biodiversity and maintain the ecosystem. Ramsar sites are also important for local communities because they provide resources for livelihoods and flood mitigation. There are currently three Ramsar sites in Maharashtra.

(1) Lonar Lake: It is a fascinating natural wonder located in Buldhana district. It was formed by a meteorite impact during the Pleistocene Epoch. The water in this lake is both saline and alkaline, creating a unique ecosystem. The lake supports a variety of microbial life, including nitrogen fixing microorganisms.

(2) Nandur Madhyameshwar Wildlife Sanctuary: It is a significant wetland ecosystem located in Nashik district. It was created due to the construction of a dam on the Godavari river. It is home to over 220 species of birds, including 25 species of migratory birds.

(3) Thane Creek: It is an estuary separating the city of Mumbai from the mainland. Its western bank is home to the Thane Creek Flamingo Sanctuary, known for its large populations of flamingos and other migratory birds. The mangrove forests along the creek provide crucial habitats and act as natural buffers against floods and cyclones.

# BALANCED DIET – KEEPING BODY AND MIND HEALTHY

Shweta Wankhede (BSc Sem-II)

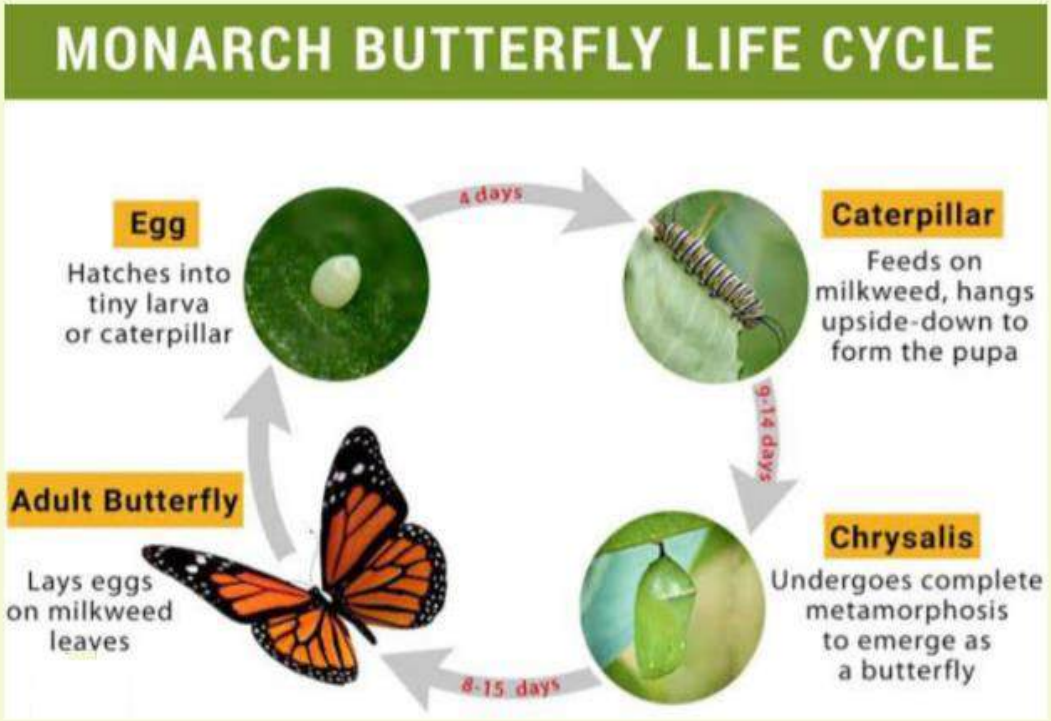
Eating a healthy, balanced diet is an important part of maintaining good health and can help one feel his best. This means eating a wide variety of foods in the right proportion and consuming the right amount of water to achieve and maintain a healthy body weight.

A balanced diet is a diet that includes the right amount of nutrients, calories and minerals for the body's needs. It can help one stay healthy, live longer and maintain high energy levels. A balanced diet includes six main components, namely, protein, carbohydrates, fat, fibre, vitamins and minerals. It should comprise 60-70% of total calories from carbohydrates,10-12% from proteins and 20-25% of total calories from fat. The deficiency of some key nutrients such as vitamins A, B, C and E, and zinc, iron and selenium can weaken the immune system. A diet rich in calcium keeps bones and teeth strong and can help to slow bone loss associated with getting older.

A balanced diet is necessary for students, as it can enhance productivity both in an out of classroom. A balanced diet can provide a steady supply of energy, which can help students stay alert and focused throughout the day. It can also enhance mood, reduce stress, and boost mental clarity.

# HOW TO RAISE BUTTERFLIES AT HOME

Pranjali V. Dubey (BSc Sem-II)




**R**aising butterflies at home can be a rewarding and educational experience. Here's a step-by-step guide to help you get started.

First, grow butterfly nectar plants and larval host plants in your garden. Choose your butterfly species. Monarch butterflies are a popular choice because they are relatively easy to raise and lay their eggs in milkweed plants. Collect caterpillars from your garden and identify the species.

Create a suitable habitat for your caterpillars:

Container: Use a well-ventilated container like an aquarium or a mesh cage.

Substrate: Line the bottom with paper towels or leaves.

Food: Provide fresh leaves from the host plant daily.

Feeding: Ensure that the caterpillars have a constant supply of fresh leaves.

Cleaning: Keep the habitat clean by removing old leaves and frass (caterpillar droppings).

When the caterpillars are ready, they will form chrysalis. Ensure the habitat is undisturbed during this stage.

