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Department of Biosciences

KYOTOS 2024

"There are things known and there are things unknown, and in between are the doors of perception."

— Aldous Huxley

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IMS Ghaziabad (University Courses Campus) stands as a beacon of academic brilliance and innovation, offering an unparalleled educational experience in the bustling hub of Ghaziabad. Renowned for its cutting- edge curriculum and dynamic learning atmosphere, the institution provides a rich blend of theory and practical exposure across a variety of undergraduate and postgraduate programs. Our state-of-the-art campus, equipped with modern technology and resources, serves as the perfect environment for fostering intellectual curiosity, creativity, and leadership.

A standout feature of our institution is the robust Biosciences Department, which is dedicated to advancing research and innovation in the life sciences. With modern laboratories, experienced faculty, and opportunities for hands-on research, the department provides students with deep insights into the world of biotechnology, microbiology. Beyond academics, IMS is a vibrant community where cultural, social, and professional growth are nurtured, preparing students to be visionary leaders and innovators in an ever-evolving global arena.

WHAT'S INSIDE ?

Prof. (Dr.) Jaskiran Kaur
DIRECTOR
IMS Ghaziabad
(University Courses Campus)

Director's Message

Science, in its purest essence, is the language through which humanity communicates with nature, unraveling the mysteries of existence and transforming them into innovations that shape the world around us. Technology, emerging from the cradle of science, is far more than a tool of convenience—it is a dynamic force that defines the rhythm of human progress. The synergy between scientific discovery and technological application ensures that advancement remains purposeful, guiding humanity toward collective growth and well-being rather than chaos.

In today's era, where digital intelligence and automation pervade every aspect of life, it becomes crucial to pause and reflect—are we harnessing technology to empower ourselves, or are we becoming its subjects? True progress lies in employing technology as an ally to human welfare—promoting health, nurturing emotional balance, and sustaining the planet. When driven by a spirit of scientific inquiry and ethical mindfulness, technology transforms into a healer, a mentor, and a steward of harmony.

At IMS Ghaziabad (University Courses Campus), we inspire our young minds to perceive science not merely as an academic pursuit but as a philosophy of curiosity, reason, and compassion. The Kyoto Magazine embodies this very spirit—serving as a vibrant platform where knowledge converges with creativity, and ideas blossom into impactful expressions.

As we unveil the sixth edition of KYOTOS, let us reaffirm our belief that science and technology must forever remain in service to humanity. The true measure of progress is not only in what we are capable of creating but in how wisely and compassionately we use our creations—to nurture vitality, cultivate peace, and uphold the shared well-being of our world.

EDITOR'S MESSAGE

Dr. Surabhi Johari

HEAD OF DEPARTMENT
Department of Biosciences

We are extremely delighted and ecstatic to share this year's magazine. We sincerely thank the efforts of the entire team especially our superstar students. The magazine focuses how technology efficiently delivers new stories to our desktops, laptops and mobile. Magazine is all about context, how ideas and images are presented in relation to one another and within a larger point of view. It explores a range of biological sciences, from the disorderly laws of gene editing to the anarchy of the microbial world. Additionally, it includes a wide range of material, including articles, science trivia, quizzes, achievements, and Department of Biosciences activities. Magazines is about trust and partnership, we, the editors, will strive always to keep you engaged.

Dr. Tanushri Chatterji

ASSISTANT PROFESSOR
Department of Biosciences

The editorial board members' honest assistance made it possible to complete the monumental undertaking of editing our department magazine. Although having talent is admirable but the real test is the capacity to recognize talent in others. I'm incredibly grateful to our esteemed Director, Prof. (Dr.) Jaskiran Kaur,General Secretary and Treasurer, CA (Dr.) Rakesh Chharia and (CA) Vidur Chharia for giving us the duty of serving as and on the Editorial Board. We send our warmest greetings to each and every reader, and we sincerely hope that this memento will win your praise for being an important contribution to the exploration of the mysterious realm of science.

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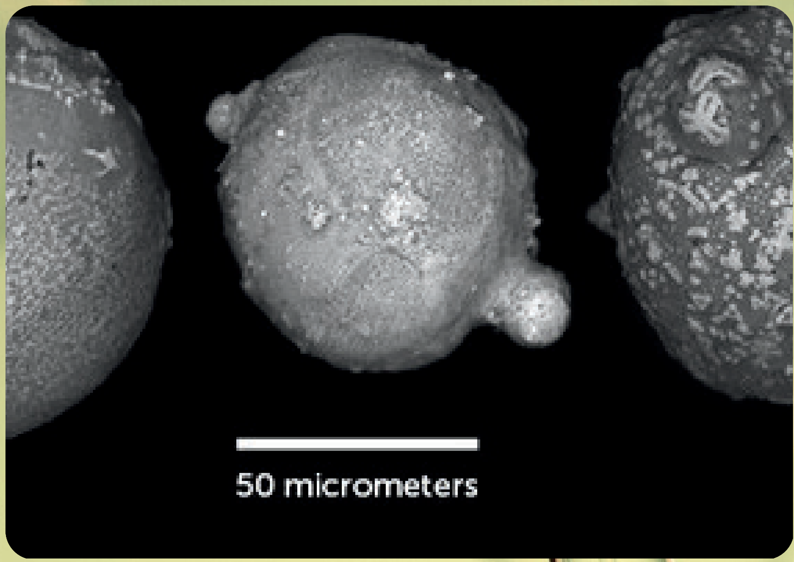
SCIENCE RECORD BROKEN IN 2024

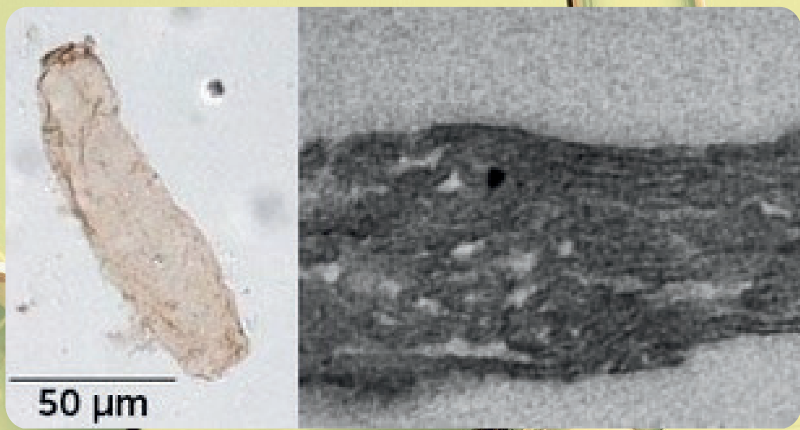
Ancient Airburst

About 2.5 million years ago, an asteroid exploded in Earth's atmosphere before hitting the surface, making it the oldest known midair explosion. Scientists confirmed this by analyzing nearly 120 microscopic rock particles from Antarctic ice, rich in olivine and spinel-likely remnants of the asteroid. The find reveals early cosmic encounters and advances our understanding of planetary geology,



The Dawn of Photosynthesis

Researchers have unearthed fossils in Australia dating back 1.75 billion years, marking the oldest evidence of photosynthesis. The bacteria, known as *"Navifusa majensis"*, displays structures similar to thylakoid membranes, offering the first direct evidence that cyanobacteria were generating oxygen during that era and influencing Earth's atmosphere.

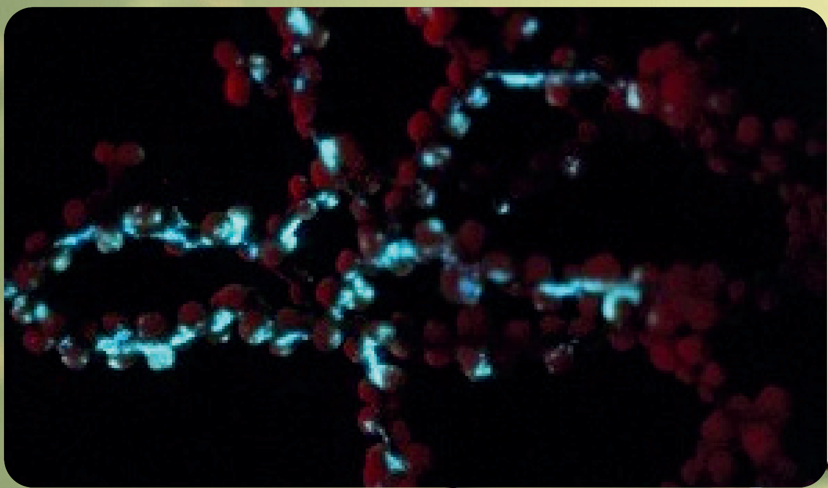


Plastic Pollution Panic

In 2024, plastic pollution became a major global concern, leading to UN treaty negotiations that missed the December deadline but will continue. With eight gigatons of plastic, pollution impacts oceans, air, food, and humans. Research identified over 16,000 plastic related chemicals, including 4,200 highly hazardous ones, highlighting the urgent need for global action.

AI Gets Supercharged

In 2024, AI advancements led large language models to outperform humans in various fields, even matching International Math Olympiad winners and surpassing PhD experts. This resulted in Nobel Prizes in Physics and Chemistry for AI contributions, highlighting its transformative impact on science. However, increased energy and water demands raised concerns about power supply, prompting tech companies to explore nuclear energy as a solution.



Oldest Bioluminescence

New research indicates that bioluminescence first appeared around 540 million years ago in the ancestors of deep-sea corals, significantly earlier than the previously thought timeline of 267 million years. This discovery, centered on octocorals such as Savalia, extends the evolutionary timeline of light-emitting characteristics and provides fresh insights into ancient marine life.

Large Genome

Scientists have discovered the largest known genome in "*Tmesipteris oblanceolata*", a tiny 15 cm fork fern from New Caledonia. Its genome is about 50 times larger than that of humans, stretching nearly 100 meters if unraveled. This finding challenges assumptions about genome size and complexity, showing that even simple-looking plants can carry vast genetic information.

ARTICLES

“Exploring the frontiers of knowledge through the voices of tomorrow’s innovators.”

Ethical Hacking: An Effective Method for Protecting IoT Networks

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RKGIT, Ghaziabad

The explosive growth of the Internet of Things (IoT) has changed the way devices speak to each other, resulting in vast networks of networked intelligent devices. The systems provide automation, real-time data processing, and increased convenience in numerous areas of application, ranging from wearable technology and smart homes to industrial automation and driverless cars. Most of these devices are run with minimal computational capabilities, poor security, and no consistent update system. Consequently, they are very susceptible to cyberattacks, including data breaches, unauthorized access, malware infections, and massive attacks like Distributed Denial-of-Service (DDoS). With an estimated 75 billion IoT devices going online by 2025, the magnitude of potential cyber threats is colossal.

The lack of a common security standard for IoT and reliance on third-party firmware contribute to these dangers further. Human vulnerabilities in the form of weak password management, out-of-date software, and lacking security practices contribute to the weakness of IoT ecosystems. Even a single compromised computer can be an entry point for intruders to breach larger networks, causing profound risks to individuals, organizations, and governments. Against these challenges, ethical hacking has emerged as a critical method of IoT security improvement. Ethical hacking is the performance of allowed simulations of attacks by hackers to find weaknesses before they are exploited by attackers. There are phases to a systematic process that includes reconnaissance, scanning, exploitation, keeping access, and reporting, all of which collectively improve organizational defenses and keep sensitive information safe.

