Microbiology society of M. G. Science

Department of Microbiology

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MICROBYTE

DISCOVER THE INVISIBLES

MICROBES – STRESS RELIVER

PATHOGENS IN SPACE

GENETIC ALPHABET

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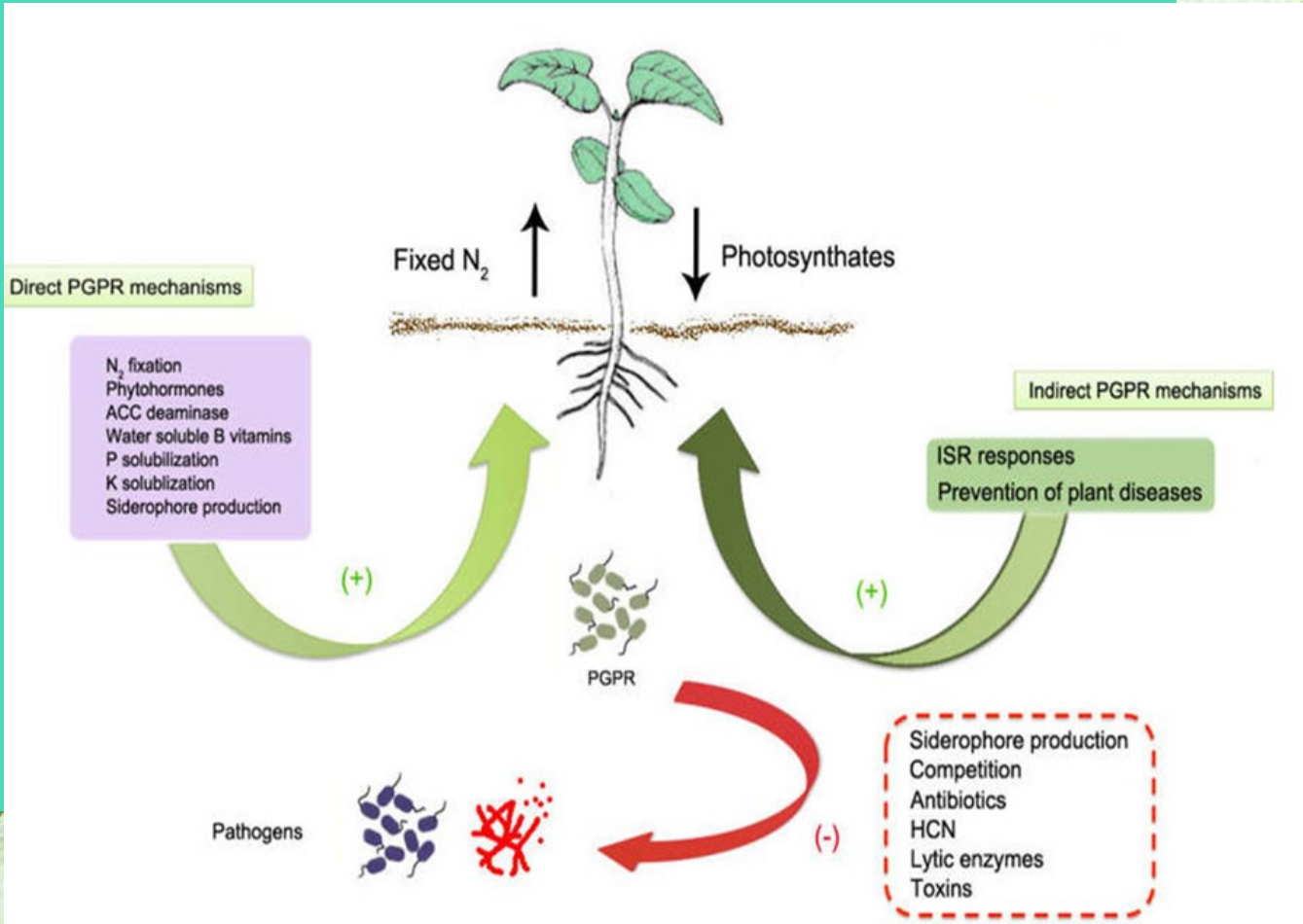
Microbes – A Great Stress reliver for plants

Role of PGPR in plant growth and mitigation of various biotic-abiotic stresses

PGPR inhabit the rhizosphere and are potentially beneficial for sustainable agriculture and horticulture. They improve plant health and promote plant growth using various direct and indirect mechanisms (Fig). A majority of fruit species are heterozygous and self-sterile, which has made PGPR inoculation crucial for fruit multiplication. This is due to the fact that fruit cultivars grown for commercial purposes do not grow true to type when reproduced from seeds. Therefore, seedling propagation techniques are useless. Many bacteria in the genera of *Agrobacterium*, *Alcali*, *Bacillus*, *Pseudomonas*, *Streptomyces* induces formation of root in stem cuttings (Bassil et al., 1991; Rinallo et al., 1999). These bacteria produce Indole Acetic Acid (IAA) (Goto, 1990). Exogenous indole-3-butyric acid (IBA) can be used to speed up the roots of bacteria-infused cuttings. (Falasca et al., 2000).

As a sustainable approach, PGPR could be employed in agricultural systems to reduce the detrimental effects of various biotic, abiotic stresses and climate change conditions (Khan et al., 2020). Plants are typically less tolerant to nutritional shortages, osmotic shifts, or salinity than soil microbes (Chanratana et al., 2019). As a result, PGPRs can play a protective role in supporting plants when they are under extreme stress. Microorganisms can provide different types of protection, such as metabolic production of various compounds that can be osmoprotective, production of various hormones that can act on plants under stress conditions, and production of various bioactive and antioxidant molecules. Some bacteria in the soil ensure the development of lateral roots in cereals. Several PGPRs are observed to remain active under high-stress conditions (Shah et al., 2021), and continuously provide nutrition to the plants when they suffer from nutritional stress (Chu et al., 2019).



