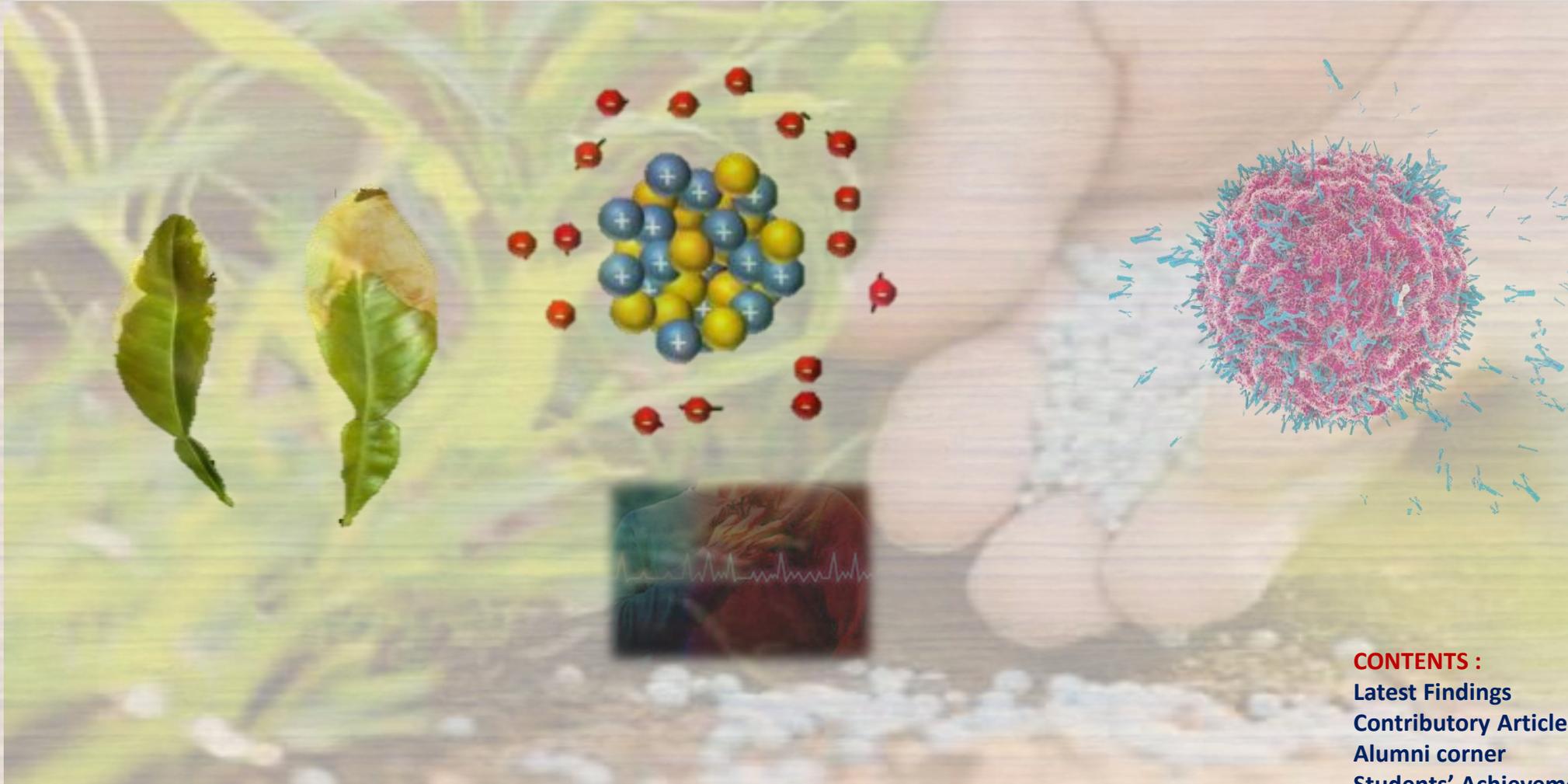




Biospark

E-NEWSLETTER OF AMITY INSTITUTE OF BIOTECHNOLOGY

Vol 7: Issue III and IV



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Amity University Madhya Pradesh, Gwalior

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Prof. (Dr.) ANIL PRAKASH

HOD, Department of Microbiology, Barkatullah University, Bhopal

(Former HOD, Department of Biotechnology, BU; member Society of PGPR; member MBSI; Fellow member Mycological Society, India)

This is my immense pleasure to write about Amity Institute of Biotechnology and the efforts drawn by them for the welfare of student, researcher and academic community. I came to know that Biospark is trimonthly compilation as a institutional newsletter with novel insights in terms of recent investigations, some recent invention or technology along with the achievements of faculties and students of the department. The faculty members are very enthusiastic for making this newsletter interesting. The articles and recent investigations work as eye opener for the benefit of academicians and researchers. Moreover, the glimpses of various activities held at AIB is looking very fascinating and hard work of the AIB team. Apart from this the achievements either by faculty or students shows the rigorous work going on and indulgent of individuals. This was always great to interact with students of department along with Director who is leading the youth for making our country with great future. The information about career and opportunity helps student for their right direction movement in their career too.

I am thankful to the Editor-in- Chief, Prof. (Dr.) R. S. Tomar also for giving this opportunity for disseminating my message for all readers of this newsletter. I wish to congratulate Amity Institute of Biotechnology, Amity University Madhya Pradesh for such a nice compilation and insights in the form of BIOSPARK.

From the Desk of Editor-in-Chief



Prof. (Dr.) R. S. Tomar

It gives me immense pleasure to bring before you the third and fourth issue of seventh volume of AIB Newsletter 'BioSpark'. The present issue covers latest developments in the field of Biotechnology and allied sectors. The recent trend of biotechnological research has shifted towards applied research in the field of health and allied sectors. The drug discovery approach in combination with bioinformatics and nanobiotechnology leads to the development of new drugs and products for the human welfare and mankind. The current research strategies includes biotechnology based on interdisciplinary research in the field of human health and environment. The development of new vaccines based on DNA recombinant technology and computational biology approach open the way for the solution of several diseases such as skin psoriasis.