With the very significant position of IoT in industries such as healthcare, transport, and manufacturing, its adoption of ethical hacking becomes particularly important. However, as cyber attacks become more sophisticated and more frequent, the need for proficient ethical hackers and vigilant security measures increases. Ethical hacking provides companies with the vision to prepare for threats, enhance system strength, and promote confidence in an increasingly interconnected online environment.

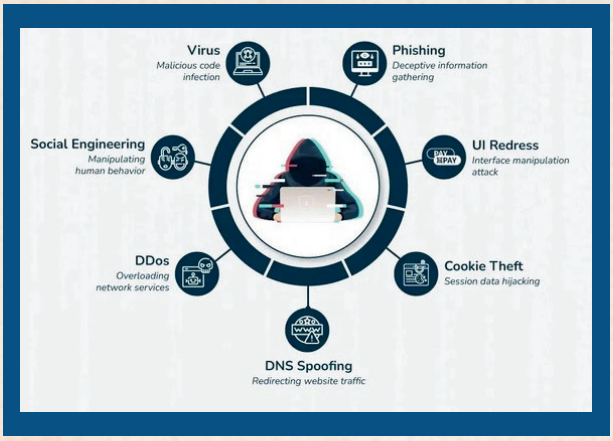

Figure 1: Types of Hacking

Ethical hacking has a clearly defined life cycle, and it starts with reconnaissance, in which information is actively or passively gathered about the target. Scanning, or finding open ports, devices, and services that can be exploited, follows that. Ethical hackers then conduct penetration testing to mimic unauthorized access and examine system defenses after vulnerabilities have been found. They sometimes try to keep access to see how much damage a true attacker would be able to inflict. Lastly, a comprehensive security report is documented, noting all the findings and providing suggestions to fortify the system.

The technologies and tools utilized in ethical hacking varied, varying from packet sniffers and IP scanners to password crackers and forensic analyzers. Increasingly, ethical hackers are incorporating machines learning to identify anomalies in traffic patterns, automate vulnerability scanning, and react to threats in real time. Though beneficial, ethical hacking can have its limitations. It demands experienced professionals, continuous training, and a complete knowledge of legal limits so as not to engage in ethical or legal infractions.In the scenario of IoT, ethical hacking is especially important. With the large number of devices, diverse protocols, and public network usage, conventional cybersecurity techniques lack efficiency in total protection.

Ethical hacking provides a preventive measure aiding in the discovery of security loopholes before they can be exploited by malicious hackers. But for this profession there are issues a lack of unified competencies, legal ambiguity, trust problems, and the difficulty of dealing with sophisticated threats. No less significant are mundane issues such as data management, expenses, and hardware-software compatibility. To mitigate such problems, organizations must adopt strong cybersecurity practices, abide by global security standards, and leverage advanced technologies like AI, machine learning, and cryptography. With frequent training, legal guidance, and active threat detection, ethical hacking can be an enduring tool of defense, assuring the future of IoT networks and protecting sensitive data in all interconnected realms.

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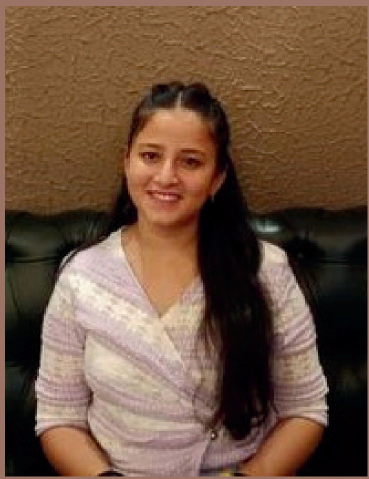
Dietary Mannan-Rich Fractions: A Sustainable Strategy to Counteract Antimicrobial Resistance in Poultry Farming



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Antimicrobial resistance (AMR) has emerged as a *"silent pandemic,"* with poultry farming recognized as a hotspot for the emergence and spread of resistant pathogens. Intensive poultry production systems frequently use antibiotics for growth promotion and are used as prophylactic agents, accelerating multidrug resistance in bacteria such as *Campylobacter jejuni*, *Escherichia coli*, and *Salmonella enterica*. These pathogens can colonize poultry asymptomatically, enter the food chain, and pose severe risks to public health through zoonotic transmission. Despite biosecurity measures and regulatory restrictions on antibiotic usage, high levels of AMR pathogens persist in poultry, underscoring the need for safe, effective, sustainable, and non-antibiotic-based interventions. Antimicrobial resistance develops when bacteria survive antibiotic exposure, facilitated by intrinsic resistance, mutations, or horizontal gene transfer via plasmids, integrons, and transposons.

When these resistant bacteria are transmitted to humans either directly or through the food chain they contribute to the increasing global burden of AMR. Studies show that up to 86% of broiler carcasses in Europe are contaminated with *Campylobacter spp.*, resistant to common antibiotics. Resistant avian *Escherichia coli* species and *Salmonella* strains can transfer resistance genes to human pathogens, emphasizing the need for non-antibiotic interventions.

Manna-rich fraction (MRF) is a refined yeast-based prebiotic component derived from the outer cell wall of *S. cerevisiae*. It primarily consists of mannans (MOS) and β-glucans with following key benefits:

- Pathogen Binding.
- Immune Modulation.
- Better Gut Health.

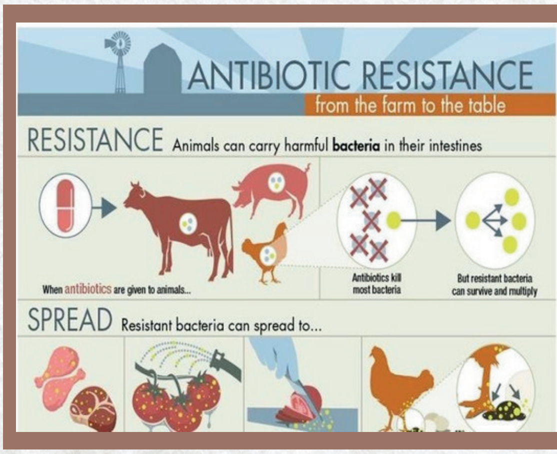

Figure 1: AMR spread and resistance

MRF supplemented resistant *E. coli* cultures showed 42% increase in intracellular ROS. When combined with ampicillin, ROS levels rise by 59% over controls and were 43% higher than with ampicillin alone. Elevated ROS likely overwhelm the bacteria's defense system, causing cellular damage and potentially restoring antibiotic susceptibility. MRF alters normal translational control of central metabolic pathway particularly glycolysis–TCA cycle. Enhanced TCA cycle leads to burst of superoxide via respiration, destabilizing Fe–S clusters and triggering Fenton reaction leading cell death. Proteomic analysis showed increased protein expression of key enzymes such as Aerobic respiration control protein (ARCA), which drives central metabolism and induces metabolic changes for greater ROS production.

C. jejuni is a major foodborne pathogen; these findings underline MRF's role in reducing zoonotic diseases. MRF significantly curbs the growth of resistant *E. coli* by 46% compared to antibiotic treatment, and the combination of MRF and antibiotic treatment led to an adjunctive growth reduction of 73%. This reduction is linked to the functional metabolomic alterations and changes in ROS production.

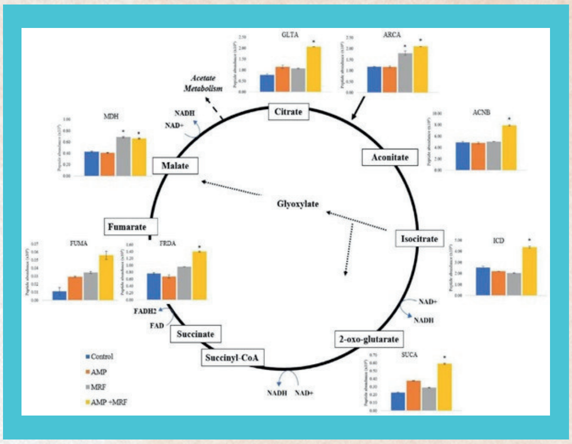

Figure 2: Elevated expression of key TCA-cycle proteins in E. coli following exogenous MRF supplementation, irrespective of ampicillin treatment

- Application in Other Livestock: MRF shows potential in other species such as pigs, aquaculture, and ruminants.
- Omics-Based Research: Integration of genomics, proteomics, and metabolomics can help unravel how MRF affects the host–microbiota–pathogen axis.

The dietary use of MRF offers a scientifically backed, sustainable strategy to mitigate AMR in poultry farming. Their multifactorial mechanisms including inhibition of bacterial adhesion, enhancement of ROS production, and modulation of metabolic and immune responses make them a potent tool to reduce dependency on antibiotics while maintaining or even improving production performance. As global food systems strive to meet growing demands without compromising public health, integrating MRF into poultry diets represents a viable pathway. Toward responsible antimicrobial stewardship in a One Health framework.

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Nature Crack Repair: How Bacteria Facilitate Smart Concrete

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Did you know bacteria can repair cracks in buildings? Something so minute can cure gigantic concrete structures. What if nature holds the key to smarter, self-healing concrete already? These questions may seem strange, but they lead to one of the most intriguing innovations in sustainable building.

In this article, we will discuss how an organism that is billions of years old is utilized in new technology to make concrete buildings longer and safer. Bacteria were the very first life present on our planet and have lived for more than 3.5 billion years. Right now, we are treating the symptoms, but what we need to do is to catch the exact root cause of it and enhance the material itself! And this is where Microbially Induced Calcite Precipitation (MICP) offers a long-lasting, eco-friendly, and low-maintenance alternative to traditional methods .

It is a biochemical reaction where specific bacteria precipitate calcium carbonate ($CaCO_3$), also known as limestone. When water enters the crack, it is kind of a wake-up signal for the bacteria. Once the bacteria are active, with a series of reactions and secretions, they then produce calcium carbonate, which fills up the crack. This process is an example of biomineralization, where living organisms create minerals.

We can also see natural biomineralization in things around us, like seashells or even in the enamel of our teeth. In this case, bacteria are producing limestone inside the concrete, which is giving it a way to repair itself naturally! Concrete is indeed a strong material, but after some time cracks can be formed in it, which can be due to weather conditions, pressure, or poor construction.

These tiny cracks allow water and chemicals to enter inside, which leads to corrosion of the steel inside, which may weaken the structure.

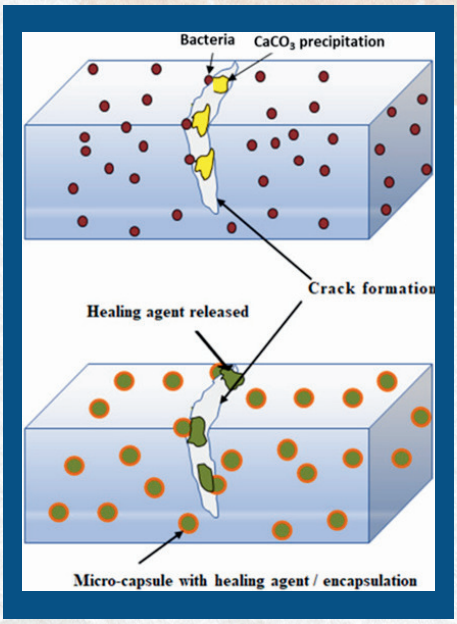

Figure 1—Calcium carbonate formation sealing a crack in self-healing concrete.

When the concrete is being prepared, nutrient sources such as calcium lactate and bacterial spores are added to the mix. These bacteria remain in a dormant or inactive state until a crack forms and water enters through it. Now this water acts as a triggering signal, waking up the bacteria. Once the bacteria are activated, they start to feed on nutrients and produce carbon dioxide. This CO_2 reacts with calcium ions and forms calcium carbonate, also known as limestone.