After about 10-14 days, the butterflies will emerge. Allow them to dry their wings before releasing them into your garden.

# INTERVIEW WITH A VAMPIRE BAT

Bhumika S. Vighne (BSc Sem-II)

Vampire bats are fascinating flying mammals that survive solely on blood. There are three species of vampire bats: the common vampire bat (*Desmodus rotundus*), the hairy-legged vampire bat (*Diphylla ecaudata*), and the white-winged vampire bat (*Diaemus youngi*). They are found in Central and South America, typically in tropical and subtropical regions. They roost in caves, mines, tree hollows, and abandoned buildings. They are nocturnal and most active in the early night.

Like the legendary monster from which they get their name, these small mammals feed on the blood of other animals for survival.

For feeding, vampire bats are equipped with sharp incisor teeth that are used to nip a small piece of flesh. An anticoagulant in their saliva allows the blood to flow continually instead of clotting. The bat then laps the blood that flows from the wound with its grooved tongue. These bats do not suck the blood from their prey. Each night, a vampire bat needs about two tablespoons of blood (20 grams), and cannot go for more than two nights without food. At one time, wild animals comprised most of their diet. With the increase in human and cattle populations, these bats now feed mainly on domestic animals such as cows, pigs and horses.

# ECOSYSTEM SERVICES AND THEIR IMPORTANCE

Nandini P. Mendhe (BSc Sem-II)

Ecosystem services are the various benefits that humans derive from natural ecosystems. These services are essential for our survival and can be categorized into four main types:

**Provisioning Services**: These are the products obtained from ecosystems, such as food, timber, fuel wood, thatching material, fibres, medicines, and genetic resources. For example, forests provide a large number of natural products, while oceans provide enormous amounts of crustaceans and fish.

**Regulating Services:** These services help regulate the environmental conditions. They include climate regulation, water purification, pollination of crops, and pest control. For instance, wetlands can filter pollutants from water, and forests can help regulate the climate by absorbing carbon dioxide.

**Cultural Services**: These are the non-material benefits that contribute to the cultural, spiritual, and recreational well-being of people. Examples include recreational activities like hiking and birdwatching, as well as cultural heritage sites and the spiritual significance of natural areas.

**Supporting Services**: These services are necessary for the production of all other ecosystem services. They include nutrient cycling, soil formation, and primary production (the creation of organic material from sunlight by plants). For example, healthy soil is essential for growing crops, and nutrient cycling helps maintain ecosystem productivity.

These four types of ecosystem services highlight the importance of healthy ecosystems for human well-being and the sustainability of our planet.

# HOW TO CREATE A BIRDHOUSE

Manvi S. Sawsakade (BSc Sem-II)

The primary goal of an artificial birdhouse is to support local wildlife in urban or altered environments, where natural nesting sites might be scarce. Artificial birdhouses serve the needs of our feathered friends, ensuring that even in dense urban areas, birds can find a place to call home.

Required material: Six old wooden planks, drill machine, hand saw, wood glue, nails, hammer.

Method: Drill or saw a large hole in one of the planks for the birds to enter. This plank will make the front of the birdhouse. Drill a small hole at the top of another plank that will form the back wall. This hole will be used for hanging the bird house from a support. Join all the planks with nails and glue to form the base, four walls, and a slanted roof for rain water to trickle down. The birdhouse is now ready. Hang it from a tree, or pole, or any other place in the house, where birds will be safe from human disturbance. Work in a safe environment and take all precautions to prevent injury while making the birdhouse.

# BIOFERTILIZERS

Chetan G. Sonone (BSc Sem-II)

In modern intensive agriculture, chemical fertilizers and pesticides are applied on a large scale to increase crop production. However, extensive use of agrochemicals in agriculture has been found to cause environmental disturbances and public health hazards affecting food security and sustainability in agriculture. Plant-associated microbes with their plant growth-promoting traits have enormous potential to solve these challenges and play a crucial role in enhancing plant biomass and crop yield under greenhouse and field conditions.

Biofertilizers are a sustainable agricultural innovation that harnesses the power of microorganisms to enhance soil fertility and plant growth. These substances contain living bacteria, fungi, and algae that form symbiotic relationships with plant roots, promoting nutrient uptake and improving crop yields.

For instance, *Rhizobium* bacteria form nodules on the roots of leguminous plants, fixing atmospheric nitrogen and making it available to the plant. Similarly, mycorrhizal fungi extend the root system's reach, allowing for better absorption of water and nutrients. The use of biofertilizers is a step towards eco-friendly farming practices, reducing dependence on chemical fertilizers, and fostering soil health. Plant-microbe interplay is indispensable for sustainable agriculture and these microbes may perform essential role as an ecological engineer to reduce the use of chemical fertilizers.

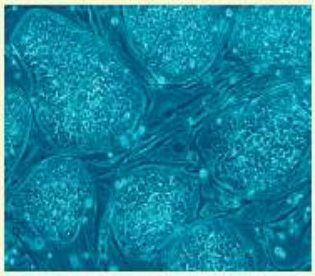
Various steps involved for production of solid-based or liquid biofertilizer formulations include inoculum preparation, addition of cell protectants such as glycerol, lactose, starch, a good carrier material, and proper packaging.