Due to increased population, world demands food security, safe environment and a better healthcare. A wide range of topics have been covered in the present issue, including the negligence of plant toxicity, Microalgae as potential biosorbent of metallic nanoparticles, Uses of electro-biofuels, T-cell therapy, along with Knowledge of French language opens the doors to France etc. contributed by the faculty and students of Amity University, Gwalior. I hope this issue will help students and other readers to update themselves with the recent advances in allied sectors of biotechnology, nanopharmaceutics and related fields. I am very thankful to editorial team for their efforts to bring out a very informative theme based volume of 'Biospark'. We always welcome your valuable inputs for the improvement of forthcoming issues.

"The Silent Danger: Heart Attacks on the Rise Among Younger Populations"

In recent years, there have been some reports of an increase in heart attacks among younger people. For example, a study published in the Journal of the American College of Cardiology in 2018 found that the incidence of heart attacks in adults under age 50 has been increasing over the past few decades. The study suggested that lifestyle factors, such as poor diet, lack of exercise, and increased stress, may be contributing to this trend. Other research has also suggested that factors such as genetic predisposition, exposure to environmental toxins, and certain medical conditions may contribute to the risk of heart attacks in younger people. Heart attacks among young people is cause for concern and highlights the importance of maintaining a healthy lifestyle, managing risk factors, and seeking medical attention promptly if symptoms arise. Playback singer Krishnakumar Kunnath, better known as KK, died at 53 shortly after performing at a concert in Kolkata's Nazrul Mancha. The popular singer who studied in Delhi's Kirori Mal College during his graduation years collapsed after the show and was rushed to a hospital in Kolkata where he was declared dead of suspected cardiac arrest. He was only 53. KK is not the first one to die at such a young age. In recent times, Raj Kaushal, Siddharth Shukla, Puneeth Rajkumar and Mirzapur actor Brahma Mishra (who died at 36) also left fans teary-eyed with their untimely demise. Dr Shriram Nene - a renowned cardiac, thoracic and a board-certified vascular surgeon who wears many hats such as healthcare innovator, tech innovator, producer and storyteller - writes on his youtube channel, "Although heart attacks and cardiac arrest have remained major health concerns around the world, a growing number of cardiovascular diseases have been diagnosed and reported among the younger population in recent years." Increase in Heart attacks among young people is cause for concern and highlights the importance of maintaining a healthy lifestyle, managing risk factors, and seeking medical attention promptly if symptoms arise.



Sharon Francis

M.Sc (Biotechnology) II Sem

Amity Institute of Biotechnology

Amity University, Madhya Pradesh

PROBIOTICS HINDER HEART ATTACK COMMON IN YOUNG AND MIDDLE-AGE PEOPLE!!!!!!

Several young age people died of heart attack such as Playback singer Krishnakumar Kunnath, better known as KK, died at 53 shortly after performing at a concert in Kolkata's Nazrul Mancha, famous singer who studied in Delhi's Kirori Mal College during his graduation years collapsed after the show and was rushed to a hospital in Kolkata where he was declared dead of suspected cardiac arrest. He was only 53. KK is not the first one to die at such a young age. In recent times, Raj Kaushal, Siddharth Shukla, Puneeth Rajkumar and Mirzapur actor Brahma Mishra (who died at 36) also left fans teary-eyed with their untimely demise (News sources).

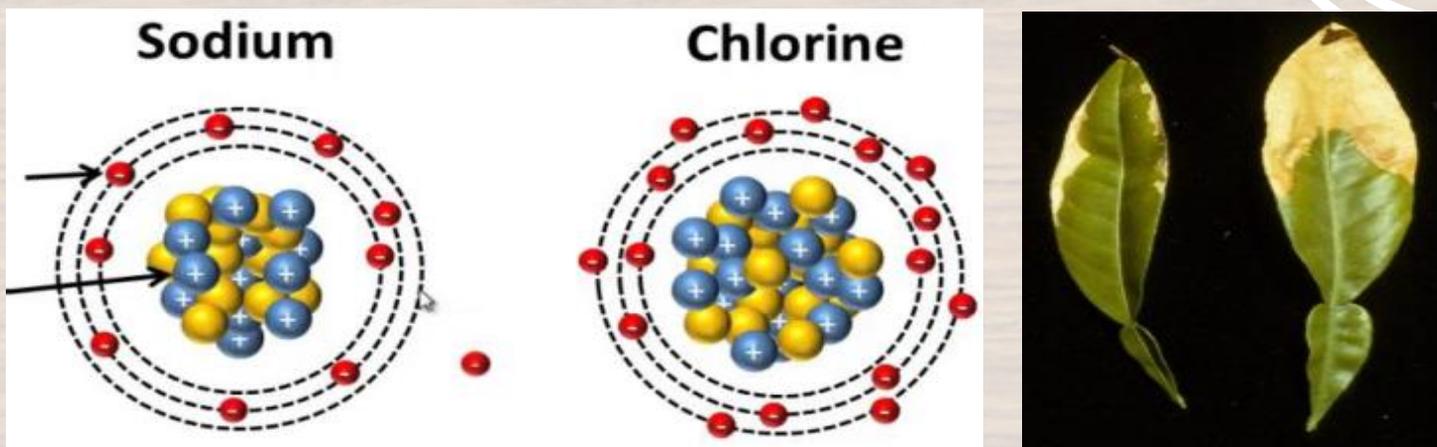
Probiotics and prebiotics conferring various health benefits on the host are emerging as promising therapeutic interventions for many diseases. These two types of food supplements have the potential to alleviate the risks of CVD through improving the levels of several cardiovascular markers, such as total and low-density lipoprotein (LDL) cholesterol, high sensitivity C-reactive protein (hs-CRP), and certain cytokines involved in the inflammatory response. In a recent research this was illustrated the preventive effects of probiotics and prebiotics on CVD via rebalancing the structural and functional changes in gut microbiota and maintaining immune homeostasis. Gut microbiota has received much attention in the past two decades. Gut microbiota, the microbial community colonizing in the gut, plays a prominent role in human health. In particular, gut dysbiosis is directly related to many acute or chronic dysfunctions of the cardiovascular system (CVS) in the host. The intake of probiotics and prebiotics plays an important role in preventing and delaying the development of this disease. The levels of crucial CVD markers, namely LDL cholesterol and CRP, are significantly improved by the introduction of various probiotic strains and prebiotics. The underlying mechanisms of their protective effect in CVD, especially CHD and stroke, have been proposed (Wu and Chiou 2021)