This CO_2 reacts with calcium ions and forms calcium carbonate, also known as limestone. This calcium carbonate fills up the crack and strengthens the structure again! When concrete cracks, water and oxygen enter the crack. This causes the bacterial spores within the mix to activate. What basically happens is that the bacteria use nutrients, and as discussed earlier, carbon dioxide is produced through respiration. CO_2 combines with calcium ions in concrete. The calcium carbonate crystals start to grow and hence heal the crack.

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Production of biodiesel from algae

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This study investigates biodiesel products using the fresh algae collected from the pond and washed with fresh water 5-6 times. Also, the algae are linked by bitsy examination, and the species was linked as Chaetophorales. The algae were bathed with n-hexane, methanol, and n-acidulous soda pop and incubated in the admixture for 24 hrs.

After the algal biomass was removed from the separating channel and the oil painting, the oil painting was burnt as evidence, i.e., biodiesel. The Thin Layer Chromatography (TLC) test verified the uprooted oil painting as biodiesel. In this work, the major attention is directed towards the production of renewable biofuels from algal biomass.

This exploration highlights the eventuality of algae as a sustainable feedstock for biodiesel products, paving the way for scalable operations that can significantly reduce reliance on fossil energies while promoting ecological balance. Biodiesel product from renewable sources is extensively considered to be one of the most sustainable alternatives to petroleum-sourced energies and a feasible means for environmental and profitable sustainability.

Algae have been identified as one of the most efficient sources for biodiesel production. Algae have the potential to produce as much as 250 times more oil per acre than soybeans. The idea of using microalgae as a source of fuel is not new, but it is now being taken seriously because of the escalating price of petroleum and, more growing concerns about global warming linked to the combustion of fossil fuels have increased interest in alternative energy sources. The global energy demand has risen to the point where nearly every aspect of modern life depends on it.

Among all energy sources, fuels play a central role. Over the past few decades, concerns about the depletion of these resources have driven a growing interest in biofuel development. They are considered safer, non-competitive, and rapidly growing organisms among those that could be used for biodiesel production. A portion of the sample was examined under a microscope to identify the species based on morphological characteristics. The algae were then ground using a mortar and pestle to break down the cell structure. The ground algal biomass was air-dried for about 20 minutes to remove residual moisture. A solvent mixture consisting of ethanol, n-hexane, and caustic soda was added to the dried algal paste to facilitate oil extraction.

The algal biomass settled at the bottom, while the upper oil layer, presumed biodiesel, was carefully collected into a storage container. The presence of biodiesel in the extracted oil was confirmed using TLC, employing a solvent system made up of hexane, ethyl acetate, and acetic acid.The extraction of oil from the algal biomass to produce biodiesel took approximately five days. After the separation process, the algal residue was discarded, and the collected oil (biodiesel) was transferred into a storage container.

Figure 1. Sample kept after adding n-hexane, methanol, and caustic soda

The solvent of TLC, which was used for the identification, binds with all the biodiesel and glows under UV. The binding is irrespective of oil composition. Algae are an economical choice for biodiesel production because of their availability and low cost. This project proves that biodiesel can be produced from algae.

Thus, algae serve as a promising source of renewable energy, capable of yielding substantial quantities of biodiesel. Additionally, the residual biomass left after oil extraction can be repurposed for livestock feed, ethanol production, and even paper manufacturing. Continuous use of petroleum-sourced fuels is now widely recognized as unsustainable because of depleting supplies and the contribution of these fuels to the accumulation of carbon dioxide in the environment.

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Nano Sponges Drug Delivery – An Innovative Drug Technology

Palak
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Pharmaceutical Nanotechnology is an emerging branch in pharmaceutics that is revolutionizing modern medicine by enabling precision drug delivery, early diagnosis, and advanced therapies. Nanotechnology involves nanosized products that can be modified in many ways, which enhances their characteristics and application of various nanoscale materials in various possible fields, primarily in the medical field, resulting in innovative technological advancements. It has an impact on various fields like medicine, including immunology, cardiology, endocrinology, ophthalmology, oncology, and pulmonology, and is utilized in specialized areas like drug delivery.

Drug delivery technology involves an effective way to deliver drugs into specialized sites of action to achieve a therapeutic effect. Targeted drug delivery ensures that the pharmacologically active moiety is selectively and effectively localized at a predetermined target in therapeutic concentration, minimizing toxic effects and optimizing the drug's therapeutic index.

They have a porous structure, which can entrap hydrophobic and hydrophilic moieties from drugs. Depending on the conditions of the process, they can have crystalline or paracrystalline forms. When complexing with drugs, the crystal structure of the nanosponges is very important. The degree of crystallization determines the drug loading capacity.

Paracrystalline nanosponges can demonstrate a range of drug loading capacities. A wide range of substances can be captured, transported, and released selectively thanks to their three-dimensional structure. They can be sited to diverse target sites because of their capacity to connect with distinct functional groupings. The preferential binding of nanosponges to the target location is made possible by chemical linkers.

Commonly used polymers include hyper-cross-linked polystyrenes and cyclodextrins (CDs) and their derivatives. Cyclodextrin-based nanosponges (CDNSs) are a particular type of nanosponge, with β-cyclodextrin frequently preferred due to its cavity size, stability, complexation ability, low cost, and production rates.

They form a three-dimensional matrix with internal cavities and nanochannels when cross-linked by substances such as carbonyl diimidazole, diphenyl carbonate, or dianhydride. It can be prepared in many ways, but they usually involve reacting to polymers with cross-linking agents to form a porous, three-dimensional structure. The choice of polymer and cross-linker, along with reaction conditions, can contribute to resulting nanosponge properties, including size, porosity, and release profile.

1. Solvent Method: It involves mixing of polymer with a suitable polar aprotic solvent like Dimethyl Sulfoxide (DMSO). The mixture is then added to an excess quantity of cross-linker; a cross-linking agent such as diphenyl carbonate or carbonyldiimidazole is added. To start polymerization and make a three-dimensional porous structure, the mixture is stirred and heated while being refluxed. The mixture is allowed to be cooled down, and nanosponges are then washed and dried.

2. Melt Method: In this process, which doesn't use any solvents, the cyclodextrin and cross-linker are heated together until they melt. The reaction happens when heat is applied; it makes nanosponges without the use of harsh chemicals. The solidified nanosponges are ground, washed, and dried after they cool down. It makes this method better for the environment and lowers the chance of solvent residue.

3. Ultrasound-Assisted Synthesis: This method speeds up the reaction between the cyclodextrin and cross linker by using high frequency ultrasonic waves. It has fine particle sizes, and a narrower size distribution is produced by ultrasonic energy. It also accelerates the rate of cross-linking and encourages uniform mixing.

4. Emulsion Solvent Diffusion Method: In this method, an organic phase is used to dissolve a polymer and drug mixture; later, it is emulsified into an aqueous phase with a stabilizer. A specific quantity of polyvinyl alcohol in an aqueous external phase, which is gradually mixed with a dispersed phase that contains drug and polymer dissolved in organic solvent.

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Phage-derived lysins and Bactericidal agents: Next- Generation Antimicrobials

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The global rise in therapeutic approaches that are both efficient and targeted has become crucial considering the global rise in antimicrobial resistance (AMR). Although already cutting-edge, conventional antibiotics have become less effective because of consumption and the rise of bacteria that are resistant to several drugs. These naturally occurring molecules are infection-specific without disturbing ambient microbiota and have distinctive mechanisms of action, e.g., hole creation or enzyme-induced breakdown of bacterial cell walls.

In clinical as well as industrial situations, bacteriophages' lysins and bacteria's indigenous bacteriocins are effective against diverse Gram-positive and Gram-negative bacteria. The use of bacteriocins to modify the gut microbiota, which could bring about therapeutic effects in colon cancer, inflammatory bowel disease, and gastrointestinal infections. For instance, bacteriocins like nisin and microcins have been able to inhibit pathogenic *Clostridium difficile* and *Escherichia coli,* reducing the risk of dysbiosis.

Bacteriocins are also targeted for food safety and as antibiotic adjuvants to avoid resistance development. Bacteriocins can be used synergistically with other antimicrobials, including antibiotics. They could decrease resistance and enhance bactericidal activity when combined with small doses of antibiotics. The amount of treatment needed in terms of minimum inhibitory concentration (MIC) is greatly reduced if *bacteriocin gravitino KS* is used together with penicillin against *Staphylococcus aureus* and *Enterococcus faecalis*. Likewise, engineered broad-spectrum lysins such as *LysCP28* have reported robust anti-biofilm activity versus the widespread foodborne pathogen *Clostridium perfringens*.

Several topical and systemic transporters for meeting stability and delivery issues. Some of these are dendrimers, hydrogels, liposomes, nanoemulsions, and electrospun fibers, particularly for veterinary and wound-healing use. The binding and catalytic domains that constitute the modular design of lysins can be modified or engineered to recognize other types of bacteria or to increase stability. Certain lysins have been domain-swapped or fused into antimicrobial peptides to enhance their activity against Gram-negative bacteria.

The growing threat of antimicrobial resistance (AMR) has created interest in therapeutic synergies that enhance efficacy while minimizing resistance emergence. Phage-derived lysins and bacteriocins have shown promising synergistic actions when combined with standard antibiotics or with each other.

Such combinations can target bacteria through several mechanisms, which reduces the amount of each chemical required while enhancing the probability of eradication of the pathogen. Through lysis of the bacterial cell wall and enhanced drug penetration, phage lysins may also enhance antibiotic efficacy.

As an example, in bacteremia and endocarditic animal models, treatment with CF-301 (exobases), an *S. aureus*-targeting lysin, combined with daptomycin significantly improves survival. In comparison with either therapy alone, it reduces the bacterial load more effectively. The bacteriocin–phage interaction (BaPI) effects, where bacteriocins enhance phage infection and lysis as well as bacterial removal by disarming bacterial defenses, thus maximizing phage infection.

Aside from their clinical use in humans, bacteriocins and lysins are finding growing applications in food safety and veterinary medicine. Lysins have been engineered in veterinary clinics to cure bovine mastitis caused by *Streptococcus* and *Staphylococcus* species, giving dairy cows an antibiotic alternative. Bacteriocins like enterocin and pediocin in the food industry are used to inhibit foodborne infection and rotting organisms, promoting safety and shelf life. Also, lysins can engineer microbiomes through specifically targeting pathogenic bacteria without affecting healthy communities.

Research on protective encapsulation and oral delivery methods is ongoing; however, there are challenges such as immunological reactions and breakdown in the gastrointestinal tract enzymes. Though promising, bacteriocins and lysins must cross several hurdles, such as immunogenicity, scalability in production, stability in physiological environments, and regulatory licensure.