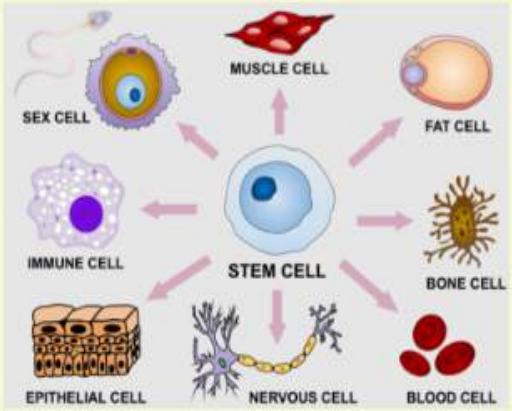
# STEM CELL RESEARCH

Aman R. Chahande (BSc Sem-II)

Stem cell research is a highly promising area of biomedical science focused on the study of unique cells, capable of developing into various types of specialised cells. Stem cells are categorized into two main types: (1) embryonic stem cells, and (2) adult or somatic stem cells. Embryonic Stem cells, derived from early stage embryos, have the potential to differentiate into any cell type, making them pluripotent. Adult stem cells are found in tissues such as bone marrow and are limited to generating only a few cell types (multipotent).

A key application of stem cell research is regenerative medicine. Researchers aim to use stem cells to repair or replace damaged tissues, potentially treating diseases such as Parkinsons, diabetes and spinal cord injury. For instance, stem cells could be used to regenerate heart tissues after a heart attack, or regenerate neurons for patients with neuro-degenerative diseases.






Beyond treating ailments, stem cells offer valuable insight into early human development and the mechanism of various physiological processes, allowing scientist to develop targeted therapies.

Stem cell research has also raised some ethical concerns. The destruction of embryos in the process of obtaining these cells sparks moral debates. As a result, many countries have established regulations to balance scientific progress with ethical considerations. Advances in induced pluripotent stem cells (IPSCs) have partially alleviated ethical concerns. IPSCs are adult cells, providing a renewable source of pluripotent cells without using embryos. This innovation represents a significant step forward in harnessing the potential of stem cells for therapeutic and research purposes.

# THE 8-8-8 RULE FOR STUDENTS

Piyush K. Khadgi (BSc Sem-II)

The 8-8-8 rule for students promotes a balanced and productive lifestyle by dividing the day into three parts: eight hours of sleep, eight hours of study, and eight hours for other activities. Following this rule can enhance the performance and overall well-being of students.

Sleep: Eight hours of sleep is crucial for a student's physical and mental health. Proper rest enhances memory retention, problem solving abilities, and focus during study hours. Lack of sleep can lead to fatigue, irritability and a decrease in cognitive functions. To ensure a good sleep schedule, stimulants like caffeine and soft drinks should be avoided before bed. The same goes for electronic devices. The sleep environment should be cool and comfortable.

Study: Devoting eight hours to study each day ensures ample time to cover academic activities. This should include attending classes, completing homework, and studying at home. This schedule will help students maximize productivity. Additionally, studying in a clean, well-lit and quiet space can improve concentration.

Other activities: The remaining eight hours should be dedicated to other activities such as physical exercise, social interactions, hobbies, and relaxation. Regular exercise boosts mental clarity, reduces stress, and enhances overall health.

Balancing sleep, study and leisure fosters holistic development. Following the 8-8-8 rule, students can lead a disciplined and healthy life, and thereby, also avoid burnout while achieving academic success.

# WESTERN GHATS OF MAHARASHTRA

Vidhi Dixit (BSc Sem-II)

The Western Ghats of Maharashtra, part of the larger mountain range that runs along the west coast of India, are renowned for their breathtaking landscapes and rich biodiversity. This region, also known as Sahyadri in Maharashtra, is a UNESCO World Heritage Site and one of the world's ten 'hottest hotspots' of biological diversity. The Ghats are not only home to an array of endemic flora and fauna but also play a crucial role in influencing the monsoon weather patterns across the Indian subcontinent. The mountain range acts as a barrier to the rain-laden winds off the Arabian Sea, leading to heavy rainfall on the western slopes and creating a rain shadow effect on the eastern side.

This unique geography makes the Western Ghats an ecological treasure

tro ve, supporting diverse ecosystems from tropical forests to grasslands, and sustaining numerous rivers that are lifelines to the surrounding regions. Famous hill stations of Maharashtra, such as Matheran, and Mahabaleshwar are situated in the Sahyadri.

# WORLD ENVIRONMENT DAY

Nikhil T. Markam (BSc Sem-II)

June 5th, marks World Environment Day, a global call to action to protect our planet and ensure a sustainable future for all. As we celebrate this pivotal day, we acknowledge the intricate web of life that binds us together – the delicate balance of ecosystems, the beauty of nature, and the resilience of human spirit. However, we also recognize the pressing environmental challenges that threaten our very existence: climate change, pollution, deforestation, and biodiversity loss. Together, we can mitigate the environmental crisis, protect the natural world, and create a brighter future for all.

As we celebrate World Environment Day, we honour the sacred trust between humanity and the planet, recognizing the intrinsic value of nature and our duty to preserve it. This day serves as a global wake-up call, reminding us that environmental protection is not just a moral imperative, but an economic and social necessity.

World Environment Day serves as a reminder that individual actions collectively shape our planetary future. Governments must establish and enforce policies protecting the environment. Corporations must prioritize sustainability and social responsibility. Individuals must make conscious choices, adopting eco-friendly habits, reducing consumption, and supporting environmental causes. Education, awareness, and community engagement are crucial in driving behavioural change and fostering a culture of sustainability. We owe it to ourselves, our children, and the planet to act with urgency and purpose. Together, we can create a sustainable world, where all life flourishes.

# HOW TO MAKE VERMICOMPOST AT HOME

Deepali Tapre (BSc Sem-II)

Making vermicompost at home from vegetable waste is a great way to recycle kitchen scraps and create nutrient-rich compost for your plants. Here's a step-by-step guide to get you started:

Prepare the Bin: Use a plastic container with holes drilled in the sides and bottom for airflow and drainage. Place the bin in a cool, shaded area, away from direct sunlight.