Agrobacterium tumefaciens

THE NATURAL GENETIC ENGINEER OF A PLANT

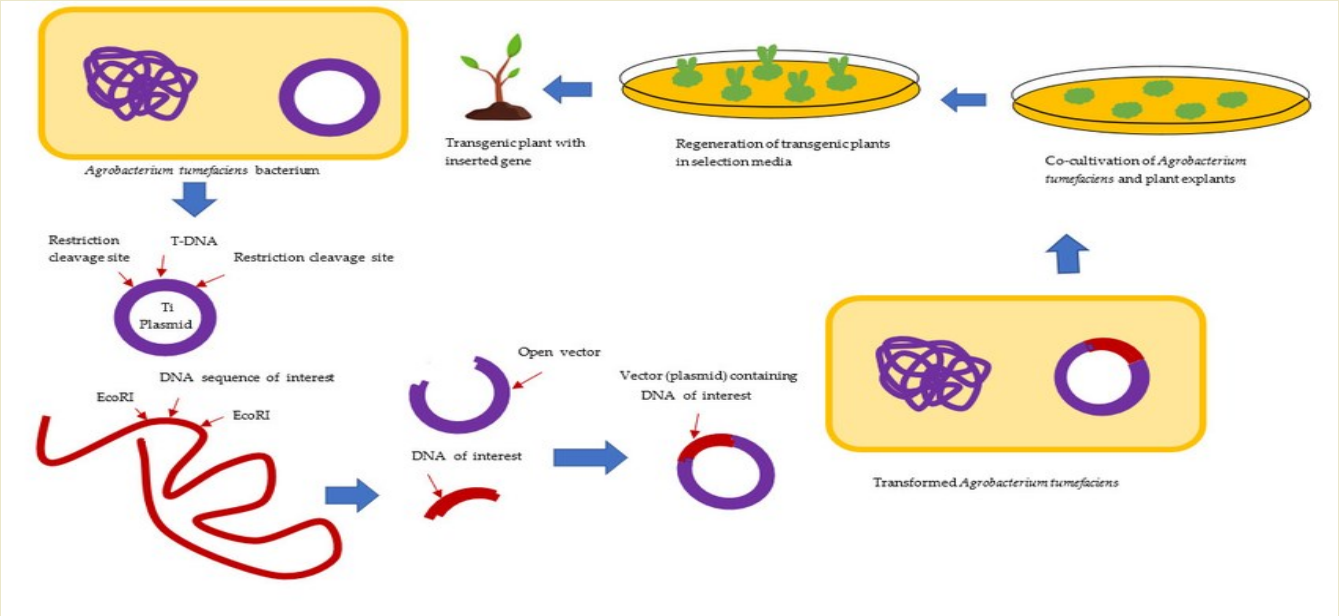
Agrobacterium tumefaciens **is the causal agent of crown gall disease i.e. tumors in nearly 140 species of eudicots. It is a rod- shaped, gram negative soil bacteria. These bacteria belongs to the family Rhizobiaceae. While other members of the family helps in nitrogen fixing, Agrobacterium is responsible for causing tumors and is pathogenic for plant. It has a specific plasmid called *Ti plasmid* having T-DNA that transforms normal cell into cancerous One.**

Thereafter, *Agrobacterium tumefaciens* was used as an important tool by scientists for plant engineering.

Applications- The tumor-inducing *plasmid Ti* can be used as useful cloning vector. With the help of restriction enzymes, gene of interest is ligated at the place of T-DNA. This plasmid is used for the purpose of transformation of *Agrobacterium tumefaciens* . Then this bacteria with transformation is incorporated into plant and transgenic plants with desirable properties are obtained.

Plant transformation: The bacterium injects a portion of its *Ti plasmid* (T-DNA) into plant cells, leading to the expression of oncogenes and the formation of tumor.

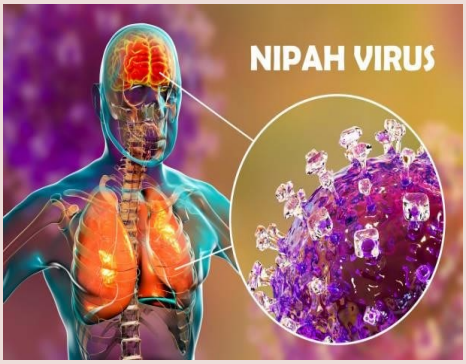
Research on the mechanism of transformation has helped us to understand the roles of bacterial and plant proteins in the process. The knowledge can help us to develop better tools for creating transgenic Plants and learn more about cellular functions.



~TANAY DUBEY (FY, SEM-1)

New method to generate Virus-Like Particles

With the new technique developed by the Institute of Advanced Virology, it will now be possible to conduct tests crucial for the +development of vaccines in biosafety level-2 labs. Now, such tests are done only in biosafety level-4 labs, because of the extreme precautions required. The newly developed particles closely resemble viruses, but are non-infectious



Recently, scientists at the Institute of Advanced Virology (IVA), Thonnakkal, Thiruvananthapuram, Kerala, have developed a novel way of generating non-infectious Nipah virus-like particles (VLPs) in the laboratory, which mimic the wild type Nipah virus (NiV).

About Nipah:

A Pathogenic Virus: The zoonotic virus Nipah is a highly pathogenic paramyxovirus, with a fatality rate of up to 80% in affected humans. Yet, research studies, especially virus neutralization assays to develop specific antivirals or therapeutics against NiV, have been limited because of the extreme level of biosafety precautions required for handling this BSL-4 pathogen.

Virus neutralization assays are critical for the development and evaluation of vaccines and immunotherapeutic, as well as for conducting basic research into the immune response and pathogenesis of NiV. These tests, which traditionally require to be done in high security labs with the infectious organism, can now be done safely in BSL-2 labs in the country using the NiV-VLPs. It is one of the deadliest pathogens known to infect humans. Zoonotic disease means it passes from animals to humans. Nipah virus can be spread to people from infected bats, infected pigs, or infected people.

Host: The natural host of the virus are fruit bats, also known as flying foxes.

About Virus-Like Particles (VLPs):

Non-infectious Particles: Virus-like particles (VLPs) are molecules that closely resemble viruses, but are non-infectious because they contain no viral genetic material.

Particles' characteristics: VLPs carry most of the characteristics of the virus, except their ability to replicate (because it lacks the viral genome).

Significance of New Method To Generate Virus-Like Particles.