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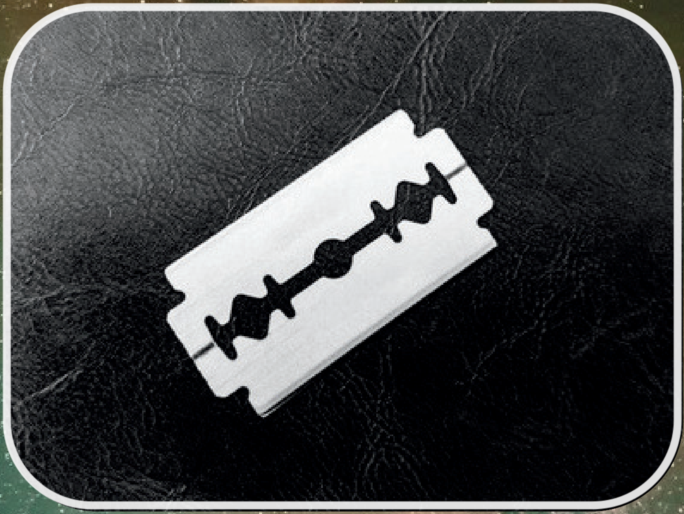
AMAZING FACTS

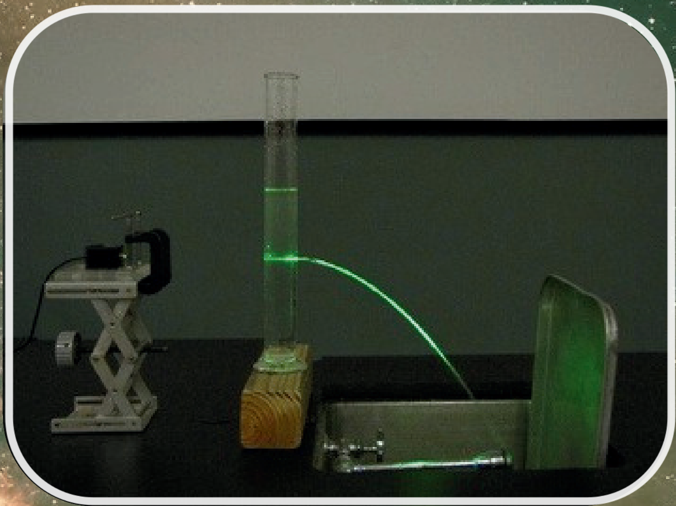


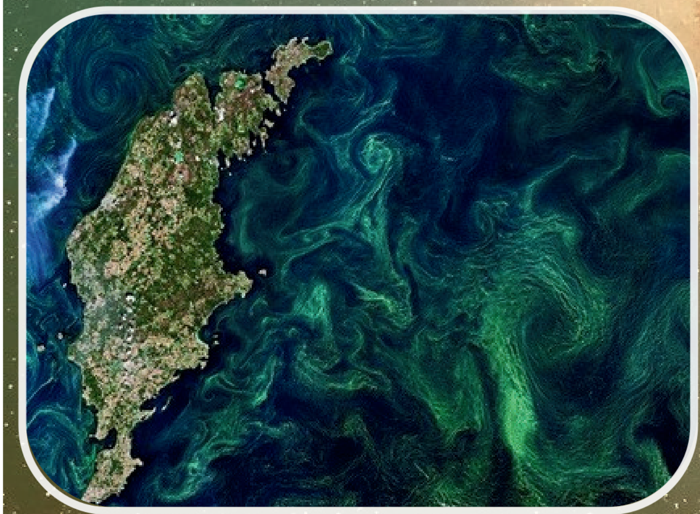
The Human Stomach: Capable of Dissolving Razor Blades

If someone swallows a razor blade, stomach acid—at a powerful pH of 1 to 2—can start breaking it down. A study in Gastrointestinal Endoscopy found that the thick back of a single-edged razor blade dissolved after just two hours in stomach acid.

A Laser can get Trapped in Water

In a Harvard demo,a laser aimed at a flowing stream of water created a red waterfall effect due to total internal reflection. As light entered the stream, it slowed in the denser water and became trapped, following the curve of the flow until the water stopped and the light disappeared.





Earth's Oxygen is Produced by the Ocean

Most of Earth's oxygen doesn't come from rainforests, but from the ocean. Tiny photosynthetic organisms like plankton and seaweed produce nearly half of the oxygen we breathe, according to the National Oceanic Service. Their vital role in maintaining our atmosphere is well confirmed by scientists.

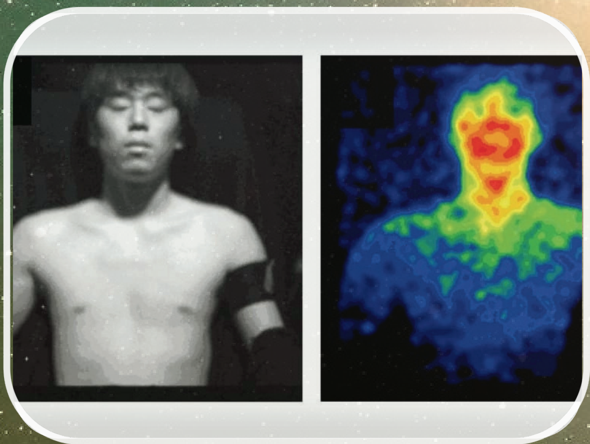
AMAZING FACTS

A Cloud can Weigh around One Million Pounds.

That childhood idea of lounging on asoft, weightless cloud might not hold up to science. According to the USGS, an average cumulus cloud can weigh as much as a million pounds—heavier than a fully loaded Boeing 747. So why don't they fall? It's because the moist air inside clouds is actually lighter than the dry air beneath them, allowing these massive giants to float gently overhead.

Bananas are Radioactive

Here's a weird food fact you probably didn't expect: Bananas are slightly radioactive because they contain potassium, which naturally decays. But there's no need to panic — you'd have to eat about a billion bananas at once to get a deadly dose of radiation, says Dr. Joe Schwarcz from McGill University's Office for Science and Society.



The Human Body Emits a Glow in the Dark

Every human emits a faint bioluminescent glow due to cellular metabolism, producing tiny bursts of photons. Scientists in Japan found that this glow is brightest around the face and upper body, particularly in the late afternoon. Although it is 1,000 times too dim for our eyes to see, it increases during periods of high metabolism, such as stress or fatigue, revealing an invisible light that evolution has concealed.

A Forthcoming Revolution: How Hybrids Are Shaping The Automobile Industry

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A hybrid electric vehicle (HEV) is a kind of vehicle that combines an ordinary internal combustion engine (ICE) with one or more electric engines into an amalgamated surge system. The presence of the electric gear system, which has inherently better efficiency, is required to attain either better mileage or better acceleration performance than an ordinary vehicle. There are varieties of HEV types, and the extent to which each works as an electric vehicle (EV) also varies. The most common form of HEV is hybrid electric cars, although hybrid electric trucks, buses, motorboats, and aircrafts also exist.

In early 1889 William H. Patton filed a patent application for a gasoline-electric hybrid railcar thrust system and for a similar hybrid boat thrust system in mid-1889. A gasoline engine runs a generator that serves to charge a lead acid cell in parallel with the locomotive motors.

The recuperative braking system, a core design concept of most modern production HEVs, was developed in 1967 for the American Motors Amitron and called "*energy regeneration brakes*" by AMC.

The AMC Amitron was the first use of recuperative braking technology in the U.S. Research and development was progressing in the 1990s with projects such as the early BMW 5 Series CVT hybrid-electric vehicle. In 1992, Volvo ECC was developed by Volvo. The Volvo ECC was built on the Volvo 850 platform. In contrast to most production hybrids, which use a gasoline piston engine to provide additional acceleration and to recharge the battery storage, the Volvo ECC used a gas turbine engine to drive the generator for recharging.

As of January 2017, the Toyota Prius liftback is the leading model of the Toyota brand with cumulative sales of 3.985 million units. Ranking second is the Toyota Aqua PriusC, with global sales of 1.380 million units, followed by the Prius V/Alpha+ with 671,200, the Camry Hybrid with 614,700 units, the Toyota Auris with 378,000 units, and the Toyota Haris Hybrid with 302,700.

Figure 1: Modern hybrid electric vehicles

Hybrid electric vehicles can be classified into various types based on their specific features.

(i) Mild Hybrids (MHEVs): These are the most common level of hybrid, containing features like stop-start technology and recuperative braking. They are less expensive than full hybrids and offer some fuel efficiency benefits, but they cannot run on electric power alone.

(ii) Full Hybrids (HEVs): HEVs offer more electric driving capability, allowing for electric-only driving at lower speeds and recuperative braking to capture energy. They also offer a higher level of fuel efficiency compared to MHEVs and can be operated as a hybrid or electric-only.

(iii) Plug-in Hybrids (PHEVs): PHEVs have a larger battery capacity than HEVs, allowing for a longer range in electric-only mode and the ability to be recharged externally. This allows them to be used as electric vehicles for shorter commutes and then use the internal combustion engine for longer journeys.

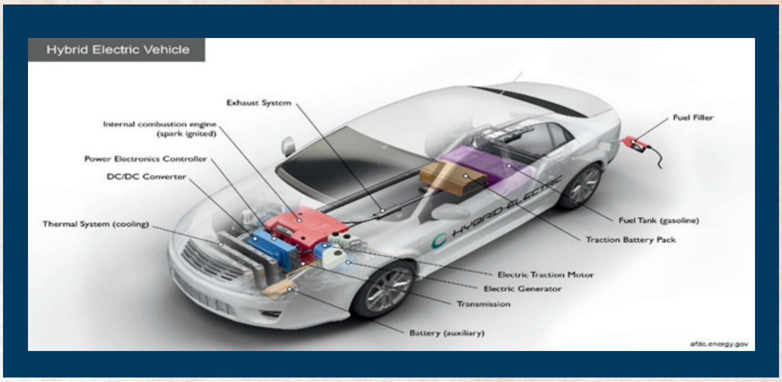

Figure 2: Intricate Design of a Full Hybrid Electric Vehicle

There are many benefits of using hybrid electric vehicles.

- They produce lower carbon emissions. Hence, HEVs are eco-friendly.
- With the electric motor assisting the IC engine, the fuel consumption gets reduced.

Apart from the benefits, there are also certain drawbacks of using hybrid electric vehicles.

- An HEV costs more than a traditional car. Hence, the upfront costs could be a problem if you are on a low budget.
- The repair costs of the electric gears may run high, as it is a very complex system.

Hybrid electric vehicles represent a crucial step in the evolution toward sustainable transportation. By combining the reliability of old and conventional engines with the efficiency of electric power, HEVs offer a proper solution to the environmental challenges posed by conventional vehicles.

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Beyond Generalized Treatment: The Future is Personalized Medicine

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For centuries, medicine has been predominantly dependent on generalized treatments based on population estimates. However, the individual variance in genetic makeup and disease manifestation often causes suboptimal outcomes. The gain of personalized medicine provides a promising alternative. Defined as a medical model that customizes healthcare decisions and practices to the individual patient, it draws from genomics, bioinformatics, and systems biology to provide targeted diagnostics and therapeutics.

This article dives into the core concepts, scientific advances, and real-world applications that underpin personalized medicine. Advances in genomics, molecular biology, and data analytics have significantly contributed to the development of this approach.

This article dives into the core concepts, scientific advances, and real-world applications that underpin personalized medicine. Advances in genomics, molecular biology, and data analytics have significantly contributed to the development of this approach. Genome sequencing technologies and artificial intelligence are allowing researchers and clinicians to identify disease-associated genes and predict how patients will respond to certain therapies.

Precision medicine is already transforming areas like oncology, where therapies can be modified based on the genetic profile of an individual's tumor. The foundation of personalized medicine lies in the understanding that everyone's biological makeup is unique, and so is their response to disease and treatment.

At its core, personalized medicine joins genomics, molecular biology, bioinformatics, and systems biology to create a more efficient and effective approach towards healthcare. One of the building blocks of personalized medicine is genomics, the study of an individual's complete set of DNAs.