Dr. Manish Kumar
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Amity University Madhya Pradesh, Gwalior

Mistakes were made by Plant Biotechnologist in Neglecting Chloride Ion Toxicity

Abiotic stresses such as salinity, drought, heat, cold and radiation affect the global environment directly or indirectly and reduce the agricultural yield and productivity. World population is exhibiting population ballooning effect, therefore increasing the yield and productivity of important crops is pressing priority. Salt stress (NaCl) has both ionic and osmotic stress component, as exposure to it leads to osmotic stress followed by ionic stress. In salinized soil where chloride ion (Cl⁻) concentration is high, growth of glycophytic plants is inhibited due to altered Cl⁻ toxicity.



Chloride ion, is an anion of halogen element and Chlorine, is a micronutrient for plants (required only in small quantities). It is a beneficial element at lower concentration, for instance it is involved in photosynthesis, in osmoregulation, control of turgor pressure and in maintaining the elongation growth. The symptoms of chloride ion toxicity are chlorotic lesions followed by necrotic lesions. There is a huge knowledge gap and lack of comprehensive base regarding plant response to Cl⁻ ion stress. The questions which are not addressed till now are – (1) Lack of knowledge related to Cl⁻ induced cellular and physiological damage, (2) Understanding of adaptive aspects of Cl⁻ ion induced tolerance.

Therefore, the molecular mechanism of Cl⁻ ion resilience and thus enhanced plant response to the same is not well understood. Hence, new research and experimental work is recommended to understand the molecular mechanism of Cl⁻ ion tolerance in plants.

Much research is done on plant response to sodium component of salt stress, while less is studied about the chloride component of salinity stress. Therefore, studying the mechanism of chloride ion tolerance in plants will open up new portfolio for developing abiotic stress resilience in plants.



Dr. Pushpika Udawat
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Knowledge of French language opens the doors to France: top destination for Indian students

French is the only language spoken on all five continents next to English. There are many French-speaking countries worldwide, such as France, Canada, Switzerland, Luxembourg, Belgium, etc. Several millions of French speakers, most people who speak French are not natives and do not live in France.

French is the second most widely taught language globally after English and one of the most frequently used tongues on the Internet. By studying French, you are opening the door to communicating with native French speakers, but other people like yourself who have studied French. Since it is the second most learned language globally, you will find many study materials or resources to learn this beautiful language.

Your French language proficiency will open you up for higher educational opportunities in French higher institutions and universities. France has a lot of higher education institutions, including many century-old universities like École Normale Supérieure, Université Pierre, École Polytechnique, Marie Curie UPMC, University of Paris Sud, ESPCI Paris Tech, École Normale, HEC, Supérieure de Lyon, Sorbonne Paris Cité etc. These educational institutions offer excellent education in various fields such as management, science, art, technology, etc. France has several innovative and research institutions that rank among the world's best.

As per the agreement signed between the Indian and French governments in 2015, Indian students in France can stay for 24 months after the study. Hence, learning French is an excellent choice for students who are planning to go to France.

The French knowledge opens the doors of these French companies in France, other Francophone regions, India, and other non-speaking French countries. Many French companies are setting up their regional offices in India and other parts of the world. Due to globalization, outsourcing, and a boom in the export industry, the careers requiring languages in India have increased tremendously.

Source: <https://www.studyfrenchspanish.com/why-learn-french/>



Mr. K. Muthuvel
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Microalgae as potential biosorbent of metallic nanoparticles from water

Nanoparticles are most utilized nanoparticles than other nanoparticles, probably enter to water bodies through the sewages of the industries. After exposure, these nanoparticles get internalize in the human body and show toxicity. Removals of nanoparticles have not received much attention and therefore, it is a novel problem directly related to human health and environment. Over the last few decades, it has gained momentum towards research and development as well. Many industries work on the use of nanomaterials for the manufacturing of different products and release their effluents/by-products in the environment. Excessive use and uncontrolled release of nanomaterials into the environment pose unfavorable effects on water and living organisms. In most of the cases, presence of these toxic particles in aquatic system are unnoticed and they are supplied in households for daily needs. Various technologies are there to treat water before supply, still they mostly concentrate on the removal of biological contaminants.

Microalgae have short generation times, can be found in freshwater, saltwater, marine water and on the surface of moist soil or rocks. Due to their fast-growing nature, they show impactful changes in their morphology and behaviour. Exposure of toxic nanoparticles lead to reduction in algal photosynthetic pigments, damage to cell membrane etc. Assays to assess the toxicity in microalgae are simple and rapid. Microalgae in their natural form as well as in their immobilized form can act as a potential biosorbent for these toxic metallic nanoparticles.



Dr. Anurag Jyoti

Assistant Professor

Amity Institute of Biotechnology

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ELECTRO BIOFUELS- Benefit to the society

Biofuels are the new age fuels which are derived from biomass. Any biological resource, such as grass, wood, crops, trees, animals, and agricultural waste, can be used to create biofuel, which provides an alternative to fossil fuels. These materials are obtained from the breakdown of organic components from sources like animals and plants. Plants employ photosynthesis to transform solar energy into chemical energy and it becomes a very laborious operation to transfer this chemical energy into biofuels. Electro-fuels are employed as a resolution to this issue. Electro fuels are formed by using microorganism which use the electrical energy and chemicals provided and produce liquid biofuels directly. Another significant problem, the increasing level of CO₂ in the atmosphere, can be resolved with this method of biofuel production. About 409 parts per million of CO₂ were detected in the atmosphere in 2019, setting a record. For the period from 1990 to 2020, there will be an increase of 12 billion tons in carbon emissions, which has been occurring annually. The good news is that many researchers have taken advantage of the fact that CO₂ is an extremely helpful precursor in the creation of more sustainable fuels, which can solve both the issue of emissions and the sustainability of fossil fuels. In order to create liquid fuel, Columbia University combined ambient air carbon dioxide (CO₂) with ammonia, a common and inexpensive chemical, and *N. europaea* bacteria. They employed reverse microbial fuel cells, in which the bacteria absorb the energy from ammonia and use it to transform CO₂ into a liquid fuel. When the ammonia is completely used by the bacteria, renewable electricity can replenish it and reintroduce it into the system, starting a cycle that continuously produces fuel. *Nitrosomonas europaea*, a chemolithoautotroph, was used as the biocatalyst due to its inherent capability to utilize ammonia as its sole energy source for growth.