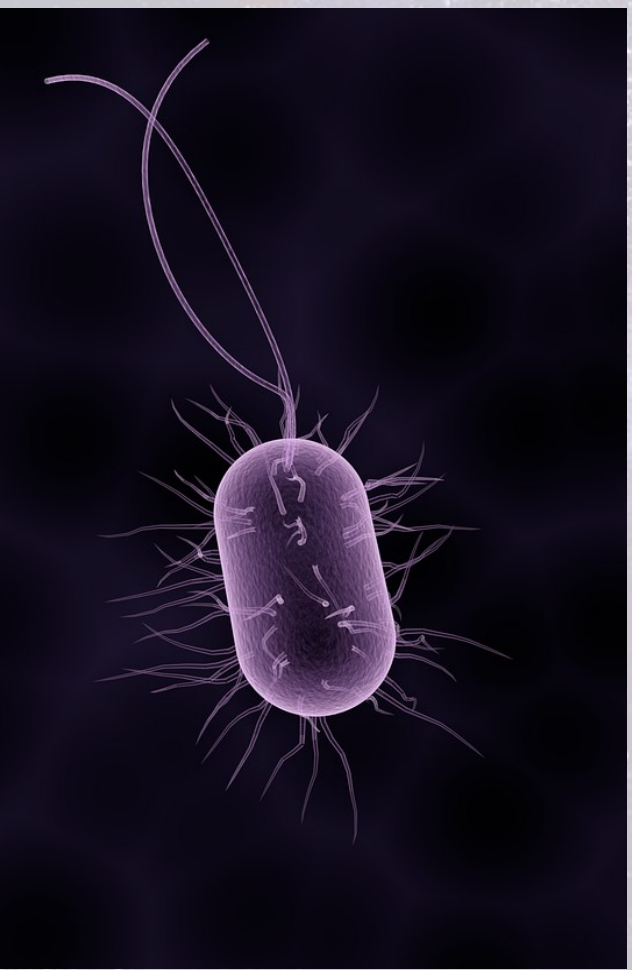
Safe & Effective Platform: This new method offers an alternate, safe and effective platform for developing neutralizing antibodies against NiV in a biosafety level -2 (BSL) laboratory.

(Biosafety Level-2 (BSL) Laboratory: This biosafety level covers laboratories that work with agents of with human diseases (i.e. pathogenic organisms) that pose a moderate health hazard.)

~SHAILEE PRAJAPATI (TY, SEM-5)

Context: Recently, researchers have examined multi-drug-resistant pathogens on the International Space Station (ISS), with potential implications for astronaut health as well as on Earth.

PATHOGENS IN SPACE



Participating Organizations: The Indian Institute of Technology Madras (IIT Madras) and NASA's Jet Propulsion Laboratory (JPL) are participating in the project.

Key features of the Research: Studying Drug-Resistant Pathogens: Examining genomic adaptions of drug-resistant pathogens can enhance precision in treatment approaches. Understanding pathogen persistence in environments such as spacecraft and hospitals can aid in contamination control.

Microbial Dynamics: Combining genomics, metagenomics, and metabolic modeling enables the study of microbial dynamics across diverse extreme environments.

Enterobacter bugandensis: ***Enterobacter bugandensis*** is a newly discovered species in the ***Enterobacter genus***, identified in 2013 from bloodstream infection cases in Uganda.

Multidrug resistant pathogen: It describes a microorganism that has acquired resistance to multiple antimicrobial agents, usually spanning three or more antimicrobial categories. Manifestation: This resistance can manifest in different types of microorganisms.

Threats: The most significant threat to public health among MDR forms is bacteria that withstand multiple antibiotics.

~ARPITA PATEL (TY, SEM-5)

Circular RNAs:

The new research frontier in cancer research

" Over the once decade, exploration into circular RNAs has surfaced as a vital area of study, revealing the pivotal part these unique RNA motes play in cancer biology."

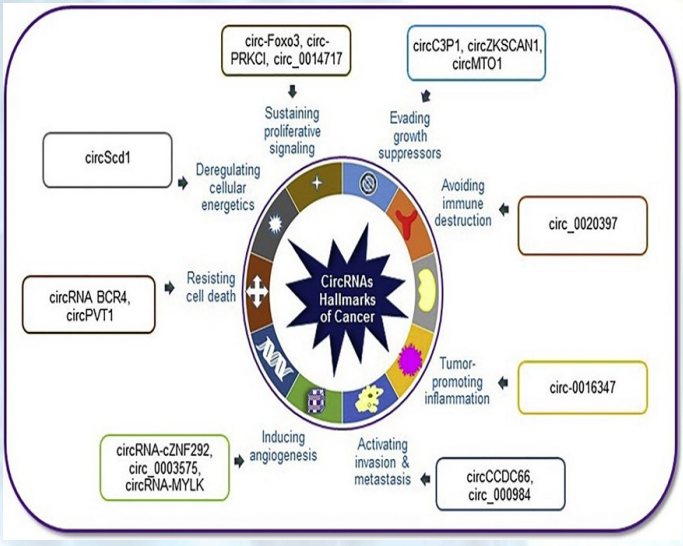
What is Circular RNAs?

RNA is a family of inheritable fractions, remarkably like DNA, present within mortal cells. A type of single- stranded RNA, which unlike direct RNA forms a covalently unrestricted nonstop circle. In circular RNA the 3' and 5' high ends typically present in an RNA patch have been joined together, because indirect RNA does not have 5' or 3' ends. It is resistant to exonuclease- intermediated declination and is more stable than utmost direct RNA in cells.

How is it used in Cancer biology?

They are differentially expressed in vulnerable cells and autoimmune conditions, also have part in transcriptional controllers, protein sponger, templates for restatement. They've a significance in the continuing fight to combat cancer. Natural Circ RNAs can be used to induce a vulnerable response to kill cancer cells, mimicking the way the synthetic COVID- 19 vaccine works to target the contagion. Elevated levels of Circ RNAs in certain people can beget mutations in their DNA which results in a form of blood cancer, called leukemia. The study also highlights the implicit to use Circ RNAs as a cancer biomarker.

Circ RNAs can be used as cancer biomarkers in liquid biopsies, such as blood, to help doctors know when cancer starts before MRI can image it, and indeed when it is responding to treatment. In such short time, we've set up there are further than 10 times as numerous Circ RNAs than all other RNAs combined, and they play a huge part in every stage of nearly every cancer-- from initiating the first cancer- causing mutation through to metastasis and indeed making cancer cells resistant to chemotherapy. By understanding the specific functions of Circ RNAs at every stage of cancer, we hope to harness them in the fight against cancer paving the way for innovative individual and remedial developments that may change the geography of oncology ever.