High throughout sequencing technologies have made it possible to identify mutations, genetic variants, and biomarkers that tell how a person develops diseases or responds to certain medications. The vast amount of genetic and clinical data generated through sequencing and medical records requires advanced modelling tools for analysis. Bioinformatics make use of algorithms and machine learning to identify patterns, predict disease risks, and support clinical decisions.

Beyond genomics, personalized medicine also considers transcriptomics, proteomics, metabolomics, and even microbiomics. This dimensional omics approach provides a native understanding of disease at the molecular level. Cancer treatment is an advanced application of personalized medicine. Tumor profiling through next generation sequencing provides the identification of individual mutations, which are then targeted using specific drugs. For example, HER2-positive breast cancer patients receive trastuzumab. CRISPR-Cas9 genome editing is being explored as a potential cure for diseases like sickle cell anemia and Duchenne muscular dystrophy.

Personalized medicine makes an impact on the management of diabetes, cardiovascular diseases, and neurological disorders. Pharmacogenomic testing ensures drug selection and dosage for optimal efficacy. For example, ANF resistance in heart disease patients can be identified using ANF genotyping.

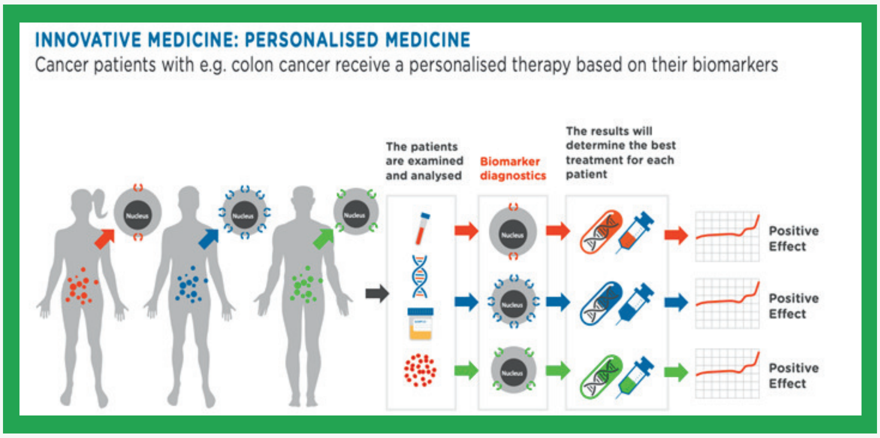

Figure 1: Cohort diagnosis for biomarker attachment and their respective effects.

Precision medicine is paving the way by which healthcare is being understood and delivered. By making some important medical interventions to an individual's genetic makeup, environment, and lifestyle, it leads to a more targeted and effective approach to diagnosis, treatment, and prevention.

With continued innovation and collaboration across disciplines, precision medicine is set to rewrite the future of global healthcare, which turns hope into reality for all the patients worldwide.

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Phytoremediation of Heavy Metals: A Greener Solution to a Poisonous Problem

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Heavy metal pollution has become a main cause of environmental concern in the world because of the poisonous, bioaccumulative, and non-degradable characteristics of heavy metals. Hg, Cd, Pb, As, Cu, and Zn are some of the common elements being released into the environment by diverse human activities like industrialization, urban development, mining, smelting activities, unnecessary use of agrochemicals, and wrong waste disposal. While certain heavy metals are naturally present because of geological processes such as volcanic eruptions and weathering of minerals, human activity has significantly hastened their release and concentration in ecosystems.

While these technologies can provide quick remedies, they usually disrupt the natural terrain, generate secondary pollutants, and involve intricate logistics and continuous monitoring. Therefore, increased efforts have been made to seek cost-effective, ecologically friendly, and sustainable solutions for the remediation of heavy metal pollution.

Phytoremediation, a term coined from the Greek term "phyto" (plant) and the Latin term "remedium" (to clean or restore), is a novel and ecofriendly method of employing green plants to extract, break down, or immobilize environmental pollutants, such as heavy metals. Phytoremediation is regarded as one of the most viable green technologies for environmental remediation because of its affordability, popularity with the public, and capacity to enhance overall ecosystem health. Phytoremediation is especially useful for low- to moderate-level contaminated sites with extensive surface areas, for which mechanical or chemical treatment is not practical or economically viable.

Phytoremediation is not one process but a group of plant-related processes (Figure. 1) that remove various types of pollutants by different biological mechanisms. The best-studied and most used phytoremediation processes are:

(i) Phytoextraction: Phytoextraction, or phytoaccumulation, refers to the accumulation of heavy metals from contaminated media by roots of plants and their translocation and storage in shoots above the ground in stems and leaves. After a growth period, the metal-rich biomass is harvested and either disposed of safely or used for metal recovery (phytomining).

(ii) Phytodegradation: Phytodegradation is the degradation of organic pollutants inside the plant tissues through enzymatic action. In contrast to phytoextraction, which emphasizes metal concentration, phytodegradation is generally applied to organic pollutants like herbicides, petroleum hydrocarbons, and solvents.

(iii) Phytovolatilization: Phytovolatilization is the uptake of some pollutants by plants, their conversion to less toxic volatile species within the plant tissues, and the release of the volatiles into the atmosphere through transpiration.The technique has been used successfully to treat pollutants such as mercury and selenium. Although phytovolatilization decreases the concentration of pollutants in water and soil, its environmental consequence over a period must be studied carefully, particularly in terms of atmospheric dispersion.

(**iv) Phytostabilization:** Phytostabilization seeks to immobilize pollutants in soil by minimizing their mobility and bioavailability. Vegetation does this by root adsorption, metal precipitation in the rhizosphere, and through pH and redox conditions modification of the soil. The process does not exclude contaminants but stops them from migrating into groundwater or being absorbed by food crops.

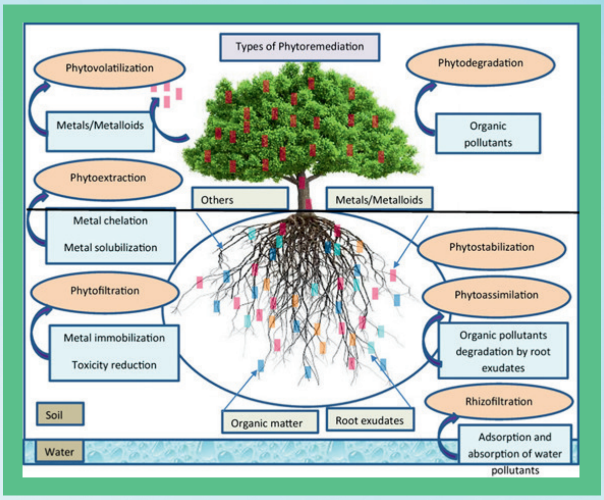

Figure 1: Different Types of Phytoremediation Methods

Success relies strongly on climate, growth rates for plants, and levels of contamination. There is also potential for passing heavy metals into the food supply if forage or edible crops are planted by mistake.

It is also less successful with contaminants deep beneath the ground or in highly poisonous concentrations.To address these challenges, scientists are investigating the use of genetically engineered plants, plant-microbe associations, and the use of chelating compounds to promote metal uptake. Given good planning, crop choice, and surveillance, phytoremediation can be a key tool for ecosystem recovery and protection of human health from the long-term effects of toxic metal exposure.

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Molecular Insight into PETase: The Enzyme Degrading Bottles

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Plastic pollution has been a growing hazard for the last 3 decades; especially polyethene terephthalate (PET) is becoming a global environmental concern due to its high durability and resistance to natural degradation. Discovery of PETase has opened new doors towards biological degradation of PET under mild conditions. PETases are a specific family of enzymes within the larger group of the serine hydrolases family.

Recent advances have further increased the stability and activity of the enzyme. New PETase enzymes are plastic-degrading enzymes enhanced by machine learning to depolymerize polyethylene terephthalate at a higher rate with increased stability at temperatures ranging from 38.6 to 70.5. The enzyme was first discovered in 2016 by Japanese scientists; it hails from the bacterium *Ideonella sakaiensis*. It was believed that this is a natural adaptation by bacteria in response to the increasing number of plastics in the environment.

This article focuses on the 3D structure, working mechanism, and importance of PETase in the current scenario. Polyethylene terephthalate is a highly used industrial polymer used in packaging like plastic bottles; it also finds its use in the textile industry as polyester fabric due to its strength and lightweight nature. Structurally it has similarities with cutinases but has several different features that make it able to interact with PET and break it down into mono-(2-hydroxyethyl) terephthalate (MHET). To hydrolyze ester bonds, it must have a catalytic triad consisting of Ser160, Asp206, and His237. It also takes on an α/β-hydrolase fold. PET's large, stiff polymer chains can be accommodated more effectively thanks to the active site's greater flexibility and openness when compared to classical cutinases.

A feature is its extended substrate binding cleft, which helps in facilitating the interaction of PETase with the crystalline surface of the polymer. The polymer is broken down by this reaction into smaller pieces, primarily ethylene glycol (EG), terephthalic acid (TPA), and mono(2-hydroxyethyl) terephthalate (MHET). Additionally, certain amino acid residues close to the active site, like Trp185, undergo conformational changes that improve substrate binding and catalysis, according to crystallographic studies. The enzyme starts a nucleophilic attack on the carbonyl carbon of PET's ester linkages using the catalytic triad of histidine, aspartate, and serine.

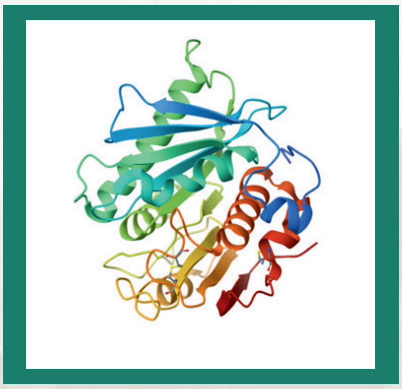

Figure 1: Crystal structure of PETase from Ideonella sakaiensis

PET (plastic) → (PETase) → MHET + TPA + EG

Although PETase is naturally able to degrade PET, its native form is not stable under industrial conditions, as it can only work under mild conditions. To overcome this, scientists have made efforts to engineer and optimize PETase using various *in vitro & in vivo* strategies. The objective is to increase the rate of substrate utilization, higher binding efficiency, and increased thermal stability to make it more suitable for large-scale industrial use in degradation and recycling. Approaches like rational design and site-directed mutagenesis have been used to target at specific site of substrate binding.

AlphaFold and other advanced 3D structure tools are used to predict the 3D structure of the altered enzyme, laying the foundation for the precise site analysis. Molecular docking simulations are used to study the interaction between the substrate binding site and PET, helping in identifying the substrate affinity of the enzyme.

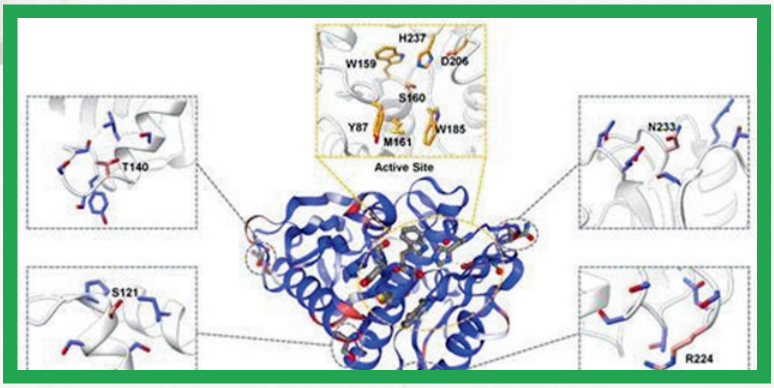

Figure 2: The team made targeted changes to an enzyme that can degrade plastic that were informed by machine learning

By utilizing in silico tools like docking, mutagenesis, deep learning, machine learning, and structure prediction, we provide a cost-effective and rapid path for optimizing the enzyme. These computational tools have opened a new gateway for quick validation and enabled the development of enzymes suitable for industrial level PET degradation and sustainable recycling solutions.