Create Bedding: Add a layer of shredded newspaper or cardboard at the bottom of the bin. This will serve as bedding for the worms. Moisten the bedding with water until it feels like a damp sponge.

Add Soil: Sprinkle a small amount of garden soil over the bedding. This introduces beneficial microorganisms that help with the composting process.

Introduce the Worms: Add the red worms to the bin. They will burrow into the bedding and start to settle in.

Add Vegetable Waste: Start adding your vegetable and fruit scraps. Cut them into small pieces to help the worms break them down faster.

Keep the bin moist but not waterlogged. If it gets too dry, sprinkle some water. If it gets too wet, add more dry bedding.

Turn the compost occasionally to aerate it and speed up the decomposition process.

Harvest the Vermicompost: After about 2-3 months, the compost should be ready. It will look dark and crumbly. To harvest, push the compost to one side of the bin and add fresh bedding and food scraps to the other side. The worms will migrate to the new food, allowing you to collect the finished compost.

Use the vermicompost as a rich fertilizer for your plants. It can be mixed into potting soil or spread on garden beds.

# FLOWERS OF MOHOTA SCIENCE COLLEGE CAMPUS

Bhairavi S. Digambare (BSc Sem-II)

*Barleria cristata*

*Pentas lanceolata*

Red Frangipani

*Clitoria ternatea*

*Ixora coccinea*

Dark-blue snakeweed

*Hibiscus rosa sinensis*

*Hibiscus rosa sinensis*

*Hibiscus rosa sinensis*

*Tecoma stans*

*Argyreia nervosa*

*Nerium oleander*

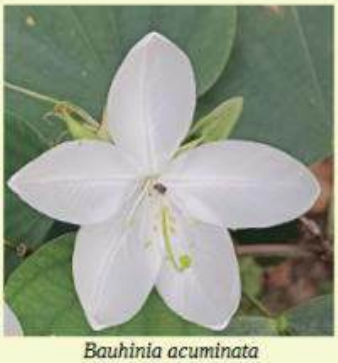

*Thunbergia erecta*


White Frangipani


Canna 'Yellow King Humbert'


*Lantana camara*


Rose


*Bauhinia acuminata*


*Euphorbia milii*


*Nerium oleander*


*Catharanthus roseus*


*Tabernaemontana divaricata*


*Pentas lanceolata*


*Canna paniculata*

# BAR-HEADED GEESE: MASTERS OF THE SKY

Shruti K. Moglewar (BSc Sem-IV)

The bar-headed goose (*Anser indicus*) is renowned for its incredible ability to fly at altitudes exceeding 8000 meters, often crossing the Himalayan mountains. Recognized by two black bars on its head, it has light grey feathers and bright orange legs and beak. Native to Central Asia, these geese migrate to South Asia during winter, covering vast distances.

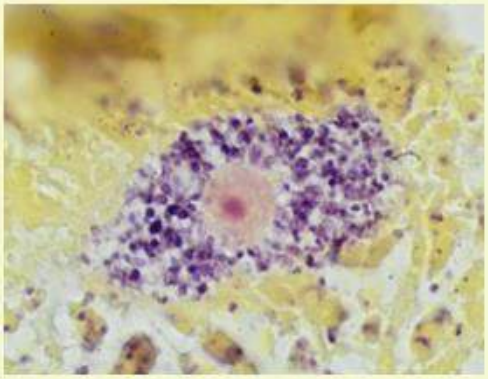
Their exceptional high-altitude flight is possible due to unique adaptations, including efficient haemoglobin for oxygen transport, larger lungs, and powerful wing muscles. These adaptations allow them to thrive in oxygen-scarce environments where most birds cannot survive.

Despite their resilience, bar-headed geese face threats like habitat destruction, climate change, and hunting. Conservation efforts are essential to protect these extraordinary birds, which symbolize endurance and adaptability. They continue to inspire researchers and nature enthusiasts, serving as a testament to the wonders of evolution.

# INNATE IMMUNITY: THE FIRST LINE OF DEFENCE

Riya G. Rehapade (BSc Sem-IV)

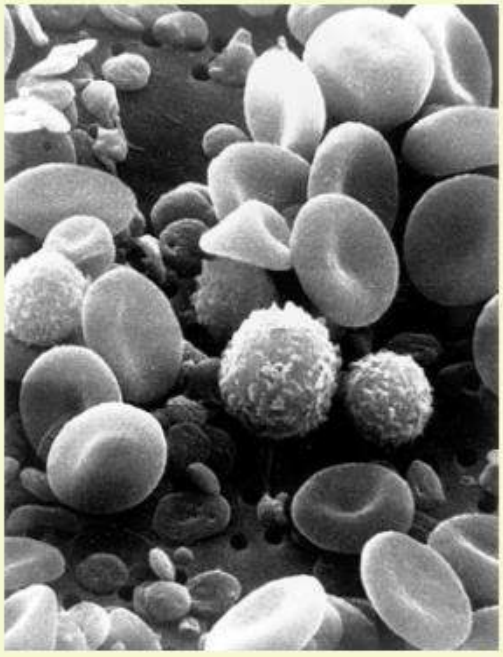
Innate immunity is the body's first line of defence against pathogens. It is a non-specific, rapid response system that does not require prior exposure to a pathogen. Key components include physical barriers (skin, mucous membranes), cellular defenses (macrophages, neutrophils, natural killer cells), and chemical factors (enzymes, interferons, complement proteins).