Some crucial players in the field include:

1. Lennart Philipson(1970s) Discovered the first Circ RNA, known as viroid RNA, in plants.

2. Richard Salditt- Georgieff and Michael J. Levy (1980s) identified Circ RNAs in human cells.

3. William S. Karnes and colleagues (2013): Identified circular RNAs as biomarkers for cancer.

4. Wan Yee Tang and colleagues (2013): Showed that circRNAs can regulate gene expression in cell.

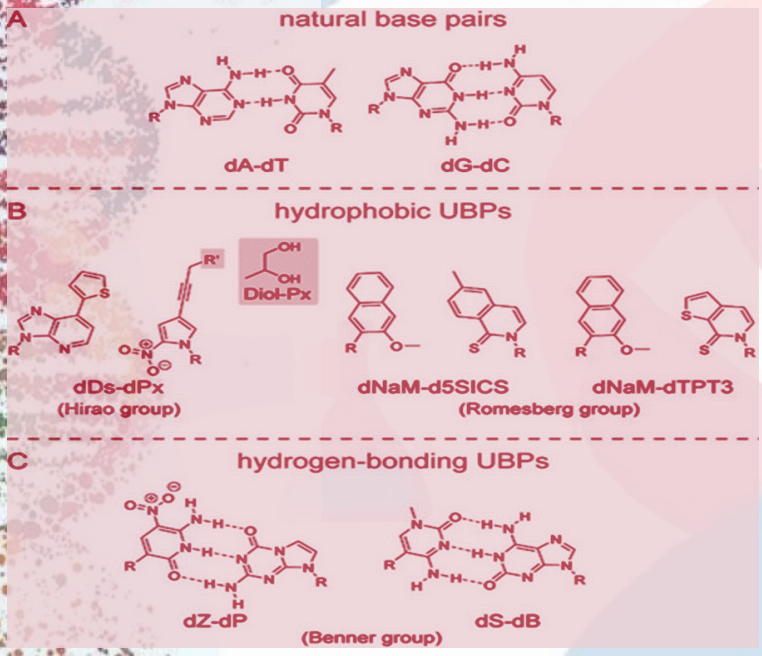
~ANJALI JADAV (TY, SEM-5)

GENETIC ALPHABET

Enhancing the genetic alphabet refers to expanding the natural set of nucleotides—adenine (A), thymine (T), cytosine (C), and guanine (G)—that make up DNA. This concept revolves around creating new, synthetic nucleotides, often termed "unnatural base pairs" (UBPs), to increase the informational capacity of DNA.

Unnatural Base Pairs (UBPs) :

Researchers have developed synthetic nucleotides that can be incorporated into DNA. These UBPs expand the number of base pairs beyond the natural four, potentially leading to the encoding of additional amino acids and creating proteins with novel properties. The first successful incorporation of UBPs into living organisms was achieved by Floyd Romesberg and his team in 2014, using a synthetic pair, d5SICS and dNaM, in *Escherichia coli* bacteria.



Applications :

Biotechnology: Enhanced genetic alphabets could allow for the production of proteins with new functionalities, leading to advances in drug development, industrial enzymes, and novel materials.

Synthetic Biology: Expanded genetic alphabets may allow the creation of entirely new forms of life with synthetic DNA, potentially leading to organisms that can perform tasks not possible for natural organisms.

Research Tools: UBPs can be used to study DNA replication, transcription, and translation processes with greater precision, providing deeper insights into molecular biology.

Challenges :

Stability: Ensuring that UBPs are stable and do not mutate or get misread during DNA replication is crucial.

Compatibility: The new nucleotides must be compatible with the existing cellular machinery for replication, transcription, and translation.

Ethical Concerns: The creation of synthetic organisms raises questions about biosecurity, potential ecological impacts, and the ethics of creating new life forms.

Future Prospects :

The ongoing research in enhancing the genetic alphabet could revolutionize fields like medicine, agriculture, and environmental science. It holds the potential to create organisms that can perform new, beneficial functions or produce novel substances not possible with natural DNA.

In conclusion, enhancing the genetic alphabet is a frontier in synthetic biology with significant implications for science and society.

~QURESHI ANVARI (TY, SEM-5)

DNA Barcoding

Species Detection and High Throughput Assays

DNA barcoding is a fast sequencing-based technique that scientists use to catalog all life on earth or perform high throughput bioanalyses.

What is DNA Barcoding?

DNA barcoding is a powerful molecular method that helps researchers identify biomolecules through sequencing short, 10-800 base pair DNA segment called barcodes. Scientists use this method widely to identify all species on earth and conduct high-throughput experiments to detect targeted small molecules within a pooled biomolecule population.

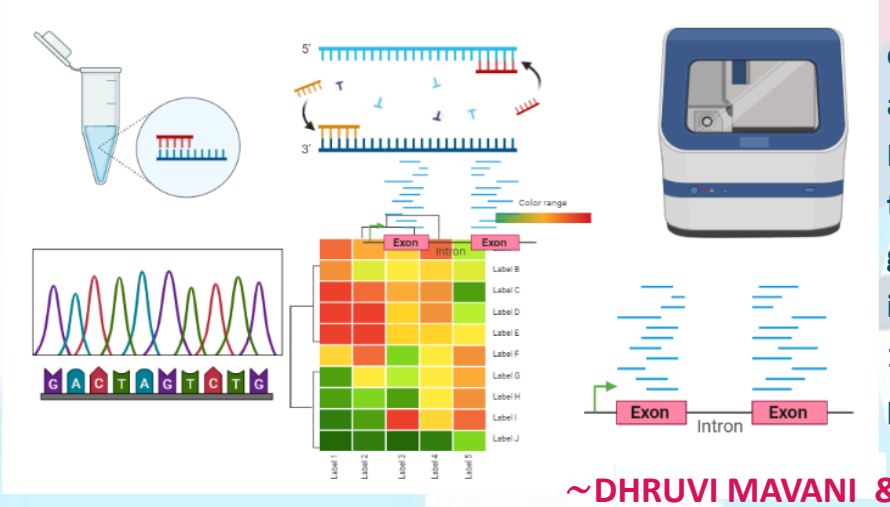
DNA barcoding for biodiversity assessment and species identification:-

DNA barcodes are gene sequences that differentiate animals, plants , and microbial species. To do this, scientists extract DNA from tiny samples taken from organisms of interest and sequence specific sections within or between genes for DNA barcoding. Subsequently, they match the unknown barcode sequence against known sequence in DNA barcode library to identify the organism.

DNA barcoding technique to conduct biodiversity assessment. Using this technique, scientists determine changes in species composition and monitor the presence of invasive, endangered, or threatened species. In comparison to traditional system, this technique offers accurate identification of hundreds of species in a very short time interval.