The discovery of PETase has promising change in environmental biotechnology; it addresses the global plastic pollution crisis. Also, in situ bioremediation involves the use of microorganisms that produce PETase in environments contaminated by PET. The creation of genetically altered microorganisms that endure unfavorable conditions and consistently generate PETase is being made possible by synthetic biology techniques.

For the sustainable degradation and regeneration of PET plastics, PETase is being integrated into closed-loop recycling systems from an industrial standpoint. The goal of these systems is to lessen reliance on the production of virgin plastic and the greenhouse gas emissions that come with conventional plastic recycling. PETase is not just any enzyme that shows the biotechnological tools, but it shows the potential and magic of nature and science to fight against environmental threats like PET to drive sustainable solutions.

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Nanotechnology in Skincare: The Future of Anti-Aging and Sun Protection

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The skincare industry has undergone a revolutionary change through the implementation of nanotechnology during the previous few years. Breaking boundary limits of anti-aging therapies along with sun protection is how this advanced scientific approach defines the current beauty market. The nano-skincare domain reveals unlimited potential which reformulates both beauty practices and skin health management standards. Understanding Nanotechnology in Skincare.

The field of nanotechnology handles matter based on nanoscale measurements between *1 nanometer and 100 nanometers*. The improved delivery method offers optimal benefits for anti-aging products and sun protection treatment because it penetrates deeper into skin layers.

Nano-Ingredients Revolutionizing Anti-Aging Skincare Consumer demand within the anti-aging skincare segment receives innovative nanotechnology advances. Several nanomaterials now act as revolutionary tools to battle skin aging. Nanoparticles Skin radiance improves significantly when the skin meets gold and silver nanoparticles. Luxury skincare products contain gold nanoparticles as their key active ingredient because they show anti-ageing and anti-inflammatory properties. The sustained delivery of anti-aging ingredients becomes possible through this technology because it better enhances the potency of ingredients while minimizing potential harm. The encapsulation methods using nanotechnology allow antioxidants and vitamins to avoid destruction from oxidation while retaining their beneficial properties from production until expiration. The application of nanotechnology has revolutionized how users protect themselves from the sun.

Traditional sun protection chemicals produce noticeable white streaks that make daily sunscreen application less attractive to users. Nanotechnology resolves this problem while achieving improved UV protection levels.

(i) Inorganic UV Filters: The standard sunscreen formulation incorporates titanium dioxide (TiO_2) and zinc oxide (ZnO) as physical blocking inorganic sunblock substances to reflect UV radiation.

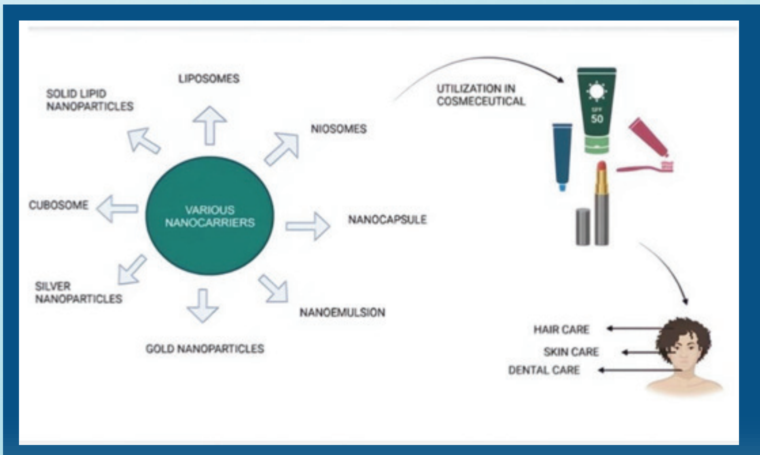

Figure 1: Utilization of Nanocarriers

The natural form of these minerals results in white opaque deposits that create an unappealing cosmetic effect on the skin surface. The nanoscale reduction of these ingredients produces transparent particles, which protect from UV rays effectively and make them an attractive option for sunscreens.

(ii) Nanocarriers for Organic UV Filters: Organic UV filters that absorb UV radiation might decompose and penetrate the skin because they show instability, so they sometimes generate skin irritations.

A nanocarrier encapsulation system increases filter stability while reducing the amount of absorption into the skin, which produces minimized negative outcomes. Higher protection factors against UV rays become achievable from lower active ingredient quantities through this technique. Scientists used polymeric and lipid nanoparticles to develop protective structures around organic UV filters, which produced better results both in performance and security benefits.

(iii) Enhanced Stability and Efficacy: The application of nanotechnology produces better sunscreen aesthetics and simultaneously makes sunscreen products more effective and lengthens their stability period.

The application of nanoparticles leads to a smooth protective skin layer, which provides complete protection against both types of UV rays.

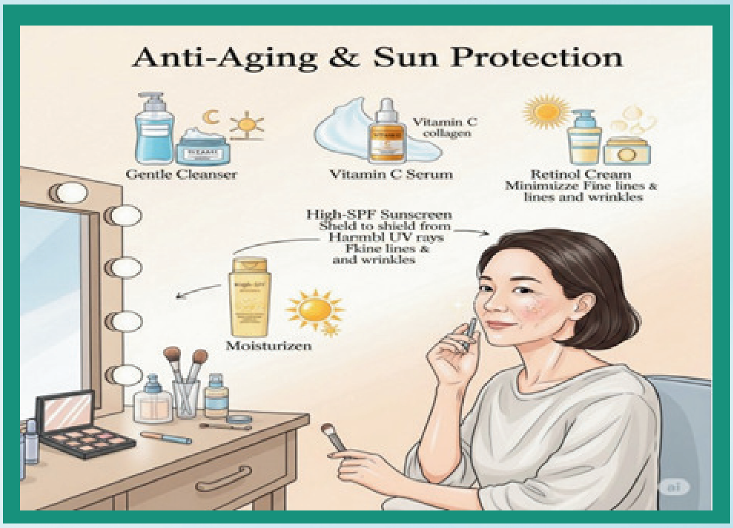

Figure 2: Daily skincare routine for anti-aging & sun protection

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Freezing Light: The Dawn of Photonic Supersolids

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For decades, the speed of light, approximately 299,792,458 meters per second, has been considered an untouchable cosmic constant, famously enshrined in Einstein's theory of relativity. But what if we told you that scientists have now "frozen" light? Yes, frozen. Not metaphorically, not dramatically slowed, but made it behave like a solid while preserving its photonic properties. This isn't science fiction; this is photonic supersolidity. In a groundbreaking study published in "Nature" by Italian researchers from the Institute of Photonics and Nanotechnologies in Milan, physicists demonstrated a state where light behaves as a "supersolid new phase of matter that paradoxically combines solidity with superfluidity (Sohn et al., 2023). If that sentence broke your brain a little, you're not alone.

Now apply that to light, a phenomenon that's typically understood as either a wave or a particle, but always in motion. The idea of stopping light is akin to catching a bullet mid-flight and making it hold a yoga pose. This achievement turns into long-standing notions about the nature of light, and matter, on their head.

- Supersolids formation arises from combined linear and nonlinear scattering, creating density modulation in space.
- Four main propagating modes appear in the dispersion, which matches well with the numerical model from the 8×8 Hamiltonian.

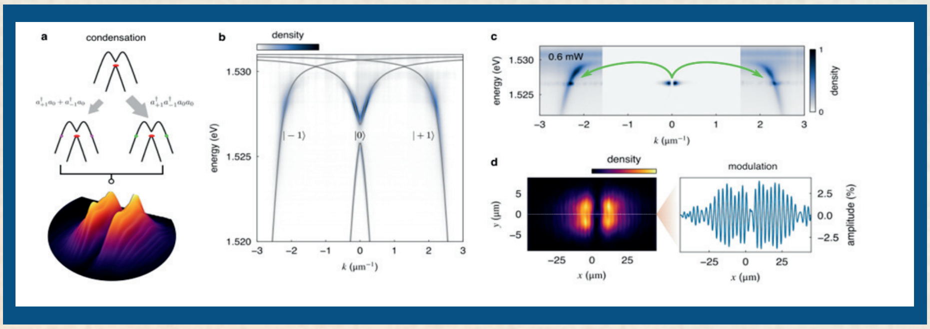

Figure1: System in reciprocal and coordinating space

- The BiC state at k = 0 scatters to $\pm k_r$ modes (|±1⟩); above threshold, the Bose-Einstein Condensate (BEC) is masked to detect these states. Photon pairs populate |±1⟩ via parametric scattering. The supersolid wavefunction ψ (x, y) exhibits strong modulation, breaking translational symmetry with ~2.6% amplitude along y = 0.

This discovery could revolutionize several technological domains:

- Quantum Computing: Imagine a quantum chip where light, not electricity, carries qubits. Supersolid light could offer more stable quantum information storage with reduced decoherence.
- Telecommunications: Freezing light might allow for buffering light signals in fiber-optic cables, drastically reducing latency and boosting data integrity.
- Metamaterials: This could lead to programmable photonic materials with properties we design, like invisibility cloaks or ultra-efficient solar panels.

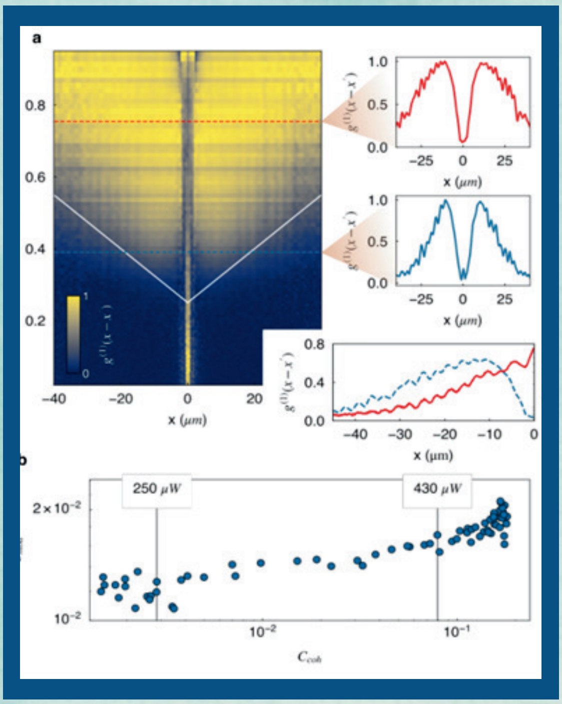

Figure2: Spatial coherence through threshold

The first-order correlator measures superfluid coherence. As power increases, the coherence length widens (slope ≈ 133 μm/mW). Modulations in align with density modulations, showing local coherence drops at crystal lattice sites (e.g., 754 μW).

But that’s how revolutions begin: not with fireworks, but with a few stubborn scientists and an unshakable idea. The freezing of light into a supersolid state isn’t just a milestone in physics, it’s a redrawing of the very lines that define our physical universe. It challenges deeply held beliefs about matter, energy, and time itself. Today, we stand on the edge of what may be a new era of photonic materials and technologies, and possibly a deeper understanding of the quantum fabric of our universe.