When pathogens breach physical barriers, immune cells recognize them through pattern recognition receptors (PRRs) that detect pathogen-associated molecular patterns (PAMPs). This triggers inflammation, phagocytosis, and the release of signaling molecules like cytokines to recruit more immune cells.

Unlike adaptive immunity, innate immunity does not generate memory, meaning the same pathogen will trigger the same response upon re-exposure. However, it plays a crucial role in activating adaptive immunity.

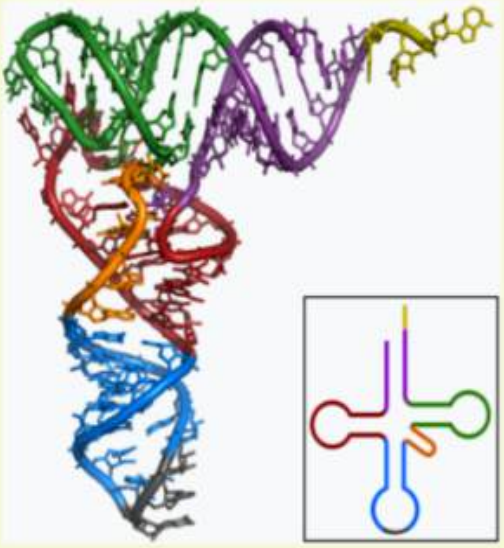
Overall, innate immunity serves as a fast and essential protective mechanism, preventing infections and maintaining homeostasis in the body.



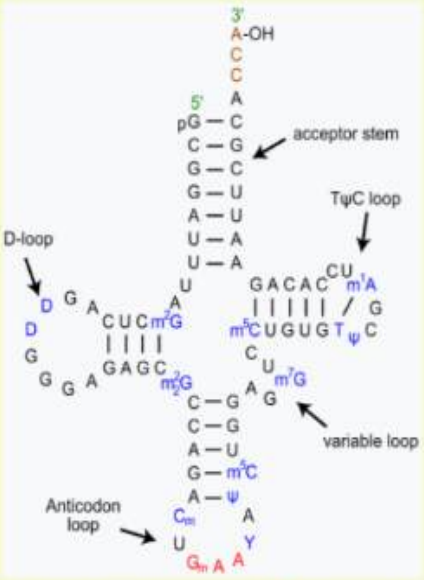
# TRANSFER RNA: THE CORNERSTONE OF PROTEIN SYNTHESIS

Reeya N. Shamkuwar (BSc Sem-IV)

Transfer RNA (tRNA) is a type of RNA molecule that plays a crucial role in the process of translating genetic information from messenger RNA (mRNA) into proteins, a process known as translation. Each tRNA molecule has a distinctive cloverleaf structure, which includes an anticodon region that recognizes and pairs with specific codons on the mRNA sequence. This specificity ensures that the correct amino acid is added to the growing polypeptide chain during protein synthesis.



There are different types of tRNA, each designed to carry a specific amino acid. When a tRNA molecule binds to its corresponding codon on the mRNA, it delivers its amino acid to the ribosome, the cellular machinery responsible for assembling proteins. This process repeats until the entire protein in synthesized.

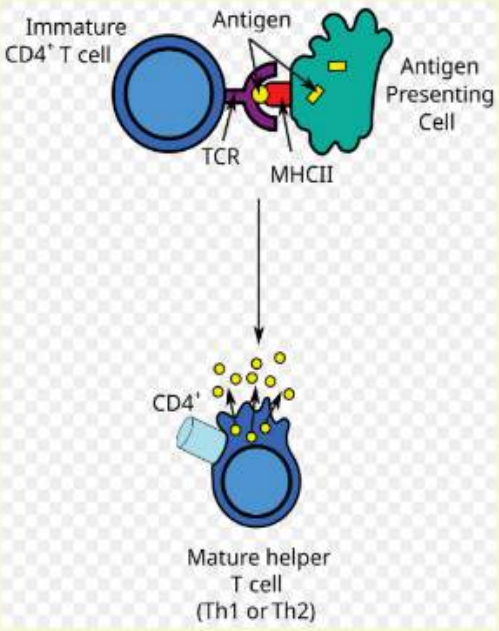



The role of tRNA as an adapter molecule, bridges the language of nucleic acids and proteins, ensuring the accurate and efficient production of proteins. These proteins are essential for various cellular functions, including metabolism, growth, and repair.

# HELPER T-LYMPHOCYTES

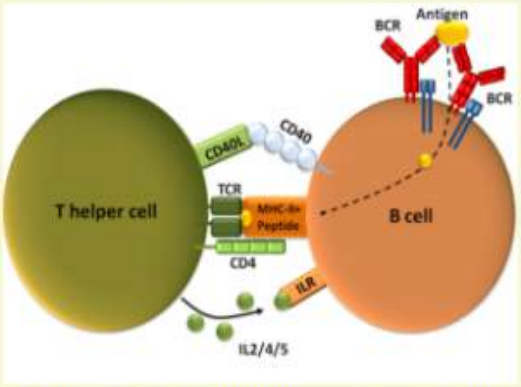
Shravani M. Purohit (BSc Sem-IV)

**H**elper T-lymphocytes are a type of T-lymphocytes and are also known as CD4+ T cells. They are one of the many forms of white blood cells that help fight infection by triggering the immune system. Helper T-cell performs a central role in the immune response. They can recognize antigens presented by cells bearing HLA Class II molecules such as monocytes.