In a typical microbial fuel cell, microbes oxidise organic fuels and send electrons to an electrochemical system to convert fuels to electrical energy. This procedure is inverted in a rMFC such that cells employ electrical energy to promote carbon dioxide fixation to high energy organics. It was noted that overall bioproduction efficiency could approach $2.7 \pm 0.2\%$ under optimal electrolysis conditions. This conventional gasoline-based liquid transportation fuel developed by Columbia University is ten times more effective than current biofuels. Cost-effective Electrical fuels would aid in lowering American reliance on foreign oil imports and boosting the country's energy security. The widespread use of electrofuels would contribute to reducing greenhouse gas emissions and the need for the customary amounts of land, water, and fertiliser needed to generate biofuels. The domestic electrofuels market has the potential to generate tens of billions of dollars for the economy. Widespread usage of electrofuels may also contribute to price stability for gasoline, saving consumers money at the pump. Electrofuel production, distribution, and sales could result in job growth.



Tanya Tomar

B.Sc Hons. Biotechnology

VI Semester

Amity Institute of Biotechnology

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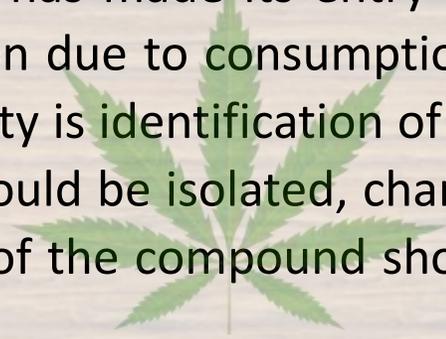
The Toxic Baby Spinach: Toxicity is due to Weed or Mushroom

The Food Safety and Standard Authority of Australia have issued a recall notice for sellers of baby spinach in Queensland due to toxic symptoms appeared in individuals who have consumed it. The symptoms are fever, delusion, hallucinations, confusion and vomiting. The symptoms of the toxicity included confusion, delusion, dilated pupils, rapid heartbeat, blurred vision, dry mouth, slurry speech, dry skin and recurrent fever. The food safety authority of Australia has found toxic weed accidentally harvested along with the baby spinach. Commercial spinach cultivated today is originated from *Spinacia tetrandra* L. a wild edible green shrub found in Nepal. During historic times and then its commercialization, it was referred to as “Persian Green”. Later on, its commercialization in the European countries it was referred to as “Spinach vegetable”. As per the National Nutrient Database for Standard Reference, fresh spinach is rich in minerals such as K, Ca, Mg, Na, P, Fe, Vitamin C, betaine, lutein, zeaxanthin, beta-carotene, vitamin E, A and K, folate and protein, respectively. However in the recent toxicity, it is found that collection of weed along with baby spinach has led to the poisoning amongst people who have consumed it.





However, it is exactly not clear whether the toxic plant is a weed or mushroom. Hence, it is not the spinach which is causing toxicity rather it is a mistaken weed that has made its entry to the human food chain. Approximately, 250 individual have sought medical attention due to consumption of toxic weed. It is thus necessary to find the origin of the weed. The pressing priority is identification of origin of toxic compounds associated to baby spinach toxicity. The toxic compound should be isolated, characterized and functionally validated to understand its toxic effect. The neuro-toxicity of the compound should be studied along with studying the associated poisoning effect.



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CAR T-cell Therapy: A New Era in Cancer Immunotherapy

Cancer is a disease in which abnormal cell division occurs without its control. It is one of the main causes of death worldwide. Chimeric antigen receptor (CAR)-T cell therapy is a revolutionary new pillar in cancer treatment. CAR-T therapy using genetically modifying T cell with chimeric antigen receptors [CAR] is the most commonly used approach to generate tumour – specific T cells. It is FDA approved to treat leukaemia, lymphoma, multiple myeloma etc. T cells are WBCs that fight infections throughout the body. They have a receptor that can recognize antigens. When the immune system recognizes foreign or abnormal antigens it can work to destroy them.

Chimeric antigen receptor T cells are cells that are genetically engineered in a laboratory as they have new receptors which can bind with the cancer cell and ultimately kill them. Each kind of CAR T cell therapy is made to fight a specific kind of antigen. This modification can occur by viral or non-viral vectors such as DNA-based transposons, CRISPR/Cas9 technology or direct transfer. In studies it is proven 9 out of 10 people with acute lymphoblastic leukaemia whose cancer didn't respond to other treatment had full remission with CAR T cell therapy. Clinical trials have given promising results with 93% full recovery. Despite such results in treating cancers, the effective translation of CAR T-cell therapy to the tumors and the corresponding clinical experience is limited due to therapeutic barriers, like CAR T-cell expansion, persistence, trafficking and fate within tumors.



Rounak Verma
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Tuberculosis Detection by FLIPP-NAAT Test

Tuberculosis (TB), which is caused by the bacteria *Mycobacterium tuberculosis*, kills more people than any other infectious disease. With approximately 2.2 lakh reported deaths each year, India has the world's highest TB burden. Despite the fact that tuberculosis is curable, detecting cases has been difficult because current diagnostic tests are expensive, time-consuming, and difficult to obtain.

Now, scientists led by Bhushan J. Toley from the Department of Chemical Engineering, IISc Bengaluru have developed a low cost, portable device to detect tuberculosis.

Fluorescent Isothermal Paper-and-Plastic Nucleic Acid Amplification Test (FLIPP-NAAT) was introduced for the detection of TB.