So, next time someone tells you that "you can’t stop light," feel free to say, "Actually, science just did."

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Torchbearers of the Department

Department of Biosciences, IMS Ghaziabad

The Department of Biosciences at IMS Ghaziabad (University Courses Campus) blends innovation, research, and hands-on learning to prepare students in biotechnology, microbiology, and life sciences.

Highlights:

- GENESIS 2024 – A fest of science, creativity, and collaboration under the theme “BioRevolution.”
- Industrial Visit to Simbhaoli Distillery – Students explored large-scale fermentation technology in action.
- Mother Dairy Visit – Hands-on insights into milk processing, quality testing, and food safety.
- IIT Roorkee Visit – Exposure to advanced labs, biodiversity, and cutting-edge biotech research.
- 2nd International Symposium 2025 – Global experts shared innovations in food and health security.
- Moon Beverages Visit – A behind-the-scenes look at beverage production and biotech applications.
- National Science Day – Students showcased posters, with Aryan securing first position

GENESIS 2024

Where Curiosity Meets Celebration

Science came alive on 4th October 2024, when GENESIS 2024 lit up the IMS Ghaziabad campus with the theme “BioRevolution.” The fest was more than just competitions – it was a stage for young innovators to quiz, debate, design posters, showcase models, capture moments through photography, and even experiment with fireless cooking.

Eminent speakers like Dr. Anupma Harshal, Mr. Prabhat Ranjan, and Chief Guest Mr. Gaurav Kant Tyagi inspired participants with their insights into science and technology. Alumni added to the excitement by judging events. The day ended as a celebration of discovery, collaboration, and the spirit of STEM.

Journey into Fermentation -Visit to Simbhaoli Distillery

Fermentation technology stepped out of textbooks and into real life for the M.Sc. Biotechnology First-Year students (Batch 2024–26) during their industrial visit to Simbhaoli Distillery Plant, Hapur, on 18th October 2024. Guided through large-scale machinery and advanced processes, students discovered how industries transform science into products. The experience not only deepened their understanding of fermentation but also gave them a glimpse of the latest industrial demands. The team at Simbhaoli Distillery made the learning journey truly memorable with their support and expertise.

-Visit to Simbhaoli Distillery

Behind the Scenes of Milk –Visit to Mother Dairy

What happens before a glass of milk reaches our table? Students of B.Sc. (Hons) Microbiology and Biotechnology found the answer during their visit to Mother Dairy's Patparganj Plant. From pasteurization to pathogen detection, students explored every step of milk processing and quality testing. The two-day visit helped bridge the gap between theoretical microbiology and its industrial applications, offering a clear view of how hygiene, safety, and technology combine in the food industry.

-Visit to Mother Dairy

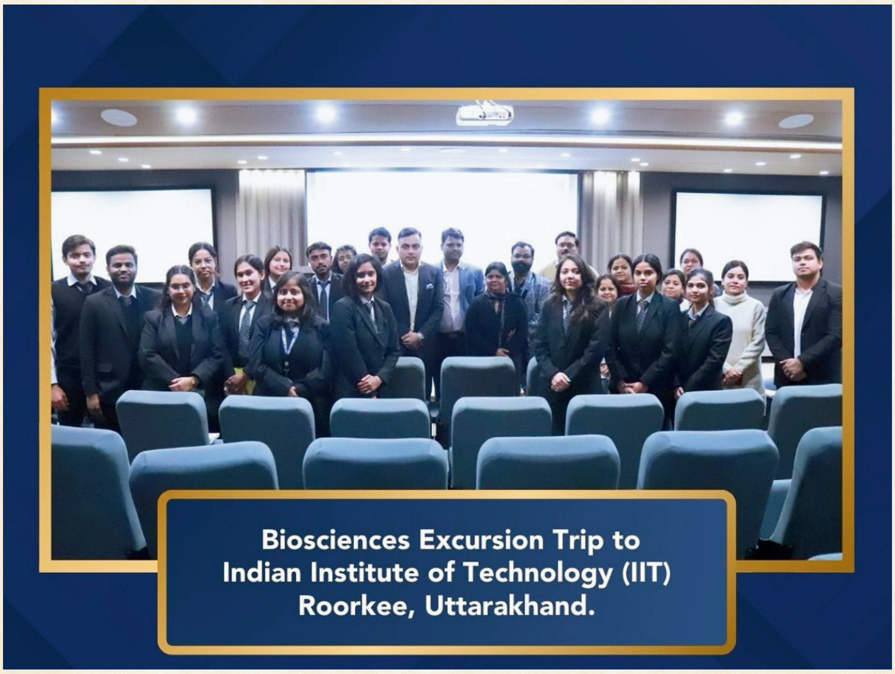
The Science Inside a Coke Bottle -Visit to Moon Beverages

-Visit to Moon Beverages

When M.Sc. Biotechnology students (Batch 2024–26) visited the Moon Beverages Coca-Cola Plant, they discovered how biotechnology quietly powers one of the world's most popular drinks. From large-scale fermentation applications to rigorous quality control systems, students got a behind-the-scenes look at beverage production.

The experience blended fun with learning, leaving students inspired by how science shapes everyday life in unexpected ways.

Flag-off Ceremony Of Excursion trip



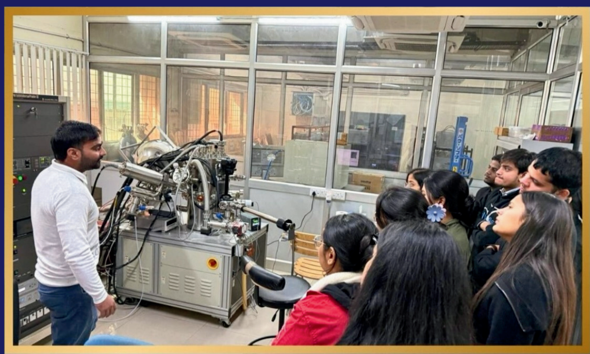
The Biosciences Department held a lively flag-off ceremony for its excursion trip, attended by faculty, students, and administrative staff. The Head of the Department highlighted the trip's significance for experiential learning and practical exposure to various ecosystems. This event aimed to enhance students' theoretical knowledge with real-world insights and uplift their spirits. After the ceremony, students and faculty departed for a journey of scientific discovery and camaraderie, with hopes for enriched knowledge and memorable experiences upon their return.

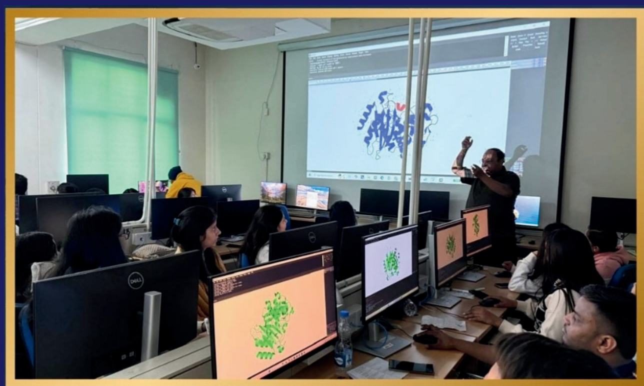
Biosciences educational trip to IIT Roorkee

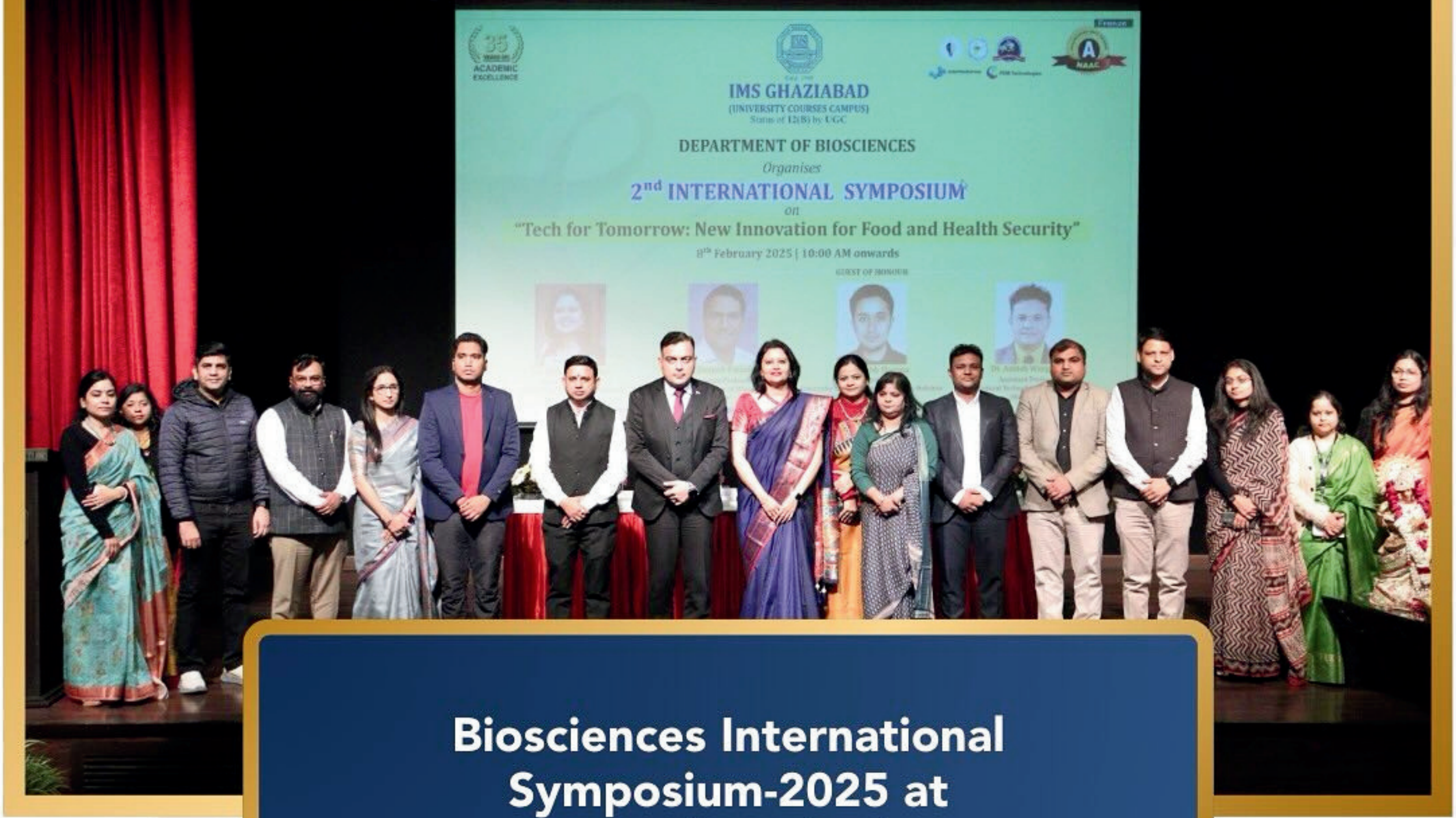
IIT Roorkee Visit – A Window to Modern Biotechnology

For the M.Sc. Biotechnology Second-Year students (Batch 2023–25), the trip to IIT Roorkee was nothing short of transformative. Students explored cutting-edge laboratories, interacted with experts, and gained exposure to advanced biotechnology techniques.

The visit was not just about science but also about exploring biodiversity and seeing innovation in action. Gratitude was extended to the management and Prof. (Dr.) Saugata Hazra, whose efforts made the experience an unforgettable milestone in the students' learning journey.