Humans have two types of immune responses for protection against pathogens, viz., innate and adaptive (acquired) immune responses. The adaptive immune system is mainly regulated by T-cells and B-cells.

Helper T-cells along with cytotoxic T-cells make up the majority of T-lymphocytes. Helper T-cells carry out multiple functions ranging from activation of the cells of the innate immune system, such as B-lymphocytes, cytotoxic T cells, secretion of cytokines, and also play critical role in the suppression of immune reaction. Hence, they play a vital role in providing immunity against pathogens such as bacteria and viruses.



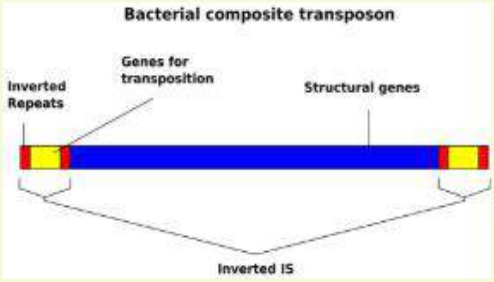

Helper T-cell dysfunction can seriously impact the immune system. The AIDS virus, HIV, binds to the CD4+ molecule on the surface of helper T-cells and replicates within them. This results in the destruction of CD4+ T-cells and leads to a steady decline in the population of Helper T-cells.

# JUMPING GENES: THE HIDDEN DRIVERS OF GENETIC DIVERSITY

Kanak R. Gujar (BSc Sem-VI)

Jumping genes, which are also known as transposons, have the unique ability to jump from one position to another within the genome of an organism. This may lead to altered traits in the organism. Changes in the sequence of DNA nucleotides and the formation of new DNA sequences lead to genetic diversity, and thereby, evolution. However, jumping genes may also lead to some unfavourable changes in the genome and lead to serious disorders like haemophilia, cancer, Rett syndrome, etc.

Barbara McClintock discovered jumping genes in the 1940s, and received the Nobel Prize in Physiology or Medicine in 1983 for her discovery. She used corn as a model organism to study chromosome breakage and genetic traits. Her discovery challenged the idea that genes have fixed positions on chromosomes. It showed that the genome can be altered.




Using genetic engineering techniques, jumping genes can be programmed to insert genetic material into specific sites in the genome, leading to precise gene editing and safer gene therapy. Currently, scientists are carrying out research on how to use jumping genes for the benefit of humankind.

# FOREST RESOURCES: SUSTAINABLE USE AND MANAGEMENT

Shreyash Mishra (BSc Sem-VI)

India's forest resources are vital for ecological balance and economic growth. These forests cover roughly 24% of the country's land area, they provide timber, non-timber forest products (NTFPs), and essential ecosystem services. Timber supports industries like construction and paper, while NTFPs, such as medicinal plants, wild honey and fruits, bolster rural livelihoods. Forests also play a crucial role in carbon sequestration, water regulation, and soil conservation, contributing significantly to environmental health.

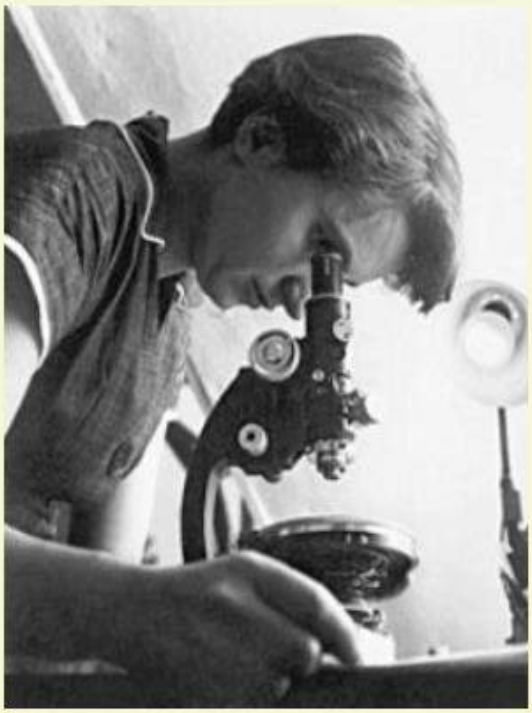
Sustainable management of these resources involves conservation, sustainable harvesting, reforestation, and community involvement. Effective strategies include monitoring forest health, promoting agroforestry, and implementing eco-friendly policies. Forest resource economics in India focuses on valuing ecosystem services, using market-based instruments like carbon credits, and conducting cost-benefit analyses to guide decision-making.

Balancing economic benefits with ecological preservation ensures that India's forests continue to support biodiversity, provide essential services, and sustain livelihoods for future generations. Effective management practices and policies are crucial for achieving this balance.

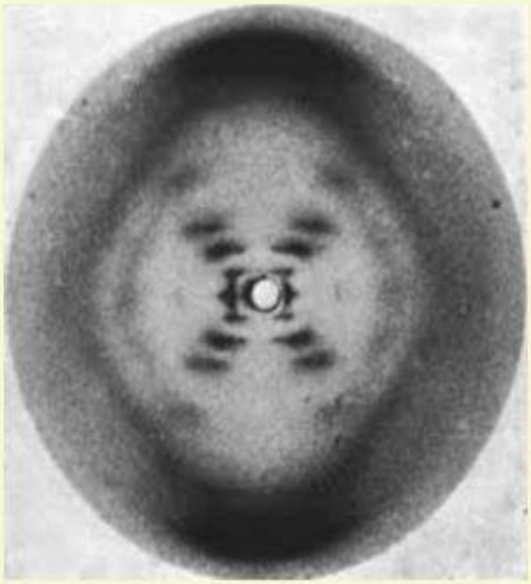
# ROSALIND FRANKLIN: THE DNA DETECTIVE

Laxmi D. Balwant (BSc Sem-VI)

Rosalind Franklin (1920-1958) was a British scientist who played a major role in the discovery of the structure of DNA. She used X-ray crystallography to study the structure of DNA molecules and viruses. Her work led to the discovery that DNA has a double helix structure. She conducted her research at King's college, London. In May 1952, she along with her PhD student, Raymond Gosling, took the famous photo 51 which provided the X-ray diffraction pattern of DNA.