The test consists of a few simple steps. First, one must add the DNA of the patient into a spot on the device (test-zone) and seal the device with an adhesive strip that comes with the kit. This setup must be kept at a temperature of 63°C for an hour. After this, one must add a fluorescent dye that binds to MtbDNA, flash ultraviolet light with a UV torch, and take a picture using a cell phone. Green fluorescence in the test zone indicates the presence of Mtb DNA, hence a positive diagnosis for TB.

The paper-and-plastic device enables rapid detection of tuberculosis at the point-of-care. It selectively amplifies the DNA of *Mycobacterium tuberculosis* (Mtb) from the DNA isolated from patient sputum (a mixture of saliva and mucus). The presence of this DNA indicates TB.

Vishnu Shaji

B.Tech Biotechnology (VIII Semester)
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Noble approach for the treatment of HIV/AIDS: CRISPR

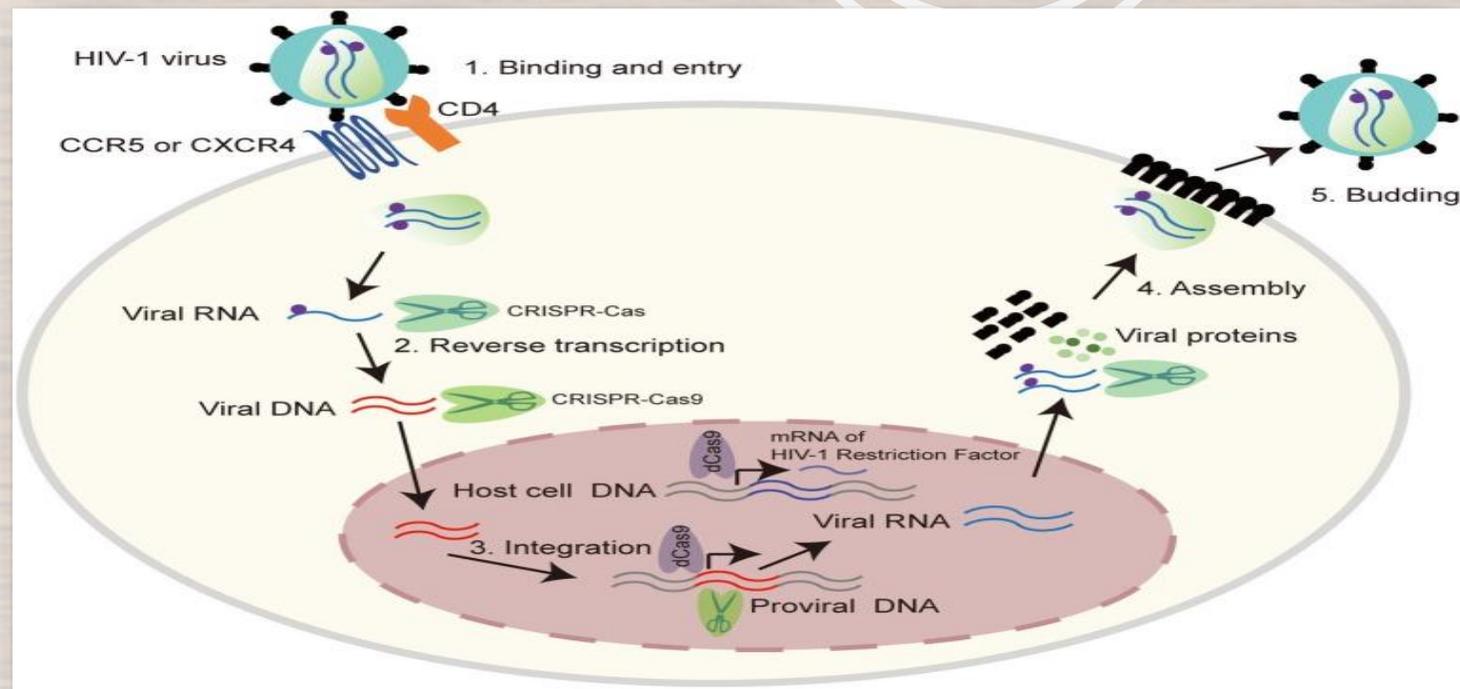
Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS) remains a serious health problem worldwide. According to WHO, about 36.9 million people were living with HIV at the end of 2017, of which about 1.5 million were newly infected. Antiretroviral therapy is the main treatment strategy for HIV-1 patients. But these therapies cannot efficiently eliminate latent viral reservoirs. Expensive therapies, side effects and drug resistance should also be considered in HIV-1/ AIDS treatment. Therefore, we need efficient and effective therapies to inhibit HIV-1 replication and eliminate latent viral reservoirs. The Clustered Regularly Interspaced Short Palindromic Repeat (CRISPR) associated nuclease (Cas9) system has been engineered as an effective gene editing technology with the potential to treat HIV/AIDS. There are several delivery options for the introduction of Cas9 and gRNA into the target cells. The component of delivery involves a DNA vector, gRNAs and Cas9 mRNA or Cas9 gRNA ribonucleoprotein complexes. Different delivery methods include electroporation, microinjection, cation lipid and lipid based nanoparticles. It is reported that CRISPR Cas 9 has the ability to inhibit viral expression. It targets multiple sites including the LTR (Long terminal repeats) regions and observed a decrease in protein expression regardless of the amount of integrated viral DNA . In a study, they placed the gene encoding gene Cas9 under the control of Tat activating promoter. The result showed cleavage of viral DNA indicating the Tat mediated transactivator of the promoter for Cas9 expression. The host co-receptors CXCR4 or CCR5 can also be targeted for blocking viral entry into the host cell, then stopping further infection. In some study gRNA showed tenfold reduction in GFP reporter expression and ~20 fold reduction in p24 expression. In all the cases, there was an overall reduction of viral particles and expression of p24. CRISPR played a role in therapeutic as well in other fields of research also, like in agriculture and for activation and silencing of particular gene in plants and animals. In future, CRISPR Cas9 has bright future in cancer biology. This method introduces a noble approach to cancer treatment by allowing for modifications to the genome of target cells, which was previously difficult to achieve.