Biosciences International Symposium-2025 at IMS Ghaziabad

2nd International Symposium 2025–Tech for Tomorrow

The campus buzzed with global energy on 8th February 2025, as the 2nd International Symposium unfolded with the theme "Tech for Tomorrow: New Innovation for Food and Health Security." Scholars, students, and experts from India and abroad came together for a day of knowledge exchange, collaboration, and future-focused dialogue. Keynote lectures, panel discussions, oral and poster presentations kept the audience engaged throughout. Distinguished speakers from India, the USA, and Germany shared cutting-edge perspectives, making the symposium a truly international learning experience. The valedictory ceremony marked the close of a day that will be remembered as a milestone in scientific collaboration at IMS Ghaziabad.

Biosciences Lab Visit to GIMS

Young Minds Shine on National Science Day

National Science Day at GIMS Greater Noida turned into a proud moment for IMS Ghaziabad. Our students enthusiastically presented their posters, showcasing creativity and scientific curiosity.

Among them, Aryan (B.Sc. Hons. Biotechnology, First Year) made the department proud by securing First Position in the competition. His achievement stands as a motivation for peers and a reminder of how young scientists can shine bright when given the right platform.

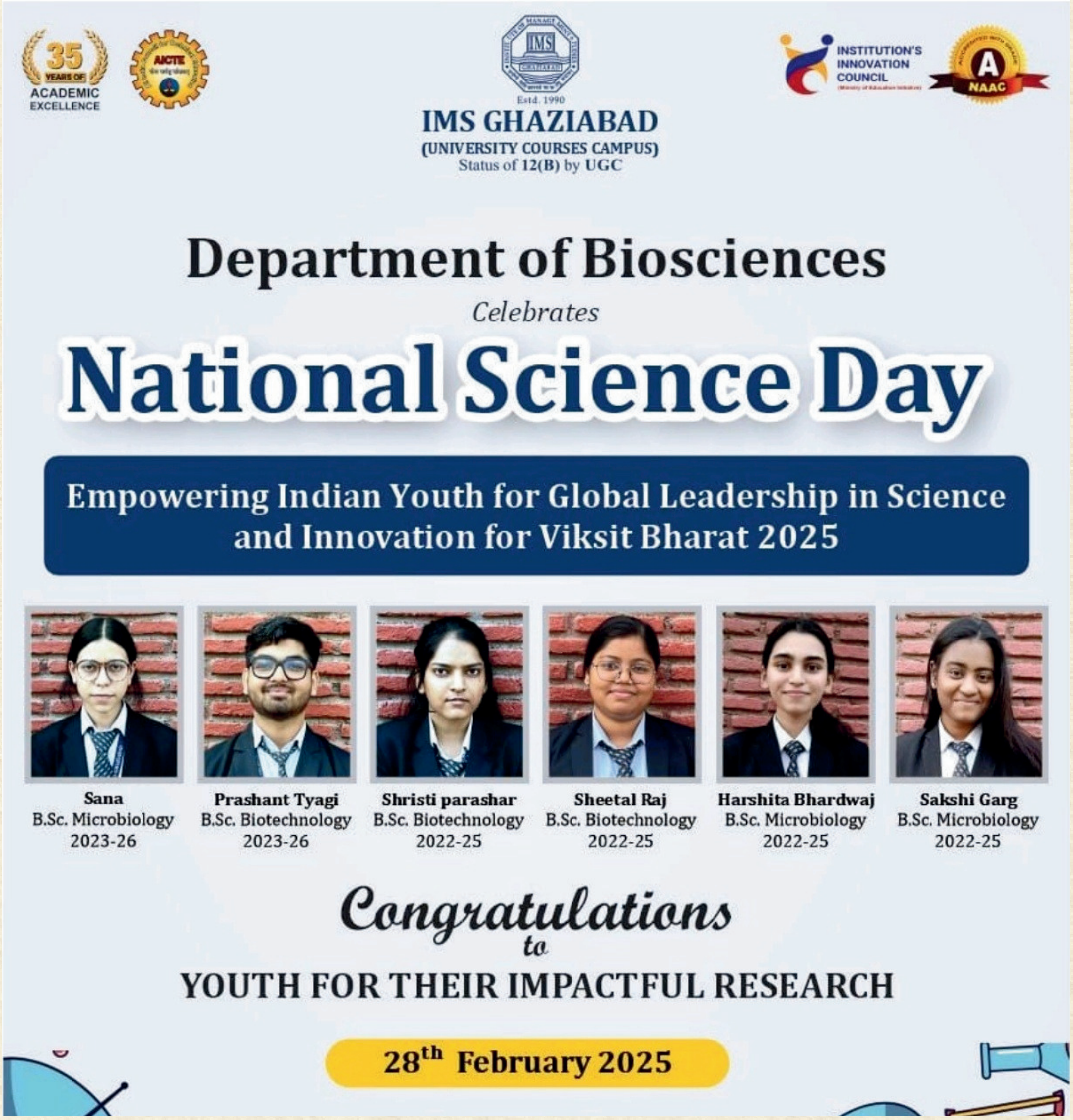
ACHIVEMENTS

Gold Medalist Department of Biosciences

Pioneers of Department of Biosciences

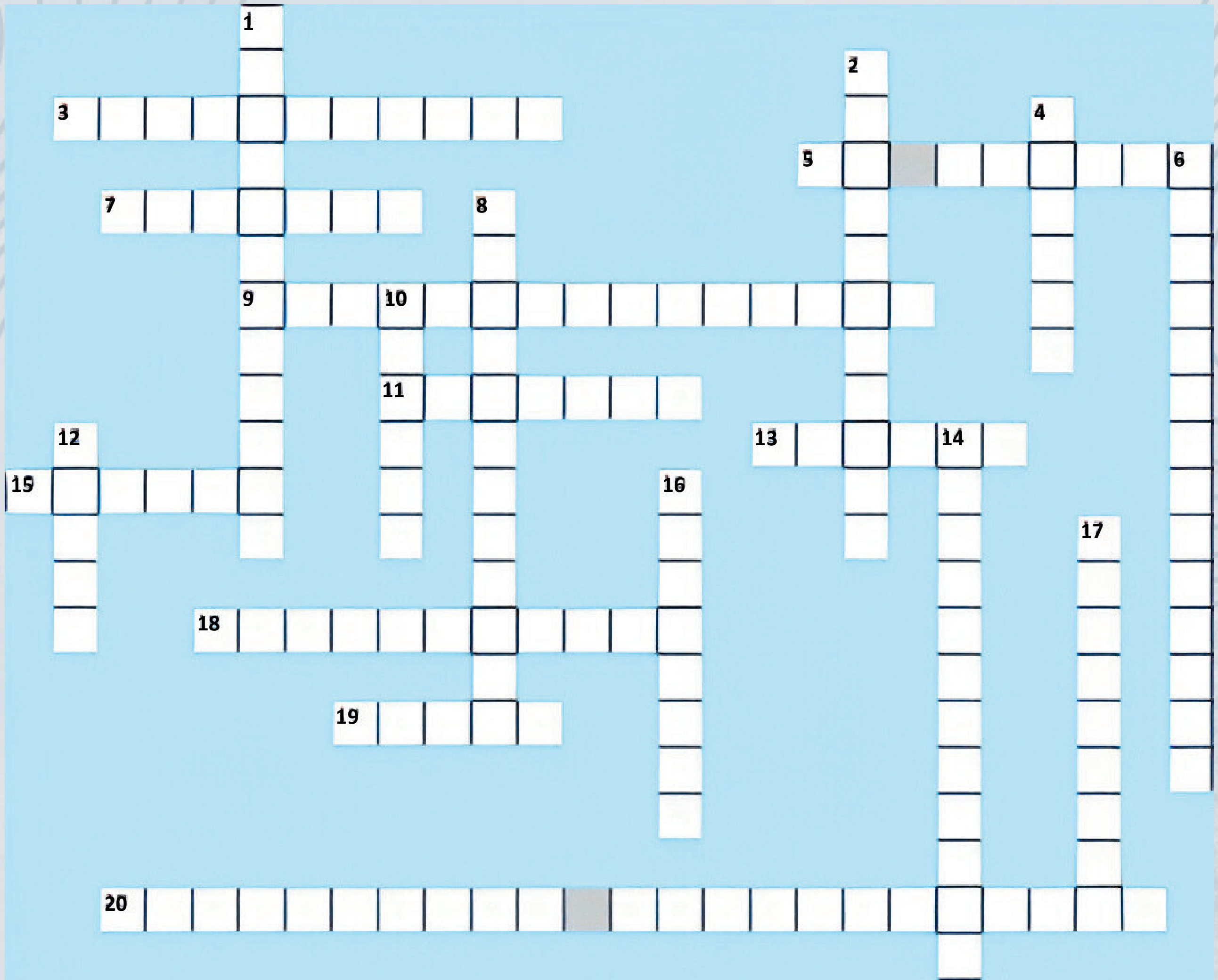
Pioneers of Department of Biosciences

National Science Day



National Science Day holds great importance as it reminds us of the value of scientific thinking and innovation in shaping society. It encourages students and researchers to question, explore, and apply science for real-world solutions. The day highlights India's achievements in science and technology while inspiring the youth to pursue research and discovery. It also builds public awareness about how science impacts daily life and national development.

CROSS WORDS



Questions ?

Across

3. _______ is the branch of science that deals with map-making.

5.A crop genetically modified for pest resistance is called _________.

7._________ is the Planet with the largest moon, Ganymede

9.A method used to introduce DNA into plant cells is ___________.

11._________ is the country is known for generating most of its electricity from geothermal sources.

13.What is the name of the valve between the left atrium and left ventricle?

15.Popular fermented dairy product rich in probiotics is ________.

18.Technology enables 3D printing of living tissues is called _________

19.A fossilized tree resin called?

20.Technology that enables machines to simulate human intelligence is called _____.

Down

1.The term describes the variety of life in the world or in a particular habitat is called _________.

2.Semi-liquid substance inside the nucleus is called _______.

4.What is the smallest bone in the human body?

6.Extremely small tech measured in billionths of a meter is known as _______.

8.______ is the name of the spacecraft that landed on Mars in 2021.

10.Gene-editing tool based on bacterial immune systems is known as ________.

12.Robotic exploration device sent to Mars is known as ______.

14.What is the scientific study of human remains called ?

16.Ecosystem has both high marine and terrestrial biodiversity __________.

17.What tool is used to match bullets to firearms?

Answers

1.Biodiversity
2. Nucleoplasm
3.Cartography
4.BT Cotton
5.Jupiter
6.Stapes
7.Nanotechnology
8.Perseverance
9.CRISPR
10.Electroporation
11.Iceland
12.Mitral
13.Yogurt
14.ROVER
15.Anthropology
16.Mangrove
17.Ballistics
18.Bioprinting
19.Amber
20.Artificial Intelligence

KYOTOS is more than a magazine. It is a space where ideas, creativity, and curiosity of students take shape. Each edition carries themes that mirror the changing world of science, pushing us to think beyond classrooms and connect learning with life.

It records not just articles, but the academic and cultural journey of the Department of Biosciences of IMS Ghaziabad (University Courses Campus). Through KYOTOS, students build confidence, sharpen communication, and discover new perspectives of science.

With every issue, KYOTOS continues to grow as a bridge between science and society, inspiring young minds to explore, collaborate, and lead the future.

KYOTOS- A Chronicle of Biosciences