She faced challenges as a woman in a male-dominated field and struggled with sexism and misogyny. Franklin died of ovarian cancer at the age of 37, before the Noble Prize was awarded to Watson, Crick and Wilkins for their work on the structure of DNA.



Rosalind Franklin's remarkable contribution to understanding the structure of DNA and viruses has left a lasting impact on the scientific community. Her legacy continues to inspire and motivate researchers, particularly women, to pursue careers in the STEM fields.

# DISCOVERY OF AN EXTINCT GIANT SNAKE SPECIES IN INDIA

Mayank Manwatkar (BSc Sem-VI)

The fossils of an extinct species of snake which has been named *Vasuki indicus,* and which lived around 47 million years ago, has been discovered in the state of Gujarat in India. It may have been one of the largest snakes to have ever lived. This species, which reached an estimated length of between 11 to 15 meters, was a member of the now extinct Madtsoiidae snake family. Biogeographic consideration, seen in conjunction with its inter-relationship with other Indian and North African madtsoiids, suggest that *Vasuki* represents a distinct lineage that originated in India.

The discovery was made by two scientists, Debajit Datta and Sunil Bajpai, who collected the fossils from an early Lutetian grey shale unit from Panandhro Lignite Mine, Kutch, Gujarat. They have named the new species after *Vasuki*, a snake that is well known in Hindu mythology.

A Vertebra of *V. indicus*

This discovery provides further knowledge about the extinct snakes of family Madtsoiidae, and also reveals that even during prehistoric times, the Indian subcontinent was a treasure trove of biodiversity.

# WIND ENERGY: A SUSTAINABLE ENERGY RESOURCE

Vaibhav Khanorkar (BSc Sem-VI)

**W**ind energy is a form of renewable energy generated from the kinetic energy of wind. It is a clean and sustainable power source that can be harnessed using wind turbines. Wind energy has the potential to help meet the world's growing energy needs. It is one of the world's fastest-growing renewable energy sources. In fact, the wind energy market is expected to grow at a compound annual growth rate of 9.4% between 2022 and 2030.

Onshore wind power is produced by wind turbines located on land, often in rural areas, whereas, offshore wind power is produced by wind turbines built on shallow water in the oceans or large lakes.

In addition to wind energy's well-known environmental benefits, wind energy development can be very good for the economy. The economic benefits of wind energy include creation of jobs, revenue for farmers and ranchers, increased local tax revenue, financial compensation for impacted communities, and wind energy tourism.

# NEW DRUG DISCOVERY

Shruti Sahu (BSc Sem-IV)

The discovery of new drugs is essential for treating diseases and improving human health. Scientists and researchers work hard to find medicines that can cure illnesses, reduce symptoms, and save lives. The process of drug discovery is complex and takes many years, but it brings hope to people suffering from various diseases.

New drugs are often discovered through research on plants, animals, bacteria, and even artificial chemicals. Scientists study how diseases work and then develop drugs to stop them. For example, antibiotics were discovered from fungi, and many painkillers come from plant sources. Today, advanced technology like artificial intelligence (AI) and genetic research helps speed up drug discovery.

One recent breakthrough is the development of new cancer drugs that target only cancer cells without harming healthy cells. These medicines, known as targeted therapies, offer fewer side effects than traditional chemotherapy. Another exciting discovery is antiviral drugs for COVID-19, which help reduce the severity of the disease and save lives.

The drug discovery process involves several steps. First, researchers identify a possible drug candidate. Then, they test it in laboratories to see if it is safe and effective. After this, clinical trials are conducted on humans in different phases. If the drug passes all safety and effectiveness tests, it is approved for public use by health authorities like the FDA or WHO.

Although drug discovery is expensive and time-consuming, it plays a vital role in fighting diseases. Governments, pharmaceutical companies, and researchers must work together to develop new treatments for conditions like cancer, diabetes, and rare genetic disorders. With modern science and technology, the future of medicine looks promising, bringing hope for healthier lives.

# EXTINCT ANIMALS: THE LOST TREASURE OF NATURE

Riya G. Rehapade (BSc Sem-IV)

Extinction is a natural process, but in recent times, many animal species have disappeared due to human activities like deforestation, hunting, pollution, and climate change. Once an animal becomes extinct, it is lost forever, affecting the balance of nature. One of the most famous extinct animals is the Dodo (*Raphus cucullatus*). This flightless bird lived on the island of Mauritius and became extinct in the late 1600s due to hunting and the introduction of non-native animals like rats and monkeys, which ate its eggs.

Another well-known extinct species is the Tasmanian Tiger (*Thylacinus cynocephalus*). It was a carnivorous marsupial native to Australia and Tasmania. Due to hunting, habitat loss, and competition with other animals, the last known Tasmanian Tiger died in captivity in 1936. The Woolly Mammoth was a giant elephant-like animal that lived during the Ice Age. It disappeared around 4000 years ago, likely due to climate change and overhunting by early humans.