The life cycle of HIV-1 provides possible CRISPR-Cas9 targets. HIV-1 life cycle is carried out in six stages: (1) Binding and entry. HIV-1 invades into host cells by binding its gp120 to CD4 receptor on the cell surface, and then to the co-receptor CCR5 or CXCR4. This binding causes HIV-1 and cell membrane fusion, by which HIV-1 enters into host cells and releases its viral RNA. (2) Reverse transcription. HIV-1 RNA was reverse transcribed into double stranded DNA by reverse transcriptase. (3) Integration. The viral DNA enter into nucleus and integrate into host genomic DNA by integrase. (4) Replication and assembly. New viral RNA generated by proviral DNA can be used as genomic RNA to make viral proteins. These proteins combining with viral RNA moves to cell surface to form immature viral particles. (5) Budding. The immature viral particles are released from cells and produce viral protease which can break the long protein chain to form the mature virus.



Krishnakant Tiwari

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Amity Institute of Biotechnology
Amity University Madhya Pradesh



Source: Xiao, Q., Guo, D., & Chen, S. (2019). Application of CRISPR/Cas9-based gene editing in HIV-1/AIDS therapy. *Frontiers in cellular and infection microbiology*, 9, 69..

A NEW STEP TOWARDS CELLULAR RECYCLING

Animal cells take in extracellular materials, a few proteins and lipids by a process called Endocytosis. Some of the endocytosed components are recycled back to the plasma membrane by a process known as recycling endocytosis. The material taken in is sorted within sorting endosomes; whatever is destined for recycling to the plasma membrane is then diverted into a tubular membranous network called the Tubular Recycling Endosomes (TRE). Motor proteins play a key role in recycling endocytosis as they generate forces to lift the cargo and carry them to the cell periphery along pre-designated lanes of microtubules. The current study shows the mechanism of functioning of one such motor protein — KIF13A, belonging to the kinesin 3 family. The researchers, led by Virupakshi Soppina of IIT Gandhinagar, reveal that a protein called Rab22A, a GTPase, binds to the neck region of two inactive KIF13A monomers to activate them — “like a zipper.” The researchers performed cloning and transfection experiments on cultured cells, followed by live cell imaging, direct fluorescence spectroscopy and in vitro single-molecule reconstitution assays to study the interaction between KIF13A and Rab22A. They found out that binding of Rab22A relieves the kink in the structure induced by Proline, and this opens up the KIF13A structure to pair up. If two inactive KIF13A monomers are akin to either sides of a zipper when it is open, the Rab22A can be compared to the slider that joins both sides and helps them pair up. Rab22A is the molecular switch that controls the two states of KIF13A — active and inactive. The first challenge is to make motor proteins work when and where you need them to. Secondly, a cell repurposes one type of motor for multiple functions. Hence, it can be an uphill task to demonstrate a specific action played by Rab22A at a specific time point.

Mridul Sharma

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Cancer & Aging : Counteraction

It is a well known fact that aging is an inevitable risk factor for cancer. With the recent research advances, it is clear that cancer and aging share various mechanisms. About half of all cancers are in people over the age of sixty. Due to the side effects and resistance to existing treatments, not all patients suffering with cancer are able to undergo definitive treatment. If we are able to understand the mechanism of how cells remember their identity – their ‘epigenetic memory’ – we can reshape them into different cells helpful in regenerative medicine. In a new study conducted by a team of researchers at University of Copenhagen, they discovered a mechanism called H2A-H2B mediated epigenetic memory which helps maintain cell memory during cell division. It was observed during DNA replication when information on histones H2A-H2B was locally and correctly translated to histones H3 and H4. Current studies at the replication fork show histone dynamics and epigenetic information inheritance demonstrated by the methylation of histone H3 on lysine 27. Histone H3-H4 dimers are imported into the nucleus by the histone chaperone ASF1 as part of the de novo nucleosome assembly process. Various histones can be transferred to the PCNA-bound CAF-1 more easily because of their different thermodynamic affinities. The latter makes it easier for stable (H3.1-H4)₂ tetramers to form and deposit, which are then completed by the addition of two H2A-H2B dimers that are positioned next to one another. There are several layers of cell and memory signals that allow our cells to retain their epigenetic information. A deep study of this signalling can help counteract aging and cancer

Bhumika Raghuwanshi

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¹Twinkle Rastogi ²Rwitabrata Mallick

Evolution of Natural Dyes – A Sustainable Approach

¹Assistant Professor, ASFDT, Amity University Madhya Pradesh

²Assistant Professor, ASLS, Amity University Madhya Pradesh

Significance of Natural Dyes

The use of natural dyes is not new, particularly in Indian culture. It is a long-established craft with a rich heritage. Since ancient times, India has been a significant manufacturer of textiles and has a long legacy in the creation, dyeing, printing, and embroidery of clothing. The use of mordant-resist dyeing can be dated to 5000 years ago by the discovery of madder-dyed cloth at the Harrapan Culture excavation at

Mohenjo-daro in the Indus river valley . Probably not much more than stains were the first colours used for textiles. Unquestionably, In the Vedic period (5000BC–1000BC), tinctorial characteristics of Kala and Asikini (perhaps indigo), Maharanjana (safflower), Manjistha (madder), Lodhra (*Symplocos racemosa*), and Haridra (turmeric) were known. Vibrant yellows and yellow oranges from annatto, saffron, and turmeric as well as pinks and rose pinks from safflower were utilized very early. These dyes were utilized by people as simple colour mixtures directly, without any chemical processing. Man found various sophisticated techniques for colouring textiles as civilizations developed. All fabrics were coloured or printed using natural ingredients up until the middle of the 19th century, as needed. Naturally, different cooking methods/recipes were used in various regions of the nation depending on the accessibility of regional specialty vegetable items and the level of regional standardization/skill attained by regional craftsmen (Fig 1). After India gained independence, the new government acknowledged the value of traditional arts in Indian culture and took action to support and safeguard their rebirth by forming state and local boards.



Fig1: Natural Ingredients of Natural Dye

Types of natural dyes

The earliest coloured textiles still in existence and significant ancient documents have lead archaeologists to the conclusion that there were three categories of natural dyes: mineral dyes, insect or animal dyes, and vegetable or plant dyes (Fig2).