Mitochondrial DNA barcodes:-

Short mitochondrial DNA (mtDNA) sequences as barcodes, specifically in the gene coding for the cytochrome c oxidase subunit 1 (*CO1*). Researchers prefer mtDNA over the nuclear genome for developing accurate species-level DNA barcodes because it is maternally inherited. This allows scientists to unambiguously retrace evolutionary relationships due to mtDNA'S lack of heterologous recombination, which trades pieces of parental DNA in the nuclear genome and complicates lineage tracin



DNA barcoding for microorganism:-

Microbiologist can identify microorganisms (e.g. bacteria, fungi, and viruses) using DNA barcodes. For fungus, researchers sequence the ITS region of nuclear rRNA genes. For bacterial and archaeal identification, microbiologist use 16s rRNA, chaperonin-60, and RNA polymerase β subunit (rpoB) gene.

~DHRUVI MAVANI & RUTVEEKA LODHA (TY, SEM-5)

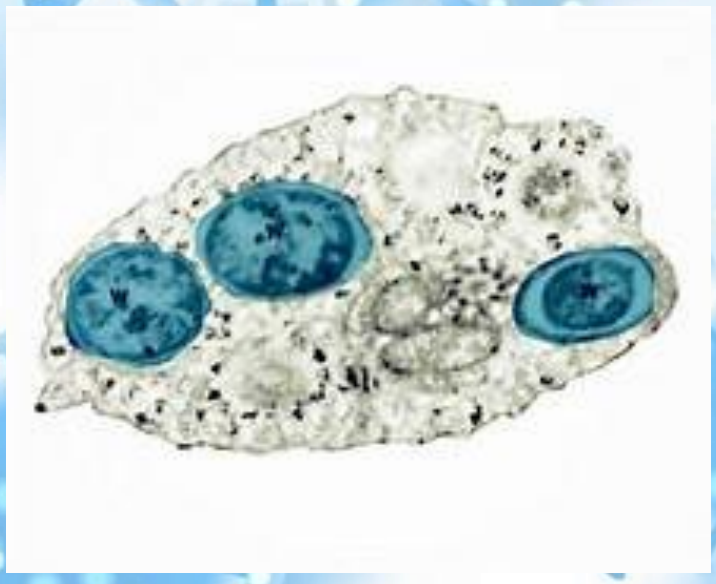
WOLBACHIA BACTERIA CONTROLS DENGUE

Researchers from the World Mosquito Program have used mosquitoes infected with *Wolbachia* bacteria to successfully control dengue.

The *Aedes aegypti* mosquito is the main transmitter of dengue, Zika, chikungunya and yellow fever viruses. *Aedes aegypti* mosquitoes originated in Africa, but they have spread through tropical and subtropical regions around the world. Dengue fever is now considered the most critical mosquito-borne viral disease in the world, according to the World Health Organization. It's also the most rapidly spreading, with a 30-fold increase in global incidence over the past 50 years.

Wolbachia is one of the world's most common types of bacteria, present in 50% of all insect species, including bees, beetles, butterflies, moths, and fruit flies.

How our *Wolbachia* method works?



We discovered that *Wolbachia* blocks viruses like dengue, chikungunya and Zika from growing in the bodies of *Aedes aegypti* mosquitoes. This means that *Wolbachia* mosquitoes have a ability to transmit viruses to people. When *Wolbachia* is established in a mosquito population it results in a decreasing of dengue, Zika, chikungunya.

So, at the World Mosquito Program, we breed *Wolbachia* mosquitoes. In partnership with local communities, we release them into areas affected by mosquito-borne diseases. Which means less risk of disease in communities where *Wolbachia* is established in the local mosquito population, without posing risk to natural ecosystems. Unlike most other initiatives, our method is natural and self-sustaining.

~BINAL ODEDARA (TY, SEM-5)

NATURE'S SECRET WEAPONS AGAINST MICROBES

With The fight against harmful microbes, some of our oldest of our oldest allies "natural products derived from plats and herbs" are emerging as potent antimicrobial agents. These hidden heroes, long used in traditional medicine like Ayurveda, offer new hope in an era where antibiotic resistance threatens global health

Imagine a world where doctors relied solely on nature's pharmacy. Before the advent of modern antibiotics, ancient healers turned to nature for remedies. Turmeric, with its active compound curcumin, was used not just for its vibrant color but for its ability to inhibit bacteria like *staphylococcus aureus*. Neem, often called "nature's pharmacy" was another staple, used to combat a wide range of infection. As antibiotic-resistant " superbugs" become a growing concern, these age-old remedies are proving more relevant than ever.

Scientists are increasingly turning to nature's complex chemistry for solutions. Unlike synthetic antibiotics, which often target a single bacterial process, natural compounds like thymol form thyme have multiple modes of action. Thymol disrupts bacterial membranes and interferes with protein synthesis, making it harder for bacteria to develop resistance.

The research isn't limited to spices alone. The bark of the cinchona tree, traditionally used to treat malaria, contains quinine still relevant today. Essential oils are also showing promise as antimicrobial agents. Tea tree oil, known for treating skin infections, and oregano oil, rich in carvacrol and thymol, have proven effective against even antibiotic-resistant strains.

As antibiotic resistant grows, the exploration of natural products as antimicrobial agents feels both innovative and grounded in tradition. These ancient remedies, now supported by modern science, remind us that nature has always been a powerful source of healing. By combining past wisdom with today's technology, we may discover sustainable solution to our future medical challenges solutions that have been quietly waiting in nature's arsenal all along.

~TABASSUM MEHRIN FABIA (SY, SEM-3)

AI AND MICROBIOLOGY:

Pioneering Discovery Leading to a New Era of Innovation

Unlocking the microscopic world with AI:

Artificial intelligence (AI) and microbiology are transforming the understanding and manipulation of microbial life, unlocking new potential in research, healthcare, and environmental management. Despite their critical roles in ecosystems, human health, and the economy, microbials remain a vast and mostly uncharted territory. Al's capability in managing and interpreting massive datasets could light the way forward, from decoding genetics to mapping behaviors and interactions, accelerating the journey into the microbial world.

One of the most exciting advancements is the use of AI in analyzing complex microbial data. Machine learning algorithms are now capable of processing vast amounts of gnomic, proteomic, and metabolic data with unprecedented speed and accuracy. These tools are not only accelerating the identification of new microbial species but also enabling the discovery of novel microbial functions and interactions.