**Woolly Mammoth**

The Passenger Pigeon *(Ectopistes migratorius)* was once numerous in North America, with billions of them flying in huge flocks. However, excessive hunting and habitat destruction led to its extinction in 1914. Many other animals, like the Pyrenean Ibex *(Capra pyrenaica pyrenaica)* and Baiji River Dolphin (*Lipotes vexillifer)*, have also vanished in recent years. Today, conservation efforts aim to protect endangered species from extinction. National parks, captive breeding programs, and laws against illegal hunting help safeguard wildlife.

Extinction is a serious issue, and humans can play a big role in preventing it. By protecting nature, reducing pollution, and stopping illegal hunting, we can help save many species from disappearing forever.

# ENVIRONMENTAL CHANGE AND ANIMAL BEHAVIOUR

Shruti K. Moglewar (BSc Sem-IV)

Changes in the environment, such as climate change, habitat destruction, and pollution, have a major impact on animal behaviour. As their surroundings change, animals must adapt to survive. Some species adjust by migrating, or changing feeding habits, or altering breeding patterns.

One of the biggest effects of environmental change is migration. Birds, fish, and mammals migrate to find food and suitable climates. However, rising temperatures and habitat loss disrupt migration patterns. For example, some bird species now migrate earlier or travel shorter distances due to changing weather.

Food availability also influences animal behaviour. Due to deforestation and climate shifts, animals must search for new food sources. Polar bears, for instance, are struggling as Arctic ice melts, forcing them to swim longer distances to find seals. Similarly, some herbivores shift their diets when their usual plants become scarce. Breeding behaviours are also affected. Warmer temperatures cause some species like amphibians, to reproduce earlier than usual. In contrast, certain animals face reduced reproduction rates due to stress from habitat loss and pollution.

Human activities such as urbanization and deforestation force animals to adapt unexpectedly. Some species like foxes and raccoons have become more nocturnal to avoid humans. Some bird species have changed their calls to communicate over city noise. Environmental changes are happening rapidly, and not all animals can adapt. Conservation efforts are crucial to protect species and maintain ecological balance. Understanding how animals respond to these changes helps scientists develop strategies for their survival.

# RECENT ADVANCES IN DNA RESEARCH

Shravani M. Purohit (BSc Sem-IV)

**R**ecent advancements in DNA research are significantly enhancing our understanding of genetics and molecular biology. One notable development is the Ocean Genome Atlas Project (OGAP), which focuses on sequencing the DNA of plankton in the Arctic fjords of Greenland. Plankton, despite their simplicity, have been instrumental in shedding light on human brain functions and medical progress. By cataloguing these organisms before they potentially disappear, OGAP seeks to preserve their evolutionary information, which could lead to breakthroughs in human medicine

In another groundbreaking study, scientists are leveraging generative AI technologies to create virtual models of human cells. Inspired by tools like ChatGPT, this approach aims to simulate cellular behaviour without relying on physical experiments. Computational biologists are training AI systems on extensive biological datasets to extract critical insights, potentially predicting drug effects and genetic mutations.

Additionally, researchers from the Indian Institute of Science (IISc) have developed an innovative imaging technique to examine how nucleotide bases—the building blocks of DNA—stack upon each other in a single strand. This study provides deeper insights into base-stacking interactions, which are crucial for the stability of the DNA double helix. Understanding these interactions could pave the way for constructing intricate DNA nano-devices and offer valuable information about DNA repair mechanisms, potentially providing treatments for various diseases, including cancer.

# DISCOVERING NEW ANIMAL SPECIES

Pranay Itankar (BSc Sem-IV)

**R**esearchers are constantly exploring forests, oceans, and remote areas of the world to discover new animal species. These discoveries help us understand nature better and protect biodiversity.

Recently, researchers have found several fascinating new species. One such discovery is a tiny frog in the Peruvian Amazon, named *Synapturanus danta*. This frog lives underground and was identified by its unique sound. In the deep ocean, scientists discovered *Eurythenes plasticus*, a shrimp-like creature found in the Mariana Trench. Sadly, it has plastic particles in its body, showing the impact of marine pollution.

A new species of snake, *Tantilla oolitica*, was identified in Florida, USA. This snake is very small and was previously thought to be extinct. Another exciting discovery is a colourful tarantula spider in Thailand, named *Chilobrachys natanicharum*. Its bright blue colour makes it stand out from other tarantulas.

A type of sponge crab, *Lamarckdromia beagle* was discovered in 2022. It measures 4–9 cm in width and has long


golden fur covering its body and legs. Its front claws are larger than its walking legs, with the rear legs adapted to hold sea sponges. The crab trims sponges to fit its body for camouflage, allowing the sponge to grow with it. These sponges release toxins, protecting both the crab and themselves from predators.

All these discoveries remind us that many species are still unknown to science. However, habitat destruction, climate change, and pollution threaten their survival. Scientists and conservationists work together to protect these new species and their environments. Discovering new species is like solving nature's mysteries. Each new species adds to the beauty of our planet and teaches us more about life on Earth. If we protect nature, we may continue to find more such amazing creatures in the future.

# Activities Conducted by the Department of Zoology in 2024-25 (In Pictures)


**Inauguration of Zoological Society**


**Study Tour to College of Fishery Science Fish Seed Production Centre, Nagpur**

**On Job Training at Ambazari Biodiversity Park, Nagpur**


**Paper Presentation by PG students in International Seminar**


**Essay Contest to Celebrate 'Wildlife Week'**


**Workshop on Soil Testing**


**Guest Lecture by Dr. Aruna Kawadkar, Assoc. Prof.**


**Guest Lecture by Dr. Suresh Masram, Professor**