Mineral Dyes- Minerals discovered in mines and on the earth's surface were the source of mineral dyes. To produce the appropriate colours for textiles, hematite was utilised for red, limonite for yellow, and lazurite for blue. The surface of the rocks was scratched to produce a powder that, after being dissolved in water or oil, was ready for usage. They can endure for years if protected because they are inorganic by nature and do not deteriorate over time like plant or animal dyes.

Animal Dyes- Insects, lichens, and shellfish were examples of animals that provided natural dyes in another category. Ancient cultures most commonly used the insects kermes and cochineal, which generated scarlet and crimson red, respectively. The extracted reds were so well-known that we still refer to these hues by the same names today.

Vegetable Dyes- Plant and tree leaves, bark, and roots are used to make vegetable dyes. Due to their ease of development and discovery, they were most commonly employed in antiquity. The most popular dyes were indigo for blue and blueish purple, saffron and safflower for yellow, and madder for red. Due of their rarity, indigo-dyed items were regarded as expensive.

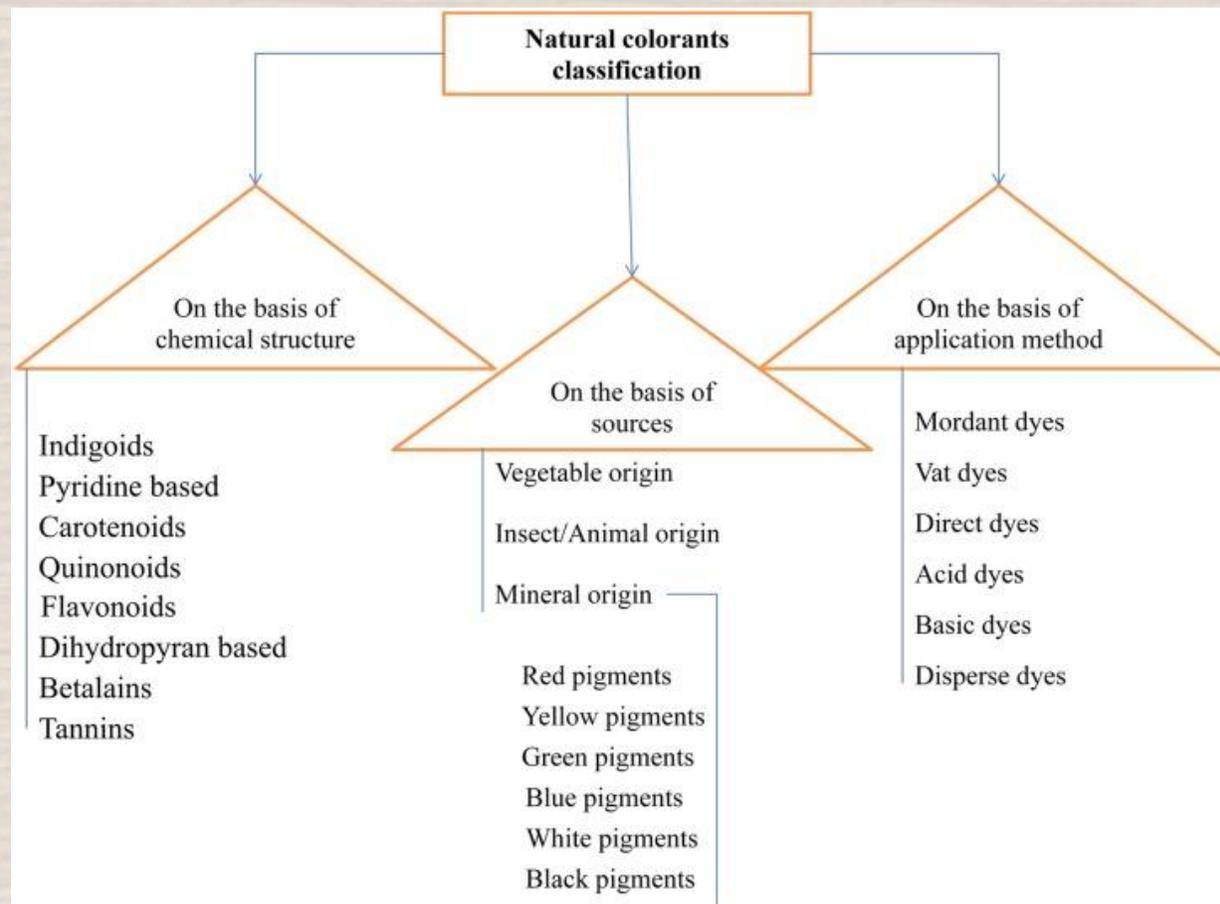


Fig 2 – Classification of Natural Colours (Ref: Mohd Yusuf et al.)

Natural dyes have been and still are used for a variety of decorative and practical uses. Since they are harmless, they are preferred over synthetic dyes since they are more safer to use as food colouring or substrates. Similar to why they're employed in the cosmetics sector, they can serve as pH indicators and are widely utilised in textile, art, and leather manufacturing. In conclusion, using natural colours has a variety of advantages for people. Most importantly, they are healthier for ourselves and the environment. Natural dyes have a few drawbacks, including the fact that they are more expensive than synthetic colours, but their overwhelmingly good effects far outweigh these.

STUDENT PLACEMENTS

S.No.	Name of the Company	Students Recruited	Compensation (CTC Rs. lakh p.a.)	Students
1	DXC Technology	1	420000	Sneha Verma (B. Tech Biotech)
2	Dabur India	4	550000	Divya Sachan (B. Sc Biotech)
			550000	Vishnu Shaji (B. Tech Biotech)
			550000	Purnima Chauhan (B. Sc Biotech)
			550000	Sakshi Bansal (B. Tech Bio)
3	Cognizant	1	400000	Tanuja singh tomar (B.Tech Bio)
4	Octavus Consulting	2	340000	Somya Shrivastava (M. Sc Biotech)
			340000	Shivani Brahme (B. Tech Biotech)
5	Academor	1	650000	PIYUSH JAIN (B. Tech Biotech)
6	Expert Lancing Research	1	400000	Muskan Bhatia (M.Sc Biotech)
			Vol.7 Issue III & IV	

Congratulations!