In healthcare, AI is revolutionizing by approaching microbiome research and analyzing patient data as AI systems can predict how changes in the microbiome may influence health and disease. AI-driven predictive models are aiding in the development of targeted antibiotics and probiotics, enhancing treatment efficacy while minimizing resistance issues.AI models are being used to monitor and predict the impact of microbial activities on ecosystems. For example, advanced AI tools are employed to track microbial responses to environmental changes, such as climate change and pollution. This information is crucial for developing strategies to mitigate negative impacts and promote ecosystem sustainability.

Future Prospects:

Looking ahead, the potential for AI and microbiology to drive innovation is immense. As AI technologies continue to evolve, their ability to analyze and interpret complex biological data will only improve. This will likely lead to new discoveries in microbial genetics, metabolism, and interactions, further enhancing the ability to harness microbes for various applications. However, the integration of AI into microbiology is not without its challenges. The technology's knack for identifying patterns can sometimes conceal the casual relationships for vital scientific discovery.

~DIANE IRAKOZE SEMANA &
VISHAKHA RAWAT (SY, SEM-3)

HISTORICAL DEVELOPMENT OF MICROORGANISMS

The existence of microbes was suspected as early as the sixth century BC in Jain scriptures from India. Antonie van Leeuwenhoek is credited with first identifying microorganisms in 1670s using his newly developed microscope. Louis Pasteur and Robert Koch established the link between microbes and diseases. Exceptional advancements in Microbiology & Biotechnology have made remarking pace in studying these microorganisms.

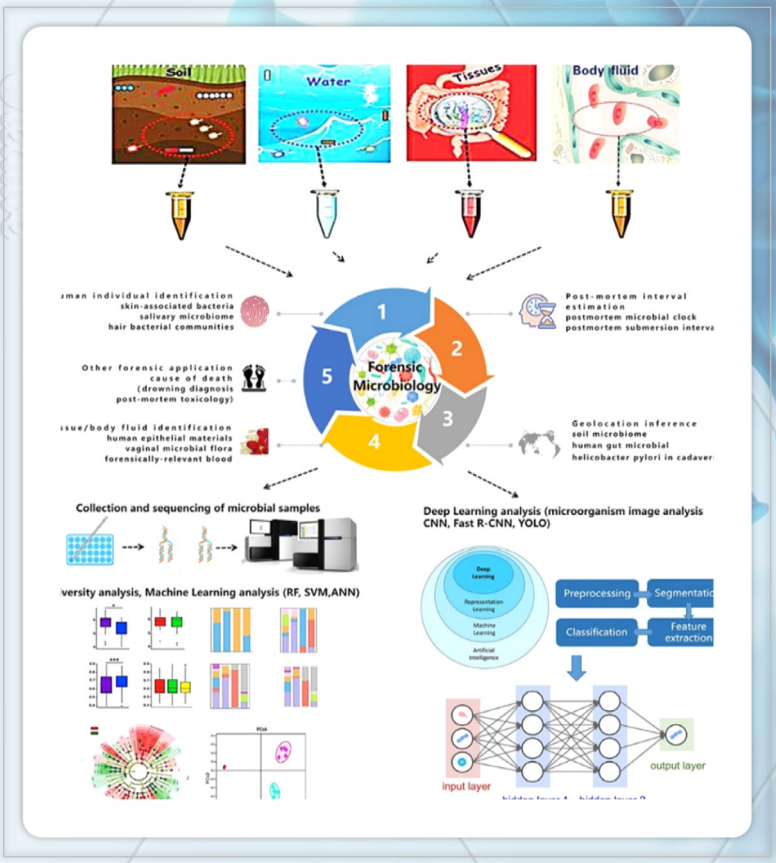
MICROBIAL FORENSICS

MICROORGANISMS AND BIO-TERRORISM

Microbes are a potential biological agent used in bio-terrorism. They have been used to orchestrate bioterrorism and bio-crimes. Bio-terrorism targets against civilian population, while bio-crimes target individuals or particular groups. Illicit use of biological agents by criminals and terrorists from 1900 to 2000 has been documented.

BIO-WARFARE AND MICROORGANISMS

The emergence of small bio-weapons programs allowed weaponization of biological agents and development of sophisticate delivery systems. Measures to combat these activities include the signing of the Geneva protocol in 1925 and the Biological Weapons convention in 1972.



MICROBIAL FORENSICS: A NEW FIELD IN THE UNITED STATES

Microbial forensics, established in 2003, is a scientific discipline analyzing evidence from bioterrorism acts, bio-crimes, or inadvertent microorganism/toxin release.

It focuses about the type of microbial agent used, determining its probable origin, identifying its natural reservoirs, transmission routes, possible targets, involvement of toxins, and confirmation of genetic modification or chemical treatment of the microorganism. Techniques used include phenotypic methods, phylogenetic analyses, nucleic acid-based methods, Polymerized chain reaction (PCR), use of microbial genetic markers, high-throughput sequencing (HTS) or sequencing (MPS) technology, or next-generation sequencing (NGS). Microbial forensics faces challenges due to the inadequacy of robust technologies to identify the sources of biological threat agents. The future of microbial forensicS, such as the betterment of different fields or techniques, increased focus on bio-surveillance, endemism, metagenomics, and proteomics.

~MUTOO SOLOMON KHAEMBA (SY, SEM-3)

NOBEL LAUREATES

The Nobel Prize in 2020 was awarded jointly to Harvey J. Alter, Michael Houghton and Charles M. Rice "for the discovery of Hepatitis C virus"

Nobel Prize in Physiology or Medicine in 2020 was awarded to three scientists—Harvey J. Alter, Michael Houghton, and Charles M. Rice—for their groundbreaking work in discovering the hepatitis C virus. This discovery was crucial in understanding and combating blood-borne hepatitis, which had been a global health issue. Their research laid the foundation for the development of blood tests that have improved the ability to detect and treat hepatitis C, reducing the incidence of liver disease and liver cancer associated with this virus.

In the late 1970s and early 1980s, despite advances in hepatitis B and A screening, many cases remained unexplained, especially for patients receiving blood transfusions. Harvey Alter, at the NIH (National Institute of Health), studied these cases and found that blood from these patients could transmit the disease to chimpanzees, confirming the illness was caused by an infectious agent with viral characteristics. The virus did not fit the profiles of known *hepatitis A or B viruses*. This work led to the designation of the disease as "non-A, non-B" hepatitis, highlighting that it was a distinct form of hepatitis not caused by previously identified viruses.