AIB PUBLICATIONS

1. Indranil Singh, Tooba Mazhar, Vikas Shrivastava, Rajesh Singh Tomar. Bio-assisted synthesis of bi-metallic (Ag-Zn) nanoparticles by leaf extract of *Azadirachta indica* and its antimicrobial properties. *Int. J. Nano Dimens.*, 2022; 13(2): 168-178. ([Web of Science](#))
2. Singh Asha, Pallavi Singh, Tomar Rajesh Singh and Shukla Sangeeta. Biogenic Synthesis of Nanoparticles and their Role in Drug delivery. *Research Journal of Biotechnology*. 2022, 17(3); 192-203. ([Scopus](#))
3. Kumar Anand, Olivia Pericak, Collin Olson, Ashok Yadav, Rubee Devi, Divjot Kour, Ashutosh Kumar Rai, Manish Kumar, Ajar Nath Yadav. Arbuscular mycorrhizal fungi as a potential biofertilizers for agricultural sustainability. *Journal of Applied Biology & Biotechnology*. 2022, Vol. 10(Suppl 1), pp. 90-107. ([Scopus](#))
4. Tanvir Kaur, Olivia Pericak, Collin Olson, Manish Kumar, Ashutosh Kumar Rai, Ajar Nath Yadav. Structural and functional diversity of plant growth promoting microbiomes for agricultural sustainability. *Journal of Applied Biology & Biotechnology*. 2022, Vol. 10(Suppl 1), pp.70-89. ([Scopus](#))
5. Rubee Devi, Tanvir Kaur, Divjot Kour, Macie Hricovec, Manish Kumar, Ajar Nath Yadav. Microbes-mediated alleviation of heavy metal stress in crops: Current research and future challenges. *Journal of Applied Biology & Biotechnology*. 2022, Vol.10(Suppl 2), pp. 25-37. ([Scopus](#))
6. Navik P, Tomar RS and Shrivastava V. Role of alpha amylase inhibitor in diabetes mellitus. *International Journal of Biology, Pharmacy and Allied Sciences*. 2022, 11(11): 5062-5079. ([Web of Science](#))

AIB Students' Achievements

SAMRIDDI GAUR

[B.Sc (H) Biotech : Batch 2019-2022]

Selected for MS Medical Biotechnology, Moscow Institute of Physics & technology, Russia



VANSHIKA KUMARI

[B.Sc (H) Biotech : Batch 2019-2022]

- **Cleared All India GAT-B 2022 exam: post graduation level competitive examination for life sciences.**
- **Cleared CUCET (Central Universities Common Entrance Test): post graduation level competitive examination for life sciences.**

Application Number		Roll Number	
222904119274		UP18000155	
Candidate's Name			
VANSHIKA KUMARI			
Mother's Name			
INDU SHARMA			
Father's Name			
PK SHARMA			
Category	GEN-EWS	Person with Disability (PwD)	NO
Gender	FEMALE	Date of Birth	14-02-2001
Nationality			
INDIAN			
Graduate Aptitude Test - Biotechnology (GAT-B)			
Total marks			
240			
Qualifying Marks	UR	OBC (NCL)	SC
	112	71	60
			60
			60
Category wise Rank	238		

Dated: 04/06/2022

Johander
Senior Director, NTA

NEHA R. Kumar

(B.Tech Biotech: Batch 2017-2021): Selected for MS Biotechnology at **University of Kent, UK**



Divleen Sachdeva

(B.Sc (H) Biotech: Batch 2018-2021): Selected for MS Biotech at **North-Eastern University, Boston, USA**



Bhashita Bharat

(B.tech Biotech: Batch 2016-2020): Selected for MS Biotech at **McGill University, Montreal, Canada**



Anjith Mangalanandan

(B.Tech Biotech: Batch 2017-2021): Selected for MS Biotechnology at **University of Strathclyde, Glasgow, UK**



FACULTY ACHIEVEMENTS

Best Paper Presentation award was received by **Dr. Anurag Jyoti** during Two days International conference on 'Post Covid Trends of Biological Sciences..' at Satya Sai College for Women, Bhopal on 12 Nov. 2022.



Best Paper Presentation award was received by **Dr. Pallavi Sing Chauhan** during Two days International conference on 'Post Covid Trends of Biological Sciences..' at Satya Sai College for Women, Bhopal on 12 Nov. 2022.



Dr. MANISH KUMAR, Assistant Professor completed his research journey at **San Diego State University**, California, USA under the guidance of Dr. Marina Kalyuzhnaya, Professor and Director of the SDSU/UCSD Joint Doctoral Program in Cell and Molecular Biology Department of Biology, College of Sciences, San Diego State University. He was funded by **DST- SERB under scheme SIRE** (SERB International Research Experience)-2022 for international exposure and visit. During his stay at SDSU for 3 months, 10 days the research was conducted on plant-microbe interaction. The methanotrophic communities (different potential strains) were applied into the roots of model plant to see the effect at the level of soil metagenomics and other physical observations. The investigation was based on the climate change mitigation study using methane utilizing microbial community.



SERB-SIRE FELLOW

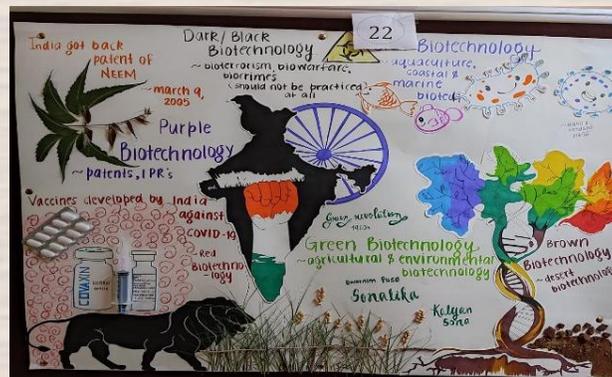


POSTER MAKING COMPETITION

On
BIOTECHNOLOGY FOR ATMANIRBHAR BHARAT
27Sept 2022

INNOVATION WEEK CELEBRATION

Glimpses



Students of AIB have shown overwhelming enthusiasm to participate in the event. Fifty five UG/PG Students of AIB participated in the poster making event as individual and or in group and made posters on given theme displaying their talent. In total 34 poster were displayed, which were well explained by the presenting students.