Michael Houghton and his team at Chiron Corporation discovered a novel RNA virus in Hepatitis C. They collected DNA fragments from infected chimpanzees' blood and used sera from hepatitis patients to identify antibodies. This breakthrough allowed for the development of diagnostic tests and treatments, improving hepatitis C management and reducing liver disease and cancer risk. Charles M. Rice's work at Washington University confirmed that the *hepatitis C virus (HCV)* alone can cause hepatitis. He identified a crucial region at the end of the HCV genome and used genetic engineering to create an engineered RNA variant. The RNA was injected into chimpanzee livers, revealing pathological changes similar to human chronic hepatitis C cases. This experiment bridged the gap between the virus's discovery and its role as a pathogen, providing the final proof needed to confirm the virus's role in chronic hepatitis cases.

The discovery of the *hepatitis C virus* led to the development of sensitive blood tests for screening blood donations and diagnosing infected individuals. These tests significantly reduced post-transfusion hepatitis incidence. This also led to the development of effective antiviral drugs like direct-acting antivirals (DAAs), which can target and eliminate the virus, resulting in cure rates of over 90% in many cases. This breakthrough has reduced the burden of liver disease and cancer.

The discovery of the *hepatitis C virus* by Alter, Houghton, and Rice revolutionized medical science and public health, leading to innovative advancements in treatment and management, inspiring global efforts towards eradicating the disease .

~DHWANI PATEL (TY, SEM-5)

KNOW YOUR CITY !!

Intas is a leading, vertically integrated global pharmaceutical formulation development, manufacturing, and marketing company. Intas is committed to challenging the unmet medical and societal needs through a comprehensive pharmaceutical value chain spanning across the world.

Intas has set up a network of subsidiaries, under the umbrella name of Accord Healthcare to operate in global markets. It is currently present in more than 85 countries worldwide with robust sales, marketing and distribution infrastructure in markets like North America, Europe, Central & Latin America, Asia-Pacific as well as CIS and MENA countries. Intas' remarkable success in North America and European operations have helped us emerge as a global brand in the world's largest pharmaceutical markets.

Every Intas product and service is a testament to its uncompromising quality standards. All products are manufactured in facilities that are approved by major global regulatory agencies including the USFDA, MHRA, EMA, TGA, MCC, ANVISA and more.

Currently, Intas has over 10,000 product registrations worldwide. In India, Intas has established leadership in key therapeutic segments like CNS, Cardiovascular, Diabetology, Gastroenterology, Urology, Oncology, Hematology, Immunology and Neurology. Overseas, the company is particularly well known for its range of products in Oncology and other hospital – based therapeutic areas in the EU and USA

As a part of the progressive future strategy, they have invested in Pharmez 2 – a highly advanced expansion of our Pharmez SEZ facility in Gujarat, India. This new age, highly automated and efficient manufacturing layout can produce more than one billion solid orals per month as well as 5 million injectable units. This futuristic Pharmez 2 facility is set to be the cornerstone of their promising future.

Intas believes in empowering people. Therefore, to fulfil its corporate vision, Intas aims to acquire and retain the best talent across the industry to fully leverage the diversity of respective markets they operate in.

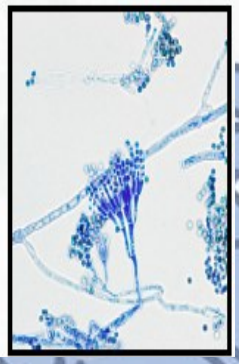
~AASHVI BHATT (SY, SEM-3)

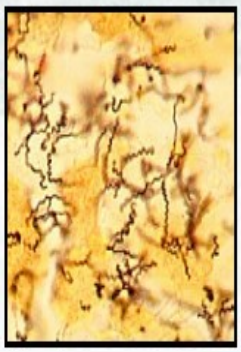
SCRATCH

Microzzles

"I'm a tiny troublemaker, often found in the gut,
My presence can be beneficial, but also a threat to cut.
I'm a master of mutation, adapting with ease,
In the lab, I'm a workhorse, but in the wild, I can cause disease.
Who Am I?

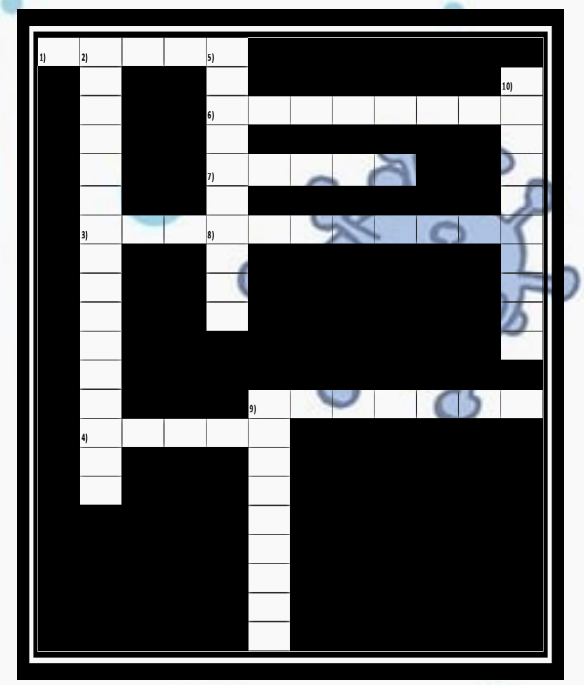
"I'm a fuzzy fungus, with a powerful punch,
I changed the face of medicine, with a chance discovery's clutch.
I produce a magical molecule, that fights off infection's might,
A lifesaving find, that shines with delight.
Who Am I?





"I'm a twisted bacterium, with a spiral design,
My shape allows me, to penetrate deep in line,
Causing diseases like Lyme, and Syphilis.
My motility's unique, with a rotating flair,
Allowing me to move, with a corkscrew air.
Who Am I?"

"I'm a microscopic marvel, with a glassy disguise,
My frustule's my shield, with a delicate surprise.
I'm a primary producer, in aquatic realms I thrive,
Converting sunlight's energy, with a photosynthetic drive.
A natural wonder, that's simply sublime.
Who Am I?"



▪ CROSSWORD:

➢ **ACROSS :**

1. Parasitic cause of chronic _____ include "Leishmaniasis" & malaria.

3. Which infection commonly caused by harvesting seafood in contaminated water?

4. AIDS disease is caused by a virus, which belongs to ____ virus group?

6. Which bacteria are present in the milk of infected animal?

7. Which bacteria that can cause a variety of illness; including diarrhea, pneumonia & sepsis?

9. Equational division is also known as ……?

➢ **DOWN :**

2. The most important function of a gene is …..?

3. A gene that takes part in the synthesis of polypeptide is _____ gene.

5. The live vaccines are available against the following viruses, except :_____

8. What is the raw source of Clostridium Niereticans?

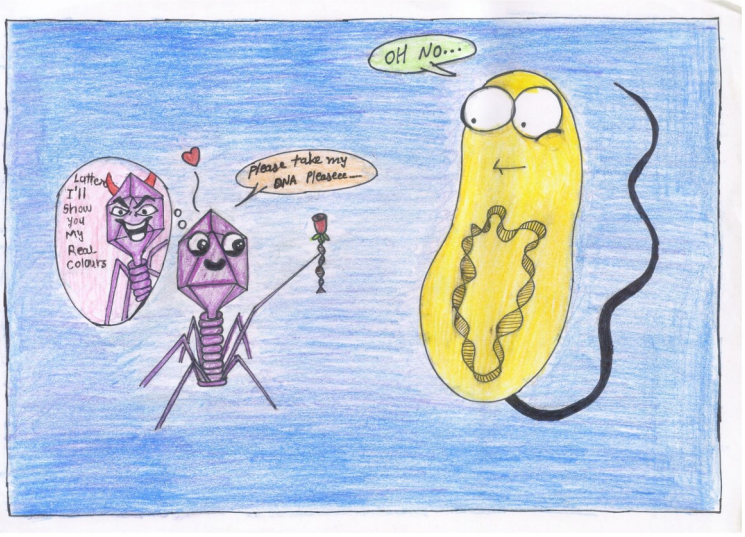
9. A Swiss ophthalmologist, Victor Morax described the genus _____?

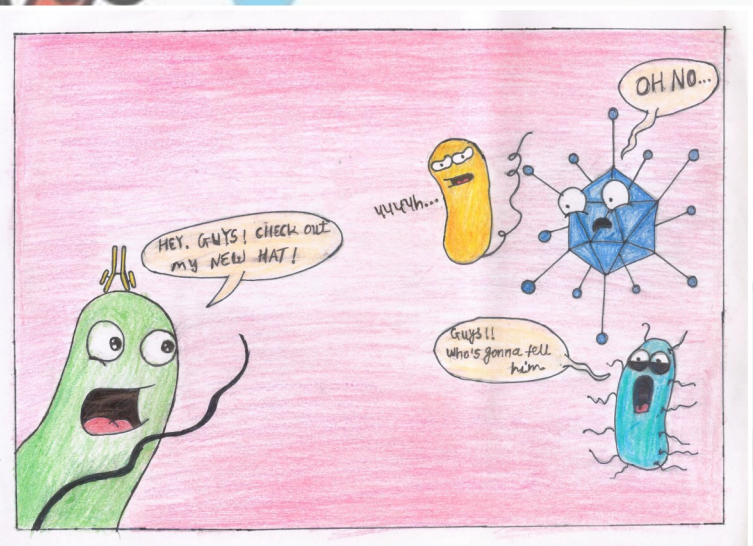
10. Who developed Mueller-Hinton agar, Which is a rich media that can grow many microbial pathogens?

JT

CELLFIE

TINYTOON





MNEMONICS

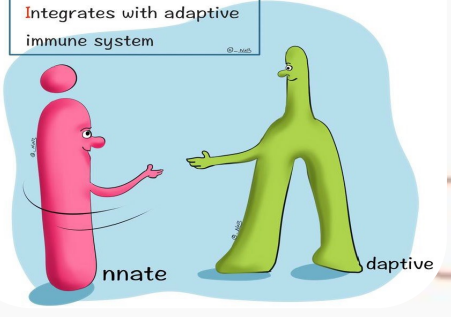
Herd immunity
develops against following vaccination

- Polio (Oral polio vaccine)
- Small pox vaccine
- Measles, Mumps & Rubella (MMR)
- Diphtheria & Pertussis

"PSM Disease"

Innate Immunity

- Instant
- Immediate
- Integrates with adaptive immune system



SCAN FOR ANSWERS

ACTIVITIES

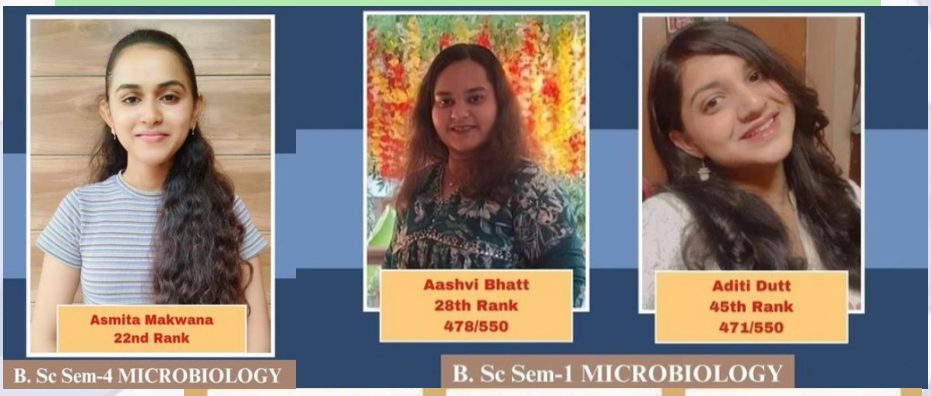
Magazine launch— BIOME (Vol-9) Dt:-2nd-Feb-2024

Teachers Day Celebration at Department— Sept, 2024

Visit to IFFCO—23rd– Feb - 2024 | Heritage Walk— 3rd-Jan-2024

ACHIEVEMENTS

STUDENTS WHO GOT UNIVERSITY RANK



B. Sc Sem-2 MICROBIOLOGY

GBioN ACHIVEMENTS :

- Aditi Dutt- 1st in Poster Making

SPORTS AND OTHER ACHIVEMENT :

- Purva Patel– 3rd prize in Intercollege Basketball
- Hardi Dabhi– Kho-Kho Intercollege, NCC Army
- Pritika Patel– 1st in One Act Play (Youth Festival)
- Vedant Sheladiya, Aashvi Bhatt– Bio Puzzle

FACULTY ACHIVEMENTS:

Assessment of Cytotoxic Effects of Para-probiotic Yogurts on Cancer Cell Lines — Journal of Chemical Health Risks

By— Pooja Jeet Patel— Adhoc Teaching Assistant, and

— Dr. Noopur Goyal— Professor and Head , Microbiology Department, M. G. Science

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